Better Regulation

Explanatory Statement

Rate of Return Guideline

December 2013

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Shortened forms

Shortened term	Full title
ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
capex	Capital expenditure
common framework	Refers to the largely consistent rules framework on the rate of return that applies to gas service providers (NGR), electricity distribution network service providers (NER chapter 6) and electricity transmission service providers (NER chapter 6A).
COSBOA	Council of Small Business Australia
CRG	Consumer Reference Group
determination	In this document generally, in the context of the rate of return, the term 'determination' refers both to regulatory determinations under the NER and access arrangement determinations under the NGR.
DRP	Debt Risk Premium
ENA	Energy Networks Association
ERA	Economic Regulation Authority
EUAA	Energy Users Association of Australia
EURCC	Energy Users Rule Change Committee
FIG	The Financial Investor Group
MRP	Market risk premium
MEU	Major Energy Users Inc
NEL	National Electricity Law
NEM	National Electricity Market
NEO	National Electricity Objective
NER	National Electricity Rules
new rules	The National Electricity Rules and National Gas Rules that were published by the AEMC on 29 November 2012
NGL	National Gas Law
NGO	National Gas Objective
NSW T Corp	New South Wales Treasury Corporation
opex	Operating expenditure
PIAC	The Public Interest Advocacy Centre
The QTC	The Queensland Treasury Corporation

RAB	Regulatory Asset Base
RARE	RARE Infrastructure Limited
RDB	Regulatory Development Branch
regulatory control period	In this document generally, in the context of the rate of return, the term 'regulatory control period' refers both to regulatory control period under the NER and access arrangement period under the NGR.
service providers	Electricity transmission network service provider, electricity distribution network service providers and gas service providers
SFG	Strategic Finance Group Consulting
subsequent regulatory control period for service providers	Expected to be 1 July 2015 to 30 June 2019.
transitional regulatory control period for service providers	1 July 2014—30 June 2015
transitional rules	Transitional rules contained in the National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012 No. 9 (Network Regulation rule change) which the AEMC determined in November 2012. These transitional rules set out the transitional arrangements for the next ACT/NSW electricity distribution determinations.
the guideline	Rate of return guideline
WACC	Weighted average cost of capital
2009 WACC review	AER 2009 review of the weighted average cost of capital (WACC) parameters (published in May 2009).

Contents

Executive summary

The AER is the independent regulator for the Australian national energy market. We are guided in our role by the national electricity and gas objectives. These objectives focus on promoting the long term interests of consumers.

In 2012, the Australian Energy Market Commission (AEMC) amended the electricity and gas rules to require us to develop a guideline which outlines our approach to setting the rate of return for regulated electricity and gas network businesses.

The requirements of the rules and the new regulatory framework

This final explanatory statement accompanies our rate of return guideline for electricity and gas transmission and distribution networks (the guideline). The rules require us to develop this guideline and to specify within it:[1]

- The method we propose to use to estimate the allowed rate of return (derived from the expected return on equity and the return on debt) for electricity and gas network businesses.
- The method we propose to use to estimate the value of imputation tax credits used to establish a benchmark corporate income tax allowance.
- How these methods will result in an allowed return on equity, return on debt and value for imputation tax credits which is consistent with the allowed rate of return objective.

The rules require us to determine an allowed rate of return that achieves the allowed rate of return objective at the time we make a revenue or access arrangement determination:

> The allowed rate of return objective is that the rate of return for a [regulated network] is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the [service provider] in respect of the provision of [regulated services]. [2]

The guideline is not binding on us in determining the allowed rate of return or on service providers in proposing their allowed rate of return as part of their revenue proposals. However, should we decide to depart from the guideline we must provide reasons for doing so. Equally, while it is open to network businesses to move away from the guideline within their specific revenue proposals, the rules require that they provide reasons for a proposal to depart from the approach set out in the guideline.

The rules also require us to set out in the guideline the estimation methods, financial models, market data and other evidence that we propose to take into account in estimating the expected return on equity, return on debt and the value of imputation tax credits.[3] In doing so, the rules require us to exercise our regulatory judgement in estimating the allowed rate of return. We propose to apply a number of criteria to inform our regulatory judgement. The guideline and accompanying explanatory statement explains how we propose to exercise our judgement.

We consider that our approach is consistent with the features of a good rate of return framework as outlined by the AEMC.[4] As such, we consider our proposed approach promotes the national electricity

1 NER cl. 6.5.2 (n) (1); 6A.6.2(n); NGR, r. 87(13).
2 NER, cl.6.5.2(c) and 6A6.2(c); NGR, r.87(3).
3 NER cl. 6.5.2 (n) (2); NGR, r. 87(14)(b).
4 AEMC, *Final Position Paper, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*,15 November 2012, pp.26–29.

and gas objectives and will contribute to achieving the allowed rate of return objective. In particular, our proposed approach focuses on:

- At both the return on equity and return on debt, the efficient financing costs for a benchmark efficient entity. This framework provides incentives for business to pursue efficient financing practices to support efficient investment while at the same time protecting consumers from the costs of inefficient practices.
- Application of assessment criteria to guide our selection and use of estimation methods, models, market data and other evidence which will inform our assessment of the overall rate of return. The application of the criteria will support consistency and transparency in our regulatory decisions and contribute to achieving the allowed rate of return objective.
- Adoption of an approach that is responsive to changing market conditions and new evidence but at the same time provides sufficient certainty to network businesses, investors and consumers regarding our approach to estimating the overall rate of return.
- Promotion of effective consumer participation through an accessible consultation process.

The major features we propose in the guideline include:

- Considering a broad range of material in arriving at a point estimate of the allowed return on equity. We propose to use the Sharpe–Lintner capital asset pricing model (CAPM) to determine a starting point estimate and a range for the return on equity. We propose to also use the Black CAPM and estimates from dividend growth models, among other information, to inform the estimation of the Sharpe–Lintner CAPM input parameters. We also propose to have regard to the return on equity suggested by the Wright approach, valuation and broker reports, and decisions by other regulators. Where appropriate, this information may lead us to set an estimate of the return on equity that differs from the output of the Sharpe–Lintner CAPM.
- Applying a trailing average portfolio approach for estimating the return on debt. The trailing average will be calculated using a simple ten year average and will be updated annually. We propose a transition period from the current 'on the day' approach to the trailing average portfolio approach for all regulated businesses.
- Considering a wide range of material to inform the estimation of the value of imputation credits.

Further details on key aspects of our guideline are outlined below.

Benchmark efficient entity

We propose to define the benchmark efficient entity as a ‘pure play’, regulated energy network business operating within Australia.

We maintain our view that the risks faced by gas and electricity businesses are sufficiently similar to warrant only one benchmark across all businesses. We do not consider that a separate benchmark for electricity or gas businesses is warranted based on the evidence before us. We note that the empirical evidence before us does not show any material difference between the results for gas and electricity businesses. We also consider that the regulatory framework mitigates the risk exposure of the regulated businesses. Furthermore, the similar framework applying between gas and electricity reduces potential divergences between the two sectors.

Our proposed approach to the definition of the benchmark efficient entity is discussed in chapter 3 of this explanatory statement and chapter 3 of the guideline.

Overall rate of return

The overall rate of return will be estimated by applying a nominal vanilla weighted average cost of capital (WACC) formula.[5] The use of a nominal vanilla WACC is a requirement of the electricity and gas rules, and was therefore not within the scope of the AER's review as set out in this guideline. The rate of return is a weighted average of the expected return on equity and the return on debt.

The weights used reflect our assessment of the relative proportion of equity and debt in the total financing arrangements of a benchmark efficient network business. We propose to calculate the overall rate of return assuming a benchmark gearing ratio of 60 per cent. Our proposed approach to gearing is discussed in appendix F of this final explanatory statement. The tax effects are captured in the corporate income tax building block of the post–tax revenue model, and include an adjustment for the value of imputation tax credits.

We propose that the allowed overall rate of return will be updated annually. This is because we propose the return on debt to be updated annually. On the other hand, we propose the allowed return on equity to be set for the duration of the regulatory period.

The overall rate of return will be a point estimate, reflecting the use of point estimates for the allowed return on equity, return on debt and gearing level. We propose that the return on equity point estimate will be chosen from within a range for the return on equity.

Our proposed approach to the overall rate of return is discussed in chapter 4 of this final explanatory statement and chapter 4 of the guideline.

Return on equity

To determine an estimate of the expected return on equity that is consistent with the allowed rate of return objective, we propose an approach that has regard to a broad range of relevant material. This approach uses the Sharpe–Lintner CAPM as the foundation model, but draws on additional models and information to determine the final return on equity point estimate. The use of the Sharpe–Lintner CAPM promotes simplicity, transparency and certainty of process.

Our proposed approach is outlined in chapter 5 and is summarised in the following flow chart. It contains six steps, and results in a single point estimate for the expected return on equity. In appendices A and B, we have completed steps one and two. That is, identify relevant methods, models, data and other information and assessing it against our criteria for determining how the information will be used. In order to promote greater certainty, we have also set out our application of step three in implementing the foundation model as at December 2013. This is set out in chapter 6 and appendices C and D. However, the application of step three will be updated based on the latest data at the time of each reset determination. Accordingly, the parameter estimates we set out in this explanatory statement for step three may differ from the parameter estimates we adopt in future reset determinations. In chapter 5, we set out an explanation of our approach to steps four to six, however the application of these steps will occur at the time of each reset determination.

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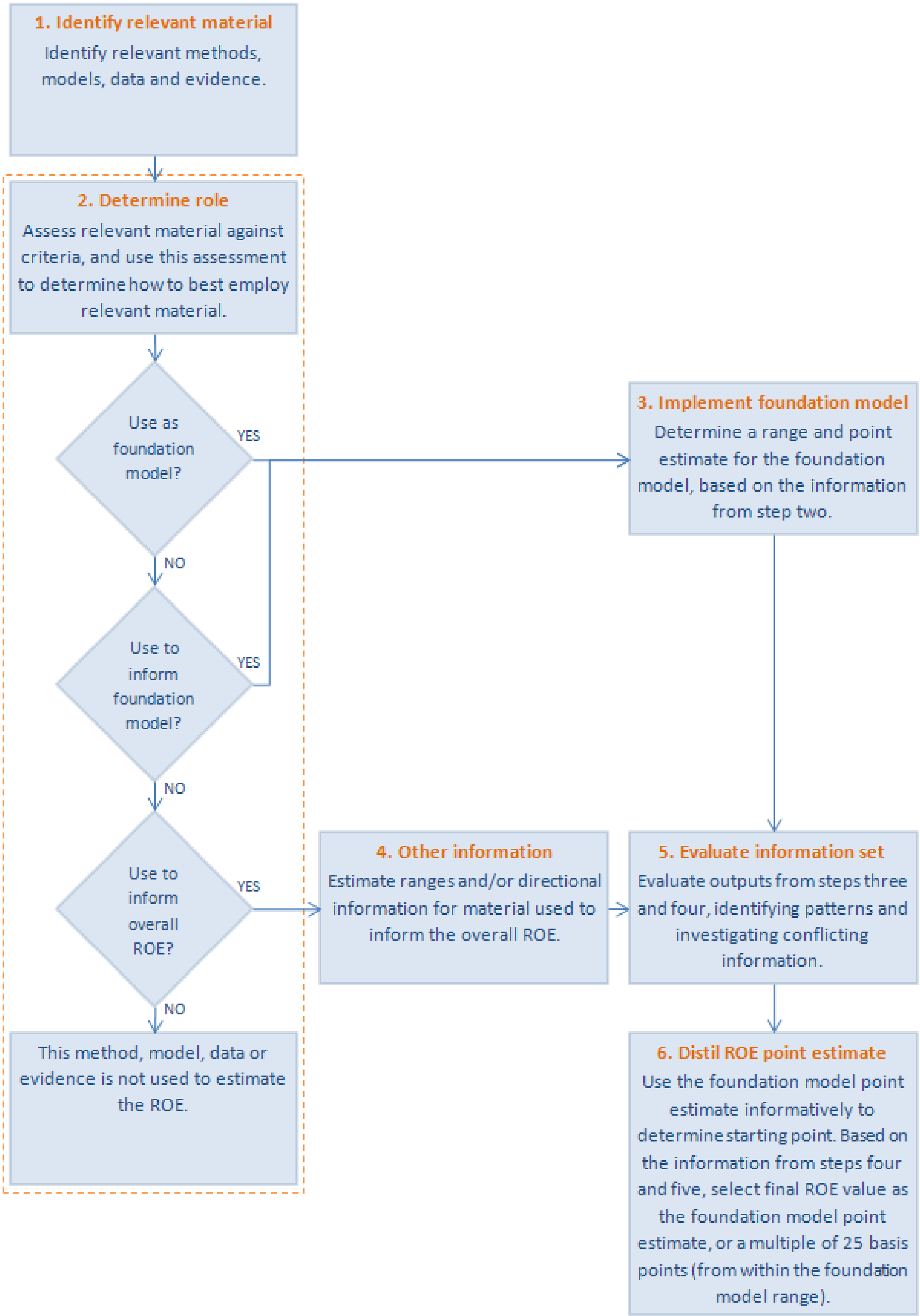
5 A nominal vanilla WACC is the combination of a nominal post-tax return on equity and a nominal pre-tax return on debt.

Figure 1 Proposed approach to estimating the return on equity



Source: AER analysis.

The risk free rate, which is an input into the foundation model, can be observed with reasonable certainty, and so we propose to adopt a point estimate for the risk free rate at the time of each determination. We propose that the point estimate for the risk free rate (used in the return on equity calculation) will be based on the prevailing yield on 10 year Commonwealth Government Securities (CGS) over a short (20 business day) period as close as practicably possible to the commencement of the regulatory period. The dates of the averaging period will be determined by the AER and disclosed in the draft decision of each determination.

The equity beta and market risk premium (MRP) cannot be as readily observed. In recognition of this uncertainty we propose to estimate ranges for these parameters from within which we propose to select a point estimate for each parameter. The adoption of point estimates and ranges for some parameters will consequently result in a range and a point estimate for the return on equity based on a Sharpe–Lintner CAPM.

In estimating the MRP, we place most emphasis on historical estimates (which gives an MRP estimate of approximately 6 per cent) and dividend growth model estimates (which give changing MRP estimates over time, particularly in response to changing interest rates). Our approach to the MRP is symmetrical. This means we may adopt a value above 6 per cent when dividend growth model estimates are above the historical estimates (as they are at December 2013), and a value lower than 6 per cent when dividend growth model estimates are below the historical estimates. At December 2013, our MRP point estimate is 6.5 per cent, chosen from within a range of 5 to 7.5 per cent.

We propose to adopt an equity beta of 0.7, chosen from within a range of 0.4 to 0.7. This is consistent with our view that returns to network businesses vary less with economic conditions than returns for the equity market as a whole. In setting the range, we have regard to empirical estimates of listed Australian energy networks. In selecting a point estimate at the upper end of this range, we have regard to other factors including empirical estimates of international energy businesses.

Our starting point for estimating the final return on equity will be the foundation model point estimate. Moreover, the final point estimate is expected to be selected from within the foundation model range.

The final estimate of the expected return on equity, however, will ultimately require the exercise of regulatory judgement. This judgement will draw on the analysis of the other information provided in step five. For example, we may determine an estimate of the return on equity that is higher (lower) than the foundation model estimate where the other information indicates a higher (lower) return is appropriate. The relative strengths and limitations of each source of other information, as well as the consistency of patterns in this information, will be important.

The use of regulatory judgement may also suggest a final estimate of the return on equity that is outside the foundation model range. In these circumstances, we may reconsider the foundation model input parameter estimates, or more fundamentally, we may also reconsider the foundation model itself. That said, we expect our final return on equity estimate, in most market circumstances, to fall within the foundation model range.

Further, under our approach, if the foundation model point estimate is not adopted the final estimate of the return on equity will be determined as a multiple of 25 basis points. This recognises the limited precision with which the return on equity can be estimated. It is also consistent with our approach of only using the foundation model informatively.

We consider our return on equity approach provides an appropriate balance between transparency, simplicity, certainty and replicability. We also expect this approach to lead to more stable estimates of the return on equity than under our previous approach.

Our proposed approach to estimating the expected return on equity is discussed in chapters 5 and 6 of this final explanatory statement and chapter 5 of the guideline.

Return on debt

We propose to apply a trailing average portfolio approach to estimate the return on debt. This approach means that the allowed return on debt more closely aligns with the efficient debt financing practices of regulated businesses and means that prices are likely to be less volatile over time. The trailing average would be calculated over a ten year period. The annual updating of the trailing average should also reduce the potential for a mismatch between the allowed return on debt and the return on debt for a benchmark efficient entity. This should reduce cash flow volatility over the longer term.

In addition, the guideline specifies a gradual transition from the current approach of using prevailing rates as close as possible to the start of the regulatory control period (the 'on the day' approach) to the trailing average portfolio approach. The transition will occur over a period of 10 years. We propose to apply this transition to all service providers consistent with our view that there is a single benchmark efficient entity.

Further, the guidelines set out the proposed method to calculate the allowed return on debt. In particular, we propose to use an independent third party data service provider to estimate the allowed return on debt. We also propose that the return on debt will be calculated over 10 or more consecutive business days, using yield estimates for a 10 year debt term and the closest proximate for a BBB+ credit rating or its equivalent.

The guideline also specifies that the trailing average must be updated during a regulatory control period using the method set out in the guideline. We propose to specify in a service provider's determination how an automatic update to the trailing average can be applied in circumstances where the method of calculating the allowed return on debt is no longer available or has been amended during a service providers regulatory control period.

Our proposed approach to, and implementation of, the return on debt are discussed in chapters 7 and 8 of this explanatory statement and chapter 6 of the guideline.

Imputation credits

Under a post–tax framework, which is required by the electricity and gas rules, the value of imputation credits is included within the calculation of the corporate tax liability.[6] This is reflected in the revenue cash flows via the corporate tax component of the building block model.

We propose that the value of imputation credits is based on the product of the payout ratio and the utilisation rate. We also propose an approach that has regard to a broad range of information to inform these inputs—including the equity ownership approach, taxation statistics, implied market value studies and the conceptual goalposts approach. Having had regard to this material, and the strengths and weaknesses of each source of evidence, we consider that 0.5 is a reasonable estimate of the value of imputation tax credits.

Our proposed approach to the valuation of imputation tax credits is discussed in chapter 9 of this final explanatory statement and chapter 7 of the guideline.

[6] The value of imputation credits is an estimate of the expected proportion of company tax which is returned to investors through the utilisation of imputation credits.

Development and application of the guideline

Important to our success in developing the guideline was to hear from all stakeholders on the matters that are important to them. In developing the guideline we have undertaken an extensive consultation process to provide stakeholders with multiple opportunities to raise and discuss matters. This comprehensive consultation process (outlined in chapter 1) was intended to ensure that the guideline addresses all relevant issues and reduces the need for any unnecessary departures from the guideline. This should also minimise the scope for extensive review of the proposed approach at each revenue or access arrangement determination. This should provide stakeholders with greater certainty and predictability as to how we will assess rate of return requirements at each determination.

We believe the new rate of return assessment framework, applied consistently over time, will address the desirability for regulatory stability through greater transparency of the key components of the rate of return and how these are assessed. This will enhance predictability, thereby lowering uncertainty for stakeholders. Our approach also provides the scope to be responsive to changing market conditions and new evidence in setting the allowed rate of return. Further, our approach will balance the interests of stakeholders by providing the opportunity for the recovery of efficient financing costs and more stable returns for the businesses, and more stable price movements for consumers. We consider this will support the necessary attraction of long term capital investment, whilst addressing the long term interests of consumers.

1 Introduction

The Australian Energy Regulator (AER) is responsible for the economic regulation of electricity and gas transmission and distribution services in eastern and southern Australia under the National Electricity Rules (NER) and the National Gas Rules (NGR) (collectively, the rules). We monitor the wholesale electricity and gas markets, and are responsible for compliance with and enforcement of the rules. We also regulate retail energy markets in the ACT, South Australia, Tasmania (electricity only) and New South Wales.

Our Better Regulation program involves the publication of several guidelines, including publication of the rate of return guideline (the guideline). The guideline will set out the approach we intend to take to determining the allowed rate of return in accordance with the National Electricity Law (NEL) and the National Gas Law (NGL) (collectively, the law).

This explanatory statement is the final paper in our consultation process for developing the draft guideline for the regulated electricity and gas transmission and distribution network service providers (the 'service providers'). It follows the Australian Energy Market Commission's (AEMC) changes to the rules on 29 November 2012. The aim of these reforms is to deliver an improved regulatory framework that focuses on the long term interests of energy consumers.

This chapter provides an introduction and background to the guidelines. First, the rate of return framework is discussed. This is followed by a summary of the role of the guideline and the applicability of this guideline to forthcoming regulatory determinations. Lastly, issues arising from the implementation of the guideline are discussed.

1.1 Rate of return regulatory framework

The return on capital often represents the largest component of the revenue determinations of service providers. A service provider should be provided with a reasonable opportunity to recover at least the efficient costs it incurs in providing regulated services and complying with a regulatory obligation or requirement or making a regulatory payment. The allowed rate of return allows service providers to obtain necessary funds from capital markets to fund capital investments and service the debt they incur in borrowing the funds. The rate of return can make up approximately 50 per cent of the revenue needs for a service provider. Therefore, the rate of return is a key element of the network charges that consumers pay.

The previous frameworks for estimating the rate of return for electricity transmission, electricity distribution and gas service providers differed in a number of respects, in particular the extent of prescription in the rules and whether the estimate was made at each determination or in a periodic review.[7]

The changes to the rules made by the AEMC were initiated by the AER in September 2011.[8] In the rule change request, we stated:[9]

7 The former frameworks refer to frameworks prior to issuance of AEMC's final determination published on 29 November 2012 which sets out the amendments that have been made to the rules. The former frameworks are provided in chapter 6A of the NER for electricity transmission, chapter 6 of the NER for electricity distribution, and rule 87 of the NGR for gas service providers.

8 For more on the rule change process, see: http://aemc.gov.au/Electricity/Rule-changes/Completed/economic-regulation-of-network-service-providers-.html.

9 AER, *Cover letter to AEMC - Rule change proposal - energy network regulation reform*, 29 September 2011, see: http://www.aemc.gov.au/electricity/rule-changes/erc0134--initiation-documents.html.

> The current restrictions on an objective assessment of the efficiency or the necessity of expenditure proposed by electricity businesses is causing consumers to pay more than they should for a safe and reliable supply of electricity services. Our proposed changes allow for a more effective and robust assessment of the costs proposed by electricity network businesses.
>
> …The AER is also proposing a consistent approach for setting the rate of return on investment for gas and electricity network businesses. These changes would provide certainty for investors while ensuring that the regulator's approach can keep pace with changing financing practices.

The AEMC was concerned that the AER should be better able to respond to changing financial market conditions and the availability of new evidence. In its final determination, the AEMC concluded that none of the previous rate of return frameworks was capable of best fulfilling the requirements of the National Electricity Objective (NEO) and the National Gas Objective (NGO) (collectively, the objectives), and the Revenue and Pricing Principles (RPP). The AEMC considered that a new rate of return framework was therefore needed.[10]

After an extensive consultation process, the AEMC amended the rules to include new requirements relating to the framework for estimating the rate of return on capital. The new rules require us to determine an allowed rate of return that achieves the allowed rate of return objective at the time we make a revenue or access arrangement determination. The allowed rate of return for a regulatory year must be a weighted average of the return on equity for the regulatory control period in which that regulatory year occurs and the return on debt for that regulatory year.[11] The allowed rate of return objective is:[12]

> …that the rate of return for a [regulated network] is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the [service provider] in respect of the provision of [regulated services].

The new rules give us the discretion to adopt the approach we consider most appropriate to estimate the rate of return with the ability to take into account a wider range of relevant estimation methods, financial models, market data and other evidence as well as considering inter-relationships between parameter values. This will enable us to determine the best estimate of the required rate of return at the time of each regulatory determination.

Further, this aspect of the new rate of return framework incorporates a greater degree of regulatory judgement than did the previous framework. As part of the new framework, the AEMC has not included any preferred methods for estimating components of the rate of return. Instead, the AEMC has provided high-level principles to guide the estimation of the rate of return consistent with achieving the overall allowed rate of return objective.

To assist us in this assessment process and to provide greater transparency around this, we are proposing to use a set of criteria which we will apply in making judgements and decisions about the estimation methods, financial models, market data and other evidence. This discussed in chapter two.

Further, we consider that the objectives, and the overall rate of return objective, will be best achieved through the exercise of regulatory practices that:

- recognise the desirability of consistent approaches to regulation across the energy industry, so as to promote economic efficiency
- promote incentives to finance efficiently

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10 AEMC, *Final determination*, 29 November 2012, p. 42.

11 NER, cl. 6.5.2(d), cl. 6A.5.2(d). should there be a reference to the NGR as well?

12 NER, cl. 6.5.2(c) and cl. 6A.6.2(c); NGR, r. 87(3).

- promote reasoned, predictable and transparent decision making
- promote flexibility and adaptability, to allow our decisions to respond to changing circumstances, and to take account of a wider range of assessment methods and information in estimating the rate of return; and
- improve the regulatory determination process to allow us adequate time for decision making, to enhance consumer engagement, and to increase transparency and accountability.

In our view, the framework allows us to focus on the overall objective of making decisions that are in the long-term interests of consumers. In essence this requires the regulatory process to look not only at the short term impact of proposals but also how these will affect price and service outcomes for customers over a longer period. It is important to keep this longer term perspective in mind when considering improvements to our regulatory approaches. In keeping with the overall objectives of incentive regulation, the overall rate of return should provide service providers effective incentives to promote economic efficiency with respect to services they provide.

The desirability of achieving the specific aims of incentive regulation may be linked back to the efficiency requirements of rules. For example, the revenue and pricing principles refer explicitly to the need to provide effective incentives to promote economic efficiency.[13]

A service provider should be provided with effective incentives in order to promote economic efficiency with respect to the regulated services that it provides, this includes promoting the:

- efficient investment in a distribution or transmission system
- efficient provision of energy network services
- efficient use of the distribution system or transmission system.[14]

Accordingly, the RPPs are an important framework issue for assessing how the national electricity and gas objectives and the rate of return objective interrelate. In assessing the rate of return we must be consistent with the objectives. This is more likely to be achieved where our decisions are consistent with the principles of incentive based regulation.

For example, it is important that the regulatory framework delivers incentives for the service providers to undertake efficient investment. This will be achieved where the required rate of return is set at the level which is commensurate with the risks facing the benchmark efficient entity. In circumstances where the allowed rate of return is higher (lower) than the required rate of return, this may lead to inefficient over investment or under investment.

1.2 The role of the guideline

The new rules require us to develop a rate of return guideline that sets out the approach we intend to take to determining the allowed rate of return for both electricity and gas service providers. To give effect to the new rules on the rate of return, we are required to develop and a publish rate of return guideline covering:

[13] NEL, s. 7A. Similar provisions are included for the NGL, see section 24.
[14] NEL, s. 7A. Similar provisions are included for the NGL, see section 24.

(1) The methodologies that the AER proposes to use in estimating the allowed rate of return, including how those methodologies are proposed to result in the determination of a return on equity and a return on debt in a way that is consistent the allowed rate of return objective.

(2) The estimation methods, financial models, market data and other evidence we propose to take into account in estimating the return on equity, the return on debt and the value of imputation credits.[15]

Accordingly, the guideline sets out:

- our proposed positions on the elements for assessing the rate of return including the return on equity and return on debt
- the estimation methods, financial models, market data and other evidence that we propose to take into account when estimating the allowed rate of return
- the way in which we propose to take into account the estimation methods, financial models, market data or other evidence.

The aim of the guideline is to provide sufficient detail to allow a service provider or other stakeholders to understand our approach and how we will exercise our discretion consistent with the rate of return objective.

In its final determination, the AEMC specifically stated that the guideline would be non-binding on us or on service providers. Although the guideline is non–binding in nature, in practice we and the service providers will be expected to follow the guideline when setting the rate of return. In the event that a service provider seeks to depart from the guideline in proposing an alternative approach to setting the rate of return, they would need to provide compelling reasons and evidence for a proposed departure. The same obligation rests on us if we wished to depart from the approach set out in the guideline.

The rules require us to review the rate of return guideline at least every three years. In our view subsequent guidelines are likely to be limited to incremental changes in approach.

1.3 Applicability of this review to forthcoming regulatory determinations

Once completed, we intend to apply the guideline to the next round of regulatory determinations to be submitted to us in 2014 (see table 1.1 and table 1.2).

The rules include transitional arrangements to enable us to apply the new rules as soon as possible. This will allow the benefits of the new rules to flow through to consumers more quickly.

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15 NER, cl. 6.5.2 and 6A.6.2(c); NGR, r. 87.

Table 1.1 Timetable for regulatory determinations (electricity)

Service provider		Framework and approach paper published	Regulatory proposal due	Regulatory period commence
2014–15 Group of NSPs	TransGrid and Transend (NSW and Tas transmission)	31 January 2014	Transitional: 31 January 2014 Full: 31 May 2014	Transitional: 1 July 2014 Full: 1 July 2015
	ActewAGL, Ausgrid, Endeavour Energy and Essential Energy (ACT and NSW distribution)	Part 1: 31 March 2013 Part 2: 31 January 2014	Transitional: 31 January 2014 Full: 31 May 2014	Transitional: 1 July 2014 Full: 1 July 2015
Directlink (Interconnector between Qld and NSW)		31 January 2014	31 May 2014	1 July 2015
2015–16 Group of DNSPs	Ergon Energy, Energex and SA Power Networks (Qld and SA distribution)	30 April 2014	31 October 2014	1 July 2015
	Jemena, United Energy, Citipower, Powercor and SP AusNet (Vic distribution)	31 October 2014	30 April 2015	1 January 2016
Post 2016 Group	Aurora Energy (Tas distribution)	31 July 2015	31 January 2016	1 July 2017
	Powerlink (Qld transmission)	31 July 2015	31 January 2016	1 July 2017
	ElectraNet (SA transmission)	31 July 2016	31 January 2017	1 July 2018
	Murraylink (Interconnector between SA and Vic)	31 July 2016	31 January 2017	1 July 2018

Source: AEMC, *Final rule determination*, 29 November 2012, p. 229.

Table 1.2 Timetable for regulatory determinations (gas)

Service provider		Regulatory proposal due	Access arrangement period commence
Gas Distribution			
2014–15 Group of NSPs	Envestra (Wagga Wagga), Jemena (NSW Gas Distribution)	June 2014	1 July 2015
Post 2016 Group	ActewAGL (ACT Gas Distribution)	June 2015	1 July 2016
	APT Allgas, Envestra (Qld), Envestra (SA) (Qld and SA Gas Distribution)	June 2015	1 July 2016
	Envestra (Albury), SP AusNet, Multinet, Envestra (Vic) (Vic Gas Distribution)	December 2016	1 January 2018
Gas Transmission			
2014–15 NSP	Dawson valley pipeline (Qld Gas Transmission)	September 2014	September 2015
Post 2016 Group	Amadeus gas pipeline (NT Gas Transmission)	July 2015	1 July 2016
	Roma to Brisbane pipeline (Qld Gas Transmission)	August 2016	1 July 2017
	APA GasNet (Vic Gas Transmission)	December 2016	1 January 2018

Source: AER analysis.

1.4 Consultation process

Important to our success in developing the guideline was to hear from all stakeholders on the matters that are important to them. In developing the guideline we have undertaken extensive consultation process to provide stakeholders with multiple opportunities to raise and discuss matters.

This comprehensive consultation process is intended to ensure that the guideline addresses all relevant issues and reduces the need for any unnecessary departures from the guideline. This should also minimise the scope for extensive review of the proposed approach at each revenue or access arrangement determination. This should provide stakeholders with greater certainty and predictability as to how we will assess rate of return requirements at each determination. An outline of the consultation process that was undertaken in the development of the guideline is provided below:

- On 18 December 2012, we released an issues paper. This paper raised and sought comment on a broad range of issues at a high level with no firm positions taken by us. We received 20 submissions on the issues paper.

- On 5 February 2013, we hosted a forum on the development of the guideline. A range of stakeholders including representatives of regulated energy businesses, energy users, state regulatory authorities, government statutory authorities and investors in regulated utilities participated in this forum. At the forum we sought high level views from participants on key matters. Forum participants discussed issues set out in our issues paper. Stakeholders sought clarification on how we would apply the principles set out in the issues paper and explain how these principles related to the objectives and the RPP.

- On 25 and 26 February 2013 we held two sub-group workshops on: i) the overall rate of return and cost of equity ii) the cost of debt. Again a range of stakeholders attended these workshops and discussed the key issues relating to development of guideline including the role of the principles, the nature of the benchmark efficient entity, the use of financial models and approaches for estimating the cost of equity and cost of debt.

- In May 2013 we released a consultation paper. This paper sought comments on our preliminary positions on some elements of the rate of return. We received 41 submissions on the consultation paper.

- On 3 and 4 June 2013 we held two sub-group workshops on: i) approach to return on debt benchmark and ii) return on equity—models assessment. A large number of stakeholders attended these workshops. The debt workshop discussed the key issues relating to approach to return on debt- benchmark ('on-the day' and portfolio), trailing average, annual updating of a trailing average, weighting, and transitional arrangements. The equity workshop discussed various models used for assessing the return on equity.

- On 18 June 2013 we held another workshop on relationship between risk and the rate of return, and implications for the definition of the benchmark efficient entity. Again a large number of stakeholders and the consultants attended this workshop. Frontier Economics made presentations on: i) characteristics and exposures of energy networks in general and ii) differences in risk exposures of different types of energy networks. Associate Professor Graham Partington made a presentation on accounting for risk within the regulatory framework. The consultants also responded to the stakeholders questions.

- On 30 August 2013, following the release of the draft rate of return guideline we held an information session presented by the AER Chairman, Andrew Reeves outlining the details of our draft guideline. We published a copy of the presentation and answers to all questions raised during the session. In response to the draft guideline and accompanying explanatory statement we receive 46 submissions.

- On 1 October 2013 we held a stakeholder forum to discuss our draft rate of return guideline. The forum provided interested stakeholders with an opportunity to clarify aspects of the draft guideline and to present their views on the draft guideline.

- On 11 October 2013, we released an issues paper on equity beta as part of our consultation for developing the rate of return guideline. This issues paper set out our proposed approach to estimating the equity beta. We received 14 submissions on this issues paper.

- In addition, we have held a number of bilateral meetings during the process with the QTC, TCorp, ERA,IPART, APIA, , EUAA, ENA, PIAC, Merrill Lynch, Moody's, Standard and Poor's, Goldman Sachs, Westpac. We also held a number of meetings with the Consumer Reference Group (customer group representatives) to receive feedback from on key issues from a consumer perspective.

We have published notes on key aspects of the discussions we had at the public forums. These can be found on our website at http://www.aer.gov.au/node/18859.

1.5 Implementation

This section outlines our approach on a number of issues arising from the implementation of the rate of return guideline.

1.5.1 Transaction costs and forecast inflation

We previously sought submissions from interested stakeholders regarding our proposed approach to allowing for debt and equity raising costs in the revenue building blocks. We also sought comments on the method we proposed to estimate forecast inflation.

As discussed with stakeholders, the final guideline does not cover our position on transactions costs or forecast inflation. These issues will need to be considered in upcoming determinations.

1.5.2 Amendments to the Post Tax Revenue Model

We will need to amend the PTRM to reflect the change to method of estimating the return on debt due to:

- Our proposal to estimate the return on debt using a trailing average portfolio approach and the proposal to annually update the return on debt allowance. Different return on debt inputs will be required in the WACC sheet each year within the regulatory period rather than a single return on debt input.
- The proposed gradual transitional arrangement from the current 'on the day' approach to the trailing average portfolio approach to estimate the return on debt. A new sheet is required for the calculation of weights to be applied to the estimate of return on debt during the transitional period.
- Different return on debt inputs for each regulatory year. This may require us to re-run the PTRM each regulatory year to update the annual building block revenue requirement and corresponding X factor for the relevant regulatory year.

The PTRM will need to be amended through a separate consultation process in accordance with the consultation procedures outlined in the rules.

1.6 Structure of this explanatory statement

This explanatory statement is structured as follows:

- Chapter 2 discusses our proposed approach to application of criteria for assessing the allowed rate of return.
- Chapter 3 discusses our proposed definition of benchmark efficient entity and compensation of risk.
- Chapter 4 discusses our proposed approach to estimating the overall return of return.
- Chapter 5 discusses the proposed approach to estimating the expected return on equity.
- Chapter 7 discusses our proposed approach to estimating the return on debt.

- Chapter 8 discusses our implementation of the estimated return on debt.
- Chapter 9 discusses our proposed approach to estimating imputation credits.

2 Application of criteria

This chapter discusses our understanding of the terms 'estimation methods, financial models, market data and other evidence' and how we propose to take this information into account in setting the allowed rate of return. We set out criteria that we propose to use to assess the merits of the various sources of information. This will help ensure that information is used in a manner that contributes to decisions which achieve the allowed rate of return objective.

2.1 Issue

The AEMC in its final rule determination considered that the estimation of the required rate of return could be improved by permitting us to take account of a broad range of information.[16] The AEMC specifically did not include in the new rules any preferred methods for determining the rate of return.[17] Instead it provided for the AER to exercise its judgement as to the best approach:[18]

> Estimating the rate of return ultimately requires a regulator to exercise judgement about the analytical techniques and evidence to use to make an estimate that is commensurate with efficient financing costs. The new framework does not prescribe methodologies or lock-in specific benchmark characteristics other than providing high–level principles that should be taken into account when estimating various components, such as return on equity and debt. While the judgement as to the best approach is left to the regulator, the preferred methods must be developed to meet the overall allowed rate of [return] objective.

To guide our exercise of judgement the new rules specify that we must have regard to 'estimation methods, financial models, market data and other evidence' relevant to the assessment of the allowed rate of return.[19] In this guideline we set out criteria that will assist our assessment of the various estimation methods, financial models, market data and other evidence and our exercise of judgement on the use of this information.

2.2 Approach

We propose to adopt a set of transparent criteria to assist our assessment of the various estimation methods, financial models, market data and other evidence to which we must have regard in our rate of return decisions. We used these criteria to assess these sources of information in developing this guideline. In future determinations we may also use these criteria to assess information presented during the determination that supports or departs from these estimation methods, financial models, market data and other evidence.

The criteria are subordinate to the law, the rules and the objectives. We anticipate that the criteria will improve the transparency, certainty and predictability of decision-making and contribute to decisions that achieve the allowed rate of return objective.

2.2.1 The criteria for assessing information

We consider that decisions on the rate of return are more likely to achieve the allowed rate of return objective if they use estimation methods, financial models, market data and other evidence that are:

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16 AEMC, Rule determination: National electricity amendment (Economic regulation of network service providers) Rule 2012: National gas amendment (Price and revenue regulation of gas services) Rule 2012, 29 November 2012, p. 67 (AEMC, *Final rule change determination*, November 2012).

17 See, for example, AEMC, *Final rule change determination*, 29 November 2012, p. iv.

18 AEMC, *Final rule determination*, 29 November 2012, p. 38.

19 NER, cl. 6.5.2(e) and cl. 6A.6.2(e); NGR, r. 87(5).

(1) where applicable, reflective of economic and finance principles and market information

   (a) estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data

(2) fit for purpose

   (a) the use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose

   (b) promote simple over complex approaches where appropriate

(3) implemented in accordance with good practice

   (a) supported by robust, transparent and replicable analysis that is derived from available credible datasets

(4) where models of the return on equity and debt are used these are

   (a) based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation

   (b) based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale

(5) where market data and other information is used, this information is

   (a) credible and verifiable

   (b) comparable and timely

   (c) clearly sourced

(6) sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.

2.3 Reasons for approach

Estimating the allowed rate of return ultimately requires us to exercise judgement about the estimation methods, financial models, market data and other evidence (which we refer to collectively as 'information') to be used. The new rules framework does not prescribe any specific models or evidence to be considered or methodologies or frameworks to be used. This is left to the discretion of the regulator, subject to the requirement to determine a rate of return that achieves the allowed rate of return objective. The new framework provides considerable flexibility in determining the allowed rate of return. Also, the broad terms in the allowed rate of return objective mean that there may be several ways of practically implementing it. Therefore, we consider it helpful to set out criteria that will structure our consideration of various sources of information and how we propose to use this information to determine a rate of return. This will provide a greater degree of certainty and transparency for our future determinations. We also consider applying these criteria will ensure a robust approach and contribute to the achievement of the allowed rate of return objective

We draw a distinction, as the AEMC did, between the consideration of this information and the methodologies used, drawing upon this information, to determine the rate of return.[20]

The criteria will assist us to evaluate the available information and its relevance to the determination of the rate of return in a structured, transparent and consistent manner. This feeds into the methodology set out within this guideline for the determination of the rate of return. As the AEMC acknowledged, this requires the exercise of judgement and discretion guided by the allowed rate of return objective. The methodology set out in this guideline guides, but does not constrain, the exercise of this discretion. The framework will provide greater consistency and transparency in the exercise of this discretion and contribute to the achievement of the allowed rate of return objective.

These criteria do not supplant the new rules. Rather, the criteria are subordinate to the law, the rules, and the objectives. We consider these criteria will provide stakeholders with greater certainty, and more importantly provide a framework, as to how we intend to exercise our regulatory judgment in respect of this information, while allowing us sufficient flexibility to make decisions in changing market conditions. Not all the various estimation methods, financial models, market data and other evidence will be of equal value in determining the efficient return on capital for the benchmark entity. For example, some information may be more relevant, more feasible to construct, or more reliable than others. The criteria will help us assess this.

The proposed approach to the consideration of information from estimation methods, financial models, market data and other evidence set out in this guideline reflects the use of these criteria.. However, at the time of an individual service provider's determination, we will also use these criteria to assess information presented by that service provider that supports or departs from the methods, financial models, market data and other evidence set out in the guideline.

We received several submissions from stakeholders on the assessment criteria that were included in the consultation paper. Most submissions generally supported our proposed approach and criteria.[21] For example, PIAC submitted that:[22]

> Important to achieving these outcomes is the use of well accepted models with sound theoretical and empirical support, fit for purpose and with internal consistency, along with reliable and well–defined data sets, and implemented appropriately for the circumstances. The AER has identified a similar set of criteria in the consultation paper and PIAC strongly supports this approach for the reasons outlined above.

However, some stakeholders expressed concerns and sought greater clarity from the guideline. Our draft report provided further explanation of the criteria and their use. In response to the draft guideline APIA expressed concern that we went beyond using the criteria to assess the relevance of the sources of information and used the criteria 'to assess the appropriateness of [the AER's] methods and methodologies for determining the rate of return for debt and equity in a way that effectively replaces the [allowed rate of return objective]'.[23] APIA proposed that the methods to be used in determining the rate of return must be assessed directly against the allowed rate of return objective

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[20] NER, cl 6.5.2(n) and 6A.6.2(n); NGR, r. 87(14).

[21] Australian Pipeline Industry Association Ltd, *Submission to the Australian Energy Regulator's rate of return guidelines consultation paper*, June 2013, p. 1 (APIA, *Submission on the consultation paper*, June 2013); Major Energy Users Inc, *Australian Energy Regulator, Better Regulation, Rate of return guidelines: Comments on the consultation paper*, June 2013, pp. 9–11 (MEU, *Comments on the consultation paper*, June 2013); The Financial Investor Group, *Response to the AER consultation paper: Rate of return guidelines*, 24 June 2013, pp. 13–14 (FIG, *Response to the consultation paper*, June 2013); Public Advocacy Centre Ltd, *Balancing risk and reward: Submission to the AER's consultation paper: Rate of return guidelines*, 21 June 2013, p. 4 (PIAC, *Submission on the consultation paper*, June 2013); Council of Small Business of Australia, *Australian Energy Regulator – Better Regulation program: Rate of return guidelines consultation paper: Comments,* 5 July 2013, p.5 (COSBOA, *Comments on the consultation paper*, July 2013.

[22] PIAC, *Submission on the consultation paper*, June 2013, p. 4.

[23] Australian Pipeline Industry Association Ltd, *Meeting the ARORO? A submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013, p. 1 (APIA, *Submission to the draft guideline*, October 2013).

and that we had not done this in the draft guideline. The ENA expressed concern that 'the potential for the criteria to conflict with the binding rule provisions and lead the AER into decisions inconsistent with the rules is in ENA's view high'.[24] However, the ENA agreed that criteria can be used in assessing the quality and relevance of evidence.[25] In this final report we have clarified that the criteria will be used in the assessment of relevant sources of information and evidence on rates of return and that the use of the criteria will be subordinate to the law, the rules, and the objectives.

The APIA also set out some specific concerns in regard to some of the criteria. These concerns are addressed in section 2.3.2, which provides further explanation of our proposed criteria.

2.3.1 Estimation methods, financial models, market data and other evidence

The new rules require us to set out in the guideline:[26]

1. The methods we propose to use.

2. The estimation methods, financial models, market data and other evidence we propose to take into account.

In determining the allowed rate of return, we must have regard to 'relevant estimation methods, financial models, market data and other evidence'.[27]

Our understanding of what these terms mean and how we may use them in determinations is discussed below. The criteria listed in section 2.2 provide a framework for assessing the relevance and quality of this information. We assess the return on equity models and information against these criteria in appendices A and B.

Estimation methods

We consider estimation methods to mean some processes or procedures used to compute an estimate of a parameter within a model or a component of the rate of return.

An example of an estimation method is the method we have previously used to estimate the risk free rate. To do so we have averaged the observed yield on 10 year Commonwealth Government Securities (CGS) over a defined period. Another example is the use of historical excess returns to inform the forward looking market risk premium (MRP) estimates in the CAPM.

We propose to use estimation methods to determine parameters, values or any other inputs to the rate of return where a financial model is not applicable, or to support a financial model.

Financial models

We consider financial model means an abstract representation of a financial decision-making situation. Examples of financial models include the Sharpe–Lintner CAPM, the Black CAPM, the Fama–French three factor model and the dividend growth model (DGM). These models are discussed in greater detail in appendix A.

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[24] Energy Networks Association, *Response to the draft rate of return guideline of the Australian Energy Regulator*, 11 October 2013, p. 2 (ENA, *Response to the draft guideline*, October 2013).
[25] ENA, *Response to the draft guideline*, October 2013, pp. 14, 26, 44.
[26] NER, cls. 6.5.2(n), 6A.6.2(n); NGR, r.87(14).
[27] NER, cls. 6.5.2(e)(1), 6A.6.2(e)(1); NGR, r.87(5)(a).

The strength of financial models is that they provide a consistent and coherent framework for considering the rate of return and its components. We expect that financial models will continue to play a central role in the determination of the allowed rate of return. We will use financial models to estimate the return on equity. We may also use one financial model to estimate parameters within another financial model. An example might be using a DGM to estimate the MRP within the Sharpe–Lintner CAPM. Our previous use of the Sharpe–Lintner CAPM has rested upon its sound theoretical foundations and strong degree of acceptance and use in practice. Regulators in Australia and overseas have used this model, as well as capital market participants more generally.[28]

Market data

We consider market data to include:

- prices, maturities, and terms and conditions of government and non-government bonds, financial derivatives, and other financial instruments
- equity prices and ratios, such as price earnings ratios and RAB multiples
- financial structures, such as gearing levels and credit ratings.

An example of market data is the data we have used in the past to determine the risk free rate. We have used data on the observed yield on 10 year CGS. Another example of market data is the data on corporate bond yields. These can be used to estimate the return on debt directly or cross-check estimates of the return on debt derived from other sources, such as the Bloomberg fair value curves.

We might use market data as inputs to estimation methods or financial models, or as alternative estimates and cross-checks of the outputs of those methods and models.

Other evidence

Examples of other evidence might include broker reports, experts' reports or feedback from market participants and stakeholders.

We might use other evidence at any point in the estimation of the rate of return, where we consider it will contribute to achieving the allowed rate of return objective. This may be as a cross-check on the overall WACC or return on equity estimates, or as a consideration when estimating a particular parameter value.

2.3.2 Assessment of proposed criteria

Reflective of economic and finance principles and market information (criterion one)

We consider economic and finance theory provides important insights into the conditions for achieving economic efficiency, including for the setting of revenue and prices for natural monopoly service providers. Economic theory also suggests economically efficient outcomes are in the long-term interests of consumers. This criterion is intended to draw on these theoretical insights to maximise the likelihood that regulatory outcomes would promote economic efficiency, and thus would achieve the allowed rate of return objective and the (national electricity and gas) objectives.

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[28] See, for example, Grant Samuel, *Financial Services Guide and Independent Expert's Report in relation to the takeover offer by Pipeline Partners Australia Pty Limited - Appendix 2: Selection of discount rate*, 3 August 2012, p. 1.

This criterion is also intended to recognise that a sound and well-accepted theoretical foundation for a regulatory approach is highly desirable. This desirability was grounded within an interpretation of the objectives and their requirement for regulation to:[29]

> ...promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect…to price, quality, safety, reliability and security of supply of electricity…
>
> ...promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.

We consider the reference to 'economic' principles is important, as it relates to the achievement of efficiency, as set out above. It is less likely that other methods—that are not grounded in the concept of economic efficiency—would be as effective in achieving the objectives.

We consider that models, estimation methods, and other information that 'are well accepted' will help to deliver outcomes that achieve the allowed rate of return objective. The intention here is to ensure models and information well-grounded in economic theory will have greater recognition and acceptability, and be more likely to be widely used in the practical estimation of efficient financing costs. We consider this will, in turn, enhance the credibility and acceptability of a decision. The allowed rate of return objective requires us to set a rate of return commensurate with the efficient financing costs of the benchmark efficient entity.[30] We do not consider this to be only a theoretical proposition. Rather, it should be consistent with observable good practice in efficient businesses. We consider that, in practice, businesses make financing and investment decisions using widely accepted economic and financial models of the efficient cost and allocation of capital. To the extent that we use models for estimating the rate of return that are consistent with those widely used in practice, we are more likely to achieve the allowed rate of return objective.

Most stakeholders made no specific comments on this criterion. However, the APIA stated that 'the link [of economic principles to the NGO through] efficiency is not explicitly made and we doubt such a link can be made'.[31] APIA considered that the NGO is concerned pragmatically with efficient investment and the long term interest of consumers.[32] As noted above we consider that economic and finance principles provide practical guidance on the efficient cost and allocation of capital. This in turn guides efficient investment and the efficient allocation of resources more generally, both of which are in the long-term interests of consumers.

Fit for purpose (criterion two)

There are two aspects of this criterion: firstly, that the use of the information should be consistent with its original purpose and limitations; and, secondly, that simpler, less complex approaches should be preferred.

Some information may be of value in the determination of the rate of return, but its value may be diminished because it was constructed for a different purpose. For example, an investment fund may use a model of relative return for allocating investments within a fund. The primary purpose of such a model may be to distinguish between the relative return of different businesses within an industry sector rather than the estimation of the absolute return. That is, for its purpose it may be less sensitive

29 NEL, section 7; NGL, section 23.
30 NER, cls.6.5.2(c) and 6A.6.2(c); NGR, r.87(3).
31 APIA, *Submission to the draft guideline*, October 2013, p.5.
32 APIA, *Submission to the draft guideline*, October 2013, p.5.

to common parameters, such as the risk free rate. In contrast, we have to set an absolute value for the rate of return, for which these common parameters are quite important.[33]

An important limitation of some of the information may be its past performance in forecasting returns or its robustness or sensitivity to assumptions. For example, dividend growth models can be quite sensitive to assumptions on growth in future earnings.[34] This factor is relevant to how the information from these models should be considered. Information that is considered less reliable may be considered qualitatively rather than quantitatively.

We prefer simpler over more complex approaches. This is because simpler models are more likely to be understandable, less prone to data mining and inappropriate correlation within the model and may have fewer data requirements. Accordingly, we consider simple models that perform as well as complex models should be preferred, all other things equal. This explanatory statement provides examples of how we intend to apply this criterion.

APIA submitted that there was no clear basis for consideration of fitness for purpose independently of the primary requirements of rule 87 of the NGR.[35] As discussed we consider that all the criteria for the exercise of regulatory discretion are subordinate to the law and the rules; hence, there is no scope for inconsistency. We agree with APIA that simple approaches must not be chosen simply as a matter of convenience.

Implemented in accordance with good practice (criterion three)

Information from estimation methods and models implemented in accordance with good practice will be preferred and given greater consideration. Such information is more likely to be reliable and result in consistent decision making in accordance with the allowed rate of return objective. By 'good practice' we mean that the information is supported by robust, transparent and replicable analysis, and derived from credible data sets.

We consider this criterion captures the notion of sound estimation approaches. It is consistent with the desirability of best-practice methods in achieving the allowed rate of return objective referred to by the AEMC.[36]

Models based on quantitative modelling (criterion four)

Models will be preferred if they are based on sound quantitative modelling principles. For example, where models of the return on equity and debt are used, they are based on quantitative modelling that is sufficiently robust such that they are not unduly sensitive to errors in input estimation. We also propose that the models used should be based on quantitative modelling that avoids arbitrary filtering or adjustment of data that does not have a sound rationale.

The primacy of the allowed rate of return objective suggests where constituent components have been used to inform the overall rate of return estimate, these constituent components must be

[33] For example, under the CAPM the MRP is a common input for estimating the return on equity across different companies and sectors. A variation in the MRP, so long as it is consistently applied, will have a relatively small effect on the relative return on equity but will have a direct effect on the absolute value of the estimated return on equity.
[34] See Appendix E for further discussion of dividend growth models.
[35] APIA, *Submission to the draft guideline*, October 2013, p.6.
[36] AEMC, *Final rule change determination*, November 2012, pp. 42, 43, 56, 71.

estimated such that they contribute to the achievement of the rate of return objective.[37] These constituent components include the return on equity and return on debt.

We do not consider that robust outcomes from quantitative modelling necessarily prescribe a mechanistic interpretation. Rather, we consider that best practice statistical approaches would help to deliver robust estimates. To the degree that estimates are not robust or statistically sound, we need to take that performance into account in terms of making a judgment as to the effectiveness of that particular method.

Market data and other information (criterion five)

Where market data or other information is used, this information should be:

- credible and verifiable
- comparable and timely
- clearly sourced.

The intention of the above criterion is to ensure the empirical analysis and data supporting the estimation of the rate of return are employed in a sound manner.

Have the flexibility to reflect changing market conditions (criterion six)

The rate of return for the benchmark efficient entity will vary with changing conditions. In this context, the determination of the rate of return is more likely to achieve the allowed rate of return objective if it draws upon data that reflects changing market conditions and new information, where relevant. We consider this criterion would help to deliver the requirements of the law and the rules.

The rules refer to the need to have regard to prevailing market conditions when estimating the return on equity.[38] However, what is intended in this criterion is that relevant estimation methods are capable of capturing the relevant changes in prevailing market conditions or changes that have occurred over time. For example, a capable estimation method would be based on data that is updated on a timely basis. Such capability could assist the method to meet the requirement for the return on equity to reflect prevailing conditions in the market for equity funds.

2.3.3 Application of proposed criteria

Table 2.1 summarises our application of the criteria in assessing the return on equity models and related information.

37 The new rules require the use of a weighted average cost of capital, but this is subject to the requirement that the weighted average must contribute to the allowed rate of return objective (NER, cls. 6.5.2(d) and 6A.6.2(d); NGR, r.87(4)).

38 NER, cl. 6.5.2(g) and cl. 6A.6.2(g) and NGR, r. 87(7).

Table 2.1 Application of criteria

Issue	Reference
Return on equity models	Appendix A
Return on equity (other information)	Appendix B
Sharpe–Lintner CAPM parameters	Chapter 6, and appendices C, D and E
Dividend growth models	Appendix E

Source: AER analysis.

3 Benchmark efficient entity and compensation for risk

This chapter outlines our proposed definition of the benchmark efficient entity. The definition of the benchmark efficient entity has implications for the estimated return on debt and equity (including the choice of data and models used to estimate the return on equity and debt).

3.1 Issue

The allowed rate of return objective requires that we set the rate of return for a distribution or transmission service provider which is commensurate with the efficient financing costs of a benchmark efficient entity. The benchmark efficient entity is to have a similar degree of risk as that which applies to the distribution or transmission service provider in respect of the provision of regulated services.[39]

The AEMC provided for the possibility of more than one benchmark if there was not a similar degree of risk between the benchmark efficient entity and the network service providers.[40]

In assessing whether more than one benchmark is required, we are directed to consider the risk characteristics of regulated energy network service providers in providing regulated services. We must assess whether the degree of risk exposure in providing regulated services is similar for the benchmark efficient entity and the regulated energy network service provider which is subject to the particular determination.[41] In preparing our draft explanatory statement we sought advice from Frontier Economics on the risks to which regulated energy businesses are exposed in delivering regulated services.[42]

This chapter outlines our considerations in making this assessment.

3.2 Approach

We propose to maintain our position in the draft guideline to:

- adopt a single benchmark across gas, electricity, transmission and distribution
- adopt a conceptual definition of the benchmark efficient entity that is 'a pure play, regulated energy network business operating within Australia'.

We have come to this view after further consideration of the issues and matters raised in submissions in response to the draft guideline.

Our approach to the implementation of the definition of the benchmark efficient entity is discussed in chapter 5 (for return on equity approach) and chapter 7 (for return on debt approach).

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39 NER, cls. 6.5.2(c), 6A.6.2(c); NGR, r. 87(2)(3).
40 AEMC, *Final rule change determination*, 29 November 2012, p. 67.
41 In electricity distribution regulated services refers to standard control services, in electricity transmission it refers to prescribed transmission services and for gas distribution and transmission it refers to reference services.
42 Frontier Economics, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia*, June 2013.

3.3 Reasons for approach

We consider that the risk exposure of the businesses we regulate, after taking into account the risk and the mitigating impact of the regulatory regime, is sufficiently similar to warrant the use of only one benchmark. We have reached this view for the following reasons:

- Differences in demand risk are mitigated by the regulatory regime through the revenue or price setting mechanism (form of control). In particular, under a revenue cap, where forecast quantity demanded differs from actual quantity demanded, in subsequent years price adjustments are made to enable the approved revenue to be received by the service provider. Further, in most cases, a transmission service provider will determine prices based on historical demand which reduces intra year revenue variations. This effectively mitigates the risk associated with demand volatility. Electricity transmission service providers are required to use a revenue cap.[43] We have indicated a preference for revenue caps.[44]

- Under a price cap, service providers may mitigate the risk of forecast error by restructuring tariffs, such that higher fixed charges are set to offset demand volatility.

- Electricity distribution and gas service providers are able to propose the form of control they employ —revenue cap, price cap, or any variation thereof.[45] Service providers would be expected to choose the form of control which maximises its shareholder wealth. If a service provider chooses a price cap over a revenue cap it implies that any expected increase in cash flows must outweigh any expected increase in risk (that is, discount rate applied to the expected cash flows).

- With respect to competition risk, we considered that by virtue of being regulated, these service providers effectively face a very limited increase in risk due to competition.

We consider that it is generally accepted that the demand for gas and electricity is relatively inelastic.[46] With reference to price and income elasticities respectively, this means that prices or incomes have to change quite significantly for the end user to change the quantity of gas or electricity that they demand. We consider that, as a consequence of the inelasticity of demand and the slow technological change, changes in end user demand are generally likely to be small or business specific and to occur over a relatively lengthy period of time. To the extent that there are genuine risks of extreme changes in demand for specific service providers which present the potential for stranding of an asset, the regulatory regime for gas and electricity can mitigate this risk by providing prudent discount and accelerated depreciation provisions.[47]

In reaching these views, we considered the risks which service providers are exposed to in delivering regulated gas and electricity, transmission and distribution services. We divided these risks into business and financial risks and considered whether they were systematic or non-systematic risks. Under this framework we considered only those risks for which investors would require compensation through the rate of return, as opposed to those risks which are compensated through cash flows or those which do not require compensation at all.

Our starting point was that we consider the businesses we regulate have similar risks in delivering regulated services and to explore areas of likely difference. We consider this approach is justified

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43 NER, cl. 6A.4.2(a)(1).

44 AER, *Discussion Paper: Matters relevant to the framework and approach, ACT and NSW DNSPs 2014–2019, Control mechanisms for standard control electricity distribution services in the ACT and NSW*, April 2012, p. 15.

45 NER, cl. 6.2.5(b), NGR, r. 97(2).

46 Bureau of Resource and Energy Economics, *Gas Market Report 2012*, Canberra, May 2012, p. 47.

47 NER, cl. 6A.26. NGR, r. 96; NER, cls. 6.5.5(b)(1), 6A.6.3(b)(1), NGR, r.89(1).

given these businesses have similar business characteristics (that is, they operate in Australia, are regulated and belong to the same industrial sub–sector).

In the draft explanatory statement, we considered the risk drivers which may have the potential to lead to different risk exposures. The differences were considered in terms of any differences that may exist between gas and electricity and transmission and distribution. Submissions in response to the draft explanatory statement restated some of these risks. We continue to hold the view that there are two major drivers of risk including:

- the businesses' types of end user customer, their demand sensitivity, and the impact of the regulatory regime on regulated revenues
- the competition to which a business is exposed in providing reference services and the impact of this on risks that require compensation, primarily systematic risks.

These considerations reinforce our view that a single benchmark efficient entity is appropriate for all of the network businesses we regulate.

Below we have provided reasons for each aspect of our definition of the benchmark efficient entity.

Pure play

A pure play business is one which offers services focused in one industry or product area. In this context, it means that the benchmark efficient entity provides only regulated energy network services.

We consider that the benchmark efficient entity should be a pure play business as a business that offers services which are not related to regulated energy network services is likely to have a different risk profile.

Regulated

A regulated entity for the purposes of our benchmark is one which is subject to economic regulation (that is, revenue price cap regulation) under the National Electricity Rules and/or the National Gas Rules.

We consider that the benchmark efficient entity should be a regulated entity as:

- The rules require that the risks associated with the provision of regulated services are considered in determining the required rate of return.[48] As regulated services are delivered by regulated entities, it is logically consistent to consider the benchmark efficient entity as a regulated entity.
- Regulated service providers are typically not exposed to competition from other firms (in the case of distribution and some transmission businesses) or exposed to limited competition (in the case of regulated transmission businesses). The limited competition may alter the relevant (systematic) risk profile when compared with an unregulated firm.
- Regulated service providers are able to earn more stable cash flows relative to most unregulated businesses. These cash flows are regularly updated at resets to reflect required revenue (including changes due to shifts in demand and expenditure drivers) and therefore have similar business risks. Regulated service providers are also provided with some protection to their cash flows during regulatory control periods (e.g. pass through provisions and reopeners).

48 NER, cls. 6.5.2(c), 6A.6.2.(c); NGR, r.87(2)(3).

- Regulated service providers may align their business practices to the regulatory regime. This may lead to a different risk exposure than that faced by an unregulated firm.

Energy network business

'Energy network' refers to a gas distribution, gas transmission, electricity distribution or electricity transmission business.

We consider that the benchmark efficient entity should be a regulated energy network business as:

- The rules refer to the regulation of energy transmission and distribution

- Different sectors of the economy are expected to have different characteristics which will lead to different risk profiles. By limiting the benchmark to energy network businesses we are limiting the possibility that risks will be dissimilar due to sectoral differences.

Implicit in the adoption of 'energy business' in the proposed definition of the benchmark efficient entity is that there is a single benchmark for gas distribution, gas transmission, electricity distribution and electricity transmission. We consider that the evidence available does not suggest that the risks are likely to be sufficiently dissimilar between gas distribution, gas transmission, electricity distribution and electricity transmission to justify more than one benchmark (see section 3.3.3).

Operating within Australia

We consider that the benchmark efficient entity should be operating within Australia as the location of a business determines the conditions under which the business operates. This includes the regulatory regime, tax laws, industry structure and broader economic environment. As most of these conditions will be different from those prevailing for overseas entities, the risk profile of overseas entities is likely to differ from those within Australia.

Other issues

Parent ownership

Overall, we consider that, consistent with financing principles, the rate of return should be based on the non-diversifiable or systematic risks of the assets (i.e. regulated energy business) and not on the overall risk of the parent.

We consider that firms either with or without parent ownership can be used for estimating the return on capital. As long as the risk of the parent is likely to be consistent with the risk of the regulated business, the estimated required return of investors in the parent or the subsidiary should reflect the required return of investors in the regulated business.

Our current definition of the benchmark entity includes 'without parent ownership'. We have reviewed this component of the definition. This review was motivated by the practical observation that over time the ownership of regulated assets has evolved towards a conglomerate structure. Today all regulated energy entities in Australia have parent ownership. Furthermore, there is evidence that credit rating agencies consider the parent ownership in assessing ratings. Parent ownership presents a different risk profile to an assumption of no parent ownership. An example of this is where the parent is able to influence negotiations to secure good terms, which results in a material decrease in the network entity's refinancing risk.[49] Frontier identified that efficiencies may be available to the parent via scale economies associated with largely fixed issuance costs, access to markets with minimum issuance size requirements, pooling of risk across subsidiaries achieving internal diversification, lowering default risk and so borrowing costs.[50]

However, we consider that it is not possible to specify a single particular ownership structure which is "efficient." Therefore, we propose not to take a view on ownership structure in the definition of the benchmark efficient entity. We continue to hold this view.

Efficiency of the benchmark entity

We consider that the benchmark entity is efficient as it responds to the incentives provided by the regulatory regime. The objectives of the regulatory regime include setting incentives which promote economically efficient investment, provision of services and use of the transmission or distribution system.[51] In relation to efficient financing practices, in our draft explanatory statement we said that:[52]

> We consider that in efficient capital markets, all firms operate on the capital frontier. All firms should be priced efficiently and able to access capital at the cost associated with the risks they face that are priced by investors (e.g. under CAPM this would be the systematic risk as measured by the CAPM beta associated with their business operations). Outperformance or underperformance relative to the frontier is reflective of firm specific factors which are not of concern to the regulator as these are not priced in capital markets and do not require ex-ante investor compensation. We note that we compensate transaction costs according to the size of the firm so as not to bias firms towards larger firm structures due to economies of scale that may be associated with raising capital.

We continue to hold this view.

Submissions in response to our draft explanatory statement:

- proposed an alternative framework for considering risk
- questioned our interpretation of efficiency in relation to the benchmark efficient entity
- re-stated or proposed new issues supporting separate benchmarks for gas and electricity
- considered that there should be a separate benchmark for government and privately owned entities.

We consider each of these issues, in turn, below.

3.3.1 Framework for considering risk

We consider that our starting position that the businesses we regulate have similar risks in delivering regulated services is justified given these businesses have similar business characteristics (that is, they operate in Australia, are regulated and belong to the same industrial sub–sector).

APIA submitted that the AER should start from a position of no similarity between the businesses' risk in providing regulated reference services and then group businesses under a benchmark when

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49 Moody's Investor Service, *Credit Focus, SP AusNet, SPI (Australia Assets) Pty Ltd and Jemena Limited: Frequently Asked Questions*, 22 May 2013.

50 Frontier Economics, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia*, June 2013, p. 40.

51 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 17-18.

52 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 175.

similarity has been established.[53] It proposed a high level method for econometrically establishing the similarity of businesses.[54] The method requires the specification of a value for the deviation from the risk characteristics of the starting point business to allow for the grouping of businesses with a particular degree of similarity.[55] We do not accept APIA's submission. We consider that APIA's proposed high level econometric method for establishing the similarity of businesses would need to be operationalised before we could consider it. Our view is that the method raises the following issues:

- It is complex and it is likely to be data intensive
- There are likely to be significant issues regarding the establishment of a sufficient nexus between the data and the risk being proxied. Finding co-movement between data sets does not necessarily mean that the intended risk effects are being captured. There is a possibility that as a consequence of data mining, data used as proxy for risks would be used without a good theoretical basis. We note that this is akin to our reservations associated with using the Fama–French three factor model (see appendix A).
- As data on all risks is included it is likely to pick up many risks that are diversifiable and which do not require compensation under the assumption that investors hold fully diversified portfolios
- If a 'state of the world' and its consequence is to be interpreted across all businesses in a relative sense then coefficients from a system of equations, where all business relationships with the 'state of the world' are specified, would need to be jointly estimated, otherwise the error terms are not correlated. If the equations were separately estimated the coefficients would not reflect the relative influence of the particular risk across the businesses.
- In estimating the parameters, there are likely to be significant problems with multicollinearity and achieving statistically significant estimates[56]
- For the above reasons, it is considered to be far too complicated for a regulatory benchmark and may not promote the achievement of the rate of return objective.

We consider that only those risks for which investors require compensation are relevant in determining a WACC. We provided detailed reasoning for this view in the draft explanatory statement. APA Group submitted that risks in general should be compensated. APA Group alluded to risks[57] which the AER considers are more appropriately factored into cash flows (for example, higher capex or opex allowances) rather than through the WACC. We reiterate our draft position in relation to the return on equity that:[58]

> [s]ystematic risk is the only risk that enters into the estimation of return on equity under the assumption that investors hold fully diversified equity portfolios. This is because it is only non-diversifiable risk that equity investors cannot manage.

With respect to the return on debt, we continue to hold our draft position in relation to return on debt. There we noted that to the extent that non-systematic risks cause an expectation of default the yield

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53 APIA, *Submission to the draft guideline*, October 2013, p. 14.
54 APIA, *Submission to the draft guideline*, October 2013, pp. 16-20.
55 APIA, *Submission to the draft guideline*, October 2013, p. 17.
56 Multicollinearity results where variables move in a sufficiently similar or related way such that reliable attribution of impacts to a particular coefficient cannot be made. This means that the data does not explain the implied relationship at the chosen level of statistical significance.
57 APA Group, *Submission to the draft guideline*, October 2013, p. 13. The example provided refers to businesses operating in higher risk environments (eg. pipelines within a major urban area versus operating in an area where there is minimal human habitation), which leads to higher operating costs.
58 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 35.

to maturity will reflect this.[59] We consider that default risk is likely to be small for regulated energy networks. This is because they are protected from competition, which is why they are regulated, and these businesses have relatively stable cash flows.

The NSW Irrigator's Council submitted that the AER should reference competitive firms rather than regulated firms in defining the benchmark entity.[60] As stated in the draft explanatory statement, we consider that the benchmark efficient entity should reference regulated energy network businesses as:[61]

- The rules require us to consider the risks associated with delivering regulated services
- Regulated businesses are typically either not exposed to competition or exposed to limited competition. Regulated businesses are able to earn more stable cash flows relative to most unregulated businesses. Consequently, these factors may alter the relevant (systematic) risk profile of a regulated business when compared with an unregulated business.
- Regulated businesses may align their business practices to the regulatory regime. This may lead to a different risk exposure than that faced by an unregulated firm.

3.3.2 Efficiency of the benchmark entity

We consider that the benchmark entity is efficient as it responds to the incentives provided by the regulatory regime. In relation to efficient financing practices, we consider that in efficient capital markets all firms operate on the capital frontier. All firms should be priced efficiently and able to access capital at the cost which reflects the risks they face and which investors consider should be priced.

APA Group submitted that the AER has not reflected the rules requirement that the benchmark efficient entity is efficient in the conceptual definition of the benchmark efficient entity. It suggested that the AER use formal efficiency analysis using econometric techniques such as data envelopment or stochastic frontier analysis. It also pointed to the use of APIA's method to address efficiency.[62]

Given our position on the efficiency of the benchmark firm, we disagree with this submission. We do not consider these are necessary for the purposes of defining the benchmark efficient entity. APA Group referred to APIA's method addressing its efficiency concerns.[63] It is unclear to us what specification APIA's method makes in relation to efficiency.

3.3.3 Consideration of energy sector risks and differing risk between gas and electricity entities

We consider the two major drivers of different risk exposures between gas and electricity and transmission and distribution are demand and competition risk. However, for the reasons outlined above, we consider that the net risk exposure of the businesses we regulate is sufficiently similar to warrant the use of only one benchmark.

59 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 36.
60 NSWIC, *Submission to the draft guideline*, October 2013, p. 5.
61 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 48.
62 APA Group, *Submission to the draft guideline*, October 2013, p. 11.
63 APA Group, *Submission to the draft guideline*, October 2013, p. 11.

Some submissions supported this view. The MEU submitted that gas and electricity and transmission and distribution should be subject to the same approach for setting the rate of return.[64] PIAC stated that it agrees with using a single benchmark efficient entity to assess the rate of return across gas and electricity and transmission and distribution.[65]

ENA considered that the AER has not recognised the 'significant confluence of technological, commercial and regulatory risks' to which network businesses are exposed.[66] We disagree with this submission. We considered the impact of technological change and the impact of the proposed regulatory regime in the draft explanatory statement.[67] We did not consider them to be material.

We noted in the draft explanatory statement that gas and electricity production technology is relatively mature and technological advances which are likely to have a meaningful impact on prices have been relatively slow to commercialise.[68] The area of greatest development is in large scale renewables. However, while we note that renewables are projected to increase significantly, the intermittency of generation requires that there is concomitant development of gas peaking load to provide system stability.[69] Rooftop PV is projected to account for only a small amount of total electricity generation in 2050.Grid connection is still likely to be required for emergency and peak use and for deriving feed-in revenue.[70] Furthermore, businesses are able to change their tariff structures to mirror the change in use profile associated with rooftop PV, moving towards a higher fixed cost based on connectivity and capacity and a lower consumption cost.[71] There is also the potential for distributed solar PV to defer the requirement for network investment associated with peak demand by reducing maximum demand.[72]

In the draft explanatory statement we considered the impact of the regulatory regime on the risks to which regulated businesses are exposed in delivering regulated services. We referenced our proposed approach to the new rules which will modify the risks to which regulated businesses are exposed.[73] The changes relate primarily to electricity businesses. They include:

- the introduction of an ex post review where inefficient capex above the allowance, related party margins and opex amounts reclassified as capex are able to be excluded from the regulatory asset base. We note that regulated gas businesses are already subject to this.[74]

- Modification to the capital expenditure sharing scheme.[75] The AER is proposing to allow service providers to retain 30 per cent of any underspend during the regulatory control period and make service providers bear 30 per cent of any overspend.[76]

In the draft explanatory statement we noted that businesses have the flexibility to reprioritise capex between activities. They also have the ability to delay more discretionary projects and re-propose those projects for funding in subsequent access arrangement periods.[77] For electricity network service

64 MEU, *Submission to the draft guideline*, October 2013, p. 12.
65 PIAC, *Submission to the draft guideline*, October 2013, p. 10.
66 ENA, *Submission to the draft guideline*, October 2013, p. 3.
67 ENA, *Submission to the draft guideline*, October 2013, p. 44-46; ENA, *Submission to the draft guideline*, October 2013, Table 3.1, p. 37-40 and pp.40-41.
68 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 36.
69 BREE, *Australian Energy Projections to 2049-2050, Canberra, December 2012*, Table 11, p. 41.
70 Bain & Company, *Distributed energy: Disrupting the utility business model*, 2013, p. 1.
71 Bain & Company, *Distributed energy: Disrupting the utility business model*, 2013, p. 1.
72 BREE, *Australian Energy Projections to 2049-2050*, Canberra, December 2012, p. 45; Bain & Company, *Distributed energy: Disrupting the utility business model*, 2013, p. 3.
73 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 37.
74 NER, cls. S6.2.2A and S6A.2.2A; NGR, r. 77(2)(b).
75 NER, cls. 6.4A and 6A.5A.
76 AER, *Better Regulation: Final Capital Expenditure Incentives Guidelines*, December 2013, p. 7.
77 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 164.

providers once the assets are included in the RAB, assets cannot be optimised out under the NER. We note that the proposed capital expenditure sharing scheme is symmetric—it rewards under spend as well as penalising overspend. It is also limited to 30 per cent. As businesses have a reasonable degree of flexibility in their expenditure and as there are rewards for underspending as well as penalties associated with overspending we do not consider that the new rules (and our proposed approach in applying those rules) will materially change the risk exposure compared with the former regulatory regime. This view is supported by Frontier Economics.[78]

APIA, APA Group and Envestra stated that the AER has not taken account of a number of differences between gas and electricity. They consider these include:

- The differing impacts associated with the failure of a large customer which arises due to differences in the electricity and gas regulatory regimes.[79] In particular APIA and APA Group submitted that electricity transmission businesses, which are subject to a revenue cap, will not lose revenue, as the revenue is recovered from the residual customer base. APIA and APA Group stated that gas transmission businesses, which are subject to a price cap, incur the loss of revenue associated with the failed customer as they are unable to increase prices within the regulatory period. APIA stated that due to the prevalence of bilateral contracts (versus the use of reference tariffs) gas transmission businesses are unable to increase prices to other customers to cover the revenue loss. APA Group stated that the NER do not provide for a reduction in the regulatory asset base except for a reduction in dedicated connection assets while the NGR allow for the removal of redundant assets in subsequent regulatory periods.[80]

- That while fuel switching may be limited (due to sunk costs), once a contract has been entered, major customers have significant market power resulting in both the customer and the energy business making significant sunk cost investment which both parties need to ensure is recoverable. APIA submitted that this results in favourable terms and risk minimising terms being negotiated by the customer.[81]

- That gas, as a fuel of choice, is subject to greater competition than electricity, which is an essential fuel. Envestra pointed to a 2006 report for the Ministerial Council on Energy, which was tasked with advising on a consistent approach to access pricing regulation across electricity and gas, transmission and distribution. It stated that gas is subject to more competition from substitutes.[82]

We disagree with each of these points. Our reasons are below.

In relation to the first point, we consider that in order for the differential impact of large customer failure to be a consideration in determining a benchmark, we would need evidence of:

- past and expected future systematic customer failures across a particular business type in comparison with another business type (for example, gas transmission businesses on average have experienced a large customer loss more frequently than electricity transmission businesses over a reasonable period of time)

78 Frontier Economics, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia*, June 2013, p. 64.

79 APIA, *Submission to the draft guideline*, October 2013, p. 11; APA Group, *Submission to the draft guideline*, October 2013, p.12.

80 We note that under the new rules there is provision for an ex-post review (NER s. S6.2.2A, s. S6A.2.2A)

81 APIA, *Submission to the draft guideline*, October 2013, pp.11-12.

82 Envestra, *Submission to the draft guideline*, October 2013, p. 5.

- the magnitude of the revenue impact associated with the large customer loss, relative to forecast or contracted revenues (to the extent that is related to non-diversifiable risk).

While there may be differential treatment afforded by the regulatory regime, it is the frequency and the magnitude of the revenue impact which will dictate whether this causes sufficiently different risk exposures between the business types as to warrant different benchmarks. We have not received any evidence of differences in the frequency and impact of large customer failure across service providers. Such would be necessary to enable us to accept these submissions. Furthermore we do not consider that the intent of the rules is to consider an individual businesses' contract risk, whereby risky contracting behaviour should have a separate benchmark to compensate for the risky behaviour. Indeed the NER provide guidance—where a transmission asset becomes redundant and amongst other provisions, the provider has not sought to reasonably allocate the risks of the value of the asset, it may be rolled out of the regulatory asset base.[83]

In relation to the second point, we consider that the bargaining choices made by a business in distress[84] should not influence our assessment of risk. In the normal course of business, where there is a choice between electricity and gas suppliers, we expect that competition would be equally felt by both gas and electricity businesses. Furthermore, we would expect that an entity would only enter into a contract where it reasonably expected to recover its costs over the life of the asset. On this basis it is not clear how competition in advance of entering into a contract differentially affects the risk of a gas and electricity business.

In relation to the third point, we note that the quotes selected by Envestra were from a discussion on the appropriate form of regulation from full (price/revenue cap) to no regulation depending on the extent of market power which a business had in providing electricity and gas transmission/distribution services. One of the five factors assessed to contribute to market power was the presence of limited competition or substitutes for end-use gas or electricity services. Also discussed in this section of the report was that energy services are subject to 'some potential for users to shift consumption away from electricity or gas towards alternative fuels or other consumption areas altogether' and that '[s]hould the price of energy rise (including because of higher cost network services) such that consumers no longer find value in purchasing an additional unit, the most likely responses are either demand side management, in terms of reduced consumption, or a shift towards an alternative means of supply such as gas or embedded generation'.[85] We observe that where gas transmission pipelines are subject to sufficient competition as to ameliorate any market power, the transmission services provided using those gas transmission pipelines are not subject to regulation. This guideline relates to regulated gas transmission and distribution services. By virtue of being regulated, they are exposed to limited competition. In the draft explanatory statement we noted that the regulatory regime mitigates the differences in demand risk through the revenue or price setting mechanism (form of control). We stated that under a revenue cap, where forecast quantity demanded differs from actual quantity demanded, in subsequent years price adjustments are made to enable the approved revenue to be received by the service provider. Under a price cap, service providers may mitigate the risk of forecast error by restructuring tariffs, such that higher fixed charges are set to offset demand volatility. We reiterate, electricity distribution and gas service providers are able to propose the form of control—revenue cap, price cap, or any variation thereof—they employ.[86] We would expect service providers to choose the form of control which maximises its shareholder wealth. If a service provider chooses a

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83 NER s.6A.s.3(a)(3).

84 As APIA describes the then position of DBP - see APIA, *Submission to the draft guideline*, October 2013, p. 12, footnote 9.

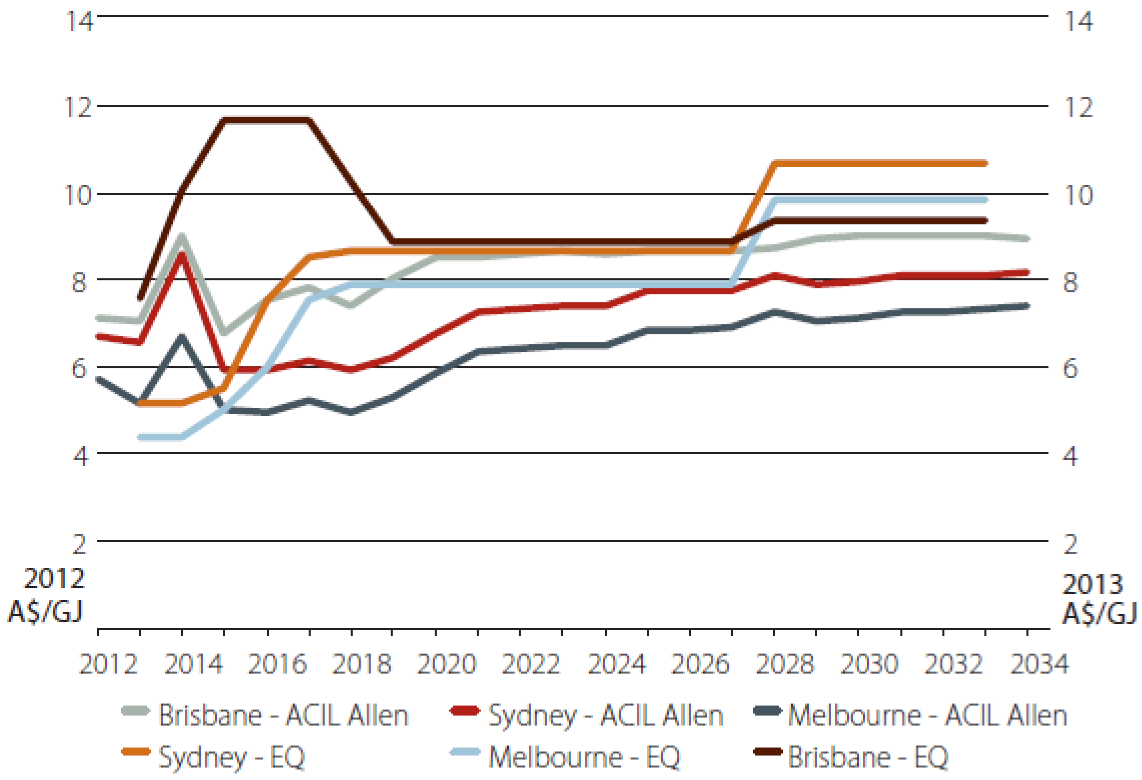
85 Allen Consulting Group, *Expert panel on energy access pricing: Report to the Ministerial Council on Energy*, April 2006, p. 50.

86 NER, cl. 6.2.5(b), NGR, r. 97(2).

price cap over a revenue cap it implies that any expected increase in cash flows must outweigh any expected increase in risk (i.e. discount rate applied to the expected cash flows).[87]

Envestra, in response to our view that we consider material competition is likely to arise between gas and electricity use where there is a significant change in the relative price of gas and electricity which is viewed to be stable over the long term, raised that it does not consider the relative cost of gas to be stable in the short or medium term.[88] We note that gas prices are projected to increase temporarily around 2014 when Queensland LNG commences and then return towards production costs once the LNG projects reach capacity (see figure 3.1).[89] We consider that due to sunk costs associated with energy consumption, consumers will make fuel-switching decisions based on relative price expectations which are stable and over the longer term, rather than in response to shorter-term, uncertain price expectations.

Figure 3.1 Eastern market gas price projections, 2012 to 2034



Notes: ACIL Allen is the base scenario and is plotted on the left hand side. EQ is EnergyQuest's $95 JCC scenario and is plotted on the right hand side.

Source: BREE, *Gas Market Report 2013*, October 2013, p. 43.

APIA submitted that the AER should consider US energy firms' asset betas in the absence of Australian data.[90] It stated that the US evidence indicates that gas transmission pipelines have a credit rating which is one notch below gas distribution, electricity transmission and distribution businesses and also have lower gearing and a lower EBITDA margin volatility. It stated that on an equal-gearing basis that gas transmission pipelines should be several notches below other energy

87 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 43.
88 Envestra, *Submission to the draft guideline*, October 2013, pp. 5-6.
89 BREE, *Gas Market Report 2013*, October 2013, pp. 42-43.
90 APIA, *Submission to the draft guideline*, October 2013, pp. 12-13.

firms. APIA also pointed to the asset beta range among the US firms considered by CEG (0.10 to 0.79) and the Australian firms considered by SFG (0.26 to 0.81) and questions how investors could conclude that the firms face similar risks.

Envestra submitted that electricity business are on average rated BBB+ while gas businesses are rated BBB, which indicated that gas businesses are riskier than electricity businesses. It stated that any perceived favourable aspects of the regulatory regime are not sufficient to offset the different risk profiles of gas and electricity businesses.[91] However, we are not aware that rating agencies distinguish between electricity and gas networks. Indeed Moody's has stated that:[92]

> Unlike issuers covered by the Rating Methodology for Regulated Electric and Gas Utilities (August 2009), regulated networks have generally been separated from supply and generation activities ("unbundling"). As such, they are exposed neither to end-users nor to commodity price risk as they charge tariffs to suppliers for the transportation of electricity and gas that are independent of the commodity price…..Moody's would therefore see regulated electric and gas networks as exhibiting relatively low business risk, which in turn translate into a significant capacity to sustain high debt levels.

We do not consider that US energy firms are a suitable proxy for Australian firms and so do not consider that the asset beta information from US energy firms is able to be used to provide evidence for separate benchmarks.

We note that for the distribution and transmission businesses that the AER regulates SFG's beta estimates ranged between 0.26 and 0.65 (see table 3.1). We note that APA GasNet, which is involved in gas transmission, is towards the lower end of the range of beta estimates. It also appears that the electricity and gas and transmission and distributions businesses are distributed throughout the range. This data would seem to indicate that there is no clear difference between gas and electricity or transmission and distribution.

Table 3.1 SFG beta estimates for AER regulated entities

	β_{OLS}	β_{Vas}	$\beta_{Re\text{-}g}$
SP AusNet	0.26	0.29	0.27
Gasnet	0.29	0.36	0.30
DUET	0.59	0.61	0.36
Envestra	0.65	0.66	0.47
Spark	0.39	0.42	0.54

Source: SFG, *Regression-based estimates of risk parameters,* June 2013, Table 5, p. 18.

We consider on the evidence before us that any difference in risk is not material enough to warrant separate benchmarks. We consider that our benchmark WACC will provide a regulatory return that should be at least as high as the expected cost of capital of the average regulated network gas businesses.

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91 Envestra, *Submission to the draft guideline*, October 2013, pp. 6-7.

92 Moody's, *Global Infrastructure Finance, Rating Methodology, Regulated Electric and Gas Networks*, August 2009, p. 40.

3.3.4 Consideration of the elements of the definition of the benchmark efficient entity

We propose to define the benchmark efficient entity as 'a pure play, regulated network energy business operating within Australia'. We consider that we are unable to conclusively determine a single efficient ownership structure. Therefore, we did not include any ownership specification in our proposed definition of the benchmark efficient entity. We note that the finance principle that the rate of return should be based on the non-diversifiable or systematic risks of the assets (that is, regulated energy business) and not on the overall risk of the parent should apply. Consistent with this principle, we consider that firms either with or without parent ownership can be used for estimating the return on capital, as long as the risk of the parent is likely to be consistent with the risk of the regulated business.

The MEU, COSBOA, and the Queensland Cane Growers Organisation submitted that the AER should have a separate benchmark entity for government-owned network service providers, reflecting the lower cost of debt which they face.[93]

The Queensland Cane Growers Organisation submitted that government–owned service provider's should have a separate benchmark entity to reflect the different financing practices and risk between government-owned and private service providers.

We observe that there are different financing practices across businesses, both private and government–owned. We have outlined the benchmark financing strategy at section 7.3.3. These practices are only relevant to the extent that they inform our benchmark efficient financing costs.

We consider that the systematic risks are likely to be almost identical between government-owned and private service providers. With respect to the difference in default risk, in the draft explanatory statement we considered that according to Klein, the lower cost of debt for government-backed entities is underwritten by taxpayers, through the government's ultimate recourse to taxation. If taxpayers were compensated for the risk they assume for tax-financed projects, then no capital cost advantage would be conferred through government finance. The risk premium on government finance would, in principle, be no different to that of private investors.[94] Indeed setting a lower WACC for government-owned businesses could place an incentive on government to sell service providers because the service provider would be worth more to private investors (who would get the higher WACC) than to government (who get the lower WACC). This could incentivise asset sales even in the absence of any efficiency reasons for privatisation. We therefore do not consider that there should be a separate benchmark for government-owned entities on the basis of different risk exposure.

The MEU considered this view was misguided. It submits that service providers' boards make decisions in the interests of the service provider, referencing its own rate of return and the allowed rate of return, rather than in the interests of taxpayers as assumed by Klein. The MEU stated there is therefore an incentive to overinvest. The MEU stated that applying the Klein assumption, the higher cost of capital allowed for the service provider relative to the cost of the whole-of-government borrowing infers that government-owned service providers have a higher risk than other users of government funds. The MEU submitted that the opposite is true—that regulated networks have excellent security, underpinned by rules, where the primary risk for non-payment is carried by retailers

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93 MEU, *Submission to the draft guideline*, October 2013, pp. 8-10; COSBOA, *Submission to the draft guideline*, October 2013; Queensland Cane Growers Organisation, *Submission to the draft guideline*, October 2013, p. 5.

94 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 49-50.

and networks are able to increase prices to maintain their allowed revenues. It submitted that this revenue security is not available to other users of government debt (such as railways and hospitals).[95]

The relevant issue in considering whether a government-owned business should have a lower benchmark rate of return compared to a privately–owned business is whether the relevant risks of the activity—investment in and operation of the energy networks is altered by government ownership. The MEU arguments addressed other issues, such as the comparison of risks and hurdle rates of return for general government capital expenditure and the costs of government-underwritten borrowing is less than that of the benchmark privately owned businesses. As the AEMC concluded:[96]

> If state-owned businesses issued their own bonds, without a government guarantee, they would face materially similar borrowing costs to privately-owned service providers. In the absence of competitive neutrality provisions, electricity consumers are unlikely to be better off from defining a separate benchmark for state-owned service. The most appropriate benchmark to use in the regulatory framework for all service providers, regardless of ownership in general, is the efficient private sector service provider.

95 MEU, *Submission to the draft guideline*, October 2013, pp. 8-10.
96 AEMC, *Final rule change determination*, November 2012, p. 72.

4 Overall rate of return

Under the rules, the allowed rate of return must be determined such that it achieves the allowed rate of return objective.[97] This includes that the allowed rate of return for a regulatory year must be:[98]

- a weighted average of the return on equity for the regulatory control period in which that regulatory year occurs, and the return on debt for that regulatory year
- determined on a nominal vanilla basis that is consistent with the estimate of the value of imputation credits.

4.1 Issue

This chapter focuses on the determination of the overall rate of return using the nominal vanilla weighted average cost of capital (WACC) formula.[99] This includes the following considerations relevant to the overall rate of return:

- our use of the nominal post–tax framework and the form of the WACC (section 4.3.1)
- intra–period adjustments (section 4.3.2)
- consideration of other information at the overall rate of return level (section 4.3.3)
- the term of the WACC (section 4.3.4).

Our approach to estimating the overall rate of return is largely consistent with our draft guideline. This approach is outlined in section 4.2, and was broadly supported by all stakeholders. Consumer groups, however, submitted that we should consider additional material to inform whether our estimate of the overall rate of return achieves the allowed rate of return objective. Service providers were more circumspect on the use of such material, and requested we provide further guidance on how regulated asset base (RAB) acquisition and trading multiples will be considered. The role of these multiples is discussed in section 4.3.3.

For clarity, several of the issues relevant to the overall rate of return are also relevant to both the return on debt and the return on equity. The primary discussion of these issues, therefore, is included in the corresponding return on debt and return on equity chapters and appendices.[100]

4.2 Approach

Our approach to determining an allowed rate of return that achieves the allowed rate of return objective includes the following characteristics:

- it estimates the rate of return on a nominal vanilla basis, as a weighted average of the point estimates of the return on equity and the return on debt[101]
- the weight given to the respective point estimates of the return on equity and the return on debt is based on our gearing ratio point estimate

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97 NER, cl. 6.5.2(b), and 6A.6.2(b); NGR, r. 87(2).
98 NER, cl. 6.5.2(d), and 6A.6.2(d); NGR, r. 87(4).
99 A nominal vanilla WACC is the combination of a nominal post–tax return on equity and a nominal pre–tax return on debt.
100 For example, the term for the return on debt is principally discussed in chapter 8.
101 NER, cl. 6.5.2(d), and 6A.6.2(d); NGR, r. 87(4).

- the term of our estimates of both the return on equity and return on debt is 10 years
- our estimate of the return on equity will be made at the start of the regulatory control period and then held constant across the regulatory control period, whereas our estimate of the return on debt will be updated annually

4.3 Reasons for approach

This section provides the reasoning for our approach, and discusses the context in which it was developed.

4.3.1 Nominal post–tax framework and the form of the WACC

The rules prescribe that we must use a nominal post–tax framework to determine building block revenues.[102]

A nominal framework means that the building block revenue forecasts include estimates of expected inflation. This means that we estimate the revenue allowance in nominal dollar terms. In particular, when calculating the rate of return on capital building block we index the regulatory asset base each year by expected inflation. We multiply this by a nominal rate of return that also includes expected inflation. To ensure that the impact of inflation is properly accounted for (that is, not included more than once), we make a corresponding reduction to the depreciation calculation. This produces the regulatory depreciation building block.

A post–tax framework means that the estimated rate of return does not include compensation for the cost of corporate income tax. Instead, the overall building block allowance includes a separate tax allowance building block. To implement this framework, we use a 'nominal vanilla' WACC, which is a combination of a pre–tax return on debt and a post–tax return on equity. Conceptually, this post–tax return on equity includes the value of dividends, capital gains and imputation credits. We also adjust the corporate income tax allowance for the value of imputation credits to investors.[103]

4.3.2 Intra–period adjustments

In previous determinations, we have set the overall rate of return by estimating a rate for the start of the regulatory control period, and holding this rate constant over the whole regulatory control period (usually five years). Further, our rate of return in previous determinations has been based on prevailing conditions in the market for funds at the commencement of the regulatory control period.

The rules now allow annual adjustments to be applied to the return on debt (if the regulator decides such an approach is appropriate).[104] This requires the formula for calculating the updated return on debt to be specified in the regulatory determination. The formula must also be capable of being applied automatically.[105]

As discussed in greater detail in chapter 7, our approach to estimating the return on debt includes annual updates. Accordingly, our overall rate of return estimate will be updated annually.

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[102] NER, cl. 6.4.2, 6.4.3, 6A.5.3 and 6A.5.4; NGR, r. 76, 87A.

[103] However, the accumulation indices used in historical estimates of the market risk premium (MRP) only include the returns from capital gains and dividends. Therefore, in using historical estimates to inform our forward looking MRP value, we 'gross up' these estimates for the value of imputation credits. We discuss our approach to the estimation of the MRP in chapter 6 and appendix D. We discuss imputation credits further in chapter 9 and appendix H.

[104] NER, cl. 6.5.2(i), and 6A.6.2(i); NGR, r. 87(9).

[105] NER, cl. 6.5.2(l), and 6A.6.2(l); NGR, r. 87(12).

4.3.3 Other information potentially considered at the overall rate of return level

In our draft guideline, we proposed to continue using regulatory asset base (RAB) acquisition and trading multiples to provide reasonableness checks on the overall rate of return. On reflection, we have modified our proposed approach for this final guideline.

We now propose to not apply levels and changes in RAB acquisition and trading multiples as a direct reasonableness check on the overall rate of return at the time of a particular revenue determination or access arrangement. Instead, we propose to use these multiples as part of a set of indicators that we monitor over time and across network businesses to help inform us of potential areas of inquiry and research. This more general use of these multiples reflects the fact that there are many potential influences on RAB acquisition and trading multiples, such as changes in the expectations and the realisations of business revenues, expenditures and rates of return. Given these many potential influences, any changes in these multiples may not be immediately attributable to any one factor. We propose to continue to monitor RAB acquisition and trading multiples to inform us of market outcomes over time and in response to changes in the environment of the network businesses, without making use of them directly in the rate of return determination process.

PIAC has submitted that we should consider direct measures of the profitability of service providers.[106] For example, the comparative performance report for Victorian electricity and gas service providers included a comparison of returns on service providers' asset bases with the allowed regulatory returns. As stated in our consultation paper, however, the incentive framework limits the usability of comparisons based on actual rates of return.[107] For example, service providers are incentivised to outperform regulatory benchmarks for opex, capex, debt, tax and service performance. The ability for a service provider to earn an actual return on equity higher than the allowed return on equity, therefore, may be due to the outperformance of these benchmarks. Importantly, outperformance does not necessarily imply that the regulatory rate of return is incorrect.

4.3.4 Term of the WACC

The rules require us to have regard to the desirability of using an approach that leads to the consistent application of any estimates of financial parameters.[108] The rules, however, do not mandate a consistent term across the return on equity and return on debt. Rather, the rules enable us to consider whether a consistent term for both the return on equity and the return on debt is appropriate.

For the reasons discussed in chapter 8, we have adopted a 10 year term for the return on debt. The reasons for this term reflect the consideration of service providers' debt portfolios. Alternatively, the term for the return on equity is discussed below.

Return on equity term

The Australian Competition Tribunal (the Tribunal) decided in its 2003 GasNet decision that 10 years is an appropriate term of the risk free rate in the Sharpe–Lintner capital asset pricing model (CAPM).[109] In the consultation paper, we sought submissions from stakeholders on the appropriate term of equity in the consultation paper. Consistent with our draft guideline, we have adopted a 10 year term for the return on equity.

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106 PIAC, *Submission to the draft guideline*, October 2013, p. 26.
107 AER, *Rate of return consultation paper*, May 2013, p. 88.
108 NER, cl. 6.5.2(e)(2) and 6A.6.2(e)(2); NGR, r. 87(5).
109 Australian Competition Tribunal, *Application by GasNet Australia (Operations) Pty Ltd [2003] ACompT 6*, 23 December 2003.

There are reasonable arguments to support either a 10 year term or a five year term for the return on equity. The case for a 10 year term emphasises the long term nature of cash flows in equity investment, in general, and the long lived nature of the assets in an infrastructure business (such as electricity and gas service providers), in particular. The case for a five year term emphasises the similarity in the cash flows between a regulated electricity or gas service provider subject to five year regulatory control periods and the cash flows of a five year bond with annual coupon payments.

The opinions of experts on this matter are mixed. Some experts support a 10 year term while others support a five year term.[110]

In this guideline, we have adopted a 10 year term for the return on equity. This is because:

- On balance, we are more persuaded by the arguments for a 10 year term, than the arguments for a five year term.
- We have adopted a 10 year term in past decisions.[111] Maintaining our previous position, in the absence of good reasons for change, promotes certainty and predictability in decision making.
- Maintaining a 10 year term avoids some practical complexities in the estimation of certain return on equity parameters (specifically, the MRP) that would result from a change from a 10 year to five year term.
- The difference in the overall rate of return between a 10 year and five year return on equity is unlikely to be material.

We elaborated further on these reasons in our explanatory statement accompanying the draft guideline.[112]

For the above reasons, maintaining a 10 year term for the return on equity promotes the allowed rate of return objective. In their submissions on the draft guideline, service providers supported maintaining a 10 year term for equity.[113] We did not receive any submissions from consumer groups that commented on the term for equity.[114]

110 For example, Pratt and Grabowski (2010) and Damodaran (2008) both propose that, in general, an equity investment in an ongoing business is long term. They suggest, therefore, that for an ongoing business, the term of the equity should be measured as the duration of the long-term—and potentially infinite—series of cash flows. Both conclude that it is appropriate to use long term government bonds to estimate the return on equity, with Damodaran suggesting that 10 years is generally appropriate. Alternatively, Lally (2012) argues that a five year term is consistent with the present value principle—that the net present value (NPV) of cash flows should equal the purchase price of the investment. Lally stated that the present value principle is approximately satisfied only if the term of equity matches the regulatory control period. S. Pratt and R. Grabowski, *Cost of Capital: Applications and Examples*, 4th edition, 2010, pp. 118–120; A. Damodaran, *'What is the risk free rate? A search for the basic building block'*, December 2008, pp. 9-10. M. Lally, *The risk free rate and the present value principle*, 22 August 2012.

111 See, for example: AER, *Access arrangement final decision APA GasNet Australia (Operations) Pty Ltd 2013-17, Part 2: Attachments*, March 2013, p. 54.

112 AER, *Better regulation: Explanatory statement, Draft rate of return guideline*, 30 August 2013, pp. 181–184.

113 See, for example: ENA, *Response to the draft rate of return guideline of the Australian Energy Regulator*, 11 October 2013, p. 30; APA Group, *Submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013, p. 23; NSW DNSPs, *Submission on the rate of return draft guideline*, 11 October 2013, p. 18; Spark Infrastructure, *Response to the AER's draft rate of return guideline*, 11 October 2013, p. 4; APIA, M*eeting the ARORO? A Submission on the Australian Economic Regulator's draft rate of return guideline*, p. 1.

114 Some submissions from consumer groups commented on the term for the return on debt. The term for debt is addressed in chapter 8.

5 Return on equity: approach

To determine the allowed rate of return, the rules require that we have regard to relevant estimation methods, financial models, market data and other evidence.[115] For the purpose of estimating the expected return on equity, this involves the consideration of a number of alternative models and information sources. The rules also require the rate of return guideline set out: [116]

- the methods we propose to use in estimating the allowed rate of return, including how those methods are proposed to result in the determination of a return on equity that is consistent with the allowed rate of return objective
- the estimation methods, financial models, market data and other evidence we propose to take into account in estimating the return on equity.

5.1 Issue

In this chapter, we outline the reasons for our proposed approach to determining a point estimate of the expected return on equity. Our proposed approach for estimating the expected return on equity uses the Sharpe–Lintner capital asset pricing model (CAPM) as our 'foundation model'. Our foundation model estimate provides a starting point, and our final estimate of the expected return on equity has regard to a broad range of relevant material. In this context, a key question for the guideline is how to distil a range of information into a point estimate of the expected return on equity.[117]

This chapter also refers to a number of appendices linked to the estimation of the return on equity. These include:

- chapter 6 outlines our approach to the estimation of the risk free rate, equity beta and market risk premium (MRP)
- appendix A assesses relevant models against our criteria, and discusses the role of relevant models
- appendix B assesses other relevant material against our criteria, and discusses the role of other relevant material
- appendix C discusses our approach to estimating the equity beta in greater detail
- appendix D discusses our approach to estimating the market risk premium in greater detail
- appendix E discusses dividend growth models (DGMs) in greater detail.

Our proposed approach for estimating the expected return on equity is consistent with the approach outlined in our draft guideline. This approach was supported by consumer groups.[118] Alternatively, submissions from service providers generally supported a multiple–model approach. The multiple–model approach, as proposed by the ENA and the APIA, estimates the expected return on equity by

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115 NER, cls. 6.5.2(e)(1) and 6A.6.2(e)(1); NGR, r. 87(5).

116 NER, cls. 6.5.2(n) and 6A.6.2(n); NGR, r. 87(14).

117 In our consultation paper we stated that we would determine a single point estimate for the return on equity before estimating the rate of return.

118 See, for example: Public Interest Advocacy Centre, *Reasonably rated: Submission to the AER's draft rate of return guideline*, 11 October 2013; Major Energy Users Inc., *Better Regulation rate of return guidelines: Comments on the draft guideline*, 10 October 2013; Energy Users Association of Australia, *Submission to the draft AER rate of return guideline*, 11 October 2013.

combining different estimates from a number of complex models.[119] The limited submissions from investor groups also supported a multiple–model approach, but generally, advocated a shift away from any view that investors require a fixed return over the risk free rate.[120]

Our final explanatory statement expands on our draft explanatory statement to include greater detail regarding the implementation of relevant material. Notably, it includes input parameter estimates for our foundation model as of December 2013. Our decision to include input parameter estimates in this final explanatory statement follows submissions from stakeholders, particularly service providers, seeking greater certainty of process.[121] We recognise that this certainty is important for promoting investment in network infrastructure.[122]

More broadly, the development of our approach to estimating the expected return on equity has followed an extensive stakeholder engagement process. This has included public workshops following the publication of both our consultation paper and draft guideline. Similarly, we held multiple meetings with service providers, network infrastructure investors and consumer representatives (including the Consumer Reference Group). As outlined previously, the discussions with stakeholders have informed our approach, and the issues raised are outlined in detail in this chapter and related appendices. The engagement process for the return on equity has also led to the following consultant reports being commissioned:

- Professor McKenzie and Associate Professor Partington developed a report titled 'Risk, asset pricing models and WACC'.[123] This report discussed the merits of alternative models used to estimate the expected return on equity, and is reflected in the analysis in appendices A and B.
- McKenzie and Partington, and Professor Lally developed separate reports on the construction of DGMs.[124] These reports are discussed further in appendix E.
- Frontier Economics developed a report titled 'Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia'.[125] The analysis in this report, in particular the assessment of the risk profile of the provision of regulated services, was relevant to the estimation of the equity beta (in chapter 6 and appendix C).

5.2 Approach

Our proposed approach to determining a point estimate for the return on equity includes the following characteristics:

- It has regard to a broad range of relevant material.

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[119] The multiple–model approach is discussed in greater detail in section 5.3.10. See, for example: ActewAGL, *Response to draft rate of return guideline*, 11 October 2013; CitiPower, Powercor, SA Power Networks, *Submission to the draft AER rate of return guideline*, 11 October 2013; APA Group, *Submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013.

[120] Spark Infrastructure, *Response to the AER's draft rate of return guideline*, 11 October 2013, p. 4.

[121] See, for example: NSW distribution network service providers, *Submission on the rate of return draft guideline*, 11 October 2013.

[122] Spark Infrastructure, *Response to the draft guideline*, October 2013, p. 5.

[123] M. McKenzie and G. Partington, *Report to the AER: Risk, asset pricing models and WACC*, 27 June 2013.

[124] M. McKenzie and G. Partington, *Report to the AER: the Dividend Growth Model (DGM)*, December 2013; M. Lally, *Review of the AER's proposed Dividend Growth Model*, December 2013.

[125] Frontier Economics, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia: A report prepared for the AER*, July 2013.

- Relevant material that may inform our estimate of the return on equity will be assessed against our criteria. This assessment will be used when we consider the merits and determine the role of relevant material in estimating the return on equity.
- The Sharpe–Lintner CAPM will be used informatively, rather than determinately, to provide the starting point estimate and range for the final return on equity. We describe the Sharpe–Lintner CAPM as our 'foundation model'.
- Input parameter estimates for the Sharpe–Lintner CAPM will be informed by material including the Black CAPM and DGM estimates. We will also have regard to other theoretical and empirical evidence, including historical excess returns, survey evidence, implied volatility measures, other regulators' MRP estimates, debt spreads and dividend yields.
- Regard will also be had to other information to determine the final return on equity point estimate. This includes an alternative implementation of the Sharpe–Lintner CAPM recommended by Professor Wright, and estimates of the return on equity from valuation reports, brokers and other regulators.[126]
- Given the uncertainty inherent in estimating expected equity returns, the final return on equity estimate will reflect either the foundation model point estimate, or an alternative value that is a multiple of 25 basis points.[127]

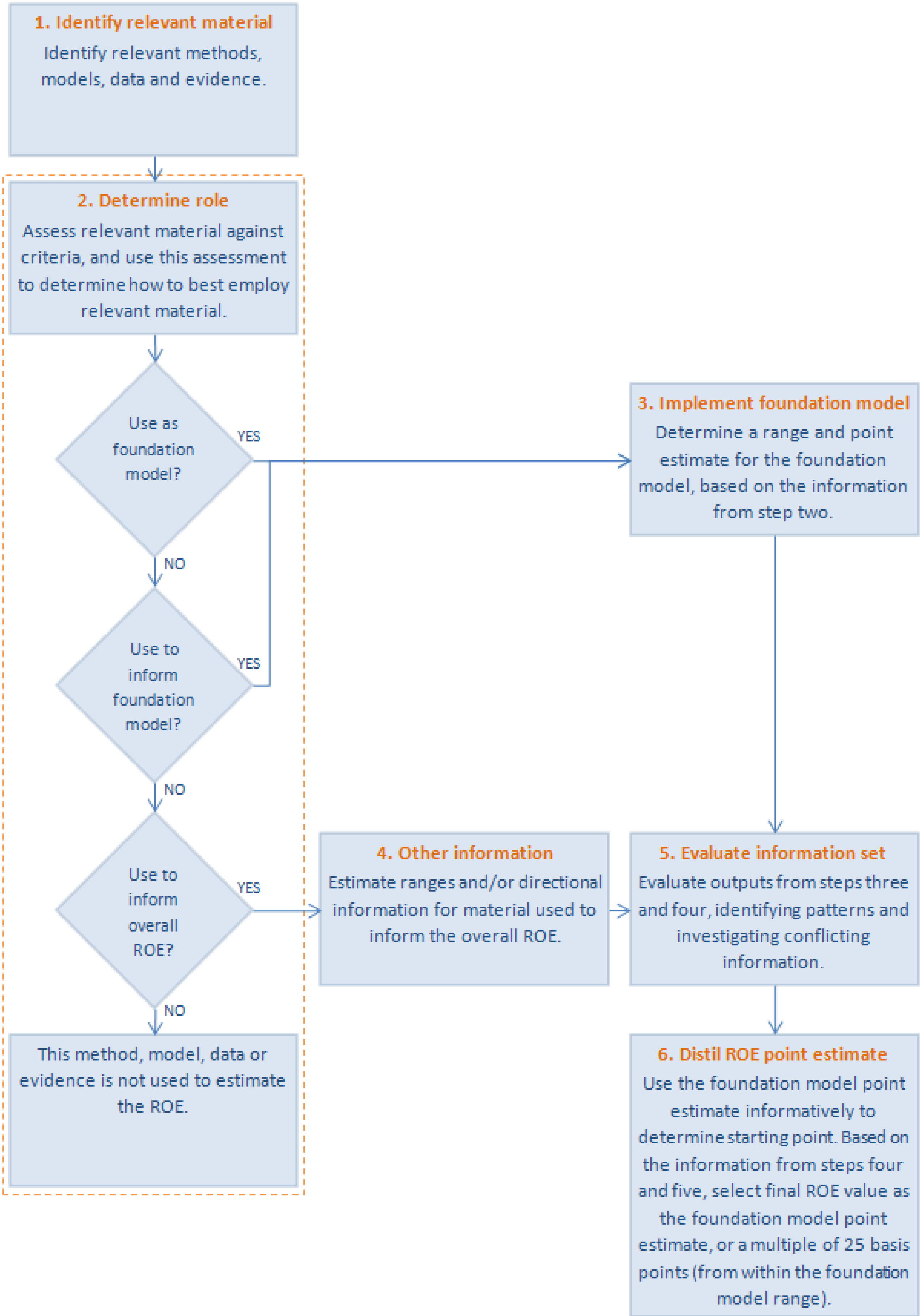
A flowchart outlining our approach is provided in figure 5.1. The implementation of this approach, and the reasoning underlying these steps, is discussed in greater detail in this chapter and in appendices A and B. We consider the information provided in our final explanatory statement will allow stakeholders to make a reasonable estimate of the return on equity that will apply at the time of a determination.[128]

126 During the Victorian gas access arrangement review, the Victorian gas service providers commissioned a report from Professor Stephen Wright. In this report, Wright proposed an alternative implementation of the Sharpe–Lintner CAPM for estimating the return on equity for the benchmark firm. See, for example: Wright, *Review of risk free rate and cost of equity estimates: A comparison of UK approaches with the AER*, October 2012.

127 If the foundation model estimate is used, this estimate will be rounded to a single decimal point.

128 For example, the inclusion on input parameter estimates for the Sharpe–Lintner CAPM should allow stakeholders to determine the starting point and expected range for the foundation model. Similarly, greater detail is provided regarding our implementation and use of the Wright approach, the dividend growth model, and expert valuation reports.

Figure 5.1 Flowchart of approach to estimating the return on equity



Source: AER analysis.

5.3 Reasons for approach

This section provides the reasoning for the development of our foundation model approach, followed by greater detail on the steps required to implement this approach. We also discuss the following:

- market practice for estimating the expected return on equity (section 5.3.3)
- regulatory judgement required to estimate the expected return on equity (section 5.3.4)
- role of our foundation model range (section 5.3.5)
- precision of expected return on equity estimates (section 5.3.6)
- stability of expected equity returns (section 5.3.7)
- development process and stakeholder engagement underpinning our approach (section 5.3.8)
- submissions from consumer groups, and alternative approaches proposed by stakeholders (section 5.3.9 and 5.3.10).

Further detail regarding our assessment and determination of the role of relevant material is provided in appendices A and B.

5.3.1 Development of our foundation model approach

In the development of our proposed approach for estimating the expected return on equity, we first considered four broad alternatives. These alternatives reflected the broad rules framework. Specifically, in our consultation paper we outlined the following four options:[129]

(1) Use one model to estimate the expected return on equity. This approach implied that the outcome of a single model is used to determine the return on equity. Other models would not form part of the estimation, and adjustments to the model outcome would not be made.

(2) Use one primary model with reasonableness checks. Generally, it would be expected that the output from the primary model would be adopted as our estimate of the expected return on equity (as per option one). However, where the reasonableness checks suggested the output from the primary model was not reasonable, the expected return on equity would be determined based on regulatory judgement (informative use of primary model).

(3) Use several primary models with quantitative but non–complicated fixed weighting. For example, this might entail the choice of two models with broad, simple weightings (such as 70:30).

(4) Use multiple models and other information. The final return on equity would be determined based on regulatory judgment, taking into account the models and other information. No explicit weights would be provided, but models and other information could be given qualitative weighting (for example, 'most weight', 'less weight', and 'low weight').

In our consultation paper, we also discussed the merits of the four alternative approaches.[130] The key benefit of using a primary model is that it provides greater predictability of outcomes. At the extreme—that is, option one—stakeholders would be able to estimate the return on equity expected to be

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129 AER, *Consultation paper, Rate of return guidelines*, 10 May 2013, pp. 42–44.
130 AER, *Rate of return consultation paper,* May 2013, pp. 42–44.

determined at the time of a determination with considerable accuracy. We also considered this option was transparent, replicable and simple to implement. This approach, however, may be too prescriptive.

Conversely, the other extreme—using multiple models and other information—draws on a range of material. This may reduce the significance of weaknesses in any one model or source of information. The limitations of this approach, however, is that it may be complex to implement (given multiple models must be estimated), and may not provide an appropriate level of predictability. A multiple model approach may also lead to inappropriate consideration being given to relevant material. These limitations are discussed in detail in section 5.3.10.

Using several primary models with quantitative but non–complicated fixed weighting shares many of the benefits and limitations of both options one and four, but to a lesser degree. Similar to option four, for example, it draws on a range of material and is complex to implement. Alternatively, similar to option one, it is predictable at the expense of flexibility.

Our proposed approach draws on elements from each alternative, but most closely resembles option two. For example, it draws on the key elements from a number of models, but recognises that all models are incomplete and that some approaches provide greater insight than others. For the following reasons, we consider this approach will deliver a robust estimate of the expected return on equity that will maximise the likelihood of our overall rate of return achieving the allowed rate of return objective:

- Using the foundation model and other information informatively (as opposed to determinately) to estimate the expected return on equity is consistent with the approaches adopted by market practitioners.[131]

- Using the foundation model and other information informatively acknowledges the inherent uncertainty in estimating the expected return on equity. That is, it recognises that all models are incomplete and that some approaches provide greater insight than others.

- Using the foundation model and other information informatively acknowledges the need for regulatory judgement in estimating the expected return on equity. Given the breadth of material and range of values that may represent reasonable estimates of the expected return on equity, the use of judgement is unavoidable.

- Using a foundation model approach is relatively simple to implement (particularly in comparison to combining different estimates of multiple models). For example, our foundation model—the Sharpe–Lintner CAPM—is a model that stakeholders are familiar with already (given its widespread use amongst market practitioners and other regulators).

- Using a foundation model approach may allow stakeholders to make reasonable estimates of the returns expected to be determined in advance of a determination. We consider that our proposed approach provides more guidance than the alternative of separately estimating and combining different models. As noted in stakeholder submissions, the guideline should provide certainty and predictability to assist investors in making their investment decisions.[132]

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131 See, for example: SFG, *Evidence on the required return on equity from independent expert reports: Report for the Energy Networks Association,* 24 June 2013; Ernst & Young, *Market evidence on the cost of equity: Victorian gas access arrangement review 2013–2017*, 8 November 2012.

132 See, for example: The Financial Investor Group, *Response to AER consultation paper: Rate of return guidelines*, 24 June 2013, p. 1.

- Using a foundation model, and drawing on other information to determine a final estimate of the expected return on equity, provides an appropriate balance between a relatively replicable and transparent process and providing flexibility in changing market circumstances. Such a process provides scope for engaging with the openness and flexibility of the rules within a broad structure.
- Using a foundation model and other information informatively, and selecting a final estimate of the return on equity that is a multiple of 25 basis points (if departing from the foundation model estimate), disavows the pursuit of false precision.
- Using the Sharpe–Lintner CAPM as the foundation model reflects our assessment of the model against our criteria. Specifically, we consider it is superior to alternative models (for the purposes of estimating the return on equity for the benchmark efficient entity).
- Our approach has also been developed in consultation with a range of stakeholders, including service providers and their industry associations, investors, and consumer groups. This engagement process is discussed in greater detail in section 5.3.8.

5.3.2 Our foundation model approach: step–by–step

To determine an estimate of the return on equity that is consistent with the allowed rate of return objective, we have adopted an approach based on a single foundation model. As summarised in section 5.2, this approach also draws on information and estimates from other relevant material. The reasons for adopting a foundation model approach are discussed in section 5.3.1.

Our approach represents a departure from the process undertaken during recent determinations. However, this approach is a result of the extensive stakeholder engagement for the development of this guideline. In particular, our approach draws on aspects of the four alternative approaches outlined in our consultation paper, as well as submissions from stakeholders. These alternative approaches, including those that combine direct estimates of multiple models (as proposed by both the ENA and APIA), are discussed in sections 5.3.1 and 5.3.10.

Step one: identify relevant material

The rules require us to have regard to all relevant estimation methods, financial models, market data and other evidence when determining our estimate of the return on equity for the benchmark efficient entity. The first step in our approach, therefore, is to identify the relevant material that may inform our estimate of the return on equity. Table 5.1 and table 5.2 list some of the material considered in this step.

We will, in accordance with the rules, have regard to all relevant material. However, this does not require us to use all of that material to inform our estimate of the return on equity.[133] Instead, we will use our assessment of the relevant material against the criteria to determine whether to use relevant material to inform our estimate of the return on equity. This assessment forms part of step two.

[133] This interpretation contrasts with submissions from the ENA and (to a lesser extent) the APIA. Specifically, the ENA submitted that our proposed approach was inconsistent with the rules as we proposed to not use specific material (for example, the Fama–French three factor model). The APIA shared the ENA's concern that a foundation model approach may have legal implications in respect of meeting the NGR, but acknowledged that a foundation model approach may satisfy the economic intent behind the NGR. Energy Networks Association, *Response to the draft rate of return guideline of the Australian Energy Regulator*, 11 October 2013, p. 24; Australian Pipeline Industry Association Ltd, *Meeting the ARORO? A submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013, p. 22.

Step two: determine role

Under step two, the relevant material (identified in step one) is assessed against our criteria. This applies a consistent framework for all material. This assessment is provided in appendices A and B.

The assessment of the relevant material against our criteria is further considered when determining where relevant material may inform our estimate of the return on equity. Specifically, we may use relevant material in one of four different ways:

(1) As the foundation model:

One possible use for relevant material under our approach is as the foundation model. As outlined in section 5.2, the foundation model is used to determine the starting point and expected range for our estimate of the return on equity. Given the prominence of the foundation model in our approach, it is critical that the model substantively meets our assessment criteria.

(2) To inform the estimation of parameters within the foundation model:

An alternative to using relevant material as the foundation model is to use such material to inform the input parameter estimates of the foundation model. Consistent with the current rules framework, this represents a balance between the assessment of relevant material against our criteria, and the desirability of drawing on the broadest range of evidence available.

(3) To inform where within the return on equity range (set by the foundation model) our 'final' return on equity point estimate should fall:

In addition to using relevant material as the foundation model, or to inform the foundation model parameters, relevant material may be used to inform the overall return on equity point estimate. This approach is consistent with using material where it is fit for purpose.

(4) Not used to estimate the return on equity:

The final category for consideration under step two is which relevant material will not be used for estimating the return on equity. This recognises that some material may not meet most of our assessment criteria, and/or may not be fit for the purpose of estimating the return on equity for the benchmark efficient entity.

Moreover, under our approach, relevant material will only be used once (to the extent practicable).[134] This avoids the potential for 'double counting' or unintended 'weight' to be assigned to a particular model or estimate. We consider this promotes transparency, and is consistent with our assessment criteria regarding the implementation of material in accordance with good practice.

Table 5.1 sets out our use of the relevant models identified in step one. We will use the Sharpe–Lintner CAPM as the foundation model, and the Black CAPM and DGM estimates to inform the Sharpe–Lintner CAPM input parameters. We propose not to use the Fama–French three factor model.

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134 It is recognised that some level of overlap of models and input evidence is unavoidable. For example, we propose to use other regulators' estimates of the return on equity, notwithstanding that other regulators may rely on much of the same material. Alternative implementations of a particular model may also be considered in multiple categories.

The reasoning and logic underlying this step is discussed in greater detail in appendix A. For example, the sensitivity of the Black CAPM to implementation variabilities limits the ability to use the Black CAPM as the foundation model. Theoretical and empirical evidence, however, supports using the Black CAPM, to some extent, in the process for estimating the return on equity. As such, we will use the Black CAPM to inform the selection of the equity beta.

Table 5.1 Role of relevant models

Material (step one)	Role (step two)
Sharpe–Lintner CAPM	Foundation model
Black CAPM	Inform foundation model parameter estimates (equity beta)
Dividend growth models	Inform foundation model parameter estimates (MRP)
Fama–French three factor model	No role

Source: AER analysis.

Table 5.2 sets out our proposed use of the other relevant material identified in step one. This includes information that we propose to use to inform foundation model input parameter estimates. It also includes material that we propose to use to inform our final estimate of the expected return on equity. For clarity, our use of debt spreads and dividend yields has changed from that outlined in the draft guideline. The reasons for this change are outlined in appendix D.

Table 5.2 Role of other relevant information

Material (step one)	Role (step two)
Commonwealth government securities	Inform foundation model parameter estimates (risk free rate)
Observed equity beta estimates	Inform foundation model parameter estimates (equity beta)
Historical excess returns	Inform foundation model parameter estimates (MRP)
Survey evidence of the MRP	Inform foundation model parameter estimates (MRP)
Implied volatility	Inform foundation model parameter estimates (MRP)
Other regulators' MRP estimates	Inform foundation model parameter estimates (MRP)
Debt spreads	Inform foundation model parameter estimates (MRP)
Dividend yields	Inform foundation model parameter estimates (MRP)
Wright approach	Inform the overall return on equity
Takeover/valuation reports	Inform the overall return on equity
Brokers' return on equity estimates	Inform the overall return on equity
Other regulators' return on equity estimates	Inform the overall return on equity
Comparison with return on debt	Inform the overall return on equity
Trading multiples	No role
Asset sales	No role
Brokers' WACC estimates	No role
Other regulators' WACC estimates	No role
Finance metrics	No role[135]

Source: AER analysis.

Step three: implement foundation model

As outlined in step two, our approach adopts the Sharpe–Lintner CAPM as the foundation model. The role of the Sharpe–Lintner CAPM, and the inclusion of only one model as a foundation model, reflects

135 As discussed in detail in appendix B, we consider that finance metrics may prove useful in our decisions. However, at this stage we have not formed a view on how these tests should be applied. Therefore, we do not propose these tests in our final guideline.

our assessment of the models against the criteria.[136] The estimation of the Sharpe–Lintner CAPM input parameters, including the role of information used to inform these estimates, is discussed in greater detail in chapter 6 and appendices A, C and D. In summary, we propose to implement the Sharpe–Lintner CAPM as follows:

- The Sharpe–Lintner CAPM will be estimated as the sum of the risk free rate, and the product of the equity beta and MRP.
- The risk free rate will be estimated with regard to Commonwealth government securities. Given yields on these securities are readily observable, only a point estimate (and not a range) for the risk free rate will be determined. The method for estimating the risk free rate is set out in the guideline, with the actual point estimate determined during the determination process.
- The equity beta range will be estimated with regard to theoretical and empirical evidence—based on the observed equity beta for a comparator set of Australian energy networks, cross checked against overseas energy networks.
- The equity beta point estimate will be determined based on regulatory judgement, having regard to the theory underpinning the Black CAPM and regulatory precedent (as discussed in appendix C).
- The MRP range will be estimated with regard to theoretical and empirical evidence—based on evidence such as historical excess returns, survey evidence, financial market indicators, estimates from other regulators, and DGM estimates.
- The MRP point estimate will be determined based on regulatory judgement, taking into account estimates from each of those sources of evidence (as discussed in appendix D).
- The range and point estimate for the return on equity will be calculated based on the range and point estimates from the corresponding input parameters. For example, the lower bound of the return on equity range would be calculated by applying the point estimate for the risk free rate and the lower bound estimates for the equity beta and MRP.

For clarity, the use of ranges and point estimates for the equity beta, MRP and the return on equity reflects the inherent uncertainty in determining precise estimates for these values.

Step four: other information

Under step four, other information that may inform our final return on equity point estimate is considered. This material was outlined in table 5.2, and is further explained in appendix B.

The manner in which we may use other information, however, may differ for each alternative source. Specifically, some of the other information may provide a range (at a point in time) for the return on equity, while others may provide only directional information.[137] In this context, directional information refers to the relativity of current estimates to a baseline value. For example, directional information may inform how the current estimate of a particular source of information differs from the corresponding estimate observed in other recent determinations. In some cases, the information source may also suggest a rough magnitude (as well as a direction). That is, an explanation may be that a given directional indicator has increased since the most recent determination, though not by a

136 See appendix A for our assessment of the models against our criteria.

137 A relative assessment will also be considered for the comparison of the return on equity with the return on debt. As discussed in appendix B, the return on equity is expected to be above the return on debt.

large amount. This may suggest that the return on equity should also have increased since the most recent determination, though not by a large amount.

Table 5.3 outlines the manner of use for each source of information we propose to use to inform our final estimate of the return on equity. Similar to step two, the form of alternative estimates will be guided by an assessment against our criteria. For clarity, the form of takeover and valuation reports has changed from that outlined in the draft guideline. As outlined in appendix B, we consider takeover and valuation reports provide estimates of the expected return on equity for a broad range of businesses. Alternatively, the Wright approach, and other regulators and brokers provide more direct estimates of the expected return on equity for service providers.

Table 5.3 Form of other information

Additional information	Form of information
Wright approach	Point in time
Other regulators' return on equity estimates	Point in time
Brokers' return on equity estimates	Point in time and directional
Takeover and valuation reports	Directional
Comparison with return on debt	Relative

Source: AER analysis.

Step five: evaluate information set

This step requires the evaluation of the full set of material that we propose to use to inform, in some way, the estimation of the expected return on equity. This includes assessing the foundation model range and point estimate alongside the other information from step four.

In evaluating the full information set, the consistency (or otherwise) of the information is expected to be important. That is, circumstances where most of the other information suggests the return on equity should be above the foundation model estimate is likely to be more persuasive than if only a single estimate suggests an alternative value. The strengths and limitations of each source of additional information, however, will also be an important factor guiding the informative value of the available material. These strengths and limitations, as assessed against our criteria, are discussed in greater detail in appendices A and B.

Step six: distil a point estimate of the expected return on equity

Our approach requires the determination of a single point estimate for the return on equity. As outlined in section 5.2, our starting point for estimating the return on equity will be the foundation model point estimate. Moreover, the final point estimate is expected to be selected from within the foundation model range.

The final estimate of the expected return on equity, however, will ultimately require the exercise of regulatory judgement. This judgement will draw on the analysis of the other information provided in step five. For example, we may determine an estimate of the return on equity that is higher (lower) than the foundation model estimate where the other information indicates a higher (lower) return is appropriate. As noted in section 5.2, the relative strengths and limitations of each source of other information, as well as the consistency of this information, will be important.

The use of regulatory judgement may also result in a final estimate of the return on equity that is outside the foundation model range. This recognises that, ultimately, our rate of return must meet the allowed rate of return objective. In these circumstances, we may reconsider the foundation model input parameter estimates, or more fundamentally, we may also reconsider the foundation model itself. That said, we consider it reasonable to expect our final return on equity estimate, in most market circumstances, to fall within the foundation model range. Specifically, the uncertainty inherent in estimating input parameters has led to ranges for the equity beta and MRP that are not particularly narrow. The corresponding range for the return on equity, given these input parameter ranges, is necessarily wider.

Further, under our approach, if the foundation model point estimate is not adopted the final estimate of the return on equity will be determined as a multiple of 25 basis points. This recognises the limited precision that the return on equity can be estimated. It is also consistent with our approach of only using the foundation model informatively.[138] The reasoning for this approach is discussed in greater detail in section 5.3.6. The selection of the final estimate of the return on equity as a multiple of 25 basis points, however, should not be interpreted as a rounding exercise. Instead, the analysis in step five will inform the direction and magnitude of the departure from the foundation model point estimate.

5.3.3 Market practice for estimating the expected return on equity

As described in section 5.2, we propose to estimate the expected return on equity using the Sharpe–Lintner CAPM as our foundation model. Our estimate of the expected return on equity, however, has regard to the limitations of the Sharpe–Lintner CAPM. Specifically, it considers other information to determine our Sharpe–Lintner CAPM input parameters. It also considers other information to determine our final estimate of the expected return on equity. For the following reasons, we consider this approach to estimating the expected return on equity is consistent with the broad approach adopted by many market practitioners:

- In a report commissioned by the ENA, SFG examined evidence on the approaches for estimating the expected return on equity adopted in independent expert reports. SFG stated that in half of the reports it reviewed, the expected return on equity was estimated by first using the Sharpe–Lintner CAPM, and then applying a specific uplift factor. This uplift factor was adopted to address perceived shortcomings in the Sharpe–Lintner CAPM estimates.[139]
- SFG also referred to a similar report prepared by Ernst & Young that was submitted to us during the Victorian gas access arrangement process. In this report, Ernst & Young stated that independent expert reports often use the Sharpe–Lintner CAPM to estimate the cost of equity, but typically exercise discretion in the application of the model.[140]

Conceptually, we consider the approaches outlined by SFG and Ernst & Young are very similar to our foundation model approach. That is, both approaches use the Sharpe–Lintner CAPM informatively, and consider other information to address any limitations inherent in the estimate. In contrast, we are not aware of any practitioner that determines estimates of the expected return on equity by combining

138 That is, using the foundation model informatively, and determining a final estimate of the return on equity with regard to additional information, acknowledges a level of imprecision.
139 SFG, *Evidence on the required return on equity for the ENA,* June 2013, pp. 1–2.
140 Ernst & Young, *Market evidence on the cost of equity*, November 2012, p. 9.

different estimates from each of the Sharpe–Lintner CAPM, Black CAPM, Fama–French three factor model, DGM and arbitrage pricing theory.[141]

5.3.4 Regulatory judgement

Under the rules, we must have regard to relevant estimation methods, financial models, market data and other evidence when estimating the return on equity. However, this does not mean that we will use all that material in reaching our decision. Nor does this mean we will give equal (or any) regard to particular sources of evidence. The use of regulatory judgement in estimating the return on equity is unavoidable, given the nature of the evidence. This was acknowledged by the AEMC, and in submissions from stakeholders. For example, the AEMC stated that we:[142]

> …must make a judgement in the context of the overall objective as to the best method(s) and information sources to use, including what weight to give to the different methods and information in making the estimate.

The ENA also stated that:[143]

> …there is an inherent element of judgement involved in factoring in all the relevant evidence.

Our approach requires regulatory judgement throughout the process, including in the development of the rate of return guideline. In particular, our approach requires judgement to:

- determine the set of relevant material
- assess the relevant material against our criteria
- determine the role for all relevant material, based on our assessment against the criteria
- determine input parameter estimates from the relevant material
- determine a range and point estimate for the return on equity from our foundation model
- distil a final estimate of the return on equity from a range of alternative estimates.

The application of regulatory judgement must also be accompanied by an appropriate level of reasoning. There may be a limit, however, to the extent that any reasoning definitively points to a single estimate or outcome. For example, suppose we adopted an approach that applied quantitative weights to two alternative models. In these circumstances, the nature of the evidence means that we would be unable to show that a weighting of 60 per cent on one model and 40 per cent on another was the 'best' outcome (relative to, for example, an alternative weighting of 55:45 or 65:35 per cent). Rather, we would demonstrate that our preferred approach is reasonably open to us on the evidence before us.[144] For example, in the context of the MRP, the Tribunal has identified that there was:[145]

> no settled view among the experts as to what is the best methodology to employ in coming to such a conclusion… [and] substantial debates among the experts, as well as the parties, as to how particular

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141 Combining different estimates of multiple models reflects the approaches proposed by the ENA and the APIA. For clarity, the Ernst & Young report stated that some experts assess the estimates obtained from the application of the Sharpe–Lintner CAPM with the values obtained using other methods. However, the other methods listed are not nearly as extensive as the list of relevant models proposed by the ENA and APIA. See, for example: Ernst & Young, *Market evidence on the cost of equity*, November 2012, p. 9.

142 AEMC, *Rule determination: National electricity amendment (Economic regulation of network service providers) Rule 2012: National gas amendment (Price and revenue regulation of gas services) Rule 2012*, 29 November 2012, p. 67.

143 ENA, *Response to the AER's rate of return guidelines consultation paper*, 28 June 2013, p. 70.

144 Application by Envestra Limited (No 2) [2012] ACompT 3 (11 January 2012) at [145].

145 Application by Envestra Limited (No 2) [2012] ACompT 3 (11 January 2012) at [143].

> methodologies should be employed and the nuances and assumptions that are necessary for their effectiveness.

The MRP is an example of a decision where we are faced with evidence supporting a range of alternative outcomes. In such circumstances, we exercise our regulatory judgment to determine a reasonable approach that is open on the evidence.

5.3.5 Foundation model range and point estimate

As outlined above, our approach uses regulatory judgement to determine input parameter estimates for our foundation model from a range of relevant material. This leads to a foundation model range, from which we expect to select our final estimate of the return on equity.

The ENA submitted that, dependent on the width and rigidity of this range, our approach may limit the weight given to relevant material.[146] For example, if the final point estimate of the return on equity was selected from within the foundation model range, the influence of alternative models would be limited to selecting an estimate from the top of our range. If this range is narrow, therefore, the influence of alternative models on our return on equity estimate may be limited. Similarly, the ENA stated that a problem with the foundation model range is that the weight placed on different pieces of evidence diminishes the further these estimates are from the boundaries of the range.[147]

We consider, however, that the Sharpe–Lintner CAPM is superior to the alternative return on equity models. This is discussed in greater detail in appendix A. It is logical to expect, therefore, that in most circumstances our final estimate of the expected return on equity will be close to the foundation model point estimate. Moreover, as stated in section 5.3.2, we consider it reasonable to expect our final return on equity estimate, in most market circumstances, to fall within the foundation model range. Specifically, the uncertainty inherent in estimating input parameters has led to ranges for the equity beta and MRP that are not particularly narrow. The corresponding range for the return on equity, given these input parameter ranges, is necessarily wider.[148]

5.3.6 Precision of estimates

Our approach also recognises that estimating the rate of return for a service provider is not a precise science. In particular, the expected return on equity is not observable. As stated by the APIA, estimates of the return on equity will be:[149]

> …approximations to unknown true values, and must be determined through the application of relevant theory and practice.

The application of relevant theory and market practice, however, may not necessarily result in the determination of precise estimates. Notably, all financial models are a simplification of the real world to allow us to draw insights into key relationships and determinants. Our approach draws on the key elements from a number of models, but recognises that all models are incomplete and that some approaches provide greater insight than others. In this context, we consider there is a limit to the specificity for which estimates of the return on equity can be determined. Accordingly, under our approach, we only use model estimates informatively.

Our approach further recognises the limited specificity for which estimates of the return on equity can be determined. It does so by only selecting estimates of the expected return on equity as multiples of

146 ENA, *Response to the draft guideline*, October 2013, pp. 16–18.
147 ENA, *Response to the draft guideline*, October 2013, pp. 18–19.
148 For clarity, this does not mean that every value within our foundation model range is equally likely.
149 APIA, *Submission to the draft guideline*, October 2013, p. 44.

25 basis points (if departing from the foundation model estimate). In reaching this view, we considered four alternatives, including determining the return on equity:

(1) To two decimal places.

(2) To one decimal place.

(3) To a multiple of 25 basis points.

(4) To a multiple of 50 basis points.

We consider that determining estimates of the expected return on equity as multiples of 25 basis points is reasonable, as the nature and breadth of the task before us does not support finer gradations. Notably, as discussed in section 5.3.4, the material we intend to consider spans a wide range of potential values and may not lead to single, definitive outcomes.

The ENA, however, stated that 'rounding' will always lead to an estimate which is worse than the best estimate.[150] The ENA also stated the final return on equity is a mathematical outcome from making a series of decisions throughout the estimation process.[151]

We disagree with the ENA's view. We consider that the ENA's discussion of a 'best estimate' misses the fundamental point. That is, the expected return on equity for the benchmark firm is unobservable.[152] There is, therefore, no single correct estimate of the expected return on equity. Similarly, the ENA's statement implied that the determination of our final estimate of the expected return on equity should be a mechanistic process. This is contrary to the view that the ENA expressed during the public forums. Moreover, the current rules, in particular the requirement to achieve the allowed rate of return objective, are structured to avoid such mechanistic approaches.

We have also considered the materiality of determining estimates of the return on equity as multiples of 25 basis points. For example, a 25 basis point difference in estimates of the return on equity would result in a 10 basis point difference in the overall rate of return (based on our gearing estimate). This is expected to translate to revenue differences of less than one per cent.[153] We consider, therefore, that choosing a value as a multiple of 25 basis points (if departing from the foundation model estimate) appropriately balances the imprecise nature of the task before us with the materiality of our decision.[154]

5.3.7 Stability of the expected return on equity

In our consultation paper, we stated that a relatively stable regulatory return on equity would have two effects:

- It would smooth prices faced by consumers.

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150 ENA, *Response to the draft guideline*, October 2013, p. 20.

151 ENA, *Response to the draft guideline*, October 2013, p. 20.

152 See, for example: Wright, *Review of risk free rate and cost of equity estimates: A comparison of UK approaches with the AER*, October 2012, p. 2.

153 For example, using the published post–tax revenue models from a sample of service providers (ElectraNet, Powerlink, Envestra (Victoria) and Aurora), the respective revenue impacts of a 25 basis point change in the return on equity ranges from 0.7 to 0.9 per cent.

154 The Council of Small Business Australia proposed that multiples of 10 basis points would be preferable. We consider, however, that the nature and breadth of the task before us does not support finer gradations. Council of Small Business Australia, *Australian Energy Regulator—Better Regulation program draft rate of return guideline—Comments*, 10 October 2013, pp. 3–4.

- It would provide greater certainty to investors about the outcome of the regulatory process.

In general, these considerations were supported by investors. For example, RARE Infrastructure stated the following:[155]

> A more stable return on equity would enhance clarity for all investors, and boost the desirability of Australian network businesses in the global investment universe (leading to lower cost of capital, which is in consumer interests).

Submissions in response to our draft guideline were also broadly supportive of stability. For example, the submission from the NSW DNSPs implied that a benefit of their proposed implementation of the Sharpe–Lintner CAPM is that it would provide stability in regulated returns on equity over time.[156]

Given network assets are long–lived and typically generate stable cash flows, some stability in the return on equity may be expected. That is, it may be reasonable to expect that, on average, the difference between contemporaneous and long–term estimates of the return on equity should be relatively small. The theoretical and empirical evidence, however, suggests the return on equity is not stable over time.[157]

We consider our approach appropriately balances the theoretical and empirical evidence with the characteristics of regulated infrastructure. For example, our implementation of the Sharpe–Lintner CAPM will result in estimates of the return on equity that may vary over time. Alternatively, the DGM and the Wright approach (for implementing the Sharpe–Lintner CAPM) will result in estimates of the return on equity that may be relatively stable over time. The informative use of these implementations of the Sharpe–Lintner CAPM, in addition to the DGM and other information, is expected to lead to more stable estimates of the return on equity than under our previous approach. The extent of this stability will depend on:

- the extent to which movements in the estimates of the risk free rate and market risk premium in the foundation model offset each other
- the informative value provided by the DGM and Wright approach (and other information that provides relatively stable estimates of the return on equity).[158]

That required returns on equity are more stable over time than those generated using our previous approach is supported by the ENA and regulated infrastructure investors.[159] That said, consumer groups were more circumspect. Consumers supported more stable returns and consequently more stable prices, but not at any cost.[160] Specifically, consumers did not support more stable (long term) prices where these prices do not reflect efficient financing costs.[161] For the reasons discussed within section 5.3.1, however, we consider that our approach will lead to estimates of the return on equity that reflect efficient financing costs.

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155 RARE Infrastructure Limited, *Submission to AER's rate of return guidelines consultation paper*, 14 June 2013. Also, see: The Financial Investor Group, *Response to the AER's rate of return guidelines consultation paper*, 24 June 2013.

156 NSW DNSPs, *Submission on the draft guideline*, October 2013, p. 1.

157 See, for example: AER, *Access arrangement final decision Envestra Ltd 2013-17, part 3: appendices*, March 2013, pp. 30–31.

158 For example, takeover and valuation reports, and broker return on equity estimates may also be relatively stable.

159 See, for example: Spark Infrastructure, *Response to the draft guideline*, October 2013, p. 5; ENA, *Response to the consultation paper*, June 2013, p. 46.

160 See, for example: COSBOA, *Comments– draft guideline*, October 2013, p. 4; Public Advocacy Centre Ltd, *Submission to the AER's rate of return guidelines consultation paper*, 21 June 2013, p. 9.

161 Major Energy Users, *Response to the AER's rate of return guidelines consultation paper*, June 2013, p. 8.

5.3.8 Development process and stakeholder engagement

We consider the process that has led to the development of our proposed approach for estimating the expected return on equity has been thorough, logical and transparent.[162] In particular, our process has received support from a range of stakeholders. For example, Spark Infrastructure stated the following:[163]

> We commend the AER for the transparency of the various review processes and for its demonstrated willingness to engage on the various arguments which have been put forward by network service providers and financial investors such as ourselves. We also believe the thoroughness of the process has been appreciated by the investment community as a whole.

Similarly, consumer groups commended our efforts to engage all stakeholders through the development of the Better Regulation program.[164]

Alternatively, service providers have criticised our process for a number of reasons. For example, the ENA was critical of the development of our assessment criteria—specifically, they stated that the criteria are not found in the primary legislation or the regulatory rules.[165] The ENA also stated that our classification of relevant material (such as using material as the foundation model, or to inform the foundation model) was inconsistent with the rules, and that we excluded relevant material prematurely.[166] For the following reasons, we consider this criticism of the development of our foundation model approach is unfounded:

- We consider the relevant legislation supports the development of criteria to guide our exercise of regulatory judgement (including the assessment of relevant material). Notably, we have stated that these criteria do not supplant the rules, and nor do we consider they restrict the application of the rules.[167] Moreover, the AEMC considered that rate of return decisions should be principles based.[168]

- Similarly, we consider using relevant material as the foundation model, to inform the foundation model input parameters, or to inform the final return on equity estimate is consistent with the broad rules framework. The rules do not stipulate that relevant material must be given equal regard in estimating the return on equity. Indeed, the AEMC was explicit that it is our role to determine what 'weight' to give to the different methods and information in estimating the return on equity.[169]

- In developing our approach for estimating the return on equity we had regard to a range of alternative approaches. This included the concurrent consideration of the merits of these alternatives, as well as the merits of the relevant material to be used in these alternative approaches. That is, we did not form conclusions to exclude certain models from consideration before assessing their potential worth in practice. Instead, our use of a foundation model approach had regard to the merits of the relevant material.

162 This process was outlined in section 5.1.
163 Spark Infrastructure, *Response to the draft guideline*, October 2013, p. 1.
164 See, for example: PIAC, *Submission to the draft guideline*, October 2013, p. 3.
165 See, for example: ENA, *Response to the draft guideline*, October 2013, pp. 11–13.
166 See, for example: ENA, *Response to the draft guideline*, October 2013, pp. 11–13.
167 AER, *Better Regulation: Explanatory statement, Draft rate of return guideline*, 30 August 2013, p. 27.
168 AEMC, *Final rule determination*, 29 November 2012, pp. iv, 38, 42–44, 56–57.
169 AEMC, *Rule determination: National electricity amendment (Economic regulation of network service providers) Rule 2012: National gas amendment (Price and revenue regulation of gas services) Rule 2012*, 29 November 2012, p. 67.

5.3.9 Consumer group submissions

Consumer group submissions broadly supported our foundation model approach, including the use of the Sharpe–Lintner CAPM as our foundation model.[170] For example, the MEU stated that our approach is sound, utilises available information in the most effective manner and provides a transparent method for developing an outcome.[171] Similarly, PIAC submitted the following:[172]

> PIAC agrees with the importance of establishing a set of evaluation criteria and a clear framework for decision-making. In particular, PIAC is pleased that in establishing this framework, the AER has not adopted the 'multi-model' approach' that has been suggested by some in response to the AEMC's rule changes. PIAC has previously argued strongly that this type of approach would open the door for gaming and disputes between the NSPs and the AER, leaving consumers marginalised in the process. The current 'multi-model' approach that has been proposed by the ENA provides a real example of how the process of allowing NSPs to combine models in various ways can add complexity, minimise transparency and lead to unacceptable outcomes for consumers …
>
> PIAC also agrees with the use of the Sharpe–Lintner CAPM as the foundation model.

The EUAA also stated that preference should be given to approaches that are tractable and transparent, and for this reason, they supported our continued use of the Sharpe–Lintner CAPM.[173]

Consumer group submissions are further discussed throughout the appendices related to estimating the expected return on equity.

5.3.10 Alternative approaches proposed by stakeholders

Section 5.3.1 outlined four broad approaches to estimating the return on equity that were considered during the development of our guideline. The ENA and APIA proposed a multiple model approach consistent with the fourth alternative. For example, the ENA described their approach as containing four key steps. These steps are:

(1) Identify the models, methods, data and evidence to use.

(2) Compute the best estimate of the required return for an average firm.

(3) Compute the best estimate of the required return for a benchmark efficient entity using each approach and piece of evidence.

(4) Distil a final estimate of the required return on equity.

The ENA initially proposed that step four would be implemented by applying quantitative weights to alternative models.[174] The ENA, however, have since stated that its multiple model approach could be implemented in a variety of forms. This includes 'looser' approaches that provide us with discretion to set out the reasons for alternative qualitative assessments.[175]

170 See, for example: COSBOA, *Comments – draft guideline*, October 2013; Ethnic Communities' Council of NSW, *Submission to Better Regulation: Draft rate of return guidelines*, 10 October 2013.
171 MEU, *Comments on the draft guideline*, October 2013, p. 25.
172 PIAC, *Submission to the draft guideline*, October 2013, p. 29.
173 EUAA, *Submission to the draft guideline*, October 2013, p. 2.
174 ENA, *Response to the consultation paper*, June 2013, pp. 47–76.
175 ENA, *Response to the draft guideline*, October 2013, p. 2.

Conceptually, the multiple model approach proposed by the APIA is similar. A notable difference is that the APIA proposed to make greater use of confidence intervals (in particular, the overlap of these intervals) to guide the selection of the final point estimate of the expected return on equity.[176]

This section discusses multiple model alternatives in greater detail. In summary, we consider the ENA's and APIA's multiple model approaches have the following limitations:

- The regard given to relevant material in the proposed approaches is not supported by the merits of the material.
- The increased complexity of the proposed approaches is not justified. This applies to the estimation of the component models, as well as the process for combining estimates from multiple models into a single point estimate of the expected return on equity.
- The proposed approaches limit the ability for stakeholders to make reasonable estimates of the returns expected to be determined (in advance of a determination).
- The volume and nature of the relevant material required to be considered limits the transparency of these proposed approaches.

Use of relevant material

A key consideration in the ENA's and APIA's approaches is the concept that the required return on equity for the average firm should first be determined.[177] This return, which is equivalent to the return on the market portfolio, is then used to populate the alternative return on equity models. In the example submitted by the ENA, DGM estimates were used to inform the estimation of the return on the market, the Sharpe–Lintner CAPM, the Black CAPM and the Fama–French three factor model. Moreover, the ENA used DGM estimates to inform its overall estimation of the expected return on equity.

We consider that this approach may not be consistent with the implementation of an approach in accordance with good practice. For example, for the following reasons we consider this approach may lead to regard being given to relevant material beyond which the merits of that material support:

- Under the ENA's approach, the return on the market is determined solely from DGM estimates. The limitations of DGMs are discussed in appendices A and E. Given these limitations, and that the corresponding estimate of the return on the market is promulgated through each of the alternative models, this may give too much regard to DGM estimates.
- The ENA's and APIA's approaches place substantial weight on the Fama–French three factor model. As discussed in appendix A, we consider that this model may not meet most of our assessment criteria.
- The ENA's and APIA's approaches placed substantial weight on the Black CAPM. As discussed in appendix A, we consider that this model may not meet most of our assessment criteria.

Level of complexity

The ENA described its multiple model approach as lining up all the relevant evidence, discussing the reliability and precision of each piece of evidence, and giving more reliable and precise evidence

176 See, for example: APIA, *Submission to the draft guideline*, October 2013, pp. 22–23.
177 ENA, *Response to the consultation paper*, June 2013, p. 47; APIA, *Submission on the consultation paper*, June 2013, p. 32.

relatively more weight.[178] Similarly, the APIA refers to its approach as 'very simple'.[179] In contrast, the foundation model approach is described as highly complex and not at all transparent.[180]

For the following reasons, we disagree with the ENA's and APIA's characterisation of both ours and their proposed approaches:

- The approach proposed by the ENA requires the full parameterisation of the Sharpe–Lintner CAPM, Black CAPM, Fama–French three factor model and multiple DGMs.[181] The APIA also proposed to estimate the return on equity using Arbitrage Pricing Theory.[182] In contrast, our foundation model approach only requires the full parameterisation of the Sharpe–Lintner CAPM and DGM.

- The estimation of the input parameters required to implement the Sharpe–Lintner CAPM is a complex and resource intensive task. For example, the estimation of the equity beta requires complex econometric analysis to determine a range of reasonable estimates. Regulatory judgement must then be used to determine a point estimate. Similarly, to determine a point estimate of the MRP from a range of evidence requires regulatory judgement. The Fama–French three factor model, however, requires the estimation of an additional two beta estimates, and an additional two risk premiums.

- The DGM proposed by the ENA is very complex. As discussed in appendix E, it estimates the expected return on equity by considering 2,672 possible combinations of input assumptions. An algorithm is then used to select one outcome from these 2,672 combinations. In contrast, the DGMs we have proposed adopt a more common approach, in which the long term dividend growth rate is an input to the model.

- The APIA proposed to use the overlap of statistical confidence intervals from multiple models to determine the expected return on equity. Determining the overlap of these intervals may be 'very simple', as stated by the APIA, but the econometric analysis required to develop these intervals would likely be complex.[183]

Importantly, it is not clear how the full parameterisation of multiple models is in the long–term interests of consumers. For example, for the following reasons we consider the additional complexity in the ENA's and APIA's proposed approaches is not consistent with our fitness for purpose criterion:

- The full parameterisation of multiple models, including the greater use of complex econometric models, increases the arcane nature of the cost of capital debate. Given that the level of precision for which equity returns can be estimated is limited (see section 5.3.6), we consider such complexity may not be justified.

- The volume of material submitted by the ENA and APIA in support of their multiple model approaches certainly adds to the discourse on the return on equity. Nevertheless, it does not decide it. It is well recognised in the academic literature, as well as in reports submitted by service providers, that the available evidence that can be used to estimate the expected return on equity is imprecise and subject to varied interpretations.[184] In particular, there is often no consensus

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178 ENA, *Response to the draft guideline*, October 2013, p. 10.
179 APIA, *Submission to the draft guideline*, October 2013, p. 22.
180 ENA, *Response to the draft guideline*, October 2013, p. 10.
181 ENA, *Response to the draft guideline*, October 2013, pp. 21–23.
182 APIA, *Submission to the draft guideline*, October 2013, p. 22.
183 APIA, *Submission to the draft guideline*, October 2013, p. 22.
184 In regard to the MRP, for example, see academic papers by: R. Mehra and E. C. Prescott, *The equity premium, A puzzle*, Journal of Monetary Economics, 15, 1985, pp. 145–161; A. Damodaran, *Equity Risk Premiums (ERP), Determinants,*

among experts on either the appropriate method or the assumptions for different methods to be used in estimating the return on equity. Moreover, each of the methods have strengths and limitations. In this context, we consider that the rationale for increasing the arcane nature of the cost of capital debate may not be justified.

- It is not clear how the statistical confidence intervals in the APIA's proposal could actually be determined (irrespective of stakeholders' econometric expertise). For example, the estimation of input parameter estimates—such as the equity beta and MRP—typically draw on a range of information (both quantitative and qualitative in nature). Notably, qualitative information may be less amenable to the robust formation of confidence intervals.

Level of predictability

As noted in our consultation paper, and in stakeholder submissions, the guideline should provide certainty and predictability to assist investors in making their investment decisions.[185] The APIA proposed using the overlap of confidence intervals from multiple models to facilitate this predictability. The ENA initially proposed the application of quantitative weights to achieve predictability, but is now also open to qualitative assessments of alternative models.

For the following reasons, we consider it may be difficult for stakeholders to make reasonable estimates of the returns expected to be determined (in advance of a determination) under each of these approaches:

- The ability of stakeholders to examine ranges of overlap, and therefore make reasonable estimates of expected returns, is predicated on the assumption that stakeholders can readily determine the corresponding statistical ranges. As the APIA acknowledged, however, not every stakeholder can undertake econometric analysis.[186]

- If qualitative assessments of alternative models are used in the ENA's multiple model approach, it may be difficult for stakeholders to make reasonable estimates of the returns expected to be determined (in advance of a determination). That is, even if stakeholders could determine estimates from the Sharpe–Lintner CAPM, Black CAPM, Fama–French three factor model and DGMs, they would have little guidance regarding how to combine the different estimates from these models.

- More generally, the complexity of the ENA's and APIA's proposed approach may make it difficult for stakeholders to make reasonable estimates of the returns expected to be determined in advance of a determination. For example, it may be difficult for stakeholders to form a view on the impact of prevailing market conditions on the factor exposure and premiums required to implement the Fama–French three factor model. Further, it may be difficult for stakeholders to form a view on the likely impact of prevailing market conditions on the informative value of alternative models.[187]

Estimation and Implications, September 2008, p. 1; J. S. Doran, E. I. Ronn and R. S. Goldberg, *A simple model for time–varying expected returns on the S&P 500 Index*, August 2005, pp. 2–3. For an example report from regulated entities, see: Officer and Bishop, *Market risk premium, a review paper*, August 2008, pp. 3–4.

185 FIG, *Response to the consultation paper*, June 2013, p. 1.

186 APIA, *Submission to the draft guideline*, October 2013, p. 24.

187 There is a high degree of imprecision already inherent in the available return on equity models. Given this imprecision, it is not feasible to take the additional step of determining which model may perform best in particular circumstances.

Level of transparency

We consider the allowed rate of return objective may be achieved if the proposed method for estimating the expected return on equity is implemented in accordance with good practice. In particular, this includes that the proposed method is supported by robust, transparent and replicable analysis. The reasons supporting this criterion are outlined in greater detail in chapter 2.

For the following reasons, we consider the volume and nature of the relevant material required to be considered limits the transparency of the multiple model approaches proposed by the ENA and APIA:

- The greater use of complex econometric models increases the potential for strategic behaviour. The Fama–French three factor model and the ENA's preferred DGM, for example, are both very complex. The merits of these models are discussed in detail in appendices A and E. This complexity limits the ability to understand the variables driving the models outputs, and to assess the reasonableness of these outputs. In contrast, the Sharpe–Lintner CAPM and more simplistic DGMs are intuitive, and are amenable to robust and coherent analysis.[188]

- The ENA proposed that its multiple model approach may be implemented by applying quantitative weights to alternative models. We consider that quantitative weights imply a level of precision inappropriate for this task. For example, under the ENA's approach, some models may be assigned one third weight, whereas others may be assigned one sixth weight. It is not clear, however, whether assigning double the weight to one model indicates that it is twice as good. Similarly, it is unclear what reasons would justify one third weight relative to a slightly different weights—for example, why not one quarter, or one half weight?

- The ENA stated that their multiple model approach is transparent, as all the relevant material can be lined up and simply assigned value dependent on the merits of the relevant material.[189] We consider this overstates any inherent transparency. For example, the ENA proposed to determine estimates from four alternative models. If a qualitative assessment of this material is undertaken, however, it would be difficult to discern the relative value given to a particular estimate. For example, a final estimate that gives equal regard to four alternative models may produce an identical outcome to a final estimate that gives primary regard to three models, and lesser regard to one model.

For clarity, we recognise the final two dot points above may also apply to our foundation model approach.[190] Indeed, similar criticisms were submitted by the ENA.[191] As discussed in section 5.3.1, however, the fundamental point is that all approaches have strengths and limitations. It is our role, therefore, to determine what 'weight' to give to different methods and information in estimating the expected return on equity.[192]

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188 See, for example: S. Myers, *Estimating the cost of equity: Introduction and overview*, 17 February 2013; APA Group, *Submission on the draft guideline*, October 2013, p. 22.

189 ENA, *Response to the draft guideline*, October 2013, p. 10.

190 For example, as outlined in section 5.3.4, there may be a limit to the reasoning we can provide to justify our MRP estimate over another similar value. Likewise, if our final estimate of the expected return on equity differs from our foundation model estimate, it may be difficult to discern the qualitative value of other relevant information.

191 ENA, *Response to the draft guideline*, October 2013, pp. 16–18.

192 AEMC, *Rule determination: National electricity amendment (Economic regulation of network service providers) Rule 2012: National gas amendment (Price and revenue regulation of gas services) Rule 2012*, 29 November 2012, p. 67.

6 Return on equity: Sharpe–Lintner CAPM parameters

In chapter 5, we outline our proposed approach to determining the return on equity. This approach includes adopting the Sharpe–Lintner capital asset pricing model (CAPM) as our 'foundation model'.

The Sharpe–Lintner CAPM requires the estimation of three parameters:

- The risk free rate—this compensates investors for the time value of money. This is compensation for an investor having committed funds to an investment for a period of time and therefore forgoing the opportunity to immediately spend money or consume goods.[193]
- The equity beta— the equity beta measures the correlation between the returns on an individual asset or firm with that of the overall market.[194] Beta multiplied by the MRP provides for the return above the risk free rate required to compensate the investor for the risk that cannot be diversified away.

The market risk premium (MRP)—this compensates an investor for the systematic risk of investing in the market portfolio or the 'average firm' in the market.[195] Systematic risk is risk that affects all firms in the market (such as macroeconomic conditions and interest rate risk) and cannot be eliminated or diversified away through investing in a wide pool of firms.[196]In this chapter, we set out our approach and high level reasons for our estimation of the three Sharpe–Lintner CAPM parameters. We also set out our estimate of the equity beta. We set out our estimate for the MRP and risk free rate in December 2013. In three appendices to this explanatory statement (appendices C, D and E), we expand on the reasons for our approach to estimating the equity beta and MRP, respectively. In these appendices, we also address issues associated with the equity beta and MRP that were raised in submissions on our draft guideline.

6.1 Risk free rate

In the Sharpe–Lintner CAPM, the risk free rate measures the return an investor would expect from an asset with no default risk.[197]

6.1.1 Issue

In the draft guideline, we proposed to estimate the risk free rate using 10 year Commonwealth government securities (CGS) averaged over a short period of time as close as possible to the commencement of the regulatory period.[198] We maintain that position for the final guideline. Briefly, we consider this position appropriate because the CGS yield is an appropriate proxy for the risk free rate in Australia and a short averaging period is consistent with the CAPM and promotes regulatory certainty and consistency. These considerations are discussed in more detail in the application section below.

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193 M. McKenzie, and G. Partington, *Report to the AER: Supplementary report on the equity market risk premium*, 22 February 2012, pp. 11–12.

194 R. Brealey, S. Myers, G. Partington and D. Robinson, *Principles of corporate finance*, McGraw–Hill: First Australian edition, 2000, pp. 186–188 (Brealey et al, *Principles of corporate finance*, 2000).

195 VAA, *Review of debt risk premium and market risk premium*, February 2013, p. 7.

196 M. McKenzie, and G. Partington, *Report to the AER: Supplementary report on the equity market risk premium*, 22 February 2012, p. 10.

197 Gregory also identified the absence of re-investment risk and inflation risk and characteristics of a risk free rate. Gregory, *The risk free rate and the present value principle*, November 2012, p.5. Lally discussed these risks in his report: Lally, *The present value principle*, March 2013, p. 10–12.

198 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 209–211

In their submissions on the draft guideline, service providers supported adopting a 10 year term and CGS yields as the proxy for the risk free rate.[199] APA Group supported a prevailing rate over a short averaging period as close as practicable to the final decision.[200] However, on the averaging period, the NSW distribution network service providers (NSW DNSPs) proposed we adopt a historical average risk free rate, instead of a prevailing rate.[201] We address the NSW DNSPs' submission below. We did not receive any submissions from consumer groups that commented specifically on the risk free rate.

6.1.2 Approach

We propose to adopt a forward looking risk free rate that is commensurate with prevailing conditions in the market for funds at the commencement of the regulatory control period.

On the risk free rate proxy, we propose to adopt:

- the yield on CGS
- a 10 year term.

On the risk free rate averaging period, we propose to adopt a period that:

- is short—specifically, 20 consecutive business days in length
- is as close as practicably possible to the commencement of the regulatory period.

6.1.3 Reasons for approach

Conceptually, the adoption of a 10 year forward looking risk free rate, based on prevailing conditions in the market for funds at the commencement of the regulatory control period is:

- reflective of prevailing market conditions
- consistent with the Sharpe–Lintner CAPM
- internally consistent with our estimate of the MRP.

Practically, in estimating a 10 year forward looking risk free rate, we propose to adopt the prevailing yield on 10 year CGS averaged over a period which is short and as close as practicably possible to the commencement of the regulatory period. We adopt his method because:

- An observable market proxy for the risk free rate is available.
- The yield on CGS is the best proxy for the risk free rate in Australia, as supported by the RBA advice.[202]
- The RBA, Commonwealth Treasury and AOFM advised that the CGS market is liquid and functioning well.[203]

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199 ENA, *Response to the draft guideline*, October 2013, p. 30; APA Group, *Submission on the draft guideline*, October 2013, p. 23-24; NSW DNSPs, Submission *on the draft guideline*, October 2013, p. 18. Spark Infrastructure, *Response to the draft guideline*, October 2013, p. 4.

200 APA Group, *Submission on the draft guideline*, October 2013, p. 23–24.

201 NSW DNSPs, Submission *on the draft guideline*, October 2013, pp. 18–24.

202 RBA, *Letter regarding the CGS market*, July 2012, p. 1.

- CGS yields are an observable market determined parameter.
- The prevailing risk free rate at any point in time is the benchmark that returns on risky investments must outperform.[204]
- Prevailing 10 year CGS yields reflect expectations of the risk free rate over the appropriate forward looking investment horizon (which is 10 years).
- A short averaging period is a pragmatic alternative to the prevailing rate.
- Selecting an averaging period in advance ensures the method is unbiased.
- There is no clear evidence that CGS yields are abnormally low. McKenzie and Partington suggest that the current rates may be consistent with a longer term trend.[205]

CGS are an appropriate proxy for the risk free rate in Australia

The risk free rate measures the return an investor would expect from an asset with no default risk. CGS are low default risk securities issued by the Australian Government, and are therefore an appropriate proxy for the risk free rate.[206] Each of the three major credit rating agencies issued its highest possible rating to the Australian Government.[207]

Experts generally acknowledge that an observable proxy for the risk free rate is available in Australia.[208] We received advice from the RBA, Australian Treasury and AOFM in July 2012 that supported the use of CGS yields as a proxy for the risk free rate in Australia.[209] In the RBA letter, Assistant Governor Guy Debelle stated:[210]

> I therefore remain of the view that CGS yields are the most appropriate measure of a risk free rate in Australia.

Similarly, the Treasury and AOFM stated:[211]

> The nominal CGS market is liquid and continues to display the attributes of a well-functioning market.

For the above reasons, we consider CGS yields credible and verifiable, comparable and timely, and clearly sourced. These reasons also illustrate why we consider the CGS yield is fit for the purpose of estimating the risk free rate and will reflect changes in market conditions.

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203 Reserve Bank of Australia, *Letter to the ACCC: The Commonwealth Government Securities Market*, 16 July 2012, (RBA, *Letter regarding the CGS market*, July 2012); Australian Treasury and Australian Office of Financial Management, *Letter to the ACCC: The Commonwealth Government Securities Market*, 18 July 2012, p. 2 (Treasury and AOFM, *Letter regarding the CGS Market*, July 2012).

204 By definition all investments other than the risk free rate are 'risky'.

205 McKenzie and Partington*, Review of the AER's overall approach*, February 2013, p. 5.

206 Gregory also identifies the absence of re-investment risk and inflation risk and characteristics of a risk free rate. Gregory, *The risk free rate and the present value principle*, November 2012, p.5. Lally discusses these risks in his report. Lally, *The present value principle*, March 2013, p. 10–12.

207 Standard and Poor's, viewed 18 November 2013, http://www.standardandpoors.com/prot/ratings/entity-ratings/en/au/?entityID=268976&sectorCode=SOV ; Moody's, viewed 18 November 2013, https://www.moodys.com/credit-ratings/Australia-Government-of-credit-rating-75300?cy=aus&lang=en; Fitch Ratings, viewed 18 November 2013 http://www.fitchratings.com/gws/en/esp/issr/80442187

208 See, for example, Lally, *The present value principle*, March 2013, p. 13, and Wright, *Review of risk free rate and Cost of equity estimates: A comparison of UK approaches with the AER*, October 2012, p. 3.

209 RBA, *Letter regarding the CGS market*, July 2012; Treasury and AOFM, *Letter regarding the CGS Market*, July 2012.

210 RBA, *Letter regarding the CGS market*, July 2012, p. 1.

211 Treasury and AOFM, *Letter regarding the CGS Market*, July 2012, p. 2.

Risk free rate averaging period

Our method for the risk free rate averaging period is to use a short and recent averaging period as close as practicably possible to the commencement of the regulatory control period. We explain our reasons for this position in the following sections.

In the Victorian gas review, we allowed service providers to nominate their preferred averaging period so long as it was consistent with certain criteria.[212] The return on debt approach informed the rationale for allowing service providers to nominate an averaging period.[213] We formerly used an 'on the day' approach for the return on debt. In practice, this meant an estimate was required for both the risk free rate and the debt risk premium averaged from a short period before the determination.[214]

As the risk free rate was identical across both the return on debt and return on equity, estimating these returns in the same period ensured they were consistent. Also, our understanding of the hedging arrangements of service providers informed the rationale for allowing them some control of the averaging period.[215] Allowing service providers to nominate an averaging period inevitably meant concurrent determinations could have different return on equity allowances, even though there is no particular economic reason why service providers with the same regulatory control period should have different returns on equity.[216]

In the draft guideline we proposed a move away from providing service providers with the flexibility to determine the exact dates of the risk free rate averaging period.[217] In the final guideline, we propose the nominated averaging period for the risk free rate will be:

- 20 consecutive business days in length[218]
- ending as close as practicably possible to the commencement of the regulatory period

We note the ENA and NSW DNSPs support a long term average estimate (for example, 10 year average) of the risk free rate in combination with a long term average MRP.[219] In the Victorian gas draft and final determinations we considered the use of a long term average risk free rate.[220] We did not find the arguments in support of a long term average compelling.[221] Further, where the equity beta is not equal to one, using a long term average risk free rate can have a significant impact on the return on equity estimate.[222] Accordingly, we do not consider a long term average risk free rate appropriate.

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212 AER, *Final decision: APA GasNet*, March 2013, Part 3, pp. 44–46.

213 AER, *Final decision: APA GasNet*, March 2013, Part 3, p. 45.

214 See, for example, AER, *Draft decision: Access arrangement draft decision: APA GasNet Australia (Operations) Pty Ltd 2013-17*, September 2012, Part 2, p. 102 (AER, Draft decision: APA GasNet, September 2012).

215 AER, *Final decision: APA GasNet*, March 2013, Part 3, p. 45.

216 See, for example, AER, *Final decision: APA GasNet*, March 2013, Part 2, p. 55; AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, p. 75; AER, *Final decision: Access arrangement final decision: Envestra Ltd 2013-17*, March 2013, Part 2, p. 114; AER, *Final decision: Access arrangement final decision: Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd 2013-17*, March 2013, Part 2, p. 97.

217 See chapter 8 for discussion of the averaging period for the return on debt. AER, *Explanatory statement: Draft rate of return guideline*, August 2013.

218 In our experience, 20 business days has been the predominant averaging period over the past few years. See, for example, the Victorian gas review where three of the four businesses nominated a 20 business day averaging period. AER, Final decision: APA GasNet, March 2013, Part 3, p. 46.

219 See, for example, ENA, Response to the consultation paper, June 2013, p. 57; NSW DNSP, Submission to AER's rate of return guidelines consultation paper, 21 June 2013, pp. 13-14.

220 AER, Draft decision: APA GasNet, September 2012, Part 2, p. 84, Part 3, pp. 12–15; AER, Final decision: APA GasNet, March 2013, Part 3, p. 25-28, 43, 72–73.

221 AER, Draft decision: APA GasNet, September 2012, Part 2, p. 84, Part 3, pp. 12–15; AER, Final decision: APA GasNet, March 2013, Part 3, p. 25-28, 43, 72–73.

222 See, for example, Lally, The present value principle: risk, inflation, and interpretation, March 2013, p. 9.

In the draft guideline we use the Wright approach as a source of additional information at the return on equity level.[223] This approach recognises the possibility of a perfectly negative relationship between the risk free rate and the market risk premium (MRP). At the same time, it also recognises the importance of the equity beta estimate in determining the return on equity.

Prevailing CGS yields are consistent with the CAPM

For the following reasons, using a CGS yield estimated as close as practical to the commencement of the regulatory control period is consistent with the CAPM. Inputs to a model should be appropriate for use in that model, so individual equity parameters in this decision should be consistent with the CAPM framework.

The CAPM uses the most current information to derive the rate of return. In theory, it would use the risk free rate on the day (in this case, the commencement of the access arrangement period), as recognised by the Federal Court in ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639 (the ActewAGL matter).[224]

During the ActewAGL matter, Associate Professor Lally for the AER and Greg Houston for ActewAGL agreed theory requires the risk free rate be an 'on the day' rate.[225] The Federal Court acknowledged this agreement:[226]

> There was no dispute between the experts that the CAPM theory suggests that, ideally, the nominal risk-free rate input will be calculated on the day of the final determination.

Associate Professor Lally advised:[227]

> In relation to the Sharpe–Lintner model, this model always requires a risk free rate prevailing at a point in time for some subsequent period rather than a historical average and application of the model to a regulatory situation would require the risk free rate prevailing at the beginning of a regulatory period.

A short averaging period is a pragmatic alternative to the prevailing rate

A short averaging period provides a reasonable estimate of the prevailing rate while not exposing service providers to unnecessary volatility. It is a pragmatic alternative to using a risk free rate that is precisely consistent with the CAPM.

As noted above, the CAPM theoretically requires the risk free rate be an 'on the day' rate—literally, the first market price on the first day of the access arrangement period.[228] However, as Lally explained:[229]

> ... the use of this transaction would expose the regulatory process to reporting errors, an aberration arising from an unusually large or small transaction, and a rate arising from a transaction undertaken by a regulated firm for the purpose of influencing the regulatory decision.

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223 See appendix B for further discussion of the Wright approach.

224 Federal Court of Australia, *ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639*, 8 June, 2011, paragraph 119.

225 In advice provided to SP AusNet by NERA, Greg Houston raised concerns with the AER's presentation of his advice to the Federal Court. NERA, *Estimating the cost of equity under the CAPM: Expert report of Gregory Houston*, November 2012, pp. 36-37. In response, we amended our discussion of Mr Houston's advice to the Federal Court.

226 Federal Court of Australia, *ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639*, 8 June 2011, paragraph 119.

227 Lally, *Risk free rate and present value*, August 2012, p. 3.

228 Lally, *Risk free rate and present value*, August 2012, p. 7

229 Lally, *Risk free rate and present value*, August 2012, p. 7

A short averaging period (for example, 20 business days) as close as practically possible to the commencement of the access arrangement period provides a pragmatic alternative—violating the theoretical requirements of the model only to a small extent. Lally states:[230]

> The use of the CAPM in a regulatory situation requires that the risk free rate and the MRP must be the rates prevailing at the beginning of the regulatory period. However pragmatic considerations suggest that the risk free rate be averaged over a short period close to the beginning of the regulatory period.

On the other hand, Lally noted a long term average would more significantly violate the requirements of the CAPM without providing any pragmatic gain:[231]

> Rates averaged over a much longer historical period would be inconsistent with the present value principle, i.e., they would violate it without offering any incremental pragmatic justification.

Subsequent advice provided by Lally did not change this conclusion.[232] Therefore, we do not consider a long-term averaging period is an appropriate and reasonable departure from the requirements of the CAPM.

APA Group also seems to support this view. It submitted:[233]

> The use of an averaging period of 20 trading days, as proposed in section 5.3.3 of the Draft Guideline, effects noise reduction without giving undue weight to superseded prior expectations.

This statement is supportive of our proposed approach for reasons in accordance with those outlined in this appendix.

In the past, we have identified the present value principle as supporting the use of a prevailing risk free rate.[234]

CGS are an observable market determined parameter

CGS yields are observable in a market. As that market is liquid and functioning well, we have confidence the market rate reflects the prevailing risk free rate and prevailing conditions in the market for funds.[235]

Changes in yields for securities traded in a liquid market are likely to reflect the actions of many market participants at each point in time. Therefore, market determined CGS yields are likely to reflect prevailing conditions in the market for funds. On its own, a yield that is low (or high) relative to historical averages is not a sign that the yield prevailing at any point in time is no longer a good proxy for the risk free rate. The current CGS yields are likely to reflect strong demand from foreign investors and a general re-assessment of the value of a risk free asset. Lower yields (higher prices) are an expected outcome from increased demand for those assets.

The Treasury and the AOFM noted this point:[236]

> The weak and fragile global economy has put downward pressure on benchmark global long-term bond yields, and is driving investors into high quality government debt.

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230 Lally, *The present value principle*, March 2013, p. 5
231 Lally, *Risk free rate and present value*, August 2012, p. 7
232 Lally, *The present value principle*, March 2013, p. 6
233 APA Group, *Submission on the draft guideline*, October 2013
234 AER, *Final decision: APA GasNet*, March 2013, Part 2, pp. 90–91.
235 Treasury and AOFM, *Letter regarding the CGS Market*, July 2012, p. 2.
236 Treasury and AOFM, *Letter regarding the CGS Market*, July 2012, p. 1

The prevailing yield is the benchmark that risky investments must out-perform

In previous advice, Professor McKenzie and Associate Professor Partington explained the relationship between the prevailing risk free rate and investment decisions:[237]

> The fundamental point to be made is that the government bond rate sets the current benchmark that a risky project has to beat. Clearly there is little point in taking on a risky project if you can get the same or higher return by investing in a government bond. The government bond thus sets a benchmark; the time value of money.

They also advised:[238]

> At the time of writing investors can invest in a 10 year government bond at yield of 3.84%. So a ten year project that offers say 4.5% is worth considering if the risk is low enough. The fact that government bond yields were higher in the past does not make 4.5% a bad deal, or 3.84% too low a benchmark. We see no reason to switch from using the current 10 year government bond yield as the proxy for the risk free rate.

The logic in Professor McKenzie and Associate Professor Partington's advice continues to apply. In prevailing market conditions as of December 2013, 4.11 per cent is the benchmark that a risky project must exceed. Similarly, at future points in time, specifically at the commencement of the regulatory control period for each determination, the prevailing risk free rate will be the benchmark that investments at that point in time must better. This supports our adoption of a prevailing risk free rate at the commencement of the regulatory control period.

Prevailing 10 year CGS yield is a forward looking 10 year rate

The prevailing 10 year CGS yield is a forward looking rate. The prevailing 10 year CGS yield varies over time. But, this variation does not mean the yield is a 'short term' rate. The prevailing 10 year CGS yield is a market determined yield investors expect on an investment with cash flows over the forthcoming ten year period.

Indeed, according to the expectations theory, at any point in time the yield on 10 year CGS incorporates the market's expectation of the yield on shorter dated bonds over that period.[239] The expectations theory is generally regarded as a partial but not complete explanation of the term structure of interest rates. Other factors are also likely to be relevant.[240]

The method is unbiased

Determining the averaging period in advance helps achieve an unbiased risk free rate.

Regulated businesses have an incentive to seek a WACC that is as high as possible, because it will increase their revenue allowance. If a regulated business can select an averaging period by looking at historical yields, it may introduce an upward bias.[241] It can select a period with the highest yield available. But, when an averaging period is agreed or specified in advance, opportunistic behaviour is less likely because the risk free rate is unknown for that future period. This same possibility of upward

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237 McKenzie and Partington, *Supplementary report on the MRP*, February 2012, pp. 11–12.

238 McKenzie and Partington, *Supplementary report on the MRP*, February 2012, p. 12.

239 The expectations theory suggests then that current yields on long-dated bonds incorporate current market yields on short dated bonds and expectations of future market yields on short dated bonds: T. Brailsford, R. Heaney, and C. Bilson, *Investments: concepts and applications*, Nelson Australia Pty Ltd: Third edition, 2007, p. 710. We discussed the expectations theory in more detail in the Victorian gas draft decision: AER, *Draft decision: APA GasNet access arrangement*, March 2013, Part 3, pp. 24–25.

240 The 'liquidity premium' theory and the 'preferred habitat' theory identify other important determinants of the term structure of debt. Elton et. al., *Modern Portfolio Theory and Investment Analysis 8th ed*. (2010), pp. 516–-521.

241 Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9-10. Lally's comments in this report were made about a specific approach proposed in the relevant determination but are consistent with the approach taken by the AER in this decision.

bias also applies to a long term average. No particular long term averaging period is clearly superior to any other. Different averaging periods will produce different average yields. A regulated business would have an incentive to select the period with the highest yield.

We therefore maintain our position that a short averaging period, determined in advance, minimises the likelihood of bias.

There is no clear evidence that CGS yields are abnormally low

In the Victorian gas review, we considered whether CGS yields are 'abnormally' low.

The analysis above demonstrates that the CGS market is liquid and functioning well. We did not accept submissions that conditions in the CGS market are abnormal. Conversely, there is no clear understanding of what 'normal' market conditions mean. Prices (and yields) in markets move up and down all the time depending on the circumstances, demand and supply conditions, and investor expectations. We do not accept that the evidence before us suggests that there is mispricing in the CGS market.

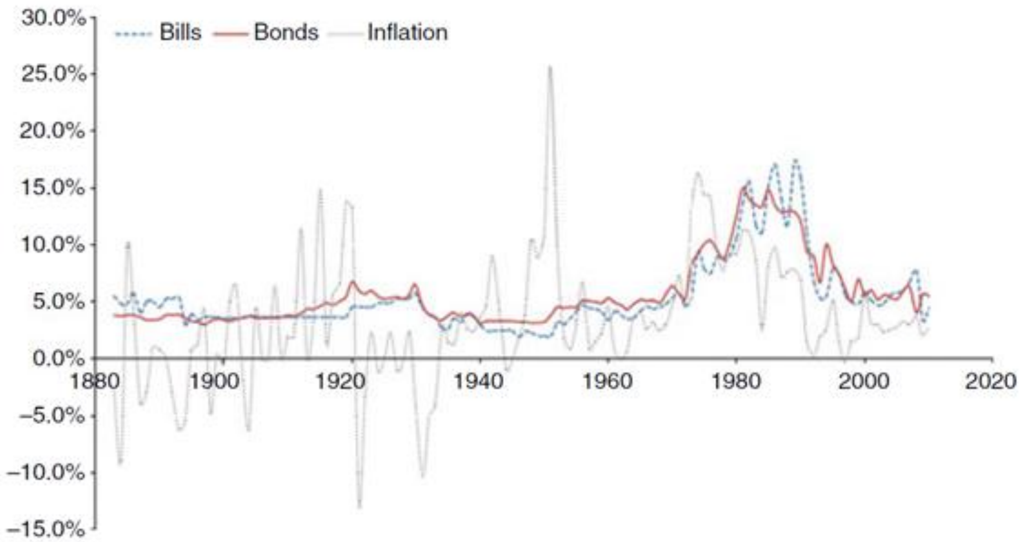
McKenzie and Partington also considered the question of whether CGS yields are abnormally low. They did not find that there was reason to describe current CGS yields as abnormally low. They state:[242]

> The evidence provided by the data suggests that the history of interest rates over the last few decades is not truly representative of the long run in this market. For both the U.S., UK and Australian markets, evidence exists which suggests that bond yields were stable (and possibly even falling) in the long run. The history of data over the last few decades is anomalous and the high interest rates observed during this period are clearly not representative of the longer time series. As such, one conclusion may be that the current environment is nothing more than a return to the 'normal' long run interest rate regime. On the other hand, it could be argued that there is a new normal and the GFC represents a true regime shirt for global financial markets. It is difficult to determine whether this is the case or not - only in the fullness of time will we be able to comment on this with any certainty.

Their report also presents the following figure from Brailsford et al (2012).

[242] McKenzie and Partington*, Review of the AER's overall approach*, February 2013, p. 5.

Figure 6.1 Bond yields, bill yields and inflation rates over time



Source: McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 13.

The figure shows:

- yields in the 1970s and 1980s were high by comparison with historical rates
- yields have remained elevated (depressed) for long periods before falling (increasing).

The available evidence does not support a conclusion that yields on CGS are 'abnormally low'. Indeed, it may be more appropriate to conclude interest rates during the 1970s and 80s were abnormally high.

Internal consistency

We consider our approach to estimating the risk free rate internally consistent with our approach to estimating the MRP. Appendix D contains more detailed discussion supporting our position.

On the other hand, the NSW businesses submitted:[243]

> When estimating the cost of equity using the Capital Asset Pricing Model (CAPM) using an estimate of the market risk premium (MRP) that primarily relies on long term historical data and an equity beta that relies on historical data, the risk free rate should also be estimated using historical data. This is an internally consistent approach, particularly when combined with a trailing average approach to the cost of debt, and should provide stability in the regulated return on equity over time…

Similarly, in its submission in response to our consultation paper, the ENA proposed the use of a long term average risk free rate.[244] The NSW DNSPs identified a report by Professor Bruce Grundy and Dr Tom Hird for CEG in support of their proposal.[245]

We do not agree that internal consistency requires we use a long term average risk free rate in combination with our estimate of the MRP. We considered this issue at length in the Victorian gas

[243] NSW DNSPs, *Submission on the draft guideline*, October 2013.
[244] ENA, *Response to the consultation paper*, June 2013, p. 57.
[245] CEG, *Estimating E[Rm] in the context of recent regulatory debate,* June 2013.

final decision.[246] The Tribunal did not find error in that decision.[247] Our reasoning on this issue can be briefly summarised as follows:

- As well as being consistent with the CAPM, we apply an approach that employs consistent definitions and logic throughout.
- A misunderstanding of our MRP estimate appears to underlie the suggestion that we should use a long term historical average of the risk free rate. We estimate a 10 year forward looking return on equity using an estimate of the 10 year forward looking MRP. We do not rely on historical data alone.

Our proposed approach in the draft and final guidelines is consistent with our proposed approach in the Victorian gas final decision. That decision contains further discussion of internal consistency.[248]

6.1.4 Application of approach

As set out above, our approach is to estimate the risk free rate based on market conditions that prevail as close as possible to the commencement of the regulatory control period. Accordingly, we propose to update the risk free rate, based on our approach, as close as possible to each individual reset determination.

6.1.5 Reasons for the application of approach

As we do not exercise discretion when estimating the risk free rate, there are no additional reasons for the application of the risk free rate approach.

6.2 Equity beta

Under our return on equity approach, we need to determine a point estimate and range for the equity beta of a benchmark efficient entity. The equity beta is a key input parameter in our foundation model, the Sharpe–Lintner capital asset pricing model (CAPM). It measures the sensitivity of an asset or business to the overall movements in the market (systematic or market risk).[249]

In this chapter, we will discuss our approach to estimating the equity beta and the reasons for our approach. In appendix C, we address issues relating to equity beta in more detail, and respond to matters raised in submissions.

6.2.1 Issue

In our consultation paper, we raised several key issues we considered relevant to the estimation of equity beta. Subsequently, on 11 October 2013, we released an issues paper on the equity beta as part of our consultation for developing the rate of return guideline. Further, we have also held a number of meetings with service providers, investors and consumer groups in relation to this issue.

In the issues paper, we proposed and set out our reasons for a 0.7 point estimate of equity beta, chosen from within a range of 0.4–0.7. On 28 October, we received submissions from interested

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246 AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 3, pp. 25-30.

247 Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8*, 18 September 2013, paragraphs 227–311.

248 AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 3, pp. 25–30.

249 R. Brealey, S. Myers, G. Partington, and D. Robinson, *Principles of Corporate Finance*, McGraw-Hill Australia: First Australian Edition, 2007, p. 187.

parties on our equity beta issues paper. We have considered the issues raised and have reassessed our analysis and reasons in light of submissions. Generally speaking, consumer groups supported our range but considered we should chose a point estimate closer to the mid-point of that range.[250] Service providers generally considered we should adopt a higher range and point estimate. For example, the Energy Networks Association (ENA) submitted we should adopt a point estimate of 0.94.[251]

6.2.2 Approach

We estimate a range for the equity beta and select a point estimate from within that range. We propose to adopt the same point estimate and range for equity beta across each of the energy sectors we regulate (electricity transmission, electricity distribution, gas transmission and gas distribution). This is because our conceptual analysis suggests systematic risks are similar between the different sectors of the energy market. Further, the results of our empirical analysis are not sufficiently precise to distinguish a measurable difference between the gas and electricity sectors.

Under our approach, we estimate the range for the equity beta based on empirical analysis using a set of Australian energy utility firms we consider reasonably comparable to the benchmark efficient entity. This empirical range is consistent with our conceptual analysis, which we use to cross check our range for the equity beta. This is because our conceptual analysis suggests the systematic risks of a benchmark efficient entity would be less than the systematic risks of a market average entity (that is, less than 1.0). Our approach to estimating the range for the equity beta gives primary consideration to Australian empirical estimates.

We then use other information sources to inform a point estimate from within the empirical range of equity beta estimates. This additional information includes:[252]

- Empirical estimates of overseas energy networks. We use this information to inform our point estimate from within the range. We consider empirical estimates for a number of international energy networks across the US, UK and Europe, prepared by a number of different entities.

- The theoretical principles underpinning the Black CAPM.

6.2.3 Reasons for approach

Our approach to estimating the range for equity beta gives primary consideration to Australian empirical estimates. We consider these empirical estimates align with our rate of return criteria (see chapter 2). That is, these estimates are:

- Based on available market data and derived with sound, econometric techniques.

- Fit for purpose as they are based on businesses that most closely, albeit imperfectly, meet our definition of the benchmark efficient entity.

- Implemented in accordance with good practice as they are derived from robust, transparent and replicable regression analysis. We note that consistent results are derived from different studies using different econometric techniques and sampling periods.

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250 COSBOA, *Comments: Return on equity issues paper*, November 2013, p. 1; MEU, *Submission to beta issues paper*, October 2013, p. 7; PIAC, *Submission to beta issues paper*, October 2013, p. 5.

251 ENA, *Submission to beta issues paper,* October 2013, p. 5.

252 AER, *Equity beta issues paper*, October 2013, pp. 54–56.

- Based on quantitative modelling in that they are derived using robust regression techniques with no arbitrary adjustment to the data.

- Based on market data that is credible, verifiable, comparable, timely and clearly sourced.

Further, we have confidence in our Australian empirical estimates because these present a consistent pattern that is robust to the use of different econometric techniques, comparator sets and time periods. For instance, consistent results have been produced under the following studies:

- Professor Henry's 2009 analysis (for the 2009 WACC review) examined data sampled at monthly and weekly frequencies over the period 1 January 2002 to 1 September 2008 for the nine comparable Australian-listed energy firms.[253] Henry implemented two types of regression calculations, ordinary least squares (OLS) and least absolute deviations (LAD). Further, he examined equity beta estimates for individual firms, portfolios of firms with constant weights, and portfolios of firms with time varying weights. He also analysed different estimation periods- including a long estimation period from after the technology bubble to before the global financial crisis (GFC), and the last five years.[254]

- The Economic Regulation Authority's (ERA's) 2011 study largely replicated Henry's approach and updated the analysis to October 2011. The ERA introduced two further regression techniques to the analysis in its 2013 study—MM and Theil–Sen.[255] Adding two new regression techniques did not change the results. Later, the ERA also further updated the analysis to April 2013. The ERA's 2013 analysis continued to show a similar pattern.[256]

- The ENA's consultant, SFG presented equity beta estimates in its June 2013 report. Its analysis of Australian data was based on the same nine comparable energy firms adopted by Henry and sampled over an 11 year period from 2 January 2002 to 19 February 2013. It computed total returns over a four–weekly period for each firm and repeated the analysis 20 times using different start points within this four-weekly period. SFG applied OLS regression to the data and incorporated the Vasicek adjustment.[257]

Notably, compared to our 2009 WACC review, we now have greater confidence in the empirical estimates for the following reasons:

- We now have greater confidence in the reliability of the empirical estimates. At one level, this reflects the substantial increase in the length of the time series of the data set. The core regressions in the 2009 WACC review were based on the periods from January 2002 to September 2008 (six years and eight months) and September 2003 to September 2008 (five years).[258] Extending the data set to 2013 allows up to an additional five years of data.[259] The more recent studies examining longer time periods provided results in line with Henry's 2009 study.

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253 Henry, *Estimating β*, April 2009, p. 8.

254 Henry, *Estimating β*, April 2009, p. 8.

255 See ERA, *Explanatory statement for the draft rate of return guideline*, August 2013, pp. 168-180. The ERA state the MM regression is a form of robust regression that has the highest breakdown point and statistical efficiency of robust regression estimators currently available. The ERA states Fabozzi proposed using the Theil-Sen estimator for the equity beta in response to the OLS estimator being acutely sensitive to outliers. See Fabozzi, F.J(2013) *Encyclopaedia of Financial Models*, Wiley Publications, p442.

256 See section 12.3.4 'estimating equity beta: Authority's enhanced study in 2013' in ERA, *Explanatory statement for the draft rate of return guideline*, August 2013, pp. 168-180

257 SFG, *Regression-based estimates of risk parameters for the benchmark firm*, June 2013, pp. 5-6.

258 For clarity, the 2009 WACC review also considered other periods, including longer periods submitted by ACG for the Joint Industry Association.

259 The Henry report we have commissioned will use data up to the end of June 2013, an increase of four years and nine months.

- In 2009, there was uncertainty due to the global financial crisis (GFC). Four years on, we now have empirical estimates generated from a broader set of different market conditions. The consistency of these results from markedly different environments also gives us increased confidence that the observed empirical range is reasonable. That is, the empirical estimates from the relatively stable period after the tech boom but before the GFC (2002–2008) are consistent with recent analysis using the period encompassing the GFC and its aftermath (2008–2013).[260] This appears to suggest that the equity beta for the benchmark efficient entity is relatively stable across time, even when there are major fluctuations in the business cycle. This increases our confidence in the observed range of equity betas.

Our approach to selecting a point estimate for equity beta from within our range considers international equity beta estimates and the theory behind the Black CAPM. We do not consider this evidence can be used to justify adjusting our range for the following reasons:

- International comparators are less aligned with the benchmark efficient entity, compared to Australian comparators. It is difficult to use this information in accordance with good practice because it is difficult to adjust for these differences. These differences include, but are not limited to; differences in regulatory regimes, economic conditions and market structures (see appendix B).

- There are major problems deriving a reasonable empirical estimate using the Black CAPM. There is also no generally accepted method to generate a reliable estimate of the zero beta return. Further, the Black CAPM is sensitive to errors in estimating the zero beta portfolio. Also, theoretical analysis does not lead to a clear indication of the magnitude of the difference between the Black CAPM and the standard Sharpe–Lintner CAPM. Further, while the Black CAPM removes one of the assumptions underlying the standard CAPM, it replaces it with another assumption (see appendix A).[261]

However, we use this evidence to inform the selection of a point estimate for equity beta from within our range. This is for the following reasons:

- We account for the Black CAPM because we recognise there is merit to its theoretical basis, particularly when viewed alongside the standard Sharpe–Lintner CAPM.[262] However, we propose to use the Black CAPM informatively, rather than mechanistically, because it is difficult to implement it in accordance with good practice.

- We recognise the limitations of having nine comparators in our Australian comparator set. Therefore, we consider empirical estimates of overseas energy networks. These are more statistically robust than our domestic estimates as they are generated from larger datasets. However, the firms in the international comparator set are less aligned with the benchmark efficient entity.

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260 This does not mean that we consider a short data period centred on the GFC would be a reasonable basis for equity beta estimation. We consider a period of (at least) five years is appropriate for equity beta estimation and see no conceptual problem with incorporating GFC data within such a data period.

261 The Sharpe–Lintner CAPM assumes there is unlimited risk free borrowing and lending, a simplification that does not hold in practice. The Black CAPM relaxes this assumption and acknowledges that investors may not be able undertake unlimited borrowing or lending at the risk free rate. However, in its place the Black CAPM assumes that unlimited short selling of stocks is possible with the proceeds available for investment. This assumption does not hold in practice either, and so there are still concerns over the basis for the model and as a result the empirical estimation of the return on the zero beta portfolio. See AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 190.

262 For clarity, this statement does not imply that we consider the theoretical basis for the Black CAPM to be completely accurate (or more reliable than the standard CAPM).

One element of our approach has changed since our equity beta issues paper. That is, we now give limited value to equity betas from regulated Australian water networks, rather than using this information as a cross check. We consider Australian water networks face reasonably comparable systematic risks to Australian energy networks. Further, adopting comparable rates of returns between energy and water decisions avoids potential investment distortions caused by different rates of return between the sectors. However, this data provides an immaterial amount of new information. Australian water regulators often base their beta estimates on equity betas from Australian energy networks.[263] Notwithstanding, this information supports an equity beta estimate within our proposed range.

6.2.4 Application of approach

Applying our approach, we propose a range for the equity beta of 0.4–0.7. We consider the equity beta of a benchmark efficient entity is in this proposed range as:

- Conceptual analysis supports that the equity beta of a benchmark efficient entity would be low and below 1.0.
- The empirical evidence for Australian electricity and gas networks supports an equity beta of between 0.4 and 0.7 for the benchmark efficient entity.

Applying our approach, we propose a point estimate for beta of 0.7. This point estimate is for a benchmark efficient entity with a similar degree of risk as that which applies to the service providers we regulate, in respect of the provision of regulated services.

Our proposed point estimate is at the upper end of our 0.4–0.7 range. We have chosen this point estimate because:

- Theoretical principles underpinning the Black CAPM suggest the standard Sharpe–Lintner CAPM may underestimate the return on equity for firms with equity betas below 1.0. Although it is difficult to ascertain the magnitude (or materiality) of this effect, selecting a point estimate at the higher end of the range is an appropriate approach to allow for the theoretical differences between the Sharpe–Lintner CAPM and the Black CAPM.
- We have used overseas energy networks to inform our point estimate (see appendix C.3, international comparators). The pattern of overseas results is not consistent and there are inherent uncertainties when relating foreign estimates to Australian conditions. However, these results support choosing a point estimate in the upper end of our range.

6.2.5 Reasons for application of approach

We note our proposed range is consistent with the range proposed in our equity beta issues paper. Consumer groups agreed that the identified range is reasonable.[264]

A range of 0.4–0.7 is consistent with our conceptual analysis. Our conceptual analysis, including evidence from Professor McKenzie and Associate Professor Partington, suggests the equity beta of a benchmark efficient entity would be 'among the lowest possible' and below 1.0.[265]

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263 See QCA, *Final report: Seqwater irrigation price review 2013-17, vol. 1*, April 2013, p. 273; ERA, *Inquiry into the efficient costs and tariffs of the Water Corporation, Aqwest and the Busselton Water Board: Revised final report*, March 2013, pp. 57–58; QCA, *Final report: SunWater, Irrigation price review: 2012-17, vol. 1*; May 2012, p. 492.

264 COSBOA, *Comments: Return on equity issues paper*, November 2013, p. 1; MEU, *Submission to beta issues paper*, October 2013, p. 1; PIAC, *Submission to beta issues paper*, October 2013, p. 5.

Our approach to estimating the range for equity beta gives primary consideration to Australian empirical estimates. Table 6.1 illustrates that these empirical evidence supports an equity beta within the range of 0.4–0.7 for the benchmark efficient entity. Further, table 6.1 demonstrates empirical studies based on Australian energy utility firms present a consistent pattern that is robust to the use of different econometric techniques, comparator sets and time periods.

Table 6.1 Average equity beta point estimates for Australian energy networks

Source	Estimation period	Individual firm averages	Fixed portfolios	Varying portfolios	Summary of analysis permutations
Henry 2009	2002–2008	0.45–0.71	0.49–0.66	0.43–0.78	Monthly/weekly intervals, 2002/2003 start, OLS/LAD regressions, value/equal Weighted fixed portfolios, average/median varying portfolios
ERA 2011	2002–2011	0.44–0.60	–	–	Monthly/weekly intervals, OLS/LAD regressions
ERA 2013	2002–2012	0.49–0.52	0.47–0.53	–	OLS/LAD/MM/TS regressions, value/equal weighted portfolios
SFG 2013	2002–2012	0.60	–	0.55	Four weekly repeat sampling

Source: Henry, *Estimating β*, 23 April 2009; ERA, *Draft decision: Western Power access arrangement*, March 2012, pp. 195–205; ERA, *Explanatory statement for the draft rate of return guidelines*, 6 August 2013, pp. 168–181; and SFG, *Regression-based estimates of risk parameters for the benchmark firm*, 24 June 2013, pp. 12–15. Note some averages are calculated by the AER.

We have transparently derived our range for equity beta using a single type of evidence—empirical estimates using our comparator set of Australian energy service providers traded on the Australian Stock Exchange. As demonstrated in table 6.1, most beta estimates fall within the 0.4–0.7 range. We have based our range on the range of point estimates derived from different samples and sampling periods. We have chosen not to base our range for equity beta on confidence intervals. This is consistent with our 2009 decision where we outlined our reasons for not basing the range for equity beta on confidence intervals.[266] These reasons include:

- The presence of outliers can affect point estimates and their associated confidence intervals.
- The presence of autocorrelation and heteroskedasticity creates difficulties in discerning whether confidence intervals overstate or understate the upper bound estimate.[267]
- Confidence intervals are less likely to represent the 'true' equity beta point estimate, compared to the range of point estimates derived from different samples and sampling periods.

We recognise the values in our range are lower than the previous equity betas we have applied to the energy sector. We applied an equity beta of 1.0 before our 2009 WACC review. This was because the NER deemed the initial equity beta value for all transmission network service providers and the NSW/ACT distribution network service providers should be a default value of 1.0.[268] Under the rules, there was a need for persuasive evidence before adopting a value or method that differed from those

265 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.
266 AER, *Final decision: WACC review*, May 2009, pp. 286-290.
267 Autocorrelation is present when the errors in the regression have a relationship or trend with errors in the past. Heteroskedasticity is where the variance in the errors is not constant (over time or as the values of the independent variables change).
268 See NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1 (in pre- 2009 versions of the NER).

previously adopted.[269] We lowered the equity premium to 0.8 in 2009 because there was persuasive evidence to depart from the previously adopted equity beta values.[270] The point estimate of 0.8 was slightly above our range of empirical estimates. This took into account the likely precision of our empirical estimates, along with other relevant considerations.[271] However, relative to 2009, we now have greater confidence that the equity beta for the benchmark efficient entity is in the range of 0.4–0.7.

Several industry stakeholders disagreed with using an equity beta from within our range and submitted an equity beta point estimate from the top of this range would be too low.[272] We disagree with these submissions. As stated in our equity beta issues paper, we consider we have sufficient evidence to determine an equity beta from our range of empirical estimates reflects the systematic risks of a benchmark efficient entity. This range is robust to different econometric techniques and sampling periods. We address the issues raised by these stakeholders in appendix C.

Under our approach, we adopt a point estimate for equity beta from the top of the empirical range. This is consistent with the point estimate proposed in our equity beta issues paper. We consider a point estimate from the top of the range to be consistent with alternative evidence international equity beta estimates and the theory behind the Black CAPM for the following reasons:

- Theoretically, under the Black CAPM, firms with an equity beta below 1.0 should have higher returns on equity than what the standard Sharpe–Lintner CAPM predicts.[273] This is because, as a result of different starting assumptions, the Black CAPM predicts the slope of estimated returns will be flatter than for the standard Sharpe–Lintner CAPM.[274] This information informs our proposal to select a point estimate at the top end of the 0.4–0.7 range of empirical estimates.
- We consider empirical estimates from a number of international energy networks across the US, UK and Europe, support a point estimate closer to the upper end of our range.

We also consider an equity beta point estimate from any point of our 0.4–0.7 empirical range is not inconsistent with McKenzie and Partington's advice that, 'one would expect the beta to be among the lowest possible'. In their submissions to our equity beta issues paper, consumer groups submitted that we should not select an equity beta at the top of the 0.4–0.7 range.[275] Each of these consumer groups submitted that a point estimate from the top of the range was inconsistent with our evidence from McKenzie and Partington. Further, MEU and PIAC both specified it would be more appropriate to adopt a point estimate around the mid-point of the range.[276] We disagree with these submissions. We consider other relevant information suggests it is reasonable for us to select a point estimate from the upper end of the range of empirical equity beta estimates. This information includes the theoretical principles underpinning the Black CAPM and empirical evidence from international comparators. We address these submissions in detail in appendix C.

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269 NER, cls. 6.5.4(e) and 6A.6.2(j).

270 AER, *Final decision: WACC review*, May 2009, p. 244.

271 AER, *Final decision: WACC review*, May 2009, p. 307.

272 CitiPower, Powercor, SAPN, *Submission to beta issues paper*, October 2013, pp. 3-4; Spark, *Response to beta paper*, October 2013, p. 3.

273 Conversely, for firms with an equity beta above 1.0, the Black CAPM predicts a lower return on equity than the standard CAPM.

274 This statement assumes that the representative investor can lend (but not borrow) at the risk free rate. The base form of the Black CAPM does not constrain the zero beta return to be above the risk free rate (which does not exist, by definition). In this case, the Black CAPM predicts a return on low beta equity that is below that of the standard CAPM.

275 COSBOA, *Comments: Return on equity issues paper*, November 2013; MEU, *Submission to beta issues paper*, October 2013; PIAC, *Submission to beta issues paper*, October 2013.

276 MEU, *Submission to beta issues paper*, October 2013; PIAC, *Submission to beta issues paper*, October 2013.

6.3 Market risk premium

Under the Sharpe–Lintner CAPM, the market risk premium (MRP) is the difference in returns between the risk free asset and the return on an average risky equity investment.

The MRP compensates an investor for the systematic risk of investing in the market portfolio or the 'average firm' in the market. Systematic risk is that which affects all firms in the market (such as macroeconomic conditions and interest rate risk) and cannot be eliminated or diversified away through investing in a wide pool of firms.

6.3.1 Issue

In the draft guideline we proposed to estimate a range and point estimate for the MRP. In doing so we proposed to consider a range of theoretical and empirical evidence—including historical excess returns, survey evidence, financial market indicators and dividend growth model (DGM) estimates. We maintain that position in the final guideline. We did not include a range and point estimate with the explanatory statement accompanying the draft guideline. In this explanatory statement we do.

In determining the MRP, we propose to consider each source of evidence identified above. This is consistent with our practice over the past five years where we have determined values for the MRP of 6.0 or 6.5 per cent. In response to our draft guideline, many stakeholders requested that we provide additional guidance and examples on the approach we are intending to apply. Therefore, in this explanatory statement to our final guideline we have included a worked example to show how we would apply the material available to inform the MRP in December 2013. The worked example settles on an MRP of 6.5 per cent based on the evidence before us.

We released the Victorian gas final decision earlier this year.[277] That decision contained a detailed consideration of the theory and evidence underlying the MRP.[278] This chapter and appendix D draw on that material. The Tribunal recently reviewed that decision and did not find error in our MRP estimate of 6.0 per cent.[279] Since the Victorian gas final decision, the most significant development in this area is our proposal of a preferred construction of the DGM.

The inclusion of a range and point estimate for the MRP in this explanatory statement responds to submissions from various stakeholders requesting estimates be included with the final decision.[280] In other submissions on this topic, the ENA supports the consideration of DGMs when estimating the MRP, with preference for estimates produced by the SFG model.[281] The APIA and APA Group appear to support the use of the Wright approach to allow for deficiencies they see in our proposed approach to estimating the MRP.[282] The EUAA appears to suggest a wider consideration of risk and return throughout the regulatory regime is required to determine an appropriate return on equity.[283]

This example is provided as a guide only. We intend to consider and review a range of material on the MRP, as it becomes available. We will draw on this material and will consider more up to date information when determining the MRP at each determination.

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277 AER, *Final decision: APA GasNet*, March 2013.

278 AER, *Final decision: APA GasNet*, March 2013, Part 2, pp. 46–56, Part 3, pp. 46–56.

279 Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8, 18 September 2013*, paragraphs 227–308.

280 See, for example, ENA, *Response to the draft guideline*, October 2013, p. 5; Envestra, *Response to the draft guideline*, October 2013, p. 4; NSW DNSPs, *Submission on the draft guideline*, October 2013, p. 3; SP AusNet, *Submission on the*

281 ENA, *Response to the draft guideline*, October 2013, pp. 30-32.

282 APIA, *Submission to the draft guideline*, October 2013, pp. 25-27; APA Group, *Submission on the draft guideline*, October 2013, pp. 27–29.

283 EUAA, *Submission to the draft guideline*, October 2013, p. 2.

6.3.2 Approach

We propose to estimate a range for the MRP, and then select a point estimate from within that range.

We propose to estimate the MRP range with regard to theoretical and empirical evidence—including historical excess returns, DGM estimates, survey evidence and conditioning variables. We will also have regard to recent decisions by Australian regulators. Each of these sources of evidence has strengths and limitations.[284]

We propose to estimate the MRP point estimate based on our regulatory judgement, taking into account estimates from each of those sources of evidence and considering their strengths and limitations.

The sources of evidence we propose to consider, and a summary of their strengths and weaknesses, are as follows:

- Historical excess returns:
  - Strengths include the estimation method and results are transparent, the estimation methods have been extensively studied and the results are well understood. Historical estimates are also widely used and have support as the benchmark method for estimating the MRP in Australia.
  - Also, over the past decade, there is an increased scepticism about the ability for particular variables to predict returns. New empirical evidence has cast doubt on previous empirical evidence that suggested particular variables were good predictors of returns. Some studies indicate there is no better forecast of excess returns than the historical average.
  - Limitations include concerns with the quality of the historical data (particularly the older data), the 'equity premium puzzle' which suggests historical excess returns may overstate expected returns, the proxy for the market return is not perfect, and there are challenges when selecting a measure of central tendency (arithmetic or geometric averages) and an appropriate averaging period.
- Dividend growth model estimates:
  - Strengths include the theoretical underpinnings of this estimation method and there is some support for the ability of valuation models (DGMs) to predict returns.
  - Limitations include the practical difficulties with estimating the DGM. These models are highly sensitive to assumptions made when estimating them and there is no clear answer about what those assumptions should be.
- Survey evidence
  - Strengths include the direct theoretical link between expected excess returns and stated expectations, and the triangulation of results across surveys and across time.
  - Limitations include timeliness, survey design and the representativeness of the respondents.
- Conditioning variables—these include dividend yields, credit spreads and implied volatility:

[284] We discuss these estimation methods in more detail in appendix D.

   - Strengths include these estimation methods are responsive to prevailing market conditions.
   - Limitations include difficulties defining a robust estimation method and, as noted above, that there is greater scepticism than previously in the academic literature about the ability of these sources of evidence to predict returns.
- Recent decisions by Australian regulators:
   - Strengths include these estimates provide an indication of regulatory practice in Australia, and that consistency in approach between regulators can avoid distortions in investment between different regulated industries.
   - Limitations include the evidence will not necessarily be timely and there may be different frameworks used by different regulators (e.g. different benchmark entity assumptions). Further, other regulators may consider similar evidence to us. Accordingly, decisions of other regulators are not direct evidence on the MRP but reflect other assessments of some or all of the information available to us.

We explore these strengths and limitations in more detail below and in appendix D.

6.3.3 Reasons for approach

In this section we outline the reasons for our approach. Our reasons fall under three headings:

- consideration given to different estimation methods
- determination of the point estimate
- considerations informing our exercise of judgment.

Consideration given to different estimation methods

Under the new rules framework we are required to estimate a return on equity that contributes to the achievement of the allowed rate of return objective. The objective requires that the rate of return is commensurate with efficient financing costs of a benchmark efficient entity. In this context we contribute to the objective by estimating the expected return on equity, and as an input, the expected MRP.

Evidence suggests the MRP may vary over time.[285] In their advice to the AER, Professor Lally and Professor Mackenzie and Associate Professor Partington have expressed the view that the MRP likely varies over time.[286] They also suggest it would be better to use a wide range of models and information to estimate the MRP.[287]

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[285] For example, Dimson, Marsh and Staunton suggest there are ‘good reasons to expect the equity premium to vary over time’. Dimson, Marsh and Staunton, *Sourcebook*, 2012, p. 37. Similarly, McKenzie and Partington suggest the fundamental determinants of the risk premium may change over time and, therefore, the market risk premium changes. M. McKenzie, and G. Partington, *Report to Corrs Chambers Westgarth: Equity market risk premium*, 21 December 2011, pp. 5–6.

[286] M. McKenzie, and G. Partington, *Review of the AER’s overall approach to the risk free rate and market risk premium*, February 2013, p. 20; M. Lally, *Review of the AER’s methodology for the risk free rate and the market risk premium*, March 2013, pp. 14–15.

[287] M. McKenzie, and G. Partington, *Review of the AER’s overall approach to the risk free rate and market risk premium*, February 2013, p. 20; M. Lally, *Review of the AER’s methodology for the risk free rate and the market risk premium*, March 2013, pp. 27–34.

However, it is well recognised that the MRP cannot be directly observed. Unlike the risk free rate, the evidence on the MRP is comparatively imprecise and subject to varied interpretation. In addition, different methods can produce widely different results at the same point in time.[288] There is also debate in the finance literature on the predictability of returns.[289] Ultimately, there is no consensus among experts on which method produces the best estimate. These differences reflect their consideration of the relative strengths and limitations of the various estimation methods, as well as their consideration of the best means of bringing these estimation methods together.

Determination of the point estimate

Given the range of estimates of the MRP and the variability of estimates over time, judgment is required when determining a point estimate for the return on equity. Just as there is no consensus among experts on the strengths and limitations of the various sources of evidence, there is no consensus among experts on the determination of a point estimate.

We propose to assess a range of evidence to inform our estimate of the MRP. In this assessment we must apply judgment to interpret the information before us. Our judgment is guided by the approaches we consider will satisfy the allowed rate of return objective and have regard to prevailing conditions in the market for funds.

Considerations informing our exercise of judgment

It is important to avoid bias in regulatory outcomes over time. Therefore, it is important we apply different sources of evidence symmetrically through time to avoid bias. Since the WACC Review in 2009, various sources of evidence on this topic have arguably been presented asymmetrically. An example is implied volatility. In periods where the implied volatility suggested the MRP should be significantly above the long term average, regulated businesses relied upon this evidence. Recently, when implied volatility estimates have fallen, regulated businesses have not relied upon, or even considered, this evidence. Asymmetric application of evidence may lead to biased outcomes. In contrast, we propose to consider each source of evidence symmetrically through time. Application of our proposed approach may result in an MRP below the long term average where the evidence supports this.

Good regulatory outcomes will be achieved by an approach that provides certainty and predictability to stakeholders. This certainty and predictability promotes the rate of return objective and comes in two forms:

- certainty of process
- certainty of value.

The process we have used to consider the relevant information and form a judgement on the MRP provides greater certainty that the rate of return objective will be achieved. Hence, it provides a better basis for future decisions and should increase certainty that we will promote the rate of return objective in future. It does not provide the same certainty of the future value of the MRP as an approach that gives greater consideration to long term averages. However, it is not clear that a relatively stable MRP provides greater certainty on the cost of equity at future decisions. The proposed approach should, however, provide greater certainty that the return on equity will be

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[288] See: Damodaran, *Equity risk premiums: determinants, estimation and implications - the 2012 edition*, March 2012, p. 93. He also noted: "No matter what the premium used by an analyst, whether it be 3% or 12%, there is back-up evidence offered that the premium is appropriate."

[289] See appendix D for more detail on this debate.

consistent with the requirement to determine the return on equity having regard to prevailing conditions in the market for funds.

Under our foundation model approach, we propose to use our foundation model estimate of the return on equity informatively. At the return on equity level we propose to compare our foundation model estimate of the return on equity with other information. Some of that other information typically provides a relatively stable return on equity estimate. Because we have adopted a prevailing risk free rate with a MRP that may vary through time, our final return on equity estimate may be relatively less likely to depart from the foundation model estimate. This is because our foundation model estimate may be relatively closer to the other information.

6.3.4 Application of approach (at December 2013)

In the previous section, we outlined and summarised our approach to determining the MRP and the reasons for the approach. In this section, we apply that approach and set out our estimate of the MRP (point estimate and range) for December 2013.

We consider a range for the MRP of 5.0 to 7.5 per cent is reasonable based on the evidence before us. The range we determine in this decision reflects the span of the evidence before us. This is because:

- The geometric mean historical excess return currently provides the lowest estimate of the MRP with a range of 3.6 to 4.8 per cent. However, as we discuss in more detail in appendix D, there are concerns with using the geometric mean as a forward looking estimate. Therefore, we consider a reasonable estimate of the lower bound will be above the geometric average. However, we give some weight to geometric mean estimates. Therefore, we consider a lower bound estimate of 5.0 per cent appropriate. The arithmetic average provides a range of 5.7 to 6.4 per cent.

- On the other hand, using our proposed models, the DGM currently provides the highest estimate of the MRP at about 7.5 per cent.[290] We consider this an appropriate upper bound for the range. The upper and lower bound estimates reflect the evidence before us. These estimates may change over time and likewise the upper and lower bounds may change.

Given the available information we consider 6.5 per cent an appropriate estimate of the MRP having regard to prevailing market conditions. After assessing the information, we consider this estimate contributes to the achievement of the allowed rate of return objective.

In reaching the conclusion that 6.5 per cent is an appropriate estimate, we had regard to the following sources of evidence:

- Historical excess returns—these estimates provide a range of 5.7–6.4 per cent if calculated using an arithmetic mean and a range of 3.6–4.8 per cent if calculated using a geometric mean. We consider 6.0 per cent a reasonable estimate based on this source of evidence.

- Dividend growth models—these estimates, from two applications of the DGM and a range of inputs, suggest a range of 6.1–7.5 per cent is reasonable for the two months to November 2013.

290 This is the average of the estimate of the MRP derived from our DGM models for the two months ending November 2013.

These estimates are broadly 60 to 80 basis points above the average for the period from March 2006 for which estimates are available.[291]

- Survey evidence—surveys of market practitioners consistently support 6.0 per cent as the most commonly adopted value for the MRP. These surveys also indicate that the average MRP adopted by market practitioners was approximately 6.0 per cent. Like the conditioning variables, surveys are subject to various limitations.

- Conditioning variables—these give mixed results, and are each subject to various limitations. On the one hand, the dividend yield is approximately equal to its long term average with no discernible trend. On the other hand, credit spreads are above their pre–2007 levels and decreasing for lower quality instruments (for example, BBB) while being equal to their pre–2007 levels and decreasing for higher quality instruments (for example, swaps). Finally, implied volatility based MRP estimates suggest the MRP is currently below its historical average level at 5.6 per cent.

We have also considered:

- Recent decisions among Australian regulators—the AER notes both the ERA and the QCA consistently adopted an MRP estimate of 6.0 per cent under the same CAPM framework. However, IPART proposes to use DGMs to estimate a range for the current market risk premium. Decisions of other regulators are not direct evidence on the MRP but reflect other assessments of some or all of the information available to the AER.

- Recent Tribunal decisions—the Tribunal held the view that it was open on the evidence for regulators to adopt a 6.0 per cent MRP in all of the recent decisions where regulated businesses sought Tribunal review.

- Consultant advice—Associate Professor Lally, Professor McKenzie and Associate Professor Partington all recently advised us that a 6.0 per cent MRP was reasonable around the time of the Victorian gas final decision.[292]

Appendix D contains more detailed discussion of the available evidence. Figure 6.2 below presents the empirical estimates.

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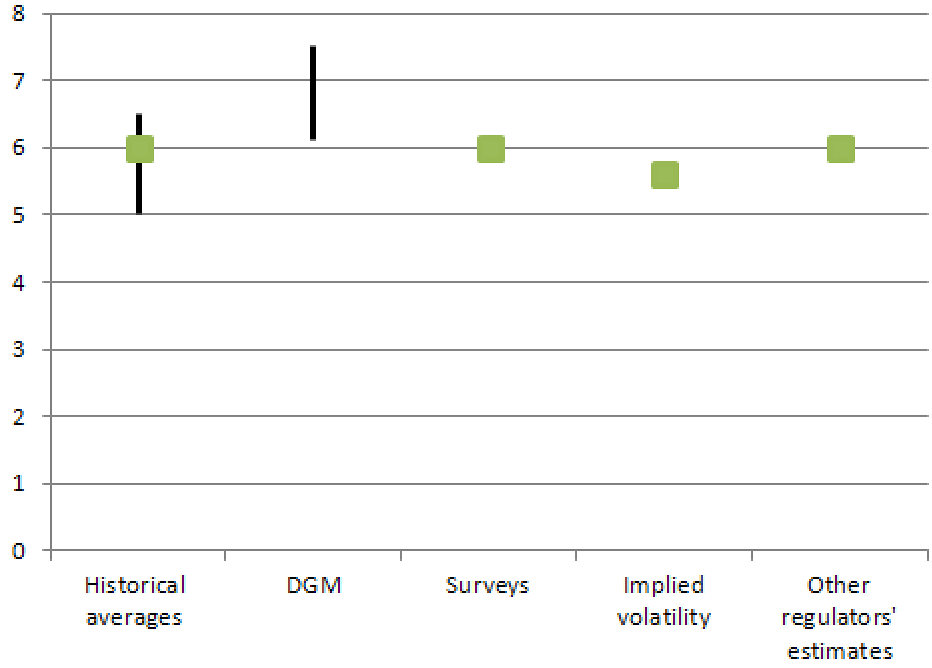
291 It should be noted that the average for this period has been affected by the GFC and this has been taken into account in considering the current MRP relative to the historical average.

292 M. Lally, *Review of the AER's methodology for the risk free rate and the market risk premium*, March 2013, p. 34; M. McKenzie, and G. Partington, *Review of the AER's overall approach to the risk free rate and market risk premium*, February 2013, p. 32.

Figure 6.2 Empirical estimates of the MRP (per cent)



Source: AER analysis

In determining an MRP of 6.5 per cent, we had regard to each source of evidence. Reflecting our assessment of the various sources of evidence, we give greatest consideration to historical averages followed by estimates of the MRP from DGMs and then surveys. We also give some consideration to conditioning variables and other regulators' estimates of the MRP. In the next section we discuss our consideration of these sources of evidence.

6.3.5 Reasons for the application of approach (at December 2013)

We consider our estimate in this decision contributes to the achievement of the rate of return objective by taking into account all the available evidence while recognising the strengths and limitations of that evidence. We have also had regard to prevailing conditions in the market for funds. In reaching this decision we have assessed a range of estimates from various sources and models.

We note our estimate of 6.5 per cent is a departure from our most recent decisions. In the most recent decisions we have consistently adopted 6.0 per cent.[293] In the past we have generally adopted MRP estimates of 6.0 or 6.5 per cent.

Consideration given to different estimates

Historical averages of the MRP are widely used by financial practitioners and regulators in Australia.[294] While a point estimate of 6.0 per cent is common, the choice of the averaging period and judgements in the compilation of the data result in a range for plausible estimates of the MRP of about 5.0–6.5 per cent.[295] We consider historical averages the best source of evidence available to estimate the MRP.

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293 See, for example, AER, *Final decision: APA GasNet*, March 2013, p. 80.

294 M. McKenzie, and G. *Partington, Report to Corrs Chambers Westgarth: Equity market risk premium*, 21 December 2011.

295 See appendix D for more detail on the sources of evidence. The lower bound of this range reflects our judgment as outlined above in the discussion of the lower bound of the MRP range.

We consider DGM estimates of the MRP a useful source of evidence. While the estimates are not as robust as historical averages they may reflect current market conditions more closely. In the past we have raised concerns about the sensitivity of this source of evidence to the assumptions used.[296]

DGMs are recognised financial models that are commonly used in practice.[297] They rest upon the fundamental proposition that the value of an asset is a function of expected future income and the discount rate, which in this case is the required return on equity.[298] DGMs are suited to the estimation of the rate of return from current market information, as demonstrated by US regulators using them for this purpose.[299] However, the outcomes are sensitive to the model assumptions, especially the assumed long term growth in dividends and the transition from current dividends to the long term growth path. There are a range of plausible assumptions that one could make on these parameters. We note, however, consistent applications of the various models appear to show similar trends over time.[300] There are also issues in applying the models in Australian conditions with more limited data.

In the past our starting point for DGM estimates of the MRP has been the specifications presented to us by the regulated businesses.[301] Of which, there have been various specifications over time.[302] These specifications have differed from decision to decision. In conducting our analysis, our approach has been to adjust these estimates to reflect our consideration of the evidence.

In this guideline process we have taken a different, bottom-up approach. We have considered the available evidence on the DGM and proposed our preferred construction of the model.[303] We have consulted with stakeholders on our preferred construction and engaged consultants to review our proposal.[304] As a result, in this explanatory statement we propose our preferred DGM estimates. Consequently, we have greater confidence in the symmetry of this information through time and give these estimates greater consideration than we have in the past.

However, we nevertheless consider any DGM, including our preferred construction, sensitive to the assumptions employed. This sensitivity might be moderated to some extent by:

- having regard to the outcomes of a range of models and assumptions on the future growth in dividends; and/or
- having regard to the current estimate of the MRP compared to the long term average for each of the models to assess the extent to which the MRP is above or below its long term average.

We have regard to a range of plausible assumptions and estimate a range for DGM estimates of the MRP of about 140 basis points.[305] We discuss our DGM estimates in more detail in appendices D and E.

We also give consideration to survey estimates of the MRP but consider this evidence less informative than historical averages and DGM estimates. This is because on the one hand survey estimates are a theoretically sound source of evidence and triangulation across various surveys and

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[296] See, for example, AER, *Final decision: APA GasNet*, March 2013, p. 101.
[297] ENA, *Response to AER rate of return guideline consultation paper*, 28 June 2013, p. 32.
[298] NERA Economic Consulting, *The market risk premium, analysis in response to the AER's draft rate of return guideline: A report for the Energy Networks Association,* 11 October 2013, p. 30.
[299] SFG, *Dividend discount model estimates of the cost of equity*, June 2013, p. 9.
[300] See, for example, IPART, *Draft report: WACC methodology*, September 2013, p. 23.
[301] AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, pp. 102-103.
[302] See, for example, discussion in appendix D.
[303] See appendix E for more detail.
[304] M. McKenzie and G. Partington, *Report to the AER: The Dividend Growth Model (DGM).*
[305] See appendices D and E for more detail.

different time periods provide support for this evidence. On the other hand, as outlined by the Tribunal and others there are various practical limitations with this evidence.[306] The results may be affected by the sampling procedures and wording of the questionnaire. Furthermore practitioners may make adjustments to other parameters (for example, the risk free-rate) or to the return on equity or overall returns to reflect prevailing market conditions and this may not be picked up in the survey.

We also give some consideration to conditioning variables and other regulators' MRP estimates. These sources of evidence are subject to various limitations and should be used with caution. At the same time, we consider them relevant and worthy of limited consideration.

In summary, in this decision, we give DGM estimates greater consideration than other forward looking estimates of the MRP, such as dividend yields, implied volatility and credit spreads. This reflects our assessment of the relative strengths and limitations of these sources of evidence. However, we have continued to give greater consideration to long term average historical excess returns, consistent with common regulatory and market practice. We consider the strengths and limitations of the various estimation methods in more detail above and in appendix D.

Determination of the point estimate

Our considerations when determining the point estimate are as follows:

- Consistent with the discussion in the previous section, we give greatest consideration to historical averages. We consider 6.0 per cent an appropriate estimate of this source of evidence.[307] This represents the starting point for our determination of a point estimate. We note that while a point estimate of 6.0 per cent is common, the choice of the averaging period and judgments in the compilation of the data result in a range for plausible estimates of about 5.0–6.5 per cent.
- We also give significant consideration to DGM estimates of the MRP. Using our preferred application of these models, we estimate a range of 6.1–7.5 per cent.
- We give some consideration to survey estimates which generally support an MRP estimate of about 6.0 per cent.
- We also give limited consideration to conditioning variables which give mixed results at the time of this decision. Credit spreads and dividend yields are stable, while implied volatility suggests the MRP may be below the historical average at 5.6 per cent.
- Lastly, we give limited consideration to other regulators' estimates of the MRP. These generally suggest an estimate of 6.0 per cent is appropriate. The Tribunal has also affirmed several of these decisions.[308]

We consider an MRP estimate of 6.5 per cent provides an appropriate balance between the various sources of evidence. This point estimate lies between the historical average range and the range of estimates produced by the DGM. This reflects our consideration of the strengths and limitations of each source of evidence as summarised above and expanded upon in appendix D.

[306] See appendix D for more discussion.
[307] See appendix D for more detail.
[308] See appendix D for more detail.

7 Return on debt: approach

This chapter deals with the conceptual issues related to return on debt estimation. Sections 7.1 and 7.2 present the issue and the approach we propose in the guideline. Section 7.3 covers the reasons for the approach.

7.1 Issue

We must set out in the rate of return guideline the methodologies we propose to use in estimating the return on debt component of the allowed rate of return. We must also set out how those methodologies are proposed to result in the determination of a return on debt in a way that is consistent with the allowed rate of return objective. This is to apply to electricity and gas, and transmission and distribution businesses, taking into account the definition of the benchmark efficient entity (see chapter 3).

7.2 Approach

To estimate the return on debt we propose:

- to use a trailing average portfolio approach, that is, to estimate:[309]
  - the average return that would have been required by debt investors in a benchmark efficient entity if it raised debt over an historical period prior to the commencement of a regulatory year in the regulatory control period
- to update the return on debt estimate annually (that is, for each regulatory year)
- to apply equal weights to all the elements of the trailing average
- to implement transitional arrangements consistent with the 'QTC method' (an annual re-pricing of a portion of the notional debt portfolio) and the benchmark term of ten years.

7.3 Reasons for approach

In the draft guideline we proposed our conceptual approach to return on debt estimation. Specifically, we proposed to estimate the return on debt using a trailing average portfolio approach with equal weights applied to all the elements of the trailing average, and to update the return on debt estimate annually. We also proposed to implement transitional arrangements consistent with the 'QTC method' and our proposed benchmark debt term. We sought views of stakeholders on our proposed approach. Below we outline the reasoning for our approach in the final guideline and address stakeholder submissions.

This section details the reasons for our approach to estimating the return on debt:

- Subsection 7.3.1 provides the relevant background.
- Subsection 7.3.2 discusses our decision to propose a single approach for the benchmark efficient entity.
- Subsection 7.3.3 reviews efficient debt financing practices and provides reasons for our preferred approach.

[309] NER, cls. 6.5.2(j) and 6A.6.2(j); NGR, r. 87(10).

- Subsections 7.3.4 and 7.3.5 consider specification of the trailing average portfolio approach with respect to annual updating and weighting schemes.

- Subsection 7.3.6 concludes with our considerations on the need for a transition and our proposed method of transition.

7.3.1 Background

Prior to the November 2012 rule change final determination, we used the return on debt definitions in the previous rules. As a result, the expected return on debt was the nominal risk free rate plus the debt risk premium (DRP).[310] We estimated the DRP in our recent decisions using an appropriate benchmark and a method that conforms to the benchmark parameters.[311] The risk free rate was the same as for the return on equity.[312]

We and the Energy Users Committee expressed concern during the rule change process that the approach under the previous rules was not producing an appropriate estimate of the return on debt for a benchmark efficient entity.[313] In the final rule change determination, the AEMC gave us the discretion to propose an approach that we consider best contributes to the achievement of the allowed rate of return objective.

The AEMC set out the characteristics of three approaches to estimating the return on debt that a regulator could reasonably contemplate, which should reflect one of the following:[314]

- the return that would be required by debt investors in a benchmark efficient entity if it raised debt at the time or shortly before the making of the distribution determination for the regulatory control period;

- the average return that would have been required by debt investors in a benchmark efficient entity if it raised debt over an historical period prior to the commencement of a regulatory year in the regulatory control period; or

- some combination of the above.

For simplicity, we refer to these as the 'on the day', trailing average portfolio and hybrid portfolio approaches, respectively.

The AEMC also provided considerations with respect of the regulatory discretion we are to exercise in arriving at our proposed approach:[315]

> This discretion for the regulator includes the detail of any approach, such as the period over which a prevailing cost of debt is observed, the length of any historical averaging period, and the form of

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310 NER, version 52, cls. 6.5.2(b) and 6A.6.2(b).

311 See, for example: AER, *Access arrangement final decision APA GasNet Australia (Operations) Pty Ltd 2013-17 attachment*, March 2013, pp. 91–92; AER, *Access arrangement final decision Envestra Ltd 2013-17 attachment*, March 2013, p. 150; AER, *Access arrangement final decision Multinet Gas(DB No.1)Pty Ltd Multinet Gas (DB No.2) Pty Ltd 2013-17 attachment*, March 2013, pp. 133–134; AER, *Access arrangement final decision SPI Networks (Gas) Pty Ltd 2013-17 attachment*, March 2013, pp. 112–113; AER, *Draft decision, ElectraNet transmission determination 2013-14 to 2017-18*, 29 November 2012, pp. 167–170; AER, *APT Petroleum Pipeline Pty Ltd access arrangement final decision Roma to Brisbane Pipeline 2012-13 to 2016-17*, August 2012, pp. 62–64;

312 See, for example: AER, *Access arrangement final decision APA GasNet Australia (Operations) Pty Ltd 2013-17 attachment*, March 2013, p. 55.

313 AEMC, *Summary of issues raised in submissions on the directions paper*, pp. 9, 15.

314 AEMC, *Rule determination National Electricity Amendment Rule 2012, National Gas Amendment Rule 2012*, 29 November, 2012, p. 90.

315 AEMC, *Final rule change determination*, November 2012, p. 90.

measurement of the observed financing costs. In all cases the regulator's judgement is to be exercised in such a way as to be consistent with the overall allowed rate of return objective.

7.3.2 Menu of approaches

As detailed in chapter 3, we propose to use a single definition of a benchmark efficient entity for the purpose of estimation of the allowed rate of return on capital. In particular, we consider that factors such as difference in size or ownership structure of service providers do not justify the adoption of different benchmark definitions. Given the definition of the benchmark efficient entity, we must specify the methodology we propose to use for estimating the allowed return on debt. There are two conceptually distinct options we could adopt in the guideline: providing details of a single estimation approach and a so called 'menu approach'.

A 'menu approach' would involve us providing details in the guideline on how we would estimate the return on debt under each of the three approaches. During a particular determination, service providers could then propose, and we could adopt the approach to estimating the return on debt that best matches the debt management practice of a benchmark efficient entity in the circumstances.[316]

We propose to maintain our proposal in the draft guideline to use a single approach to estimating the return on debt for the benchmark efficient entity, rather than a menu of approaches.

Our reasoning for this position is as follows:

1. We acknowledge there may be a number of approaches to the return on debt estimation that could be consistent with the rules, the RPP, and the objectives. However, we consider that the rules do not require us to discuss and provide detail of all possible variations of approaches to estimation of return on debt. Rather, our task is to detail the methodologies we propose to use.[317] In addition, we consider that, as long as the adopted approach satisfies the rules, the RPP, and the objectives, there is no need for it to be further tailored to the individual circumstances of service providers.

2. Further, we consider that one of the objectives of the guideline and the Better Regulation program is to provide regulatory certainty and transparency. Regulatory certainty and transparency are important factors for both energy consumers and service providers and their investors.[318]

3. We consider that the 'menu approach' would not be consistent with the principles of incentive-based regulation. Specifically, it would not encourage efficient debt financing. A service provider would have an incentive to propose the option that maximises its total allowed revenue, but not necessarily use the proposed approach in managing its actual debt portfolio. For instance, the prevailing rate of return on debt at the start of a regulatory control period may be high relative to its historic average. If so, a service provider might prefer the 'on the day' approach to a portfolio approach. If the prevailing rate of return on debt subsequently fell by the beginning of the next regulatory control period, its preferences may change in favour of a portfolio approach. These incentives to behave strategically may be reduced by introducing transitional arrangements between the approaches. However, a 'menu approach' coupled with transitional arrangements would still raise concerns. If a service provider chose to switch back to a different approach at a later date, the regulator would potentially face the complex task of working out a transitional

[316] See, for example: ENA, *Response to the AER's rate of return guidelines issues paper*, February 2013. pp. 27–29.
[317] NER, cls. 6.5.2(n) and 6A.6.2(n); NGR, r. 87(14).
[318] PIAC, *Submission to the consultation paper*, June 2013, p. 6; Paul Johnston, *Investor perspectives on energy market reform*, Presentation to ENA forum, 24 July 2013, p. 2.

arrangement to apply within another transitional arrangement. We do not consider this to be a desirable outcome, particularly given it may not promote the long term interests of consumers.

4. We consider that the proposed adoption of the trailing average approach is a major change in the regulatory framework. We arrived at this decision through an extensive consultation process and analysis. A major change in regulatory approach requires a strong level of commitment from all stakeholders. We do not consider that the use of a 'menu approach' would be consistent with the commitment required for this regulatory change.

We also received submissions on specific issues in relation to a menu approach. We consider these submissions below.

Thus, for the above reasons, we consider that it is preferable to set out one approach consistent with the rules, the RPP, and the objectives in the guideline rather than providing a menu of possible approaches. The above reasoning is consistent with the reasoning we presented in the draft guideline.

Response to key issues raised in stakeholder submissions

In their submission to the draft guideline consumer groups generally supported our proposal to use a single approach to estimating the return on debt for the benchmark efficient entity. They submitted that a menu of approaches would not be consistent with incentive based regulation and would provide service providers with incentives to behave strategically.[319]

The submissions on this issue we received from industry stakeholders fall into two categories: comments on the reasoning we used to arrive to our conclusion and comments related to the preferred choice of approach.

In the first category, APA and APIA emphasised the need for the proposed approach to satisfy the requirements of the rules and, especially, the allowed rate of return objective.[320] In particular, APIA submitted:[321]

> We do not have a particular problem with the [trailing average approach], and believe the availability of a trailing average approach will enhance efficiency within the energy industry. Where we have issue is with the preclusion of other approaches to the cost of debt, which the NGR has deemed to be acceptable; an on-the-day and a hybrid approach. … Additionally, while we take the AER's point that, so long as its approach satisfies the rules, the NEO and the NGO, it does not need to take individual circumstances into account in this particular context, we would remind the AER that the rules also require it to provide support for or against methodologies that makes direct reference to the ARORO. The AER has not done this; neither its support for its trailing average approach nor the reasons it gives for not supporting for other models makes reference to the ARORO.

In the second category, consistent with its submission to the consultation paper, Jemena submitted that it 'favours the hybrid cost of debt approach because it leads to lower financing costs for smaller networks like JEN and JGN, which benefits both the firms and their customers'.[322]

The ENA expressed the following view:[323]

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319 Public Interest Advocacy Centre, *Reasonably rated: Submission to the AER's draft rate of return guideline*, 11 October 2013, pp. 10, 40–41; Council of Small Business Australia, *Australian Energy Regulator – Better Regulation program draft rate of return guideline – Comments*, 10 October 2013, p. 4.

320 APA Group, *Submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013, p. 33; Australian Pipeline Industry Association Ltd, *Meeting the ARORO? A submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013, pp. 4, 8–9, 35–36.

321 APIA, *Submission to the draft guideline*, October 2013, pp. 35–36.

322 Jemena Ltd., *Rate of return guideline: Jemena submission on the draft guideline*, 11 October 2013, p. 1.

> The ENA agrees that the trailing average approach to estimating the cost of debt should be set out in the guideline. …The ENA also recognizes the AER's preference that the guideline should specify a single approach to estimating the return on debt. However, as the ENA has previously submitted, some businesses consider that the hybrid or current approaches better reflect efficient debt management practices in some cases. While the AER has chosen to include only the trailing average approach in the draft guideline, as the guideline is not binding, businesses have the opportunity to present alternative approaches as part of their revenue determinations.

We address the above submissions in more detail in section 7.3.3. In particular, we have provided more detailed discussion of how our proposed approach addresses the allowed rate of return objective in response to the submissions from the ENA, Jemena, APIA and APA Group.

Overall, we consider that no new evidence was presented that would justify our departure from the preferred approach. Therefore, we propose to use a single approach to estimating the return on debt for the benchmark efficient entity. Section 7.3.3 of this chapter sets out how such an approach contributes to achievement of the allowed rate of return objective.

7.3.3 Efficient debt financing practices and conceptual approach to return on debt estimation

We propose to use a trailing average portfolio approach to estimating the return on debt of the benchmark efficient entity.

In this section we discuss our considerations of efficient debt financing practices of the benchmark efficient entity and provide reasons for our preferred approach.

In summary:

- We propose to use a single definition of a benchmark efficient entity and specify a single approach to estimating the return on debt.
- We consider that holding a portfolio of debt with staggered maturity dates is likely an efficient debt financing practice of the benchmark efficient entity operating under the trailing average portfolio approach.
- We consider that the regulatory return on debt allowance under the trailing average portfolio approach is, therefore, commensurate with the efficient debt financing costs of the benchmark efficient entity.
- We further consider that the trailing average portfolio approach is consistent with other requirements of the rules, RPP, and the objectives.

Efficient debt financing of the benchmark efficient entity

The allowed rate of return objective requires 'the rate of return for a [service provider] is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the [service provider] in respect of the provision of [regulated services]'.[324] Therefore, it is important to be clear about how we identify efficiency and what would represent efficient debt financing costs.

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323 Energy Networks Association, *Response to the draft rate of return guideline of the Australian Energy Regulator*, 11 October 2013, p. 56.

324 NER, cls. 6.5.2(c) and cl. 6A.6.2(c); NGR, r. 87(3).

As we discussed in the draft guideline, we consider that satisfying the requirements of the rules, the objectives, and RPP is aligned with promoting economically efficient outcomes.[325] The AEMC's rule change determination recognised these considerations. It noted that the rate of return on debt framework should reflect the allowed rate of return objective and:[326]

> ...should try to create an incentive for service providers to adopt efficient financing practices and minimise the risk of creating distortions in the service provider's investment decision.

We propose that the benchmark efficient entity should be a regulated energy business (see chapter 3). It then follows that efficiency of different debt financing practices of the benchmark efficient entity needs to be considered in the context of the adopted regulatory regime and, specifically, the adopted approach to return on debt estimation.

We acknowledge the QTC's view on the relevance of financial risk management principles in assessing the efficiency of different return on debt approaches:[327]

> These principles allow the broader objectives of debt management to be considered, such as managing various risks to reduce the probability of financial distress. The principles can also capture the risks faced by consumers under different return on debt approaches.
>
> …an efficient debt financing strategy is one that results in a business's equity providers being exposed to an acceptable level of refinancing and interest rate risk, taking into account the business's size, asset life, capital structure and the characteristics of the firm's cash flows.

Therefore, we interpret 'the efficient financing costs of a benchmark efficient entity' as financing costs resulting from the benchmark efficient entity minimising the expected present value of its financing costs over the life of its assets. In doing so, the benchmark efficient entity would take into account the regulatory framework and the associated financial risks it faces and expects to face in the future. That is, *all other things being equal*, each regulatory approach to estimating return on debt corresponds to:

- the efficient financing costs of the benchmark efficient entity under this approach; and
- a range of efficient financing practices—including a range of efficient debt financing practices—that result in those efficient financing costs.

These considerations provide a basis for assessing how different approaches to estimating the return on debt satisfy the requirements of the rules and promote overall efficiency in a manner consistent with the objectives and RPP.

Current 'on the day' approach

In this section we analyse our current methodology that is an 'on the day' approach. The purpose of the following analysis is not to establish whether the 'on the day' approach is consistent with the requirements of the rules. Rather, the aim is to provide a starting point for our consideration of the trailing average portfolio approach in later sections. As we stated in section 7.3.2, we consider that our task is to establish consistency with the rule requirements only for the methodologies we propose to use.[328]

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325 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 76–78.
326 AEMC, *Rule Determination*, 29 November 2012, p. 73.
327 Queensland Treasury Corporation, *Rate of return guidelines consultation paper: Submission to the Australian Energy Regulator*, 21 June 2013, p. 21.
328 NER, cls. 6.5.2(n) and 6A.6.2(n); NGR, r. 87(14).

Our current methodology estimates the return on debt of a service provider as the prevailing return on debt as close as possible to the start of the regulatory control period.[329] Conceptually, the 'on the day' return on debt estimate would reflect the return on debt of the benchmark efficient entity that raises all debt required to satisfy its financing needs once for every regulatory control period (that is, just ahead of the start of each regulatory control period).

The efficient debt financing practices of the benchmark efficient entity under the 'on the day' approach would depend on a number of factors. These include debt financing costs, the associated financial risks and the risks the benchmark efficient entity expects to face in the future.

In the 2009 WACC review we recognized that 'the central task of the Treasury function at [regulated energy network] businesses is to manage risks (that is, refinancing, interest rate and currency risks) at the lowest possible costs' and the 'complex trade-off between refinancing risk and the cost of debt'.[330] We observed that 'according to the Treasurers, having a debt portfolio with staggered maturity dates is critical to mitigating refinancing risk'.[331] We also observed that '[t]he Treasurers explain that interest rate risk is managed separately by hedging against movements in base rates away from the risk-free rate assumed by the regulator at the reset'.[332] These risks are discussed below.

Refinancing risk is the risk that a firm would not be able to efficiently finance its debt at a given point in time. This may be because the debt instruments that it seeks are not available to it, or because they are expensive.[333] Refinancing risk is often due to systematic factors, such as macroeconomic trends or changes in debt market liquidity. However, refinancing risk may also result from company specific matters. For example, if lenders knew that a company needed to refinance its debt at a certain time or risk bankruptcy, they might raise the interest rates that they demand from the company.

The need to manage refinancing risk is balanced against the overall cost of the benchmark efficient entity's debt portfolio. For example, a longer average term of debt for a debt portfolio means lower refinancing risk. But it also means the total cost of the debt portfolio is higher.[334] Hence, the efficient debt financing practices would address this trade–off.

Further, regulated businesses face **interest rate risk**, resulting from a potential mismatch between the regulatory return on debt allowance and their actual return on debt:[335]

> Consider a firm that operates a single regulated network. For such a business, any difference between the costs of servicing its debt and the allowed return on debt will flow through to (or from) equity holders. This is because the firm must pay its debt holders exactly what it has promised them, irrespective of whether the regulatory allowance is more or less than what is to be paid. Any surplus or deficit will then flow to (or from) the equity holders as the residual claimants. Consequently, if a regulated firm is able to match its debt servicing costs to the regulatory revenue allowance, it will remove this source of cash flow volatility to equity holders. It is for this reason that many regulated businesses seek to create the best possible match between their borrowing costs and the regulatory revenue allowance in relation to those borrowing costs.

329 In practice, this approach uses a short averaging period of 5–40 days shortly before the determination is made. See, for example: AER, *Final decision: WACC review,* May 2009, pp. 19–20, 171.
330 AER, *Final decision: WACC review*, May 2009, pp. 150, 152.
331 AER, *Final decision: WACC review*, May 2009, p. 151.
332 AER, *Final decision: WACC review*, May 2009, p. 144.
333 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 169.
334 Assuming a positively sloping yield curve.
335 SFG Consulting, *Rule change proposals relating to the debt component of the regulated rate of return, Report for AEMC*, 21 August 2012, p. 22.

Under the 'on the day' approach, the benchmark efficient entity can manage its interest rate risk in a number of ways. For example, it can raise all debt required to satisfy its financing needs once (i.e., just ahead of the start of each regulatory control period). Alternatively, it can engage in some other debt financing practice, but enter into hedging arrangements. Entering hedging arrangements aims to replicate a borrowing cost structure that would arise if the benchmark efficient entity did refinance the entirety of its debt at the beginning of the regulatory control period.

Under the former scenario, the benchmark efficient entity may be able to alleviate the potential mismatch between the regulatory return on debt allowance and its expected return on debt. However, raising the entirety of its debt once for every regulatory control period would expose the benchmark efficient entity to substantial refinancing risk.

Under the latter scenario, the benchmark efficient entity would be able to address both its interest rate risk and refinancing risk. For example, the benchmark efficient entity could hold a floating-rate debt portfolio with staggered maturity dates. It could then overlay this with 'pay fixed' interest rate swaps to hedge the base rate to the regulatory allowance for the duration of the regulatory control period. This strategy would address its refinancing risk and limit the potential mismatch between the regulatory return on debt allowance and its expected return on debt to their DRP components. As Chairmont Consulting pointed out:[336]

> For an Australian efficient operator there is no market to effectively, and in a cost efficient manner, hedge their DRP.

Therefore the benchmark efficient entity would not able to alleviate all potential mismatch in relation to the debt margin component of the return on debt, unless it issues the entirety of its debt during the averaging period. To this extent, under the 'on the day' approach the benchmark efficient entity faces a potential trade–off between the need to manage its refinancing and interest rate risk.

Further, the need to manage interest rate risk is also balanced against the overall cost of the benchmark efficient entity's debt portfolio.

The efficient debt financing practices of the benchmark efficient entity would address all of the above considerations and trade–offs. Thus, determining which debt financing practices of the benchmark efficient entity are efficient under the 'on the day' approach is a complex and, to a large extent, theoretical exercise. However, we can inform our analysis by observing market outcomes in the regulated energy sector.

Many debt financing strategies may have been available to service providers under the current 'on the day' approach. However, we observe that most service providers hold a diversified portfolio of debt with staggered maturity dates.[337] This means that a service provider will only have to refinance a proportion of its debt at any point in time. Holding a portfolio of debt with different terms to maturity allows a service provider to manage its refinancing risk.[338] This view, for example, is supported by the submission from CitiPower, Powercor, and SAPN:[339]

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336 Chairmont Consulting, *Comparative Hedging Analysis*, 12 June 2013, p. 17.

337 See, for example: ENA, *Response, Attachment 17: Debt strategies of utility businesses*, CEG, June 2013, pp. 16–22; SP AusNet, *Submission to the consultation paper*, June 2013, p. 1; NSW DNSP, *Submission to the consultation paper*, June 2013, p. 5.

338 NSW DNSP, *Submission to AER's rate of return guidelines consultation paper*, 21 June 2013, p. 3; PIAC, *Submission on the consultation paper*, June 2013, p. 20.

339 CitiPower, Powercor and SA Power Networks, *Response to the AER's rate of return guidelines consultation paper*, 28 June 2013, p. 6.

> The characteristics of an Australian network business are such that it is efficient financing practice to stagger issuances to manage refinancing risk.

Further, in its report for AEMC, SFG analysed common debt management strategies used by service providers under the current 'on the day' approach to address interest rate risk. It noted that:[340]

> One debt management approach that is commonly used by small to medium sized regulated businesses is to "lock in" the base interest rate at the time of the determination using the interest rate swaps market…

This strategy would involve the following steps:

- A service provider would issue floating rate debt prior to the regulatory determination (or issue fixed rate debt and immediately swap it into floating rate debt with the same maturity).
- The service provider would then enter 'pay fixed – receive floating' interest rate swap contracts during the averaging period prior to the regulatory determination:[341]

> Under these contracts, the business receives the relevant risk-free rate of interest from the counterparty and pays to the counterparty a fixed rate of interest that is set at the time the contract is entered into. The term of the swap will be set to match the length of the regulatory period (usually five years).

- On balance, such strategy 'leaves the business paying only the fixed rate under the swap contract'.[342]

SFG also observed that businesses that might be 'too large to lock in interest rates using swap contracts' during the averaging period use 'different techniques to match their debt service cash flows with the regulatory revenue allowance, including':[343]

> a) Locking in base interest rates in the swaps market over a much longer time period (e.g., 6 to 12 months) rather than seeking to do this during the 20- to 40-day averaging period, and simply accepting the inevitable mis-match between interest payments and the regulatory allowance; and
>
> b) Issuing fixed rate bonds well before the determination and "parking" the proceeds until the determination – for government-owned businesses who raise their finance through treasury corporations.
>
> …The issue-early-and-park approach is not feasible for private sector businesses.

Finally, SFG noted that businesses that own a portfolio of multiple assets, with regulatory determinations occurring at different points in time 'are able to use a portfolio debt management approach':[344]

> This involves accessing debt markets from time to time when conditions are considered to be favourable, and not seeking to actively hedge interest rate risk at the time of each determination.

Overall, SFG suggested that:[345]

> …for a single-asset firm, it is highly unlikely that the firm would elect not to attempt to match its debt service costs with the allowed return on debt.

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340 SFG Consulting, *Rule change proposals relating to the debt component of the regulated rate of return, Report for AEMC*, 21 August 2012, p. 24.

341 SFG Consulting, *Rule change proposals relating to the debt component of the regulated rate of return, Report for AEMC*, 21 August 2012, p. 24.

342 SFG Consulting, *Rule change proposals relating to the debt component of the regulated rate of return, Report for AEMC*, 21 August 2012, p. 24.

343 SFG Consulting, *Rule change proposals relating to the debt component of the regulated rate of return, Report for AEMC*, 21 August 2012, pp. 25–26.

344 SFG Consulting, *Rule change proposals relating to the debt component of the regulated rate of return, Report for AEMC*, 21 August 2012, p. 27.

345 SFG Consulting, *Rule change proposals relating to the debt component of the regulated rate of return, Report for AEMC*, 21 August 2012, p. 23.

Consistent with this view, NSW TCorp submitted:[346]

> …privately- and government-owned utilities will seek to minimise uncompensated financial risk by closely matching debt costs to the debt allowance benchmark.

In practice, we observe that most privately–owned businesses typically manage their interest rate risk by entering into interest rate swap contracts in order to 'lock in' the base rate at the time of the determination. This is consistent with Jemena's submission: [347]

> NSPs typically use swap transaction to hedge interest rate exposure for the duration of the regulatory period…and issue timing and market choice to manage risks in the DRP component.

This observation is also consistent with our consultant's report for the 2009 WACC review:[348]

> Typically private companies borrow on the longest tenor available, and then convert the fixed rate debt into synthetic floating rate debt. This would then be hedged during the reset period via an interest rate swap for the duration of the regulatory period.
>
> In the absence of the long term bond market, corporates will typically borrow bank debt on the longest tenor available on a floating basis and then again hedge their interest rate risk to match the regulatory period.

Given the observed practices of regulated network businesses and the definition of the benchmark efficient entity, we consider that the following practice is likely to constitute an efficient debt financing practice of the benchmark efficient entity under current 'on the day' approach:

- holding a debt portfolio with staggered maturity dates and using swap transactions to hedge interest rate exposure for the duration of a regulatory control period.

Outline of alternative approaches

Below we outline other alternative approaches.

The trailing average portfolio approach estimates the return on debt as 'the average return that would have been required by debt investors in a benchmark efficient entity if it raised debt over an historical period prior to the commencement of a regulatory year in the regulatory control period'.[349] This reflects the forward–looking return on debt that would be incurred by the benchmark efficient entity for debt raised incrementally.

The hybrid portfolio approach incorporates elements from the 'on the day' and trailing average portfolio approaches. Under this approach, the estimate of the risk free rate roughly corresponds to the one derived under the 'on the day' approach (that is, reflecting market conditions around the time of the determination). The DRP estimate roughly corresponds to the one derived under the trailing average portfolio approach (that is, a long–term estimate). Similar to the trailing average portfolio approach, the return on debt estimate under the hybrid portfolio approach reflects the forward–looking return on debt that would be incurred by the benchmark efficient entity for debt raised incrementally.

Finally, we note that the methodology we currently adopt is only one example of an 'on the day' approach. 'On the day' approaches contain a range of methods that can differ with respect to the length and timing of the averaging period, as well as the structure of the return on debt allowance. For instance, another example of an 'on the day' approach would be to align the term of the base rate of

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346 NSW Treasury Corporation, *AER's proposal for a 7-year debt allowance benchmark*, 9 October 2013, p. 1.
347 Jemena, *Submission to the consultation paper*, June 2013, p. 19.
348 Deloitte, *Refinancing, debt markets and liquidity*, 12 November 2008, p. 13.
349 NER, cls. 6.5.2(j)(2) and cl. 6A.6.2(j)(2); NGR, r. 87(10)(b).

the return on debt allowance with the length of the regulatory control period and its credit margin component with the benchmark debt maturity.[350]

Our preferred approach: overall considerations

We propose to use a trailing average portfolio approach to estimating the return on debt of the benchmark efficient entity. As we state in section 7.3.2, we consider that the guideline should specify a single approach to estimating the return on debt for the benchmark efficient entity.

In this section we set out our considerations of how our proposed approach to estimating return on debt would result in the determination of a return on debt in a way that contributes to the achievement of the allowed rate of return objective.

Under the trailing average portfolio approach the return on debt estimate is computed as a weighted average of the total return on debt over a period spanning up to the start of the regulatory control period (or regulatory year). The length of this period would be informed by the benchmark debt maturity. We discuss the choice of the weighting scheme in section 7.3.5 and the choice of the benchmark term to maturity in section 8.3.3.

To assess this approach against the requirements of the rules, we need to consider what would represent efficient debt financing practices of the benchmark efficient entity under the trailing average portfolio approach. We cannot directly observe the efficient debt financing practices of the benchmark efficient entity under the trailing average portfolio approach. Therefore, we need to rely on theoretical reasoning and indirect evidence. This indirect evidence includes observed debt financing practices of service providers under the current 'on the day' regulatory approach and, to the extent they are relevant, observed debt financing practices of unregulated businesses.

As we observed above, under current 'on the day' approach most service providers hold a diversified portfolio of debt with staggered maturity dates. Most privately–owned service providers also manage their interest rate risk via 'locking in' base interest rates in the swap market for the duration of a regulatory control period. We agree with SFG that this interest rate risk management strategy is likely a product of the 'on the day' approach, and if the trailing average portfolio approach is implemented:[351]

> …it would make no sense for businesses to seek to lock in interest rates at the time of the determination. To manage interest rate risk, the business would need to match, as best it can, its debt service costs with the average cost of debt estimated by the regulator. This would require the business to actually issue debt throughout the period over which the average was taken. That is, no business would have any incentive to adopt the approach of using swaps to lock in the rate at the time of the determination or the raise-early-and-park approach, because those approaches are designed to match market rates at the time of the determination. Both of these approaches would be abandoned in favour of an approach whereby debt was issued approximately uniformly over the historical averaging period.

In other words, the trailing average portfolio approach allows a service provider—and therefore also the benchmark efficient entity—to manage interest rate risk arising from a potential mismatch between the regulatory return on debt allowance and the expected return on debt of a service provider without exposing itself to substantial refinancing risk.

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[350] M.Lally, *Estimating the cost of debt of the benchmark efficient regulated energy network businesses*, 16 August 2013, p. 8.

[351] SFG Consulting, *Rule change proposals relating to the debt component of the regulated rate of return, Report for AEMC*, 21 August 2012, p. 32.

Thus, we consider that holding a (fixed rate) debt portfolio with staggered maturity dates to align its return on debt with the regulatory return on debt allowance is likely to be an efficient debt financing practice of the benchmark efficient entity under the trailing average portfolio approach.

If a benchmark efficient entity holds a debt portfolio with staggered maturity dates, the expected return on debt for any regulatory year can be computed as follows. It is a weighted average of the returns on debt issued prior to that regulatory year and the expected returns on debt issued during the regulatory year. Where weights depend on the size of each particular issue. We discuss annual updating of the return on debt estimate and the choice of a weighting scheme in more detail in sections 7.3.4 and 7.3.5, respectively. Overall, we are satisfied that the chosen specification of the trailing average portfolio approach performs well in terms of minimising the potential difference between the return on debt allowance and the expected return on debt of the benchmark efficient entity. Annual updating of the trailing average improves the match between the return on debt allowance and the expected return on debt, as it allows the incorporation of newly revealed market information into the estimate more frequently.

To summarise, we are satisfied that the trailing average portfolio approach is likely to contribute to the achievement of the allowed rate of return objective and recognises 'the desirability of minimising any difference between the return on debt and the return on debt of a benchmark efficient entity referred to in the allowed rate of return objective'.[352]

If the expected return on debt (and equity) raised in a period is different from the return on debt (and equity) allowance for the period, this difference may distort intertemporal investment and consumption decisions. That is, it may result in dynamic inefficiency. In particular, if the return on debt allowance is below the expected return on debt this might result in under–investment. On the other hand, if the return on debt allowance is above the expected return on debt this would lead to over–compensation for the regulated business and customers paying prices that are above efficient levels.

Under the trailing average portfolio approach, movements in the market return on debt from year to year are reflected in the allowed return on debt. Reflecting market changes during the regulatory control period reduces the scope for sub-optimal investment and consumption levels. We discuss annual updating in section 7.3.4 and different weighting schemes in section 7.3.5. Overall, we are satisfied that the trailing average portfolio approach provides service providers with incentives to engage in efficient debt financing practices. We consider this promotes overall efficiency of investment, operation and use of, electricity and natural gas services for the long term interest of consumers in a manner consistent with the objectives.

Finally, we consider the trailing average portfolio approach is capable of providing the benchmark efficient entity with a staggered debt portfolio with a reasonable opportunity to recover at least the efficient debt financing costs. This implies that a service provider with a similar degree of risk is also provided with the same opportunity.

In addition to the considerations above, the trailing average portfolio approach provides the following benefits:

- It smooths movements in the return on debt over a number of years. We consider this would result in lower price volatility (from one regulatory control period to the next) for energy consumers and more stable returns for investors than the "on the day" approach. Consideration of consumer

[352] NER, cls. 6.5.2(k)(1) and cl. 6A.6.2(k)(1); NGR, r. 87(11)(a).

price volatility is an important factor, since the price volatility affects intertemporal decisions of energy consumers and hence affects the overall efficiency of economic outcome.

- It minimises the consequences of a single measurement error.[353]
- It may be more reflective of the actual debt management approaches of non-regulated businesses.[354] It might, therefore, be more likely to represent efficient financing practice.

The above reasoning is consistent with the draft explanatory statement. It also takes into account stakeholder submissions to the draft guideline. We have provided more detailed discussion of how our proposed approach addresses the allowed rate of return objective in response to the submissions from ENA, Jemena, APIA, and APA Group.[355] Below we respond to other key issues raised in stakeholder submissions.

Response to key issues raised in stakeholder submissions

The majority of stakeholders supported our proposal to use the trailing average portfolio approach in their submissions to the draft guideline.[356] For example, the ENA submitted:[357]

> The trailing average approach performs well in terms of minimizing the potential difference between the return on debt allowance and the expected required return on debt, as required under the National Electricity Rules. It also better reflects the actual and efficient financing practices of the majority of businesses and will result in lower volatility in both revenue and prices, compared with the current approach.

At the same time, the stakeholders expressed preferences regarding certain aspects related to the implementation of the approach. These included annual updating, particular weighting schemes, benchmark term, and the presence of transitional arrangements. We discuss these aspects in the relevant sections of the explanatory statement.

On the other hand, NSW Irrigators' Council submitted that:[358]

> …the seven year trailing average portfolio approach will provide less clarity and transparency for the overall determination of the allowed WACC parameter. As such, NSWIC submits that the allowed WACC should be set for the entirety of the regulatory period instead of being re-evaluated every time period.

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353 Since a larger number of observations are used to come up with the final estimate, a single measurement will have a smaller distorting impact on the overall estimate than with the short averaging period used for the 'on the day' approach.

354 See, for example, CEG, *Efficiency of staggered debt issuance*, February 2013, pp. 30–32.

355 APA Group, *Submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013, p. 33; Australian Pipeline Industry Association Ltd, *Meeting the ARORO? A submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013, pp. 4, 8–9, 35–36; Jemena Ltd., *Rate of return guideline: Jemena submission on the draft guideline*, 11 October 2013, pp. 1–2; ENA, *Response to the draft guideline*, October 2013, p. 56.

356 ActewAGL, *Response to draft rate of return guideline*, 11 October 2013, p. 3; APA Group, *Submission on the draft guideline*, October 2013, p. 33; Council of Small Business Australia, *Australian Energy Regulator – Better Regulation program draft rate of return guideline – Comments*, 10 October 2013, p. 4; Ethnic Communities' Council of NSW, *Submission to Better Regulation: Draft rate of return guidelines*, 10 October 2013, p. 2; ENA, *Response to the draft guideline*, October 2013, p. 4; Energex Ltd., *Response to the AER's draft rate of return guideline*, 11 October 2013, p. 3; Envestra, *Response to AER draft rate of return guideline*, 11 October 2013, p. 8; Ergon Energy, *Submission on the draft AER rate of return guidelines and explanatory statement: Australian Energy Regulator*, 11 October 2013, p. 4; Energy Users Association of Australia, *Submission to the draft AER rate of return guideline*, 11 October 2013, p. 2; NSW distribution network service providers, *Submission on the rate of return draft guideline*, 11 October 2013, pp. 1, 4; Public Interest Advocacy Centre, *Reasonably rated: Submission to the AER's draft rate of return guideline*, 11 October 2013, pp. 10, 41–43; Queensland Treasury Corporation, *Submission to the draft rate of return guideline*, 11 October 2013, p. 1; SP AusNet, *Submission on the draft rate of return guideline*, 11 October 2013, pp. 1–3; Spark Infrastructure, *Response to the AER's draft rate of return guideline*, 11 October 2013, p. 3; TransGrid, *Submission on the rate of return draft guideline*, 11 October 2013, p. 3.

357 ENA, *Response to the draft guideline*, October 2013, p. 56.

358 NSW Irrigators' Council, Draft submission: Australian Energy Regulator, *Better Regulation – Draft rate of return guideline*, 14 October 2013, p. 5.

We disagree. As long as the parameters and the formula for the trailing average are specified at the time of regulatory determination, the approach is transparent. The regulatory return on debt estimate can be reproduced by applying the formula. In addition, as we propose to update the estimate for each regulatory year, we must apply annual updating through the automatic application of a formula.[359] Therefore, annual updating would also be transparent and reproducible.

Finally, in their submissions to the consultation paper the ENA and Jemena submitted that some businesses might consider that 'a hybrid approach will better reflect their own efficient debt management practices'. They also submitted that the trailing average portfolio approach 'has some material negative consequences for smaller network service providers'.[360] In the draft guideline we provided the following considerations in regard to these submissions:

- As detailed in chapter 3, we propose not to use size as a part of the benchmark efficient entity definition. We do not consider that risks associated with difference in size of service providers should be rewarded through the allowed rate of return on capital. Thus, to the extent that Jemena is facing higher risks due to its smaller size, these risks should not be compensated through the rate of return allowance.
- Further, as long as the return on debt allowance is specified ex ante, service providers have the incentive to use debt financing practices in a way that allows them to seek least cost debt financing and manage their refinancing and interest rate risks. A service provider is free to choose whatever debt financing practices it sees fit, given the incentives provided by the regulatory framework.

The remaining question is whether and to what extent would the trailing average portfolio approach distort investment decisions of smaller service providers like Jemena and thus, result in an inefficient outcome.

In its submission to the draft guideline, Jemena expressed its preference for the hybrid portfolio approach 'because it leads to lower financing costs for smaller networks like JEN and JGN' and submitted:[361]

> Finally, we recognise the AER's preference for the guideline to set out only one cost of debt approach (i.e. the trailing average approach). We also note that the guideline is not binding and the National Electricity Rules and National Gas Rules allow for alternative cost of debt approaches. We therefore look forward to further consulting with the AER on alternative approaches during the JEN and JGN price reviews.

The ENA also suggested that some businesses might have a preference for the hybrid or 'on the day' approaches.[362] We acknowledge the position expressed by the ENA and Jemena. We were not, however, persuaded that Jemena provided enough supporting evidence that our use of the trailing average portfolio approach would result in significant distortion of its investment decisions.

7.3.4 Annual updating

We propose to update the allowed return on debt estimate in each regulatory year of a regulatory control period.

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359 NER, cls. 6.5.2(i), 6.5.2(l), 6A.6.2(i) and 6A.6.2(l); NGR, rs. 87(9) and 87(12).

360 ENA, *Response to the consultation paper*, June 2013, pp. 6-7; Jemena, *Submission to the consultation paper*, June 2013, p. 1.

361 Jemena Ltd., *Rate of return guideline: Jemena submission on the draft guideline*, 11 October 2013, pp. 1–2.

362 ENA, *Response to the draft guideline*, October 2013, p. 56.

The rules allow for two options in designing the return on debt estimation methodology:[363]

1. The same estimate applies to each regulatory year within the regulatory control period.

2. The estimate can be (potentially) different for different regulatory years within the regulatory control period.

Under the trailing average portfolio approach, the first option implies that the trailing average is computed at the start of the regulatory control period and not updated until the next regulatory control period. The second option is consistent with the trailing average estimate being updated annually. As we observed in the consultation paper, the second option can be implemented either by annually updating the allowed revenue in each regulatory year of a regulatory control period, or via a retrospective (net present value-neutral) true up at the next determination.

We propose to update the allowed return on debt estimate annually for the following reasons:

1. Annual updating minimises the potential mismatches between the benchmark efficient entity's return on debt and allowed return on debt during the regulatory control period. This, in turn, reduces the scope for dynamic inefficiency.

2. Annual updating is feasible and its costs are relatively small. We propose to use a third–party data provider to estimate the allowed return on debt. In this case, on balance, the advantages of annual updating outweigh the associated additional resource requirement and other potential disadvantages, such as potentially higher volatility of consumer prices within a regulatory control period.

Each of the two options allowed by the rules has advantages and disadvantages. In particular, option one (no annual updating) may lead to mismatches between the benchmark efficient entity's return on debt during the regulatory control period and the regulatory return on debt allowance. This could create investment distortions for the benchmark efficient entity and result in dynamic inefficiency.[364] This problem would be exacerbated where there is a prolonged period of increasing or decreasing rates of return on debt and when the return on debt displays significant autocorrelation.[365] The paper by the ACCC's Regulatory Development Branch (RDB) on the return on debt suggested that the issue is partly resolved due to the inherent lagged self–correction mechanism that accounts for the changes in the return on debt at the next determination.[366] However, such self–correction does not take into account the time value of money. Further, it may take more than one regulatory control period in the circumstances described above.

On the other hand, option two (estimate updated annually) minimises the potential mismatches between the benchmark efficient entity's return on debt and allowed return on debt during the regulatory control period. However, it introduces additional complexity to the tariff computation (that is, the CPI-X profile would need to be recalculated annually). Option two may also be more resource intensive on both us and stakeholders. In addition, any difference between the benchmark rate of return on capital computed with and without annual updating becomes less significant if the benchmark debt tenor is long.

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[363] NER, cls. 6.5.2(i) and 6A.6.2(i); NGR, r. 87(9).
[364] See section 7.3.3 for more detail.
[365] See, for example, QTC, *Submission to the consultation paper*, June 2013, pp. 29-38. We provided further analysis of this quantitative study in the draft explanatory statement: AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 88–89.
[366] RDB, *Estimating the return on debt*, April 2013, pp. 30–35.

Further, the rules require that we must apply annual adjustments in an automatic way. [367] Therefore, our decision on whether to use annual adjustments or not cannot be made without also considering implementation issues. These include whether the return on debt is estimated using a third–party dataset (such as the ones produced by Bloomberg or expected to be produced by the RBA) or a dataset we create.[368] In particular, if a third–party dataset is used, annual updating would likely be less resource intensive than if an in–house dataset is used.

Finally, on the issue of annual updating that is implemented via a retrospective true up, industry stakeholders submitted in their response to the consultation paper that:

- use of a retrospective true up would potentially lead to higher volatility of consumer prices and revenues of service providers from one regulatory period to the next[369]
- use of a retrospective true up would result in high cash flow mismatches for service providers within a regulatory control period, which would flow through to equity holders.[370]

CEG also expressed this view.[371] We consider that the results presented by CEG should be interpreted with caution. It is not clear that the historical US data sample used in the study is of direct relevance to the current domestic capital market that functions under inflation targeting. Nevertheless, we consider that the study suggests that updating annually may be in some circumstances preferable to a retrospective true up.[372]

In the draft explanatory statement we proposed to use a third–party data provider to estimate the allowed return on debt. We then considered that in this case, on balance, the advantages of annual updating outweigh the associated additional resource requirement and other potential disadvantages, such as potentially higher volatility of consumer prices within a regulatory control period.[373] Therefore, we proposed to update the return on debt estimate in each regulatory year of a regulatory control period. Taking into consideration stakeholder submissions to the draft guideline, we propose to maintain this approach in the final guideline. The final guideline outlines the annual updating process. We provide an overview of stakeholder submissions in relation to annual updating below.

Response to key issues raised in stakeholder submissions

The majority of submissions supported our proposal to update the return on debt estimate annually.[374] For example, SP AusNet submitted:[375]

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367 NER, cls. 6.5.2(i), 6.5.2(l), 6A.6.2(i) and 6A.6.2(l); NGR, rr. 87(9) and 87(12).

368 The RBA expects to start publishing monthly credit spreads of Australian non-financial corporations from December 2013.

369 NSW DNSP, *Submission to the consultation paper*, June 2013, p. 7; Envestra, *Submission to the consultation paper*, June 2013, p. 10; CitiPower, Powercor and SA Power, *Response to the consultation paper*, June 2013, p. 7; ENA, *Submission to the consultation paper*, June 2013, p. 7; TransGrid, *Response to the consultation paper*, June 2013, Attachment p. 3; SP AusNet, *Submission to the consultation paper*, June 2013, p. 3; APIA, *Submission on the consultation paper*, June 2013, p. 37; QTC, *Submission on the consultation paper*, June 2013, p. 2.

370 CitiPower, Powercor and SA Power, *Response to the consultation paper*, June 2013, p. 7; ENA, *Submission to the consultation paper*, June 2013, pp. 7, 100; SP AusNet, *Submission to the consultation paper*, June 2013, p. 2.

371 CEG, *Impact of annual updating on revenue smoothing, Memorandum*, 17 June 2013, p. 6.

372 We provided further analysis of this quantitative study in the draft explanatory statement: AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 88–89.

373 AER, *Better Regulation: Explanatory statement, Draft rate of return guideline*, 30 August 2013, pp. 86–89.

374 APA Group, *Submission on the draft guideline*, October 2013, p. 37; COSBOA, *Comments– draft guideline*, October 2013, p. 4; ENA, *Response to the draft guideline*, October 2013, pp. 4, 56; Energex, *Response to the draft guideline*, October 2013, p. 3; Envestra, Response *to the draft guideline*, October 2013, p. 8; Ergon Energy, *Submission on the draft guideline*, October 2013, p. 4; EUAA, *Submission to the draft guideline*, October 2013, p. 6; MEU, *Comments on the draft guideline*, October 2013, p. 42; NSW DNSPs, *Submission on the draft guideline*, October 2013, pp. 1, 5; QTC, *Submission to the draft guideline*, October 2013, p. 1; SP AusNet, *Submission on the draft guideline*, October 2013, pp. 1–2.

375 SP AusNet, *Submission on the draft guideline*, October 2013, pp. 1–2.

> The inclusion of annual updating is necessary to allow NSPs to minimise the mismatch between the return on debt allowance and the actual return on debt. This will also result in smoother prices for consumers, as changes to the cost of debt are gradually reflected in the allowance rather than aggregated and passed through at the beginning of the next regulatory control period.

The ENA and APA Group expressed similar concerns related to the implementation of the formula for annual updating. In particular, APA Group submitted:[376]

> APA understands the reasons for, and is generally supportive of, the AER's proposal to update the allowed rate of return in each year of a regulatory period by updating the estimate of the rate of return on debt used in determining that allowed rate.
>
> If the allowed rate of return is updated annually as proposed, then rules 6.5.2(l) and 6A.6.2(l) of the NER, and rule 87(12) of the NGR, require that a change to the service provider's total revenue be effected through the automatic application of a formula. This formula is to be established for each service provider individually, and is to be set out in a regulatory decision pertaining to the service provider. We expect that the form of this formula and its use will involve some complexity. The way in which the AER intends to flow the annually updated rate of return through to regulated revenue should, therefore, be the subject of consultation, and (at minimum) key principles should be set out in the rate of return guidelines.

The ENA submitted:[377]

> The ENA strongly supports that annual updating of the cost of debt will be carried out as part of the trailing average approach set out in the draft guideline. …The ENA would welcome further details on how annual updating would be carried out to be provided by the AER. An opportunity to comment on the implementation of this process, for example, changes to be made to the PTRM, would also be welcome.

We acknowledge the above considerations. As discussed in chapter 1, we recognise that the post–tax revenue model (PTRM) will need to be amended to reflect our adoption of a trailing average portfolio approach. This includes annually updating the trailing average. We will consult on proposed amendments to the PTRM in accordance with the consultation procedures outlined in the rules.

Further, PIAC submitted that it 'does not have a strong preference with respect to annual updating' and that:[378]

> PIAC recommends that the AER undertake further assessment on the length of interest rate cycles in order to inform the final decision on annual updating of the return on debt and the trade-off between the cost of this and the long-term benefit to consumers.

PIAC also submitted:[379]

> If automatic annual updating were to proceed PIAC would recommend the following:
>
> - the AER confirms that the process of updating will not be so complex for either the AER or the NSP that it will add to overall costs and/or reduce transparency in the process;
> - the AER note the significant increase in the burden on consumers to engage effectively in the process and investigate ways this might be addressed;
> - the AER ensure that the reduction in interest rate risk for the NSP is appropriately captured in the cost of equity, for instance, by a further reduction in equity beta.
> - At a minimum, the benefits of annual updating should outweigh any additional costs that NSPs may claim for implementing annual updating; and

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376 APA Group, *Submission on the draft guideline*, October 2013, p. 37.
377 ENA, *Response to the draft guideline*, October 2013, p. 56.
378 PIAC, *Submission to the draft guideline*, October 2013, pp. 9, 43.
379 PIAC, *Submission to the draft guideline*, October 2013, p. 44.

- the AER closely monitor the outcomes of annual updating so that a more robust statistical assessment of its value and costs can be conducted in the future.

We acknowledge PIAC's position. We consider that, on balance, the benefits of annual updating outweigh the relevant costs and that annual updating is consistent with the requirements of the rules. We would expect that annual updating would be likely to minimise the potential mismatch between the allowed return on debt and the expected return on debt for the benchmark efficient entity.

As discussed above, the rules require that the return on debt calculation must be capable of automatically updating.[380] We intend to set out the process for automatic updating that will be transparent in service providers' relevant determinations. Consumer groups will have an opportunity to comment on the proposed process for updating the return on debt estimate during a relevant determination process. We also acknowledge that the PTRM (revenue/price control model) will need to be amended to reflect our approach to estimating the return on debt (including the need to annually update the return on debt). We will consult with stakeholders on any proposed amendments (refer to 1.5.2).

Finally, we have addressed the submission of NSWIC in section 7.3.3.

7.3.5 Weighting

We propose to maintain our proposed approach in the draft guideline and to adopt a simple (equally weighted) trailing average to estimate the return on debt allowance.

As the term suggests, the trailing average estimate of the return on debt is a weighted average of individual rates of return on debt within a certain time period. The choice of individual weights depends on the assumptions we make about the efficient financing practices and debt profile of the benchmark efficient entity. If we assume the benchmark efficient entity issues debt uniformly over time in tranches of equal size (that is, the debt balance remains constant over time), it is reasonable to apply equal weights. That is, for a benchmark term of 10 years, a weight of 1/10 would be given to each year in the trailing average.[381] We refer to such a weighting scheme as a simple (unweighted) average. If the benchmark efficient entity has an increasing (or decreasing) debt balance, using a simple trailing average might result in a mismatch between its return on debt and the allowed return on debt. This mismatch might potentially distort investment decisions and lead to a dynamically inefficient outcome.

Alternatives to simple trailing average suggested by stakeholders include:[382]

- weights based on the actual debt issuance data
- weights based on the actual changes in RAB, adjusted by the benchmark gearing
- weights based on the debt issuance assumptions in the PTRM.

We propose to adopt a simple trailing average rather than the alternative weighting scheme for the following reasons:

1. All three of the alternative approaches imply that the weights used in a trailing average would be different for each individual service provider. We do not consider that differences in investment

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380 NER, cls. 6.5.2(l) and 6A.6.2(l); NGR, r. 87(12).
381 See section 8.3.3 for further detail on the proposed benchmark term of debt.
382 AER, *Rate of return consultation paper*, May 2013, pp. 111–113.

profiles of individual service providers justify adoption of different benchmark definitions. Since we propose to use a single definition of the benchmark efficient entity, there should be a single weighting scheme.

2. Weighting schemes based on actual data (the first two approaches) may not provide a service provider with incentives to review the efficient timing of investment in response to the cost and availability of finance (as we further discuss below). In addition, these approaches would need to be implemented via a retrospective true up, since such weights can only be computed after the parameters they are based on have been observed.

3. Service providers may not (and indeed, often do not) follow their forecast PTRM profile. We consider the relative complexity of the PRTM–based weighting scheme, and forecast imprecision outweigh potential benefits of the approach.

Below we detail our reasoning.

All three approaches imply that the weights would be different for each individual service provider. We previously considered that this would represent a departure from the benchmarking approach and the allowed rate of return objective.[383]

In response to this position, the QTC submitted:[384]

> The use of different weights for each service provider is not a departure from benchmark regulation, as the efficient cost of debt for the benchmark efficient firm will depend on its investment and funding profile during a period.

We recognise that the debt financing requirements of the benchmark efficient entity are informed by its investment profile. To that extent, the efficient debt financing practices of the benchmark efficient entity would be affected by its efficient investment profile and debt financing needs. The benchmark efficient entity is a conceptual notion rather than a real entity. So, therefore, are its investment profile and debt financing needs, as no entity with that profile or those needs actually exists. Individual service providers' expected funding profiles are therefore only of limited use. They may inform our view about the efficient financing practices of the benchmark efficient entity with a similar degree of risk. However they are not a substitute for the investment profile and debt financing of the benchmark efficient entity. Further, since we propose to use a single definition of the benchmark efficient entity, we propose that there should be a single weighting scheme.

In addition to the above considerations, the three alternative approaches suggested by stakeholders also have other limitations.

We consider that the return on debt allowance which relies on the actual value of a parameter that the service provider can influence (such as debt balances and capex) is not consistent with incentive–based regulation. In particular, such weighting schemes may not provide a service provider with incentives to minimise its return on debt and, therefore, to engage in efficient financing practices. The QTC submitted that:[385]

> A weighting scheme based on the actual increase in the RAB would provide incentives for efficient financing practices, because the service provider is incentivised to fund at a lower cost relative to prevailing rates at the time of the investment. …The advantage of weighting using the actual increase in RAB is that

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383 AER, *Consultation paper, Rate of return guidelines*, 10 May 2013, pp. 111–113; AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 89–92.

384 QTC, *Submission to the draft guideline*, October 2013, p. 20.

385 QTC, *Submission to the draft guideline*, October 2013, p. 20.

the service provider is not influenced by the absolute level of interest rates in regards to the timing of its investment.

We acknowledge that the benchmark entity would still have an incentive to reduce interest costs relative to prevailing rates. However, we do not consider that removing the link between the absolute level of interest rates and timing of investment would necessarily lead to an efficient outcome. For an investment decision to be efficient, it needs to take into account a number of factors. One of the factors, arguably, is the prevailing rates at which a service provider can obtain funding.

In addition, the weighting based on the actual changes in RAB (or, for that matter, any historical values) would need to be implemented via a retrospective (NPV–neutral) true up, since such weights can only be computed after the parameters they are based on have been observed. This would increase the complexity of the estimation process. This also could potentially result in higher price volatility for consumers and cash flow volatility for investors.[386]

Further, we consider weights based on the PTRM (forecast) debt balances.

During the regulatory control period, a service provider might choose not to follow the debt issuance profile assumed in the PTRM forecast. We agree that the 'PTRM debt balances …are ultimately approved by the AER' and 'reflect the new funding required to maintain and expand a service provider's network'.[387] However, the PTRM is approved at the time of regulatory determination and relies on forecasts incorporating all the available relevant information at that time. It is conceivable that future capital expenditure which is considered efficient at the time of the determination might no longer be considered to be efficient at a later date, as new information becomes available. For example, a significant change in the prevailing conditions in capital markets might influence the efficiency of such investment.

We acknowledge the QTC's view that it might not be possible to forecast future interest rates with any certainty.[388] At the same time, it might be possible to observe whether the prevailing rate is relatively low or relatively high. This appears to be consistent with the QTC's statement referring to 'a time when interest rates are relatively low (for example, due to continued quantitative easing)'.[389] To clarify, it might be possible to tell that the rates are relatively high without it being possible to tell whether or not they continue being relatively high next year. In that case, it might be efficient for a service provider to postpone investment if it considers the prevailing rate of return on debt is relatively high.

To summarise:

- Service providers may not (and indeed, often do not) follow their forecast PTRM profile. Moreover, there are circumstances when it might be efficient for a service provider to do so.

- PTRM forecast debt balances of individual service providers are not a substitute for debt financing profile of the benchmark efficient entity.

- Given the above, PTRM–based weighting scheme might not minimise the mismatch between the expected return on debt of the benchmark efficient entity and the allowed return on debt.

- Implementation of the PTRM–based weighting scheme is relatively complex.

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386 See, section 7.3.4 for a discussion of retrospective true ups.
387 QTC, *Submission to the draft guideline*, October 2013, p. 21.
388 QTC, *Submission to the draft guideline*, October 2013, p. 20.
389 QTC, *Submission to the draft guideline*, October 2013, p. 20.

For the above reasons, we are not convinced that trailing average with PTRM–based weights will perform better than the approach with simple weights in terms of addressing the allowed rate of return objective and other requirements of the rules. We consider the relative complexity of the PRTM–based weighting scheme, and forecast imprecision outweigh potential benefits of the approach. We propose not to use the PTRM–based weighting scheme.

Other considerations

The above analysis acknowledges that the potential mismatch between the regulatory return on debt allowance based on a trailing average with uniform weights and the efficient debt financing costs can potentially cause investment distortions. However, alternative weighting approaches also have disadvantages.

Below we provide additional considerations that inform our proposed approach.

The QTC submitted that:[390]

> It is possible that an unweighted average may perform adequately if normal circumstances are assumed to occur in the future, with interest rates relatively near to their longer-term average and a relatively low rate of growth in regulated asset bases (RAB). … An unweighted average is likely to prove problematic in circumstances where interest rates are volatile, and where interest rates are persistently higher or lower than the trailing average value. These are the conditions which currently exist…

We note that an unweighted average would be 'problematic' when interest rates are volatile only to the extent that the efficient investment profile of the benchmark efficient entity leads to increasing debt balances/increasing RAB over time.[391] If it is efficient for the benchmark efficient entity to maintain a constant RAB which would be funded by issuing debt in equal tranches over time then the equally weighted trailing average would be reflective of its efficient debt financing costs.

Further, in the case of an increasing or decreasing RAB, the potential mismatch between the benchmark efficient entity's efficient debt financing costs and the equally–weighted return on debt allowance would be smaller:

- the longer is the benchmark term of debt
- the smaller is the growth rate of RAB/debt balances.

Response to key issues raised in stakeholder submissions

In their submissions to the draft guideline stakeholders expressed different views on our proposed approach. Several consumer groups expressed their preference for simple weights.[392] For example, PIAC submitted:[393]

> With respect to the various options for weighting years within the trailing average portfolio, PIAC agrees with the AER's conclusions that there should be no weighting applied. Any weighting complicates the analysis but provides no better guarantee that it will replicate the prudent practices of an efficient benchmark entity. The fact that NSPs will have a different profile than the 'equal weight' profile is not a relevant consideration unless it is found that there is some consistent cycle of debt issuances that would be adopted by a benchmark efficient NSP over time.

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390 QTC, *Submission to the draft guideline*, October 2013, p. 18.
391 Assuming that the benchmark gearing ratio is constant.
392 EUAA, *Submission to the draft guideline*, October 2013, p. 6; PIAC, *Submission to the draft guideline*, October 2013, p. 44; COSBOA, *Comments– draft guideline*, October 2013, p. 4.
393 PIAC, *Submission to the draft guideline*, October 2013, p. 44.

NSWIC, however, stated:[394]

> Should a trailing average approach be adopted however, NSWIC submits that the weights should reflect the approximation to the present regulatory period, instead of having equal weights for each year of the seven year period.

At the same time, NSWIC provided no further recommendation on a specific design of such a weighting scheme.

Many industry stakeholders did not explicitly address the issue of weighting in their submissions. At the same time, several stakeholders supported QTC's proposal to adopt 'a weighted average based on the PTRM debt balances'.[395] We have addressed the QTC's position above. Consistent with the QTC's view, Ergon Energy submitted that 'use of unweighted average may lead to investment distortions especially for service providers with large capital expenditure programs'.[396] Further, CitiPower and Powercor submitted that 'under the simple average approach it will be impossible for a distribution business to effectively hedge its costs when its RAB is growing'.[397]

Energex submitted that:[398]

> Given that capital expenditure in network businesses invariably follows a ‘lumpy’ profile characterised by large, less frequent investments, the consequences of a mismatch between the regulated cost of debt and the actual cost of debt can be significant and difficult to hedge in advance (**as the exact amount and timing of future expenditures is rarely certain**).[Emphasis added]
>
> …Energex therefore supports QTC’s proposed weighted average approach as it will properly take account of the cost of new borrowings expected to be undertaken at the start of each regulatory period based on the approved capex forecasts.

We acknowledge that Energex views the timing and amount of future expenditures as uncertain. However, we consider that this view emphasises difficulties in forecasting future debt financing needs and, therefore, is not consistent with Energex's recommendation.

Finally, United Energy and Multinet did not recommend a specific approach. They submitted that:[399]

> The Companies consider that the use of fixed weights over time (or an equally weighted average) may be inappropriate in certain circumstances, such as in those cases in which a business is experiencing marked growth in its regulatory asset base. …Regulated businesses should be presented with an opportunity to prepare arguments for the use of time-varying weighting schemes. Businesses may be able to devise weighting methods that make use of information pertinent to a benchmark efficient entity, and thereby overcome potential problems associated with the use of firm specific data.

We consider that in future regulatory determinations (given the non-binding nature of the guideline) stakeholders have an opportunity to propose alternative approaches to estimating return on debt.

Taking into account all of the considerations above as well as computational and conceptual simplicity of an equally–weighted trailing average, we maintain our proposal in the draft guideline to adopt an equally–weighted (simple) trailing average.

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394 NSWIC, *Submission to the draft guideline*, October 2013, p. 5.
395 QTC, *Submission to the draft guideline*, October 2013, pp. 1–2, 18–21; Ergon Energy, *Submission on the draft guideline*, October 2013, pp. 5–6; Energex, *Response to the draft guideline*, October 2013, pp. 2–3; CitiPower, Powercor, SA Power Networks, *Submission to the draft guideline*, October 2013, p. 7.
396 Ergon Energy, *Submission on the draft guideline*, October 2013, p. 5.
397 CitiPower, Powercor, SA Power Networks, *Submission to the draft guideline*, October 2013, p. 7.
398 Energex, *Response to the draft guideline*, October 2013, pp. 2–3.
399 United Energy and Multinet, *Submission to the AER's draft rate of return guideline*, 15 October 2013, p. 5.

7.3.6 Transitional arrangements

We propose to maintain our approach in the draft guideline to apply uniform transition to all service providers in moving to the trailing average return on debt. That is, we propose to use a single transitional arrangement consistent with the 'QTC method', based on the proposed benchmark debt term of 10 years. This is based on the following considerations:

- consideration that the benchmark efficient firm is likely to need a transition in moving from the current 'on the day' approach to the trailing average approach
- proposing an approach that is likely to contribute to the achievement of the allowed rate of return objective and other requirements of the rules
- providing a gradual transition to the trailing average approach given a possible change in prior expectations regarding the regulatory framework by stakeholders
- practical considerations regarding use of historical information (and possible agreement) to calculate the return on debt
- minimising incentives for potential strategic behaviour of service providers.

In this section we consider the reasons above in more detail as well as review the relevant stakeholder submissions.

Background

Our intention to adopt the trailing average approach to estimate the allowed return on debt within this guideline raises a question of whether we need a transition to move away from the current 'on the day' approach. An alternative would be to apply the trailing average approach to service providers immediately at the start of their next regulatory control period.

The amended rules allow us to apply a transition if considered appropriate. The rules state that in estimating the return on debt regard must be had to the following (transition) factor:[400]

> ...**any impacts** (including in relation to the costs of servicing debt across regulatory control periods) **on a benchmark efficient entity** referred to in the allowed rate of return objective that could arise as a result of changing the methodology that is used to estimate the return on debt from one regulatory control period to the next... [emphasis added]

We note that the term 'any impact' allows us to address a wide range of concerns. The AEMC in its reasons accompanying the final rule determination stated that the purpose of this factor was:[401]

> The purpose…is for the regulator to have regard to the impacts of changes in the methodology for estimating the return on debt from one regulatory control period to another. Consideration should be given to **the potential for consumers and service providers to face significant and unexpected change in costs or prices that may have negative effects on confidence in the predictability of the regulatory arrangements**. [emphasis added]

The AEMC then further stated:[402]

> Its purpose is to allow consideration of transitional strategies so that any **significant costs and practical difficulties** in moving from one approach to another is taken into account. [emphasis added]

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400 NER, cls. 6.5.2(k)(4) and 6A.6.2(k)(4); NGR, r. 87(11)(d).
401 AEMC, *Final rule change determination*, 29 November 2012, p. 85.
402 AEMC, *Final rule change determination*, 29 November 2012, p. 85.

As we discussed in the consultation paper, we do not support the notion that transitional arrangements should be specific to individual service providers' debt financing practices.[403] The return on debt for each regulatory year needs to be determined so that it contributes to the achievement of the allowed rate of return objective. That is, debt financing practices of individual service providers inform the return on debt estimate to the extent that they inform our view of what represents the efficient debt financing costs of the benchmark efficient entity.

We propose to use a single definition of a benchmark efficient entity and we do not consider that factors such as difference in size or ownership structure of service providers justify the adoption of different benchmark definitions. Further, given our definition of the benchmark efficient entity, we propose to adopt a single approach to return on debt estimation. Therefore, if a transition is needed for the benchmark efficient entity, we consider it should be implemented via a single transitional method. As we pointed out in our consultation paper, we also would not expect a transition to occur more than once, unless we changed the approach to estimating the return on debt in future guidelines.

Overall considerations

Considering whether a transitional arrangement is necessary in moving from the current 'on the day' approach to the trailing average portfolio approach focuses on the potential for:

- significant costs and practical difficulties for the benchmark efficient entity in moving to another approach for estimating the return on debt
- significant and unexpected change in costs/prices that may have negative effects on confidence in the predictability of the regulatory arrangements.

We consider that the AEMC's reasoning provides us with some guidance regarding important considerations for determining whether a transitional arrangement is required.

Overall, we consider that there should be a transition from the 'on the day' approach to the trailing average portfolio approach for the benchmark efficient entity.

In section 7.3.3 we considered what would constitute the efficient debt financing practices of the benchmark efficient entity under the current 'on the day' approach. We considered it likely that holding a debt portfolio with staggered maturity dates and using swaps to hedge interest rate exposure for the duration of a regulatory control period would constitute such an efficient debt financing practice. Further, we consider that holding a (fixed rate) debt portfolio with staggered maturity dates to align its return on debt with the regulatory return on debt allowance is likely to be an efficient debt financing practice of the benchmark efficient entity under the trailing average portfolio approach. That is, it is likely that the benchmark efficient entity would need to unwind its hedging contracts in moving from the current 'on the day' approach to the trailing average portfolio approach. Therefore, if transition is immediate (that is, if there is no transitional arrangement), the benchmark efficient entity is likely then to face costs or practical difficulties, as:

- It would have likely entered hedging contracts to manage its interest rate risk in the past.[404]

403 AER, *Rate of return consultation paper*, May 2013, p. 115.

404 For example, the benchmark efficient entity could have entered into 'pay floating' interest rate swap contracts matching its term of the debt immediately after issuing fixed rate debt. This would effectively convert the issued fixed rate debt into floating rate debt. Therefore, at the time of the next regulatory determination, it would have floating rate exposure on its historical debt.

- It would be impossible for it 'to go back and lock in rates that applied some time ago'.[405]
- Without transition there would be, therefore, a mismatch between the expected return on debt of the benchmark efficient entity and the regulatory return on debt allowance set according to the trailing average portfolio approach.[406] This mismatch could potentially be significant.

A gradual transition, on the other hand, can take into account the efficient financing practices under the current 'on the day' approach. It can also address the need for the benchmark efficient entity to unwind its historical hedging contracts. As SFG suggested:[407]

> The type of "rolling in" arrangement that has been proposed by QTC would be an effective means of transitioning from the current Rules to the use of an historical average cost of debt approach.

Further, we consider that a gradual adjustment is also consistent with the need to account for the effect of the change in the return on debt approach on confidence in the predictability of the regulatory regime. This would accommodate any potential discrepancy between the proposed approach to estimating the return on debt and reasonable expectations consumers, service providers, and investors formed before the rule change.

In particular, unexpected and immediate changes in approaches to setting regulatory allowances for the return on debt can be disruptive to both businesses and consumers (to the extent that they may result in significant and unexpected changes in energy prices and cash flows compared to the expected levels under the continuation of the previous policy). Gradual changes to the regulatory framework may be more desirable. For instance, under the ‘on the day’ approach energy consumers may have reasonably expected energy prices to be based on the 'on the day' rate at the next determination. In particular, to the extent that the prevailing market rate of return on debt is mean–reverting, consumers would expect that if they face higher than average energy prices today, they would face lower that average prices in the future.

The reasonable expectations of consumers may not be met if a switch to the trailing average portfolio approach were implemented without a transition. A transition would allow for a more gradual adjustment to the change in regulatory approach. The same logic, of course, also applies to the reasonable expectations formed by service providers. In particular, the benchmark efficient entity may have reasonably expected that the current 'on the day' regulatory approach would continue into the future. As we observed in section 7.3.3, it is likely that it would then be holding a debt portfolio with staggered maturity dates and using swap transactions to hedge interest rate exposure for the duration of the current regulatory control period. As we discussed above, in this case, an immediate transition to the trailing average portfolio approach could potentially result in significant costs and practical difficulties for the benchmark efficient entity.

We have also had regard to the issues, related to the implementation of the return on debt approach. Without a transition, we would need to estimate the trailing average of the return on debt for each service provider at the commencement of the next regulatory control period. Some elements of the average would be based on historical data that might not be readily available, particularly, to the extent that we are proposing to use a third–party data set. We would also need to reach an

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405 SFG Consulting, *Rule change proposals relating to the debt component of the regulated rate of return, Report for AEMC*, 21 August 2012, p. 45.

406 This is because the expected return on debt of the benchmark efficient entity would reflect the hedging contracts it entered into. For example, if it entered into 'pay floating' interest rate swap contracts immediately after issuing fixed rate debt, the respective portion of its debt servicing costs would be linked to the prevailing base rate, rather than historical base rate at the time of debt issuance.

407 SFG Consulting, *Rule change proposals relating to the debt component of the regulated rate of return, Report for AEMC*, 21 August 2012, p. 46.

agreement with each service provider on the averaging periods for historical data where there is no transition. In this case, a service provider may prefer the averaging periods that deliver the highest estimates of the past rates of return. A transition that does not use historical data would avoid this issue.

Finally, as we discussed in section 7.3.2, there is a concern that, given the guideline is not binding, service providers would seek to switch from proposing one return on debt approach to proposing another and back at the time of their determinations. Service providers could propose to adopt whichever approach provided them with the highest allowed revenue. A transitional arrangement may deter a service provider from seeking to opportunistically switch between approaches, given this would require a further transitional arrangement. Any further transitional arrangement would delay the full commencement of the new approach. In turn, this would delay any 'windfall gains' received by the service provider from changing approaches.

We consider that the 'QTC method' of transition, consistent with simple weighting, addresses all of the reasons for a transition specified above. In addition, the 'QTC method' received the most support from stakeholders throughout the guideline process. We provide details on the 'QTC method' in appendix G.

Below we provide an overview of stakeholder submissions to the draft guideline on the issue of a transition and explain how our proposed approach addresses the stakeholders' comments.

Response to key issues raised in stakeholder submissions

In their submissions to the draft guideline consumer groups expressed the following range of views:

- Whether or not a transition is needed depends on other factors, such as the benchmark debt term and the length of the averaging period.[408]
- The benchmark debt term should be five, rather than seven, years. If a five-year tenor is adopted, there is lesser or no need for a transition.[409]
- Our proposed transition is too long. A transition is needed to accommodate prior expectations of consumers, but:[410]
    - it should be no longer than five years
    - it should start on July 1 2013 for all service providers, except the Victorian distributors (for them it should start on January 2014 to match their regulatory year).
- If a transition is adopted, it should be uniform, based on consideration of the benchmark efficient entity and allowed rate of return objective, and should not 'be driven by the particular preferences of NSPs with particular ownership characteristics'.[411]

PIAC also submitted:[412]

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408 PIAC, *Submission to the draft guideline*, October 2013, p. 51; EUAA, *Submission to the draft guideline*, October 2013, p. 6.
409 MEU, *Comments on the draft guideline*, October 2013, p. 42; PIAC, *Submission to the draft guideline*, October 2013, p. 7; COSBOA, *Comments– draft guideline*, October 2013, p. 5; ECC, *Submission to the draft guidelines*, October 2013, p. 2.
410 EUAA, *Submission to the draft guideline*, October 2013, p. 6.
411 PIAC, *Submission to the draft guideline*, October 2013, p. 52; COSBOA, *Comments– draft guideline*, October 2013, p. 5.
412 PIAC, *Submission to the draft guideline*, October 2013, p. 51.

> This is perhaps one of the more difficult decisions the AER will have to make. There are arguments for providing a period of adjustment for the NSPs from one regulatory approach to another. However, there are very good arguments for not having a transition period, not least of which is the precedence it sets, the complexity and time lag to achieve the final objective and the risks on the way to that goal.

With respect to the above submissions, we consider:

- The length of transition is determined by considerations of the efficient debt financing practices of the benchmark efficient entity and, as such, is related to the benchmark debt term. We propose to adopt the benchmark debt term of 10 years. Therefore, the corresponding transition period would also be 10 years. This takes into account the period of time that is likely to be needed for the benchmark efficient entity to unwind its hedging contracts.[413] Accordingly, we do not consider that adopting a shorter benchmark debt term reduces the need for transition.

- We consider that the beginning of the transition period for each service provider should match the beginning of the regulatory control period in which new rules apply to that service provider.

- We consider that the key objective of the transitional arrangements is to estimate the return on debt so that it contributes to the achievement of the allowed rate of return objective. As such, we do not consider that the proposed transitional method creates a 'time lag to achieve the final objective'.

Many service providers generally supported our proposed approach to transition, provided the approach is based on a 10 year benchmark term of debt.[414] For example, QTC submitted:[415]

> QTC supports the proposed transitional arrangements (but based on the original 10-year benchmark debt tenor and transition period), **which are appropriate for service providers that have attempted to align their funding with the 'on the day' method**, although we note that different transitional arrangements may be appropriate for other service providers. [emphasis added]

On the other hand, ActewAGL expressed a view that 'a transition may not be necessary for businesses that already follow [the portfolio approach]'.[416]

Further, the NSW DNSPs and TransGrid supported an immediate transition (that is, no transitional period) to trailing average for their businesses, as these businesses 'already [use] a benchmark efficient portfolio approach to manage [their] debt'.[417] The NSW DNSPs submitted:[418]

> - Throughout previous regulatory frameworks and the Global Financial Crisis (GFC), the NSW DNSPs have managed their debt on a staggered portfolio basis. We agree with the AER that a staggered portfolio approach is an efficient approach to debt management. The cost of debt under this approach is reflected in a trailing average cost of debt. As such we have serious concerns over the AER's proposed approach of adopting a transition to the trailing average, which would under-compensate a "benchmark efficient firm" with a debt portfolio size of the NSW DNSPs by more than $700 million over a seven year transition period based on current forward rate projections;
>
> - In our view, if the AER was to apply a transition to the trailing average for the NSW DNSPs, this would provide an allowed cost of debt lower than the efficient cost of debt, which would not satisfy the Revenue and Pricing Principles in Section 7A of the National Electricity Law (NEL) to provide a

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413 For example, if the benchmark efficient entity entered into a 10 year swap contract (the duration of the swap contract would then match the benchmark debt term) a year before the regulatory determination, such a swap contract would take 10 years to unwind.

414 APA Group, *Submission on the draft guideline*, October 2013, p. 33; Ergon Energy, *Submission on the draft guideline*, October 2013, p. 6; Jemena, *Submission on the draft guideline*, October 2013, p. 1; QTC, *Submission to the draft guideline*, October 2013, p. 2; SP AusNet, *Submission on the draft guideline*, October 2013, p. 3.

415 QTC, *Submission to the draft guideline*, October 2013, p. 2.

416 ActewAGL, *Response to the draft guideline*, October 2013, p. 3.

417 TransGrid, *Submission on the draft guideline*, October 2013, p. 3.

418 NSW DNSPs, *Submission on the draft guideline*, October 2013, pp. 1–2.

> network service provider with a **reasonable opportunity to recover at least its efficient costs**. We also consider that any such decision by the AER to adopt a debt transition to the NSW DNSPs would be inconsistent with the National Electricity Objective and the Rate of Return Objective…

TransGrid expressed a similar view.[419] The NSW DNSPs' submission also included supporting reports by CEG and UBS.[420]

The ENA summarised the views expressed by the member service providers as follows:[421]

> In some circumstances, it may be that no transition is required if the business already uses a debt financing approach consistent with an efficient benchmark or this is the best way of facilitating a business to hedge its efficient interest costs to the regulatory allowance.
>
> The ENA considers that the transition path set out by the AER in its draft guideline is **appropriate, where a business is in transition from a debt raising practice that is consistent with the AER's current approach** to establishing the cost of debt. [emphasis added]

We detailed our reasons for a single transition method for the benchmark efficient entity above, taking into account the stakeholders submissions we received. Further, we consider that the trailing average portfolio approach and the proposed transition method is capable of providing the benchmark efficient entity with a reasonable opportunity to recover at least the efficient debt financing costs. This implies that a service provider with a similar degree of risk is also provided with the same opportunity.

Overall, we propose to maintain our approach in the draft guideline to use a single transitional arrangement consistent with the 'QTC method' (based on the proposed benchmark debt term of 10 years) in moving to the trailing average return on debt to apply to all service providers.

419 TransGrid, *Submission on the draft guideline*, October 2013, pp. 3–4.

420 Competition Economists Group, *Transition to a trailing average approach: A report for the NSW distribution network service providers*, 11 October 2013; UBS [commercial in confidence].

421 ENA, *Response to the draft guideline*, October 2013, p. 77.

8 Return on debt: implementation

This chapter deals with the implementation issues for estimating the return on debt. Section 8.1 and 8.2 presents the issue and the approach we propose in the guideline. Section 8.3 elaborates on the reasoning for the proposed approach.

8.1 Issue

We must set out in the rate of return guideline the methodologies we propose to use in estimating the return on debt component of the allowed rate of return. We must also set out how the implementation of those methodologies is proposed to result in the determination of a return on debt in a way that it contributes to the achievement of the allowed rate of return objective.[422] In the draft guideline, we sought views regarding implementation issues for estimating the return on debt. Specifically, we need to make decisions on the following matters:

- Whether to use a third party data service provider (such as Bloomberg) or produce an estimate in-house.
- The averaging periods used to estimate the prevailing return on debt.
- The inputs to estimate the return on debt, including the benchmark term of maturity of debt and credit rating.

8.2 Approach

After further consideration of the issues and submissions to the draft guideline, we propose to use:

- an independent third party data service provider to estimate the return on debt
- an averaging period of 10 or more consecutive business days to estimate the prevailing return on debt, where the averaging period should be as close as practical to the commencement of the each regulatory year in a regulatory control period
- a benchmark credit rating of BBB+ or its equivalent.

We also propose to use a benchmark term of debt of 10 years, whereas in the draft guideline we proposed a term of seven years.

8.3 Reasons for approach

In the draft guideline, we sought stakeholder views on our proposed use of a third party data service provider. We also sought views on the proposed benchmark credit rating, average term of debt and an averaging period to calculate the return on debt of 10 or more consecutive business days.

Each of these issues is discussed below.

8.3.1 Third party data service provider

At this time, we propose to use a third party data service provider as the source of an estimate of the benchmark return on debt. We consider that this method has the following advantages:

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422 NER, cls. 6.5.2(n), 6A.6.2(n); NGR, r.87(14).

- It is independent expert advice.
- It can be implemented in the context of automatically updating a trailing average of the return on debt as required by the NER/NGL.

We have previously expressed a preference for using an independent third party data service provider, where the method for estimating the return on debt is transparent. However, other factors—such as differences in debt selection criteria—would also need to be considered in assessing which of the competing data providers to adopt in a determination. We consider that an assessment of the relative merits of a data service provider is consistent with the allowed rate of return objective and recognises 'the desirability of minimising any difference between the return on debt and the return on debt of a benchmark efficient entity referred to in the allowed rate of return objective'.[423]

We propose to specify in a service provider's determination how an automatic update to the trailing average can be applied in circumstances where the method of calculating the allowed return on debt is no longer available or has been amended during a service provider's regulatory control period.

Our further reasoning for adopting an independent third party data provider and our response to submissions is summarised below.

As previously discussed in the explanatory statement, the return on debt could be estimated either by reference to an estimate developed by a third party dataset service provider, or by an AER in-house method. We currently use the BBB seven year Bloomberg fair value curve (FVC), extrapolated to a 10 year maturity (based on a benchmark credit rating of BBB+ and a 10 year term to maturity).

For the draft guideline, we proposed to estimate the return on debt using a third party data service provider. We considered that using a third party data service provider has the following advantages:

- Third party data sources are provided for use by market practitioners and developed independently from the regulatory process.
- Third party data sources are constructed by finance experts with access to a comprehensive financial database, where judgements are made in terms of debt selection and any necessary adjustments to yields. Using an independent third party also reduces the scope for debate on debt instrument selection issues and curve fitting or the use of some form of averaging methods to derive the estimate of the return on debt. As we have previously highlighted, if we used an in-house method, we would need to develop and apply: [424]
    - detailed criteria for selecting debt instruments with appropriate specification of contingencies to allow automatic updating.
    - a detailed description of the estimation method (that is, a curve fitting technique or some form of averaging observed yields—for example, Nelson–Siegel, Svensson or spline-based approaches).
- A third party data source can be more readily implemented in the context of automatically updating a trailing average of the return on debt as required by the rules.

423 NER, cls. 6.5.2(k)(1), 6A.6.2(k)(1); NGR, r.87(11)(a).
424 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 98–99.

At the time the draft guideline was published, Bloomberg was the only independent third party data service provider that published an independent estimate of the return on debt.[425] At the same time while we proposed to rely on a third party data service provider such as Bloomberg for the estimation of return on debt, we acknowledged the known issues with this dataset or potential issues with using a third party dataset. In particular:[426]

- The third party data service provider may stop publishing data.
- The third party data service provider may stop publishing the data at maturities and/or credit ratings that are consistent with the definition of the benchmark efficient entity.
- The methodology used by the third party data service provider may not be shared publicly thus reducing transparency and making it harder to identify any divergences between the estimates derived from this source and the return on debt of the benchmark efficient entity.
- The lack of transparency around the methodology may also reduce confidence in the consistency of estimates over time and between different points on the curve.

It is now expected that the Reserve Bank of Australia (RBA) will publish an estimate for return on debt, on both broad band BBB (includes BBB-, BBB and BBB+) and an A credit rating band (includes A-, A and A+), with a range of maturities (for example, three, five, seven and 10 year average debt terms). Importantly we also understand that the RBA's method will be transparent.

ENA supported the use of the Bloomberg BBB FVC as the mechanism to implement a curve fitting process to determine the benchmark return on debt. ENA also considered the curve fitting process proposed by CEG as a useful cross-check on the proprietary methods employed by Bloomberg.[427] APA also supported the continued reliance on Bloomberg to estimate the return on debt but provided no basis for this support.[428] Similarly, COSBOA did not oppose the use of third party data, but encouraged the AER to develop an in-house dataset.[429] As indicated in the draft guideline, for the reasons outlined above, we prefer to use an independent third party data service provider to estimate the return on debt.

PIAC submitted that the AER needs to undertake an assessment of the consistency of the third party provider's yield curves from year to year, to maintain the integrity of the annual updating process.[430] PIAC also submitted that:[431]

> The AER should continue to develop its own database of information on relevant corporate bonds in the Australian market place and relevant overseas markets, in order that it can critically evaluate commercial third-party providers of bond yields.

We acknowledge PIAC's views. However, at this time, we propose to use a third party data service provider as the source of an estimate of the benchmark return on debt, given that this method has advantages as discussed above.

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425 Bloomberg generates fair market sector curves for many bond sectors, grouped by currency, sovereign, agency, corporate, industry, issuer, and credit ratings. A yield curve is built daily for each sector based on the population of bonds directed to that sector or curve. A zero coupon yield curve is modelled and all other curves (par, coupon curve and forward curve) are derived from the zero coupon yield curve.

426 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 100.

427 ENA, *Response to the draft guideline*, October 2013, p. 56.

428 APA, *Submission to the draft guideline*, October 2013, p. 35.

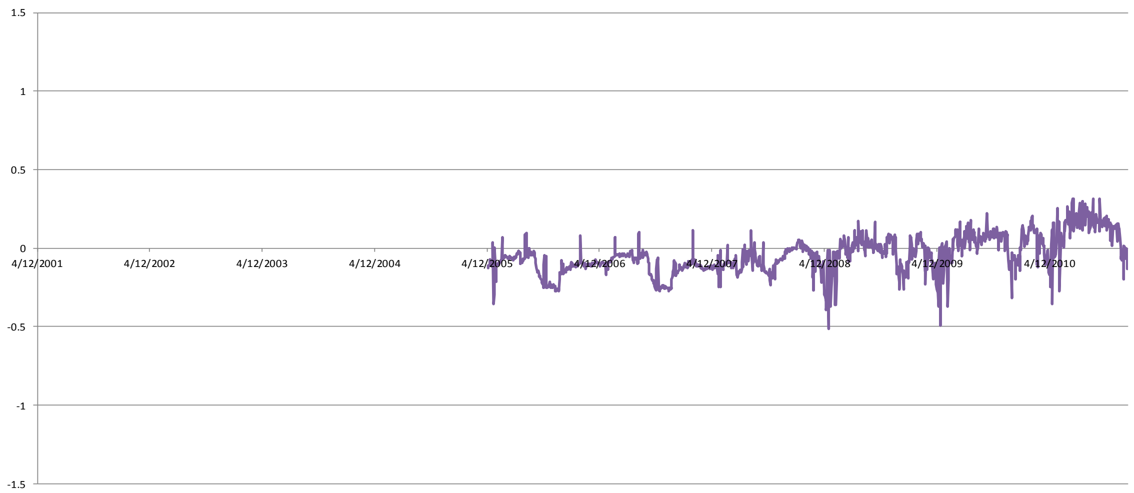
429 COSBOA, *Comments– draft guideline*, October 2013, p. 4.

430 PIAC, *Submission to the draft guideline*, October 2013, p. 46.

431 PIAC, *Submission to the draft guideline*, October 2013, pp. 45–46.

EUAA submitted that the analysis by Smyczynski and Popovic in figure 8.1 shows that for most of the time since the global financial crisis the five year annual Bloomberg FVC has been above the five year average bond yield. It also suggested the use of weighted average yield of bonds with three to seven years to mature.[432] However, this analysis also indicates that prior to 2008the five year annual Bloomberg FVC has typically been below the five year average bond yield. Importantly, based on the longer-term historical experience, this evidence does not support the view that the Bloomberg FVC will have a systematic bias towards the overestimation of the relevant average bond yield.

Figure 8.1 Spreads between 5 year annual average BBB 5 year BFV and 5 year annual average of the average yield on bonds with maturity of 3 to 7 years and BBB band credit rating



Source: Smyczynski and Popovic, *Estimating the Cost of Debt: A Possible Way Forward, Regulatory Development Branch, Australian Competition and Consumer Commission*, April 2013, p. 44.

MEU supported an AER developed dataset and estimation technique, and stated that:[433]

- The industry the firm operates in is the critical determining factor in setting the cost of the bond, and not the credit rating (and noted the analysis by Oakvale and Chairmont Consulting to support this view).
- Bloomberg FVCs have consistently provided an overstatement of the observed costs for bonds that are incurred by regulated energy networks.
- The AER, by using the Bloomberg FVCs, effectively persists in assuming all bonds rated to the same credit rating are equivalent and all should be used to provide the benchmark.
- The AER should use a cohort of bonds that are comparable to those sourced by firms similar to the firms that are to be regulated as this will provide a more accurate benchmark for the cost of debt sourced by service providers.
- The AER should consider all investment-rated bonds when calculating the benchmark return on debt.

432 EUAA, *Submission to the draft guideline*, October 2013, pp. 2–3.

433 MEU, *Comments on the draft guideline*, October 2013, pp. 29–33; EUAA, *Submission to the draft guideline*, October 2013, p. 6.

We agree the industry a business operates in is an important factor but the credit rating is still a relevant and an important factor to take into account when considering proxy selections for a benchmarking process. Both Oakvale and Chairmont Consulting agreed with our view.[434] However, in practice we are using a range of credit ratings to estimate the return on debt for a benchmark efficient entity. This is because we understand that the available independent third party data providers use a range of ratings (for example, the Bloomberg FVC uses a BBB credit rating band.[435]

We agree that, ideally, we should use a cohort of bonds that are comparable to those sourced by businesses similar to the benchmark efficient entity. However, we consider that the number of close comparators in the BBB band is too small to be reliable for the estimate of return on debt. Lally has also recognised this issue and proposed a 'four tiered approach' where the first tier would include those businesses to be the closest comparators (that is, regulated energy network businesses).[436] The fourth tier would include unregulated businesses whose principal activities would be monopolistic (for example, airfield operations). However, we note that even with this approach to bond selection, the sample size is limited.[437] Further, the ERA has indicated that it would ideally select bonds from the regulated sector. But, due to the lack of bonds, the ERA has considered it is necessary to widen the criteria to all Australian entities.[438]

Finally, in response to the inclusion of all investment grade bonds to estimate the return on debt for a benchmark efficient entity, we consider it may be too broad to include all investment rated bonds. For example, this would include government-owned businesses, which we have excluded from the definition of the efficient benchmark entity. However, as acknowledged above in practice we are using broad BBB band credit ratings for the estimate of return on debt.

8.3.2 Approach to calculating the averaging period to estimate the allowed return on debt

The averaging period is used to smooth out short term volatility in the annually updated return on debt allowance. This smoothing can be achieved by averaging the daily estimates published by an independent third party data service provider over a number of days.

At this time we propose to estimate the prevailing return on debt using a simple average of the prevailing rates observed over a period of 10 or more consecutive business days up to a maximum of 12 months. The proposed averaging period will be subject to the following principles to be included in the guideline:

- The period must be specified prior to the commencement of the regulatory control period.
- At the time the period is nominated, all dates in the averaging period must take place in the future.
- The averaging period should be as close as practical to the commencement of each regulatory year in a regulatory control period.
- A period needs to be specified for each regulatory year within a regulatory control period.

434 Chairmont Consulting, *Debt risk premium expert report*, 9 February 2012, p. 8; Oakvale Capital, *Report on the cost of debt during the averaging period: The impact of callable bonds*, February 2011, pp. 1–2.

435 While the benchmark credit rating is BBB+, Bloomberg's BBB rated FVC is based on a composite of BBB–, BBB, and BBB+ rated bonds.

436 M. Lally, *Estimating the cost of debt of the benchmark efficient regulated energy network business*, August 2013, p. 23.

437 A review of bond data on Bloomberg on 28 June 2013 indicates that there were only 12 outstanding bonds on issue for a 10 year BBB rated entity. This sample size increases to only 14 bonds, if a five to seven year term to maturity is adopted.

438 ERA, *Final decision on WA Gas Networks Pty Ltd proposed revised access arrangement for the Mid-West and South-West Gas Distribution Systems*, 28 February 2011, pp. 79–85.

- The specified periods for different regulatory years are not required to be identical, but should not overlap.
- Each agreed averaging period is to be confidential.

The allowed return on debt averaging periods can be either:

- proposed by the service provider during the Framework and Approach process or in its initial regulatory proposal, and agreed by the AER; or
- determined by the AER, and notified to the service provider within a reasonable time prior to the commencement of the regulatory control period, if the periods proposed by the service are not agreed by the AER.

We consider this approach has advantages, in terms of:

- providing clear principles and guidance to be applied in considering a service provider's proposed averaging period
- providing flexibility to accommodate different averaging period windows for different service providers for the first regulatory year, as a result of different transitional arrangements.

In the draft guideline we specified averaging periods for different groups of service providers, depending on their transitional arrangements as outlined in the rules. Meanwhile, we also recognised that the averaging period window would vary widely between service providers for the first regulatory year of the regulatory control period as a result of the transitional rules.[439] Consequently, for the final guideline we do not consider that it is appropriate to specify the averaging periods for service providers (or groups of service providers). This is also consistent with the AEMC view that implementation issues are better dealt with through the Framework and Approach paper rather than through the guidelines, which are not intended to apply in a service provider specific manner.[440]

In the draft guideline, we proposed that the service provider's averaging period for the subsequent regulatory year should end six months before the commencement of the relevant regulatory year to:

- provide service providers with sufficient time to calculate the return on debt
- obtain our approval before they submit their annual pricing proposals for the upcoming regulatory year.

In response, some submissions considered that specifying an averaging period which ends six months before the commencement of the relevant regulatory year is too far from the start of the regulatory year.[441] QTC considered that it would be appropriate to allow service providers to nominate averaging periods that end no later than three months prior to the start of the next regulatory year, rather than the proposed six months.[442] CitiPower, Powercor and SA Power Networks also noted that investors require a premium to be paid for committing to the provision of funds between date of pricing and provision of funds, unless the time period is very short.[443]

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439 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 102–105.

440 AEMC, *Final rule change determination*, November 2012, pp. 248–249.

441 CitiPower, Powercor and SA Power Networks, *Submission to the draft guideline*, October 2013, pp. 7–8; Ergon Energy, *Submission on the draft guideline*, October 2013, pp. 6–7; QTC, *Submission to the draft guideline*, October 2013, p. 22.

442 QTC, *Submission to the draft rate of return guideline*, October 2013, p. 22.

443 CitiPower, Powercor and SA Power Networks, *Submission to the draft guideline*, October 2013, pp. 7–8.

Submissions from service providers that are subject to a 'preliminary determination with mandatory re-opener' in the rules expressed concern that they will be disadvantaged. They submitted that they are only be able to nominate an averaging period within the window of five months for the estimating the allowed return on debt in the first regulatory year. These service providers suggested the start date for the first agreed averaging period should be brought forward in advance of their initial regulatory proposal.[444]

We recognise it is desirable for the averaging period to be as close as practical to the start of the relevant regulatory year. At the same time, the annual updating process requires service providers to submit their pricing proposals for approval in advance of the upcoming regulatory year. Therefore, we propose that the service provider's averaging period be as close as practical to the commencement of the relevant regulatory year (rather than no closer than six months as proposed in the draft guideline). In addition, we propose that a service provider can nominate the averaging periods during the Framework Approach (F&A) process (rather than limiting the nomination in their regulatory proposal). However, we consider that any averaging periods nominated by a service provider should be as close as practical to the commencement of the relevant regulatory year within a regulatory control period.

The MEU and PIAC submitted that our proposed averaging period window of 12 months is too long and too open-ended. MEU and PIAC consider that service providers can 'cherry pick' if there are consistent cycles of interest rates within the year. To minimise this concern, they recommended that we should assess whether there is an intra-year cycle for bond yields, and that we should consider taking an average of all business days across a year or selecting a period of 40 consecutive business days close to the final determination.[445] The MEU presented figure 8.2 that tracks the long term average monthly changes of 10 year CGS yields since 1970. It noted that interest rates are likely to fall in the third and fourth quarters of a year and likely to rise in the first and second quarters of the year. MEU concluded that this 'unequivocal bias' would be used by the service providers to maximise their benefit.[446] Further, EUAA noted the proposed averaging period calculation effectively reduces service providers' interest rate risk and users do not benefit from it.[447]

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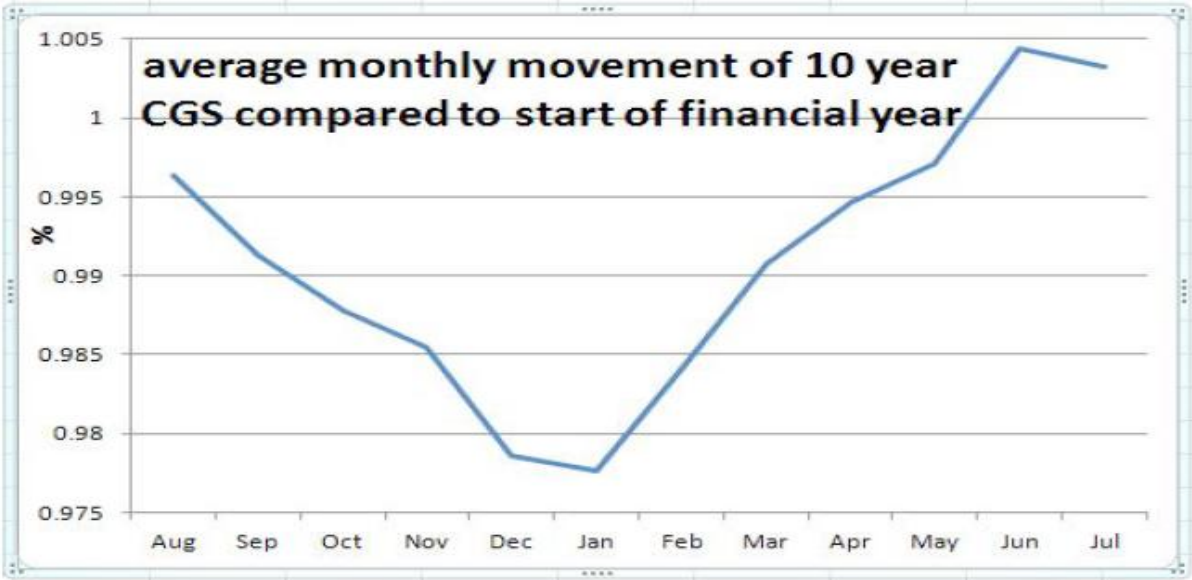
444 Ergon Energy, *Submission on the draft guideline*, October 2013, pp. 6–7; Energex, R*esponse to the draft guideline*, October 2013, p. 3.

445 EUAA, *Submission to the draft guideline*, October 2013, p. 3; MEU, *Comments on the draft guideline*, October 2013, pp. 38–40; PIAC, *Submission to the draft guideline*, October 2013, pp. 47–48.

446 MEU, *Comments on the draft guideline*, October 2013, pp. 39–40.

447 EUAA, *Submission to the draft guideline*, October 2013, p. 3.

Figure 8.2 MEU averaging period analysis

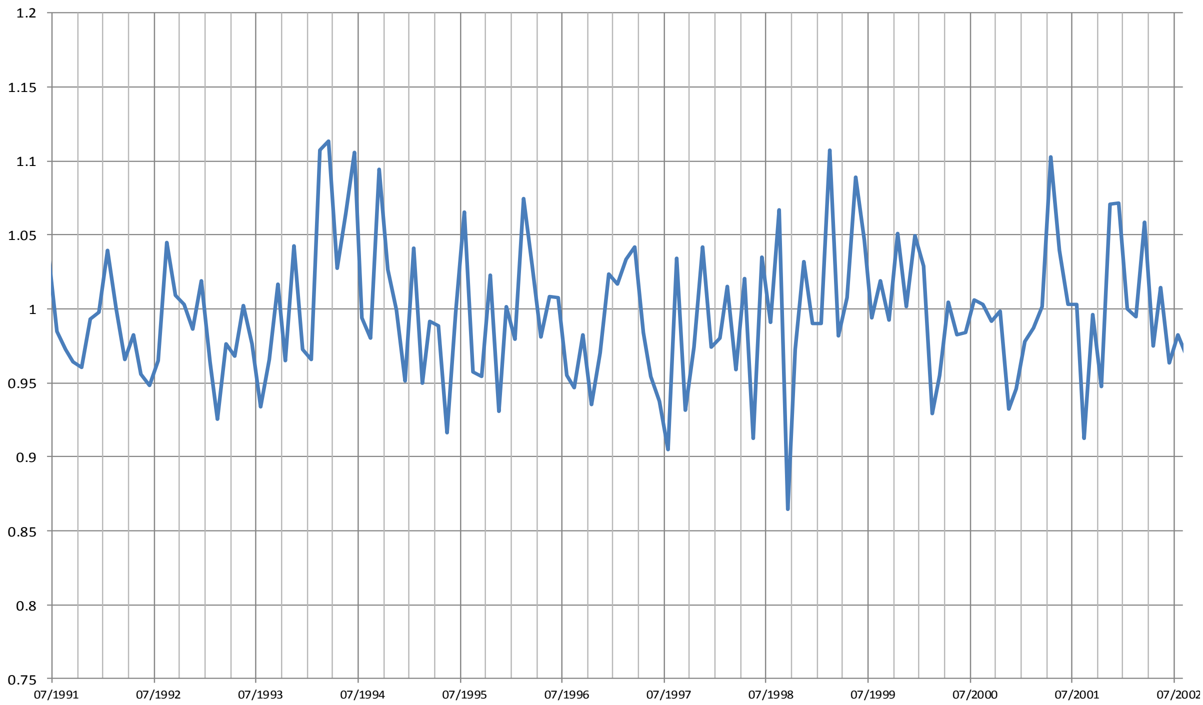


Source: MEU, *Submission to the draft guideline*, October 2013, p. 39.

We propose that the averaging period window should be 10 or more consecutive business days up to a maximum of 12 months. We consider that regulatory gaming is less likely when the averaging periods are specified and agreed upon in advance. This is because the return on debt will be unknown for future periods. That said, we have reviewed historical CGS yields and Bloomberg FVCs to assess whether the intra-year pattern as suggested by the MEU exists.[448] In particular, we have analysed both the CGS yields and the Bloomberg BBB FVC yields from the time that data is first available on Bloomberg. As presented in figure 8.3 to figure 8.5, this evidence does not support the view that there is a consistent intra-year pattern for interest rate movements in the 10-year CGS yields and the seven year Bloomberg BBB FVC. In addition to the graphical analysis, regression analysis can be used to test for seasonality effects. However, as the seven year Bloomberg BBB FVC yields are only available from January 2002, we do not have a sufficiently large sample for the regression analysis. The regression analysis will not be robust given this sample is small. However, if any robust analysis becomes available in the future that suggests the existence of such an intra-year pattern, we will reconsider our position. In addition, we will use our discretion to reject the averaging periods proposed by the service provider if the service provider is found to choose the averaging periods opportunistically according to an intra-year pattern.

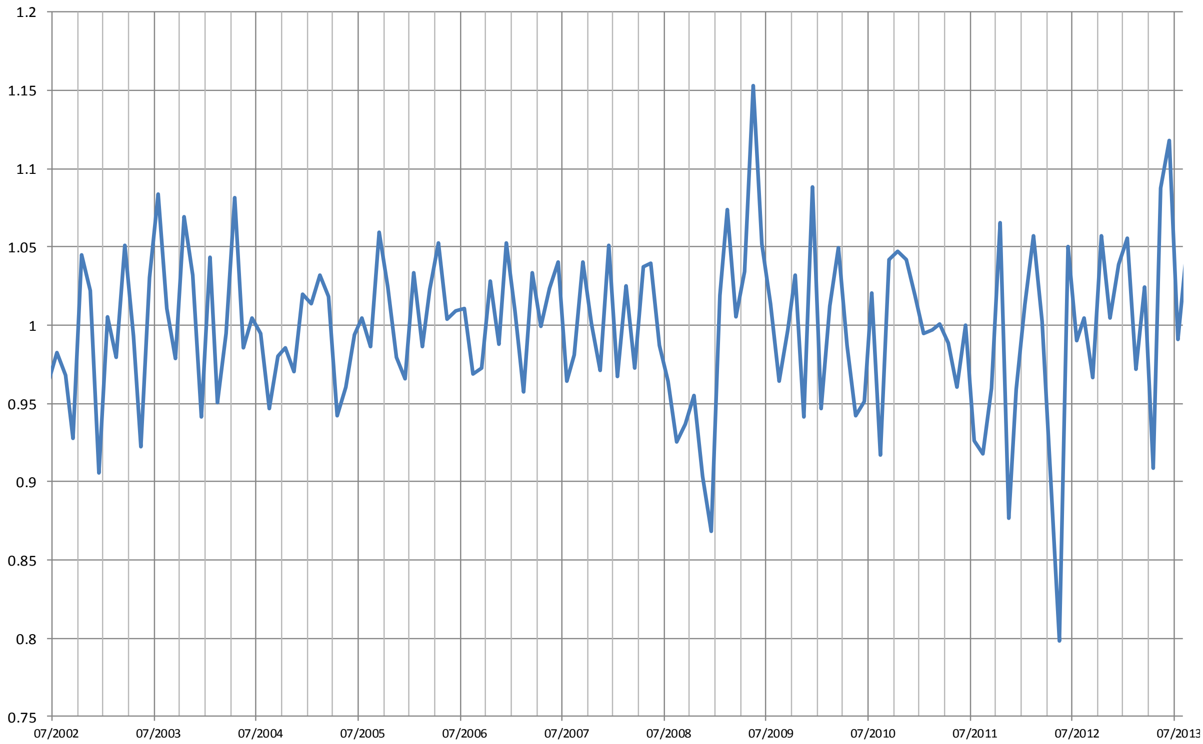
448 We consider the Bloomberg BBB FVC data is more relevant than the CGS yield when analysing the intra-year pattern of return on debt over time.

Figure 8.3 Average monthly movement of 10-year CGS yields (July 1991 – July 2002)



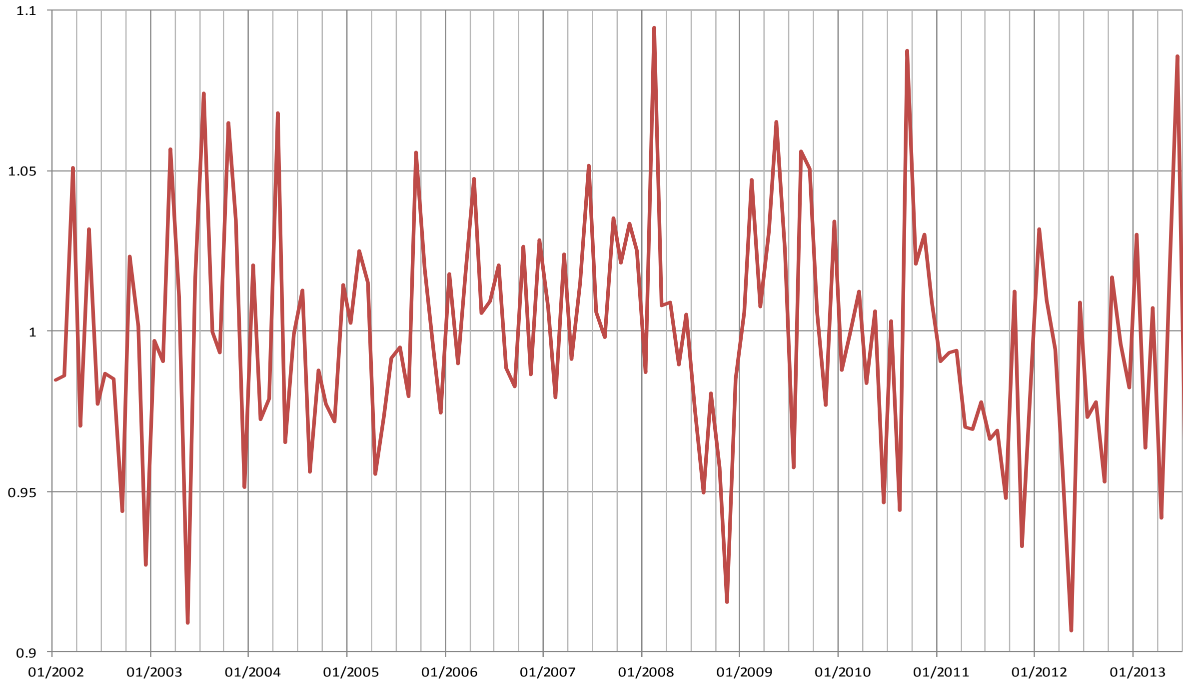
Source: Bloomberg and AER analysis.

Figure 8.4 Average monthly movement of 10-year CGS yields (July 2002 – July 2013)



Source: Bloomberg and AER analysis.

Figure 8.5 Average monthly movement of 7-year Bloomberg BBB FVC (January 2002 – January 2012)



Source: Bloomberg and AER analysis.

Additionally, Ergon Energy commented that service providers cannot issue debt twice. Therefore, our example in the draft guideline for overlapping averaging periods for the first and second agreed averaging periods cannot be replicated in practice.[449] As outlined above, we propose that the averaging period should be as close as practical to the commencement of the relevant regulatory year. Further, we have included a condition that the specified averaging periods for different regulatory years should not overlap.

8.3.3 Benchmark term of debt

We need to specify the benchmark debt term for a debt portfolio in order to estimate the allowed return on debt for a benchmark efficient entity. The benchmark debt term:

- establishes the period over which the trailing average is calculated
- determines the period of the transition to the trailing average
- is an input to obtaining yields to estimate the return on debt.

In the explanatory statement accompanying the draft guideline, we proposed a seven year debt term at issuance. PwC and CEG estimated a debt term of approximately 10 years from debt portfolio data derived from Bloomberg and annual reports. We considered that there were methodological issues with the term inferred and did not rely upon it. In the absence of actual debt portfolio information we noted the 2009 WACC Review finding of a term of 7.4 years after making adjustments to convert floating rate notes into a fixed rate equivalent term and for hedging. We considered that the debt term was likely to be less than 10 years. Adding weight to the decision to move to a shorter debt term, we

449 Ergon Energy, *Submission on the draft guideline*, October 2013, pp. 6–7.

noted the difficulty in finding a mechanistic extrapolation method for annual updating. In using Bloomberg FVCs to estimate the yield on debt, extrapolation is required from the 7-year BBB Bloomberg FVC yield to a 10-year yield estimate. We considered that our current paired bond extrapolation approach could not be specified in a way that would reliably result in either the derivation of a bond sample (if specifications were too tight) or an acceptable error level (if specifications were too loose). We considered two other approaches which we discounted due to a lack of robustness and applicability.[450]

In the final guideline we are proposing an average term of debt for the benchmark debt portfolio of 10 years. We have reached this view for the following reasons.

Conceptually we consider that businesses will seek to issue longer-term debt. As the assets are long-lived the fewer times that the debt which funds them is required to be refinanced, the lesser is the risk. The risk consists of firstly, securing funding and secondly, with securing this funding at rates which do not vary considerably from the prevailing rates associated with financing that debt. Generally the cost of longer term debt is higher than shorter term debt as debt holders require compensation for the risks associated with holding debt over a longer time period.

A business will consider the trade-off of the higher cost of issuing long term debt against the reduction in costs associated with lowering refinancing risk.[451] Lally suggests that one way of lowering the cost of debt is to swap the risk-free component to a shorter term.[452] However, businesses state that under a trailing average approach hedging is either not required, not relevant or not possible.[453]

The determination of the benchmark debt term is a complex theoretical exercise. While we consider businesses will seek to issue longer-term debt, conceptually it is not clear what that term should be. Accordingly, we have considered the current debt financing practices of businesses considered to be close comparators to the benchmark efficient entity to inform us in arriving at a proposed debt term.

Based on observed practice we have assessed that the businesses' debt portfolio weighted average term at issuance is 8.7 years (ranging between 6.7 years to 16.3 years). We observe that businesses are securing bank debt with an average term at issuance of 4.3 years, issuing Australian bonds with an average term of 9.7 years and offshore bonds of 9.7 years. We understand that the current domestic bond market is not liquid in Australia beyond an issuance of seven years. However, businesses appear to be issuing offshore to cover any lack of liquidity in the domestic market. Further, when they issue offshore they appear to issue at multiple maturities (for example, seven, 10 and 15 years). We note that issuances beyond 15 years are currently not common.

Given that the empirical evidence lies between a seven and 10-year term we have considered that:

- The move to a trailing average approach effectively builds in a term for a longer period than the current approach.
- There is variability in the weighted average term at issuance over time.[454]

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[450] AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 105-109.

[451] AER, *Final decision: WACC review*, May 2009, p. 152.

[452] M. Lally, *Estimating the cost of debt of the benchmark efficient regulated energy network business*, August 2013, pp. 11–12.

[453] ENA, *Response to the draft guideline*, October 2013, p. 67; QTC, *Submission to the draft guideline*, October 2013, pp. 8-9; APIA, *Submission to the draft guideline*, October 2013, p. 33; SP AusNet, *Submission on the draft guideline*, October 2013, p.2.

[454] In the 2009 WACC Review the weighted average debt term at issuance was 9.14 years. For the same businesses, the weighted average in August/September 2013 was 8.70 years.

- We regulate under objectives of promoting efficient investment and allowing businesses to recover their efficient costs.[455]

Accordingly, in moving to a trailing average approach we consider that we are committing to a debt term for the period nominated. To change the benchmark debt term in response to updated debt portfolio information would not be conducive to regulatory stability. In light of this, in order to ensure that the benchmark efficient entity is able to recover its efficient financing costs consistent with the allowed rate of return objective, we propose to use a 10 year debt term for the purposes of estimating the return on debt and for setting the period of the trailing average. It also means that a 10-year transition will apply.

We will, however, continue to monitor the average debt term at issuance of the regulated network service providers against the benchmark term. We will consider this information when we are assessing future transactions costs and any proposed adjustment of the return on equity.

With respect to the issue of extrapolation, we acknowledge businesses submissions that stated that at times the difference between 10-year and 7-year yields may be material.

We consider that, at a minimum, the difference between the 10-year and 7-year risk-free rates should be added to the estimated yield on a BBB+ 7-year debt term (if extrapolation is required). We propose to calculate the risk-free 10-year/7-year yield differential as the average difference between the annualised yield on 10-year and 7-year CGS bonds. The nominated averaging period (see 8.3.2) that we propose to use is the period over which the average risk-free yield differential is calculated.

We do not consider it prudent to commit to a particular method in the guideline for extrapolating the 10-year/7-year debt risk premium (DRP) differential. We consider that it is more appropriate to examine the possible methods at the time of the reset, in the context of the prevailing conditions. We consider that the 10-year/7-year DRP differential estimated via extrapolation should be capped to minimise any significant unexpected error associated with the extrapolation technique.

These issues are discussed in more detail below.

Conceptual issues in managing a debt portfolio for regulated energy businesses

We consider that in managing a debt portfolio for regulated energy businesses the following issues will be contemplated:

- Matching debt funding to the asset lives to manage refinancing risk
- Using interest rate swaps to reduce the cost of debt.

These issues are considered in turn below.

Long-term debt funding to match long-lived assets to manage refinancing risk

We consider that a business will, within the constraints of the market for corporate bonds, aim to match the length of the debt term to the asset life in order to minimise refinancing risk. We note, however, that this is subject to consideration of the increased cost of debt associated with a longer term.

455 NGL, ss.23, 24; NEL, ss.7, 7A.

A significant proportion of regulated energy assets are long-lived. We observe that electricity transmission lines and gas pipelines are depreciated for regulatory purposes over as long as 60 years.[456] Accordingly, we consider that the entity will seek to fund the long-lived energy assets with longer debt tenors in order to manage refinancing and interest rate risk. By issuing longer term debt the entity reduces the frequency with which it must approach the market, thereby reducing the risk associated with not being able to secure funding at the time when it is required, or at rates that are higher or lower than those it currently pays. In approaching the market less frequently there is less risk associated with changing interest rates, which reduces the volatility in debt servicing costs and the likelihood of mismatch between the business' cash flows and its debt servicing obligations.

However, longer-term debt costs more than shorter-term debt in normally functioning markets, as debt holders require compensation for the risks associated with committing capital over a longer period of time. This will lead the entity to trade-off the increase in refinancing risk and the increase in transactions costs due to more frequent issuance associated with shorter-term debt against the increased cost of longer-term debt. The AOFM stated, 'a debt portfolio that reprices less frequently gives rise to less volatile debt servicing cost outcomes… Experience suggests that this risk reduction usually comes at appreciable cost.'[457]

CEG submitted that besides the cost trade-off described by the movement down an upwards sloping issuer yield curve, lenders will seek a higher risk premium (that is, interest costs will increase) for the effect of the increased refinancing risk on the overall risk of the entity if it shortens its maturity period. That is, the yield curve for the business will shift up. CEG stated that it is unclear conceptually whether the two opposing effects will result in a lowering of the cost of debt.[458] However, CEG did not provide evidence of its practical significance.

AOFM stated that the term premium associated with issuing longer-term debt 'has been significantly reduced in recent years, both because of low historical outright levels of borrowing and because the yield curve has tended to be 'flatter' than history would suggest be the case. In view of this the AOFM has been strategically lengthening its issuance activities since mid-2011'.[459]

We note that despite what AOFM describe as current favourable conditions, the actual business' debt portfolios we accessed did not indicate an increase in the tenor of bonds being issued recently (see figure 2). We observe that for the same businesses, the average term at issuance at the 2009 WACC Review was 9.1 years and is now estimated to be 8.7 years. This suggests that the optimal term and refinancing risk/debt cost trade-off does not appear to have changed materially.

A number of submissions stated that it is desirable to issue longer-term debt in order to match the asset life and so minimise interest rate and refinancing risk.[460] Further, some submissions submitted that the shortening of the debt term from 10 years, which is stated to be current financing practice, to seven years will increase their refinancing risk.[461] QTC, NSW DNSPs and NSW TCorp stated that compared with a 10-year term, a seven year term will increase the proportion of the total debt portfolio which is required to be annually refinanced from 10.0 per cent to 14.3 per cent.[462] QTC also stated

456 As indicated by PTRM models from the following determinations: AER, *Final decision: Envestra access arrangement Vic, Part 2: Attachments*, March 2013; AER, *Final decision: Aurora distribution determination*, April 2012; AER, *Final decision: SPI Networks (Gas) access arrangement*, March 2013

457 AOFM, *Email to the AER "Rate of Return Guideline - Review"*, received 23 October 2013.

458 CEG, *Review of Lally and Chairmont for the ENA,* October 2013, p. 4.

459 AOFM, *Email to the AER "Rate of Return Guideline - Review"*, received 23 October 2013.

460 AFMA, *Submission to the draft guideline – Benchmark term of debt*, October 2013, p. 2; Ergon Energy, *Submission on the draft guideline*, October 2013, p. 4; NSW DNSPs, *Submission on the draft guideline*, October 2013, pp. 4,12.

461 Ergon Energy, *Submission on the draft guideline*, October 2013, p. 4; NSW DNSPs, *Submission on the draft guideline*, October 2013, p. 4

462 NSW DNSPs, *Submission on the draft guideline*, October 2013, p. 14.

that assuming a five per cent annual growth rate in the debt balance, a seven year benchmark will increase the annual funding requirement to approximately 20 per cent. QTC stated that this will create a mismatch between the return on debt and the cost of debt for firms that continue to issue 10-year debt to keep refinancing risk at an acceptable level. NSW DNSPs and NSW TCorp stated that the increased annual refinancing will increase the liquidity requirements accordingly.[463] Finally, NSW DNSPs stated that the increase in short-term debt would cause credit metrics to deteriorate, requiring review of the benchmark credit rating, in turn increasing the cost of debt and equity.[464]

We understand that the credit metrics which the ratings agencies are interested in are as specified in table 8.1.

Table 8.1 Credit metrics considered by rating agencies

Moody's	S&P's
Adjusted interest cover ratio or FFO interest cover (sub-weighting 15%)	FFO/Debt
Net debt/regulatory asset value (15%)	Debt/EBITDA
FFO/net debt (15%)	Debt/Capital
RCF/capex (5%)	

Source: Moody's, *Rating Methodology: Moody's Global Infrastructure Finance – Regulated Electric and Gas Networks*, August 2009, p. 28; Standard & Poor's Rating Services, *Ratings Direct: Methodology: Business Risk/Financial Risk Matrix Expanded*, September 2012, p. 3.

We recognise that the amount to be annually refinanced will increase under a seven year term relative to a 10-year term. However, the annual interest and the net debt, all else equal, should be no higher under a 10-year term than a seven year term. It is therefore unclear to us how the credit metrics could deteriorate.

We note that the businesses have in place policies regarding annual refinancing amounts in order to manage refinancing risk. For example, Envestra and APA Group have a policy of not refinancing more than 15 and 20 per cent of their debt portfolio respectively in one year. This implies a minimum average term at issuance of seven and five years respectively.[465] For the 2009 WACC Review, statements outlining treasury practices were received from Jemena, Envestra, Citipower and Powercor, SP AusNet and QTC. The policies on the maximum percentage of the debt portfolio to be refinanced in a year ranged between 15 and 25 per cent, implying a minimum term at issuance of between seven and four years.[466] We note that a seven year debt term is within the guidelines set in treasury policies.

McKenzie and Partington consider that given the low default risk of regulated utilities, refinancing and interest rate risk are unlikely to be substantive in normal market conditions.[467]

463 NSW DNSPs, *Submission on the draft guideline*, October 2013, p. 14.
464 NSW DNSPs, Submission *on the draft guideline*, October 2013, p. 14.
465 Envestra, 2013 Annual Report, p. 56.
466 AER, *Final decision: WACC review*, May 2009, p. 151.
467 McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 12.

We also note CEG's remarks that any increase in refinancing risk associated with adopting a seven year term, if businesses do in fact have a longer debt term at issuance currently, will be reflected as a shift in risk from debt to equity.[468]

Use of interest rate swaps to reduce the cost of debt

We consider that an efficient financing practice will be to minimise financing costs subject to managing refinancing and interest rate risk. We consider that, post transition, the benchmark efficient entity is not likely to engage in an active debt management strategy using swaps.

In the explanatory statement accompanying the draft guideline, we referred to the likely use of hedging, drawing on advice from Lally. Lally advised that firms will minimise refinancing risk by issuing longer-term debt. However, in order to decrease the cost of debt, firms will swap the base rate into a shorter-term fixed rate. The term of the swap will be determined by the firm optimally trading-off the increase in interest rate risk and the transactions costs associated with the swap against the interest rate differential between the longer-term fixed rate and the shorter-term swap base rate.[469]

AFMA submitted that due to recent international regulatory developments it considers that interest rate swaps are likely to increase the cost of debt rather than reduce the cost of debt.[470] NSW DNSPs stated that issuing shorter term debt will proportionately shift premiums away from longer term debt to shorter term debt. It also stated that the transaction costs associated with engaging in interest rate swap contracts would be 'prohibitively high for businesses with notional debt portfolios the size of NSW DNSPs'.[471]

A number of industry submissions submitted that the current use of interest rate swaps is to hedge to the five year regulatory period under the current 'on the day' approach, thereby minimising the interest rate risk associated with the resetting of the risk free rate at each regulatory determination. The submissions stated that hedging is not required, not relevant, or not possible under a trailing average approach.[472] ENA stated '[t]he trailing average cost of debt allowance is explicitly calculated on the basis that there is no swap overlay to a business's debt portfolio. It is illogical to base the term of debt under the trailing average approach on an assumption that businesses will enter swap contracts'.[473] ENA and QTC suggested that the use of floating rate debt and interest rate swaps, as suggested by Lally, is more akin to a hybrid approach than a portfolio approach.[474] QTC also suggested that as Lally has stated that the term of the base rate under the trailing average approach is indeterminable, Lally's arguments cannot be used to support a seven year term.[475]

ENA and QTC also argued that in the presence of relatively stable revenues, a shorter-term base interest rate exposure will increase the potential for a mismatch between the firm's revenues and its debt servicing costs.[476] QTC submitted that this will increase the probability of financial distress, especially if the firm is highly geared. QTC questions whether the lower interest rate would offset this increase in risk.[477]

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468 CEG, *Review of Lally and Chairmont for the ENA,* October 2013, p. 5.
469 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 105-106.
470 AFMA, *Submission to the draft guideline – Benchmark term of debt*, October 2013, p. 3.
471 NSW DNSPs, *Submission on the draft guideline*, October 2013, p. 16.
472 ENA, *Response to the draft guideline*, October 2013, p. 67; QTC, *Submission to the draft guideline*, October 2013, pp. 8-9; APIA; Energex; SP AusNet;
473 ENA, *Response to the draft guideline*, October 2013, p. 69.
474 ENA, *Response to the draft guideline*, October 2013, p. 67; QTC, *Submission to the draft guideline*, October 2013, p. 9.
475 QTC, *Submission to the draft guideline*, October 2013, p. 10.
476 ENA, *Response to the draft guideline*, October 2013, p. 67; QTC, *Submission to the draft guideline*, October 2013, p. 9.
477 QTC, *Submission to the draft guideline*, October 2013, p. 9.

We note that when businesses issue debt, for example into the US Private Placement market, they often issue at the same time, multiple bonds with staggered maturities. From the observed debt portfolios we note that there have been simultaneous issues of five, seven and 10 year bonds, and 10, 12 and 15 year bonds. We also note that approximately one third of the total value of all the portfolios has been issued as floating rate notes.

As discussed in chapter seven, we consider that an efficient financing practice of the benchmark efficient entity would be to minimise the expected present value of its financing costs over the life of its assets subject to managing the associated financial risks (and subject to the regulatory regime). On this basis we have concluded that the benchmark efficient entity would have likely entered into hedging contracts to manage its interest rate risk in the current regulatory control period (that is, under the 'on the day' approach). Further, we consider that holding a (fixed rate) debt portfolio with staggered maturity dates to align its return on debt with the regulatory allowance is likely to be an efficient financing practice of the benchmark efficient entity under the trailing average portfolio approach. To achieve this the benchmark efficient entity would need to unwind its existing hedging contracts and issue new (fixed rate) debt over a transition period to gradually accumulate a portfolio that matches the trailing average regulatory return on debt allowance. Consistent with this, we consider that post transition the benchmark efficient entity is not likely to engage in an active debt management strategy using swaps.

Current regulated energy business evidence of term at issuance

Evidence provided by the businesses indicates that the current average term at issuance is 8.7 years.

We consider that the choice of term at issuance is informed by market practice given the trade-offs identified above. However, the reliance on observed practice is complicated by a change in approach to estimating the return on debt. In particular, observed practice relates to the current 'on the day' approach and this may differ under the trailing average approach.

In the explanatory statement accompanying the draft guideline, we stated that we had concerns about PwC's and CEG's analysis of debt term at issue. In the absence of actual debt portfolio information we referred to the 2009 WACC Review conclusion of an effective term of 7.4 years (consisting of 7.1 years after adjusting floating rate notes into a fixed-term equivalent and 7.4 years after adjusting floating rate notes into a fixed-term equivalent and after accounting for hedging).

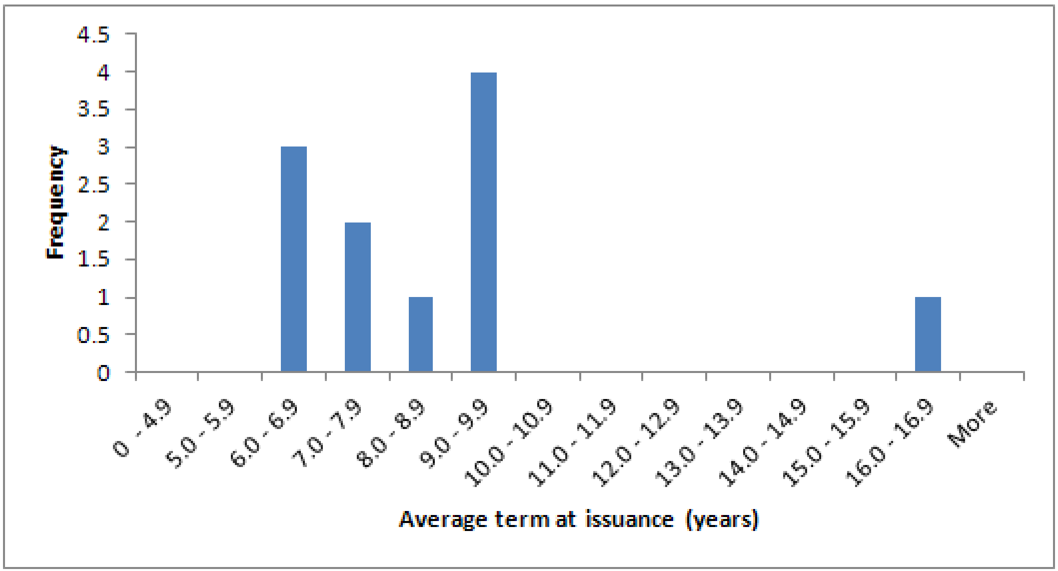
ENA provided actual debt portfolio information to the AER in its response to the draft guideline. In particular, actual debt portfolio information for Envestra, ElectraNet, Multinet and United Energy, Powercor, SA Power Networks and SP AusNet was provided. Inferred debt portfolio information[478] was also provided for APA Group. ENA also collected debt portfolio information from SPIAA (parent of Jemena) and Dampier Bunbury Pipeline but excluded this information on the basis that SPIAA (parent of Jemena) is government-owned and that Dampier Bunbury Pipeline is not regulated by the AER. We sought this information from the ENA and also requested actual data for the APA Group. We also sought formal assurances, via statutory declaration, from the businesses that the information provided represented the business' full debt portfolio and accorded with its financial records. During this process we were provided with CitiPower's debt portfolio and minor amendments to maturity dates or amounts and correction of omitted instruments.

478 This information was drawn from APA Group's annual report, a slide presentation (dated 21 August 2013) and Bloomberg.

In reviewing the updated information we observe that the average term at issuance, calculated using each business' drawn debt share of the total sum of all entities drawn debt as weights, varied from 6.7 years to 16.3 years, but on average was 8.7 years (see Figure 8.6 and Table 8.2).

While this is a point in time estimate, we note that it has not changed considerably since the 2009 WACC Review, where the average term at issuance was 9.1 years. There are indications that the current market environment is favourable for issuing longer-term debt due to the low prevailing interest rates and increased appetite for corporate debt domestically. This would lead us to expect that the current environment is supportive of businesses issuing longer tenors. However, from 2011 (post the GFC credit tightening) we are observing tranches of offshore issues (mainly in the US private placement market) at a range of relatively short tenors. Eighty per cent of the bonds issued from 2011 had an average tenor of 10 years or less. We therefore consider that an average term of issuance around nine years is reasonably stable over time.

Figure 8.6 Histogram of businesses' weighted average term of issuance of total debt portfolio



Source: ENA provided eleven business debt portfolios, AER analysis.

Table 8.2 Energy business' debt value and term at issuance

Business	Total debt ($m)	Drawn debt ($m)	Term at issuance - drawn debt (yrs)	Term at issuance - bank debt (yrs)	Term at issuance - AUD bonds (yrs)	Term at issuance - offshore bonds (yrs)
Envestra	2,453.9	2,053.9	16.3	4.4	19.7	15.3
ElectraNet	1,520.5	1,367.8	9.0	2.7	14.8	7.8
Multinet and United Energy	3,355.8	3,062.7	7.1	4.8	8.3	8.1
CitiPower, Powercor and SA Power Networks	7,293.0	6,833.8	8.8	3.4	10.0	8.6
SP AusNet	6,289.5	5,364.5	8.6	3.6	8.4	8.8
APA Group [(a)]	5,307.9	4,416.3	9.2	3.0	7.5	10.7
SPIAA (parent of Jemena)	4,703.0	4,239.9	6.7	4.6	5.3	10.8
Dampier Bunbury Pipeline	2,745.0	2,540.0	6.7	4.7	8.2	N/A
Average term at issuance (all debt)	**33,668.5**	**29,879.7**	**8.7**	**4.3**	**9.7**	**9.7**

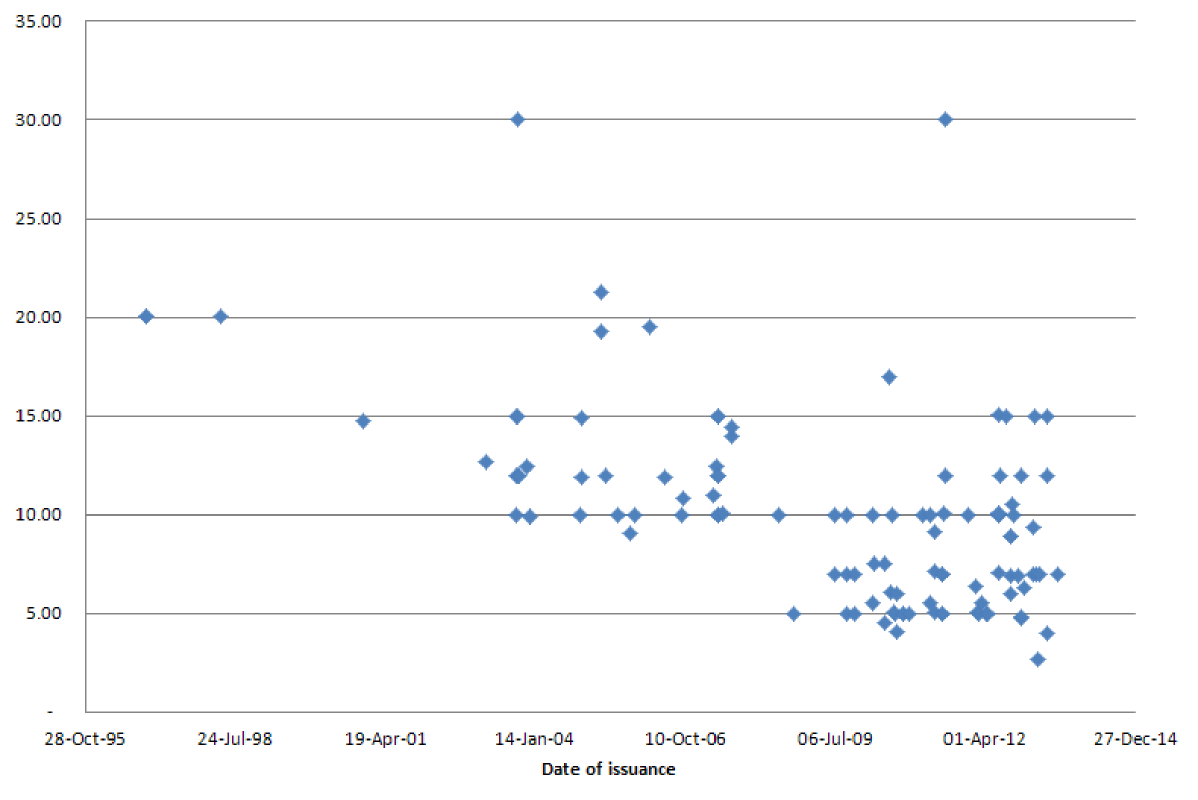
Source: AER analysis of ENA, *Submission to the draft guideline*, October 2013.
Note: (a) AER has adjusted the maturity of APA Group subordinated notes from 2072 to 2018.

The NSW DNSPs submitted that 'the corporate bond market is not sufficiently liquid to provide Australian energy network businesses with the option to issue the majority of their debt beyond 10 years' which necessitates that entities issue offshore.[479] This is supported by the business debt portfolios provided to the AER which currently have on issue:

- bank debt and commercial paper which have issuance tenors of between 1 month and 7.0 years
- Australian bonds which have issuance tenors of between 2.7 and 21.3 years
- offshore bonds which have tenors of between 4 and 30 years (see figure 8.7).

[479] NSW DNSPs, *Submission on the draft guideline*, October 2013, p. 12.

Figure 8.7 Businesses' term at issuance of bonds (as at 30 June-20 September 2013[(a)], years)



Source: ENA provided eleven business debt portfolios, AER analysis.

Note: Two businesses provided portfolio information as at 30 June 2013, eight as at 30 August 2013 and one as at 20 September 2013.

For the purposes of estimating debt yield compensation we consider that it is appropriate to consider:

- Drawn debt rather than total debt (equal to drawn and undrawn debt) as it is the cost of drawn debt that the WACC is compensating. The cost of undrawn debt is a transaction cost which is compensated through the opex building block cash flows.
- Term at issuance rather than term to maturity. Term at issuance reflects the premium associated with the original term length. An issuer must pay this premium irrespective of the premium at a subsequent point in time, as reflected by the term to maturity.
- All senior/secure debt instruments (including bank and other non-bond based debt).

In the 2009 WACC Review we adjusted the term of debt to take account of floating rate notes. At that time we observed from the sample of actual debt portfolios that floating rate debt had a lower yield than the fixed rate equivalent.[480] We consider that floating rate notes could have a different yield to fixed rate debt. This is because the risk being compensated for floating rate notes may be different to that of fixed debt due to the influence of interest rate reset risk on yields. We intend to revisit this issue at the next review of the rate of return guideline.[481]

In section 3.3.4 we stated that we considered that there should not be a separate benchmark for government-owned energy network service providers because the risk for which investors require

480 AER, *Final decision: WACC review*, May 2009, pp. 158-159.
481 NER s.6.5.2(p), NGR r.87(16).

compensation is the same. Under competitive neutrality requirements, governments in Australia are required to charge their departments and statutory bodies a fee such that the interest rates they are exposed to are equivalent to those they would face in accessing capital without the benefit of the effective underwriting by the taxpayer. To estimate the fee, treasuries reference the debt issuances of privately-owned business at the same credit rating as the stand alone credit rating of the government energy network service provider. Given the reference to privately-owned businesses, we do not consider that any further information is provided by using government-owned energy business debt portfolio information relative to using privately-owned energy debt portfolio information.

CEG undertook analysis of the revised portfolio on behalf of ENA. It did not include Jemena or Dampier Bunbury Pipeline in its revised analysis. CEG reported a simple/weighted average term at issuance of 10.9/10.5 years.[482] This calculation of term at issuance differs from the AER's calculation of an average term at issuance of 8.7 years because we have:

- Included SPIAA (parent of Jemena) and Dampier Bunbury Pipeline debt portfolio into the calculation. These businesses both had average terms at issuance of 6.7 years.
- Adjusted APA Group's maturity date for its subordinated notes from 30 September 2072 to 30 September 2018 on the basis that this is how APA Group is representing the maturity of the bond[483] and investment commentary indicates that the expected maturity is 2018[484]. This is because at this time credit ratings agencies will no longer treat 50 per cent of this debt as equity, as is currently the case, thereby negatively impacting APA Group's credit rating.

CEG submitted that a weighted average of the entire drawn debt portfolio is likely to understate the debt used to fund the regulatory asset base. It states that an amount of short-term debt should be excluded as short-term debt is used to provide the cash balance or to fund the repayment of soon-to-mature debt.[485] After excluding an amount equal to the value of the cash and cash equivalents balance or other liquid funds it calculates a simple/weighted average term at issuance of 11.0/10.7 years.

We do not agree with CEG's submission that a portion of short-term debt (bank debt and commercial paper) may be excluded as negative cash. We consider that a cash balance will reflect a number of items, including receivables and the proceeds of asset sales, which are not debt transfers. We understand that short-term debt is primarily used by the businesses to fund new capital expenditure, until such time as a marketable parcel (approximately $500 million) is accumulated that may be refinanced by issuing longer-term (bond) debt. We also understand that businesses try to have enough residual bank debt drawn to maintain competition between a pool of banks in order to provide competitively priced capex facilities. We therefore do not consider that it is appropriate to discount short-term debt by an amount equal to cash and cash equivalents.

CEG submitted that SP AusNet should be excluded from the analysis on the basis that its debt management policy to date is likely to be affected by its majority government ownership. If it is excluded, CEG calculates a simple/weighted average term at issuance of 11.5/11.3 years. As stated above, our basis for excluding government-owned network service providers from our sample is that

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482 CEG, *Response to AER criticisms of estimates of average term of debt for the ENA*, October 2013, p. 2.

483 See slide 23 of the Full Year Results Presentation, 21 August 2013, <www.apa.com.au/media/214600/apa fy13 presentation.pdf> accessed 25 October 2013.

484 See Wealth Focus, *APA Group Subordinated Notes Analysis & Research*, 10 August 2012, <www.fundsfocus.com.au/managed-funds/pdfs/ipo/apa-analysis.pdf> accessed 25 October 2013; Morning Star, *APA Group Subordinated Notes (AQHHA): Piping hot margin but be comfortable with the risk!*, 13 August 2012, <www.morningstar.com.au/s/documents/20120813-APA-Group-New.pdf> accessed 25 October 2013;

485 CEG, *Response to AER criticisms of estimates of average term of debt for the ENA,* October 2013, p. 2.

we cannot observe their cost of debt. We consider that this is not the case with SP AusNet and Jemena. SP AusNet and SPIAA have their own treasuries which raise funds in the private capital market. We can and do observe their cost of debt. Singapore Power (SP) currently holds 51 per cent of SP AusNet and 100 per cent of SPIAA (parent of Jemena[486]). These Australian assets constitute approximately 70 per cent of SP's assets. While the ratings agencies consider that SP supports SP AusNet and SPIAA, we consider that SP is likely to have similar risk to SP AusNet and SPIAA given the high weighting of the Australian regulated network service providers in the SP portfolio and that the other subsidiaries are Singapore's monopoly electricity and gas distribution and transmission network service providers. We consider SP is run as an independent company to Temasek Holdings, its holding company, who as a policy does not guarantee the financial obligations of its portfolio companies.[487] We also note that Temasek Holdings is a corporation run on a commercial basis.[488] We therefore consider that SP AusNet and SPIAA are suitable comparators and should be included in the sample used to inform the debt term at issuance.

QTC presented the debt maturity profiles of non-regulated infrastructure businesses and businesses operating in capital intensive industries. It argued that while these firms' business risk profile may differ from that of a regulated service provider, they are presented with the same requirement to refinance maturing debt or fund new investment when credit markets are unfavourable. On the assumption that a seven year term at issuance results in a 3.5 year term to maturity, QTC states that this is shorter than these firms, which have gearing less than 60 per cent.[489] However, we do not consider a term at issuance can be inferred from the series of business graphs' term to maturity data presented by QTC. We consider that more robust analysis of the data is required in order to substantiate this assertion.

Support for a 5-year debt term

The MEU, COSBOA and the Ethnic Communities' Council of NSW stated that we should consider the extensive evidence provided by the ERA that suggests that the average term of debt is closer to five years than seven years.[490]

PIAC's preference is for a five year term to match the regulatory period and, on the basis of Davis and Lally's recommendation to IPART, to achieve net present value neutrality of regulated cash flows under the building block model.[491]

PIAC and the Ethnic Communities Council of NSW state that a five year term is also more practically advantageous, leading to more accurate and consistent estimation of yields via the Bloomberg FVCs.[492]

COSBOA and the Ethnic Communities Council of NSW stated that a five year term would also lessen the need for a transition.[493]

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486 SPIAA also holds interests in ActewAGL, United Energy Distribution and other Australian gas pipelines.

487 Temasek Holdings (Private) Limited, 'Investor FAQs', <http://www.temasek.com.sg/investorrelations/investorlibrary/investorfaqs> accessed 3 December 2013.

488 Temasek Holdings (Private) Limited, 'About Temasek', <http://www.temasek.com.sg/abouttemasek/faqs> accessed 3 December 2013.

489 QTC, *Submission to the draft guideline*, October 2013, p. 10.

490 MEU, *Submission to the draft guideline*, October 2013, pp. 33-37; COSBOA, *Submission to the draft guideline*, October 2013, p. 5; ECC, *Submission to the draft guidelines*, October 2013, p. 2.

490 PIAC, *Submission to the draft guideline*, October 2013, pp. 48-51.

491 PIAC, *Submission to the draft guideline*, October 2013, p. 49.

492 ECC, *Submission to the draft guidelines*, October 2013, p. 2.

493 COSBOA, *Submission to the draft guideline*, October 2013, p. 5; ECC, *Submission to the draft guidelines*, October 2013, p. 2; PIAC, *Submission to the draft guideline*, October 2013, p. 50.

We consider that the evidence of the term at issuance presented by the ERA is consistent with that found by us. However, the ERA has a different approach to us. It states that:[494]

> The Authority considers that it is the average remaining term to maturity that determines the debt profile of a firm at a given time. That is, the yield required to service a firm's cost of debt is a function of the remaining term to maturity, and not the term to maturity at issuance. Investors will price bonds based on the coupons they are eligible to receive, the face value of the bond and the credit risk of the bond issuer. The prior history of the bond does not determine the current market value of a bond, and therefore does not determine the current market value of a bond, and therefore does not determine the current market value of a firm's debt. Therefore, the term to maturity at issuance is irrelevant for the pricing of a firm's debt, and consequently irrelevant for determining the relevant term to maturity for estimating the risk-free rate of return.

Our preference is to use the opportunity cost of capital, rather than the new entrant cost of capital, for calculating the return on debt. This is for two reasons. Under this approach as the regulatory framework does not revalue the RAB to current market value, we do not consider that the new entrant cost is consistent with this regulatory framework. Also businesses incur a term premium on the issuance of new debt. This term premium may not be priced when the debt is sold on the secondary market. However, the business which initially issued the debt must pay the term premium for the life of the debt..

Under a trailing average approach we do not consider that the NPV neutrality objective is appropriate. We expect that a business will recover its return on debt on average over the term of the trailing average rather than over the regulatory period. An assumption of NPV neutrality over a five year regulatory period may, on average, be unlikely to equal the firms' debt financing costs.

Conclusion on the debt term

We consider that a business will, within the constraints of the market for corporate bonds, aim to match the length of the debt term to the asset life in order to minimise refinancing risk. We note, however, that this objective is subject to consideration of the increased cost of debt associated with a longer term. Businesses in their submissions indicated that the use of interest rate swaps will no longer be required under a trailing average approach. Current debt portfolio information indicates that firms are choosing weighted average debt terms of between 6.7 years to 16.3 years, but on average 8.7 years. We note that of the 11 businesses, 10 have an average term at issuance of less than ten years.

In moving to a trailing average approach we consider that we are committing to a debt term for the period nominated. To change the benchmark debt term in response to updated debt portfolio information would not be conducive to regulatory stability. In light of this, in order to ensure that the benchmark efficient entity is able to recover its efficient financing costs consistent with the allowed rate of return objective, we propose to use a 10 year debt term for the purposes of estimating the return on debt and for setting the period of the trailing average. It also means that a 10-year transition will apply.

We will, however, continue to monitor the average debt term at issuance of the regulated network service providers against the benchmark term. We will consider this information when we are assessing future transactions costs and any proposed adjustment of the return on equity.

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[494] ERA, *Explanatory Statement for the Draft Rate of Return Guidelines - Meeting the requirements of the National Gas Rules*, August 2013, p. 75.

Extrapolation—technical assessment

In the explanatory statement accompanying the draft guideline, we raised concerns over the ability to find a reliable extrapolation method for mechanistically calculating the 10-year DRP for annual updating purposes. The need for extrapolation has arisen due to the absence of a Bloomberg FVC BBB+ at the benchmark term of 10 years.

As discussed in the explanatory statement accompanying the draft guideline, in attempting to automate the AER's current paired bonds extrapolation method, we found difficulties in specifying binary requirements which enable choosing two bonds for a company, with a term approximating seven years and another approximating 10 years. We outlined that there is a trade-off between specifying the term requirements too tightly, such that a pair of bonds is not found, and specifying the term requirements too loosely, such that the yield curve differences for the two terms lead to unacceptable error in the DRP term differences. We also raised that it is difficult to specify factors which would lead to the exclusion of bonds on the basis of unusual trading activity (for example, such as if the company was subject to merger and acquisition activity).

In the explanatory statement accompanying the draft guideline, we considered two alternative extrapolation methods:

- The 7-year/5-year Bloomberg Australian BBB FVC spread.
- The 10-year/7-year Bloomberg US BBB FVC spread (post swapping back to Australian dollars).

In relation to the first method, PwC noted that the extrapolation method may be inaccurate during periods of increased market uncertainty.[495] We also found that this method resulted in much larger error than other methods.[496] We commented that this method would require an overall constraint to be specified in the automation process to address the likelihood of unacceptable error. We considered that it would be difficult to specify such a constraint.

With respect to the second alternative method, we considered that there are likely to be different risk exposures for a business operating in the US compared with one operating in Australia. We therefore considered that using the US Bloomberg curves to proxy for Australia would be likely to result in unacceptable estimation error.

A number of submissions commented that they did not consider that the limitations associated with extrapolation methods should influence the choice of debt term.[497]

The ENA, based on the advice of CEG, proposed two alternative extrapolation methods:[498]

- CGS spread plus a fixed DRP spread, calculated using the AER's current paired bond approach, to be set at the determination and carried over for five years
- CGS spread plus the specification of a formula for calculating the DRP spread. The ENA points to the use of QTC's proposed formula based on the historical relationship between the 10-year DRP

[495] PwC, *Powerlink Methodology to estimate the debt risk premium: Report to Powerlink Queensland*, April 2011, p. 11.
[496] AER, *Final decision – Public: Jemena Gas Networks, Access arrangement proposal for the NSW gas networks 2010-15*, June 2010, p. 188.
[497] APIA, *Submission to the draft guideline*, October 2013, p.33; APA Group, *Submission on the draft guideline*, October 2013, p. 34.
[498] ENA, *Response to the draft guideline*, October 2013, p. 62.

and the interest rate swap curve. The ENA stated that the formula 'need not be based on purely contemporaneous data during each annual averaging period'[499].

Box 8.1 Discussion of QTC's proposed extrapolation method

QTC's proposed method of extrapolation involves:[500]

Establishing a simple linear relationship between 7- and 10-year BBB+ credit margins from the QTC quarterly credit margin survey[501]. QTC estimated the relationship for data between March 2006 and June 2013 using linear regression. The relationship is specified as:

10 yr/7 yr BBB^+ SRP[502] term premium = 0.0015 + 0.0778 x 7yr BBB^+ SRP[503] (1)

AFMA 7- and 10-year fixed swap mid rates (which are published daily) are used in the formula from the first step above in order to estimate the 10-year BBB^+ yield.

10 yr BBB^+ yield = 10 yr swap rate + 7 yr BBB^+ SRP + 10 yr/7 yr BBB^+ SRP term premium

10 yr BBB^+ yield = 10 yr swap rate + 7 yr BBB^+ SRP + (0.0015 + 0.0778 x 7 yr BBB^+ SRP) (2)

where:

10 yr swap rate = 10 yr AFMA fixed swap mid rate

7 yr BBB^+ SRP = 7 yr Bloomberg BBB+ FVC debt yield - 7 yr AFMA fixed swap mid rate.

The AER has a number of concerns regarding this method:

We consider that the particular estimated relationship, specified in (1) above, may not always perform well. Importantly, we have no reality check for the QTC survey data, apart from a short period between March 2006 and September 2007 when the Bloomberg 10-year BBB FVC was available. During this short period the difference between the Bloomberg 10-year BBB FVC debt yield and the 10-year BBB debt yield estimated using QTC's method was relatively small. On average, the difference between the QTC method and the Bloomberg FVC between March 2006 and October 2007 was 1 basis point. The maximum difference was 22 basis points and the minimum difference was -11 basis points. However, we have reason to expect that this may not be the case recently. We consider there are likely to be two sources of differences. We note that over the same period the 10-year/7-year Bloomberg SRP ranged between -0.17 and 0.18 while the QTC 10-year/7-year SRP ranged between 0.16 and 0.24. In addition to significantly different levels, the shape of the curves were also quite different (see figure 8.8).

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499 ENA, *Response to the draft guideline*, October 2013, p. 64.

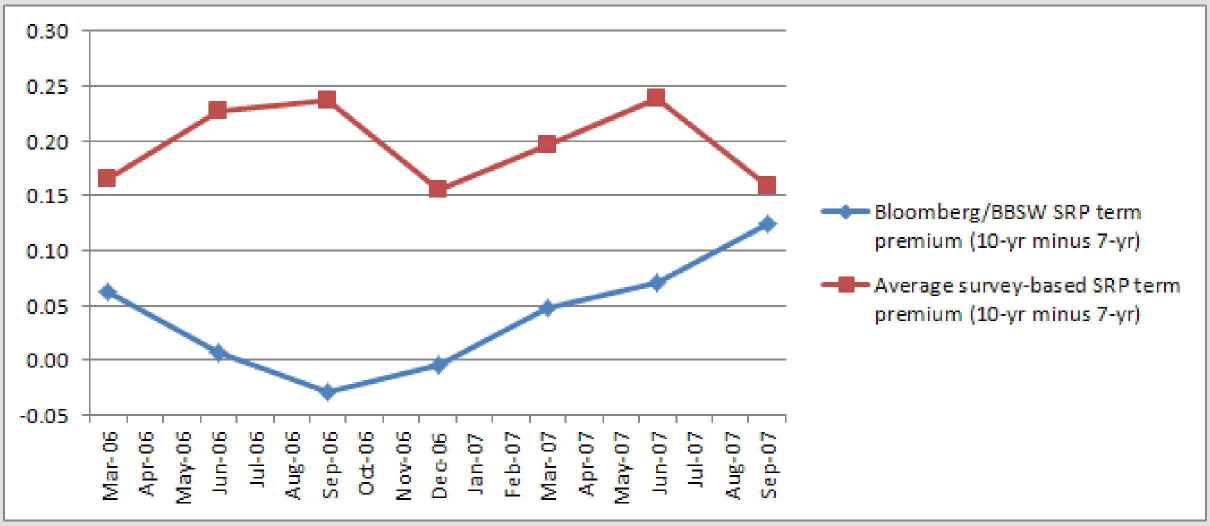
500 QTC, *Submission to the draft guideline*, Attachment A, October 2013, pp. 1-8.

501 QTC undertakes a quarterly credit margin survey as part of the administration of the competitive neutrality fee on behalf of Queensland Treasury and Trade, to determine credit margins on corporate debt issuance for various tenors and credit ratings. The QTC quarterly survey requests data on indicative A$ issue margins to swap for new debt issuance based on a minimum total annual borrowing program of A$1 billion, with a credit rating of AAA to BBB-, for between a 3 month and 10 year tenor and excluding margins for facility, underwriting or Commonwealth guarantees. Six debt capital market specialists are surveyed.

502 SRP is the swap risk premium. It is the margin between the annualised fixed corporate yield and the annualised fixed swap rate for the same term to maturity.

503 QTC advised of this update to the original specification of the relationship due to an error it found in its data transposition.

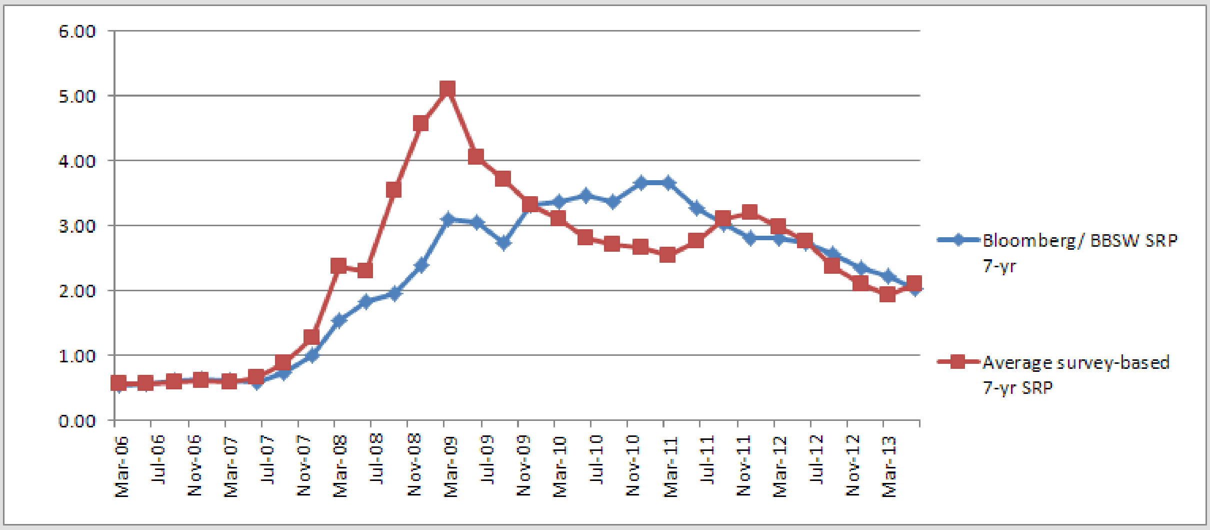
Figure 8.8 Comparison of Bloomberg and survey-based SRP term premium (10-yr minus 7-yr)



Source: QTC credit margin survey, Bloomberg, AER analysis.
Note: The Bloomberg/BBSW SRP term premium (10-yr/7-yr) is the difference between the 10-yr SRP (Bloomberg BBB+ 10-year FVC yield less the BBSW 10-year rate) and the 7-yr SRP (Bloomberg BBB+ 7-year FVC yield less the BBSW 7-year rate)

We also note that during the 2006-07 period the QTC 7-year SRP and Bloomberg 7-year SRP were closely aligned. However, it can be seen in Figure 8.9 that the 7-year QTC SRP and the 7-year BBB Bloomberg FVC/BBSW SRP have diverged frequently since July 2007. The difference between the 7-year QTC SRP and the 7-year BBB Bloomberg FVC/BBSW SRP was on average 17 basis points, between March quarter 2006 and June quarter 2013. The minimum and maximum were -219 and 113 basis points respectively (see Figure 8.9). We consider that these two sources of error margins are significant such that we do not propose to make an upfront commitment to using the QTC method in the guideline.

Figure 8.9 Comparison of Bloomberg and survey-based 7-yr SRP



Source: Bloomberg, QTC credit margin survey, AER analysis.
Note: The Bloomberg/BBSW SRP 7-yr premium is the Bloomberg BBB+ 7-year FVC yield less the BBSW 7-year rate. The QTC SRP 7-yr is the swap risk premium reported by debt market specialists, collected quarterly by QTC.

We consider that the use of two separate datasets may result in inconsistencies. QTC survey data is used to establish the coefficients describing the relationship between the 7- and 10-year credit margins (equation (1)) for inclusion in estimating the 10-year BBB+ debt yield (equation (2)). However, as the QTC data is only available on a quarterly basis, AFMA and Bloomberg data is used to estimate the daily 10-year BBB+ yield in the second step (equation (2)). The validity of using one data set to establish the coefficients and then another data set to populate the relationship is questionable. As the data sources are different there may be inconsistencies which lead to error.

The 7-year/10-year credit margin relationship is estimated over a historical period of seven years between March 2006 and June 2013 so is not a contemporary indication of the credit margin relationship, as would be expected for annual updating. The coefficients describing the relationship are sensitive to the time period chosen.

Approximately five years of quarterly data (18 observations) is required to achieve statistical significance at a 5 per cent significance level. At this time, in advance of a determination, it is unclear whether the five years of data is representative of the conditions prevailing at the time of the annual updating of the debt yield estimate. For example, if there were to be a reversal in interest rate trends shortly before a determination, it would be unlikely to be reflected in a linear relationship estimated over 5 years. The ENA noted that the actual difference in any given period could be much greater than the long run average estimate.[504] We consider the reverse may also be true—that the actual difference in any given period could be much less than the long run average estimate.

For the reasons discussed in Box 8.1 we do not consider that it is advisable to commit to the method proposed by QTC in advance of considering the specific circumstances of a determination.

AFMA also proposed a method of extrapolation which involved:[505]

- Using the AFMA 10-year swap rate, which AFMA states would account for a significant component of the debt risk premium, and adding a margin for the BBB versus swap component at a 10-year tenor
- AFMA suggests that the margin may be calculated as the difference between the 7-year BBB Bloomberg FVC yield and the 7-year AFMA swap rate plus an additional adjustment for the 7 to 10-year BBB Bloomberg FVC yield.

The AER consider that the difficulty with this method is arriving at a consensus on estimating the additional adjustment for the 7- to 10-year BBB Bloomberg FVC yield.

Materiality of 10-year/7-year yield spread

In the explanatory statement accompanying the draft guideline, we noted that actual Bloomberg 10-year and 7-year BBB FVC yield data was only available up to October 2007. We calculated a yield spread of 21 basis points over the period for which both the 10-year and 7-year Bloomberg BBB FVC were available. However, a number of submissions stated that they considered the 10-year/7-year yield spread to be material.[506]

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504 ENA, *Response to the draft guideline*, October 2013, p. 59.

505 AFMA, *Submission to the draft guideline – Benchmark term of debt*, October 2013, p. 3.

506 ENA, *Response to the draft guideline*, October 2013, p. 58; SP AusNet, *Submission on the draft guideline*, October 2013, pp. 2-3; Transgrid, *Submission to the draft guideline*, October 2013, p. 4; Energex, *Submission to the draft guideline*, October 2013, p. 2.

QTC analysed the AER's decisions from 2012 to date, which were calculated using the paired bond approach. It found an average 10-year/7-year term premium of 64 basis points.[507] APIA submitted that recent ANZ evidence on the 10-year/7-year spread on A- to A+ bonds is on average 30 basis points. It states that this creates a WACC difference of 18 basis points.[508] AFMA stated that the spread between the 10-year and 7-year swap rate for the last ten years has ranged between -23 and 40 basis points. It stated that the current spread is approximately 35 basis points. It indicated that the swap difference is only a proxy for the BBB curve spread, which is likely to be wider, as lower credits tend to have steeper curves. It stated that this indicates that the term premium is likely to be quite material at times.[509]

Conclusion on extrapolation

We note that there is no Bloomberg data beyond October 2007 against which the accuracy of an extrapolation method is able to be assessed. After this date, extrapolation methods are being compared against each other with no "truth" comparison available. It is not clear which method should be held up as the base "best performer", against which other methods should be compared.

We consider that the 10-year/7-year risk free component of debt yield is able to be robustly estimated due to the current existence and expected future existence of 10-year and 7-year CGS data. As such, whether we estimate an extrapolation of the total debt yield or separately estimate the risk free rate and DRP components (if extrapolation is required), we consider that the risk free component should be applied at the annual update.

On balance, we consider that where the 10-year/7-year BBB+ DRP component of debt yield is able to be robustly estimated in a mechanistic way that it should be applied. We consider that there are a number of alternative methods and no method addresses the issue of containing unexpected errors. For the purposes of the guideline, we do not consider that we are able to specify a method which will satisfy this requirement at the time of each determination. We therefore intend to consider the method of extrapolation (if required) for annual updating of the return on debt at a service provider's determination.

At the time of each service provider's determination we will be better placed to consider the contemporaneous performance of QTC-type specifications for extrapolation. If there continues to be a concern regarding exposure to material error in extrapolating the DRP, we will consider setting bounds on the DRP estimate, consistent with DRP estimates observed close to the time of each determination.

8.3.4 Credit ratings

The credit rating is an input into deriving the benchmark return on debt. As with all other WACC parameters, the credit rating level of a benchmark efficient entity is not directly observable and must be estimated. We propose to use a benchmark credit rating of BBB+ or its equivalent to estimate the return on debt. Our position is based on:

- a single credit rating of BBB+ is consistent with the definition of the benchmark efficient entity
- the view that credit ratings should be relatively steady for businesses considered to be close comparators to the benchmark efficient entity over time

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507 QTC, *Submission to the draft guideline*, October 2013, p. 14.
508 APIA, *Submission to the draft guideline*, October 2013, p. 34.
509 AFMA, *Submission to the draft guideline – Benchmark term of debt*, October 2013, pp. 3-4.

- empirical evidence of credit ratings from businesses considered to be the closest comparators to the benchmark efficient entity
- a credit rating of BBB+ is consistent with the previously adopted value.

Overall, we have informed our view by examining empirical evidence based on expanded samples which include the full sample of regulated networks and the historical rating data series. Further, we consider that as discussed in the 2009 WACC review, in considering empirical evidence, there is a trade-off in determining the length of the estimation period. In particular, older data might be considered less reflective of current risk assessments (which would suggest a shorter period) but recent data may not provide reliable (which would suggest using a longer period). On balance, we consider it reasonable to use an estimation period of at least five years consistent with our approach to estimating the equity beta. Accordingly, this analysis supports the adoption of BBB+ or its equivalent for the benchmark efficient entity.

Our reasoning is detailed below.

The definition of the benchmark efficient entity

The rate of return objective requires that the benchmark efficient entity must have a similar degree of risk as that which applies to the service provider.[510] We consider that the relevant risks between gas and electricity and transmission and distribution businesses are sufficiently similar (refer to chapter three). As such we consider that there should be a single benchmark efficient entity. For this guideline, we have adopted the definition of the benchmark efficient entity, which is a pure play, regulated energy network business operating within Australia (see chapter three).

Implicit in the adoption of 'energy network business' in the proposed definition of the benchmark efficient entity is that there is a single benchmark for electricity and gas, and transmission and distribution networks. Adopting a single credit rating is consistent with a single benchmark.

APA submitted that there is no basis for the use of a single credit rating, given that there is no basis for the single 'benchmark'.[511] We disagree with this view. We consider that the risks between gas and electricity and transmission and distribution businesses are sufficiently similar, as discussed in chapter three and the equity beta section in chapter six. Accordingly, we maintain a single credit rating is appropriate for a single 'benchmark'.

Median credit ratings

For the draft guideline, we derived a median credit rating from the full sample of regulated energy networks operating within Australia over the period 2002–2013.[512] The full sample comparators are listed below:[513]

- APT Pipelines Ltd
- ATCO Gas Australian LP
- DBNGP Trust

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[510] NER, cl. 6.5.2(c). It similarly applies for the Transmission Network Service Providers, see NER, cl. 6A.6.2(c).
[511] APA Group, *Submission on the draft guideline*, October 2013, pp. 35–37.
[512] AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 111–112.
[513] This set of firms was drawn from Standard and Poor's industry report cards (November 2012, table 2), with the exclusion of a firm that is government owned (Ergon Energy Corp Ltd).

- DUET Group
- ElectraNet Pty Ltd
- Energy Partnership (Gas) Pty Ltd
- Envestra Ltd
- ETSA Utilities
- Powercor Australia LLC
- SP AusNet Group
- SPI (Australia) Assets Pty Ltd
- The CitiPower Trust
- United Energy Distribution Pty Ltd

This evidence supports a BBB+ credit rating. This analysis covered both electricity and gas networks, which is consistent with our position to have a single benchmark, given that the regulated energy networks are considered to have a similar degree of risk.

ENA and service providers recommended a BBB credit rating based on recent market evidence.[514] Envestra submitted that credit ratings are forward looking and the analysis on historical credit rating medians between 2002 and 2012 is irrelevant. Envestra stated that the main reason for this is that until 2009 the AER adopted an equity beta value of one, which provides higher equity returns and a larger cash flow buffer from which to service interest payment obligations (that is, the service provider has a stronger financial risk profile).[515] ENA also considered that there is no basis to have regard to credit ratings prior to 2008–2009.[516]

ENA also stated that there is a need to:[517]

> …..consider the interrelationships between the financial risk profile and the credit rating, and ensure the combination of allowed RoD, RoE, RoR, expenditures and related revenue building blocks in the PTRM result in FFO-to-Interest and FFO-to-Debt that are commensurate with the benchmark credit rating.
>
> Based on the credit matrix analysis submitted by Kanagra, recent AER's regulatory decisions have resulted in rating on the lower limit of BBB and this is below the BBB+ benchmark proposed in the draft guideline.

As we discussed in the 2009 WACC review, in the context of using empirical evidence to estimate the equity beta in determining the length of the estimation period, there is a trade-off. On one hand, older data might be considered less reflective of current risk assessments (which would suggest a shorter period). On the other hand, in order to obtain a robust and statistically reliable equity beta estimate we need to have sufficient number of observations (which would suggest a longer period). The sample of Australian businesses that can be considered close comparators to the benchmark efficient entity is limited. Therefore, one option to increase the number of observations is to consider the longest available time period. On balance, we consider it reasonable to use an estimation period of at least five years consistent with our approach to estimating the equity beta.

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514 ENA, *Response to the draft guideline*, October 2013, pp. 73–75.
515 Envestra, *Response to the draft guideline*, October 2013, p. 7.
516 ENA, *Response to the draft guideline*, October 2013, pp. 73–75.
517 ENA, *Response to the draft guideline*, October 2013, pp. 73–75.

Further, we disagree with the view that the most recent information at one point in time on credit ratings should inform the benchmark credit rating on the basis that:

- Credit ratings are relatively steady for regulated service providers over a longer period of time.
- We are unaware of evidence that supports the view that the overall financial risk profile for regulated service providers has changed since 2009 WACC review.

It is not clear that overall the financial risk profiles for service providers have changed due to the new equity beta value since last WACC review. We note while we lowered equity beta from 1.0 (and 0.9) to 0.8 since the 2009 WACC review, both MRP and gamma increased (even though gamma is not part of return of equity).[518] We are unaware of any specific financial performance thresholds which suggest that lower (higher) credit matrix outcomes will automatically result in a lower (higher) credit rating. Further, the equity beta only applies to the return on equity component of the building block revenue allowance. This means even where a service provider incurs a relatively reduced revenue requirement on this revenue component, they will still receive revenues from all other components of the building blocks, which may also change.

We are unaware of any evidence suggesting that service providers' financial risk profiles have changed since the last WACC review. On the contrary, in advising us on issues related to different risks across asset pricing models and the WACC, McKenzie and Partington found the credit rating has been steady for regulated utilities in Australia. They concluded that the credit risk for regulated utilities is likely to be relatively small under normal market conditions. This is because the default risk is small and the risk of credit migrations for utilities is low and stable.[519]

The rating agency Moody’s concurred with this view. In its recent industry outlook analysis, Moody’s stated that the credit profile for Australia’s regulated utilities sector continues to be underpinned by a regulatory framework that is mature and supportive in general, noting that:[520]

> We believe that the Australian regulatory regime remains fundamentally supportive under the new rules. This is partly because one of its long-standing objectives - that is, to incentivize investments in the network assets - remains in place.
>
> In spite of changes made to the WACC setting process, other credit supportive features of the Australian regulatory regime are still in place. These include the regulator’s independence, timely recognition of capital investments through the ‘building block’ and the Regulated Asset Base (RAB) approach, as well as the fixed tariff path for the five-year regulatory period. These features continue to underpin a generally supportive - albeit weakened - regulatory environment in Australia. Background information on the building block approach is provided in Appendix 1.
>
> Furthermore, the regulators’ track record and the institutional strength of the Australian regulatory environment - developed over the past 10 years - provides some reassurance that the likelihood of an abrupt change owing to the increased regulatory discretion is not high.
>
> Finally, the sector’s monopoly position insulates it from the direct impact of competition. The essential nature of its energy transportation business supports the long-term demand for its services. These characteristics further enhance the sector’s strong business risk profile and provide a backstop against detrimental changes in regulation, which could stifle the required investment in these networks.

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518 Gamma changed from 0.65 to 0.25 in the 2011 Victorian electricity appeal and has remained 0.25 since. We changed the MRP in the 2009 WACC review from 6.0 per cent to 6.5 per cent for all distribution determinations, until the gas distribution determination in 2011, when MRP went back down to 6.0 per cent. For transmission network service providers, MRP has remained 6.5 per cent for all determinations since the 2009 WACC review.

519 M. McKenzie, and G. Partington, *Risk, asset pricing models and WACC*, June 2013, p. 15.

520 Moody’s, *Industry outlook: Australian Regulated Utility Networks*, 21 February 2013, p. 8.

Further, Standard and Poor's consider that the regulatory framework itself is the most critical aspect that underlies regulated utilities' creditworthiness.[521] Standard and Poor's also acknowledge that the stable cash flows of regulated network utilities mean that less weight is given to their more aggressive metrics.[522] While a rating agency's exact method is proprietary, it seems likely that a holistic assessment is undertaken when determining credit ratings. We also consider that the assessment of credit ratings is inherently subjective, and the outcomes highly sensitive to various assumptions. As a result, a 'financeability' assessment—whether by rating agencies or by a regulator—necessarily involves judgement.

Empirical evidence

To inform our view on the benchmark credit rating we have had regard to empirical evidence. We consider that the empirical evidence supports a BBB+ credit rating or its equivalent.

Table 8.3 Median credit rating of Australian regulated energy networks (2002–2013)

Measure	Energy Networks
Median credit rating (2002–2012)	BBB+
Median credit rating (2002–2013)	BBB+, Negative watch
Median credit rating (November 2013)	BBB

Source: AER analysis.

For the 2002–2012 period, our analysis indicates a median rating of BBB+. However, we observe that the credit rating outcomes can be sensitive to the time period used for estimation purposes (for example, inclusion of 2013 data changes the median credit rating to BBB+ with a negative watch, while the median credit rating for 2013 only is BBB). We also note that there have been some recent credit downgrades. Notwithstanding, our view is that credit ratings are relatively steady for regulated energy businesses over a period of time. Therefore, we consider a historical credit rating analysis produces a more reliable result.

In the draft guideline, we also replicated Kanangra's full sample analysis using a median credit rating approach rather than using its average approach.[523] As indicated in table 8.4, our analysis using Kanangra's sample of businesses and credit ratings gives a median Standard and Poor's credit rating of BBB+ with a positive outlook when 2013 data is included. Further, exclusion of 2013 data changes the median credit rating to A-.

[521] Standard and Poor's, *Key credit factors: Business and financial risks in the investor–owned utilities industry*, November 2008, p. 8.

[522] Standard and Poor's, *Key credit factors: Business and financial risks in the investor–owned utilities industry*, November 2008, p. 17.

[523] AER, *Final decision: WACC review*, May 2009, p. 267. During the last WACC review, we considered that examining median credit ratings of sample businesses was the most appropriate approach to determining a benchmark efficient credit rating.

Table 8.4 Median credit rating of Australian regulated energy networks (2008–2013)

Measure	Energy Networks
Median credit rating (2008–2013)	BBB+, Pos
Median credit rating (2002–2012)	A-

Source: This set of firms and ratings was drawn from Kanangra's report, ENA, *Response to the AER's rate of return guidelines consultation paper, Attachment 16: Credit Ratings for Regulated Energy Network Services, table 15, KANANGRA,* June 2013, p. 25.

Note: NB: "Pos" = positive outlook.

9 Imputation credits

In this chapter, we outline our proposed position on the value of imputation credits in building block revenue determinations and their relationship to the rate of return. We set out our proposed conceptual approach for estimating the value of imputation credits (gamma)—determined as the imputation credit payout ratio multiplied by the utilisation rate. We also apply that approach to estimate a value of imputation credits.

9.1 Issue

Under the Australian imputation tax system, investors receive an imputation credit for income tax paid at the company level.[524] For eligible investors, this credit offsets their Australian income tax liabilities. If the value of imputation credits exceeds an investor's tax liability, that investor can receive a cash refund for the balance. The credits are therefore a benefit to investors in addition to any cash dividend or capital gains from owning shares.

The value of imputation credits affects the estimation of building block revenue allowances. However, the manner in which imputation credits are accounted for depends on whether cash flows are pre-tax or post-tax. We use a post-tax framework with a rate of return that is after company tax but before personal tax. Under a pre-tax WACC framework, the value of imputation credits is a WACC parameter. In contrast, under a post-tax WACC framework, the value of imputation credits is not a WACC parameter.[525] Instead, it is a direct input into the calculation of tax liability for the company, via the corporate tax component of the building block model. This approach is consistent with standard Australian regulatory practice and is the approach prescribed in the rules.[526]

9.2 Approach

We propose that the value of imputation credits within the building block revenue framework is an estimate of the expected proportion of company tax which is returned to investors through utilisation of imputation credits. This is consistent with the Officer framework, which models the value of imputation credits via the parameter gamma (usually labelled using the Greek letter, γ):[527]

> γ [gamma] is the proportion of tax collected from the company which gives rise to the tax credit associated with a franked dividend.

Further, and consistent with the Monkhouse formula, we propose to estimate gamma as the product of two parameters:[528]

- The payout ratio, which is the proportion of imputation credits generated by the benchmark efficient entity that are distributed to investors.[529] In estimating the payout ratio, our proposed approach primarily considers tax statistics (on franking account balances).

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524 See *Income Tax Assessment Act 1997,* parts 3–6.

525 However, in estimating the MRP, the AER 'grosses up' the measurement of observed excess returns (from capital gains and dividends) to consistently value the imputation credits distributed with those dividends. This is to be consistent with a framework that is after company tax but before personal tax.

526 NER, cl. 6.5.3, NER, cl. 6A.6.4 and NGR r.87A.

527 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), p. 4.

528 See P. Monkhouse, 'The Valuation of Projects Under the Dividend Imputation Tax System', *Accounting and finance*, 1996, vol. 36(2), pp. 185–212.

529 The imputation credit payout ratio is distinct from the dividend payout ratio, which is the proportion of available firm free cash flow distributed to equity holders via dividends. This choice of terminology is consistent with the draft guideline and

- The utilisation rate, which is the extent to which investors can use the imputation credits they receive to reduce their personal tax.[530] In estimating the utilisation rate, our approach considers implied market value studies, including both dividend drop off studies and alternative market value studies. Our approach also considers equity ownership, tax statistics, conceptual analysis and other supporting information.

We propose that gamma be set with regard to a benchmark efficient entity informed by market wide behaviour rather than with regard to industry or firm specific values.

Applying this approach, we propose to adopt 0.5 as the value of imputation credits. This is the product of:

- A payout ratio of 0.7. This is NERA's estimate for the payout ratio, based on taxation statistics.[531]
- A utilisation rate of 0.7. We have chosen this value with regard to the alternative estimation approaches presently before us, and their relative strengths and weaknesses. In particular, we have higher regard to those approaches that:
  - Accord with our interpretation of the nature of the utilisation rate parameter in the conceptual framework provided by Officer and Monkhouse (while acknowledging that interpretation of this framework is a matter of debate)
  - Are simpler and more transparent
  - Produce reasonable estimates in light of empirical realities and conceptual considerations. These are namely that, most investors are eligible to redeem imputation credits and that investors in the possession of imputation credits have the incentive to redeem them.

The estimation approaches we considered were:

- The equity ownership approach, which suggests a utilisation rate of 0.7 to 0.8. We have significant regard to this approach. This is primarily because we consider that it is consistent with our interpretation of the conceptual framework provided by Officer and Monkhouse. This approach is also simple, intuitive and uses a relatively transparent source of data.
- Tax statistics studies, which suggest a utilisation rate of 0.4 to 0.8. We have regard to this approach. This is mainly because we consider it is consistent with our interpretation of the conceptual framework provided by Officer and Monkhouse. However, we acknowledge that the authors of some of these studies report problems with data quality and consistency.
- Implied market value studies, which suggest a utilisation rate of 0 to 0.5. We have somewhat less regard to this approach. This is mainly because we consider it is not consistent with our interpretation of the conceptual framework provided by Officer and Monkhouse. It also employs complex and sometimes problematic estimation methodologies.
- The conceptual goalposts approach, which suggest a utilisation rate of 0.8 to 1.0. This is not an empirical estimation approach like the three above. Rather, this approach suggests there are

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most submissions on this issue. It is sometimes called the distribution rate or the access fraction, and in equations is sometimes referred to using the symbol *F*.

530 More formally, as set out below, the utilisation rate is the complex weighted average (by value and risk aversion) of individual investors' utilisation rates. In turn, these reflect each investor's expected ability to use imputation credits to reduce their tax (or get a refund).

531 NERA, *The payout ratio: A report for the Energy Networks Association*, June 2013.

conceptual boundaries for estimates of the utilisation rate. That is, the utilisation rate should produce a return on equity that lies between the return on equity under complete market segmentation and the return on equity under complete market integration.[532] Estimates of the utilisation rate in the range 0.8 to 1.0 meet this test.[533]

- Other supporting evidence, including observations about market practice, government tax policy, and imputation equity funds.

On balance, we consider that an estimate for the utilisation rate of 0.7 reasonably reflects the estimates produced by the alternative approaches presently before us. This is with due regard to the strengths and weaknesses of each approach. The equity ownership approach, to which we have most regard, suggests a utilisation rate of 0.7 to 0.8. Taxation studies, to which we have regard, suggest estimates of 0.4 to 0.8. These give us some cause to consider that a reasonable estimate lies closer to 0.7 than 0.8. We have less regard to implied market value studies and the conceptual goalposts approach. However, the former suggests the utilisation rate might be lower than 0.7, and the latter suggests it might be higher than 0.7. In view of the limitations of these final two approaches, and the offsetting directional implications, we consider our estimate is reasonable.

9.3 Reasons for approach

We consider that our approach is reasonable because it:

- is consistent with our interpretation of the conceptual framework for the value of imputation credits provided by Officer and Monkhouse
- is consistent with the role of imputation credits in the regulatory framework, as this framework reflects the Officer framework
- estimates parameters on a market-wide basis, and this is supported by stakeholders and an expert review from Lally
- estimates the payout ratio in a manner that is simple and intuitive, uses long-term, published data, and is supported by stakeholders and an expert review from Lally
- estimates the utilisation rate in manner that recognises the strengths and weaknesses of the existing body of utilisation rate estimates.

9.3.1 The conceptual framework for the value of imputation credits

We have re-evaluated the conceptual task of estimating the value of imputation credits. In this section, we discuss the results of this analysis.

Imputation credits are an additional return to investors, beyond the capital gains and dividends they receive from owning shares. Under the rules, the value of imputation credits is applied as a reduction to the estimated cost of corporate income tax. [534] This is because some of the tax that the company pays generates imputation credits. Where investors receive and redeem these imputation credits, the

532 Under complete segmentation, there are no foreign investors in domestic equity and no domestic investors in foreign equity. Under complete integration, domestic and foreign equity markets (and investors) are completely integrated.

533 M. Lally, *The estimation of gamma*, 23 November 2013, pp. 46–47 (Lally, *The estimation of gamma*, November 2013).

534 NGR, r. 87A; NER, cl. 6.5.3 and NER, cl. 6A.6.4.

government reduces their tax liability or pays them a cash refund to the face value of the credit.[535] Further, to operate consistently with the rate of return, the value of imputation credits should fit within the Officer and Monkhouse frameworks in the presence of imputation credits.[536]

Those frameworks require that:

- The value of imputation credits is investors' expected reduction of effective company tax paid because of h imputation credits. Specifically, this is the reduction of company tax measured before personal tax.
- The value of imputation credits is calculated as a weighted average across investors in the defined market.[537] Specifically, investors are weighted by their value of shares owned and their risk aversion.[538] Consequently, the commonly referred to concept of the market price being set by the 'marginal investor' is not particularly meaningful or helpful in this context. Rather, all investors collectively set the market price, to the extent they participate in the defined market. Consistent with the 2009 WACC review, we propose that the defined market is an Australian domestic market that recognises the presence of foreign investors to the extent they invest in the Australian market.[539] This definition reflects the realities of capital markets. It also sits between the purely theoretical definitions of a 'fully segregated' and a 'fully integrated' market. This definition has critical implications for the value of imputation credits.
- The CAPM assumes investors value the equity returns over the full CAPM period, with no trading during that period.[540] In reality, trading is ongoing. However, where the model's inputs draw on trading data, it is important that this data has arisen throughout the trading year. This ensures that the data is not especially sensitive to any specific trading circumstances at particular times.

To varying extents, these framework requirements relating to the conceptual task have been discussed in past regulatory analysis.[541] However, we consider the implications of these requirements have not been fully considered and used in previous analysis to inform the selection of estimation methods.[542]

From this re-evaluation, we have determined that the regulatory debate on the value of imputation credits did not fully address this conceptual task. Instead, the previous regulatory debate has included an economic and econometric debate over certain arcane details. The debate has also solely relied on a particular class of evidence that has a number of significant limitations.[543] We consider this outcome is not in the long-term interests of energy consumers. We consider a wider appraisal of the available evidence is better regulatory practice.

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535 This is correct under the AER's consistent position of estimating parameters after company tax but before personal tax. If we considered parameters after personal tax, we would have to use a different CAPM, and the value of an imputation credit would depend on an investor's marginal tax rate.

536 See R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), pp. 1–17; P. Monkhouse, 'The cost of equity under the Australian dividend imputation system', *Accounting and finance*, November 1993, vol. 33(2), pp. 1–18.

537 See, for example: P. Monkhouse, 'The cost of equity under the Australian dividend imputation system', *Accounting and finance*, November 1993, vol. 33(2), pp. 1–18; M. Lally and T. van Zijl, 'Capital gains tax and the capital asset pricing model', *Accounting and finance*, July 2003, vol. 43(2), pp. 187–210.

538 See M. Lally and T. van Zijl, 'Capital gains tax and the capital asset pricing model', *Accounting and finance*, July 2003, vol. 43(2), p. 192.

539 AER, *Final decision: WACC review, May 2009,* pp. 97–101.

540 See for example: J. Lintner, 'The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets', *The review of economics and statistics*, February 1965, vol. 47(1), p. 15.

541 For example: Handley, *Further comments on imputation credits: A report prepared for the AER*, April 2009, p. 12.

542 This includes the analysis in the 2009 WACC review (including the material submitted by stakeholders) and in the regulatory decisions that were the subject of Tribunal appeal in 2010 and 2011.

543 See 'Implied market value estimates' in section 9.3.5.

Much of the regulatory debate from the 2009 WACC review and the Tribunal review focused on evaluating detailed technical issues around specific studies or pieces of evidence. It would have assisted us and the Tribunal to have taken a step back from the detail and to have started from a better conceptual understanding of imputation credits within the building block revenue model. The Tribunal stated:[544]

> The Tribunal has found some deficiencies in its understanding of the foundations of the task facing it, and the AER, in determining the appropriate value of gamma. These issues have not been explored so far because they have not arisen between the parties, who appear to be in agreement about how the Rules should be interpreted regarding the treatment of corporate income tax. They may be matters that the Tribunal will take up in its further decision in these matters; or they may best be left until the next WACC review. Indeed, they may go to the basis for the Rules themselves.

In responding to the Tribunal's comments, we have now considered the questions raised in McKenzie and Partington's March 2011 report.[545] We have also extended them by revisiting the foundational theory of the value of imputation credits. Having done so, we have reached views on these issues that were not before the Tribunal at the time of its review.

Further, we consider that in the 2009 WACC review and subsequent decisions, we adopted too narrow a scope of evidence to estimate the utilisation rate. Specifically, our analysis was limited only to tax statistic estimates and dividend drop off studies. Accordingly, in this guideline, we have endeavoured to draw on a broader range of evidence with regard to its strengths and weaknesses. Much of this evidence was also not before the Tribunal at the time of its review.

9.3.2 The role of imputation credits in the regulatory framework

Under the rules, we are required to use a building block framework to estimate revenue for service providers. The building block framework sets out how to estimate the various revenue streams that make up a total revenue allowance.[546] The function of this building block revenue estimate is to determine the allowed revenue that a service provider requires to:

- Fund its operating expenses.
- Achieve adequate returns to raise debt and equity in order to finance its capital investments. This is made up of a rate of return on capital, to compensate investors for the risks of investment. It also includes a return of capital (depreciation), which gradually returns the initial principal of the investment, and subsequent investments, back to investors.
- Pay its tax liability.
- Reflect any incentive increments or decrements in the design of the regulatory regime.

It is important that under the building block framework, investors own the service provider's benefits from its operating profits, and/or capital gains. As an example, holding all else constant, if a service provider paid tax but was not compensated for its taxation expense, this shortfall would reduce the pool of funds available for reinvestment or for distributing dividends to investors. Therefore, all building block revenue allowances ultimately affect the total return to investors. In this way, increasing or decreasing a building block revenue component will increase or decrease the return to investors, all else being equal.

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544 Australian Competition Tribunal, *Application by Energex Limited (No 2) [2010] ACompT* October 2010, paras 149, 150.

545 M. McKenzie and G. Partington, *Report to the AER: Response to questions related to the estimation and theory of theta*, 7 March 2011.

546 NER, cl. 6.4.3; NER, cl. 6A.5.4; NGR, r. 76.

One important expense that a company faces is taxation. An allowance for taxation can be estimated as a separate building block allowance, or through the rate of return. Either way, the service provider and, ultimately investors are compensated for the company's tax liability. The difference is only how this return is presented. The rules specify that the AER must estimate a nominal vanilla rate of return.[547] Amongst other things, this means the return on capital does not include an allowance for the cost of taxation.[548] As a result, the building block framework includes an estimate of the cost of corporate income tax as a separate revenue item. The construction of the rule governing the cost of corporate income tax is consistent with the treatment of imputation credits in the Officer framework.[549]

The cost of company tax rule

The electricity distribution rule governing the cost of company tax includes this adjustment.[550]

> The estimated cost of corporate income tax of a Distribution Network Service Provider for each regulatory year (ETC_t) must be calculated in accordance with the following formula:
>
> $ETC_t = (ETI_t \times r_t)(1 - \gamma)$
>
> Where:
>
> ETI_t is an estimate of the taxable income for that regulatory year that would be earned by a benchmark efficient entity as a result of the provision of standard control services if such an entity, rather than the Distribution Network Service Provider, operated the business of the Distribution Network Service Provider, such estimate being determined in accordance with the post–tax revenue model.
>
> r_t is the expected statutory income tax rate for that regulatory year as determined by the AER; and
>
> γ is the value of imputation credits

The electricity transmission rules and gas rules contain equivalent provisions.[551]

This formula can be broken down into two components which explain the intuition of the rule:

- $(ETI_t \times r_t)$ is an estimate of the benchmark efficient entity's tax payments to the government.
- $(1 - \gamma)$ is an adjustment to reduce the tax allowance for the value (γ) of tax payments which are then transferred from the government to investors via imputation credits.

This rule, and the Officer framework, suggests that the value of imputation credits is an estimate of the expected proportion of company tax which is returned to investors through imputation credits.

9.3.3 Selection of market–wide, industry–wide or firm–specific basis of estimation

A key question is whether to estimate gamma on a market–wide, industry–wide or firm–specific basis. Consistent with the draft explanatory statement and the 2009 WACC review, we propose to estimate gamma (and its components) as a market-wide parameter. [552]

We propose to continue estimating gamma as a market-wide parameter. This is because:

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547 NGR, r. 87; NER, cls. 6.5.2, 6A.6.2.

548 However, the calculation of historical excess returns on stocks (used in estimation of the MRP) requires that returns be 'grossed up' for the assumed value of imputation credits. This is because share prices used to estimate these returns are post-personal tax. That is, investors trading in these shares have already incorporated their personal tax circumstances into bid prices. This is to be consistent with a framework that is after company tax but before personal tax.

549 See appendix H.

550 NER, cl. 6.5.3

551 NGR, r. 87A and NER, cl. 6A.6.4.

552 AER, *Final decision: WACC review*, May 2009, p. 421.

- Estimating the utilisation rate on a market-wide basis is consistent with our interpretation of the nature of this parameter in the Officer framework. In his report, Lally explains why, conceptually, the utilisation rate is a market-wide parameter under the Officer framework.[553]

- We prefer to estimate the payout ratio on a market-wide basis given the likely problems presented by estimating it on either a firm-specific or industry-wide basis. Lally's recent report supports this position.[554]

- Stakeholders supported estimating gamma as a market-wide parameter.[555]

Lally demonstrates that, in the Officer framework, the utilisation rate is a market-level parameter while the distribution rate (that is, the payout ratio) is a firm-specific parameter.[556] Therefore, the utilisation rate should be estimated on a market-wide basis. For the payout ratio, however, Lally suggests that firm-specific estimation would present the following problem:[557]

> However firm-specific estimates of the distribution rate are subject to the difficulty that, if the firm's dividends are fully franked, then the firm will be able to manipulate (raise) its price or revenue cap by reducing its dividends (so as to reduce its distributed credits, which lowers its distribution rate and therefore raises its cost of capital estimated from the Officer model used by regulators).

Lally suggests that the alternatives, industry-wide or market-wide estimation, represent a trade-off between statistical reliability versus potential bias.[558] On current evidence, and from a pragmatic perspective, Lally favours market-wide estimation.[559]

In the consultation paper, we sought submissions on whether we should continue to estimate gamma as a market wide parameter. The ENA supported this position.[560] There were also no further substantive comments from stakeholders on this question in submissions to the draft guideline.[561]

9.3.4 The payout ratio

We propose to apply the cumulative payout ratio approach (based on taxation statistics) to estimate the payout ratio. Applying this approach, we propose to adopt a payout ratio of 0.7.

Consistent with our analysis in the explanatory statement accompanying the draft guideline, we consider that the cumulative payout ratio method is likely to produce a reasonable estimate of the payout ratio. This is because:

- it is simple and intuitive

- it uses long-term, published data

- it was broadly supported in submissions to the consultation paper, and there were no further substantive comments on the payout ratio in submissions to the draft guideline[562]

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553 Lally, *The estimation of gamma*, November 2013, pp. 10–11.
554 Lally, *The estimation of gamma*, November 2013.
555 For example, see: ENA, *Response to AER rate of return guideline consultation paper*, 28 June 2013, p. 82.
556 Lally, *The estimation of gamma*, November 2013, pp. 10–11.
557 Lally, *The estimation of gamma*, November 2013, p. 50.
558 Lally notes that bias 'will arise if industry or market-level data are used because the parameter value varies over firms. Industry-level data is likely to be less biased because firms within the same industry are likely to be less variable than firms in general'. M. Lally, *The estimation of gamma*, 23 November 2013, pp. 50–51.
559 Lally, *The estimation of gamma*, November 2013, p. 54.
560 ENA, *Response to AER rate of return guideline consultation paper*, 28 June 2013, p. 82.
561 However, regarding the rate of return guideline as a whole, some stakeholders argue against the use of a single benchmark entity. These arguments are considered in chapter 3.

- it is supported by Lally's report on our estimation of gamma in the explanatory statement accompanying the draft guideline.[563]

Further, we note that, based on current evidence, the method produces a value for the payout ratio that is consistent with that previously determined by the Tribunal (that is, 0.7).[564]

The payout ratio is the proportion of imputation credits that the benchmark company or market distributes, out of the total credits it generates. For example, if a company generates $100 of imputation credits and distributes $80 of imputation credits, its payout ratio for that year is 0.8. Since Australian companies generate one dollar of imputation credits per one dollar of tax they pay, this is equivalent to the value of imputation credits distributed divided by the total value of company tax paid.

In section 9.3.3, we consider it is preferable to estimate the payout ratio as a market-wide parameter for practical reasons. This section sets out our approach to estimating the payout ratio on a market-wide basis.

As noted above, we propose the cumulative payout ratio method be used to estimate the payout ratio. This method starts with the total value of franking credits that are in firms' franking account balances, reflecting the cumulative additions and subtractions of franking credits since the commencement of the imputation tax system. Then, subtracting this from total company tax paid over the same time period produces an estimate of the franking credits that have been distributed in total. This relies on the idea that every dollar of company tax paid generates an imputation credit, which can either be distributed or retained in franking account balances. Then, dividing this estimate by company tax paid to the ATO over the same time period produces an estimate of the total payout ratio over this time. Using this method, NERA estimates the cumulative payout ratio from 1987–88 to 2010–11 as 0.7.[565]

We have also considered whether the payout ratio might be rising over time. We do not find the current evidence conclusive. However, we propose that future consideration is warranted regarding our previous suggestion that a payout ratio of 0.7 was more likely to understate than overstate a forward looking payout ratio.[566]

9.3.5 The utilisation rate

The utilisation rate is the before-personal-tax reduction in company tax per one dollar of imputation credits that the representative investor receives. For this guideline, we consider the utilisation rate should be based on the body of utilisation rate estimates with regard to its strengths and weaknesses. This includes the equity ownership approach, tax value studies, implied market value studies and the conceptual goalposts approach. With current evidence, we consider this suggests a utilisation rate of 0.7. This is a departure from the value for the utilisation rate that the Tribunal adopted. In light of only one source of evidence which it considered in 2011, the Tribunal determined that the utilisation rate should be 0.35.[567] This estimate was based on a single dividend drop off study.[568]

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562 ENA, *Response to AER rate of return guideline consultation paper*, 28 June 2013, p. 83; APIA, *Submission on the consultation paper*, June 2013, p. 40; Major Energy Users (MEU), *Response to the AER's rate of return guidelines consultation paper*, June 2013, pp. 49–50; FIG, *Response to the consultation paper*, June 2013, pp. 35–36; Citipower, Powercor and SA Power Networks, *Response to the AER's rate of return guidelines consultation paper*, 28 June 2013, p. 9.

563 Lally, *The estimation of gamma*, November 2013, pp. 4–5.

564 Australian Competition Tribunal, *Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompT 9,* 24 December 2010, para 4.

565 NERA, *The payout ratio: A report for the Energy Networks Association,* June 2013, p. ii. Also, see appendix H for our analysis of the NERA report.

566 See appendix H for a more detailed discussion.

567 Australian Competition Tribunal, *Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9,* May 2011, para 42.

In reaching our view, we have re-examined:

- the operation of imputation credits and how investors use them
- the representative investor and observed utilisation estimates
- the utilisation rate as a proportion of tax cash flows
- sources of evidence for the estimate—including the equity ownership approach, tax statistic estimates, various implied market value estimates, and the conceptual goalposts approach.

The representative investor and observed utilisation estimates

We consider the relationship between the representative investor in the market and the implied representative investor from estimation methods such as tax studies and dividend drop off studies). We consider this relationship is critical in assessing what we are estimating and which estimation methods are fit for purpose.

To answer the question of the appropriate representative investor, we considered afresh:

- the Sharpe–Lintner CAPM framework under imputation as derived in Officer, Monkhouse, Lally and Van Zijl, and Lally[569]
- analysis of this conceptual framework by academic experts
- the construction of the corporate tax building block in the rules and how this interacts with the Officer framework used within the rate of return.

Our analysis of these issues is set out in section 9.3.1, and further in appendix H. Having undertaken this analysis, we conclude that we did not fully adopt or address important aspects of this analysis during the 2009 WACC review. As a result, the Tribunal review focused only on the particular suitability of tax value studies and dividend drop off studies. This was with an incomplete conceptual framework. The Tribunal acknowledged this incomplete framework at several points in its reasons.[570]

We conclude that the representative investor:

- Is the weighted average of investors within the defined market, where the weightings reflect market participation (equity ownership value) and risk aversion.[571]
  - In this context, the defined market is investors in Australian equity, either domestic or foreign.
- Is the representative investor at any hypothetical point during a trading year—that is, it does not disproportionately reflect an investor or set of investors at a particular point in time. This is because investors may invest at any point during the year. If a benchmark parameter is set using

568 SFG, *Dividend drop-off estimate of theta, Final report, Re: Application by Energex Limited (No 2) [2010] ACompT 7,* 21 March 2011.

569 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), pp. 1–17; P. Monkhouse, 'The cost of equity under the Australian dividend imputation system', *Accounting and finance*, November 1993, vol. 33(2), pp. 1–18; M. Lally and T. van Zijl, 'Capital gains tax and the capital asset pricing model', *Accounting and finance*, July 2003, vol. 43(2), pp. 187–210; and M. Lally, 'The CAPM under dividend imputation', *Pacific accounting review*, December 1992, vol. 4(1), pp. 31–44.

570 We have summarised the Tribunal's commentary in appendix H.

571 See, for example: P. Monkhouse, 'The cost of equity under the Australian dividend imputation system', *Accounting and finance*, November 1993, vol. 33(2), pp. 1–18; and M. Lally and T. van Zijl, 'Capital gains tax and the capital asset pricing model', *Accounting and finance*, July 2003, vol. 43(2), pp. 187–210.

data from a short period in systematically different trading circumstances to the rest of the year, it produces an estimate that is only relevant to those circumstances.

Having reached this view, we consider it has important implications for the practical task of estimating the value of imputation credits. The most important implication of this relationship is that the source of evidence the Tribunal adopted for the utilisation rate (a dividend drop off study) does not produce an estimate for the representative investor. This is because dividend drop-off studies give the value weighted investor's valuation of imputation credits:

- Based on the combined package of imputation credits, dividends, and other entitlements (unless adjusted for). That is, a value for imputation credits is not available via simple observation of the dividend drop off in these studies. The implied values for the franking credit and the cash component must be econometrically separated, which is difficult to do reliably. We discuss this further in appendix H.
- For trades around the time of dividend distribution—that is, these studies only reflect trading around the cum-dividend and ex-dividend dates.

This is explained further below.

Arriving at an estimate of the utilisation rate

Consistent with the draft guideline, we propose to estimate the utilisation rate using the body of relevant evidence with regards to its strengths and weaknesses, checked against a range of supporting evidence. That is, we will not seek to identify a definitive study or even a definitive approach. Rather, we propose to consider the range of expert estimates and opinions on the utilisation of imputation credits. This section addresses:

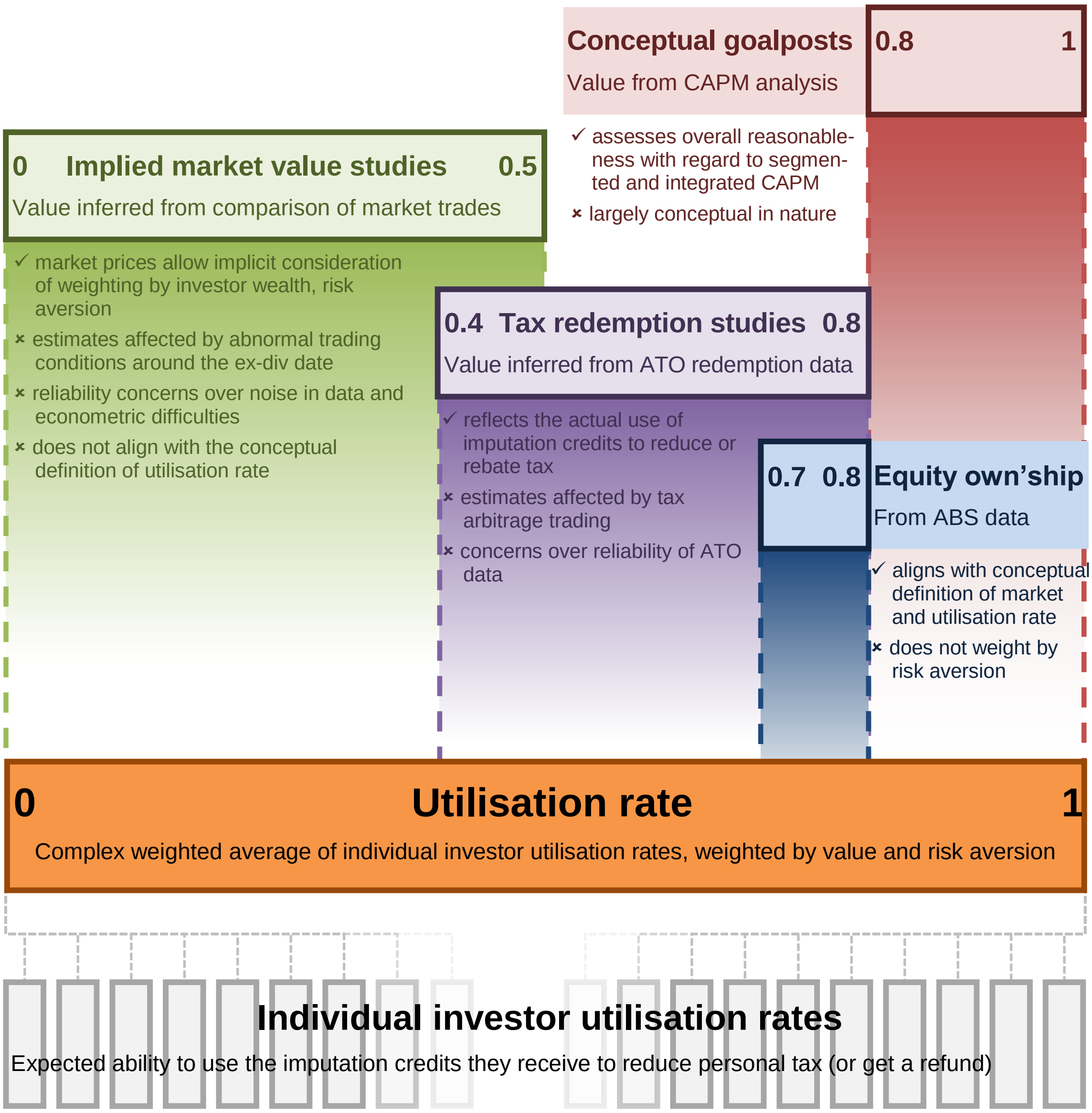
- the equity ownership approach—on current evidence, this suggests an estimate between 0.7 and 0.8
- tax statistic estimates—on current evidence, these suggest an estimate between 0.4 and 0.8
- implied market value studies—on current evidence, these suggest an estimate between 0 and 0.5
- conceptual goalposts approach—on current evidence, this suggests an estimate between 0.8 and 1.0
- other supporting evidence—including observations about market practice, government tax policy, imputation equity funds, which do not suggest a specific quantitative estimate.

Having considered all of these sources of evidence with regard to their strengths and weaknesses, we propose to apply a utilisation rate of 0.7. We consider this approach is consistent with McKenzie and Partington's recommendation to 'triangulate' different sources of evidence.[572] Further, we consider that having regard to a range of evidence, tempered by an understanding of the strengths and weaknesses of each source of evidence, is good regulatory practice and results in a reasonable estimate. Based on these reasons, we consider an estimate of the utilisation rate of 0.7 promotes the rate of return objective.

[572] M. McKenzie and G. Partington, *Report to the AER, Evidence and submissions on gamma*, 25 March 2010, p. 4.

The following diagram sets out the main sources of evidence and some of their key strengths and weaknesses. It does not include the supporting evidence which, though it might provide some qualitative information, does not produce a reasonable quantitative estimate.

Figure 9.1 Overview of different approaches to estimating the utilisation rate



Source: AER analysis.

Figure 9.1 shows that several of the different estimation approaches produce broad ranges of possible utilisation rates. As a set, the different approaches generate estimates that span the entire range of possible utilisation rates, from 0.0 to 1.0. There is relatively little overlap between them, and no common core of possible utilisation rates that is included in every approach. Every available approach has weaknesses that result in each approach providing a flawed picture of the true utilisation rate we seek to estimate.

We engaged Associate Professor Lally of the Victoria University of Wellington to undertake a critical review of the imputation credit related sections of the draft guideline. Associate Professor Lally assessed the strengths and weaknesses of each of the five approaches (see table 9.1), and presented his expert opinion on the utilisation rate estimate arising from each of the first four approaches. He considered that the material underlying the fifth approach (other supporting evidence) could not be used to generate a reasonable estimate of the utilisation rate. He also included a reasonableness check that was closely aligned to his first approach (consistency with the conceptual definition).

Table 9.1 Summary of utilisation rate approaches in the Lally report

Method for estimating the utilisation rate	Lally estimate	Notes on Lally report
1. Conceptual definition	1.0	This is Lally's preferred approach. It is also linked to the reasonableness check below.
2. Equity ownership approach	0.7	This is Lally's second best option.
3. Tax statistics studies	0.40–0.80	The midpoint of the range (0.60) is referenced when deriving a point estimate.
4. Implied market value studies	0.39 (average)	Lally takes an average of the most relevant studies, after excluding implausible results.
5. Other evidence (including market practice)	NA	Lally notes some recent evidence indicates 0.75, but no robust estimate can be derived from this type of evidence.
Reasonableness check (conceptual goalposts)	1.0, or close to it.	New approach suggested by Lally, involves comparison of the return on equity between (full) segmentation and (full) integration.

Source: M. Lally, *The estimation of gamma*, 23 November 2013, pp. 3–4, 15–16, 46–47.

Table 9.1 shows that Lally's preferred option is to follow approach one (conceptual definition). His second preference is to follow approach two (equity ownership approach). Lally's third best option was to take an average of the first four approaches (1.0, 0.7, 0.6 and 0.39), but applying less weight to options three and four. Here is Lally's conclusion:[573]

> Using the three criteria described above, my preferred estimate is 1 from the [conceptual definition] approach and my second preference is 0.70 from the [equity ownership] approach. If these three criteria were rejected, I would favour use of the results from the first four approaches, with values of 1, 0.70, 0.60 and 0.39; the problems associated with the [implied market value and tax statistics studies] warrant a lower weighting than on the other methods and therefore an estimate for *U* [the utilisation rate] of about 0.80.

To aid readability, in this quote we use our labels for each of the approaches (in the original quote Lally refers to the approaches only by number). Lally's overall conclusion is that the utilisation rate should be 0.7, 0.8 or 1.0.

Our evaluation of these approaches has changed since the draft guideline, in response to submissions and also as a result of Associate Professor Lally's critical review. In summary:

- Our assessment of the equity ownership approach has changed to reflect updated Australian Bureau of Statistics (ABS) data. It has also changed to recognise that there is unlikely to be a bias arising from the clientele effect. In the draft guideline, we considered that this approach supported an estimate of 0.7. This estimate has now increased slightly to the range 0.7–0.8.
- Our assessment of tax statistic estimates responds to submissions but does not include major changes. In the draft guideline, we considered this approach suggested an estimate of 0.45–0.8.

[573] Lally, *The estimation of gamma*, November 2013, p. 4

This estimate has now altered slightly to the range 0.4–0.8. This primarily reflects an intention to avoid inappropriate specificity.

- Our assessment of implied market value studies has changed to more explicitly reflect the strengths and weaknesses of individual studies. Consistent with the draft guideline, we still consider it inappropriate to rely upon just one study (even if it were possible to resolve which study was the best available estimate). However, it would be incorrect to imply that all studies had equal strengths and weaknesses. In the draft guideline, we considered that this approach suggested an estimate of 0.0 to 1.0. This estimate has now altered considerably to the range 0.0–0.5.
- The conceptual goalposts approach has arisen from submissions and consultant reports in the period since the draft guideline. Therefore, we did not report this approach in the draft guideline. The primary basis for our conceptual goalposts approach is the reasonableness check presented by Lally. However, it is also linked to the 'conceptual definition' approach he advocates.
- Our assessment of the other supporting evidence continues to reflect the difficulty in establishing a quantitative estimate from this approach, which is largely qualitative or anecdotal in nature.

Table 9.2 sets out the differences between the AER's position in the draft guideline and our current approach.

Table 9.2 Comparison of utilisation rate approaches in the draft and final guideline

Method for estimating the utilisation rate	Draft guideline	Final guideline	Notes on change from draft to final
Equity ownership approach	0.7	0.7–0.8	Minor change reflects new data from ENA
Tax statistics studies	0.45–0.8	0.4–0.8	Minor change reflects level of precision in data, including consideration of ENA submissions
Implied market value studies	0.0–1.0	0.0–0.5	Major change reflects evaluation of strengths and weaknesses of individual studies, reflects comments made by ENA and Lally
Conceptual goalposts approach	NA	0.8–1.0	New approach suggested by Lally, responds to ENA submissions
Other evidence	NA	NA	Largely qualitative, so not used to derive a specific figure.

Source: AER, *Better regulation, Explanatory statement, Draft rate of return guidelines*, 30 August 2013, p. 119; AER analysis.

Based on the available evidence, including the strengths and weaknesses of each of the approaches set out above, we propose to adopt a utilisation rate of 0.7. The expert advice from Associate Professor Lally suggests that our determination of a utilisation rate of 0.7 is reasonable, based on the evidence currently available.

The rest of this section sets out the basis for each of the five approaches, and the result of applying each approach in current market conditions.

The equity ownership approach

Imputation credits are distributed from companies to investors. Eligible investors can then redeem these credits. Before personal tax, eligible investors claim back company tax by one dollar per dollar of credit they receive. In contrast, ineligible investors reduce company tax by zero dollars per dollar of credit they receive.

Therefore, if we estimate the value weighted proportion of eligible investors out of all investors in the Australian market, we have a conceptually sound estimate of the representative investor's expected utilisation rate. As described above, most domestic investors are eligible investors whereas foreign investors are ineligible investors. So the proportion of equity held by domestic investors (instead of foreign investors) provides an estimate of the underlying utilisation rate. We refer to this approach as the 'equity ownership approach'.

In the explanatory statement accompanying the draft guideline, we relied upon an estimate that domestic investors held 71 per cent of Australian equity.[574] This was based upon a 2007 feature article by the ABS.[575] We also stated that we would seek to update this estimate for the final guideline.

The September 2013 report by Hathaway provides updated domestic to foreign equity ownership percentages, on a year-by-year basis from 1988 to 2012.[576] These percentages are drawn from the same underlying ABS statistical tables as the 2007 feature article we previously referenced. Hathaway calculates that across the last 24 years, the percentage of Australian equity held by domestic investors has moved between a relatively narrow band between 75 per cent and 81 per cent. This is shown in the following graph from Hathaway's report. We note that the right hand axis shows the percentage of *foreign* ownership of Australian equity. This is, between 25 per cent and 19 per cent.

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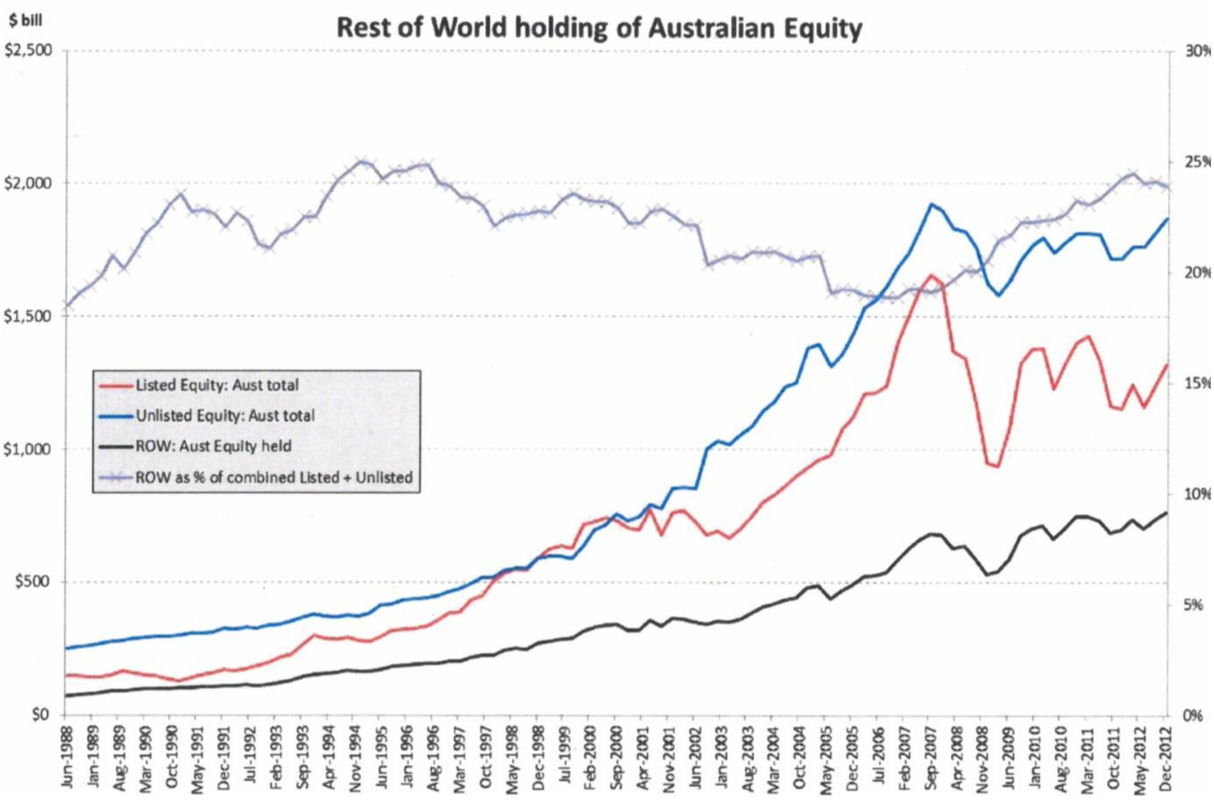
574 AER, *Explanatory statement: Rate of return guideline*, August 2013, p. 130.

575 Australian Bureau of Statistics, *Feature article: Foreign ownership of equity*, Available at: http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/5302.0Feature%20Article10Sep%202007?opendocument&tabname=Summary&prodno=5302.0&issue=Sep%202007&num=&view

576 Hathaway makes no explicit comment on the use of the 'equity ownership' approach to estimate the utilisation rate; these equity ownership percentages are presented in the context of describing the overall flow of imputation credits. See N. Hathaway, *Imputation Credit Redemption ATO data 1988-2011, Where have all the credits gone?*, September 2013, pp. 16–21.

Figure 9.2 Foreign ownership of Australian equity, calculated from ABS data by Hathaway



Source: N. Hathaway, *Imputation credit redemption: ATO data 1988-2011, Where have all the credits gone?,* September 2013, p. 19 (figure 5).

Even though they are both drawn from ABS data, Hathaway's estimates do not align with the reported ABS figures (in their 'feature article') for the period where they overlap. For example, the ABS reported the domestic ownership percentage as constant at 71 per cent from 2004 to 2007. This is when Hathaway has the equivalent figure moving around 80 per cent. Given they are the primary authors of this data, the ABS reported figures might be considered more reliable. However, the Hathaway data is more recent, and may reflect revisions (corrections) to the ABS data since 2007.

In view of this evidence, we consider that estimates of the utilisation rate based on the equity ownership approach lie in the range 0.7 to 0.8. This assessment has changed slightly since the draft guideline. In the draft guideline, we considered that the equity ownership approach indicated a point estimate of 0.7.

In his review, Lally considers that this estimation technique aligns with our conceptual framework:[577]

> In respect of estimating *U [the utilisation rate]*, the AER draws upon three principal methods. The first of these is the equity ownership approach, in which *U* is estimated as the proportion of Australian shares held by Australians (AER, 2013, section 8, pp. 120-131). Since *U* is a value-weighted average over investors, and the AER includes foreigners in this set, and foreigners can't use the credits (except through tax arbitrage, which is heavily constrained by legislation), and virtually all local investors can fully utilise them, it follows that *U* is the proportion of Australian shares held by Australians. Drawing upon data from the Australian Bureau of Statistics (2007), the estimate is 70%. With the inclusion of foreigners in the relevant set of investors, this methodology for estimating U follows directly from the AER's definition of *U*.

577 Lally, *The estimation of gamma*, November 2013, p. 16.

The Tribunal has not previously considered this approach because no party applied it during the 2009 WACC review or in subsequent decisions. We consider the equity ownership approach is a reasonable estimate for the following reasons:

- The proportion of domestic investment in Australian equity is a good proxy for the value weighted average investor's eligibility to utilise franking credits. This is because:
  - in general, domestic owners of equity (who expect to hold shares for a full CAPM period) can utilise franking credits
  - conversely, foreign owners of Australian equity cannot utilise franking credits
  - the proportion of domestic ownership of Australian equity is therefore an average of investors that expect to be eligible to redeem franking credits weighted by their market value ownership
  - where investors redeem credits, company tax is reduced by one dollar per dollar of imputation credit. This is because the redemption of credits transfers company tax from an expense to a return for investors.

However, under the Officer framework (or the alternative derivations in Lally and Van Zijl or Monkhouse), the weightings for the representative investor should account for both:

- the value weighting of each individual investor—that is, the proportion of equity in the market that they own
- the risk aversion of all investors—specifically, the expected return of each investor's portfolio divided by their expectations of variance in that portfolio.[578]

The equity ownership approach accounts for the first of these factors, but not for the risk aversion of all investors. We consider it is not practically possible to estimate this factor. This is because it would require specific calculations or assumptions relating to the portfolios and risk preferences of all individuals or classes of investors. Because risk aversion is complex to measure or observe outside of its effects on prices, these calculations are unfeasible.

In our explanatory statement to the draft guideline, we stated that the equity ownership approach might underestimate the true utilisation rate. This was because it assumed that imputation credits would be evenly distributed in proportion to the overall balance between domestic and foreign investors. There is an incentive for domestic investors who are eligible to redeem imputation credits to disproportionately hold shares that do pay imputation credits over those that do not. Foreign investors have the opposite incentive. Hence, there may be a divergence between the domestic proportion of total equity ownership and the domestic proportion of total imputation credits received.[579]

We no longer hold this view. In his critical review, Lally points out that even if this clientele effect existed, it would not alter the true underlying utilisation rate.[580] This is because the utilisation rate is defined using value weights that reflect the overall proportion of equity held by each investor. It is not defined using the proportion of imputation credits that investors received. Hence, the equity ownership

578 Risk aversion is also in the weighting derivation in Monkhouse (1993) equation 4.8. P. Monkhouse, 'The cost of equity under the Australian dividend imputation system', *Accounting and finance*, November 1993, vol. 33(2), p. 10.

579 Interestingly, the Hathaway report indicates that foreign investors actually receive more than their expected proportion of imputation credits. Using data from 2004-2011, they hold 25 per cent of total equity and receive 29 per cent of all fully franked dividends and imputation credits. N. Hathaway, *Imputation credit redemption: ATO data 1988-2011, Where have all the credits gone?*, September 2013, p. 19.

580 Lally, *The estimation of gamma*, November 2013, p. 16.

approach correctly aligns with the conceptual definition of the utilisation rate. Also, any divergence arising from a clientele effect is not a source of bias (either as an overestimate or underestimate) for this approach. In contrast, estimates from implied market value studies or tax redemption studies may be influenced by this effect, as discussed below.

We accept that there are potential disadvantages with the equity ownership approach. Nonetheless, we consider the equity ownership approach is a reasonable estimate because:

- It is well aligned with our interpretation of the conceptual framework as set out in sections 9.3.1 and 9.3.2.
- It is the only measure of the representative utilisation rates that is representative of the entire trading year.
- It is simple and intuitive.
- It is based on reliable data and calculations.
- Both tax value studies and implied market value studies are sensitive to trading around the cum-dividend and ex-dividend days. For dividend drop off studies in particular, this issue can critically affect the resulting estimate. This limitation, that affects other approaches, does not affect the equity ownership approach.

Tax statistic estimates

Tax statistic estimates are based on ATO data for the amount of tax reduced (or refunded) through the use of imputation credits. Hence, tax statistics report the actual dollar benefit to Australian taxpayers from their imputation credits. While they are not identical, this estimation technique aligns closely with our interpretation of the conceptual definition of the utilisation rate. This conceptual definition is the expected ability of equity holders to use the imputation credits they receive to reduce their personal tax.[581] According to our conceptual definition, this true utilisation rate is value weighted by the total equity ownership of each investor. However, tax statistics reflect the final set of investors who redeem the credits. It is possible that some of these investors have traded specifically to receive the credits (tax arbitrage). Hence, tax statistics estimates are weighted by imputation credits received, not by equity ownership across the entire period.

The most relevant estimates are from the period post 2000, when taxation laws were changed to allow eligible investors to claim a refund for any excess or unused imputation credits.[582] Prior to this time, when investors received franking credits above their tax assessment, they were not entitled to any benefit from the unusable credits.[583] The estimates from the period post 2000 are 0.81 (Handley and Maheswaran), 0.62 (Hathaway, using dividend data) and 0.44 (Hathaway, using dividend data and franking account balance data).[584] We round this range to 0.4 to 0.8. Rounding avoids inappropriate specificity in our consideration of this class of evidence as a whole.

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581 Further, equity holders can also use imputation credits to receive a refund, where they have imputation credits in excess of their total tax assessment.

582 We have not excluded the earlier estimates entirely; they have been interpreted with regard to their strengths and weaknesses, including that the effect of this tax change might cause them to underestimate the (current) utilisation rate. See appendix H for a more detailed discussion.

583 For clarity, this tax law change did not allow foreign investors to redeem imputation credits that would otherwise have been ineligible for redemption.

584 J. Handley and K. Maheswaran, 'A measure of the efficacy of the Australian imputation tax system', *The economic record*, March 2008, vol. 84(264), pp. 82–94; and N. Hathaway, *Imputation credit redemption ATO data 1988–2011, Where have all the credits gone?*, September 2013, p. 7.

The potential advantages of tax statistic estimates are that:

- They are consistent with our interpretation of the conceptual framework, as set out earlier in this chapter. This is because tax statistics produce an estimate of the extent that investors are eligible to use their imputation credits to reduce their personal tax.
- They are an estimate from the only event where imputation credits are 'traded' separately. That is, it is only in tax returns that we can observe anything about franking credits unattached from dividend payments. This avoids the ‘allocation problem’, which is discussed below in the section on implied market value studies.
- Effects of market movements that are not associated with the value of imputation credits do not confound measurements of imputation credit redemption. However, market value studies are sensitive to this problem. We consider that more critical data and method issues affect the implied market value approaches. We describe this below and in appendix H.
- They use a comparatively simple and replicable method. They also pose fewer econometric challenges than market value studies.

However, when having regard to this class of evidence, we give due consideration to the data quality concerns raised in some of these studies. In particular, Hathaway urges caution in using tax statistics on account of a large and unexplained discrepancy between the data series on dividends and the data series on franking account balances.[585] This notwithstanding, we continue to have some regard to tax statistics in proposing a value for the utilisation rate because:[586]

- We do not propose to rely entirely on this class of evidence.
- We have strengthened confidence in this class of evidence because it produces a range of estimates that covers the range of estimates under the equity ownership approach.
- There is an apparent consensus regarding the efficacy of using data from the franking account balance to estimate the payout ratio.
- We give appropriately higher regard to the estimate that is internally consistent. We do this considering the two estimates produced by Hathaway, whilst acknowledging the potential problems with each individual series.. This is 0.62, arrived at by using dividend data only.

We note that estimates of the utilisation rate from tax statistics are weighted by imputation credits received and not by equity ownership across the entire period. However, we cannot determine the direction of any bias this creates in such estimates relative to the true utilisation rate. In examining this question, we have considered conceptual arguments around investors' incentives to obtain (or avoid) franked dividend packages. We have also considered empirical observations of the proportion of franking credits paid out to different classes of investors. See appendix H for further discussion.

Implied market value estimates

Implied market value studies are another class of evidence that can be used to estimate the utilisation rate. In general, implied market value studies seek to infer a value for imputation credits using a price differential for a security. This differential includes a security with a imputation credit entitlement, and

585 N. Hathaway, *Imputation credit redemption ATO data 1988–2011, Where have all the credits gone?*, September 2013, p. 5.

586 See appendix H for a more detailed response to Hathaway.

the same security without the imputation credit entitlement. The most prominent type of implied market value estimates are dividend drop off studies, which compare the price of a share before and after a dividend is distributed. Econometric techniques (regressions) are then used to infer the value of the imputation credit attached to the dividend. The estimate of the utilisation rate (0.35) from the 2011 Tribunal decision was established using a dividend drop off study.[587]

We have reviewed the available implied market value studies, with due regard to the relative strengths and weaknesses of the individual studies. For instance, studies that use data from the current tax regime (after 2000) are more relevant Studies that use more rigorous econometric techniques are also more relevant. Even after accounting for these attributes, there is considerable disparity in the results. Overall, we consider that they support an estimate of 0.0–0.5 for the utilisation rate. This broad range reflects the uncertainty around the disparate results.

However, consistent with our position in the explanatory statement accompanying the draft guideline, we consider a number of shortcomings affect implied market value studies. There are a number of conceptual reasons why the market value of imputation credits does not align with the relevant utilisation rate. Secondly, there are implementation difficulties in establishing the 'true' market value of imputation credits using these implied market value studies. We have regard to these weaknesses when we include the estimate from implied market value studies (0.0–0.5) in broadly considering different evidence on the utilisation rate.

The implied market value studies do not align with the conceptual definition of the utilisation rate because:[588]

- The utilisation rate is a complex average of investors' utilisation rates, weighted by the value of equity they provide across the relevant period—a year or longer.[589] Implied market value studies reflect only those investors holding the shares around the time the dividend is distributed . This is just two days; with cum-dividend and ex-dividend dates used in most studies. In other words, the sample of investors holding imputation credits around the ex-dividend date differs systematically from the relevant population. That is, the population of those investing in the Australian share market across the entire year.
- The defined utilisation rate in the Officer framework assumes a segmented domestic market and an absence of a tax differential between capital gains and dividends.[590] The implied market value studies reflect the presence of foreign investors and differential tax rates, both of which are conceptually incompatible with the Officer framework.[591]
- The utilisation rate is defined with regard to the representative investor's utilisation rate—that is, the ability to use each imputation credit received to reduce personal tax (or get a refund). Price behaviour around the dividend date, however, may reflect a number of incentives separate from the taxation incentive. Hence, equating the implied market value studies with the utilisation rate inappropriately assumes away these other factors.

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587 Australian Competition Tribunal, *Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9*, May 2011; SFG, *Dividend drop-off estimate of theta, Final report, Re: Application by Energex Limited (No 2) [2010] ACompT 7*, 21 March 2011.

588 We discuss these issues in greater depth in appendix H.

589 Lally, *The estimation of gamma*, November 2013, p. 14.

590 Lally, *The estimation of gamma*, November 2013, p. 20.

591 The conceptual goalposts approach directly addresses this question. It assesses whether a reasonable estimate of the return on equity will arise from the inconsistent combination of the Officer framework (which assumes full segmentation) and input parameters (which reflect partial integration). This unreasonable overall outcome might arise even if each component is justified in isolation—that is, the Officer model is the best available option, and the input parameters reflect empirical reality.

The implied market studies themselves are difficult to interpret because:[592]

- The value of franking credits is not independently observable, since they are only traded together with a cash dividend.[593] In dividend drop off studies, an estimate of the implied value of imputation credits requires econometric separation of the value of dividends from the value of franking credits. While there are econometric techniques available to do this, the nature of the imputation credit data means applying these techniques to imputation credits is particularly problematic. This is often labelled the allocation problem.

- The form of the regression equation has a material effect on the overall estimate, and there is no consensus on the appropriate equation.[594] Similarly, the implied market value estimates are sensitive to input choices, with reasonable alternative treatments to data generating materially different outcomes.[595] For dividend drop off studies in particular, there is considerable noise in the data. Further, there is no consensus on whether it is better to resolve this issue through data filtering or outlier treatment.

- Even where implied market value studies purport to use the same data period and the same econometric techniques, different estimates of the utilisation rate are produced.[596] Similarly, studies comparing the utilisation rate across time periods (and different underlying tax regimes) produce results that move in different directions.[597] This variability undermines the credibility of all implied market value studies.

Therefore, we consider that implied market value studies are of limited use in estimating the utilisation rate. This is because they do not produce an estimate for the representative investor in accordance with the conceptual definition of the utilisation rate. Further, even if implied market value estimates were conceptually appropriate, there are significant limitations with the accuracy and robustness of such studies.

To this effect, McKenzie and Partington (2010) observe that:[598]

> It is clear that a precise and unambiguous valuation of theta is unlikely to be derived from traditional ex-dividend studies. It would be unwise, therefore, to rely on one ex-dividend study to determine theta (the utilisation rate). Equally, it would be unwise to just rely on combining results across several ex-dividend studies; triangulation with other evidence is desirable.

In contrast, in reaching its decision on the utilisation rate, the Tribunal relied on a single study from this single class of evidence.[599] We consider this leads to an outcome that does not promote the long term interests of users of electricity or natural gas. This is a significant factor in our proposal to depart from the Tribunal's estimate.

592 We discuss these issues in greater depth in appendix H.
593 M. McKenzie and G. Partington, *Report to the AER, Evidence and submissions on gamma*, 25 March 2010, p. 12.
594 Lally, *The estimation of gamma*, November 2013, p. 26.
595 Lally, *The estimation of gamma*, November 2013, pp. 24–25.
596 Lally, *The estimation of gamma*, November 2013, pp. 22–23.
597 Lally, *The estimation of gamma*, November 2013, pp. 22–23.
598 M. McKenzie and G. Partington, *Report to the AER, Evidence and submissions on gamma*, 25 March 2010, p. 11.
599 Australian Competition Tribunal, *Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9,* May 2011, para 29.

Conceptual goalposts

The Officer framework we use assumes segmented capital markets.[600] That is, domestic (Australian) investors make all domestic (Australian) investments. Further, these domestic investors cannot make foreign investments, just as foreign investors cannot make investments in Australia.

If capital markets were fully segmented as per this assumption, all investors would be eligible to fully redeem their imputation credits (either as reduction in personal tax or as a tax rebate). Therefore, the utilisation rate would be 1.0 (or very close to it).[601]

In his critical review of the explanatory statement accompanying the draft guideline, Associate Professor Lally considers it paramount to estimate the utilisation rate consistently with the underlying theoretical framework:[602]

> In my view, the most important requirements in selecting a methodology for estimating *U [the utilisation rate]* are **that the estimate be consistent with the definition of U, as a value-weighted average over the utilisation rates of all investors who are relevant to the Officer CAPM**, that the parameter estimate is likely to give rise to an estimated cost of equity from the Officer model that lies within the bounds arising from either complete segmentation or complete integration of equity markets, and that the estimate is reasonably precise.

The importance of theoretical consistency leads Lally to recommend that the optimal estimate of the utilisation rate is 1.0, on these conceptual grounds:[603]

> In respect of *U [the utilisation rate]*, there are five possible approaches to estimating it. The first of these arises from the definition of the parameter as a weighted average across all investors; coupled with ignoring foreigners (consistent with the Officer CAPM), this yields an estimate of 1 (the utilisation rate of local investors).
>
> …
>
> Using the three criteria described above, my preferred estimate is 1 from the first approach…

The empirical reality does not accord with the segmentation assumption. Domestic (Australian) investors are able to invest overseas, and foreigners make significant investments in Australia. As set out above when discussing the equity ownership approach, around 20–30 per cent of Australian equity (listed and unlisted) is supplied by overseas investors. However, data does not support the opposing assumption—that capital markets are fully integrated.[604] Rather, the reality lies between these two theoretical ideals.

We are not aware of any pricing models that assume partial integration. There are pricing models that assume fully integrated capital markets (such as the international CAPM), but they were not proposed by any party during the guideline development process (including ourselves). Instead, we attempt to recognise the messy empirical reality of 'partial integration' by adopting the Officer framework, while acknowledging that it is predicated on a segmented domestic market. We then adopt a market definition which does reflect the empirical reality. That is, we define the market as an Australian domestic market that recognises the presence of foreign investors to the extent they invest in the Australian market. In practice, where we select proxies for input parameters to the Officer framework,

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600 Note that the standard Sharpe–Lintner CAPM also assumes segmented capital markets - in effect, the Officer framework is the standard Sharpe-Lintner CAPM adjusted to incorporate imputation credits.

601 The ENA considers that the utilisation rate would be at most just less than 1 because there is a time delay before investors receive benefit from their imputation credits. ENA, *Response to the draft guideline*, October 2013, p. 102.

602 Lally, *The estimation of gamma*, November 2013, pp. 3–4, emphasis added by the AER.

603 Lally, *The estimation of gamma*, November 2013, pp. 3–4.

604 For example, domestic investors hold too much domestic equity (and therefore too little foreign equity) relative to that predicted by an international CAPM. This issue is often called the 'home bias' problem and is the subject of much academic research and debate.

these proxies reflect that market definition. Such a proxy could include using an index on the Australian Stock Exchange (ASX) to calculate the return on the market.

In response to the draft guideline, the ENA made a number of points. These related to the market definition, capital market segmentation/integration, the Officer framework derivation, and the appropriate basis for the estimation of the utilisation rate. The ENA considers that:

- Every CAPM, by definition, requires a 'closed system' where investors and investment opportunities inside the system are entirely isolated (segmented) from any external investors/investment opportunities outside the system.[605]
- The AER market definition does not provide this closed system, since it includes some foreign investors in a domestic market.[606]
- Under the AER market definition, the requirements for the CAPM are not met, so there is no market clearing price, no equilibrium, no representative investor, and the CAPM cannot be used to estimate the return on equity.[607]
- Notwithstanding each of the above points, if the AER populates the Officer framework with a 'market price' estimate for all input parameters (including the utilisation rate); it will produce a reliable estimate of the return on equity.[608]

The core of the ENA criticism is that we has been inconsistent between choosing the model and when populating the inputs to the model. There are two primary ways to resolve the inconsistency. First, it would be consistent to adopt an entirely segmented domestic model. This would use the (domestic) Officer framework with domestic inputs, including a utilisation rate of 1.0 (or close to it).[609] The ENA has not proposed this. Second, it would be consistent to adopt an entirely integrated global model. This would use an international CAPM with international inputs, including a utilisation rate of 0.0 (or close to it). The ENA has not proposed this approach either. It is not apparent how the ENA's proposal to use 'market prices' that reflect foreign investors in the Officer (domestic only) CAPM resolves the internal inconsistency they criticise.

However, these two extreme positions—a fully segmented and a fully integrated approach—provide a means to assess whether our approach is reasonable. Associate Professor Lally presented this approach in his critical review. This has been labelled by us as the 'conceptual goalposts' approach. To begin, Lally notes the inconsistency we are grappling with (and which the ENA has identified):[610]

> The AER (2013, section 8.3.1, page 120) also includes foreign investors to the extent that they invest in the Australian market, to reflect the empirical reality of their existence. However this involves use of a model (the Officer CAPM) that assumes that national markets for risky assets are segmented along with the definition for a parameter (U) *[the utilisation rate]* that is inconsistent with this model.

Lally considers the overarching concern is whether the inconsistency between input parameters and model definitions might produce an unreasonable outcome, That is, even if the individual components

605 ENA, *Response to the draft guideline*, October 2013, pp. 104–106.

606 That is, the market is defined as an Australian domestic market that recognises the presence of foreign investors to the extent they invest in the Australian market. ENA, *Response to the draft guideline*, October 2013, p. 102.

607 ENA, *Response to the draft guideline*, October 2013, p. 106.

608 ENA, *Response to the draft guideline*, October 2013, p. 104, 107.

609 The domestic MRP would have to recognise only domestic investors, without foreign investors investing in Australia, but also without the domestic investors being able to invest overseas.

610 Lally, *The estimation of gamma*, November 2013, p. 14.

are each justified in isolation, the combination might produce an overall result that is no longer reasonable:[611]

> The Officer (1994) CAPM implicitly assumes that national markets for risky assets are completely segmented, in the sense that investors are precluded from purchasing foreign risky assets. However, most estimates of *[the utilisation rate] U* reflect the presence of foreign investors. Consequently the potential for economically unreasonable estimates of the cost of equity arises, i.e., values that lie outside range of those arising under complete segmentation and complete integration of national markets for risky assets. In this event the partial recognition of foreign investors would effectively constitute cherry-picking that maximises the revenue or price cap, i.e., ignoring foreign investors when it is favourable to regulated firms (choosing the CAPM) and also estimating *U* by a methodology that reflects the presence of these investors when it is also favourable to regulated firms. We therefore assess whether various estimates of *U* lead to this outcome.
>
> To do so it is necessary to consider the implications for the cost of equity of complete integration and complete segmentation of national markets for risky assets.

Lally points out that, while there is some uncertainty about the return on equity in a partial integration scenario, it must lie within two boundaries. At one end, there is the return on equity that would be required if the domestic market was entirely segmented. At the other extreme is the return on equity if the capital market was completely integrated (that is, global). These are the goalposts that the true return on equity must lie between. To assess whether our approach passes this test, Lally estimates for the average Australian firm:[612]

- The return on equity under segmentation, using a domestic-only (segmented) CAPM populated with domestic parameters. That is, a market risk premium for a segmented Australian market, an equity beta relative to the Australian market, and a utilisation rate of 1.0.
- The return on equity under integration, using an international CAPM (based on Solnik, 1974) populated with global parameters. That is, using a market risk premium for an integrated (global) market, an equity beta relative to the global market and a utilisation rate of 0.0.
- The return on equity under the AER's approach, using a segmented (Officer) CAPM, populated with parameters that accord with the AER's partially integrated market definition. That is, a market risk premium and an equity beta that reflect the domestic market, but recognising foreign investors to the extent that they invest there.

Lally estimates the input parameters in a manner that is consistent with the available data (and regulatory practice where relevant). He also implements a sensitivity analysis with different plausible permutations of these parameters.

The aim is to ascertain what utilisation rates under the third scenario will result in a return on equity that lies between the return on equity from the first two scenarios (full segmentation and full integration). This is how Lally presents the results of this assessment:[613]

> In summary, in the face of an inconsistency between the use of the Officer model (which assumes that national equity markets are segmented) and an estimate of the utilisation rate on imputation credits that is less than 1 (which reflects the presence of foreign investors), a minimum requirement is that the results from this approach should lie within the bounds arising from complete segmentation of national equity markets and complete integration (to ensure that the cost of capital results are consistent with some scenario regarding segmentation or integration). However, estimates of *[the utilisation rate] U* that are significantly less than 1 fail this test in virtually every case examined, and are therefore deficient. In effect, combining Officer's CAPM with a utilisation rate that is significantly less than 1 constitutes a defacto form of

611 Lally, *The estimation of gamma*, November 2013, p. 38.
612 Lally, *The estimation of gamma*, November 2013, pp. 38–47.
613 Lally, *The estimation of gamma*, November 2013, pp. 46–47.

> cherry-picking of parameter values and models that maximises the price or revenue cap for regulated businesses. By contrast, if the Officer model were combined with a utilisation rate on imputation credits of 1, or close to it, the test described here would be satisfied in most cases. All of this suggests that, if the Officer model is used, the only sensible estimate of the utilisation rate is at or close to 1.

Associate Professor Lally recommends, based on this approach, the utilisation rate should be set at 1 or close to it. To refine this estimate, we have undertaken further analysis using the approach set out by Lally. This indicates that utilisation rates between 0.8 and 1.0 will generate a reasonable return on equity (that is, one that lies between the goalposts) in the majority of permutation scenarios.[614] Further, when interpreting this sensitivity analysis, it is also relevant whether each particular scenario has arisen from an extreme permutation—that is, if the individual parameters are all at their highest (or lowest) possible values. Such a scenario is much less likely than a permutation where most of the parameters are at their expected (average values). A utilisation rate of 0.6 or below generates very few return on equity results that are reasonable (between the goalposts), and these all arise at extreme permutations.

It appears that the ENA's key concern with the AER's approach is that it does not sufficiently account for the investment opportunities overseas: [615]

> Moreover, the conceptual framework that the AER proposes to use to derive a value for theta assumes that the returns that are available on investments outside Australia have no impact whatsoever on the returns that investors require from their Australian investments.

We consider the use of these conceptual goalposts is the best available approach to respond to this concern. It considers not just the value of imputation credits, but the overall return on equity encompassing these imputation credits in the context of domestic and global returns.

Finally, the ENA's submission refers to a NERA report which describes an econometric exercise that relates tangentially to this issue.[616] They use a general-equilibrium model to postulate that, if one assumes fully integrated capital markets, the introduction of imputation credits makes relatively little difference to the observed market risk premium, even when those imputation credits are fully redeemed. As Lally notes, this relates to the use of an international CAPM—but this is not what the ENA is proposing.[617]

We consider the conceptual goalposts approach supports an estimate of the utilisation rate in the range 0.8 to 1.0. It also suggests that a utilisation rate of 0.6 or below is unreasonable.

Other supporting evidence

Aside from the empirical estimates detailed above, we have considered whether observed policy decisions and market behaviours suggest investors obtain significant, little or no value from imputation credits. This includes consideration of:

- Surveys that reveal the value ascribed to imputation credits, in several different forms:

[614] That is, utilisation rates in this range generate a return on equity between the 'full integration' and 'full segmentation' return on equity in at least 50 per cent of all permutations.
[615] ENA, *Response to the draft guideline*, October 2013, p. 103.
[616] NERA Economic Consulting, *Imputation credits and equity prices and returns: A report for the Energy Networks Association*, 11 October 2013.
[617] Lally, *The estimation of gamma*, November 2013, pp. 19–20.

    - Surveys of senior management of ASX listed companies (chief financial officers, managers, accountants)[618]

    - Surveys of key institutions (investment banks, professional services firms, infrastructure funds)[619]

    - Examination of independent expert reports lodged with the ASX (themselves prepared by a number of different consulting firms)[620]

- Other evidence on imputation credits:

    - The ongoing participation of equity imputation funds[621]

    - Government tax policy to 'close the loophole' for dividend washing[622]

Consistent with the explanatory statement accompanying the draft guideline, we interpret this class of evidence with regard to its particular characteristics. The primary strength of this material is that it relates to real-world behaviour.[623] The primary weakness is that it does not report the utilisation rate relevant to our definition. For example, the relevant utilisation rate is for all investors in the market, but the supporting evidence might include anecdotal evidence that relates to one particular category of investors. Hence, it may only be useful in a restricted qualitative sense. This type of information is not precise enough to imply a specific quantitative estimate, but may be able to inform broad observations about the apparent value.

Discussion of the available supporting evidence is included in appendix H. This discussion builds upon the material in the explanatory statement accompanying the draft guideline. On balance, we consider this evidence suggests it is reasonable to conclude that imputation credits have significant value to investors. We have not relied on this information to determine a specific value, but this information is consistent with the significant and positive estimate for gamma we have proposed.

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618 For example, Truong, Partington and Peat, 'Cost-of-capital estimation and capital-budgeting practice in Australia', *Australian Journal of Management*, June 2008, vol. 33(1), pp. 95–121.

619 For example, KPMG, *Corporate finance: Valuation practices survey*, April 2013.

620 For example, SFG, *Evidence on the required return on equity from independent expert reports: Report for the Energy Networks Association*, 24 June 2013.

621 Our non-comprehensive survey indicates that fund managers such as ANZ, BT Wholesale Investment Funds, Colonial First State all offer wholesale imputation investment funds. See AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 136.

622 Parliamentary library, ***Measures to minimise exploitation of franking credits by 'dividend washing'***, May 2013, Available at: http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/BudgetReview201314/FrankingCredits. See AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 136.

623 This statement does not imply that the market value of imputation credits defines the utilisation rate, for the reasons set out previously. We also consider whether the empirically observed 'real-world' parameters are consistent with our overall framework such that the overall return on equity is reasonable—the conceptual goalposts approach attempts exactly this task.

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Better Regulation

Explanatory Statement

Rate of Return Guideline

(Appendices)

December 2013

AUSTRALIAN
ENERGY
REGULATOR

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Shortened forms

Shortened term	Full title
ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
capex	Capital expenditure
common framework	Refers to the largely consistent rules framework on the rate of return that applies to gas service providers (NGR), electricity distribution network service providers (NER chapter 6) and electricity transmission service providers (NER chapter 6A).
COSBOA	Council of Small Business Australia
CRG	Consumer Reference Group
determination	In this document generally, in the context of the rate of return, the term 'determination' refers both to regulatory determinations under the NER and access arrangement determinations under the NGR.
DRP	Debt Risk Premium
ENA	Energy Networks Association
ERA	Economic Regulation Authority
EUAA	Energy Users Association of Australia
EURCC	Energy Users Rule Change Committee
FIG	The Financial Investor Group
MRP	Market risk premium
MEU	Major Energy Users Inc
NEL	National Electricity Law
NEM	National Electricity Market
NEO	National Electricity Objective
NER	National Electricity Rules
new rules	The National Electricity Rules and National Gas Rules that were published by the AEMC on 29 November 2012
NGL	National Gas Law
NGO	National Gas Objective
NSW T Corp	New South Wales Treasury Corporation
opex	Operating expenditure
PIAC	The Public Interest Advocacy Centre
The QTC	The Queensland Treasury Corporation

RAB	Regulatory Asset Base
RARE	RARE Infrastructure Limited
RDB	Regulatory Development Branch
regulatory control period	In this document generally, in the context of the rate of return, the term 'regulatory control period' refers both to regulatory control period under the NER and access arrangement period under the NGR.
service providers	Electricity transmission network service provider, electricity distribution network service providers and gas service providers
SFG	Strategic Finance Group Consulting
subsequent regulatory control period for service providers	Expected to be 1 July 2015 to 30 June 2019.
transitional regulatory control period for service providers	1 July 2014—30 June 2015
transitional rules	Transitional rules contained in the National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012 No. 9 (Network Regulation rule change) which the AEMC determined in November 2012. These transitional rules set out the transitional arrangements for the next ACT/NSW electricity distribution determinations.
the guideline	Rate of return guideline
WACC	Weighted average cost of capital
2009 WACC review	AER 2009 review of the weighted average cost of capital (WACC) parameters (published in May 2009).

Contents

A Return on equity: assessment of models

Our proposed approach for estimating the expected return on equity has regard to relevant estimation methods, financial models, market data and other evidence. In this appendix we discuss the merits of the relevant return on equity models (outlined in chapter 5) against our assessment criteria set out in chapter 2. We also discuss the proposed role of these models in our foundation model approach.[1]

Our assessment criteria were developed to facilitate the transparent, consistent and replicable comparison of relevant material. For the reasons outlined in chapter 2, we consider that using models that meet these criteria will likely result in estimates of the rate of return that achieve the allowed rate of return objective.

Moreover, our assessments draw on a range of consultant reports commissioned by us and stakeholders, and submissions received during the development of this guideline. We note that there are differing views among experts on the usefulness of alternative return on equity models. However, our analysis has drawn upon the expert advice that is before us.

A summary of our assessment of relevant return on equity models against our criteria is provided in table A.1.

[1] This appendix, however, does not contain our proposed implementation of these models. Instead, these can be found in appendices C and D (Sharpe–Lintner CAPM parameters, including the use of the Black CAPM), and appendix E (dividend growth models) of this final explanatory statement. Similarly, for a detailed description of the construction of these models, interested stakeholders should refer to appendix E of our consultation paper.

Table A.1 Summary of our assessment of the relevant models against our criteria

Criteria	Sharpe–Lintner CAPM	Black CAPM	Dividend growth model	Fama–French model
Where applicable, reflective of economic and finance principles and market information: – estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data.	The Sharpe–Lintner CAPM reflects economic and finance principles. Empirical shortcomings of the model may be addressed by alternative implementations of the model.	The Black CAPM reflects economic and finance principles. However, there are difficulties aligning the theoretical model with the available empirical analysis.	DGMs reflect economic and finance principles. DGMs do not identify (or provide a theory on) the risk factors that explain equity returns. However, they are based on the finance principle that markets are efficient and the present value of a share reflects the discounted value of its expected future dividends.	There is no clear theoretical foundation to identify the risk factors, if any, that the Fama–French three factor model captures.
Fit for purpose: – the use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose; – promote simple over complex approaches where appropriate.	Careful application of the Sharpe–Lintner CAPM tends to give estimates of the expected return on equity that are sensible and reasonably stable over time. The model is relatively simple to implement.	Estimation of the Black CAPM is technical and involves complex econometric techniques.	Most DGMs are relatively simple. However, the model proposed by SFG is unusually complex for a DGM.	Implementing the Fama–French three factor model is complex. Each additional parameter increases the scope for estimation error such that, even if there were strong theoretical support for the additional parameters, the overall result might be less accurate than a simpler model.
Implemented in accordance with good practice: – supported by robust, transparent and replicable analysis that is derived from available, credible datasets.	Input parameter values can be estimated with tolerable accuracy, and the Sharpe–Lintner CAPM is widely used for estimating the expected return on equity for regulated companies. This includes by academics, market practitioners and other regulators.	Estimation of the Black CAPM, in particular the return on the zero beta portfolio, is difficult to do in a robust, transparent or replicable manner because of the complexity of the model.	The simplicity of most DGMs enable them to be estimated in a robust, transparent and replicable manner.	The use of the Fama–French three factor model for estimating expected returns on equity appears limited (for example, it is not used by other regulators). The instability in factor exposures, as well difficulties understanding why factor exposures bounce around when business risks appear

				stable, also provide reasons to be cautious about using the model.
Where models of the return on equity and debt are used these are: – based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation – based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale.	The econometric derivation of input parameters leads to concerns about the potential for data mining. The estimation of input parameters for the Sharpe–Lintner CAPM, however, is less complex than the estimation of input parameters for the Black CAPM and the Fama–French three factor model.	The econometric derivation of input parameters leads to concerns about the potential for data mining.	DGM estimates are highly sensitive to changes in the interest rates. This can be either a positive or negative figure of the models, depending on one's view of the relationship between the risk free rate and market risk premium.	The econometric derivation of input parameters leads to concerns about the potential for data mining.
Where market data and other information is used, this information is: – credible and verifiable – comparable and timely – clearly sourced.	Not applicable.	Not applicable.	The dividend growth estimate is difficult to estimate, and has a material impact on the results. Other input parameters can be well sourced and verifiable.	Not applicable.
Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.	Responsive to changing market conditions through adjustment of input parameters (in particular, the risk free rate and the MRP)	Responsive to changing market conditions through adjustment of input parameters. However, this is more problematic than the Sharpe–Lintner CAPM because of the difficulty in empirically estimating changes in the zero beta return.	The model can readily incorporate changes in the market data, such as share prices and interest rates.	Responsive to changing market conditions through adjustment of input parameters. However, this is more problematic than the Sharpe–Lintner CAPM because of the difficulty in empirically estimating additional input parameters.

Source: AER analysis.

A.1 Sharpe–Lintner CAPM

This section contains our assessment of the Sharpe–Lintner capital asset pricing model (CAPM) against our criteria, and its proposed role in our foundation model approach. We consider that the Sharpe–Lintner CAPM meets most of our criteria. This is consistent with the position in our draft guideline. Similarly, consistent with the position in our draft guideline, we propose to use the Sharpe–Lintner CAPM as our foundation model.

In general, submissions from stakeholders acknowledged that the Sharpe–Lintner CAPM should be used, in some capacity, to estimate the expected return on equity. Consumer groups, for example, submitted that the Sharpe–Lintner CAPM has an established theoretical and empirical base, is relatively transparent and provides some predictability in outcomes.[2] Alternatively, service providers largely focused on the empirical performance of the model, and the individual parameter estimates.[3] Service providers did not support our foundation model approach.[4]

A.1.1 Assessment of the Sharpe–Lintner CAPM against our criteria

The Sharpe–Lintner CAPM relies on the well–accepted finance principle that rational investors will seek to minimise their level of risk (as measured by the variance of portfolio returns) for a given return.[5]

The Sharpe–Lintner CAPM requires the estimation of three parameters—the risk free rate, the equity beta, and the market risk premium (MRP).[6] The estimation of these parameters is discussed in detail in chapter 6 and appendices C and D. We consider these parameters, and the model itself, can be implemented in accordance with good practice. This is because:

- Our estimation of the risk free rate uses yields on Commonwealth government securities.[7] These yields are published by the Reserve Bank of Australia, which we consider to be a reliable source. As demonstrated in chapter 6, this estimation approach is also relatively simple, robust, transparent and replicable.
- Our estimation of MRP relies on a broad range of evidence, including historical excess market returns, estimates derived from dividend growth models (DGMs), surveys of market practitioners and other regulators' estimates.[8] To varying degrees, we consider these information sources are robust and transparent. Notwithstanding this, we consider that drawing on a range of information to select a point estimate may reduce the risk of error associated with any particular information source. In this context, we consider this approach is robust, transparent and replicable.

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2 See, for example: Public Interest Advocacy Centre, *Reasonably rated: Submission to the AER's draft rate of return guideline*, 11 October 2013, p. 28; Energy Users Association of Australia, *Submission to the draft AER rate of return guideline*, 11 October 2013, p. 2.

3 See, for example: Energy Networks Association, *Response to the draft rate of return guideline of the Australian Energy Regulator*, 11 October 2013, pp. 27–37; Australian Pipeline Industry Association Ltd, *Meeting the ARORO? A submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013, pp. 25–30.

4 See, for example: APA Group, *Submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013.

5 Or alternatively, rational investors will seek to maximise expected returns for a given level of risk (variance). See, for example: Peirson, Brown, Easton, Howard and Pinder, *Business Finance*, McGraw-Hill: Ninth edition, 2006, pp. 200–207.

6 The Sharpe–Lintner can also be implemented using the expected return on the market portfolio over the risk free rate (as opposed to the MRP).

7 See for example, AER, *Final decision: Access arrangement final decision: APA GasNet Australia (Operations) Pty Ltd 2013-17, Part 2: Attachments*, March 2013 (AER, *Final decision: APA GasNet 2013–17, Part 2: Attachments*, March 2013).

8 See for example, AER, *Final decision: APA GasNet 2013–17, Part 2: Attachments*, March 2013.

- Our estimation of the equity beta is based on regression analysis of publically available stock market returns, as well as other evidence. The regression analysis incorporates sensitivity analysis to test the robustness of our estimates. Similar to our approach for the MRP, drawing on a range of information may also reduce the risk of error associated with any particular information source. Further, each step of our approach is documented to promote transparency and to allow these results to be replicated.

The ability to implement the Sharpe–Lintner CAPM in accordance with good practice is supported by Professor Myers. Specifically, in a report submitted by the APIA, Professor Myers stated that the careful application of the model tends to give estimates of the return on equity that are sensible and reasonably stable over time.[9] Moreover, Professor Myers stated that the input parameter values can be estimated with tolerable accuracy.[10]

The Sharpe–Lintner CAPM, particularly relative to alternative asset pricing models, has been the subject of much empirical analysis.[11] The importance of the empirical performance of any model is reflected in our assessment criteria, and is supported by submissions from the MEU and PIAC.[12] In the case of the Sharpe–Lintner CAPM, the empirical shortcomings of the model are often cited as key drivers for the consideration of alternative specifications of the CAPM.[13] These shortcomings have been highlighted in submissions from the ENA and the APIA.[14] Most notably, they submitted evidence that the model may systematically under or overestimate expected returns for low and high beta stocks respectively (that is, low or high beta bias).[15]

Many of the empirical tests of the Sharpe–Lintner CAPM, however, are themselves the subject of ongoing academic debate. For example, a common test used to demonstrate low beta bias is to plot the average beta of share portfolios against the realised returns on these portfolios. Indeed, similar evidence was included in the report by NERA, and submitted by ENA.[16] In previous decisions we have highlighted the limitations of these tests, as suggested in the academic literature.[17] These limitations include:

- They use a market proxy that does not accord with the Sharpe–Lintner CAPM market.[18]

- They consider realised returns, whereas the Sharpe–Lintner CAPM requires expected returns.[19]

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9 S. Myers, *Estimating the cost of equity: Introduction and overview*, 17 February 2013, p. 3.

10 Myers, *Estimating the cost of equity for APIA*, February 2013, pp. 2–3.

11 For example, see: Australian Pipeline Industry Association Ltd, *Submission to the Australian Energy Regulator's rate of return guidelines May consultation paper*, June 2013, pp. 44–45.

12 For example, the MEU stated that theories must be proven to replicate real world outcomes before they should be given credence. Similarly, PIAC submitted that the reasonableness of the outputs of the models with respect to the allowed rate of return objective should first be tested against real world market data. MEU, *Response to the AER's rate of return guidelines issues paper,* February 2013, p. 23; PIAC, *Submission to the AER's rate of return guidelines issues paper*, February 2013, p. 24.

13 For example, see: M. McKenzie, and G. Partington, *Report to the AER: Risk, asset pricing models and the WACC*, 27 June 2013, p. 24; and APIA, *Submission on the consultation paper*, June 2013, pp. 45–57.

14 ENA, *Response to the draft guideline*, October 2013, pp. 21–23, 27–44; APIA, *Submission to the draft guideline*, October 2013, pp. 25–30.

15 Myers, *Estimating the cost of equity for APIA*, February 2013, p. 3; and The Brattle Group*, Estimating the cost of equity for regulated companies: Prepared for the Australian Pipeline Industry Association*, February 2013, p. 18.

16 NERA, *Review of cost of equity models: A report for the Energy Networks Association,* June 2013.

17 AER, *Final decision: Envestra Ltd access arrangement proposal for the SA gas network 2011–2016*, June 2011, pp. 167–168.

18 See, for example: Roll, R., *'A critique of the asset pricing theory's tests; Part I: On past and potential testability of the theory'*, Journal of Financial Economics, 1977, vol. 4, pp. 129–176; and Levy, M. and R. Roll, *'The market portfolio may be mean/variance efficient after all'*, Review of Financial Studies, 2010, vol. 23(6), pp. 2464–2491.

19 See, for example: Campello, M., L. Chen and L. Zhang, *'Expected returns, yield spreads and asset pricing tests'*, Review of Financial Studies, 2008, vol. 21(3), pp. 1298–1338.

- They use short–term intervals (less than one month), whereas the Sharpe–Lintner CAPM uses a long–term investment horizon.[20]
- They use inappropriate statistical tests or procedures.[21]

Notwithstanding the above, we consider that our implementation of the Sharpe–Lintner CAPM recognises the empirical criticisms of the model. For example, using the Black CAPM theory to inform our equity beta estimate may mitigate possible low beta bias.[22] This is consistent with the approach outlined in our draft guideline. Our use of the Black CAPM, and our estimation of the equity beta are discussed in detail in appendix C and chapter 6 respectively.

Similarly, we consider submissions that suggest our implementation of the Sharpe–Lintner CAPM leads to equity returns that are too variable may be addressed through the consideration of other information.[23] For example, as discussed in appendix E, we propose to have regard to DGM estimates when estimating the MRP. As discussed in appendix B, we also propose to consider an alternative implementation of the Sharpe–Lintner CAPM—that proposed by Professor Stephen Wright.[24] Both the Wright approach and the DGM (when used to provide an estimate of the MRP) assume a perfectly negative relationship between the MRP and the risk free rate. Having regard to these estimates, therefore, may lead to more stable returns. The issue of stability in equity returns is also discussed in chapter 5.

In addition to our implementation of the Sharpe–Lintner CAPM, we consider the extent of any empirical shortcomings should be considered against the use of the model in practice. As stated by McKenzie and Partington, the Sharpe–Lintner CAPM is without doubt the most widely used model for estimating the expected return on equity for regulated companies.[25] It is also the most widely used model among financial market practitioners. For example:

- The Sharpe–Lintner CAPM is used by all Australian utilities regulators—the Independent Pricing and Regulatory Tribunal in NSW, the Economic Regulatory Authority of WA, the Queensland Competition Authority, the Essential Services Commission in Victoria, and the Essential Services Commission of South Australia.[26]

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[20] While there is no agreement on the exact length of the investment horizon, there is consensus that a one month period is too short. See, for example: Cohen, R., C. Polk and T. Vuoteenaho, *'The price is (almost) right'*, Journal of Finance, 2009, vol. 64(6), pp. 2739–2782; and Levhari, D., and H. Levy, 'The capital asset pricing model and the investment horizon', Review of Economics and Statistics, 1977, vol. 59(1), pp. 92–104.

[21] See, for example: Ray, S., N. E. Savin and A. Tiwari, *'Testing the CAPM revisited'*, Journal of Empirical Finance, 2009, vol. 16(5), pp. 721–733; Lewellen, J., S. Nagel and J. Shanken, *'A sceptical appraisal of asset pricing tests'*, Journal of Financial Economics, 2010, vol. 96(2), pp. 175–194; and Grauer, R., and J. Janmaat, *'Cross-Sectional tests of the CAPM and Fama–French three–factor model'*, Journal of Banking and Finance, 2010, vol. 34, pp. 457–470.

[22] For clarity, the critique of empirical tests of low beta bias in the Sharpe–Lintner CAPM focus on limitations in measuring the market portfolio. However, our implementation of the model addresses this perceived limitation through consideration of the equity beta. We consider this represents a pragmatic approach. AER, *Final decision: Envestra Ltd Access arrangement proposal for the Qld gas network 1 July 2011 – 30 June 2016*, June 2011, p. 158.

[23] For example, see: ENA, *Response to the draft guideline*, October 2013, pp. 41–44; Spark Infrastructure, *Response to the AER's draft rate of return guideline*, 11 October 2013, p. 5; APIA, *Submission on the consultation paper*, June 2013, p. 29.

[24] Under the Wright approach, the return on the market portfolio and the risk free rate are estimated separately. Wright, *Response to Professor Lally's analysis*, November 2012.

[25] McKenzie, and Partington, *Risk, asset pricing and WACC*, 27 June 2013. p. 22.

[26] See, for example: ERA, *Determination on the 2013 WACC for the freight and urban railway networks*, July 2013; ESC, *Price review 2013: Greater metropolitan water businesses - Final decision*, June 2013; IPART, *Hunter Water Corporation: Final report*, June 2013; ESCOSA, *SA Water's water and sewerage revenues 2013/14-2015/16: Final determination - Statement of reasons*, May 2013; QCA, *Final report: Seqwater irrigation price review 2013-17, vol. 1*, April 2013.

- PriceWaterhouseCoopers, in providing advice for the Office of Gas and Electricity Markets, stated that the Sharpe–Lintner CAPM is 'the most appropriate framework for calculating the cost of equity'.[27]

- The Water Services Regulation Authority in the UK stated that 'although the CAPM has its limitations, it is the most robust way for a regulator to measure the returns required by shareholders'.[28]

- The Civil Aviation Authority in the UK stated that the Sharpe–Lintner CAPM is 'an industry standard, specifically in the context of estimating appropriate return benchmarks for regulated industries'.[29]

- SFG, in a report examining the approaches for estimating the expected return on equity adopted in independent expert reports, found that all the reports in its sample used the Sharpe–Lintner CAPM.[30]

- Ernst & Young stated that independent experts widely use the Sharpe–Lintner CAPM to estimate the return on equity.[31]

Given the above, we consider the concerns from service providers regarding the empirical performance of the Sharpe–Lintner CAPM may be overstated. That is, the use of the model in practice suggests that any limitations of the model can be overcome.

A.1.2 Role of Sharpe–Lintner CAPM

As outlined above, our assessment of the Sharpe–Lintner CAPM is that it meets most of the criteria set out in chapter 2. For the following reasons, we consider that the Sharpe–Lintner CAPM may add the most value to our approach as the foundation model:

- It is widely used for estimating the expected return on equity for regulated companies. This includes use by academics, market practitioners and other regulators.

- The Sharpe–Lintner CAPM—estimated as the sum of the risk free rate, and the product of the equity beta and MRP—is relatively simple to implement. This includes that input parameter estimates are supported by robust, transparent and replicable analysis.

- Other relevant material can be used to inform the Sharpe–Lintner CAPM parameter estimates. This may mitigate any limitations of the model. The model, therefore, facilitates the inclusion of a broad range of material, but may still provide some certainty to stakeholders as to the final return on equity value.

- The Sharpe–Lintner CAPM can be used to provide both a range of estimates, and a point estimate from within this range. This functionality may provide further predictability to stakeholders regarding the final return on equity value.

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27 PriceWaterhouseCoopers, *Advice on the cost of capital analysis for DPCR5, Final report*, December 2009, p. 2.

28 Water Services Regulation Authority, *Notice of reference: determination of adjustment factor for the period 2010–2015*, August 2010.

29 Civil Aviation Authority, *Economic regulation and the cost of capital*, November 2001.

30 SFG, *Evidence on the required return on equity from independent expert reports: Report for the Energy Networks Association,* 24 June 2013, p. 1.

31 Ernst & Young, *Market evidence on the cost of equity: Victorian gas access arrangement review 2013–2017*, 8 November 2012.

Our proposed use of the Sharpe–Lintner CAPM is consistent with our draft guideline. In particular, we consider the Sharpe–Lintner CAPM is superior to other potential foundation models that we have considered.[32] This approach was supported by submissions from consumer groups. For example, PIAC stated the following:[33]

> [W]e agree with the use of the Sharpe–Lintner CAPM as the foundation model. The Sharpe–Lintner CAPM has limitations, however, these limitations are well known and therefore allowances can be made for these in a systematic and transparent way. The model has a solid theoretical base and best fits the criteria set out by the AER. It is well established as the principal model used by regulators in many jurisdictions to assess the cost of equity.

In contrast, the ENA and APIA were critical of the use of the Sharpe–Lintner CAPM as the foundation model. Notably, the ENA submitted that our preference for the model was for empirical reasons only.[34] Our assessment criteria, however, have regard to a range of factors. For the reasons outlined in chapter 2, we consider this is appropriate. Our reasons above also reflect considerations beyond the empirical performance of the Sharpe–Lintner CAPM. We consider, therefore, that the ENA's submission represented a narrow view of our assessment of the merits of the Sharpe–Lintner CAPM (and other models).

A.2 Dividend growth models

This section contains our assessment of the DGM against our criteria, and its proposed role in our foundation model approach. We consider that the model meets some of the criteria. Consistent with the position in our draft guideline, we propose to use DGM estimates to inform our estimation of the MRP.

A.2.1 Assessment of dividend growth models against our criteria

DGM estimates can be determined using single or multiple stage models. Single stage DGMs may estimate the return on equity as the sum of the expected dividend in the next period over the current price, and a constant expected growth rate of dividends.[35] In contrast, multiple stage models relax the assumption of a constant expected growth rate of dividends. Instead, multiple stage models adopt a number of assumptions regarding the stream of future dividends. A three–stage DGM, for example, requires assumptions regarding the expected growth rate of dividends in three periods. The first period typically incorporates analyst forecasts, while the final period typically assumes constant real growth in perpetuity. The middle period, therefore, transitions the expected growth rate from the level forecast by analysts to the constant growth rate assumed in the final period.[36]

Given both single and multiple stage DGMs may not require econometric analysis, we consider the implementation of either approach is relatively simple. Moreover, the underlying financial theory of the

32 We note that the ENA's submission on our consultation paper repeatedly referred to comments made by Professor Partington (at our return on equity workshop), that the performance of the Sharpe–Lintner CAPM was egregiously bad. The ENA's use of this quote was misleading and selective. In particular, the ENA omitted to state that Partington went on to say that the performance of alternative models were even worse. The point of Partington's statement was that all models are a simplification of reality and as such are incomplete. Because models by their nature are incomplete, their performance in forecasting outcomes will be less than perfect. However, among the models before us, Partington considered that the Sharpe–Lintner CAPM was superior.

33 PIAC, *Submission to the draft guideline*, October 2013, p. 29.

34 ENA, *Response to the draft guideline*, October 2013, p. 21.

35 McKenzie, and Partington, *Risk, asset pricing and WACC*, June 2013, pp. 35–36.

36 For further discussion of DGM models, see: AER, *Final decision, Access arrangement final decision: SPI Networks (Gas) Pty Ltd, 2013-17, Part 2*, March 2013, pp. 101–103.

model—that the price of an asset should be equal to the present value of the expected future cash flows from that asset—is well accepted and sound.[37]

The determination of robust and transparent DGM estimates, however, is predicated on the reliability and breadth of the available input data. As outlined previously, the estimation of DGMs requires assumptions about dividend yields, as well as the expected growth rate of dividends. For estimates of dividend yields in the Australian market, a sufficiently robust data series exists.[38] Additionally, methods for estimating the growth rate of dividends in the Australian market have been developed.[39] This is why we place emphasis on DGMs for estimating the MRP. Our approach to the MRP, and particular construction of the DGM that we adopt, are explained in appendices D and E, respectively.

In contrast, we do not consider that the same level of data exists to form robust dividend yield estimates for Australian energy service providers. For example, there are only five sample Australian service providers for which dividend yield data is available.[40] Further, the time series for when these estimates are available are both variable and short.[41] It is also unclear whether a robust method for estimating the growth rate of dividends for service providers has been developed. Of further concern is that DGMs are sensitive to the particular assumptions used. This is particularly relevant for the long term growth rate assumption.[42] This is why we do not adopt DGM estimates for estimating the return on equity directly for the benchmark efficient entity. This is explained further in appendix E.

These implementation issues can be demonstrated using a simplistic version of the DGM—the constant growth model. A worked example of this simple model is available in appendix E. In brief, the example shows that these data limitations can produce estimates of the expected return on equity for regulated service providers that are higher than expected returns to the market. We consider such outcomes are implausible given the lower risk profile of service providers.

Dividends and prices, that are needed to estimate the return on equity from the DGM, are readily observable in the market.[43] As such, we consider that the model is flexible to reflect changing market conditions. On the other hand, as noted by the Brattle Group, because stock prices (and to a degree forecasted growth rates) change frequently, the model's results often vary substantially over time.[44] This may mean that the model is sensitive to frictions in the market, which could lead to imprecise results.

A.2.2 Role of dividend growth models

As outlined above, our assessment of DGMs is that they meet some of the criteria set out in chapter 2.

The sensitivity of DGMs to input assumptions limits the ability to use DGMs as the foundation model. For example, estimates of simple DGMs (such as those previously proposed by CEG) currently provide estimates of the return on equity for the benchmark efficient entity that are implausible. That

37 Brealey, Myers, and Allen, *Principles of Corporate Finance: Tenth edition*, 2011, p. 82.
38 For example, dividend yields for the ASX200 are readily available.
39 For example, see: M. Lally, *The dividend growth model*, 4 March 2013; CEG, *Response to AER Vic gas draft decisions internal consistency of MRP and risk free rate*, November 2012; and CEG, *Update to March 2012 report: On consistency of the risk free rate and MRP in the CAPM*, November 2012. Appendix H outlines the dividend growth model we have used for this draft decision.
40 The relevant businesses are the APA Group, DUET, Envestra, Spark Infrastructure and SP AusNet.
41 For example, dividend yield estimates for Envestra are available from 2001, and from 2006 for Spark Infrastructure.
42 The Brattle Group, *Estimating the cost of equity*, February 2013, p. 30.
43 As discussed , however, there are questions on the robustness of some dividend yield estimates.
44 The Brattle Group expressed similar concerns about the long term growth rate assumption. Brattle Group, *Estimating the cost of equity*, February 2013, p. 31.

is, they provide estimates of the return on equity for the benchmark efficient entity that exceed the return on the market determined by the same model.

These implementation issues, however, are less prevalent when using DGMs to determine an estimate for the return on the market. DGM estimates, therefore, may be used (in addition to other evidence) to inform the MRP. Alternatively, they could be used as directional information for the return on equity. For the following reasons, we consider that DGMs may add the most value to our approach by informing the range and point estimate of the MRP:

- It allows these estimates to directly impact the range and point estimate of the foundation model. Although our approach also considers additional information to select a final return on equity value, the foundation model estimate may be more robust.
- It recognises that DGM estimates may have more informative value than just providing an indication of the directional change in return on equity. For example, DGMs provide actual values for the return on the market. In contrast, information such as debt spreads do not indicate what value the return on equity should be, but instead, only provide relative information.

The estimation of the MRP is discussed in greater detail in appendix D.

A.3 Black CAPM

This section contains our assessment of the Black CAPM against our criteria, and its proposed role in our foundation model approach. We consider that the model meets some of the criteria. Consistent with the position in our draft guideline, we propose to use the Black CAPM to inform our estimation of the equity beta.

A.3.1 Assessment of the Black CAPM against our criteria

The Black CAPM requires the estimation of three parameters—the return on the market portfolio, the return on the zero beta portfolio, and the equity beta.[45] The estimation of the return on the market and zero beta portfolios, however, is complex. Moreover, estimates of the return on equity from the Black CAPM are highly sensitive to these inputs. For example:

- Expected returns on zero beta portfolios are not observable, and no generally accepted empirical measurement of the zero beta portfolio exists.[46] As stated by, McKenzie and Partington 'there is no generally accepted empirical measurement of the zero beta return… because the empirical measurement of the zero beta return is neither simple, nor transparent'.[47] Accordingly, the estimation of returns on a zero beta portfolio typically requires econometric analysis. Such analysis is neither simple nor transparent, and may lead to difficulties in determining robust updates to these estimates at the time of each determination. This also leads to concerns about data mining.
- Estimation of the Black CAPM also requires an exact identification of the market portfolio. As stated by McKenzie and Partington, the estimation of the zero beta return is sensitive to the choice of proxy for the market portfolio and so even a portfolio close to the market may not be

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[45] M. McKenzie and G. Partington, *Report to the AER: Review of NERA report on the Black CAPM*, 24 August 2012, p. 25.
[46] McKenzie and Partington, *Review of NERA report on Black CAPM*, August 2012, p. 8.
[47] McKenzie and Partington, *Review of NERA report on Black CAPM*, August 2012, p. 8.

sufficient.[48] Instead, the use of a portfolio which is not the market portfolio may lead to parameter estimates that are outside the bounds prescribed by the underlying theoretical model.[49]

- NERA, for example, recently submitted an estimate of the return on equity derived from the Black CAPM for which they acknowledged the reference portfolio was not mean–variance efficient.[50] NERA's corresponding return on equity estimate was implausible, insomuch as it implied a negative market risk premium. [51]

We consider NERA's report demonstrates that the estimation of parameters for the Black CAPM is not sufficiently robust such that the model could be implemented in accordance with good practice.[52] Further, the sensitivity of the model to estimates of both the zero beta and market returns (especially given the difficulties in robustly estimating these parameters) represents a fundamental limitation of the model.[53]

Given the abovementioned limitations, it is informative to also consider the use of the model by regulators and academics. To our knowledge, the Black CAPM is not used by other regulators (either domestically or internationally), academics or market practitioners to estimate the return on equity.[54]

A feature of the Black CAPM is that, relative to the Sharpe–Lintner CAPM, the slope of estimated returns is flatter. As a result, the Black CAPM will estimate higher returns than the Sharpe–Lintner CAPM for assets with a beta less than one. Alternatively, for assets with a beta greater than one, the Black CAPM will estimate lower returns than the Sharpe–Lintner CAPM.[55] The empirical support for the Black CAPM, however, is inconclusive. There is evidence both for and against the empirical outperformance of the model over the Sharpe–Lintner CAPM. Further, there is also evidence that indicates both models are relatively poor predictors of returns.[56] Additionally, the difficulties inherent in testing the Sharpe–Lintner CAPM (for example, the misspecification of the market portfolio, as outlined in section A.1.1) also apply to tests of the Black CAPM.

On the other hand, the Black CAPM relies on the well–accepted economic and finance principle that rational investors will minimise the variance of portfolio returns for a given return, or alternatively maximise expected returns given variance. The Black CAPM also relies on similar fundamental assumptions to the Sharpe–Lintner CAPM, with one major difference. The Sharpe–Lintner CAPM assumes there is unlimited risk free borrowing and lending, a simplification that does not hold in practice. The Black CAPM relaxes this assumption and acknowledges that investors may not be able undertake unlimited borrowing or lending at the risk free rate.[57] However, in its place the Black CAPM assumes that unlimited short selling of stocks is possible with the proceeds available for investment.[58] This assumption does not hold in practice either, and so there are still concerns over the basis for the model and as a result the empirical estimation of the return on the zero beta portfolio.

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48 McKenzie and Partington, *Review of NERA report on Black CAPM*, August 2012, p. 14.
49 McKenzie and Partington, *Review of NERA report on Black CAPM*, August 2012, pp. 8, 9, 22.
50 NERA, *The Black CAPM: A report for APA Group, Envestra, Multinet & SP AusNet*, March 2012, pp. 12–13, 18–19. Mean variance efficient means that investors choose a portfolio that minimises the variance of portfolio returns given expected returns, or maximises expected returns given variance.
51 McKenzie and Partington, *Review of NERA report on Black CAPM*, August 2012, pp. 24–25.
52 This reflects the third of our assessment criteria for the application of regulatory judgement.
53 This reflects the third and fourth of our assessment criteria for the application of regulatory judgement.
54 AER, *Final decision: Envestra access arrangement Qld*, June 2011, p. 40. AER, *Draft decision Envestra Ltd Access arrangement proposal for the Qld gas network 1 July 2011 – 30 June 2016*, February 2011, p. 63.
55 APIA, *Response to the consultation paper*, June 2013, p. 46.
56 For example, see: AER, *Final decision, Envestra Ltd, Access arrangement proposal for the SA gas network, 1 July 2011 – 30 June 2016*, June 2011, pp. 167–175. NERA, *Review of cost of equity models; a report for the Energy Networks Association*, June 2013, pp. 5–19. McKenzie and Partington, *Review of NERA report on Black CAPM*, 24 August 2012.
57 McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013. p. 25.
58 McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013. p. 25.

We consider that the Black CAPM's flexibility to account for changing market conditions is similar to that of the Sharpe–Lintner CAPM. As discussed, however, we consider that the robustness of the parameter estimates, in particular the return on the zero beta portfolio, is poor. There is an interaction effect where it is very difficult to empirically estimate changes in the zero beta return in order to reflect changing market circumstances.

A.3.2 Role of the Black CAPM

As outlined above, our assessment of the Black CAPM is that it meets some of the criteria set out in chapter 2.

The sensitivity of the model to implementation assumptions precludes the use of the Black CAPM to provide a direct estimate of the return on equity for the benchmark efficient entity or for the market. In particular, there are major implementation problems arising from the difficulty of empirically estimating the input parameters. Under our approach, therefore, it may be reasonable to conclude that the Black CAPM should not be used to estimate the return on equity.

Notwithstanding these limitations, drawing on a broader range of material may lead to estimates of the return on equity that best reflect efficient financing costs. Theory may also support using the Black CAPM, to some extent, in the process for estimating the return on equity. For the following reasons, therefore, we will use the theory of the model to inform the selection of the equity beta point estimate:

- Unlike the Sharpe–Lintner CAPM, the Black CAPM does not assume that investors can borrow or lend at the risk free rate. Given this difference, we considered incorporating the theory of the Black CAPM into our foundation model by adjusting the risk free rate. The risk free rate, however, is readily observable.
- An alternative to adjusting the risk free rate is to instead focus on the selection of the equity beta. A key outworking of the Black CAPM is that the Sharpe–Lintner CAPM may underestimate the return on equity for firms with equity betas less than one. For equity betas in this range, the direction of an adjustment (though not the magnitude) can be determined on conceptual grounds. To the extent the Black CAPM may have some support, we will use the model (in addition to other evidence) to inform the selection of the equity beta.

The selection of the equity beta point estimate is discussed in appendix C.

A.4 Fama–French three factor model

This section contains our assessment of the Fama–French three factor model against our criteria, and its proposed role in our foundation model approach. We consider that the model does not meet most of our criteria. This is consistent with the position in our draft guideline. Similarly, consistent with the position in our draft guideline, we propose to not use the Fama–French three factor model to estimate the expected return on equity.

Submissions from consumer groups supported our proposed approach to not use the Fama–French three factor model.[59] Alternatively, service providers and their industry associations submitted that not using the Fama–French three factor model would be inconsistent with the rules.[60]

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59 See, for example: Council of Small Business Australia, *Australian Energy Regulator – Better Regulation program draft rate of return guideline – Comments*, 10 October 2013, p. 3.

60 See, for example: ENA, *Response to the draft guideline*, October 2013, p. 39.

A.4.1 Assessment of the Fama–French three factor model against our criteria

The Fama–French three factor model was developed based on empirical research of historical stock returns in the United States.[61] In particular, the model sought to expand on the Sharpe–Lintner CAPM to determine estimates of the return on equity that better matched historical data. In addition to the excess return on the market portfolio (over the risk free rate), the model includes two factors to explain the expected return on an asset.[62] These additional factors are:[63]

- the difference between the return on a portfolio of high book–to–market shares and the return on a portfolio of low book–to–market shares (labelled the value premium, or high–minus–low or HML factor)
- the difference between the return on a portfolio of small capitalisation shares and the return on a portfolio of large capitalisation shares (labelled the size premium, or small–minus–big or SMB factor).

While often referred to as 'the Fama–French model', it is important to recognise that there is not a unique specification of the model. Instead, alternative specifications of the Fama–French model exist. For example, a momentum effect is sometimes included in a four factor model, while term and credit spreads have also been utilised.[64] Two and three and a half factor models have also been cited.[65] Accordingly, if the Fama–French model were to be used to estimate the expected return on equity for regulated utilities, further consideration would be required to determine which version of the model to use, or whether to use multiple versions of the model. For the purpose of this discussion we focus on the three factor version of the Fama–French model. The three factor version is the most commonly discussed variation of the Fama–French model, and is the specification proposed by the ENA and APIA.[66]

The use of the Fama–French three factor model for estimating expected returns on equity, however, appears limited. Notably, McKenzie and Partington stated that there is little evidence of use of the Fama–French model by companies to estimate their cost of capital.[67] In regard to regulatory practice, McKenzie and Partington also added the following:[68]

> The general regulatory preference, however, has clearly been for the use of the [Sharpe–Lintner] CAPM. This is not surprising when we consider evidence such as that of Europe Economics (2007), who analysed the factor premiums over time and reported that they change sign and that they are often not significantly different from zero. Indeed the return on the book to market factor was never significantly different from zero. Furthermore, in estimating the factor loadings for a regulated entity (Heathrow and Gatwick airports), the only significant factor loading was on the market factor. Similar results were obtained in a study of regulated water companies by Europe Economics (2009).

Similarly, Professor Myers noted that the Fama–French model is used in practice for many important tasks (such as evaluating the performance of actively managed funds), but *not* to estimate the expected return on equity.[69] That the model is not used to estimate the expected return on equity

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61 See discussion in: AER, *Draft decision—Public, Jemena Gas Networks Access arrangement proposal for the NSW gas networks, 1 July 2010 – 30 June 201*5, February 2010, pp. 110–111.

62 Consequently, the Fama–French model also includes two additional beta parameters (for exposure to value and size premiums, in addition to the 'standard' beta that represents exposure to the market risk premium).

63 Peirson et al, *Business Finance,* 9th edition, 2006.

64 McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013. p. 31.

65 Clarke, de Silva, and Thorley, *The not-so-well-known three-and-one-half factor model*, 6 September 2013; Crain, *A literature review of the size effect*, 29 October 2011.

66 ENA, *Response to the draft guideline*, October 2013, p. 38; Australian Pipeline Industry Association Ltd, *Response to issues paper: The Australian Energy Regulator's development of rate of return guidelines*, 20 February 2013, p. 42.

67 McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013, p. 32.

68 McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013, p. 32.

69 Myers, *Estimating the cost of equity for APIA*, February 2013, p. 6.

raises concerns with the model's fitness for purpose, and whether it can be implemented in accordance with good practice.[70]

Additionally, we have previously observed that the value and size factors used in the Fama–French three factor model vary considerably and do not follow a pattern of systematic observance in Australia.[71] For example, in our final decision for Jemena Gas Networks (JGN) in NSW, we presented a summary of factor premiums published in Australia. These are shown in table A.2. Notably, both the value and size premiums varied considerably, notwithstanding the overlapping data periods used. If risk premiums are not systematically observed, there is no reason to expect that the risk premiums observed today (or at any time previously) will continue into the future.

Table A.2 Published factor premium estimates for the Fama–French three factor model in Australia

Author	Period (data)	HML (per cent)	SMB (per cent)
Fama and French (1998)	1975–1995	12.3	N/A
Halliwell, Heaney and Sawicki (1999)	1980–1991	14.6	6.0
Faff (2001)	1991–1999	14.0	–6.0
Faff (2004)	1996–1999	6.0	–6.5
Gaunt (2004)	1993–2001	8.5	10.0
Gharghori, Chan and Faff (2007)	1996–2004	10.4	17.2
O'Brien, Brailsford and Gaunt (2008)	1982–2006	9.4	4.3
Kassimatyis (2008)	1993–2005	12.6	11.5

Source: AER, *Final decision: JGN access arrangement*, June 2010, p. 140.

Our final decision for JGN also responded to submissions that the MRP is equally unstable. The ENA's submission in response to our draft guideline included a similar argument—that the value and size premiums are no more unstable than historical market excess returns.[72] However, as noted in our final decision for JGN, the range of values for the MRP (as taken from the same reports from which the value and size premiums in table A.2 were obtained) was 4.7 to 9.1 per cent. This

70 The ENA submitted that while survey evidence indicates that practitioners adopt the Sharpe–Lintner CAPM to estimate the return on equity, practitioners also account for the risks proxied by size and book–to–market ratios. We consider, however, that the ENA's submission does not indicate that the Fama–French three factor model is used in practice. Instead, it appears more supportive of our approach to using the Sharpe–Lintner CAPM informatively, and using other information to estimate input parameters (particularly the equity beta). ENA, *Response to the draft guideline*, October 2013, p. 40.

71 For example, see: AER, *Final decision: JGN access arrangement*, June 2010, pp. 138–142; AER, *Draft decision: JGN access arrangement*, February 2010, pp. 114–116.

72 ENA, *Response to the draft guideline*, October 2013, p. 40.

compares to the value premium range of 6.0 to 14.6 per cent, and the size premium range of negative 6.5 to 17.2 per cent.[73]

The ENA also submitted a more recent study, by Brailsford, Guant and O'Brien, that considered that the value premium in Australia is a pervasive, market wide characteristic.[74] On this basis, the ENA proposed that the value premium represented a priced risk factor that should be used to estimate the expected return on equity.[75]

The prevalence or otherwise of the value premium, however, should not be considered in isolation. As outlined previously, the version of the Fama–French model proposed by the ENA is the three factor variant. Notably, the Brailsford, Guant and O'Brien study also found that in Australia, the size factor has a negative risk premium (although it was not statistically significant).[76] Similarly, other academic papers have concluded that the size effect that was once prevalent has now diminished or disappeared.[77]

A negative relationship between returns and the size factor raises doubts about whether it should be a relevant predictor of returns. In particular, these findings are contrary to the often cited explanation that the size factor compensates for a firm's liquidity.[78] In this context, we consider the statement by McKenzie and Partington—that there is no clear theoretical foundation to identify the risk factors, if any, that the model captures—to be informative.[79] The instability in factor exposures, as well the difficulties in understanding why factor exposures bounce around when business risks appear stable, were also noted by Professor Myers.[80] These provide reasons to be cautious about using the Fama–French three factor model for estimating required returns for Australian energy utilities. We consider these results are not consistent with a model that can be implemented in accordance with good practice. This is consistent with the position in our draft guideline.

A further concern with the model is that, as McKenzie and Partington stated, even where factors are observed in ex–post returns, this does not mean that the same factors are priced ex–ante.[81] The existence of ex–post factors (such as for value and size), therefore, may neither support nor contradict the Sharpe–Lintner CAPM.[82]

The complexity of implementing the Fama–French three factor model also limits its fitness for purpose in a regulatory context. Estimating the equity beta and MRP for the Sharpe–Lintner CAPM, for example, is a contentious process. The Fama–French three factor model, however, requires the estimation of an additional two factor premiums, and an additional two factor exposures. Each additional parameter increases the scope for estimation error such that, even if there were strong theoretical support for the additional parameters, the overall result might be less accurate than a

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73 AER, *Final decision: JGN access arrangement*, June 2010, pp. 138–142; and AER, *Draft decision: JGN access arrangement*, February 2010, pp. 114–116.

74 Brailsford, Guant and O'Brien, *The investment value of the value premium*, Pacific-basin Finance Journal, 2012.

75 ENA, *Response to the draft guideline*, October 2013, p. 41.

76 See McKenzie and Parrington, *Risk, asset pricing and WACC*, June 2013, p. 31, citing T. Brailsford, C. Gaunt and M. O'Brien, 'The investment value of the value premium', *Pacific-Basin Finance Journal*, 2012, vol. 20(3), pp. 416–437. For other findings of negative size factor premiums, see: R. Faff, 'A simple test of the Fama and French model using daily data: Australian evidence', *Applied Financial Economics*, vol. 14, 2004, pp. 83–92.

77 M. Crain, *A literature review of the size effect*, 29 October 2011.

78 Smaller companies are typically traded less frequently than the stock of larger companies. This reflects, for example, the greater coverage by analysts of larger companies. All else equal, it is expected that this reduced liquidity (and therefore increased risk) would result in returns on smaller companies being higher than larger companies.

79 McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013, p. 28.

80 Myers, *Estimating the cost of equity for APIA*, February 2013, p. 6.

81 McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013, p. 30.

82 McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013, p. 30.

simpler model.[83] Further, contrary to the submission from the ENA, Professor Myers acknowledged the relative complexity of estimating the value and size premiums:[84]

> … the expected risk premiums for the size and value factors are difficult to forecast. Of course the CAPM's equity risk premium is also difficult to forecast, but more historical data are available, and there has been at least a partial convergence of views about the equity risk premium.

The Fama–French three factor model may also not be sufficiently robust so as to avoid undue sensitivity to estimation errors. This arises from the observed instability in both the risk premiums themselves (particularly in an Australian context) and the individual firm exposures to these risk factors (factor loadings). This concern is amplified by the greater number of parameters when compared to other financial models. The econometric derivation of these parameters also leads to concerns about data mining, which were acknowledged by the APA Group.[85]

Finally, the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel (the Nobel Prize in Economic Sciences) was recently awarded to Eugene Fama, Lars Peter Hansen, and Robert Shiller. The ENA submitted that this represents a material development relevant to the role assigned to the Fama–French three factor model in our final guideline.[86]

The Nobel Prize, however, was not exclusively linked to the derivation of the Fama–French three factor model. Instead, it recognised Fama's (and Shillers' and Hansen's) broader contributions to the empirical analysis of asset pricing.[87] Indeed, it is widely acknowledged that Shiller and Fama hold divergent views on market efficiency: whereas Fama stresses the extent to which market prices efficiently reflect available information, Shiller places greater emphasis on the role of human error in determining market outcomes. Moreover, William Sharpe has previously been awarded a Nobel Prize for his work in developing the Sharpe–Lintner CAPM. In this context, a Nobel Prize should not necessarily be interpreted as validating a given model or view. Instead, it may be more balanced to consider them as recognising contributions to a field that is still open to considerable debate.

A.4.2 Role of the Fama–French three factor model

Our assessment of the Fama–French three factor model is that it does not meet most of the criteria set out in chapter 2. The model may have some empirical support (most notably for the inclusion of the value factor), however, we consider the limitations of the model include:

- There is no clear theoretical foundation to identify the risk factors, if any, that the model captures. The lack of clear theoretical foundation to identify the risk factors raises a number of key questions, including why value and size factors should be relevant predictors of returns, and whether these factors apply in the Australian context.

- The empirical patterns on which the model was developed may be variable over time, and may not apply in Australia. In particular, recent papers suggest that the size factor has disappeared. As noted by Professor Myers, in a report submitted by the APIA, it is not clear why factor exposures bounce around when business risks appear stable. These results suggest a cautious approach to using the Fama–French three factor model for estimating required returns for Australian energy utilities.

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83 McKenzie and Partington, *Risk, asset pricing and WACC*, June 2013, p. 33.

84 ENA, *Response to the draft guideline*, October 2013, p. 39. Myers, *Estimating the cost of equity for APIA*, February 2013, p. 7.

85 It should be noted, however, that the APA Group consider these limitations may be overcome. APA Group, *Submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013, p. 31.

86 ENA, *Submission to the draft AER rate of return guideline: 2013 Nobel Prize in economic sciences*, 17 October 2013

87 See, for example: Royal Swedish Academy of Sciences, *Understanding asset prices*, October 2013.

- It is complex to implement, insomuch as two additional factor exposures and two additional risk premiums are required to estimate the expected return on equity (relative to the Sharpe–Lintner and Black CAPM).
- To our knowledge, the model is not used to estimate future returns on equity in Australia. Instead, it is principally used as an ex–post benchmarking tool. Moreover, even where the factors are observed in ex–post returns, this does not mean that the same factors are priced ex–ante.

Based on these limitations, we consider that the Fama–French three factor model is not suitable to be used as the foundation model.[88] Moreover, the lack of clear theoretical foundation to identify the risk factors limits the ability to use the model to inform the input parameter estimates of the foundation model. Accordingly, we propose to not use the Fama–French three factor model to estimate the expected return on equity.

Our proposed approach to not use the Fama–French three factor model is consistent with our draft guideline. This approach was supported by submissions from consumer groups.[89] This contrasts to submissions from the ENA, who stated that not using the Fama–French three factor model is inconsistent with the rules.[90] For clarity, as outlined in chapter 5, the rules require that we have regard to all relevant material. However, this does not require us to use all of that material to inform our estimate of the expected return on equity.

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88 Our reasons for adopting a foundation model approach are outlined in chapter 5.

89 See, for example: Major Energy Users Inc., *Australian Energy Regulator, Better Regulation, Rate of return guidelines: Comments on the consultation paper*, June 2013, p. 26.

90 ENA, *Response to the draft guideline*, October 2013, p. 39.

B Return on equity: assessment of other information

Our proposed approach for estimating the expected return on equity has regard to relevant estimation methods, financial models, market data and other evidence. In appendix A, we discussed the merits of relevant return on equity models (outlined in chapter 5) against our assessment criteria set out in chapter 2. In this appendix, we discuss the merits of other (non–model) information against our criteria. We also discuss the proposed role and implementation of other information in our foundation model approach.[91]

Our assessments draw on a range of consultant reports commissioned by us and stakeholders, and submissions received during the development of this guideline. We note that there are differing views among experts on the usefulness of other information to inform our estimate of the expected return on equity. However, our analysis has drawn upon the expert advice that is before us.

B.1 Relevant material used to inform the estimation of the return on equity

Under our proposed approach to estimating the expected return on equity, we may use relevant material as our foundation model, or to inform the foundation model input parameters. Alternatively, we may use relevant material to inform our final estimate of the expected return on equity.

This section discusses relevant material that we propose to use to inform our final estimate of the expected return on equity.

B.1.1 Wright approach

In our current implementation of the Sharpe–Lintner CAPM, we estimate the expected return on equity with reference to the prevailing risk free rate, plus the product of the equity beta and the MRP. This implementation is discussed in detail in chapter 6. In effect, we estimate the Sharpe–Lintner CAPM using the following formula:

$$k_e = r_f + \beta_e \times MRP$$

Instead of estimating the MRP directly, however, an alternative proposed by Professor Wright is to separately estimate the components of the MRP—being the return on the market portfolio and the risk free rate.[92] That is, the Sharpe–Lintner CAPM is described as follows:

$$k_{\mathrm{e}} = r_f + \beta_e \times (\mathrm{r_m} - \mathrm{r_f})$$

Effectively, under the Wright approach the estimation of the MRP is replaced by the estimation of the return on the market. If the return on the market portfolio is assumed to be relatively constant (and this is a strong assumption), estimates of the expected return on equity for the benchmark efficient entity, therefore, will only move marginally with variations in the risk free rate.[93]

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[91] This appendix, however, does not contain a detailed description of the construction of these models. Instead, interested stakeholders should refer to appendix E of our consultation paper.

[92] S. Wright, *Review of risk free rate and cost of equity estimates: A comparison of UK approaches with the AER*, October 2012.

[93] Assume, for example, an equity beta of 0.7 and a constant return on the market portfolio of 10 per cent. If the risk free rate fell from 5 per cent to 4 per cent, our estimation of the return on equity using the Sharpe–Lintner CAPM would fall from 8.5 per cent to 8.2 per cent. That is, a 100 basis point fall in the risk free rate results in a 30 basis point fall in the return on equity.

For the following reasons, we consider the Wright approach should play a role in our estimation of the expected return on equity:

- The Wright approach estimates the expected return on equity using the Sharpe–Lintner CAPM. As outlined in appendix A, our assessment of the Sharpe–Lintner CAPM is that it may meet most of the criteria set out in chapter 2.
- The Wright approach results in significantly more stable estimates of the expected return on equity when compared to the implementation of the Sharpe–Lintner CAPM (using our foundation model approach). Given network assets are long–lived and typically generate stable cash–flows, some stability in return on equity expectations may be expected. The stability of the expected return on equity is discussed in chapter 5.
- The Wright approach is transparent, replicable and relatively simple to implement. For example, the Wright approach assumes that the return on the market is relatively constant and as such, uses only historical data to estimate the return on the market.[94]

The Wright approach, however, has a number of limitations. In particular, it assumes that the relationship between the risk free rate and the MRP is perfectly negatively correlated, and the return on equity is relatively stable over time.[95] The reasonableness of these strong assumptions was discussed in our final decision for the Victorian gas service providers. This included the consideration of consultant reports from Professor McKenzie and Associate Professor Partington, Associate Professor Lally, Professor Wright, Professor Gregory, Cambridge Economics Policy Associates (CEPA), CEG, SFG and NERA. Specifically, in our final decision for the Victorian gas service providers we concluded the following:

- CEPA noted that the relationship between the risk free rate and the MRP is difficult to test empirically. In particular, the MRP is unobservable and any regressions would rely on developing a robust and consistent time series of investor expectations. Accordingly, the arguments presented by academics, regulators and companies have tended to be more indirect, and conclusions have therefore been presented in more uncertain terms. As a result, CEPA considered there is not enough evidence to justify making a firm conclusion about the relationship between the risk free rate and the MRP.[96]
- McKenzie and Partington performed a comprehensive literature review on the relationship between the risk free rate and the MRP. Despite evidence of a negative relationship provided by the consultants engaged by the Victorian gas service providers, they found both a positive and a negative relationship is possible. They concluded, therefore, that the relationship between the MRP and the level of interest rates is an open question. Specifically, they considered that submissions received from service providers in support of such a relationship were not sufficiently well established to form the basis for a regulatory adjustment to the MRP.[97] McKenzie and Partington's review of the academic literature was more comprehensive than the review of the academic literature in any of the reports submitted by the Victorian gas service providers. This was a primary reason why we relied on the conclusion of McKenzie and Partington's report over the conclusions from reports submitted by the Victorian gas service providers.

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94 Wright, *Review of risk free rate and cost of equity estimates*, October 2012.
95 Wright, *Review of risk free rate and cost of equity estimates*, October 2012.
96 CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, February 2013, p. 25.
97 M. McKenzie, and G. Partington, *Review of the AER's overall approach to the risk free rate and market risk premium*, February 2013, pp. 21–28.

- Lally reviewed evidence presented by CEG, Wright, Gregory, SFG and NERA in support of a stable return on equity or a negative relationship between the risk free rate and MRP. He identified numerous problems in the evidence presented by the Victorian gas service provider's consultants.[98] In addition, Lally applied Australian data using Wright's approach and found the time–series of MRP estimates is much more stable than that for the average real market return. This supports estimating the MRP rather than the real market return on equity from historical data.[99] While Lally noted there may be a negative relationship between the real risk free rate and the MRP, it isn't sufficiently strong to suggest the real market return on equity is more stable than the MRP.[100]

Consistent with our final decision for the Victorian gas service providers, we consider there is no consensus in the academic literature on the direction, magnitude or stability of the relationship between the risk free rate and the MRP. Instead, there is evidence to support both a positive and negative relationship.[101] Given these uncertainties—in particular, that the direction of any relationship may be variable and unstable—we consider it more reasonable to assume that no consistent relationship exists between the MRP and risk free rate.

In contrast to the submission from the ENA, however, this should not be interpreted as us reaching only one conclusion regarding the relationship between the MRP and risk free rate.[102] Similarly, it should not be interpreted that we necessarily consider the relationship between the MRP and the risk free rate will remain stable through different market circumstances.[103] Instead, our approach to estimating the expected return on equity will consider estimates of the Sharpe–Lintner CAPM that assume both no consistent relationship, and a negative relationship between the MRP and risk free rate.[104] This recognises the varied academic literature. Consistent with our draft guideline, therefore, we propose to consider the Wright approach to inform the selection of our point estimate of the expected return on equity from within the foundation model range.

The use of the Wright approach is supported by the APIA.[105] The MEU also supported the use of the Wright approach, but only to the extent that it considered that more stable returns will better reflect the long term expectations of investors.[106] Alternatively, PIAC stated that we should limit the use of the Wright approach in our assessment of the expected return on equity.[107] This reflected PIAC's view that the Wright approach has little foundation in theory.[108]

Implementation

We propose to estimate a range (at a point in time) for the long term historical average return on the market. As calculated in December 2013, we consider a range of 9.9 to 12.7 per cent appropriate. This is consistent with our proposed approach in the explanatory statement accompanying the draft

98 M. Lally, *Review of the AER's methodology for the risk free rate and the market risk premium*, March 2013, pp. 8–18.
99 Lally, *Review of the AER's methodology*, March 2013, p. 13.
100 Lally, *Review of the AER's methodology*, March 2013, p. 16.
101 McKenzie and Partington, *Review of the AER's overall approach*, February 2013, pp. 21–30.
102 Energy Networks Association, *Response to the draft rate of return guideline of the Australian Energy Regulator*, 11 October 2013, p. 33.
103 ENA, *Response to the draft guideline*, October 2013, pp. 35–36.
104 We note, however, that our proposed approach to estimating the MRP places greater emphasis on DGM estimates than we have in the past. DGM estimates, like the Wright approach, are responsive to changes in interest rates. This may mean that the Wright approach does not provide a substantial amount of additional information on the expected return on equity, given our new proposed MRP approach.
105 APIA, *Meeting the ARORO? A submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013, pp. 25–26.
106 MEU, *Better Regulation rate of return guidelines: Comments on the draft guideline*, 10 October 2013, p. 22.
107 PIAC, *Reasonably rated: Submission to the AER's draft rate of return guideline*, 11 October 2013, p. 36.
108 PIAC, *Submission to the draft guideline*, October 2013, p. 36.

guideline. We propose to estimate a range because the estimated return on the market will vary depending on the time period used.

We propose to estimate the long term average historical return on the market by estimating the long term average real return on the market and adding our inflation expectation (using the Fisher equation). This is consistent with recommendations from various consultants during the Victorian gas final decision.[109]

In section D.1 of the MRP appendix, we consider historical excess returns. The same data that informs long term average historical excess returns informs the historical average real return on the market. Therefore, the same considerations outlined in appendix D are relevant, including:[110]

- concerns about the quality of the historical data
- concerns about the potential for bias in historical estimates, particularly as a result of survivorship bias
- concerns about whether to use the arithmetic or geometric mean.

Adjusted to incorporate an imputation credit utilisation rate (theta) of 0.7, the real historical return on the market is in a range of 7.2 to 10.0 per cent (based on arithmetic averages) and 5.4 to 7.7 per cent (based on geometric averages). As shown in table B.1, these estimates span the periods 1883–2011, 1937–2011, 1958–2011, 1980–2011 and 1988–2011.

Table B.1 Long term average real return on the market

Sampling period	Arithmetic mean	Geometric mean
1883–2011	8.6	7.1
1937–2011	7.2	5.4
1958–2011	8.8	6.5
1980–2011	10.0	7.7
1988–2011	9.2	7.4

Source: Handley, *An estimate of the historical equity risk premium for the period 1883 to 2011*, April 2012, p. 6; AER analysis.

Consistent with our considerations in appendix D, we consider the range produced by arithmetic averages appropriate for estimating the range for the nominal return on the market.[111]

For simplicity, we assume an inflation rate of 2.5 per cent when estimating the nominal return on the market in this decision. At each reset, we propose to update the nominal return on the market using the expected inflation we estimate at that time.

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109 See, for example: Lally, *Review of the AER's methodology*, March 2013, p. 30.
110 See appendix D for more detail.
111 See appendix D for more detail.

Combining expected inflation of 2.5 per cent with the long term arithmetic average we estimate a range for the long term average nominal return on the market of 9.9 to 12.7 per cent.

B.1.2 Takeover and valuation reports

Takeover and valuation reports (also referred to as independent expert reports) are prepared for listed businesses in the event of certain transactions. These transactions include takeover bids, mergers and schemes of arrangement, acquisitions, divestitures, share buy-backs, and related party transactions. The Corporations Act 2001, ASX listing rules and ASIC regulatory guides have various provisions requiring such reports.

On balance we consider that takeover and valuation reports should play a role in our estimation of the expected return on equity.

The criteria relevant to the consideration of expert reports are that the information is:

- fit for purpose
- credible and verifiable, comparable and timely, clearly sourced
- flexible enough to allow for changing market conditions and new information.

The Sharpe–Lintner CAPM is the model used by most experts to value a firm, although its implementation may vary between experts. In principle, there is significant comparability between the task of the expert in determining the cost of capital to value a firm and the task of the regulator in determining a cost of capital to set a regulated price. Hence, the information on the rate of return is broadly 'fit for purpose'. However, expert reports will relate to a variety of different types of companies. Reports dealing just with regulated utilities are infrequent. Hence, the information is more relevant to the expected return on equity across the market rather than just for utilities. Another factor that limits their value is that they may cover a wide range of issues that are not necessarily relevant to the cost of capital under Sharpe–Lintner CAPM. These may be factored into the valuation of the company, possibly through the choice of discount rate.

Expert reports are credible, verifiable, and clearly sourced. Against this, expert reports are not released at regular intervals. Consequently, some estimates may be out of date.

Expert reports have regard to changing market conditions and new information. Firms undertaking valuations will generally have an agreed policy or framework that is applied consistently at a point in time. Within this they may adjust their assumptions and point estimates having regard to current market conditions. However, the adjustments can be arbitrary and may be made to the risk free rate, the market risk premium and/or the expected return on equity. Hence, the results are most comparable at the overall return on equity level. The estimates for the overall rate of return may vary due to the difference between our proposed approach to the estimation of debt costs (trailing average) and that used in expert reports.

In the 2013 Victorian gas distribution review, CEPA reviewed the evidence presented by Envestra on expert reports and found that:[112]

- the credibility of some reports is undermined by unexplained short term swings in the estimates

112 CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, February 2013.

- more recent studies should be considered more relevant and given greater consideration
- there are important idiosyncrasies in the analysis in the reports.

In their submission to the draft guideline, APIA questioned the relevance and role of reports from valuation experts and brokers and did not propose that these be considered. This was consistent with the views expressed in their submission on the consultation paper.

Other submissions to the draft guideline did not comment on the use of this information. In their submission to the consultation paper ENA submitted that independent expert reports contained relevant evidence that can inform the determination of the expected return on equity.

Having considered this source of information against our criteria, we agree with the ENA. The weaknesses noted above mean that while some regard may be placed on the analysis in expert reports in considering the expected return on equity, the information needs to be considered with care.

Implementation

Expert reports will be reviewed and a range for the expected return on equity derived from this analysis. Greater weight will be given to more recent reports and the information will be used informatively. Changes in the expected return on equity over time tracked by firms providing expert reports may provide information relevant to the assessment of current expectations for the return on equity relative to the return on equity in previous periods. Given concerns about the comparability of the estimates at a point in time across expert reports, this may be more informative than the absolute value of the return on equity assumed at a point in time considering prevailing estimates.

B.1.3 Brokers' return on equity estimates

Broker reports are prepared by equity analysts to provide information for investors in listed companies. These reports generally include estimates of the rate of return, as well as other information (such as analysis of current financial positions and forecasts of future performance). These reports may also include estimates of the expected return on equity.

On balance, we consider that broker estimates of the expected return on equity should play a role in our estimation of the expected return on equity.

The criteria relevant to the consideration of expert reports are that the information is:

- fit for purpose
- credible and verifiable, comparable and timely, clearly sourced
- flexible enough to allow for changing market conditions and new information.

Like expert reports, broker reports commonly use the Sharpe–Lintner CAPM where expected future earnings are used to value shares, although its implementation may vary. On the other hand broker reports on utilities are more frequent and timely than expert reports on utilities.

Like expert reports, broker reports are credible, verifiable, clearly sourced and predominantly use Sharpe–Lintner CAPM where a required return is specified. Relative to expert reports, broker reports on regulated utilities are likely to be published more frequently, however the specification of the model and assumptions may be less complete.

Broker reports are also flexible. Firms undertaking valuations will generally have an agreed policy or framework that is applied consistently at a point in time. Within this they may adjust their assumptions and point estimates having regard to current market conditions. However, the adjustments can be arbitrary and may be made to the risk free rate, the market risk premium and/or the expected return on equity. Hence the results are most comparable at the overall return on equity level. The estimates for the overall rate of return may vary due to the difference between our proposed approach to the estimation of debt costs (trailing average) and that used in broker reports.

Finally, CEPA's conclusions in regard to expert reports (outlined in section B.1.3) can be extended to broker return on equity estimates.

As noted above APIA questioned the relevance and role of reports from brokers and did not propose that these be considered. They suggested that analysts have an incentive to recommend stock purchases and this may lead to a downward bias in their estimates of returns on equity. Other submissions to the draft guideline did not comment on the use of this information. In their submission to the consultation paper ENA noted that caution must be used in the interpretation of broker reports and questioned whether broker reports would ever affect the determination of the expected return on equity.

Having assessed this source of information against our criteria, we agree with the ENA. The weaknesses noted above mean that while some regard may be placed on the analysis in expert reports in considering the expected return on equity, the information needs to be considered with care.

Implementation

Broker reports will be reviewed and a range for the expected return on equity derived from this analysis. Greater weight will be given to more recent reports and the information will be used informatively. Unlike expert reports, which provide information on returns across a range of industries, broker reports can provide targeted and more timely information on returns for regulated utilities. We propose to consider both the current assumptions on required returns and changes in assumed required returns over time, as tracked by the firms providing the reports. Given concerns about the comparability of the estimates at a point in time across broker reports, examination of trends over time may provide information on current returns relative to long term averages.

B.1.4 Other regulators' estimates of the expected return on equity

Estimates of the expected return on equity developed by other regulators may provide useful information to inform our estimate of the expected return on equity. As with broker estimates of the expected return on equity, we have not explicitly considered other regulators' estimates of the expected return on equity in the past.[113]

We consider that estimates of the expected return on equity from other regulators should play a role in our estimation of the expected return on equity. We, and other regulators, are independent statutory authorities. Further, the rules framework which governs regulatory decisions typically requires estimation methods and financial models to be based on well–accepted economic and financial principles. More generally, broader administrative law requirements also require analysis to be well reasoned, transparent and publicly available. For these reasons, other regulators' estimates of

[113] We have, however, considered other regulators' rates of return, and other regulators' estimates of the MRP.

the expected return on equity may meet our criterion regarding being implemented in accordance with good practice.

Moreover, other regulators' estimates of the expected return on equity are typically derived for the same purpose as our estimates. In assessing estimates of the expected return on equity from other regulators, however, we will have regard to the extent to which alternative estimates are derived from alternative approaches and independent analysis.

Other regulators' estimates of the expected return on equity also have the following limitations:

- Estimates from other regulators may not always be directly comparable to our estimates due to differences in the estimation approach. In particular, other regulators do not always use a benchmark efficient entity that is consistent with our definition.
- Estimates from other regulators may not always reflect prevailing market conditions, as there may be a delay between when the corresponding decisions are made. As such, these estimates may not be sufficiently flexible to allow changing market conditions to be reflected.

These limitations suggest that other regulators' estimates may only play a limited role in our estimation of the expected return on equity. In this context, therefore, the consistency of these estimates with other additional information may be more informative than any individual estimate.

Our proposed approach is consistent with that outlined in our draft guideline. It is somewhat unclear, however, whether this approach is supported by stakeholders. For example, while the ENA acknowledged that other regulators' estimates of the expected return on equity are relevant to estimating the expected return on equity, they did not state how they should be considered.[114] Similarly, consumer groups such as PIAC stated that information sources other than the Sharpe–Lintner CAPM are more likely to add noise rather than useful information.[115]

Implementation

To the extent that other regulators' estimates of the expected return on equity are available, we propose to use these estimates as a range to inform our estimate of the expected return on equity. Table B.2 provides a summary of recent decisions from other regulators. Consistent with our approach outlined in chapter 5, we will update this information at the time of a determination.

[114] Instead, the ENA only stated that the extent to which such estimates are taken into account should depend upon their relevance and reliability. ENA, *Response to the draft guideline*, October 2013, p. 47.

[115] PIAC, *Submission to the draft guideline*, October 2013, pp. 29–30.

Table B.2 Other regulators' estimates of the expected return on equity

Regulatory authority	Decision date	Sector	Return on equity (per cent)
ERA	July 2013	Rail	6.04 – 9.28[(a)]
ESC	June 2013	Water	7.13
IPART	June 2013	Water	8.3 – 9.3[(b)]
ESCOSA	May 2013	Water	8.59
IPART	May 2013	Water	8.3 – 9.3[(b)]
QCA	April 2013	Water	6.19
ERA	January 2013	Water	6.62

Notes: (a) This ERA decision included estimates for three networks. The two estimates included in this table reflect equity beta estimates of 0.45 and 1.0.

(b) This range is estimated using the mid–points of IPART's input parameter ranges.

Source: AER analysis, ERA, ESC, QCA, IPART, ESCOSA.[116]

B.1.5 Comparison between return on equity and return on debt

We consider the comparison between the return on equity and return on debt is relevant material that may inform our estimate of the expected return on equity. Equity investors are residual claimants on a firm's assets in the event of default. It is typically expected, therefore, that equity investments are riskier than debt investments, and that the return on equity should exceed the return on debt. Accordingly, using the comparison between equity and debt returns to inform our estimate of the expected return on equity is reflective of economic and finance principles.

Assessing the expected magnitude of the difference (or spread) between equity and debt returns, however, is complicated. For example, the expected return on equity that we estimate is an expected return, while the return on debt is a promised return.[117] Additionally, we estimate the return on debt as a pre–company tax measure, whereas our estimate of the expected return on equity is on a post–company tax basis.

The importance of comparing debt and equity premiums on a consistent basis was highlighted by McKenzie and Partington.[118] In particular, promised returns will always exceed expected returns. As such, if the return on debt was adjusted to reflect an expected return, the return would fall. The corresponding spread, therefore, would increase. Consistent with our assessment criterion, we consider that comparing estimates on a consistent basis reflects good practice.

116 ERA, *Determination on the 2013 WACC for the freight and urban railway networks*, July 2013; ESC, *Price review 2013: Greater metropolitan water businesses - Final decision*, June 2013; IPART, *Hunter Water Corporation: Final report*, June 2013; IPART, *Gosford City Council and Wyong Shire Council, Water - Final Report*, May 2013; ESCOSA, *SA Water's water and sewerage revenues 2013/14-2015/16: Final determination - Statement of reasons*, May 2013; QCA, *Final report: Seqwater irrigation price review 2013-17, vol. 1*, April 2013; ERA, I*nquiry into the efficient costs and tariffs of the Water Corporation, Aqwest and the Busselton Water Board: Revised final report*, March 2013.

117 That is, debt returns are calculated based on promised cash flows (or coupons), while equity returns reflect market expectations of returns. SFG, in a report commissioned by the Victorian gas networks, supported this view. SFG, *The required return on equity: Response to AER Victorian gas draft decisions*, 7 November 2012, p. 38.

118 M. McKenzie, and G. Partington, *The relationship between the cost of debt and the cost of equity*, March 2013.

As a result of the difficulties inherent in quantifying an appropriate spread between the two estimates, we propose to not define a specific spread requirement. Instead, we propose to use the spread between debt and equity returns as a relative indicator. For example, if the return on equity does not exceed the return on debt, we may reconsider the foundation model input parameter estimates. In these circumstances, we may also reconsider the foundation model itself.

Our proposed approach is consistent with that outlined in our draft guideline. Submissions in response to this approach, however, were primarily received following the publication of our consultation paper. For example, the ENA submitted that our estimate of the expected return on equity should be grossed–up to reflect the probability of default.[119] The ENA also submitted that no adjustment is required for corporate tax considerations.[120]

We considered the concerns raised by the ENA during the recent Victorian gas access arrangement.[121] In particular, McKenzie and Partington explained that for the return on equity, expected cash flows adjust to reflect changes in the level of default risk. The expected return on equity, therefore, should not be grossed–up to reflect the probability of default.[122] In regard to any corporate tax adjustments, the ENA's submission may be correct if the objective is to compare the returns investors require on debt and equity before personal tax. However, if the objective is to compare such returns on a like–for–like basis, then an adjustment would be required to ensure consistency.[123] Any adjustment is likely to introduce calculation error into the assessment.[124]

B.2 Relevant material not used to estimate the return on equity

The rules require us to have regard to all relevant estimation methods, financial models, market data and other evidence when determining our estimate of the expected return on equity for the benchmark efficient entity.[125] However, this does not require us to use all of that material to inform our estimate of the return on equity.[126] In this section, we discuss relevant material that we do not propose to use for estimating the expected return on equity.[127]

B.2.1 Brokers' and other regulators' estimates of the rate of return

Our assessment of brokers' and other regulators' estimates of the rate of return is that the material may not meet many of our assessment criteria. In particular, we consider that brokers' and other regulators' estimates of the rate of return are not fit for the purpose of informing our estimate of the expected return on equity.

The limitations of brokers' and other regulators' estimates of the expected return on equity (for example, different benchmark assumptions and regulatory periods) are discussed in sections B.1.3 and B.1.4. More generally, these limitations reflect comparability issues with our estimate of the expected return on equity. Brokers' and other regulators' estimates of the overall rate of return, however, may be further limited by our approach to estimating the return on debt. For example, we

119 ENA, *Response to the consultation paper*, June 2013, pp. 40–41.
120 ENA, *Response to the consultation paper*, June 2013, pp. 40–41.
121 AER, *Access arrangement final decision Envestra Ltd 2013-17, part 3: appendices*, March 2013, pp. 47–48, 65–76.
122 McKenzie and Partington, *Relationship between cost of debt and cost of equity*, March 2013, pp. 6–10.
123 McKenzie and Partington, *Relationship between cost of debt and cost of equity*, March 2013, pp. 21.
124 McKenzie and Partington, *Relationship between cost of debt and cost of equity*, March 2013, pp. 21–22.
125 NER, cl 6.5.2(e)(1) and 6A.6.2(e)(1); NGR, r. 87(5).
126 This interpretation contrasts with submissions from the ENA and APIA. Specifically, the ENA and APIA submitted that our proposed approach was inconsistent with the rules as we propose to not use specific material (for example, the Fama–French three factor model). See: ENA, *Response to the draft guideline*, October 2013, p. 38; APIA, *Submission to the draft guideline*, October 2013, p. 4.
127 We do not propose to use the Fama–French three factor to estimate the expected return on equity. Our discussion of this model, including our reasons for not using it, is included in appendix A.

have proposed to adopt a trailing average that is updated annually, whereas other regulators and market practitioners typically determine the return on debt at the time of a determination.

Given these different approaches may lead to different outcomes by design, the comparability of the respective estimates is limited. As such, we propose to not use brokers' and other regulators' estimates of the rate of return to estimate the expected return on equity.

The approach outlined in our final explanatory statement is consistent with our draft guideline. As outlined in section B.1.4, however, it is somewhat unclear whether this approach is supported by stakeholders. For example, while the ENA acknowledged that brokers' and other regulators' estimates are relevant to estimating the expected return on equity, they did not state how they should be considered.[128] Similarly, while consumer groups such as PIAC stated that alternative approaches are more likely to add noise rather than useful information, they still supported the use of reasonableness checks.[129]

B.2.2 RAB acquisition and trading multiples

We propose to not use RAB acquisition and trading multiples to inform our estimate of the expected return on equity. Instead, we propose to use these multiples as part of a set of indicators that we monitor over time and across network businesses to help inform us of potential areas of inquiry and research. These multiples are discussed in greater detail in chapter 4.

B.2.3 Financeability and credit metrics

Financeability is the term applied to a business' ability to finance its activities. In the context of a regulated service provider, these activities are those regulated services subject to our determinations.

The financeability of a business is typically assessed by considering the revenues and cash flows of the business in relation to its financial liabilities. For example, credit rating agencies (such as Standard and Poor's and Moody's) carry out an assessment of the financeability of businesses from the perspective of debt investors. Also, IPART and Ofgem, use financeability tests as part of their determination processes.

These tests may prove useful in our decisions, but at this stage we have not formed a view on how these tests should be applied. Therefore, we do not propose these tests in our final guideline. In the future, however, we may use these tests to inform our estimate of the expected return on equity.

This position is consistent with our draft guideline. It is somewhat unclear, however, whether this is supported by stakeholders.[130]

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128 Instead, the ENA only stated that the extent to which such estimates are taken into account should depend upon their relevance and reliability. ENA, *Response to the draft guideline*, October 2013, p. 47.

129 PIAC, *Submission to the draft guideline*, October 2013, pp. 26, 30.

130 As outlined in section 1.1.1B.1.4, while the ENA acknowledged that financeability metrics are relevant to estimating the expected return on equity, they did not state how they should be considered. Instead, the ENA only stated that the extent to which such estimates are taken into account should depend upon their relevance and reliability. ENA, *Response to the draft guideline*, October 2013, p. 47.

C Return on equity: equity beta

The equity beta under the Sharpe–Lintner capital asset pricing model (CAPM) measures the standardised correlation between the returns on an individual risky asset or business with that of the overall market.[131] It measures the sensitivity of an asset or business to the overall movements in the market (systematic or market risk).[132] Risk results from the possibility that returns will differ from expected returns (the greater the uncertainty around the returns of a business, the greater its level of risk). Because the Sharpe–Lintner CAPM assumes investors can diversify away business–specific risk, investors will only require compensation for bearing non-diversifiable or systematic risk.[133] Sources of non-diversifiable risk may include risk associated with factors such as changes in real gross domestic product (GDP), inflation, currency and commodity prices, and real long-term interest rates.[134] A business' sensitivity or exposure to these risks will depend, among other things, on its business activities and its level of financial leverage.[135]

The equity beta scales the market risk premium (MRP) up or down to reflect the business' or asset's risk premium (premium above the risk free rate) that equity holders would require to hold that particular asset or business as part of its well-diversified portfolio. An equity beta of 1.0 implies that the business' returns vary with economic conditions by the same amount as the overall market. An equity beta between 0 and 1.0 implies the business' returns tend to vary in the same direction as the overall market, but not as far. An equity beta greater than one implies the business' returns amplify the overall movements of the market.[136]

Under the rules, we are not required to set out the specific parameter values (or ranges) we determine after applying our proposed methodologies and taking into account our proposed estimation methods and other information.[137] Despite this, we have endeavoured to set out proposed parameter values in a number of areas in order to promote regulatory certainty. Stakeholders have supported the inclusion of point estimates and ranges in the guideline.[138]

We propose an equity beta point estimate of 0.7 from a range of 0.4 to 0.7 for a benchmark efficient entity.

In our equity beta issues paper, we noted that we had commissioned an update of our empirical estimates from Professor Henry.[139] This report was incomplete when we released our issues paper. However, we noted this updated analysis would further inform our findings.[140] Unfortunately, we still have not received the final report from Professor Henry. As such, this decision considers the same empirical analysis of Australian energy networks as presented in our equity beta issues paper.

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131 McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 21.

132 R. Brealey, S. Myers, G. Partington, and D. Robinson, *Principles of Corporate Finance*, McGraw-Hill Australia: First Australian Edition, 2007, p. 187.

133 Business–specific risk is also known as non-systematic risk or diversifiable risk. McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 3.

134 Some risks that are broadly systematic may contain some non-systematic components (for example, interest rate risk).

135 Frontier, *Assessing risk for regulated energy networks*, July 2013, p. 1; McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, pp. 11–12.

136 R. Brealey, S. Myers, G. Partington, and D. Robinson, *Principles of Corporate Finance*, McGraw-Hill Australia: First Australian Edition, 2007, p. 187.

137 NER 6.5.2(n), NGR 87(14).

138 PIAC, *Balancing risk and reward: Submission the AER's consultation paper: Rate of return guideline*, 21 June 2013, p. 15; and Major Energy Users Inc., *Australian Energy Regulator, Better regulation: Rate of return guidelines, Comments on the consultation paper*, June 2013, pp.19–20. See also ENA, *Response to AER rate of return guideline consultation paper*, 28 June 2013, p. 10; AER, *Questions and answers: rate of return draft guideline information session*, 30 August 2013, p. 1.

139 AER, *Equity beta issues paper*, October 2013, p. 24.

140 AER, *Equity beta issues paper*, October 2013, p. 24.

C.1 Conceptual analysis

The conceptual issues we have considered in estimating the equity beta for a benchmark efficient entity include:

- A comparison of the systematic risks between the different energy network sectors.
- The potential impact of regulatory changes on the systematic risk exposure of service providers.
- A comparison of the benchmark efficient entity relative to the market average firm.
- We have also considered the relative systematic risks of energy and water networks. However, this has not influenced our equity beta estimates. This is because, while systematic risks of Australian energy and water networks are comparable, the water sector provides an immaterial amount of new information.

Based on conceptual analysis, we consider that:

- Electricity transmission, electricity distribution, gas transmission, and gas distribution networks face similar levels of systematic risk. This is such that we adopt the same equity beta for the benchmark efficient entity across each sector.
- The systematic risk exposure of energy networks going forward is likely to be comparable to their systematic risk exposure in the past. Therefore, we consider it reasonable to rely on the Australian empirical estimates of energy networks (which are historical) as the key determinant of our equity beta point estimate and range. This view accounts for our reforms across the Better Regulation program.
- Conceptual analysis suggests that the benchmark efficient entity will have lower overall systematic risk exposure than the average firm in the market. Expert advice supports that the lower business risk for regulated energy networks more than offsets their higher financial risk. Our range and point estimate are compatible with this conceptual expectation.

C.1.1 Comparative systematic risks of different energy networks

We consider that systematic risks between gas, electricity, transmission and distribution networks are sufficiently similar as to justify one benchmark.[141] Most submissions to our consultation paper either supported or did not object to this view.[142] Consequently, we have adopted a single benchmark efficient entity, defined as 'a pure play, regulated energy network business operating within Australia'. Our reference to 'energy network' refers to a gas distribution, gas transmission, electricity distribution or electricity transmission service provider.

The systematic risk exposure of the gas and electricity networks we regulate is sufficiently similar to warrant the use of one benchmark (see chapter 3). Stakeholders have indicated two main areas where there might be differences in the risk exposure between gas and electricity businesses—

141 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 42–46.

142 For a supportive submission, see Citipower, Powercor and SA Power Networks, *Response to the AER's rate of return guidelines consultation paper*, 28 June 2013. Only one submission strongly disagreed, see Envestra, *Response to AER rate of return consultation Paper*, 28 June 2013 (Envestra, *Response to the consultation paper*, June 2013).

demand risk and competition risk.[143] In our view, these should not lead to material differences in the net systematic risk exposure for the following reasons.

On demand risk:

- The regulatory regime mitigates demand risk through the form of control. In particular, under revenue caps, the price is adjusted to enable the service provider to receive the approved revenue where forecast demand differs from actual demand. Under a price cap, service providers may mitigate the risk of forecast error by restructuring tariffs to offset demand volatility.

- To the extent that there are genuine risks of extreme changes in demand for specific service providers which present the potential for stranding of an asset, the regulatory regime for gas and electricity can mitigate this risk by providing prudent discount and accelerated depreciation provisions.[144]

On competition risk:

- Both gas and electricity service providers face limited competition risk by virtue of being regulated natural monopolies. Generally, competition risks for regulated networks are low. In fact, such networks are usually regulated because they are natural monopolies. Although competition in unregulated industries may emerge naturally, this is unlikely to occur in regulated industries.[145]

- Material competition between gas and electricity may arise with changes in the relative efficiency of consumers' technology. However, gas and electricity production technology is relatively mature and technological advances that have meaningful impacts on prices have been relatively slow to commercialise.[146] Material competition between gas and electricity could also arise if there is a significant longer term, stable change in the relative prices. However, because demand for gas and electricity is relatively inelastic, prices would have to change significantly for consumers to change their demand for gas or electricity.[147]

- The Australian Pipeline Industry Association (APIA) and Envestra have submitted that gas service providers face greater risk than electricity service providers because gas faces greater competition.[148] However, gas service providers mitigate competition from other pipelines through long term contracts with consumers—typically between 10 to 15 years.[149] In particular, transmission service providers usually enter into contracts which underwrite their revenue requirements. These contracts typically assign a portion of the risk to the end user.[150] Gas distribution service providers also often undertake pipeline extensions when they are underwritten

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143 Envestra, *Response to the consultation paper*, June 2013, p. 10; APIA, *Response to Issues Paper: The Australian Energy Regulator's development of Rate of Return Guidelines*, 20 February 2013, Schedule 3, p. 1 (APIA, *Response to the issues paper*, February 2013); APA Group, *Submission responding to AER Rate of Return Guidelines Consultation Paper*, 21 June 2013, p. 5.

144 For prudent discounts, see NER, cl. 6A.26, NGR r. 96; for accelerated depreciation provisions see NER, cls. 6.5.5(b)(1), 6A.6.3(b)(1); NGR, r.89(1).

145 Frontier, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia: A report prepared for the AER*, July 2013, pp. 14–15 (Frontier, *Assessing risk for regulated energy networks*, July 2013).

146 Bureau of Resource and Energy Economics, *Australian energy projections to 2049-50*, Canberra, December 2012, pp. 42–43.

147 Bureau of Resource and Energy Economics, *Gas Market Report 2012*, Canberra, May 2012, p. 47.

148 APIA, *Response to the issues paper,* February 2013, Schedule 3, p. 1; Envestra, *Response to the consultation paper*, June 2013.

149 Energy Quest, *ESAA Domestic Gas Study Stage 2*, 10 March 2011, p. 69.

150 For example, in October 2011 APA entered a 10 year contract with AGL to transport gas in its Carpentaria Gas Pipeline to Diamantina Power Station at Mount Isa. The power station is underpinned by 17-year energy supply agreements with Mount Isa Mines. APA *Annual Report 2012*, p. 7. Another example, is the Stage 3 expansion of Epic Energy's South West Queensland Pipeline is underpinned by transport agreements for over 90 per cent of the increased capacity with AGL Energy and Origin Energy until 2028 and 2034. Energy Quest, *ESAA Domestic Gas Study Stage 1*, 1 September 2010, p. 42.

by government or developer contributions.[151] Further, the regulatory regime and the limited scope for competition between pipelines mitigates the potential theoretical reasons for gas service providers being somewhat riskier than the average electricity service provider. This view is shared by Frontier, which stated that:[152]

> …there are some reasons to think that regulated gas transmission pipeline networks may be somewhat riskier than other types of regulated energy networks. …. However, this is not a strongly-held view, as aspects of the incentive regulatory arrangements provide more certainty to gas networks than electricity networks. Ultimately, the question of whether gas transmission pipeline networks are riskier than other types of energy networks needs to be answered empirically.

C.1.2 Potential impact of other regulatory changes

Following the Australian Energy Market Commission's (AEMC's) changes to the rules on 29 November 2012, we started developing the Better Regulation program.[153] This program aims to deliver an improved regulatory framework focused on promoting the long term interests of consumers. We have made several changes to our assessment approaches through the Better Regulation program. These changes, once implemented, have some potential to affect the risk profile of service providers. It is unclear to what extent these changes will affect the benchmark efficient entity's exposure to systematic risk, compared to non-systematic risk. As noted above, only systematic risk is relevant for determining equity beta.[154]

We are moving away from the current 'on-the-day' approach to a trailing average for estimating the return on debt of an efficient benchmark efficient entity. We expect the trailing average approach will more closely align with the efficient debt financing practices of service providers. This approach will lead to less volatile cash flows for the service providers over time and allow them to manage interest rate risk without exposing themselves to substantial refinancing risk.[155]

Further, we are changing our approach to the return on equity to promote a more stable return on equity over time. For example, our proposed implementation of the Sharpe–Lintner CAPM will result in estimates of the return on equity that may vary over time. For instance, our proposed implementation entails considering DGM estimates to inform our estimation of the MRP, and the Wright approach for implementing the CAPM to inform our overall return on equity.[156] We expect this will result in estimates of the return on equity that may be relatively stable over time.[157] Additionally, we expect the informative use of other information will lead to more stable estimates of the return on equity than under our previous approach. This other information will include return on equity estimates from valuation reports, brokers and other regulators, which may also be relatively stable.

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151 For example, Victorian government contributions via the 'Energy to the Regions' program have enabled gas distribution expansion.

152 Frontier, *Assessing risk for regulated energy networks*, July 2013, p. 5.

153 AEMC, *Final rule change determination*, November 2012.

154 McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 21; R. Brealey, S. Myers, G. Partington, and D. Robinson, *Principles of Corporate Finance*, McGraw-Hill Australia: First Australian Edition, 2007, p. 187.

155 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 82.

156 During the Victorian gas access arrangement review, the Victorian gas service providers commissioned a report from Professor Stephen Wright. In this report, Professor Wright proposed an alternative implementation of the Sharpe–Lintner, CAPM for estimating the return on equity for the benchmark firm. See: Professor Stephen Wright, *Response to Professor Lally's analysis*, November 2012.

157 The Wright approach assumes that the return on the market is constant and as such, uses only historical data to estimate the return on the market. A constant return on the market implies there is a negative relationship between the market risk premium and the risk free rate. Wright acknowledges that assuming the cost of equity is constant necessarily implies that the market risk premium moves inversely to the risk free rate (point for point).See S. Wright, *Response to Professor Lally's analysis*, November 2012.

In its submission to our equity beta issues paper, Major Energy Users (MEU) submitted that the move to a trailing average would reduce service providers' risks such that the relevant equity betas should be lower than what we have historically seen.[158] Public Interest Advocacy Centre (PIAC) noted it would expect that the transition to trailing average debt, coupled with more stable rates of return, would reduce the volatility of a benchmark efficient entity's cash flows. Consequently, PIAC suggested we further investigate the impact of our proposed rate of return approach on systematic risk and adjust historic beta averages to reflect the significant reduction in financial risk exposure.[159] We consider the effects of moving to a trailing average approach to debt in our conceptual analysis. This is where we determine the systematic risks of energy networks compared to the market average firm (see section C.1.3). Considering we propose to transition businesses to the trailing average approach over the next ten years, we do not expect this will materially affect the systematic risks that service providers face over the next three years. Consequently, we consider it reasonable to rely on empirical estimates, which reflect historical data.

We do not expect our new approach to forecasting expenditure will increase the systematic risks of a benchmark efficient entity. In our equity beta issues paper we stated, 'changes to non-WACC aspects of the Better Regulation Program might place less reliance on service providers' actual costs'.[160] This is because, under our new expenditure forecasting approach, we propose to complement our existing assessment techniques with new benchmarking techniques. In our equity beta issues paper, we noted, 'it is unclear to what extent these changes will reflect changes in the systematic risk of a benchmark efficient entity'.[161] We now consider this will not increase the systematic risk of a benchmark efficient entity. We consider this could increase the systematic risk of a service provider with inefficient expenditure. However, by definition, there should be no material and unjustified difference between revealed and efficient costs for a benchmark efficient entity. In its submission to our draft rate of return guideline, MEU submitted our new forecast expenditure approach should increase the accuracy of the expenditure allowance. MEU submitted this should reduce risks because under–allowances will be less likely.[162] However, we consider it is unclear if and to what extent this could decrease the systematic risk of a benchmark efficient entity.

Overall, we expect our new approach to estimating the return on debt and equity to decrease the volatility of service providers' cash flows. However, the transition into these new approaches will be gradual due to various transitional arrangements and different regulatory control periods. Accordingly, we conclude that Australian empirical estimates (which are historical) remain a reasonable basis for determining our equity beta estimates. We will consider any new information in relation to this matter as it becomes available.

C.1.3 Systematic risk of energy networks compared with the market average firm

We consider it is possible to determine a prior expectation of where the equity beta for the benchmark efficient entity sits relative to the average equity beta across all firms in the market, which is 1.0 by definition.[163] Our prior expectation is that the equity beta of a benchmark efficient entity should be less than 1.0. This implies that returns to a benchmark efficient entity vary less with economic conditions

[158] MEU, *Submission to beta issues paper*, October 2013, p. 5.
[159] PIAC, *Submission to beta issues paper*, October 2013, pp. 6–7, 9–10.
[160] AER, *Equity beta issues paper*, October 2013, p. 14.
[161] AER, *Equity beta issues paper*, October 2013, p. 14.
[162] MEU, *Comments on the draft guideline*, October 2013.
[163] More precisely, the value weighted average across all firms in the market is 1.0. As pointed out by McKenzie and Partington, the equal weighted average may not be 1.0, since larger firms may be unevenly distributed above or below 1.0. See McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 21.

than returns for the market as a whole, We addressed this type of conceptual analysis at length in our 2012 decision for the Roma to Brisbane pipeline, and this material remains relevant.[164]

Two key types of systematic risk are relevant: business risk and financial risk.

Business risk for the benchmark efficient entity

Business risk relates to the systematic risk exposure of the underlying business assets. It is generally accepted that the benchmark efficient entity has lower business risk than the market average firm.[165] First, there are a number of inherent characteristics for an energy transportation network that lead to low systematic risk exposure. These include:[166]

- Operation of a natural monopoly—the physical structure of the networks (including the substantial economies of scale and impracticality of duplicating the networks) reduces competition, which mitigates the effect of changes in aggregate demand on network revenue.[167]

- Provision of an essential service with low price elasticity of demand—across the ups and downs of the business cycle, demand does not change as dramatically for essential services such as energy. This reduces the correlation between changes in the benchmark efficient entity's return and the market return.[168]

Second, the structure of the regulatory regime insulates service providers from systematic risk, reflecting the following regulatory features (across electricity and gas):

- Form of pricing control—as noted above, revenue caps automatically adjust in response to changes in demand, reducing systematic risk. Even under a price cap, the ability to restructure tariffs may act to offset demand volatility.

- Tariff variation mechanisms—these include annual adjustments for inflation, which reduce exposure to inflation risk (itself a driver of systematic risk) for the benchmark efficient entity.[169]

- Cost pass through mechanisms—that allow for certain costs to be passed on to consumers, where expenditure was unforeseen at the commencement of the regulatory period. In some cases cost pass throughs relate solely to business–specific risk. However, where these unforeseen expenses relate to market wide influences, the cost pass through would reduce systematic risk exposure.[170]

- Tariff structures that include fixed charges—the benchmark efficient entity can adopt pricing structures that align with their high fixed costs, further reducing the impact of any change in aggregate demand.[171]. For example, this could include access charges for network connections,

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164 AER, *Draft decision: APT Petroleum Pipeline Pty Ltd, Access arrangement draft decision, Roma to Brisbane pipeline, 2012–13 to 2016–17*, April 2012, pp. 149–51, 315–319 (AER, *Draft decision: APTPPL access arrangement*, April 2012). There is also relevant material in AER, *Final decision: APT Petroleum Pipeline Pty Ltd, Access arrangement final decision, Roma to Brisbane Pipeline, 2012–13 to 2016–17*, August 2012, pp. 88–89.

165 See SFG, *Equity beta: Report prepared for APT Petroleum Pipelines Ltd*, 11 October 2011, p. 14 (SFG, *Equity beta for APTPPL*, October 2011); and McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 6.

166 See Frontier, *Assessing risk for regulated energy networks*, July 2013, pp. 60–63; also M. McKenzie and G. Partington, *Report to the AER: Risk, asset pricing models and WACC*, 27 June 2013, p. 11 (McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013).

167 We note the potential for some sectoral differences in competition exposure between electricity and gas. See Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, pp. 60–61.

168 McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 14–15.

169 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 6.

170 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 6.

171 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 14.

irrespective of energy use. This could also include capacity charges on pipelines, irrespective of gas use.

The broad category of business risk can be disaggregated into further subcategories of risk. In a 2012 report for the AER, Professor McKenzie and Associate Professor Partington (McKenzie and Partington) disaggregated business risk into economic risk and operational risk, before assessing the overall impact.[172] They considered that operational risk would be above the market average, given the high proportion of fixed costs (relative to variable costs) for energy networks. However, the overall business risk would still be very low because the benchmark efficient entity could mitigate the effect of this cost structure through the use of fixed charges.

The July 2013 Frontier report went further, in that it disaggregated business risk into nine different categories. Frontier's assessment was concerned with both systematic and non-systematic risk; and only the former is relevant to the estimation of equity beta.[173] Nonetheless, it is relevant that the Frontier report assessed the total risk (systematic and non-systematic) for each subcategory of business risk as low or medium, relative to the rest of the economy.[174]

Having regard to this conceptual analysis, including expert opinions from Frontier and McKenzie and Partington, we consider that business risk for the benchmark efficient entity will be very low.[175]

Financial risk for the benchmark efficient entity

Financial risk relates to the additional systematic risk exposure that arises from the debt holdings of a firm. The underlying principle is that, since payments to debt holders take precedence over payments to equity holders, the systematic risk exposure for equity holders (that is, the equity beta) increases as the firm issues more debt. It is generally accepted that the benchmark efficient entity has higher financial risk than the market average firm.[176] The key characteristic causing this higher financial risk is the relatively high financial leverage (gearing) for the benchmark efficient entity (60 per cent) relative to the market average firm (roughly 30 to 35 per cent).

However, the exact relationship between financial risk and financial leverage is not straightforward. McKenzie and Partington discussed the limitations of various linear and nonlinear leverage formulae.[177] They considered that, overall, increased financial leverage increases financial risk. However, they cautioned against any claim that the exact nature of this relationship might be known. McKenzie and Partington described one possible nonlinear relationship where, at a moderate level of debt, increases in leverage resulted in only a slight increase in financial risk. However, at high debt levels, increases in leverage resulted in a much larger increase in financial risk.[178] This analysis would suggest that, even where we observe financial leverage that is significantly above the market average financial leverage, we should be cautious about inferring an equivalent increase (that is, a significant increase) in financial risk above the market average. In other words, even though the financial leverage of the benchmark efficient entity is (approximately) double the financial leverage of the market average firm, we should not infer that this means the benchmark efficient entity has

[172] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 5; see also M. McKenzie and G. Partington, *Report to the AER: Risk, asset pricing models and WACC*, 27 June 2013, p. 11 (McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013).
[173] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, pp. 41–42, 105–106.
[174] Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 65.
[175] See McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.
[176] See SFG, *Equity beta for APTPPL*, October 2011, p. 14.
[177] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 7–13.
[178] McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 10.

(approximately) twice the financial risk. We simply do not know enough about the exact nature of the relationship between financial leverage and financial risk.[179]

The recent Frontier report disaggregated financial risk into five different categories (again including both systematic and non-systematic risk).[180] Frontier assessed the level of risk relative to other businesses in the economy, for each of the subcategories that contribute to financial risk, as:[181]

- low risk—default risk, financial counterparty risk, and illiquidity risk (for large networks)
- medium risk—refinancing risk
- medium to high risk—interest rate reset risk, and illiquidity risk (for small networks).

There are four subcategories assessed as medium or low risk (including illiquidity risk for large networks). Hence, in the Frontier analysis, only two subcategories might explain an aggregate financial risk materially above the market average level (medium risk): interest rate reset risk and illiquidity risk for small networks.

Further, when the Frontier report assessed interest rate reset risk as 'medium to high', it did so on the assumption that the regulated return on debt would continue to be set using an 'on the day' approach.[182] Later in that report, Frontier acknowledges that the implementation of a trailing average approach (as we adopt under our new approach) would reduce, but not eliminate, interest rate reset risk:[183]

> Some stakeholders have argued for a long-term trailing average approach to determining the cost of debt as a way of reducing interest rate reset risk, at least on the debt side. Clearly, such an approach would result in a very smooth profile for the allowed cost of debt. However, as noted in Chapter 3, the application of such a mechanism would not eliminate interest rate reset risk altogether.

We now propose to adopt a trailing average approach to debt (see chapter 7). We consider that the trailing average approach will reduce refinancing risk. In addition to the trailing average return on debt, there is an additional effect flowing from the new approach to the determination of the rate of return under the changed legislation. As noted above, we expect our new approach to lead to a more stable return on equity over time. This is because we now propose to consider additional sources of information that provides relatively stable estimates of the return on equity.[184] All else equal, this change should reduce the variability in returns to equity holders, and the more stable cash flows should reduce the default risk for the firm.[185] Taken together, conceptual analysis of the new approach to determining the rate of return should reduce the benchmark efficient entity's exposure to financial risk.

Overall systematic risk assessment of business risk and financial risk

The conceptual assessment of equity beta relative to the market average is determined by the direction and relative magnitude of these two systematic risk factors: business risk and financial risk.

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179 As is clear from the start of this paragraph, McKenzie and Partington would still consider that, as a result of the higher leverage, the benchmark firm had higher financial risk—the direction of the effect is reasonable, but not the magnitude.
180 Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, pp. 10, 41–42, 105–106.
181 Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 65.
182 Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 64.
183 Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 74.
184 AER, *Explanatory Statement: Draft rate of return guideline*, August 2013, pp. 68–69.
185 Frontier Economics, *Assessing risk for regulated energy networks*, July 2013, p. 24.

The expert report we commissioned from McKenzie and Partington attempts this assessment. They undertook conceptual analysis of both business risk and financial risk, and engaged with academic literature on this issue.[186] They also noted that their conceptual findings are supported when they turn to the empirical evidence:[187]

> Taken together, the previous conceptual discussion clearly provides evidence to suggest that the theoretical beta of the benchmark firm is very low. While it is difficult to provide a point estimate of beta, based on these considerations, it is hard to think of an industry that is more insulated from the business cycle due to inelastic demand and a fixed component to their pricing structure. In this case, one would expect the beta to be among the lowest possible and this conclusion would apply equally irrespective as to whether the benchmark firm is a regulated energy network or a regulated gas transmission pipeline.
>
> Empirical support for this proposition may be found by looking at the industry beta tables of Damodoran (see Appendix 2). The equity betas for water, gas and electricity are the lowest in the table, while their debt to equity ratios are among the highest. Although this evidence is based on US companies, there is no reason to believe that a similar pattern would not exist in Australia.

This is how McKenzie and Partington conclude their report:[188]

> This report was asked to prepare a response to three questions. The first question was whether there are conceptual or theoretical grounds to expect that the benchmark firm has an equity beta below 1.0? A close examination of the components of systematic risk clearly suggests the answer to this question is in the affirmative. In fact, one would expect the beta to be among the lowest possible and this conclusion would apply equally irrespective as to whether the benchmark firm is a regulated energy network or a regulated gas transmission pipeline.[189]

Based on the available evidence, including the expert reports from Frontier and McKenzie and Partington, we consider there are reasonable conceptual grounds to expect that the equity beta of a benchmark efficient regulated energy network will be below 1.0. However, we recognise the limits of this type of approach, and use it to inform our assessment with regard to these limitations. Further, conceptual analysis does not indicate the magnitude of the difference between the benchmark efficient entity and the market average (1.0), and we propose to rely on empirical estimates for this assessment.

In its submission to our equity beta issues paper, APA Group (APA) stated that our conceptual analysis could not support a low value for beta or a value below 1.0. It explained that conceptual analysis does not lead far and we must hold recourse to empirical evidence.[190] Similarly, APIA was not supportive of us making use of conceptual analysis for anything other than forming priories to be empirically tested.[191] Further, the Energy Networks Association (ENA) submitted if we maintain that a conceptual analysis supports an equity beta of less than 1.0, then our guideline should clearly set out the quantitative basis for its 0.4 to 0.7 range.[192] We do not consider these submissions to be inconsistent with our approach to estimating the equity beta. In fact, we have based our 0.4 to 0.7 range on the equity beta point estimates for entities in our Australian comparator set of energy networks under different samples and sampling periods. Stakeholders can see that we have based this range on a thorough quantitative assessment, based on empirical evidence (see section C.2). We

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186 McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 5–15.

187 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.

188 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 23.

189 This quote refers to three questions, which were set out in the terms of reference for the McKenzie and Partington report. For clarity, the other two questions did not relate to conceptual analysis of the benchmark firm against the market average firm. They related to (1) the possibility of bias in regressions with low R-squared statistics and (2) the possibility of systematic bias in the CAPM as demonstrated by Monte Carlo simulations. See McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 3.

190 APA, *Submission on beta issues paper*, October 2013, p. 20.

191 APIA, *Submission to beta issues paper*, October 2013, p. 4.

192 ENA, *Submission to beta issues paper*, October 2013, p. 25.

note that our range is consistent with our conceptual analysis, which suggests the equity beta of a benchmark efficient entity would be low and below 1.0.

The ENA submitted that our conceptual analysis is inconclusive as it implies a benchmark efficient entity has below average operating risk and above average finance risk.[193] Consequently, the ENA submits this provides no basis to conclude that beta would be less than 1.0, as the low operating risk may have a smaller impact than the high financial risk. We disagree with this submission. Under our conceptual analysis, we take both operating and financial risks into account and consider the net impact of these systematic risks in reaching our conclusion. We note that, when taking both these systematic risk components into account, McKenzie and Partington concluded, 'the theoretical beta of the benchmark firm is very low'.[194]

C.1.4 Systematic risk of energy networks compared with water networks

Australian energy and water networks share many key characteristics and face similar systematic risks. However, we consider this information should have limited application to estimating the equity beta for a benchmark efficient entity. This differs from our approach expressed in our equity beta issues paper. In this issues paper, we proposed to use the equity betas of Australian water networks to cross check the reasonableness of our equity beta estimates for the benchmark efficient entity.[195] This change to our approach has no material impact on our outcome. We have changed our proposed approach for the following reasons:

- Australian water regulators often use equity betas from Australian energy networks to inform or determine their equity beta estimates for water networks. To this extent, this data will not provide material additional information.
- Australian water regulators sometimes use data from international water networks to inform their equity beta estimates. We consider this international data less relevant.

However, we recognise there are still reasons that support using equity betas from Australian water networks to inform our equity beta estimates for a benchmark efficient entity. These include:

- Conceptually, we consider energy and water networks face similar levels of systematic risk.
- It is desirable to have similar regulated returns between these two industries. Because these industries face similar levels of systematic risk, different returns between these two industries could cause investment distortions.

Conceptually, we consider energy and water networks face similar levels of systematic risk. This is for the following reasons:

- Expert advice from Frontier to the Australian Competition and Consumer Commission (ACCC) suggests water and energy networks have similar exposure to systematic risk.[196] Frontier noted water and energy networks are appropriate proxies for one another in terms of their regulatory frameworks, ownership, industry structure, diversity of operation and operating leverage.[197] We note that while energy generators and retailers will likely face more competition risk than water

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193 ENA, *Submission to beta issues paper*, October 2013, p. 20.
194 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.
195 AER, *Equity beta issues paper*, October 2013, p. 43.
196 Frontier, *The cross sectoral application of equity betas: energy to water, A report prepared for the Australian Competition and Consumer Commission*, April 2010 (Frontier, *Cross sectoral equity betas: Energy to water*, April 2010).
197 Frontier, *Cross sectoral equity betas: Energy to water*, April 2010, p. 32.

networks, energy distribution and transmission networks should face similarly low levels of competition risk to water networks.

- Expert advice from Frontier to us concluded, 'given the similarity of their activities and characteristics, water networks and energy networks are, in principle, reasonable comparators to one another'.[198]

- Rural water utilities have greater exposure to and dependence on weather patterns. However, this risk is diversifiable and, therefore, independent to the equity beta.[199] We held this position in our equity beta issues paper.[200] In its submission, APIA noted that weather influences rural water service providers' demand risks; whereas economic conditions influence energy producers' demand risks.[201] As we have previously mentioned, risks influenced by weather patterns are diversifiable. Therefore, they are independent of the equity beta.

Due to the conceptual similarities between Australian energy and water networks, we consider it desirable to have similar regulated returns between these two industries. Because these industries face similar levels of systematic risk, different returns between these two industries could cause investment distortions.

In spite of the conceptual similarities, we have changed the approach proposed in our equity beta issues paper. No Australian water networks are listed on the Australian Stock Exchange (ASX). Therefore, we would need to use determinations made by Australian water regulators to cross check our equity beta estimates.[202]

It is problematic to rely on these regulatory determinations, because these do not provide material additional information. This is because Australian regulators often use equity betas from Australian energy networks to inform or determine their equity beta estimates for water networks. For instance, in recent water determinations, the Queensland Competition Authority (QCA), the Economic Regulatory Authority (ERA) and the Essential Services Commission of South Australia (ESCOSA) have had regard to the energy sector.

With this in mind, we still note that this information supports an equity beta estimate within a 0.55 to 0.8 range.[203] This is similar to our proposed 0.4 to 0.7 range of empirical equity beta estimates, and our proposed point estimate of 0.7 (see chapter 6). We also note that while 0.55 to 0.8 is higher than our range of empirical estimates for the energy sector, these regulatory decisions consider information other than empirical estimates. For example, in its determination for Sydney Desalination Plant, the Independent Pricing and Regulatory Tribunal (IPART) adopted a 0.6 to 0.8 range with 60 per cent gearing. This was consistent with its consultant, SFG's recommendation.[204] However, SFG's ordinary least squares regression on 16 listed water utilities derived a mean beta estimate of 0.55,

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198 Frontier, *Assessing risk for regulated energy networks*, July 2013, p. 92.
199 Frontier, *Cross sectoral equity betas: Energy to water*, April 2010, pp. 11–12.
200 AER, *Equity beta issues paper*, October 2013, pp.43–44.
201 APIA, *Submission to beta issues paper*, October 2013, p. 7.
202 AER, *Equity beta issues paper*, October 2013.
203 ESC, *Price review 2013: Greater metropolitan water businesses - Final decision*, June 2013; ESC, *Price review: Regional urban water businesses - Final decision*, June 2013; ESC, *Price review 2013: Rural water businesses - Final decision*, June 2013; IPART, *Hunter Water Corporation: Final report*, June 2013; ESCOSA, *SA Water's water and sewerage revenues 2013/14-2015/16: Final determination - Statement of reasons*, May 2013; IPART, *Gosford City Council and Wyong Shire Council, Water - Final Report*, June 2013; QCA, *Final report: Seqwater irrigation price review 2013-17*, vol. 1, April 2013; ERA, *Inquiry into the efficient costs and tariffs of the Water Corporation, Aqwest and the Busselton Water Board: Revised final report*, March 2013; IPART, *Review of prices for the Sydney Catchment Authority*, June 2012; IPART, *Review of prices for Sydney Water Corporation's water, sewerage, stormwater drainage and other services*, June 2012; QCA, *Final report: SunWater, Irrigation price review: 2012-17*, vol. 1; May 2012; IPART, *Review of water prices for SDP*, December 2011; QCA, *Gladstone Area Water Board: Investigation of pricing practices: Final report*, June 2010.
204 IPART, *Review of water prices for SDP*, December 2011, p. 80.

within a 90 per cent confidence interval of 0.4 to 0.7.[205] In its submission, ActewAGL noted that in its report to IPART, SFG Consulting (SFG) noted that we should estimate beta with consideration of the downward market beta estimate.[206] However, we note that in its recent reports, SFG has not applied the downward market beta.[207]

It is also problematic to rely on regulatory determinations for Australian water networks, because international evidence influences this data. This is because, in recent water determinations, the IPART, QCA and ESCOSA have considered information concerning international water networks. Just as we consider information from international energy networks to be less relevant than information from Australian energy networks, we consider information from international water networks to be less relevant than information from Australian water networks. This is because of the limitations associated with international data (see section C.3).

We have changed our approach since our equity beta issues paper and now give limited consideration to equity betas from Australian water networks. Several stakeholders submitted that using equity betas from the water sector would introduce regulatory circularity.[208] PIAC noted that this circularity is 'considerable' and that this evidence provides little new information.[209] Several stakeholders submitted we should not give consideration to equity betas from Australian water networks.[210] We maintain that, in principle, equity betas from Australian water sectors and energy sectors are comparable. However, we also recognise this data does not provide a material amount of new information. Further, information from international water networks influences some of this data. Therefore, we consider this information should have limited application to estimating the equity beta for a benchmark efficient entity. However, this decision does not have a material impact on our proposal to apply a 0.7 equity beta point estimate from a 0.4 to 0.7 range.

C.2 Australian empirical analysis

Like the MRP, the equity beta is not directly observable. As a result, it must be estimated by reference to proxies and cannot be determined with certainty. The historical empirical estimates are the main form of evidence to determine reasonable equity beta estimates for a benchmark efficient entity. Accordingly, we propose to use empirical estimates of equity betas from a set of Australian comparable firms to guide the equity beta value we adopt. The empirical estimates will be generated using a number of different comparator sets and a range of econometric techniques. The relevant Australian empirical estimates indicate the equity beta of a benchmark efficient entity is in the range of 0.4 to 0.7. We consider the equity beta estimates derived from domestic empirical analysis meet the rate of return criteria.[211] Therefore they are likely to contribute to a rate of return estimate that achieves the allowed rate of return objective.

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205 SFG, *Cost of capital parameters for Sydney Desalination Plant*, 10 August 2011, p. 5.

206 This is because SFG considered water utilities' betas were higher in falling markets than in rising markets. See ActewAGL, *Response to beta issues paper*, October 2013, p. 2.

207 See SFG, *Estimation of beta for Australian water networks*, April 2013; SFG, *Regression-based estimates of risk parameters*, June 2013.

208 APA, *Submission on beta issues paper*, October 2013; APIA, *Submission to the draft guideline*, October 2013; COSBOA, *Comments: Return on equity issues paper*, November 2013; MEU, *Submission to beta issues paper*, October 2013; PIAC, *Submission to beta issues paper*, October 2013.

209 PIAC, *Submission to beta issues paper*, October 2013, p. 29.

210 APA, *Submission on beta issues paper*, October 2013, p. 17; APIA, *Submission to the draft guideline*, October 2013, p. 2; COSBOA, *Comments: Return on equity issues paper*, November 2013, p. 3, ENA, *Submission to beta issues paper*, October 2013, p. 5.

211 AER, *Equity beta issues paper*, October 2013, pp.54-56. Also see section 6.2.3 of the explanatory statement.

The following section discusses the selection of comparator set. We also justify our position with respect to a number of empirical considerations, including data issues, methodological issues, and interpretation of empirical estimates.

C.2.1 Comparator set selection

We defined the benchmark efficient entity as 'a pure play, regulated energy network business operating within Australia'. We would, ideally, use firms that share all or most of the key characteristics of the benchmark efficient entity when conducting our regression analysis to estimate the equity beta. In practice, few firms would reflect this benchmark. Therefore we use market data for domestic businesses that are considered to be reasonable comparators to the benchmark efficient entity to inform the equity beta estimate. We identified nine firms that may be considered as reasonable comparators to the benchmark efficient entity. They are ASX listed firms that provide regulated electricity and/or gas network services operating within Australia.

These are the same comparable firms that we identified in the equity beta issues paper. Table C.1 sets out the details of these nine firms. Three of these firms are no longer trading. Another firm, AGL Energy Limited, has changed its operations such that it no longer closely represents a benchmark efficient firm.[212] We account for this by only including data over an applicable time period for these firms. Whereas, for the other five firms, we would consider the most recent data.

Table C.1 Listed entities providing regulated electricity and gas network services operating in Australia

Firm (symbol)	Time/trading period	Sectors
AGL Energy Limited (AGK)	January 1990 – October 2006	Electricity Gas
Alinta (AAN)	October 2000 – August 2007	Gas
APA Group (APA)	June 2000 – present	Gas Minority interest in energy
DUET Group (DUE)	August 2004 – present	Electricity Gas
Envestra Ltd. (ENV)	August 1997 – present	Gas
GasNet (GAS)	December 2001 – November 2006	Gas
Hastings Diversified Utilities Fund (HDF)	December 2004– November 2012	Gas
Spark Infrastructure Group (SKI)	March 2007[213] – present	Electricity Gas
SP AusNet (SPN)	December 2005 – present	Electricity Gas

Source: AER analysis, Bloomberg, AER, *Final decision: WACC review*, May 2009, p. 255

212 In October 2006, AGL sold its infrastructure and asset management business to Alinta and acquired a portion of Alinta's retail and co-generation businesses.

213 The SKI data is available from December 2005, but the data prior to March 2007 reflects stapled securities traded as instalment receipts—these instalments requires further leverage adjustment and makes beta estimation difficult.

While the firms in table C.1 closely represent a benchmark efficient entity, they also provide non-regulated electricity and/or gas services. Examples of this include:

- Approximately 25 per cent of APA's revenue in the 2013 financial year (excluding pass–through revenue) was subject to prices determined under full regulation. APA generates most of the remaining 75 per cent of its revenue from contracts which have set terms, including negotiated pricing for the life of the contract.[214]
- DUET Group's assets, receive some unregulated revenue—Dampier Bunbury Pipeline (7 per cent unregulated), United Energy (8 per cent unregulated) and Multinet (5 per cent unregulated).[215]
- SP AusNet has an unregulated corporate arm, 'Select Solutions' that provides a number of commercial services.[216]

Generally, with the exception of APA, these non-regulated activities only constitute a small portion of the revenue earned by the firms in this comparator set. Therefore, when we consider the impact of these unregulated activities, we expect the net impact would be sufficiently minor such that our equity beta estimates for the comparators are reasonable. However, we understand that the organisational structure and commercial activities of these comparator firms are subject to change. Consequently, we will continuously review our comparator set in case we need to make adjustments. This may entail adjusting the comparator set by excluding or adding new comparators.

The Council of Small Business of Australia (COSBOA) and PIAC supported our selection of the comparator firms. COSBOA noted while there are a limited number of comparators, the available data and the way we proposed to use the data was based on a sufficiently robust and reliable basis.[217] PIAC supported our choice of the comparator set on a preliminary basis. However, it noted that it could not take a final position until the new empirical analysis is available.[218]

In their submissions to our equity beta issues paper, a few service providers suggested our sample of Australian comparators is too small to produce reliable estimates. As a result, international data—particularly the data from the US should be considered in addition to the Australian sample in determining the equity beta of a benchmark efficient entity.[219]

We also note APA's submission on this matter:[220]

> Relaxing the criteria for comparability might, as the Issues Paper suggests, increase the number of firms for which data could be obtained for beta estimation.
>
> However, the criteria for comparability must be those of the NER and the NGR. The comparators must:
>
> - be efficient; and
> - have a degree of risk similar to that which applies to the service provider in respect of the provision of regulated services.
>
> We do not see much scope for relaxing the criterion that any potential comparator be efficient.

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214 APA Group, *Australian Pipeline Trust: Annual report for the financial year ended 30 June 2013*, p. 2.
215 DUET Group, *Annual Report 2012*, p. 5.
216 SP AusNet, *Statutory Annual Report 2013*, p. 23.
217 COSBOA, *Comments: Return on equity issues paper*, November 2013.
218 PIAC, *Submission to beta issues paper*, October 2013.
219 ActewAGL, *Response to beta issues paper*, October 2013, p. 3; ENA, *Submission to beta issues paper*, October 2013, pp. 28–29; Spark, *Response to beta paper*, October 2013, p. 2.
220 APA, *Submission on beta issues paper*, October 2013, p. 8.

APA further suggested that international evidence may have a role to play in certain specific circumstances, but not in beta estimation.[221]

We recognise there are only nine reasonable Australian comparators and a larger comparator set would be desirable in an ideal world. However, the 56 US–listed stocks in SFG's sample are less relevant comparators as discussed in section C.3. Including these firms simply to increase the number of our observations would not be a preferable option. We agree with APA on this issue that while increased statistical reliability is desirable, it is not preferable if it substantially reduces the relevance of the data.

Moreover, we consider the available Australian data is sufficient for us to form a reasonable equity beta estimate.[222] The set of nine Australian comparators generates a consistent pattern of empirical estimates that is robust across different sample periods and econometric techniques. Further, the data set has substantially increased since the 2009 WACC review, and the statistical precision of the estimates has improved.

Service providers also noted there are substantial variations in the empirical beta estimates. These variations indicate that firms in the comparator set do not face comparable levels of systematic risk.[223] As explained in the issues paper, the equity beta range for the benchmark efficient entity is informed by the average of individual equity beta point estimates for the comparable Australian–listed firms and various portfolio beta estimates based on these Australian–listed firms. We note the individual equity beta estimates vary from one firm to another. It is difficult to select an estimate from a particular comparable firm over a completely different equity beta estimate of another firm and the range of individual beta estimates is too wide to be useful. The individual beta estimates may not provide robust estimates for the benchmark efficient entity. However, we consider the average beta estimates derived from the set of nine Australian comparators using different sample periods and different regression techniques provide a more robust equity beta estimate of the benchmark efficient entity.

Similarly, we note the individual US empirical beta estimates proposed for use by the service providers also vary substantially. They range from 0.49 to 1.51 according to SFG's analysis using the comparable US firms identified by Competition Economists Group (CEG).[224] SFG subsequently proposed a beta estimate of 0.82 by taking the average of individual beta estimates for the Australian listed firms and 56 US listed firms.[225]

C.2.2 Methodological choices

In this section, we consider some of the methodological issues in more detail. Specifically, time period selection, the method used to account for leverage and the use of portfolio equity beta.

Time period selection

There is generally a trade–off in determining the length of the estimation period. On one hand, older data might be considered less reflective of current systematic risk assessments (which would suggest a shorter period). On the other hand, in order to obtain a robust and statistically reliable equity beta

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221 APA, *Submission on beta issues paper*, October 2013, p. 9,16–17.

222 Although the sample is small, there is a consistent pattern of empirical estimates across different sample periods and econometric techniques, as presented in section 4.

223 APA, *Submission on beta issues paper*, October 2013, p. i; APIA, *Submission to beta issues paper*, October 2013, p. 5; CitiPower, Powercor, SAPN, *Submission to beta issues paper*, October 2013, p. 2; ENA, *Submission to beta issues paper*, October 2013, pp. 29–31.

224 SFG, *Regression-based estimates of risk parameters*, June 2013, p.19.

225 Note we do not consider it is reasonable to estimate the beta for the benchmark efficient entity using US estimates, this is discussed in section C.3 below.

estimate we need to have sufficient number of observations (which would suggest a longer period). The sample of Australian businesses that can be considered close comparators to the benchmark efficient entity is limited. One option to increase the number of observations is to consider the longest available time period. Another option is to broaden the comparator set to include businesses that do not as closely reflect the benchmark efficient entity, such as overseas comparators or businesses in other regulated industries.[226] On balance, we consider it reasonable to use an estimation period of at least five years. We propose to consider regressions using three permutations of the estimation period:

- The longest period available
- The period after the 'technology bubble' and before the global financial crisis (GFC), then the period after the GFC
- The last five years of available data

This view is consistent with our proposal in the equity beta issues paper.

MEU submitted that the GFC might provide an upward bias in the empirical evidence. Therefore the impact of the GFC must be assessed.[227] As discussed in the equity beta issues paper, we noted Professor Henry raised similar concern. He stated that post-September 2008 events associated with the GFC would be unlikely to be consistent with the CAPM as an equilibrium pricing model and should be excluded from consideration.[228] However, in the 2009 WACC review we also considered the Allen Consulting Group's (ACG) updated results, provided in support of the Joint Industry Associations' (JIA) submission. These were based on an analysis of the most recent available data at the time. These results demonstrated that the GFC had minimal impact on the estimated equity beta when compared to the ACG's previous report that estimated equity betas for the sample period up until May 2008.

We also noted that it is impossible to predict whether (or when) the financial markets would fully recover to their pre-GFC state. As such, it is unclear whether the GFC should be classified as an 'unrepresentative event', as a structural break, or as a normal part of the cycle. Further, we acknowledge that the start and end date for the GFC across different economies and asset markets are matters of varying opinion and are not settled.

Similarly, regarding the exclusion of the 'technology bubble' period, we note at the time of the 2009 WACC review the 'technology bubble' represented a larger proportion of the estimation period than it currently does. As more observations become available, the effect of this event (if it is not removed from the observation period) on the beta estimates may diminish. It is also not clear if the 'technology bubble' period should be treated differently from the GFC period. As a result, we propose to consider regression estimates based on both periods that include and exclude the 'technology bubble' and 'the GFC'.

Gearing

The equity betas of comparator businesses will reflect varying levels of actual financial leverage between the businesses. Such equity betas can be de-levered to obtain the asset beta of the business. The result of de-levering reflects the beta of the asset if the asset was financed 100 per

[226] These options are further discussed in section C,3 (international comparators) and C.1.4 (comparison against water networks).
[227] MEU, *Submission to beta issues paper*, October 2013, p. 5.
[228] Ó. Henry, ***Estimating β***, 23 April 2009, p. 8 (Henry, ***Estimating β***, April 2009).

cent by equity, with zero debt. These asset betas can then be re-levered, based on the benchmark gearing level adopted by the regulator to obtain an equity beta based on the benchmark level of gearing. We note there are views both for and against de-levering and re-levering equity beta estimates. We propose to have regard to both the raw and adjusted beta estimates.

We have not received any submissions in relation to this issue; therefore we have maintained our position in the equity beta issues paper.

We have consistently used a gearing ratio of 60 per cent in our previous regulatory determinations. We propose to maintain a gearing of 60 per cent for the benchmark efficient entity as discussed in appendix F. We propose to continue using the Brealey–Myers formula to de-lever and re-lever the comparable businesses' equity beta estimates. That is:

$$\beta_e = \beta_a \left(1 + \frac{D}{E}\right)$$

where:

β_e is the equity beta

β_a is the un-levered asset beta, and

$\frac{D}{E}$ is the debt to equity ratio.

In their April 2012 report on equity beta, McKenzie and Partington discussed the relationship between leverage and equity beta at length. They identified a number of limitations with de-levering and re-levering. These include:[229]

- the relationship between equity betas, financial leverage and financial risk is complex and uncertain;
- by making an adjustment to reflect the benchmark level of gearing, we are imposing a certain assumed relationship;
- attempting to adjust for the different leverage of individual firms using an inaccurate formula and assumptions might be doing more harm than good.

McKenzie and Partington considered that the overall evidence indicates that financial leverage has relatively little impact on overall equity beta.[230] Therefore, they recommended it might be more reasonable to simply estimate the equity beta without de-levering and re-levering the comparator set.

We note the choice of whether or not to de-lever and re-lever is not material on the portfolio estimates as the industry average gearing and the benchmark gearing are very similar. However, the difference for the individual comparative firm equity beta estimates will be greater because some firms have higher or lower gearing than the benchmark efficient entity.

229 McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 7–15.
230 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 14.

Portfolio estimates

Different samples of businesses will produce different equity beta estimates. We propose to continue examining the portfolio estimates that use simple average and median returns to inform the equity beta for a benchmark efficient entity. These include estimates from:

- equal weighted portfolios—which consist of *n* businesses and each business has a weighting of 1/*n*
- value weight portfolios—where the weighting on each business is proportional to the market capitalisation of the business relative to the market capitalisation of that entire portfolio
- time varying portfolios—where the weights in the portfolios vary over time due to businesses being introduced into the portfolio as they become listed on the market and being removed when they are no longer listed.

This approach is consistent with our equity beta issues paper. We have only received comment from APA in relation to this matter. That comment has not caused us to depart from our view set out in the equity beta issues paper. APA submitted that each individual firm in the portfolio should satisfy the criteria for the benchmark firm before it can be used in a portfolio. It does not consider the individual firms in the comparator set satisfy the benchmark firm criteria and therefore these estimates cannot inform choice of an equity beta range or point estimate.[231]

As discussed in section C.2.1, ideally we would use firms that exactly reflect characteristics of the benchmark efficient entity when conducting our regression analysis to estimate the equity beta. However, few firms reflect this benchmark in practice. Therefore we need to use market data for domestic businesses that are considered to be reasonable comparators to the benchmark efficient entity to inform the equity beta estimate. We consider the nine firms that we have identified may be considered as reasonable comparators to the benchmark efficient entity. The individual beta estimates might not provide robust estimates for the benchmark efficient entity. However, the average of these individual equity beta point estimates and the portfolio estimates based on these firms provide a reasonable equity beta range for the benchmark efficient entity.

In the 2009 WACC review, we identified a number of different approaches to obtain equity beta estimates that are reflective of the benchmark efficient entity. These include:[232]

- comparing the re-levered equity beta estimates of individual stocks
- obtaining individual re-levered equity beta estimates of the businesses that are representative of a benchmark efficient entity and calculating an estimate of the equity beta using a median or a simple average
- calculating median and average returns for a portfolio of stocks—using an equal-weighted portfolio or value-weighted portfolio—and then estimating a portfolio equity beta.

It is unlikely that an equity beta estimate for a particular comparable business will be superior to a completely different equity beta estimate of another comparable business. Therefore, in addition to estimating equity betas for individual businesses, we consider equity beta estimates generated from a portfolio of businesses would provide guidance on the equity beta for a benchmark efficient entity.

231 APA, *Submission on beta issues paper*, October 2013, p. 15.
232 AER, *Final decision: WACC review,* May 2009, p. 307.

This is also consistent with the ACG view put forward by the Joint Industry Associations at the 2009 WACC review.[233]

C.2.3 Recent Australian empirical estimates

The historical empirical estimates are a main form of evidence to determine equity beta values. We propose to use empirical estimates of equity betas from a set of Australian comparable firms to guide the equity beta value we adopt. This is because the domestic empirical estimates meet most of our criteria.[234] The empirical estimates are generated using a number of different comparator sets and a range of reasonable econometric techniques. The recent relevant empirical estimates indicate the equity beta estimate falls in the range of 0.4 to 0.7.[235] This equity beta range is informed by the average of individual equity beta point estimates and a number of portfolios of different compositions and lengths. It does not represent the range of individual equity beta estimates or the confidence interval around the equity beta estimate. This is because the average of individual beta point estimates is more likely to represent the equity beta of a benchmark efficient entity.

2009 Henry estimates

In the 2009 WACC review, we found the empirical evidence indicated an equity beta point estimate of between 0.4 and 0.7. We considered the most relevant empirical estimates:[236]

- use listed Australian gas and electricity networks as the set of comparable firms (consider both individual and portfolio equity beta estimates)
- commence after the technology boom (2002 onwards) but end just before the start of the GFC, exclude business–specific events
- implement two types of regression equations – ordinary least squares (OLS) and least absolute deviation (LAD)
- use both weekly and monthly estimation intervals
- calculate based on continuous returns
- do not apply a Blume or Vasicek adjustment.

Table C.2 presents Henry's re-levered equity beta estimates for the individual comparator businesses (averaged by sample period/sampling frequency/regression technique) from his 2009 report. This produced equity beta point estimates of 0.45 to 0.71 as the average of individual firms.

Table C.2 Average re-levered equity beta estimates from Henry's 2009 analysis

	2002–2008 (monthly)	2002–2008 (weekly)	2003–2008 (monthly)	2003–2008 (weekly)
OLS	0.57	0.59	0.65	0.71
LAD	0.45	0.45	0.64	0.59

Source: AER, *Final decision: WACC review*, May 2009, p. 318.

233 ACG, *Beta for regulated electricity networks*, September 2008, pp. 34–35.

234 AER, *Equity beta issues paper*, October 2013, pp.54-56. Also see section6.2.3 of the explanatory statement.

235 We noted in the equity beta issues paper that we have commissioned an update of empirical estimates from Professor Henry. However, this report is not yet complete. When we receive the new empirical estimates that we have commissioned in the future we will review our findings.

236 AER, *Final decision: Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters*, 1 May 2009, pp. 260–277 (AER, *Final decision: WACC review*, May 2009).

Henry also produced portfolio equity beta estimates. As presented in tables C.3 and C.4 below, the individual portfolio equity beta estimates ranged from 0.35 to 0.94 and the average equity beta estimates for the portfolios ranged from 0.49 to 0.66.

In addition, Henry estimated portfolio beta estimates with time varying weights, although he considered time-varying portfolios are likely to be affected by measurement errors:

- The time-varying portfolio equity beta estimates using average returns:
  - range from 0.55 to 0.57 using the post technology bubble period ending September 2008
  - range from 0.64 to 0.78 using the five years ending September 2008.
- The time-varying portfolio equity beta estimates using median returns:
  - range from 0.43 to 0.68 using the post technology bubble period ending September 2008
  - range from 0.52 to 0.68 using the five years ending September 2008.

Table C.3 Henry's re-levered portfolio equity beta estimates—monthly observations

	P1'	P1	P2	P3	P4	P5	Avg (P1-5)	Avg (P1'-5)
Estimation period	Jan 2002 - Sep 2008	Oct 2003 - Sep 2008	Aug 2004 - Sep 2008	Dec 2004 - Sep 2008	Dec 2005- Sep 2008	Mar 2007 - Sep 2008	Jan 2002 - Sep 2008	Jan 2002 - Sep 2008
Businesses	ENV, APA	ENV, APA	ENV, APA, DUE	ENV, APA, DUE, HDF	ENV, APA, DUE, HDF, SPN	ENV, APA, DUE, HDF, SPN, SKI	ENV, APA, DUE, HDF, SPN, SKI	ENV, APA, DUE, HDF, SPN, SKI
Equal weighted								
OLS	0.44	0.55	0.50	0.59	0.59	0.62	0.57	0.55
LAD	0.45	0.60	0.70	0.57	0.62	0.81	0.66	0.63
Value weighted								
OLS	0.47	0.58	0.52	0.61	0.55	0.60	0.57	0.55
LAD	0.57	0.75	0.52	0.55	0.49	0.94	0.61	0.65

Source: AER, *Final decision: WACC review*, May 2009, p. 322.

Table C.4 Henry's re-levered portfolio equity beta estimates—weekly observations

	P1'	P1	P2	P3	P4	P5	Avg (P1-5)	Avg (P1'-5)
Estimation period	Jan 2002 - Sep 2008	Oct 2003 - Sep 2008	Aug 2004 - Sep 2008	Dec 2004 - Sep 2008	Dec 2005-Sep 2008	Mar 2007 - Sep 2008	Jan 2002 - Sep 2008	Jan 2002 - Sep 2008
Businesses	ENV, APA	ENV, APA	ENV, APA, DUE	ENV, APA, DUE, HDF	ENV, APA, DUE, HDF, SPN	ENV, APA, DUE, HDF, SPN, SKI	ENV, APA, DUE, HDF, SPN, SKI	ENV, APA, DUE, HDF, SPN, SKI
Equal weighted								
OLS	0.45	0.51	0.46	0.58	0.59	0.62	0.54	0.54
LAD	0.35	0.42	0.42	0.51	0.54	0.64	0.51	0.49
Value weighted								
OLS	0.51	0.57	0.49	0.60	0.52	0.56	0.55	0.54
LAD	0.45	0.51	0.51	0.53	0.57	0.61	0.55	0.53

Source: AER, *Final decision: WACC review*, May 2009, p. 323.

2011 and 2013 ERA estimates

The ERA has conducted two studies on equity beta after the 2009 WACC review. In 2011, the ERA replicated Henry's study with a dataset updated to October 2011. In 2013, the ERA developed two new econometric techniques for equity beta estimation in its draft rate of return guideline. In addition, the dataset was updated to April 2013. We note the ERA's studies adopted the same approach as applied by Professor Henry in his 2009 equity beta analysis. The equity beta estimates in both the ERA's 2011 and 2013 studies are in line with Henry's 2009 results.

The ERA's 2011 study only estimated equity betas for the individual comparator businesses and applied both OLS and LAD methods to the data.[237] As presented in table C.5, using a monthly estimation interval, the ERA's equity beta estimates range from 0.07 to 0.97, with a mean of 0.46 and a median of 0.43. In table C.6, using a weekly estimation interval, its equity beta estimates range from 0.22 to 1.34 with a mean of 0.52 and a median of 0.43.

Table C.5 The ERA's 2011 re-levered equity beta estimates for individual businesses, sampled monthly

	AGL	ENV	APA	GAS	DUE	HDF	SPN	SKI	AAN	Avg
OLS	0.70	0.46	0.67	0.26	0.38	0.07	0.26	0.42	0.81	0.45
LAD	0.50	0.37	0.70	0.24	0.27	0.47	0.26	0.44	0.97	0.47

Source: ERA, *Draft decision: Western Power access arrangement*, March 2012, p. 202. Averages are calculated by the AER.

[237] ERA, *Draft decision: Western Power access arrangement*, March 2012, pp. 195–205.

Table C.6 The ERA's 2011 re-levered equity beta estimates for individual businesses, sampled weekly

	AGL	ENV	APA	GAS	DUE	HDF	SPN	SKI	AAN	Avg
OLS	0.75	0.36	0.61	0.33	0.32	1.34	0.22	0.49	0.96	0.60
LAD	0.53	0.31	0.60	0.26	0.26	0.84	0.22	0.34	0.62	0.44

Source: ERA, *Draft decision: Western Power access arrangement*, March 2012, p. 204. Averages are calculated by the AER.

In the ERA's draft rate of return guideline released in August 2013, it introduced two additional econometric methods—MM and Theil–Sen to the existing OLS and LAD methods. In this study, the ERA adopted the same sample of nine companies used in its 2011 study and Henry's 2009 analysis. However, it excluded three of the nine companies (GAS, AAN and AGL) as they do not have data available until 2013.[238] Its re-levered equity beta estimates for the individual firms with data up to 2013 range from 0.17 to 1.20, with a mean of 0.50. These results are shown in table C.7.

Table C.7 The ERA's 2013 re-levered equity beta estimates for individual businesses

	APA	DUE	ENV	HDF	SKI	SPN	Ave
OLS	0.59	0.17	0.44	1.20	0.54	0.05	0.50
LAD	0.55	0.23	0.44	1.11	0.37	0.26	0.49
Robust MM	0.63	0.25	0.45	1.00	0.48	0.30	0.52
Theil–Sen	0.56	0.27	0.45	1.00	0.39	0.22	0.48
Average	0.59	0.23	0.45	1.08	0.45	0.21	0.50

Source: ERA, *Explanatory statement: Draft rate of return guidelines*, August 2013, p. 171.

The ERA's 2013 study also examined portfolio beta estimates. As shown in table C.8, its re-levered portfolio equity beta estimates range from 0.39 to 0.59 with a mean of 0.50.

238 ERA, *Explanatory statement: Draft rate of return guidelines*, August 2013, pp. 168–181.

Table C.8 The ERA's 2013 re-levered portfolio equity beta estimates

	P0	P1	P2	P3	P4	Avg
Estimation period	Jan 2002 - Apr 2013	Sep 2003 - Apr 2013	Aug 2004 - Apr 2013	Dec 2004 - Apr 2013	Dec 2005 - Apr 2013	
Businesses	ENV, APA	ENV, APA	ENV, APA, DUE	ENV, APA, DUE, HDF	ENV, APA, DUE, HDF, SPN, SKI	ENV, APA, DUE, HDF, SPN, SKI
Equal weighted						
OLS	0.49	0.49	0.39	0.55	0.49	0.48
LAD	0.53	0.54	0.41	0.58	0.59	0.53
MM	0.49	0.50	0.41	0.58	0.56	0.51
Theil-Sen	0.44	0.46	0.40	0.55	0.53	0.47
Ave	0.49	0.50	0.40	0.56	0.54	0.50
Value weighted						
OLS	0.53	0.53	0.40	0.47	0.40	0.47
LAD	0.56	0.55	0.44	0.52	0.51	0.51
MM	0.53	0.53	0.43	0.51	0.49	0.50
Theil-Sen	0.47	0.49	0.41	0.49	0.45	0.46
Ave	0.52	0.52	0.42	0.50	0.46	0.49

Source: ERA, *Explanatory statement: Draft rate of return guidelines*, August 2013, p. 173.

2013 SFG estimates

In its submission to the rate of return consultation paper, the ENA submitted several reports prepared by SFG in relation to equity beta estimates. SFG presented its equity beta estimates for both the Sharpe–Lintner CAPM and the Fama–French three factor model using historical stock returns on the relevant Australian and US stocks. From the SFG analysis, we consider only the estimates based on the Sharpe–Lintner CAPM are of relevance. This is because we are estimating the equity beta in the context of the Sharpe–Lintner CAPM. Further, the Australian estimates are more relevant than the US estimates.[239] Nonetheless, the SFG's equity beta estimates based on comparable Australian firms support the equity beta range of 0.4 to 0.7 for the benchmark efficient entity.

[239] We discuss the US estimates in section C.3.

SFG's analysis of nine comparable Australian stocks for the Sharpe–Lintner CAPM was similar to that conducted by Henry in his 2009 report, except it:[240]

- Used data up to 19 February 2013 based on four-weekly returns, but repeat analysis 20 times using different start points within the four-weekly period.
- Only examined OLS estimates as it considered LAD estimates exhibit a downward bias.
- Made Vasicek adjustments to the OLS estimates, which increased OLS beta estimates by an average of 0.03.
- It estimated a mean re-levered Sharpe–Lintner CAPM equity beta estimate of 0.60 for the Australian firms, with a confidence interval of 0.37 to 0.83. It also derived an equal weighted index based on these Australian firms. The average re-levered beta estimate for this index is 0.55, with a 95 per cent confidence interval of 0.41 to 0.68.[241]

Some service providers expressed their concerns with the beta estimates presented by Henry and the ERA. They submitted the choice of the starting points during the weeks or months for which historical returns are calculated is arbitrary.[242] CEG conducted sensitivity analysis of Henry's portfolio 3 with different sampling intervals and showed the average beta estimates vary by picking different starting points.[243] We note CEG only conducted sensitivity analysis for Henry's portfolio 3 in its most recent report and analysed only portfolio 4 in its previous report for the Dampier to Bunbury Pipeline (DBP). We consider a comprehensive analysis of all portfolios and individual firm betas is required to reach this conclusion. Nonetheless, we note that SFG by repeating its analysis 20 times using different start point within the four-weekly period, produced the equity beta estimates in line with Henry's and the ERA's estimates. We will further analyse this issue in the future.

SFG had concerns with the reliability of LAD estimates and considered Vasicek adjustment should be applied. It submitted Vasicek-adjusted OLS estimates are more reliable measures of systematic risk than unadjusted OLS estimates.[244] We have only been able to give limited regard to these issues because of the complexity of those reports. We will consider them in more detail in the future.

However, we note regardless of whether OLS or LAD regressions are used, Henry's estimates support the range of 0.4 to 0.7. Further, the ERA's 2013 analysis separately reports four different regression estimates. The equity beta estimates across all regressions also converge on the range of 0.4 to 0.7.

In the 2009 WACC review, we noted some of our conceptual concerns with applying the Vasicek adjustment. In particular, we had concerns with assumed prior belief that the equity beta was 1.0. We considered assuming the mean of the distribution is one may be a reasonable assumption where the beta is randomly selected from the market at large. But this is not the case in relation to our estimation of the equity beta for the benchmark efficient entity. The population is not the entire market. It is a small set of comparator businesses that had been carefully selected to be comparable to the benchmark efficient entity. The true betas from this population cannot be observed. However, strong empirical and conceptual evidence suggested that the mean of the true betas could be

240 SFG, *Regression-based estimates of risk parameters*, June 2013, p. 6.
241 SFG, *Regression-based estimates of risk parameters*, June 2013, pp. 12–15.
242 APA, Submission on beta issues paper, October 2013, p.12; APIA, Submission to beta issues paper, October 2013, pp. 16–18; ENA, Submission to beta issues paper, October 2013, pp. 32–34.
243 AER, *Precision of beta estimates*, October 2013, pp. 4–7.
244 SFG et al, *OLS and LAD regression techniques,* June 2013; SFG et al, *Vasicek adjustment to beta estimates,* June 2013.

expected to be less than one.[245] Further, putting aside our conceptual concerns, the practical outcome is that applying the Vasicek adjustment in the manner recommended by SFG made little to no difference on the beta estimates. Even SFG itself noted that the average difference between the raw OLS estimate and the Vasicek–adjusted OLS estimate is just 0.03 for the nine Australian firms.[246]

The ENA proposed an equity beta of 0.94 for the benchmark efficient entity. This is based on:

- 1/6 weight on the estimate from SFG's regression analysis of Australian and US–listed firms (0.82)
- 1/3 weight on the evidence that regression-based estimates of beta have little or no association with realised returns (1.00)
- 1/3 weight on SFG's dividend discount model analysis of the same nine Australian–listed firms in regress analysis (0.96)
- 1/6 weight on the expected return which accounts for the relationship between size, book-to-market ratio and returns (0.91).

In this section, we consider the equity beta estimates for the benchmark efficient entity in the context of our foundation model, that is the domestic Sharpe–Lintner CAPM. Therefore we do not discuss beta estimates from the other models. We assess other models against the rate of return criteria in appendix A. We only use dividend growth models to inform the range and point estimate of the MRP and do not propose to use the Fama–French three factor model as it does not meet most of the criteria.

C.3 International comparators

International equity beta estimates differ from our benchmark efficient entity definition. Therefore we consider the equity beta estimates based on international comparators should not be used as the primary determinant of the equity beta range or the point estimate for the benchmark efficient entity. This is discussed in detail in section C.3.1. Nonetheless, these empirical estimates are consistent with our choice of a point estimate in the upper end of our range. Section C.3.2 presents empirical estimates for a number of international energy networks.

C.3.1 Role for international comparators

Several international regulators use evidence derived from analysis of international comparators to inform their decisions on equity beta.[247] Such use of international comparators is often motivated by the lack of relevant domestic comparator businesses. For example, there is no publicly listed domestic regulated business in Ireland and there are only two relevant comparator businesses in the New Zealand domestic market.[248] Different to the Commission for Energy Regulation and the NZ

245 We had concerns with assumed prior belief of one. Assuming the mean of the distribution was one may be a reasonable assumption where the beta is randomly selected from the market at large, but this is not the case in relation to our estimation of the equity beta for the benchmark efficient entity. The population is not the entire market but a small set of comparator businesses that had been carefully selected to be comparable to the benchmark efficient entity. See: AER, pp. 299–300.

246 SFG, *Regression-based estimates of risk parameters*, June 2013, p. 6.

247 NZ Commerce Commission, *Input methodologies (electricity distribution and gas pipeline services), Reasons paper,* December 2010, pp. 157–161, 508–552; Commission for Energy Regulation, *Decision on 2011 to 2015 distribution revenue for ESB Networks Ltd*, 19 November 2010, pp. 125–133; Europe Economics, *Europe Economics report for the Commission for Energy Regulation (CER), Cost of capital for Transmission Asset Owner (TAO), Transmission System Operator (TSO), Distribution System Operator (DSO),* 16 June 2010, pp.74–94.

248 Europe Economics, *Report for the commission for energy regulation Commission*, 16 June 2010, p.78; NZ Commerce Commission, *Input methodologies (electricity distribution and gas pipeline services), Reasons paper,* December 2010, pp.

Commerce Commission, we consider the available data on the nine Australian comparators is sufficient for us to form a reasonable equity beta range, as already discussed in section C.2.1.

We defined our benchmark efficient entity as 'a pure play, regulated energy network business operating in Australia'. Further, we discuss the equity beta estimates in the context of our foundation model, that is the domestic Sharpe–Lintner CAPM. This provides a strong rationale for estimating equity beta using Australian data. The use of a foreign proxy is a suboptimal outcome. It should only be used where there is evidence that this will produce more reliable estimates of the domestic equity beta than the Australian estimates themselves. We consider service providers and their consultants have not established reasonable basis to conclude that US data should be used in place of Australian data.

In the 2009 WACC review, we noted the difference in regulation of businesses, the regulation of the domestic economy, geography, business cycles, weather and a number of different factors are likely to result in differences between equity beta estimates for similar businesses between countries.[249] It is difficult to assign quantitative impacts to each of these qualitative factors.

We also note the beta estimates from international comparators are measured with respect to the market portfolio of their home market. This means the beta estimates from international comparators are not a measurement of the firm's systematic risk relative to the Australian domestic market portfolio. The Australian market portfolio may exhibit a relatively high systematic risk since it contains many mining stock returns of which are very dependent on the global economy and therefore have high systematic risk. The effects of industrial structure on the systematic risk of the market portfolio are well known and noted in the financial literature.[250] The potential practical importance of this issue is considerable. If the systematic risk of the market portfolio in Australia is higher than that of other countries, then international comparators may produce upwardly biased estimates when used in Australian context.

In their submissions to the equity beta issues paper, consumer groups submitted that less weight should be placed on the international data. COSBOA submitted that our use of international comparisons to set the return on equity at the high point of the range is inconsistent and not justified.[251] PIAC agreed with us that it is necessary to interpret the results of international studies with caution and the choice of overseas comparators needs to be based on solid reasoning:[252]

> This 'solid reasoning' should include a critical examination of the regulatory differences between Australia and the comparator nations However, it should also consider the broader economic, operating, tax and legal environments. Given the complexity of making comparisons, there must be a strong onus of proof on any stakeholder who proposes using international comparator data in a 'determinative' or informative' role (versus using the results as a 'cross-check'). That is the onus should sit with the proposer to clearly establish the benefits that the international data adds to the estimation of the equity beta for the benchmark efficient entity in terms of enhancing both the reliability and validity of the results.

Similarly, APA submitted that international evidence should not be considered for beta estimation:[253]

157–161, 508–552; Commission for Energy Regulation, *Decision on 2011 to 2015 distribution revenue for ESB Networks Ltd*, 19 November 2010, pp. 125–133.

249 AER, *Final decision: WACC review*, May 2009, pp. 261–264.

250 M. Lally, 2004 discusses this in an Australian context. Heston and Rouwenhorst, 1994 discuss this issue in a European context. S.Heston, S. and K. Rouwenhorst, 'Does industrial structure explain the benefits of international diversification', *Journal of Financial Economics*, Vol 36, 1994, pp. 3–27.

251 COSBOA, *Comments: Return on equity issues paper*, November 2013, p. 3.

252 PIAC, *Submission to beta issues paper*, October 2013, p. 24.

253 APA, *Submission on beta issues paper*, October 2013, p .9 and pp.16–17.

> We do not see data from international comparators as necessarily being relevant to construction of the benchmark efficient entity, or to estimation of the parameters of financial models to which regard might be had in rate of return determination. They may have a role to play in certain specific circumstances, but not in beta estimation. Augmenting an Australian sample with data for international comparators may increase the size of the sample to be used in estimation, but if the data for those comparators are from a different population, the meaning of the resulting estimate and its reliability are quite unclear.
>
> …
>
> We see the task of ensuring that potential international comparators might reasonably be expected to provide information relevant to the benchmark provider as adding complexity which has not yet been addressed.
>
> APA sees international comparators as providing neither primary data for beta estimation, nor evidence which is particularly useful in establishing whether Australian equity betas are those of the benchmark entity.

In its recent reports, CEG has conducted sensitivity analysis of Henry's equity beta estimates for both the Australian comparators and the US regulated firms.[254] However, we consider this sensitivity analysis does not lead to the conclusion that Australian equity beta estimates should not be used. We acknowledge that estimates of equity beta might be affected by altering the start of the estimation period, end of the estimation period, sampling period (that is, monthly versus weekly or daily returns), or firms included within the sample. The evident variability in the analysis conducted by CEG on Henry's US data suggests there is no advantage relative to using Australian data.[255]

In its June 2013 report, CEG examined the correlation between industry betas in Australia and the US. It suggested that the US sample provides a relevant proxy for regulated Australian energy network as the industry betas are positively correlated.[256] However, we do not consider CEG's analysis sufficient to reach this conclusion. CEG's analysis simply found the beta estimates across industry indices in Australia and the US have a correlation of:[257]

- 0.54 for estimation period of 27 January 1994 to 30 March 2013
- 0.60 for estimation period of 28 January 2002 to 30 March 2013.

This positive correlation is not surprising as both Australia and the US are open markets in the global economy. Bodie et al. found high positive correlations among stock portfolios of different developed countries (including US, Germany, UK, Japan, Australia, Canada and France). They suggest globalisation and market integration are the cause of these high correlations.[258] The positive correlation between the two market indices does not imply the equity beta estimates from the US comparable firms can be used as a direct proxy for the Australian benchmark efficient entity. CEG has not demonstrated that the equity beta estimates from the US utilities sector are reasonable proxies for the Australian benchmark.

We further note this CEG analysis indicates the beta estimates for the Australian utilities sector are relatively stable over time, while it is not the case in the US:[259]

- For estimation period of 27 January 1994 to 30 March 2013, the average beta estimate for the Australian utilities sector is 0.43. The average beta estimate for the US utilities sector is 0.56.

254 CEG, *International comparators for the ENA*, October 2013, pp. 41–45; CEG, *Precision of beta estimates*, October 2013, pp. 4–7.
255 CEG, *International comparators for the ENA*, October 2013, pp. 41–45.
256 CEG, E*quity beta from US companies,* June 2013, pp. 37–41.
257 CEG, E*quity beta from US companies,* June 2013, p. 39.
258 Bodie, Kane and Marcus, *Investment*, eighth edition, McGraw-Hill Irwin, 2009, pp. 883–884.
259 CEG, E*quity beta from US companies,* June 2013, p. 39.

- For estimation period of 28 January 2002 to 30 March 2013, the average beta estimate for the Australian utilities sector is 0.47. The average beta estimate for the US utilities sector is 0.72.

CEG provided no explanation for these differences.

In the issues paper, we found a number of US comparator businesses with a high proportion of regulated assets identified by CEG are vertically integrated. They engage in energy generation, wholesale and retail of energy, as well as other regulated activities distinct from energy distribution and transmission.[260] In response, in its October 2013 report CEG analysed the relationship between:[261]

- asset beta and the generation plant as a proportion of total assets
- asset beta and the generation opex as a percentage of total opex
- asset beta and the ratio of bundled electric revenues to delivery only electric revenues.

CEG subsequently concluded that regulated provision of generation or retail activities is not risker than regulated provision of energy transport services in the US as the slope coefficients for these analyses are not statistically different from zero.

As we noted in the equity beta issues paper, most of the vertically integrated businesses in the CEG's sample engage in both energy generation and retail activities. Some also engage in other regulated/unregulated activities that are distinct from energy distribution and transmission, such as telecommunications, real estate development and manufacturing. CEG has not tested for the relationship between the asset beta and the total effect of these non-relevant activities, which would be a more relevant test to support its conclusion.

We have conducted our own analysis and found that vertical integration and other activities do increase beta estimates. We note CEG's sample of US comparators has a significant overlap with the sample previously examined by the Allen Consulting Group (ACG) in its report to the ENA, Grid Australia and the APIA.[262] However, the ACG included 'only those businesses that are almost exclusively electricity and/or gas distribution and transmission businesses' in its US comparator set.[263] Further, according to the classification presented by the ACG, more than half of the CEG comparator businesses were classified as 'integrated regulated' or 'integrated', and, therefore, excluded from the ACG sample.

We examined the US re-levered equity beta estimates presented by SFG. We included only those identified by ACG as 'almost exclusively electricity and/or gas distribution and transmission businesses'. This produced an average equity beta of 0.76 as presented in Table C.9. This is significantly lower than the 0.88 average estimated by SFG based on the 56 US comparator businesses identified by CEG.[264] In this sense, we consider CEG did not provide satisfactory evidence to demonstrate that vertically–integrated US energy businesses and businesses that engage in other activities present close comparators to 'a pure play, regulated energy network business operating in Australia'.

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260 AER, *Better regulation equity beta issues paper*, October 2013, pp. 33–34.
261 CEG, *International comparators for the ENA*, October 2013, pp.11–18.
262 ACG, *Beta for regulated electricity transmission and distribution, Report to Energy Network Association, Grid Australia and APIA*, 17 September 2008, pp. 16–57 (ACG, *Beta for regulated electricity networks*, September 2008).
263 ACG, *Beta for regulated electricity networks,* September 2008, p. 18.
264 SFG, *Regression-based estimates of risk parameters*, June 2013, p. 19.

Table C.9 US listed individual firm data—exclusively electricity and gas distribution and transmission businesses

Name	Re-levered beta
Consolidated Edison	0.55
Laclede Group	0.58
Northwest Natural Gas	0.59
Northeast Utilities	0.61
South Jersey Industry	0.71
WGL Holdings	0.73
New Jersey Resources	0.74
Pepco Holdings	0.74
Centerpoint Energy	0.75
Piedmont Natural Gas	0.79
Atmos energy	0.79
AGL Resources	0.80
Southwest Gas	0.82
Nisource	0.84
CH Energy Group	0.85
ITC Holdings	1.03
UIL Holdings	1.04
Mean	0.76

Source: AER analysis based on SFG data. See: SFG, *Regression-based estimates of risk parameters*, June 2013, p. 19.

APIA noted that we have rejected CEG's US dataset on the basis that some firms are vertically–integrated, but accepted vertically integrated Australian firms such as Alinta and AGL, which owned generation plant in this time period and was a gas retailer.[265] Similarly, APA also noted that AGL Energy is a retailer and Alinta has experienced financial difficulties and no longer exists as a company

265 APIA, *Submission to beta issues paper*, October 2013, p. 6.

with traded shares. While AGL Energy is currently a retailer, this resulted from a major asset swap in October 2006 when AGL sold its infrastructure and asset management business to Alinta and acquired a portion of Alinta's retail and co-generation businesses.[266] As discussed in section C.2, we account for this by only including data on AGL Energy up until October 2006. Similarly, we only included data for Alinta up until August 2007 because it no longer exists as a company with traded shares.

The ENA noted there are strong similarities between our current approach to beta estimate and the previous Tribunal's comments in relation to the debt risk premium (DRP). Therefore it submitted:[267]

> The fact that the overseas companies may be not be quite as comparable to the benchmark firm must be weighed against the paucity of the domestic data - in the same way that BBB and A- bonds should be included due to the paucity of BBB+ bonds.

We do not consider the previous Tribunal's comments made in relation to the DRP are relevant to our equity beta estimation. Different to the DRP, we consider the available data on the nine reasonable Australian comparators is sufficient for us to form a reasonable equity beta estimate, as discussed in section C.2.1. While including a sample of 56 US–listed stocks would increase the number of observations, they are less relevant comparators due to the numerous issues discussed above. This is similar to our approaches for the other Sharpe–Lintner CAPM parameters. For example, we do not mechanistically apply US data to our risk free rate or the MRP estimation, despite the US data is more 'voluminous'. We consider service providers and their consultants did not provide satisfactory evidence to demonstrate that the US energy businesses present close comparators to 'a pure play, regulated energy network business operating in Australia'. As stated earlier in this section, countries (Australia and the US in particular) differ along a number of dimensions that can result in differences in the equity beta estimates for similar businesses. CEG discussed only one of those factors—differences in regulatory environments. Therefore, we consider empirical estimates of international comparators should be interpreted with caution.

C.3.2 International empirical estimates

Although we have concerns with the equity beta estimates derived from international comparators, we have considered the US empirical estimates as well as other international estimates before us. They range from 0.5 to 1.3. Recognising the inherent uncertainty caused by the inability to quantify differences between the US and Australia, we consider the analysis of overseas energy networks support the choice of a point estimate in the upper end of our range.

In the 2009 WACC review, we presented Henry's equity beta estimates for a set of US electricity networks (but not gas networks). For the period 1990 to 2008 (but excluding the technology bubble), the simple average of individual firms' betas (monthly/weekly by Henry) are 0.58 to 0.71.[268] ACG also calculated equity beta estimates, using a comparator set that included electricity and gas networks. For the same period, these point estimates are:[269]

- 0.65 to 0.73 as the average of individual firms (OLS, re-weighted OLS and LAD by ACG)
- 0.54 to 0.68 as the average/median of portfolios (OLS, re-weighted OLS and LAD by ACG).

266 APA, *Submission on beta issues paper*, October 2013, p. 4.

267 ENA, *Submission to beta issues paper*, October 2013, p. 42

268 Henry, *Estimating β*, April 2009, pp. 40–46; AER, *Final decision: WACC review*, May 2009, p. 330. As pointed out by CEG, we have incorrectly cited the bottom end of this range in the equity beta issues paper.

269 ACG, *Beta for regulated electricity networks*, September 2008, p. 48; AER, *Final decision: WACC review*, May 2009, pp. 329–331.

CEG submitted we have been inconsistent in presenting the equity beta ranges for the domestic firms and the international comparators. CEG submitted that for the domestic data, we have focused on the post 2002 beta estimates while we have only reported the longest data for the US estimates.[270] We note there are a sufficient number of businesses in the US to examine equity beta estimates which include data prior to the 'technology bubble'. However, this is not the case for the Australian data. Further, we note that using a longer estimation period is likely to provide more precise equity beta estimates. For completeness, we also report the US beta estimates prepared by Henry and ACG for the shorter periods below:[271]

- 0.65 to 0.78 as the average of individual firms using data from 2002 to 2008 (OLS and LAD by Henry)
- 0.76 to 0.86 as the average of individual firms using data from 2003 to 2008 (OLS and LAD by Henry)
- 0.86 to 1.00 as the average of individual firms using data from 2003 to 2008 (OLS, re-weighted OLS and LAD by ACG)
- 0.65 to 1.05 as the average/median of portfolios using data from 2003 to 2008 (OLS, re-weighted OLS and LAD by ACG)

Separate from the 2009 WACC review, but still considering the same data window (that ends with the GFC), other evidence on overseas equity betas includes the following:

- Analysis by the Essential Service Commission of Victoria (ESC) in 2008 presented equity beta estimates for US energy networks together with analysis for equivalent Australian networks. The ESC's key conclusion is that US estimates are slightly above the Australian estimates and that 'the US evidence suggests that the beta is between 0.6 and 0.8'.[272]
- PricewaterhouseCoopers (PwC) produced international equity beta estimates for Ofgem in 2009.[273] These estimates include five years of data up until the onset of the GFC. The sample included gas and electricity distribution and transmission firms in the USA, UK and Europe. The average equity beta is 0.64 (to December 2007) or 0.78 (to September 2008).[274]
- The 2012 McKenzie and Partington report referred to estimates of equity beta by Professor Damodoran of the Stern School of Business at New York University.[275] Damodoran has calculated equity beta estimates for the various United States industry sectors each year since 1999, using a five year data window.[276] The pattern across this analysis is that the electricity and gas network equity beta estimates are amongst the lowest observed.[277] The results that are most

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[270] CEG, *International comparators for the ENA*, October 2013, pp. 26–33.
[271] Henry, *Estimating β*, April 2009, pp.41-46; ACG, *Beta for regulated electricity networks*, September 2008, p. 49.
[272] ESC, *Final decision: Gas access arrangement review 2008–2012*, 7 March 2008, p. 476.
[273] PricewaterhouseCoopers, *Final report: Office of the Gas and Electricity Markets, Advice on the cost of capital analysis for DPCR5*, 1 December 2009, pp. 37–45 (figures 13, 16–19).
[274] The average equity betas were computed by us based on visual inspection of figures 13, 16-19 and the methodology description provided in the PwC report. We adjusted for vertical integration for both UK and non-UK businesses in a manner consistent with the PwC methodology. We do not use the date at which PwC reports equity betas as we aim to find other equity beta estimates that match the same data window as that of Henry's.
[275] McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 15, 29–32.
[276] This data is available at http://pages.stern.nyu.edu/~adomodar/ and then clicking on the link 'Updated Data' at top left, accessed 24 September 2013.
[277] Specifically, the relevant industry sectors are Natural Gas (Distribution) which becomes Natural Gas Utility in 2008, Electric Utility (East), Electric Utility (West) and Electric Util. (Central).

comparable to the 2009 WACC review analysis are those ending in January 2007 and January 2008. The point estimates are:[278]

- 1.34 in January 2007 re-levered to 60 per cent gearing (debt to equity ratio of 61 per cent)
- 1.31 in January 2008 re-levered to 60 per cent gearing (debt to equity ratio of 62 per cent)
- We acknowledge that the gearing figures reported in the equity beta issues paper were in fact debt to equity ratios as correctly pointed out by CEG. We have corrected these numbers and re-levered these estimates to match the benchmark gearing of 60 per cent. We note Damodoran estimates were much higher than the estimates produced by others for the similar period. We consider this is because the Damodoran estimates are based on the entire industry sector. The industry sector betas would also measure non-regulated or regulated businesses that engage in activities other than the provision of electricity and gas transmission and distribution services.

In the equity beta issues paper, we also presented new estimates of equity beta for overseas electricity and gas networks—that is, estimates that consider data after the onset of the GFC. These estimates have been relatively sparse. The following reports provide empirical evidence based on this broader sample:

- The CEG report prepared as a part of the ENA submission to our consultation paper (discussed above) suggested a sample of 56 US–listed energy network companies to be used as comparators for the Australian regulated energy networks.[279] Based on the comparator sample provided by CEG, SFG computed equity beta estimates over an 11 year period from 2 January 2002 to 19 November 2012.[280] The resulting estimates of re-geared equity beta are as follows:[281]
  - 0.88 for the average re-geared equity beta of individual firms
  - 0.91 for the average re-geared equity beta of equal-weighted index.
- The Damodoran equity beta estimates for United States industry groups have been updated across this time:[282]
  - 0.99 in January 2010 re-levered to 60 per cent gearing (debt to equity ratio of 87 per cent)
  - 1.01 in January 2011 re-levered to 60 per cent gearing (debt to equity ratio of 79 per cent)
  - 1.01 in January 2012 re-levered to 60 per cent gearing (debt to equity ratio of 75 per cent)
  - 0.72 in January 2013 re-levered to 60 per cent gearing (debt to equity ratio of 74 per cent)
- The NERA Economic Consulting (NERA) report for the Queensland Competition Authority (QCA) included equity beta estimates for UK and US energy networks for two different estimation

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278 These averages are calculated as the average of the four relevant categories listed above, each weighted by the number of firms in that category. The equity beta for each firm is unadjusted for leverage. That is, it has not been de-levered and re-levered to the benchmark gearing (60 per cent), though there is minimal difference between the average leverage (61 or 62 per cent) and the benchmark in this case.

279 CEG, *Equity beta from US companies,* June 2013.

280 SFG, *Regression-based estimates of risk parameters,* June 2013.

281 The SFG results incorporate Vasicek adjustment to the beta estimates. Consistent with the 2009 WACC review, we have not applied Vasicek adjustment in our past decisions.

282 As with the previous Damodoran results, these averages have been corrected from the equity beta issues paper and re-levered to 60 per cent gearing.

periods ending in March 2011.[283] NERA used both equal-weighted and value-weighted portfolios to produce point estimates of:[284]

- 0.63 to 1.09 for UK firms
- 0.79 to 0.96 for US firms

- For its Input Methodologies (electricity distribution and gas pipeline services) reasons paper New Zealand Commerce Commission estimated asset and equity betas for a set of comparator businesses, classified as either electricity utility or gas utility by Bloomberg.[285] The sample of comparators included two NZ businesses (Horizon Energy and Vector), six Australian businesses (DUET, Spark Infrastructure, SP AusNet, APA, Envestra, and Hastings Diversified Utilities), one UK National Grid, and 70 US businesses. The sample periods included five-year intervals up to 31 May 1995, 31 May 2000, 31 May 2005, 31 May 2006, 31 May 2007, 31 May 2008, 31 May 2009, and 31 May 2010. The average estimates (over all sampling periods and all businesses in the sample) of the asset betas for the sample were as follows:
  - Overall: 0.28, gas: 0.23, electricity: 0.30 using monthly data (correspond to the equity betas of 0.70, 0.58, 0.75, respectively, assuming 60 per cent gearing zero debt beta).
  - Overall: 0.32, gas: 0.31, electricity: 0.32 using weekly data (correspond to the equity betas of 0.80, 0.78, 0.80, respectively, assuming 60 per cent gearing zero debt beta).

In its submission to the equity beta issues paper, MEU considered that we have overcompensated in our assessment of the point estimate as a result of incorporating inappropriately biased overseas experience into the analysis:[286]

> At earlier stages of the analysis of equity beta (i.e. before there was sufficient data in the Australian market), overseas evidence showed that equity betas were considerably lower than those calculated from the sparse data available for Australian energy network firms. This overseas data was either rejected or significantly moderated on the basis that the "tech bubble" had significantly deflated energy network equity betas by excluding the impact of this apparent aberration. If the impact of the tech bubble had not been excised, the output of the analysis would have been much lower equity betas. This means the assessments are inflated compared to un-modified empirical evidence.
>
> …the overseas economic outcomes since the GFC will have been to inflate the equity betas for overseas network firms. The GFC probably had a bigger impact on markets than the tech bubble, but the AER attempts to rationalise the exclusion of the tech bubble from equity beta estimates but to include the effects of the GFC. This removes a downward bias on equity beta (the tech bubble) but retain an upward bias from the GFC and the subsequent recessions affecting overseas stocks.

We note this is a valid consideration. As discussed in section C.2.2, we propose to consider Australian regression estimates based on both periods that include and exclude the 'technology bubble' and 'the GFC'. This would similarly apply to the international data.

We have reviewed the available international estimates referenced above. After taking into account the difficulty of adjusting for differing operating environments, we consider that the data nonetheless provides support to our estimate at the top of our equity beta range for the benchmark efficient entity.

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[283] NERA, *Cost of capital for water infrastructure company: Report for the Queensland Competition Authority*, 28 March 2011, pp. 36–37, 60.

[284] We recognise the comments from CEG and PIAC that Conine formula is not consistent with our standard leverage adjustment method. We have subsequently changed the NERA range to reflect the range using our standard leverage adjustment method.

[285] New Zealand Commerce Commission, *Input methodologies (electricity distribution and gas pipeline services), Reasons paper*, December 2010, pp. 508–552.

[286] MEU, *Submission to beta issues paper*, October 2013, pp. 2–3.

C.4 The Black CAPM

The Black CAPM is an alternative to the Sharpe–Lintner CAPM. We set out a brief overview of the Black CAPM in our consultation paper.[287] As a result of slightly different starting assumptions, the Black CAPM predicts that the slope of estimated returns will be flatter than for the Sharpe–Lintner CAPM.[288] This means that for firms with an equity beta below 1.0, the Black CAPM predicts a higher return on equity than the Sharpe–Lintner CAPM.[289]

We have already set out an evaluation of the Black CAPM against the criteria in appendix A. We have also provided analysis on the strengths and weaknesses of the Black CAPM in previous regulatory decisions (noting that these were under the previous rules framework).[290] The key point from this evaluation is that there is little prospect of resolving the implementation difficulties surrounding the Black CAPM—particularly the empirical estimation of the return on the zero-beta portfolio. Without robust parameter inputs, we have no confidence that direct estimation using this financial model will contribute to achieving the allowed rate of return objective. However, this does not mean there is no merit to the theoretical basis for the Black CAPM, particularly when viewed alongside the Sharpe–Lintner CAPM.[291] In the equity beta issues paper, we considered that the theoretical principles underpinning the Black CAPM can be used to inform a point estimate from the empirical equity beta range.[292] We have received some submissions in relation to this issue, however, they have not caused us to depart from this position. These submissions are discussed in detail in section C.4.3 below.

C.4.1 Theoretical implications

The key theoretical difference relates to borrowing and lending. The Sharpe–Lintner CAPM assumes that investors can access unlimited borrowing and lending at the risk free rate. However, the Black CAPM instead assumes that investors can access unlimited short selling of stocks, with the proceeds immediately available for investment. Either of these assumptions might correctly be criticised as being unrealistic, and it is not clear whether the replacement assumption is preferable.[293] Of course, such simplifications are inherent in all financial models.

From these starting assumptions, the following formula for the Black CAPM can be derived:

$$r_e = r_z + \beta_e \times (r_m - r_z)$$

Where

r_e is the expected return on equity

β_e is the equity beta

r_m is the expected return on the market

287 AER, *Consultation paper, Rate of return guidelines*, 10 May 2013, pp. 91–93.

288 This statement assumes that the representative investor can lend (but not borrow) at the risk free rate. The base form of the Black CAPM does not constrain the zero beta return to be above the risk free rate (which does not exist, by definition). In this case, the Black CAPM predicts a return on low beta equity that is below that of the Sharpe–Lintner CAPM.

289 Conversely, for firms with an equity beta above 1.0, the Black CAPM predicts a lower return on equity than the Sharpe–Lintner CAPM.

290 For example, see AER, *Final decision, Envestra Ltd, Access arrangement proposal for the SA gas network, 2011–2016*, June 2011, pp. 43–46, 164–175.

291 For clarity, this statement does not imply that we consider the theoretical basis for the Black CAPM to be completely accurate (or more reliable than the Sharpe–Lintner CAPM).

292 AER, *Equity beta issues paper*, October 2013, pp.49-53.

293 McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 25.

r_z is the expected return on the zero beta portfolio

Note that this equation follows the same form as the Sharpe–Lintner CAPM, except that risk free rate (r_f)has been replaced by the zero beta return (r_z).

There are clear conceptual definitions for the expected return on the zero beta portfolio. It will sit between the borrowing rate (upper bound) and lending rates (lower bound) available to the representative investor.[294] It is not possible to directly observe these borrowing and lending rates for the representative investor. However, this nonetheless provides a rough guide for any estimated return on the zero beta portfolio. Interest rates for different types of investors (including different credit ratings) are observable in the market. Previous expert advice to the AER indicated that the relevant borrowing rates may set an upper bound that is quite close to the risk free rate.[295]

Further, if it is assumed that investors can lend (but not borrow) at the risk free rate, the expected zero beta return will sit between the risk free rate and the expected return on the market.[296] This provides a further check on the reasonableness of empirical estimates of the zero beta return.

Where the zero beta return is above the risk free rate, the Black CAPM predicts that the Sharpe–Lintner CAPM will underestimate the expected return for shares with an equity beta below 1.0. That is, if the Sharpe–Lintner CAPM is used to generate an estimate of the return on equity, the conceptual prediction from the Black CAPM is that the return on equity will be above this figure (for all shares with an equity beta below 1.0). The magnitude of the increase is difficult to determine conceptually, though there is some rough guidance from the observation of borrowing rates in the market.

C.4.2 Empirical implementation of the Black CAPM

In the equity beta issues paper we noted that the empirical implementation of the Black CAPM is difficult. This is because the zero beta return is not observable and there is no reasonable method to obtain an estimate of the zero beta return. There is also an interaction effect with the return on the market, which is similarly unobservable. The Sharpe–Lintner CAPM also requires the return on the market to be estimated. However, in the Black CAPM, the inadequacy of the available proxies for the market portfolio amplifies the problems inherent in estimating the zero beta return (but do not have this effect on the risk free rate in the Sharpe–Lintner CAPM).

The NERA report submitted by the ENA illustrates how difficult it is to obtain a reliable empirical estimate of the return on the zero-beta portfolio.[297] NERA focuses on the zero beta premium, which is the return on the zero beta portfolio above the risk free rate. This calculation mirrors the calculation of the market risk premium, which is the expected market return above the risk free rate. The headline result is that the zero beta premium is around 12 per cent, with different scenarios shown in table C.10.

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294 See NERA, *Estimates of the zero-beta premium: A report for the Energy Networks Association*, June 2013, p. 6; or B. Grundy, *Comment on the cost of capital: A report for Envestra*, 23 March 2011, p. 8 (paragraph 21).

295 The arguments and counter-arguments are contained in K. Davis, *Cost of equity issues: A report for the AER*, 16 January 2011, pp. 6, 11; B. Grundy, *Comment on the cost of capital: A report for Envestra*, 23 March 2011, pp. 8–9; and K. Davis, *Cost of equity issues: A further report for the AER*, 13 May 2011, pp. 10–11.

296 Since even small investors can lend to the Commonwealth Government via purchase of CGS this seems plausible; though there are still complicating factors (for example, inflation and the residual sovereign risk). K. Davis, *Cost of equity issues: A further report for the AER*, 13 May 2011, pp. 4–5; see also McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 25.

297 NERA. *Estimates of the zero-beta premium: A report for the Energy Networks Association*, June 2013.

Table C.10 Estimates of the zero beta premium in NERA's latest report

Approach	Date range	Zero beta premium using portfolios (%)	Zero beta premium using securities (%)
NERA preferred method	1974–2012	13.95	11.05
	1974–1993	17.68	12.99
	1994–2012	10.03	9.00
Cross check using CEG method	1974–2012	11.23	8.74

Source: NERA, *Estimates of the zero-beta premium: A report for the Energy Networks Association*, June 2013, pp. 16, 17, 23.

Estimates of this magnitude appear implausible. Such a zero beta premium is approximately double the market risk premium of six per cent under a standard approach. The conceptual definition of the Black CAPM does not permit a zero beta return above the market return. In current conditions, with a risk free rate around four per cent, this means that the expected return on the zero beta portfolio is around 16 per cent. This is significantly above any reasonable expectation of the borrowing rate for the representative investor. Again, this is not compatible with the conceptual definition of the Black CAPM.[298] Professor McKenzie and Associate Professor Partington responded to an earlier report by NERA with a similar estimate of the zero beta return in this way:[299]

> As we illustrated earlier, the use of a portfolio which is not the market portfolio, and which is inefficient, leads to all sorts of problems when estimating the zero beta return. In this case, the result is a parameter estimate that is clearly incorrect, lying well outside the bounds prescribed by the underlying theoretical model. This hardly seems a solid basis on which to establish a cost of capital for regulatory purposes.

Further, given the linear form of the Black CAPM, these zero beta return estimates imply there is a negative price for systematic risk. That is, as a share takes on more systematic risk exposure, the expected return declines. Greater systematic risk means less reward. Given the market average return (for a share with an equity beta of 1.0) is around half the zero beta return, the expected return for a stock with an equity beta of 2.0 is approximately the risk free rate.

In section C.4.3 below, we set out how the selection a point estimate at the upper end of the equity beta empirical range might be one option to reflect the differing predictions of the Black CAPM relative to the Sharpe–Lintner CAPM.

As a rough assessment of the reasonableness of this option, it is possible to convert a higher equity beta into an equivalent zero beta premium above the risk free rate. Consider the illustrative scenario where the risk free rate is 4.0 per cent, the market risk premium is 6.0 per cent and the total market return is therefore 10.0 per cent. Using the CAPM, a firm with an equity beta of 0.6 would therefore have an expected return of 7.6 per cent. Increasing the equity beta from 0.6 to 0.7 would increase the expected return to 8.2 per cent, an increase of 60 basis points. To obtain an equivalent overall return in the Black CAPM, the original equity beta (0.6) could have been used with a zero-beta return of 5.50 per cent. The zero beta premium above the risk free rate is therefore 150 basis points (5.50 per cent minus 4.00 per cent). A number of illustrative scenarios are shown in table C.11.

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298 See B. Grundy, *Comment on the cost of capital: A report for Envestra*, 23 March 2011, p. 8, K. Davis, *Cost of equity issues: A further report for the AER*, 13 May 2011, pp. 4–5; and McKenzie and Partington, *Risk, asset pricing models and WACC*, June 2013, p. 25.

299 M. McKenzie and G. Partington, *Report to the AER: Review of NERA report on the Black CAPM*, 24 August 2012, pp. 22–23.

Table C.11 Zero beta premium implied by a given uplift in the equity beta

Risk free rate R_f (%)	MRP (%)	Market return R_m (%)	Change in beta	Implied zero-beta premium R_f - R_z (%)
4.0	6.0	10.0	0.4 – 0.7	3.00
4.0	6.0	10.0	0.5 – 0.7	2.40
4.0	6.0	10.0	0.6 – 0.7	1.50
4.0	7.5	11.5	0.55 – 0.7	2.50
5.5	6.0	11.5	0.4 –0.7	3.00
5.5	6.0	11.5	0.55 – 0.7	2.00

Source: AER calculations.

Table C.11 shows that, for 0.1 increase in equity beta (that is, from 0.6 to 0.7), to a 0.3 increase (that is, from 0.4 to 0.7), the size of the zero beta premium is between 150 basis points and 300 basis points (under a variety of scenarios for the risk free rate and market risk premium). This does not seem implausible, since zero beta premiums of this magnitude are below the market risk premium as required by the definition of the Black CAPM. Further, although the borrowing rates for the representative investor are not readily discernible, these magnitudes appear reasonable.

For clarity, we do not consider that the possible zero beta premiums presented in table C.11 are accurate or reliable as empirical estimates. As per our earlier analysis, we do not consider that there is any reliable empirical estimate for this parameter. However, in light of the available evidence, if the Black CAPM captured the 'true' state of the world better than any other asset pricing model, this magnitude of adjustment appears open to us.

As an additional factor, much of the evidence on 'low beta bias' relies on studies that use a short term risk free rate (one to three months) in the regression equation. The difference between the short term risk free rate and the long term risk free rate (10 years, as used by the AER) is considerable. On a longer time period, the average difference is 70 basis points. Recently, the difference has been larger—around 150 basis points in August 2013.[300] The zero beta premiums presented in table C.11 should therefore be increased by this amount when considering this class of evidence on the Black CAPM.

C.4.3 Impact on equity beta determination

The direct difference between the Black CAPM and the Sharpe–Lintner CAPM relates to the risk free rate. However, we do not propose to add a zero beta premium to the risk free rate. First, this would effectively replace the Sharpe–Lintner CAPM with the Black CAPM. As set out in the draft guideline, we consider the Sharpe–Lintner CAPM is suitable as the foundation model and is the more reliable of the two models.[301] Second, the risk free rate is readily observable and there exists very little

300 This illustrative example compares the effective yield on CGS with three months to maturity (2.33 per cent, RBA series TB129) and ten years to maturity averaged across August 2013 (3.86 per cent, RBA series TB133). The difference is 1.54 per cent.

301 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 61–62, 185–193.

contention over its value. This contrasts with the equity beta where there is no readily observable estimate and the regulatory process already requires consideration of a number of non-quantifiable factors. Including the Black CAPM at this point has the advantage of allowing the consideration of offsetting and/or cumulative factors. Third, to the extent that support for the Black CAPM is driven by empirical findings of a 'low beta bias', these are often explained with reference to problems in estimating equity beta (rather than the risk free rate, which is usually not in dispute).

Some service providers submitted that the evidence from the Black CAPM suggests the appropriate beta estimate is 1.0, for all firms in the market (including the benchmark firm).[302] These submissions stated that the AER's approach was unreasonable because it did not lift the equity beta range to include this value, or set the equity beta point estimate at 1.0.[303]

At its core these submissions reflect a different interpretation of the empirical evidence in the NERA report. This report states that the zero beta premium should be twice the market risk premium.[304] As set out above, we consider that this implausible result demonstrates that this empirical estimation approach cannot be relied upon. The service providers appear to agree with the position that this empirical estimation approach is flawed, since they do not propose to adopt the (implausible) outcome (a zero beta premium equal to twice the market risk premium). Nonetheless, they also use the same study to justify moving the zero beta premium to the maximum extent possible before the estimate becomes conceptually implausible.[305] No reasonable explanation is provided as to why such a selective adjustment is warranted, rather than any other.

We consider that such an adjustment basis would not be reasonable. We did not arbitrarily or automatically rule out such an approach, but we considered whether analysis based on the Black CAPM might result in an increase to the range, or to the upper boundary of the range, relative to the values that would have been selected absent consideration of the Black CAPM. The empirical and conceptual evidence did not warrant such an adjustment.

As discussed in the equity beta issues paper, our proposed approach is to consider the Black CAPM when determining equity beta for use in the Sharpe–Lintner CAPM. Relative to the Sharpe–Lintner CAPM, the theory of the Black CAPM points to the selection of a higher estimate for this parameter. However, while the direction is known, the magnitude is much more difficult to ascertain. As noted above, we give primary consideration to Australian empirical estimates. We consider the theory of the Black CAPM is not sufficient to justify an adjustment to our range, but it supports selection of a point estimate at the upper end of the range.

Several stakeholders commented that the theoretical analysis of the Black CAPM identified such shortcomings in this approach that it should not have been used to inform the equity beta point estimate.[306] We consider that this explanatory statement, which presents the strengths and weaknesses of the Black CAPM, provides a reasoned basis for the particular role we have given to this analysis.

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302 ActewAGL, *Response to beta issues paper*, October 2013, p. 3; ENA, *Submission to beta issues paper*, October 2013, pp. 22–23.

303 ENA, *Submission to beta issues paper*, October 2013, pp. 22–23, 26–27.

304 See the earlier AER discussion of these results (table C.10), source document is NERA, *Estimates of the zero-beta premium: A report for the Energy Networks Association*, June 2013, pp. 16, 17, 23.

305 Further, they appear to consider that the conceptual limit is setting the zero beta premium equal to the market risk premium, rather than the (correct) upper bound which is based on the borrowing rate available.

306 See for example COSBOA, Return on equity issues paper, Comments, October 2013, p. 3.

PIAC stated that it was unreasonable for the AER to use theoretical analysis based on the Black CAPM to influence the selection of the equity beta point estimate.[307] PIAC considered that this was internally inconsistent with the AER position on another form of theoretical analysis—the conceptual analysis of the benchmark firm relative to the market average firm. In that case, the AER stated that it would rely on the empirical evidence (rather than the theoretical analysis) to determine the equity beta.[308]

We do not consider that we have been inconsistent in our treatment of the two different conceptual analyses.[309] Each produces a directional expectation relative to a reference point, but not the magnitude of any adjustment.[310] The observed empirical range is given primacy over each of these two conceptual directional expectations. However, one of the reference points lies entirely outside the empirical range. That is, the range of 0.4 to 0.7 lies entirely below the equity beta of the market average firm (of 1.0).[311] The other reference point lies within the observed empirical range, by definition. In this differing circumstance, we select our equity beta estimate with regard to the directional expectation—but not outside the empirical range.[312] Hence, we have not elevated the conceptual above the empirical in either case.

C.5 Selection of range and point estimate

In this section, we respond to submissions on the point estimate and range for the equity beta. We set out our key reasons for selecting the point estimate and range in chapter 6.

C.5.1 Selection of range

We note that our proposed range in this decision is consistent with the range proposed in our equity beta issues paper. Only one of our key reasons for selecting our proposed range has changed since our equity beta issues paper. That is, we no longer propose to use equity betas from regulated Australian water networks as a cross check. We consider Australian water networks face reasonably comparable systematic risks to Australian energy networks. However, this data provides an immaterial amount of new information because Australian water regulators often base their beta estimates on equity betas from Australian energy networks. Notwithstanding, this information supports an equity beta estimate within a 0.55 to 0.8 range, which would be consistent with our proposed range.

In its submission to our equity beta issues paper, Spark Infrastructure stated that, when setting the equity beta range, we over-emphasised the importance of covariance between stock and market returns as a measure of risk and ignored a wide range of risks priced by investors.[313] We note our foundation model, the Sharpe–Lintner CAPM assumes investors hold a diversified portfolio of assets and only require compensation for systematic risk, defined as the covariance between stock and

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307 PIAC, *Better equity, submission to the AER's equity beta issues paper*, 28 October 2013, pp. 28–29.

308 More specifically, the AER stated that the empirical evidence would determine the *magnitude* of the directional adjustment in accordance with the conceptual analysis. See AER, *Better regulation, Equity beta issues paper*, October 2013, p. 18; and PIAC, *Better equity, submission to the AER's equity beta issues paper*, 28 October 2013, p. 29.

309 Even so, differing applications might be reasonable if they reflected the differing strengths and weaknesses of each piece of conceptual analysis.

310 That is, for the conceptual comparison against the market average firm, the expectation is that the equity beta will be below 1.0. For the conceptual Black CAPM analysis, the expectation is that the equity beta will be above the 'standard' Sharpe–Lintner CAPM equity beta.

311 For clarity, the McKenzie and Partington statement that the benchmark firm equity beta should be 'among the lowest possible' was not made with regard to the 0.4 to 0.7 range. Rather, it was a statement made with regard to the entire spectrum of possible equity beta values, above and below 1.0.

312 As has been set out above, we did consider whether to adjust the range itself with regard to the Black CAPM; but the evidence (and in particular, the empirical evidence) did not support such an adjustment.

313 Spark, *Response to beta paper*, October 2013, p. 3.

market returns.[314] We disagree with the claim that we have ignored a wide range of risks priced by investors. In selecting to use the Sharpe–Lintner CAPM as a foundation model, we have considered the merits of other financial models, which price additional risks. When analysing this information, we determined it was reasonable to use the Sharpe–Lintner CAPM as a foundation model (see appendix A). Further, the regulatory regime compensates service providers for non-systematic risks through mechanisms like self-insurance allowances and cost pass throughs.[315] Therefore, it would not be appropriate for the allowed rate of return to also compensate service providers for these risks.

Further, consumer groups agree that this identified range is reasonable. In its submission to our equity beta issues paper, COSBOA agreed the evidence presented by us lead to an equity beta range of 0.4 to 0.7.[316] MEU found our approach to identifying the range was rigorous and incorporated considerable analysis.[317] PIAC observed it was reasonable for us to conclude that the range was 0.4 to 0.7.[318] We agree with these submissions.

We have transparently derived our equity beta range using a single type of evidence—empirical estimates using our comparator set of Australian energy service providers traded on the ASX. Most of these beta estimates fall within the 0.4 to 0.7 range. We have provided a coherent logic behind what our range represents. That is, we have based our range on the range of point estimates derived from different samples and sampling periods. We consider this is most likely to provide a reasonable range for the 'true' equity beta of a benchmark efficient entity. We have chosen not to base our equity beta range on confidence intervals. Our consultant, Henry has noted the confidence interval is not a particularly useful method of comparison across equity beta estimates.[319] Further, this is consistent with our 2009 decision where we did not base the equity beta range on confidence intervals.[320] We outlined our reasons for not basing our range on confidence intervals. Since 2009, our reasoning has not changed and is as follows:

- The presence of outliers has the potential to affect point estimates and their associated confidence intervals.
- The presence of autocorrelation and heteroskedasticity causes issues when examining confidence intervals. Namely, it becomes difficult to discern whether confidence intervals overstate or understate the upper bound estimate.
- The upper and lower bounds of confidence intervals are less likely to represent the 'true' equity beta point estimate of a benchmark firm, compared to the range of point estimates derived from different samples and sampling periods.

In its submission to our equity beta issues paper, APIA strongly emphasised that a range of 0.4 to 0.7 significantly underrepresents the actual range of values in the dataset. APIA claimed that we have not derived this range transparently and have not based it on confidence intervals. APIA asserted it is difficult to understand where the upper bound of the range should be without the confidence interval.[321] Likewise, the ENA was also concerned that we did not provide coherent logic behind what the range represents, particularly with regards to the upper boundary. Consequently, the ENA

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314 McKenzie and Partington, *Risk, asset pricing models and WACC, June 2013*, p. 21; R. Brealey, S. Myers, G. Partington, and D. Robinson, *Principles of Corporate Finance*, McGraw-Hill Australia: First Australian Edition, 2007, p. 187.

315 See NER 6A.7.3, 6.6.1; NGR 97(1)(c), 531.

316 COSBOA, *Comments: Return on equity issues paper*, November 2013.

317 MEU, *Submission to beta issues paper*, October 2013.

318 PIAC, *Submission to beta issues paper*, October 2013.

319 Henry, *Estimating β*, April 2009, p. 50.

320 AER, *Final decision: WACC review*, May 2009, pp. 286–290.

321 APIA, *Submission to beta issues paper*, October 2013.

suggested we should explain what our range captures.[322] We disagree with these submissions and consider we have transparently derived our equity beta range. In our issues paper and in this decision we note that we have based our range of empirical estimates on the range of point estimates derived from different samples and sampling periods. We consider this is more likely to represent the 'true' range of equity beta point estimates, as opposed to the upper and lower bounds of confidence intervals.

APIA proposed this range is unrealistically narrow because our empirical analysis assumes investors use just one day of the week or month to estimate returns. By relaxing this one assumption, APIA find average betas range from 0.29 to 0.94, depending on whether it estimates beta on the 6th or 17th day of the month. As discussed above, we consider a comprehensive analysis of all portfolios and individual firm betas is required to reach this conclusion. Nonetheless, we note that SFG by repeating its analysis 20 times using different start point within the four-weekly period, produced the equity beta estimates in line with Henry's and the ERA's estimates. We will further analyse this issue in the future.

We recognise the values in our range are lower than the previous equity betas we have applied to the energy sector. However, we do not consider this to be problematic. We applied an equity beta of 1.0 before our 2009 WACC review because the NER deemed an initial default equity beta value of 1.0 for all transmission network service providers and the NSW/ACT distribution network service providers.[323] Under the rules, there was a need for persuasive evidence before adopting a value or method that differed from those previously adopted.[324] Therefore, we lowered the equity premium to 0.8 in 2009 because there was persuasive evidence to depart from the previously adopted equity beta values.[325] This point estimate of 0.8 was slightly above our range of empirical estimates. This took into account the likely precision of our empirical estimates, along with other relevant considerations.[326] Relative to 2009, we now have greater confidence that the equity beta for the benchmark efficient entity is in the range of 0.4 to 0.7. This is for the following reasons:

- We now have greater confidence in the reliability of the empirical estimates. At one level, this reflects the substantial increase in the available data set. The core regressions in the 2009 WACC review were based on the periods from January 2002 to September 2008 (six years and eight months) and September 2003 to September 2008 (five years).[327] Extending the data set to 2013 allows up to an additional five years of data.[328] The more recent studies examining longer time periods provided results in line with Henry's 2009 study.
- In 2009, there was uncertainty due to the global financial crisis. Four years on, we now have empirical estimates generated from a broader set of different market conditions. The consistency of these results from markedly different environments also gives us increased confidence that the observed empirical range is reasonable. That is, the empirical estimates from the relatively stable period after the tech boom but before the GFC (2002–2008) are consistent with recent analysis using the period encompassing the GFC and its aftermath (2008–2013).[329] This appears to suggest that the equity beta for the benchmark efficient entity is relatively stable across time, even

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322 ENA, *Submission to beta issues paper*, October 2013.
323 See NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1 (in pre-2009 versions of the NER).
324 NER, cls. 6.5.4(e) and 6A.6.2(j).
325 AER, *Final decision: WACC review*, May 2009, p. 244.
326 AER, *Final decision: WACC review*, May 2009, p. 307.
327 For clarity, the 2009 WACC review also considered other periods, including longer periods submitted by ACG for the Joint Industry Association.
328 The Henry report we have commissioned will use data up to the end of June 2013, an increase of four years and nine months.
329 This does not mean that we consider a short data period centred on the GFC would be a reasonable basis for equity beta estimation. We consider a period of (at least) five years is appropriate for equity beta estimation and see no conceptual problem with incorporating GFC data within such a data period.

when there are major fluctuations in the business cycle. This increases our confidence in the observed equity beta range.

- Several industry stakeholders disagreed with using an equity beta from within our range and submitted an equity beta point estimate from the top of this range would be too low. CitiPower, Powercor and SA Power Networks raised concerns that we have lowered the equity premium over the last four years and have proposed to continue to do so by using a 0.7 point estimate. They expressed concern that, given an equity beta of 0.7, the inferred return on equity could be insufficient to attract an efficient level of investment.[330] Spark Infrastructure submitted an equity beta of 0.7 would prevent service providers from effectively competing for capital.[331] We consider these submissions to be assertions that stakeholders have insufficiently substantiated. We consider we have sufficient evidence to determine an equity beta from our range of empirical estimates reflects the systematic risks of a benchmark efficient entity. This range is robust to different econometric techniques and sampling periods.

C.5.2 Selection of a point estimate

We consider an equity beta point estimate from the top of our empirical range to be consistent with our consultants' advice. McKenzie and Partington stated, 'one would expect the beta to be among the lowest possible'. They also noted that 'it is difficult to provide a point estimate of beta, based on these considerations'.[332] Further, they stated afterwards that one could find empirical support for their proposition by looking at the industry beta tables from Damodoran's study, which considers international data. This data is more supportive of a point estimate in the upper end, rather than in the middle of our range.[333] As such, our proposed point estimate of 0.7 is not inconsistent with our consultants' advice.

In their submissions to our equity beta issues paper, COSBOA, MEU and PIAC argued against selecting an equity beta at the top of the 0.4 to 0.7 range.[334] Each of these consumer groups submitted that a point estimate from the top of the range was inconsistent with our evidence, including advice from Frontier, McKenzie and Partington. Particularly, these stakeholders felt 0.7 did not reflect McKenzie and Partington's conclusions that the equity beta would be 'the lowest possible'. Further, PIAC submitted that the ERA's empirical analysis in 2013 suggested re-levered portfolio equity beta estimates range from 0.39 to 0.59, with 0.5 as a mean.[335] As discussed in the previous paragraph, we do not consider selecting an equity beta of 0.7 to be inconsistent with our consultants' advice.

MEU and PIAC both specified that it would be more appropriate to adopt a point estimate around the mid-point of the range.[336] PIAC submitted that, as a matter of policy, we should adopt a point estimate around 0.5 to 0.6 and only depart from this if there is a compelling case to do so.[337] We consider the evidence currently before us is sufficiently strong to justify applying an equity beta point estimate at the upper end of the 0.4 to 0.7 range of empirical estimates. Adopting a point estimate around the mid-point would be more reasonable if our intention was to base the allowed return on equity on the Sharpe–Lintner CAPM and empirical estimates alone. However, the rules require us to have regard to relevant estimation method, financial models, market data and other evidence when determining the

330 CitiPower, Powercor, SAPN, *Submission to beta issues paper*, October 2013, pp. 3–4.
331 Spark, *Response to beta paper*, October 2013, p. 3.
332 McKenzie and Partington, *Estimation of equity beta*, April 2012, p. 15.
333 McKenzie and Partington, *Estimation of equity beta*, April 2012, pp. 29–32.
334 COSBOA, *Comments: Return on equity issues paper*, November 2013; MEU, *Submission to beta issues paper*, October 2013; PIAC, *Submission to beta issues paper*, October 2013.
335 PIAC, *Submission to beta issues paper*, October 2013, p. 7.
336 MEU, *Submission to beta issues paper*, October 2013; PIAC, Submission to beta issues paper, October 2013.
337 PIAC, *Submission to beta issues paper*, October 2013, p. 30.

allowed rate of return.[338] When this information is taken into account, we consider it reasonable to select a point estimate from the upper end of the range of empirical equity beta estimates.

MEU submitted that, we should not only consider whether we should adopt a point estimate at the top of the range. Rather, it submitted we should have also considered whether any biases supported selecting an equity beta in the lower end of the range.[339] For instance, MEU suggested actual equity betas have been lower than regulated betas in past determinations, because regulated energy networks have been purchased at higher multiples than what the regulated rates of return imply. However, we have to be careful when interpreting the results of trading multiples for the following reasons:

- As stated in our draft explanatory statement, while a trading multiple above one may imply that the market discount rate is below the regulated rate of return, factors other than the rate of return may have caused this.[340]
- Even if a trading multiple above one is implying the market discount rate is below the regulated rate of return, this does not necessarily indicate that the equity beta is too high. Rather, this could be associated with a different parameter in the WACC formulation.
- Further, even if trading multiples imply market discount rates have been lower than the historic regulated rates of return, and this is due to the regulated equity beta, this does not suggest only lowering the allowed equity beta from 0.8 to 0.7 is an insufficient decrease. It is possible that lowering the allowed equity beta any further will result in the regulated rate of return being lower than the actual equity beta of a benchmark efficient entity.

Several stakeholders suggested alternative point estimates. The ENA suggested we select an equity beta point estimate of 0.94 should be used if we apply our foundation model.[341] The ENA bases this figure on a regression analysis involving Australian and US–listed firms (0.82 weighted by 1/6) and the expected return accounting for the relationship between size, book-to-market ratio and returns (0.91 weighted by 1/6). The ENA also bases this on evidence that regression-based estimates have little association with realised returns (1.00 weighted by 1/3) and a dividend growth model (DGM) analysis of the Australian comparator set (0.96 weighted by 1/3). The NSW distribution network service providers supported the ENA's submission and considered the available evidence suggests using an equity beta between 0.8 and 1.0 in the foundation model.[342] We consider this approach proposed by the ENA biases the equity beta upwards considerably, for the following reasons:

- It uses international data in its regression analysis, which reduces the relevance of the empirical estimates (see section C.3.2).
- It incorporates risk factors from the Fama–French three factor model into the equity beta of the Sharpe–Lintner CAPM. We have previously found there were significant problems with this model and have proposed not to use it (see A.3 and section C.4).
- It gives considerable consideration to DGM analysis. We do not rely on DGMs to estimate the return on equity for service provides because there are difficulties with constructing credible datasets for implementing industry specific DGMs (see A.2). Rather, we just use DGMs to inform our estimate of the MRP (see chapter 6).

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338 NER 6.5.2(e)(1); NGR 87(5)(a).
339 MEU, *Submission to beta issues paper*, October 2013, p. 4.
340 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 79.
341 ENA, *Submission to beta issues paper*, October 2013, p. 5.
342 NSW DNSPs, *Submission on beta issues paper*, October 2013, p. 1.

D Return on equity: evidence informing the market risk premium

In chapter 6 we discussed our proposed approach to estimating the market risk premium (MRP) and provided an estimate based on information available at December 2013. In this appendix, we consider the available evidence in more detail. We consider the strengths and limitations and identify empirical estimates for each source of evidence.

Broadly defined, there are four main kinds of estimation methods:[343]

- historical excess returns
- dividend growth models
- survey evidence
- conditioning variables (for example, implied volatility and dividend yields)

We also consider recent decisions by other Australian regulators.

In this appendix, we also touch on a number of other considerations relevant to our point estimate of the MRP. We consider the possibility of a negative relationship between the risk free rate and the MRP and the question of internal consistency between the risk free rate and the MRP in the Sharpe–Lintner CAPM.

Lastly, we consider the academic literature on the predictability of excess returns.

D.1 Historical excess returns

Historical excess returns estimate the realised return that stocks have earned in excess of the 10 year government bond rate. We consider historical excess returns the most robust source of evidence for estimating the MRP. At December 2013, this evidence suggests a 10 year forward looking MRP of 6.0 per cent is reasonable.

D.1.1 Approach

Historical excess returns can be directly measured. Although not forward looking, historical excess returns have been used to estimate a forward looking MRP on the view that investors base their forward looking expectations on past experience. The Tribunal recognised this view in the Dampier to Bunbury Natural Gas Pipeline (DBNGP) matter.[344] Although the estimate changes slowly over time, we consider it is likely to reflect prevailing market conditions if investor expectations are guided by historical excess returns.

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[343] Gibbard, Peter, *Estimating the Market Risk Premium in Regulatory Decisions: Conditional versus Unconditional Estimates*, ACCC/AER Working Paper Series, Working Paper no. 9, September 2013.

[344] The Tribunal recognised this view in the Dampier to Bunbury Natural Gas Pipeline (DBNGP) matter. Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26 July 2012, paragraph 153.

In a regulatory context, the use of historical excess returns has advantages, as identified by McKenzie and Partington:[345]

- The estimation methods and the results are transparent. This evidence is the simplest form available for estimating the MRP.
- The estimation methods have been extensively studied and the results are well understood. This ensures they are credible and verifiable.
- Historical estimates are widely used and have support as the benchmark method for estimating the MRP in Australia.

Dimson, Marsh and Staunton (2012) stated there is no better forecast of expected excess returns than the historical average:[346]

> In summary, there are good reasons to expect the equity premium to vary over time. Market volatility clearly fluctuates, and investors' risk aversion also varies over time. However, these effects are likely to be brief. Sharply lower (or higher) stock prices may have an impact on immediate returns, but the effect on long-term performance will be diluted. Moreover volatility does not usually stay at abnormally high levels for long, and investor sentiment is also mean reverting. For practical purposes, we conclude that for forecasting the long run equity premium, it is hard to improve on extrapolation from the longest history that is available at the time the forecast is being made.

Their conclusion was informed by their assessment of the current state of research on the MRP, which they summarised as follows:[347]

> Mean reversion would imply that the equity premium is to some extent predictable…Yet despite extensive research, this debate is far from settled. In a special issue of the Review of Financial Studies, leading scholars expressed opposing views, with Cochrane (2008) and Campbell and Thompson (2008) arguing for predictability, whereas Goyal and Welch (2008) find that 'these models would not have helped an investor with access only to available information to profitably time the market'.

Potential issues with historical excess returns

In using historical excess returns as a source of evidence for the forward looking MRP, it is also important to consider whether historical estimates are likely to under or overstate a forward looking MRP. As various experts have noted, historical excess returns may be subject to certain biases, including:

- survivorship bias (McKenzie and Partington; Damodoran)[348]
- unanticipated inflation, historically high transaction costs and a historical lack of low cost opportunities for diversification (Siegel)[349]
- bias due to the inclusion of historical data which contains periods of major recessions (Lally)[350]

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345 M. McKenzie, and G. Partington, *Report to Corrs Chambers Westgarth: Equity market risk premium*, 21 December 2011, pp. 5–6, (McKenzie and Partington, *Equity market risk premium*, December 2011)

346 Dimson, Marsh and Staunton, *Credit Suisse Global Investment Returns Sourcebook 2012*, February 2012, p.37.

347 Dimson, Marsh and Staunton, *Credit Suisse Global Investment Returns Sourcebook 2012*, February 2012, p.36.

348 Damodoran, A. *Equity risk premiums: determinants, estimation and implications—the 2012 edition*, Mach 2012, p. 24; McKenzie and Partington, *Equity market risk premium*, December 2011, pp. 6–8.

349 J. Siegel, 'The equity premium: Stock and bond returns since 1802', *Financial Analysts Journal*, Jan-Feb 1992, pp. 28-38; J Siegel, 'The Shrinking Equity Premium', *Journal of Portfolio Management*, vol. 26, 1999, pp. 10-17.

350 M. Lally, *The cost of equity and the market risk premium*, 25 July 2012, p. 24 (Lally, *Cost of equity and the MRP*, July 2012).

McKenzie and Partington suggested MRP estimates based on historical data may be overstated relative to true expectations, as a result of survivorship bias.[351] According to Damodoran, survivorship bias is created by estimating historical returns on only stocks that have survived.[352] Historical data excludes negative return stocks that no longer exist, which naturally results in higher return estimates. McKenzie and Partington and Joye supported this view.[353] This upward bias is a relevant consideration because the various Australian stock indexes exclude failed stocks.[354]

Other authors also suggest historical excess returns are upwardly biased. Lally noted Siegel (1999) considered unanticipated inflation means historical returns underestimate real returns on risk free assets.[355] As noted by McKenzie and Partington, Siegel also submitted historical returns on equity overstate returns actually realised, given historically high transaction costs and the historical lack of low cost opportunities for diversification.[356]

To address the overestimation problem noted by Siegel, Lally suggested one could estimate the MRP by adding back the historical average real risk free rate to the conventional MRP estimate and then deducting an improved estimate of the long-term expected real risk free rate. The adjusted MRP estimate using historical excess returns is 4.9 per cent. Lally noted results from this methodology have been used by both the Queensland Competition Authority (QCA) and the New Zealand Commerce Commission in reaching their conclusions on the MRP.[357]

McKenzie and Partington noted Gregory makes a similar argument to Siegel in support of his view that the regulatory rate of return in the UK has been too high. He submitted that comparing realised bond returns unprotected from inflation with realised equity returns that have some protection from inflation is likely to overstate the MRP.[358]

Lally also suggested historical excess returns may underestimate the forward looking 10 year MRP when an economy has entered a major recession. However, he noted Australia has not recently entered a major recession and, even if it had, the downward bias is unlikely to be very large.[359] He also noted:[360]

> ... the fact that the AER bases its estimate of the MRP at least partly upon historical averaging of excess returns does not invalidate its claim that it is estimating the MRP for the next ten years; this estimation methodology is suitable (in conjunction with other methodologies) for estimating the MRP for the next ten years as well as for estimating the long-term average MRP. The use of historical averaging results may introduce a downward bias at the present time, but the effect is likely to be small relative to the standard deviation in the estimate and to possible upward bias in the methodology arising from significant unanticipated inflation in the 20th century.

D.1.2 Application of approach

At December 2013, there are a range of estimates of historic excess returns that are available to us. This range of estimates arises from employing different time periods, averaging techniques, treatment

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351 McKenzie, M. and G. Partington, *Equity market risk premium*, 21 December 2011, pp. 6–7.
352 Damodoran, A. *Equity risk premiums: determinants, estimation and implications—the 2012 edition*, Mach 2012, p. 24.
353 M. McKenzie, and G. Partington, *Report to the AER: Review of regime switching framework and critique of survey evidence,* 27 August 2012, p. 19, (McKenzie and Partington, *MRP: regime switching framework and survey evidence*, August 2012); Joye, C., *Super funds miss mark in bias to equities*, Australian Financial Review, 14 August 2012.
354 For example, the ASX All Ordinaries Index represents the 500 largest companies listed on the ASX. Market capitalisation is the only eligibility requirement. An underperforming stock that is losing its market share would be eventually be removed from the index. See: http://www.asx.com.au/products/capitalisation-indices.htm#all_ordinaries_index.
355 Lally, *Cost of equity and the MRP*, July 2012, p. 8, (Lally, *Cost of equity and the MRP*, July 2012).
356 McKenzie and Partington, *Equity market risk premium*, December 2011, p. 7.
357 Lally, *Review of the AER's methodology*, March 2013, p. 29.
358 McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 18.
359 Lally, *Cost of equity and the MRP*, July 2012, p. 24.
360 Lally, *Cost of equity and the MRP*, July 2012, p. 27.

of imputation credits and underlying data sets. In general, these estimates span a range between about 3.5 and 6.5 per cent, with most estimates clustered around 6.0 per cent.

There is no one sampling period that is preferable, since each period has a number of strengths but at least one weakness. For this reason, all five sampling periods described below are relevant. Also, both arithmetic and geometric averages are relevant to the determination of an appropriate estimate.[361] We exercise judgment in determining 6.0 per cent is a reasonable estimate of historical excess returns based on the evidence before us in December 2013.

In exercising our judgment we consider the possibility of upward bias in historical excess returns outlined above. Since it is not clear what the precise magnitude of the upward bias is, McKenzie and Partington do not recommend adjusting the historical estimate of the MRP. Given that 6.0 per cent is towards the top of the range of average historical excess returns, we consider 6.0 per cent is a reasonable estimate, and unlikely to underestimate a forward looking MRP.

In the following sections we:

- update the available data for our estimate of theta and to add data for 2012
- consider the appropriate sampling period
- consider the issue of arithmetic and geometric means
- consider concerns about the underlying data set for the period 1883-1958.

Updated estimates

The most recent estimates of historical excess returns we have were provided by Handley in a report he provided to us in 2012.[362] These estimates extended to 2011. Using data provided by NERA and submitted by the ENA, we have updated Handley's estimates in two ways:[363]

1. The first update accounts for the increase in our assumed use rate of imputation credits (theta) from 0.35 to 0.7.[364] This has the effect of increasing the estimates outlined above, particularly for the shorter sampling periods. This update ensures consistency throughout the regulatory decision.[365]

2. The second update brings the estimates up to the end of 2012. This also increases the estimates made using data from 2011 as the market return in 2012 was positive. However, we note that the estimates tend to move around from year to year and so a longer term perspective is needed. McKenzie and Partington, who noted Gray and Officer on this issue, supported this point:[366]

> In this respect, "(w)e recognise that it is likely that the MRP is not stationary and likely to vary under different economic conditions. However, the fact that there is no adequate theory underlying the variability of MRPs makes it dangerous to adjust an MRP estimate simply because another year or two or three of data alter the estimated mean…

361 For further discussion, see Australian Competition Tribunal, *Application by Envestra Ltd (No 2) [2012] ACompT4*, 11 January 2012, paragraph 157.

362 J. Handley, *An estimate of the historical equity risk premium for the period 1883 to 2011*, April 2012.

363 NERA, *Market risk premium for the ENA,* October 2013.

364 See appendix J for discussion of our assumed utilisation rate of imputation credits. The increase in this number increases the realised return to investors which increases the market risk premium relative to the return on bonds.

365 The Tribunal considered the issue of consistency in the APA GasNet matter.

366 McKenzie and Partington, *Equity market risk premium*, December 2011, pp. 18-19.

Historical excess returns over the periods 1883–2012, 1937–2012, 1958–2012, 1980–2012 and 1988–2012, lie in a range of 5.7 to 6.4 per cent (based on arithmetic averages) and 3.6 to 4.8 per cent (based on geometric averages). These results are shown in table D.1.

Table D.1 Historical excess return estimates—assuming a use rate of distributed imputation credits of 0.7 (per cent)

Sampling period	Arithmetic mean	Geometric mean
1883–2012	6.3	4.8
1937–2012	5.9	3.9
1958–2012	6.4	3.8
1980–2012	6.3	3.6
1988–2012	5.7	3.6

Source: NERA, AER analysis.

Sampling period

Brailsford, Handley and Maheswaran (BHM) chose the starting point for each of the five estimation periods because the quality of the underlying data sources changed (in 1883, 1937, 1958 and 1980) and the imputation tax system was introduced (in 1988).[367]

We consider the strengths and weaknesses of each sampling period are:

- Longer time series contain a greater number of observations, so produce a more statistically precise estimate.
- Significant increases in the quality of the data becomes available in 1937, 1958 and 1980.
- More recent sampling periods more closely accord with the current financial environment, particularly since financial deregulation (1980) and the introduction of the imputation credit taxation system (1988).[368]
- Shorter time series are more vulnerable to influence by the current stage of the business cycle or other (one-off) events.[369]

There is no one sampling period that is preferable, since each period has a number of strengths but at least one weakness. For this reason, all five sampling periods described are relevant.

367 Brailsford, Handley and Maheswaran, *Re-examination of the historical equity risk premium in Australia,* Accounting and Finance, vol. 48, 2008, pp. 85–86.

368 In a report submitted on Aurora's revised proposal, NERA raised the issue that the market excess returns were less volatile before the 1950s. See: NERA, Market risk premium, 20 February 2012, pp. 13–20. The lack of a well developed theory behind what drives the MRP makes us cautious of excluding large periods of data because it does not represent a forward looking MRP. Also, other evidence suggests the historical excess returns were too high before the 1950s. See: AER, *APTPPL access arrangement draft decision*, April 2012, pp. 296297–7.
Further, the arithmetic averages of historical excess returns over 1883–2011 and 1958–2011 both produce a historical MRP of 6.1 per cent. The geometric averages are 4.7 and 3.0 respectively. Accordingly, even if we were to rely on only the post 1958 data, it would not change its position on the appropriate value of the MRP.

369 AER, *Final decision—WACC review*, May 2009, pp. 200, 204; Brailsford, Handley and Maheswaran, Re-examination of the historical equity risk premium in Australia, Accounting and Finance, 2008, vol. 48, pp. 78–82. (AER, *WACC review final decision*, May 2009).

Arithmetic and geometric means

We consider the arithmetic average of 10 year historical excess returns would likely be an unbiased estimator of a forward looking 10 year return. However, historical excess returns are estimated as the arithmetic or geometric average of one year returns. One year historical excess returns are variable. This means that their arithmetic average will overstate the arithmetic average of 10 year historical excess returns. Similarly, the geometric average of one year historical excess returns will understate the arithmetic average of 10 year historical excess returns.[370]

Both the arithmetic and geometric averages are relevant to consider when estimating a 10 year forward looking MRP using historical annual excess returns.[371] The Tribunal has found no error with this approach.[372] The best estimate of historical excess returns over a 10 year period is therefore likely to be somewhere between the geometric average and the arithmetic average of annual excess returns.

The historical data

To date, we have relied upon estimates of historical excess returns produced by Handley. NERA interrogates the data underlying Handley's 2012 estimates and proposes an alternative data set.[373] Employing this data set across the range of time periods we consider above and using a theta of 0.7 produces a range of 5.7 to 6.6 per cent.

Table D.2 below compares the arithmetic average historical excess returns using the BHM data with and without NERA's adjustment.

Table D.2 Arithmetic average historical excess returns (theta 0.7)

Sampling period	With BHM adjustment	With NERA adjustment
1883–2012	6.3	6.6
1937–2012	5.9	5.9
1958–2012	6.4	6.4
1980–2012	6.3	6.3
1988–2012	5.7	5.7

Source: NERA, AER analysis.

At this time we consider that we should not employ the alternative estimates provided by NERA for the following reasons:

- the original data is published in a peer reviewed academic journal
- the original data (including adjustment in early years) is supplied by a credible source (the ASX)

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370 Further discussion on this matter can be found in the Victorian gas draft decision. AER, *Draft decision: SPI Networks access arrangement*, September 2012, Appendix B.2.1.

371 Further discussion of the use of geometric averages can be found in the Victorian gas final decision. AER, *Final decision: SPI Networks (Gas) access arrangement*, March 2013, Part 3, B.5.1.

372 Australian Competition Tribunal, *Application by Envestra Ltd (No 2) [2012] ACompT4*, 11 January 2012, paragraph 157.

373 NERA Economic Consulting, *The market risk premium, analysis in response to the AER's draft rate of return guideline: A report for the Energy Networks Association*, 11 October 2013. (NERA, *Market risk premium for the ENA*, October 2013); J. Handley, *An estimate of the historical equity risk premium for the period 1883 to 2011*, April 2012. (Handley, *Historical equity risk premium to 2011*, April 2012).

- we have not had the opportunity to test NERA's submissions.

Even if we were persuaded to adopt the data series incorporating NERA's adjustment, it would not change our estimate of the MRP based on historical excess returns in December 2013. This is because:

- When determining an appropriate MRP estimate from historical excess returns, we have regard to a number of different time periods, averaging methods etc. NERA's adjustment will affect some of these time periods, but not all. Some of the estimates in the table above are above 6.0 per cent while others are below 6.0 per cent. The estimates obtained from the NERA data series do not materially alter the span of estimates obtained from the full suite of estimation techniques. Nor do the estimates obtained from the NERA data series materially impact the clustering of estimates around 6.0 per cent.[374]

- BHM outline a number of general reasons why we should be careful when interpreting the results from early time periods, particularly the data from before 1936.[375] These general concerns remain regardless of the particular adjustment used. BHM conclude the early historical data, from before 1958, should be treated with caution.[376]

- The concerns we outline above regarding the possible causes of upward bias in MRP estimates from historical excess returns are still applicable. This includes survivorship bias.

Given these considerations, and the wider discussion in the preceding sections, we consider an appropriate MRP estimate using historical excess returns is 6.0 per cent at December 2013.

D.2 Dividend growth models

The dividend growth model (DGM) method examines the forecast future dividends of businesses and derives the return on equity that makes these dividends consistent with the market valuation of the equity of those businesses. While we do not consider DGM estimates of the MRP as robust as estimates produced by historical excess returns, we consider these estimates useful. At December 2013, these models produce a range of 6.1-7.5 per cent.

We also consider the detail of DGM construction, including our preferred construction, in appendix E.

D.2.1 Approach

The DGM method is a theoretically sound estimation method for the MRP. As DGM estimates incorporate prevailing market prices, they are more likely to reflect prevailing market conditions.[377] DGM estimates are also clearly forward looking as they estimate expectations of future cash flows and equate them with current market prices through the discount rate.[378]

However, there are practical limitations with using this evidence. In particularly, these estimates are highly sensitive to the assumptions used. It is necessary that all assumptions used have a sound

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374 M. McKenzie, and G. Partington, Report to Corrs Chambers Westgarth: *Equity market risk premium*, 21 December 2011, pp. 14–17.

375 T. Brailsford, J. Handley and K. Maheswaran, *Re-examination of the historical equity risk premium in Australia*, Accounting and Finance, 2008, p. 76–77.

376 T. Brailsford, J. Handley and K. Maheswaran, *Re-examination of the historical equity risk premium in Australia*, Accounting and Finance, 2008, p. 81.

377 M. McKenzie, and G. Partington, Report to Corrs Chambers Westgarth: *Equity market risk premium*, 21 December 2011, p. 23.

378 M. McKenzie, and G. Partington, Report to Corrs Chambers Westgarth: *Equity market risk premium*, 21 December 2011, p. 23.

basis, otherwise estimated results from DGM analysis may be inaccurate and lead analysts into error.[379] McKenzie and Partington also supported this view:[380]

> Clearly valuation model estimates are sensitive to the assumed growth rate and a major challenge with valuation models is determining the long run expected growth rate. There is no consensus on this rate and all sorts of assumptions are used: the growth rate in GDP; the inflation rate; the interest rate; and so on. A potential error in forming long run growth estimates is to forget that this growth in part comes about because of injections of new equity capital by shareholders. Without allowing for this injection of capital, growth rates will be overstated and in the Gordon model this leads to an overestimate of the MRP.

Our primary concern with using DGM estimates is the sensitivity of the estimates to assumptions about the long term growth rate and the time it takes to reach the long run growth rate, as demonstrated by table D.4 below. We do not consider any particular set of assumptions superior or more reliable. In its submission, PIAC stated the DGM is extremely sensitive to input assumptions and can generate volatile and conflicting results.[381] This statement is in line with our analysis.

Notwithstanding our concerns about the reliability of input assumptions, we consider DGM estimates have strong theoretical grounding and are more likely to reflect prevailing market conditions than other approaches.[382] There are many possible formulations of DGMs and the results from the different variants tend fluctuate through time.[383] For DGMs to be given greater consideration in the regulatory process, we consider that it is necessary to settle on a variant that can be consistently applied through time. A consistent approach through time will moderate some of the causes of variation. In our draft explanatory statement we proposed a particular formulation. We received submissions on this proposal and also obtained expert advice from McKenzie and Partington and Lally.[384]

In the draft guideline we proposed a DGM estimate using a two-stage model to inform our estimate of the MRP. In the final guideline we propose a two-stage and a three-stage model. Also, we propose to estimate a range of MRP values using differing inputs. Considering two models and a range of assumptions alleviates some of our concerns about the sensitivity of the model to input assumptions. Our use of two and three stage versions of the DGM reflects that these models are commonly used. Reputable sources including the Bank of England and Damodaran support this conclusion.[385] The assumptions we use in our preferred models are informed by advice we received from Lally.[386] Appendix E contains a detailed discussion of our proposed approach to estimating the DGM. We note the ENA appears to support the use of DGM estimates of the MRP, but considers the approach we identified in the draft decision has weaknesses.[387] The ENA suggests these weaknesses can be

379 For example corporate finance texts have noted "The simple constant-growth DCF [discounted cash flows] formula is an extremely useful rule of thumb" but "Naive trust in the formula has led many financial analysts to silly conclusions." Brealey, Myers and Allen, *Principles of Corporate Finance: International Edition*, 9th Edition, Boston: McGraw-Hill, 2008, p. 95.

380 McKenzie and Partington, *Equity market risk premium, December 2011*, p. 25.

381 PIAC, *Submission to the draft guideline*, October 2013, p. 35.

382 S. Myers, *Estimating the cost of equity: Introduction and overview*, 17 February 2013, p. 12.

383 See

Table D.4below and appendix E for more detail.

384 M. McKenzie and G. Partington, *Report to the AER: The Dividend Growth Model (DGM)*, December 2013; M. ,Lally, *Review of the AER's Proposed Dividend Growth Model*, December 2013.

385 See, for example, Mika Inkinen, Marco Stringa and Kyriaki Voutsinou, *'Interpreting Equity Price Movements since the Start of the Financial Crisis'*, Bank of England Bulletin, 2010, Q1; Aswath Damodaran, *Equity Risk Premiums (ERP): Determinants, Estimation and Implications - The 2013 Editon*, March 2013; pp. 65–73; Pratt and Grabowski, *Cost of Capital: Applications and Examples*, pp. 31–40. Bloomberg provides estimates of the cost of equity using a three-stage model.

386 See appendix E for detail.

387 ENA, *Response to the draft guideline*, October 2013, p. 41.

overcome by using a model such as the SFG model.[388] We do not consider the SFG model a preferable model. We discuss this issue in more detail in appendix E.

In a report for the ENA, NERA supported the use of DGM estimates of the MRP and suggested we should use a model such as the SFG model.[389] NERA acknowledged the uncertainty about what constitutes a reasonable value for long-run real dividend growth and suggested this may pose problems for regulatory purposes. It considered the solution to this problem is to use a model, such as SFG's, which produces a long-run growth estimate as an output, rather than requiring it as an input.[390]

This is a departure from a recent report by NERA.[391] In that report NERA proposed multi-stage DGM estimates of the MRP informed by its estimate of the long-run dividend growth rate.[392] There is no discussion in NERA's recent report about why it did not propose those models now. Further, earlier in its recent report, NERA considered the empirical literature and finds evidence to support valuation model estimates of the MRP.[393] These models are not the same as that proposed by SFG; rather, they are more similar to the model we proposed in the explanatory statement accompanying our draft guideline.[394] It is not clear why NERA did not then propose such models for our purposes.

At the WACC review in 2009, academics (Officer and Bishop, and CEG) and industry representatives (including the ENA) considered DGM estimates should be used only as a 'cross check' on the reasonableness of other methods to estimate the MRP, rather than as the primary method.[395] In contrast, in this review the ENA suggested substantial weight should be placed on DGM estimates—specifically those produced by a model designed by SFG.[396] The reasons for this change in position have not been explained.

We also note some US economic regulators use the DGM extensively in estimating the return on equity.[397] However, the DGM is not yet well accepted for use in the Australian context. A notable exception is IPART. In its draft decision for its review of the rate of return approach, IPART proposed to use DGMs to inform its estimate of the prevailing return on equity.[398]

D.2.2 Application of approach

There are many variations of the DGM we could use. Table D.4 below demonstrates that regulated service providers and their advisers have put numerous variations to us.

In December 2013, our proposed approach produces an estimate for the MRP that ranges between 6.1 and 7.5 per cent. Table D.3 outlines the results from our preferred models with the range of assumptions we use.

388 ENA, *Response to the draft guideline*, October 2013, p. 45; SFG, *Dividend discount model estimates*, June 2013.

389 NERA, *Market risk premium for the ENA*, October 2013, p. iv.

390 NERA, *Market risk premium for the ENA*, October 2013, p. iv.

391 NERA, *Prevailing conditions and the market risk premium: A report for APA Group, Envestra, Multinet and SP AusNet*, March 2012, pp. 32-41.

392 NERA, *Prevailing conditions and the market risk premium: A report for APA Group, Envestra, Multinet and SP AusNet*, March 2012, pp. 32-41.

393 NERA, *Market risk premium for the ENA*, October 2013, pp. 31-32.

394 AER, *Better Regulation: Explanatory statement, Draft rate of return guideline*, 30 August 2013, pp. 219-225.

395 AER, *WACC review final decision*, May 2009, pp. 218–219.

396 CEG, *Risk free rate and MRP in the CAPM*, March 2012, p.38.

397 CEG, *Risk free rate and MRP in the CAPM*, March 2012, p.38.

398 IPART, *WACC methodology: Research— Draft report*, September 2013, p. 15.

Table D.3 MRP estimates using AER DGM models (per cent)

Growth rate	Two stage model (MRP)	Three stage model (MRP)
4.0	6.10	6.65
4.6	6.66	7.10
5.1	7.13	7.47

Source: Bloomberg, AER analysis.

We consider our preferred construction provides a reasonable indication of the range of MRP estimates implied by the DGM. In appendix E we outline our assumptions in more detail.

Different consultants have produced widely different DGM estimates over short periods, or even in the same report. Table D.4 below appeared in the Victorian gas final decision and illustrates DGM estimates from the preceding year, which ranged from 5.90 to 9.56 per cent.[399] DGM estimates from the more recent reports (CEG and Lally) produced a lower range of 5.90 to 8.89 per cent.[400] We have added the DGM estimate submitted by the ENA using the SFG model which is 7.9 per cent for the second half of 2012.[401]

399 AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, pp. 101–103, Part 3, 50–56.

400 AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, pp. 101–103, Part 3, 50–56.

401 SFG, *Reconciliation of Dividend Discount Model Estimates with those Compiled by the AER* ,October 2013.

Table D.4 Recent DGM based MRP estimates produced by consultants

	Dividend yield	Dividend per share growth	RFR	MRP estimate
CEG (March 2012)	5.68%	6.60%	3.77%	8.52%
Capital Research (Feb 2012)	4.70%	7.00%	5.08%	6.62%
Capital Research (Feb 2012)	5.23%	7.00%	5.08%	7.15%
Capital Research (Feb 2012)	5.71%	7.00%	5.08%	7.63%
Capital Research (Mar 2012)	6.29%	7.00%	3.73%	9.56%
NERA (Feb 2012)	Bloomberg and IBES forecasts	5.65%	3.96%	7.72–7.75%
NERA (Feb 2012)	Bloomberg and IBES forecasts	5.65%	5.50%	6.18–6.21%
NERA (March 2012)	Bloomberg and IBES forecasts	5.65%	3.99%	7.69–7.72%
CEG (November 2012)	5.34%	6.60%	3.05%	8.89%
Lally (March 2013)	5.34%	a mix of long term and short term dividend growth	3.26%	5.90–8.39%
SFG (June 2013)	4.7*	5.8*	3.1	7.9%

Sources: CEG, Capital Research, Capital Research, NERA, Lally, SFG
*Implied by the model, not assumed by SFG.

D.3 Survey evidence

Survey estimates explore investor expectations about the MRP by directly asking them what their expectations are. We propose to give survey estimates some consideration when estimating the MRP. In December 2013, these estimates generally support an MRP of about 6.0 per cent.

D.3.1 Approach

As the MRP is an investor expectations metric, it seems reasonable to estimate it by asking investors what they expect. However, in reality this is not easily achieved. It is not clear exactly who should be asked to respond to a survey or what questions they should be asked.

In the Victorian gas final decision, we noted that survey evidence should be treated with caution.[402] The Tribunal has considered survey evidence in the past and outlined a number of considerations to take into account:[403]

402 AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, pp. 105–108, Part 3, p. 48.

> Consideration must be given at least to the types of questions asked, the wording of those questions, the sample of respondents, the number of respondents, the number of non-respondents and the timing of the survey. Problems in any of these can lead to the survey results being largely valueless or potentially inaccurate.

We apply the criteria noted by the Tribunal to the survey evidence we consider.[404]

The relevance of some survey results depends on how clearly the survey sets out the framework for MRP estimation. This includes the term over which the MRP is estimated and the treatment of imputation credits. Survey based estimates may be subjective, because market practitioners may look at a range of different time horizons and they are likely to have differing views on market risk. This concern may be mitigated as the sample size increases.[405]

McKenzie and Partington place significant weight on survey evidence due to the triangulation of that evidence.[406] The idea behind triangulation is that a specific survey might be subject to a particular type of bias (although there is no compelling demonstration of it). However, the type of bias would likely be much less consistent across surveys using different methods and different target populations.

Lally also supported the use of survey evidence and suggested the recent Fernandez survey is the most relevant survey evidence. However, he suggested its average of 5.9 per cent should be considered as an upper bound as some respondents to this survey will have provided responses for a MRP defined against bank bills.[407]

We consider survey evidence fit for the purpose of estimating the MRP. However, we are mindful of the limitations of this evidence identified by the Tribunal.[408] Also, it won't necessarily be clear whether the information is credible and verifiable, or clearly sourced.[409] Similarly, given surveys are undertaken sporadically, this evidence will not necessarily be flexible enough to reflect changing market conditions and new information.

The Victorian gas final decision contains further discussion of survey evidence.[410]

D.3.2 Application of approach

In the Victorian gas final decision, we considered survey evidence on the MRP from before and after the WACC review. There are two surveys reported since that decision. The surveys we consider include:

- KPMG (2005) surveyed 33 independent expert reports on takeover valuations from January 2000 to June 2005. It found the MRP adopted in valuation reports was in a 6.0 to 8.0 per cent range. KPMG reported 76 per cent of survey respondents adopted an MRP of 6.0 per cent.[411]

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403 Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 3*, 11 January 2012, paragraphs 159–163.

404 See, for example, *AER, Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, pp. 105-108, Part 3, p. 48.

405 Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 3*, 11 January 2012, paragraphs 159–63.

406 McKenzie and Partington, *Supplementary report on the MRP*, February 2012, p. 19; McKenzie and Partington, *MRP: regime switching framework and survey evidence*, August 2012, p. 28.

407 Lally, *Review of the AER's methodology*, March 2013, p.32.

408 For example Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 3*, 11 January 2012, paragraphs 159–163.

409 The quality of survey evidence is influenced by the design of the survey as well as the responses received from market participants and academics. As the respondents are unknown, the responses are not verifiable. See, the Victorian gas final decision for further discussion of survey evidence.

410 *AER, Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 3, p. 48.

- Capital Research (2006) found the average MRP adopted across a number of brokers was 5.09 per cent.[412]
- Truong, Partington and Peat (2008) surveyed chief financial officers, directors of finance, corporate finance managers or similar finance positions of 365 companies included in the All Ordinaries Index at August 2004. From the 87 responses received, 38 were relevant to the MRP. They found the MRP adopted by Australian firms in capital budgeting was in a 3.0 to 8.0 per cent range, with an average of 5.94 per cent. The most commonly adopted MRP was 6.0 per cent.[413]
- Bishop (2009) reviewed valuation reports prepared by 24 professional valuers from January 2003 to June 2008. It found the average MRP adopted was 6.3 per cent, and 75 per cent of these experts adopted a MRP of 6.0 per cent.[414]
- Fernandez (2009) surveyed university finance and economics professors around the world in the first quarter of 2009. The survey received 23 responses from Australia and found the required MRP used by Australian academics in 2008 was in a 2.0 to 7.5 per cent range, with an average of 5.9 per cent.[415]
- Fernandez and Del Campo (2010) surveyed analysts around the world in April 2010. The survey received seven responses from Australian analysts and found the MRP that they used in 2010 was in a 4.1 to 6.0 per cent range, with an average of 5.4 per cent.[416]
- A further survey by Fernandez et al. (2011) in April 2011 reported the MRP used by 40 Australian respondents was in a 5.0 to 14.0 per cent range, with an average of 5.8 per cent.[417]
- Asher (2011) surveyed 2000 members of the Institute of Actuaries of Australia. Asher reported 33 of a total of 58 Australian analysts who responded to the survey expected the 10 year MRP to be 3.0 to 6.0 per cent. The most commonly adopted MRP value was 5.0 per cent. The report also illustrated that expectations of a MRP much in excess of 5.0 per cent were extreme.[418]
- A further survey by Asher (2012) in March 2012 reported 49 useful responses, with an average 10 year MRP of 4.6 per and two thirds of the responses falling in the range 4.0 to 6.0 per cent.[419]
- Like KPMG (2005), Ernst Young (2012) surveyed 17 independent expert reports on takeover valuations from January 2012 to October 2012. It found the mid-point MRP adopted in valuation reports was in a 6.0 to 7.0 per cent range and 71 per cent of them adopted a mid-point MRP of 6.0 per cent.[420]
- The recent survey by Fernandez et al. (2013) in June 2012 reported the MRP used by 73 Australian respondents. Respondents included both academics and a wide range of practitioners.

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411 KPMG, *Cost of capital—market practice in relation to imputation credits*, August 2005, p. 15.

412 Capital Research, *Telstra's WACC for network ULLS and the ULLS and SSS businesses—review of reports by Prof. Bowman*, March 2006, p. 17.

413 Truong, G. Partington, G. and Peat, M., *Cost of capital estimation and capital budgeting practices in Australia*, Australian Journal of Management, June 2008, vol. 33, no. 1, p. 155.

414 Bishop, S., *A conservative and consistent approach to WACC estimation by valuers*, Value Advisor Associates, 2009.

415 Fernandez and Del Campo, *Market Risk Premium used by Professors in 2008: A Survey with 1400 Answers,* IESE Business School Working Paper, WP-796, May 2009, p. 7.

416 Fernandez and Del Campo, *Market Risk Premium Used in 2010 by Analysts and Companies: A Survey with 2400 Answers*, IESE Business School, May 2010, p. 4.

417 Fernandez, Arguirreamalloa and Corres, *Market Risk Premium used in 56 Countries in 2011: A Survey with 6,014 Answers*, IESE Business School Working Paper, WP-920, May 2011, p. 3

418 Asher, *Equity Risk Premium Survey—results and comments*, Actuary Australia, July 2011, no. 161, pp. 13–14.

419 Asher, *Equity Risk Premium Survey 2012: results and comments*, Actuary Australia, July 2012, pp. 28-29.

420 Ernst & Young, *Market evidence on the cost of equity: Victorian gas access arrangement review 2013-2017*, 8 November 2012, p. 23.

It found the MRP the respondents used in 2012 was in a 3.0 to 10.0 per cent range, with an average of 5.9 per cent.[421] The number of Australian respondents to this survey was reasonably large (greater than previous surveys) and resulted in similar MRP responses. This provides us with a degree of further confidence in the results of MRP surveys.

- A recent survey by KPMG (2013), published February 2013, found survey participants are overwhelmingly using an MRP of 6.0 per cent for Australia, with some bias to 7.0 per cent.[422] This survey received 23 responses from practitioners with a variety of backgrounds including academics, investment banks, professional services firms and infrastructure funds.
- A further survey by Fernandez et. al. (2013) in June 2013 reported the MRP used by 17 Australian respondents. It found the MRP the respondents used in 2013 was in a 3.0 to 25 per cent range, with an average of 6.8 per cent.[423] The number of respondents to this survey fell when compared to the previous survey, weakening the reliability of this evidence. The mean MRP estimate is almost 1 per cent higher in this survey than the previous survey. This may be due to outliers at the upper end. The fact the median MRP estimate of 5.8 per cent is slightly lower than the 6.0 per cent from the previous year supports this possibility. This survey adds to the triangulation of evidence around 6.0 per cent.

Table D.5 summarises the key findings of the surveys.

421 Fernandez, Arguirreamalloa and Corres, *Market Risk Premium used in 82 Countries in 2012: A Survey with 7,192 Answers*, IESE Business School Working Paper, CH-14, January 2013, p. 3.

422 KPMG, *Valuation Practices Survey 2013*, February 2013.

423 Fernandez, Arguirreamalloa and Linares, *Market Risk Premium and Risk Free Rate used for 51 countries in 2013: a survey with 6,237 answers*, IESE Business School, June 2013.

Table D.5 Key findings of MRP surveys

	Numbers of responses	Mean	Median	Mode
KPMG (2005)	33	7.5%	6.0%	6.0%
Capital Research (2006)	12	5.1%	5.0%	5.0%
Truong, Partington and Peat (2008)	38	5.9%	6.0%	6.0%
Bishop (2009)	27	N/A	6.0%	6.0%
Fernandez (2009)	23	5.9%	6.0%	N/A
Fernandez and Del Campo (2010)	7	5.4%	5.5%	N/A
Fernandez et al (2011)	40	5.8%	5.2%	N/A
Asher (2011)	45	4.7%	5.0%	5.0%
Asher (2012)	49	4.6%	5.0%	4.0–6.0%
Ernst & Young (2012)	17	6.26%[424]	6.0%	6.0%
Fernandez et al (2013)	73	5.9%	6.0%	N/A
KPMG (2013)	23	N/A	6.0%	N/A
Fernandez et al (2013)	17	6.8%	5.8%	N/A

Sources: KPMG (2005), Capital Research (2006), Truong, Partington and Peat (2008), Bishop (2009), Fernandez (2009), Fernandez and Del Campo (2010), Fernandez et al. (2011), Asher (2011), Asher (2012), Fernandez et al. (2013a3), KPMG (2013), Fernandez (2013b).

Survey measures of the MRP across different years, different survey respondents or sources, and different authors support an MRP of about 6.0 per cent. For the surveys under consideration, the most commonly used MRP was 6.0 per cent.

In its submission on the consultation paper, the ENA noted the Tribunal's considerations and highlighted two key concerns with our proposed consideration of survey estimates:[425]

1. Participants have no real idea whether the current list of surveys referred to by the AER are considered to be sufficiently reliable to carry weight in decision-making. It suggested the AER should test each survey against the criteria outlined by the Tribunal. Its submission to our consultation paper contained more detailed analysis of survey evidence.

424 Ernst & Young only presented mid-point MRP in its report. Therefore the actual mean from those 17 valuation reports might be different to what is presented here.

425 ENA, *Response to the consultation paper*, June 2013, pp. 42–43.

2. If the current list of surveys is considered to contain reliable evidence on the MRP, participants do not have a reasonable understanding of the relative consideration given to that survey evidence.

With regard to the first concern, we note that in the Victorian gas final decision we considered survey evidence in more detail.[426] As part of this, we referenced a report by McKenzie and Partington, which considered survey evidence an important source when estimating the MRP.[427] The ENA does not appear to have engaged with this analysis in its submission to the draft guideline.

In its submission on the consultation paper the ENA engaged with material we reflected in the Victorian gas final decision.[428] However, the ENA focussed on a reference to Professor Lally's preference for the Fernandez survey as the most recent survey.[429] In doing so the ENA did not consider the broader evidence outlined in our Victorian gas final decision, most notably the report provided by McKenzie and Partington. Also, in addressing the Fernandez survey, the ENA considered an older edition, from 2011 (although it referenced a more recent edition from 2013).[430]

With regard to the second concern identified above, as with all the evidence informing the MRP, we consider survey evidence with regard to its strengths and limitations. We exercise judgment when determining a point estimate.

D.4 Conditioning variables

Conditioning variables are variables that can be used to make adjustments to the mean historical excess return, or in other words, to condition it. The conditioning variables that have been presented to us are dividend yields, credit spreads and implied volatility.

We have general concerns with using conditioning variables to estimate the MRP.[431] Also, we have raised concerns about the specific application of such variables in the past. Therefore, we do not consider conditioning variables provide reliable estimates of the MRP on their own and should be used with caution. These estimation methods may be most useful as indicators of changes in general market conditions.

D.4.1 Dividend yields

In the explanatory statement accompanying the draft guideline we highlighted dividend yields as a potential source of additional information. In the final guideline we consider instead that dividend yields are more appropriately used to inform the estimation of the MRP.

Approach

As we noted in the explanatory statement accompanying the draft guideline, there is some empirical support for dividend yields as a predictor of equity returns and excess returns.[432] However, the bulk of the empirical support is for dividend yields informing the MRP. Regulated businesses and their

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426 *AER, Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 3, p. 48.
427 McKenzie and Partington, *Supplementary report on the MRP*, February 2012, p. 19.
428 ENA, *Response to the consultation paper*, June 2013, pp. 42-43; *AER, Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 3, p. 48
429 ENA, *Response to the consultation paper*, June 2013, pp. 42–43.
430 Lally, *Review of the AER's methodology*, March 2013, p. 32.
431 See below for further discussion of return predictability.
432 See, for example, Fama and French, *Dividend Yields and Expected Stock Returns*, 1988, Journal of Financial Economics, 25, pp. 23-49.

consultants have proposed dividend yields as a useful indicator for the MRP in the past.[433] As such, we consider these estimates are fit for the purpose of informing the MRP.

In the past we have expressed concerns about the practical application of this information and the empirical support for such analysis.[434] There is a body of work which casts doubt on the accuracy of dividend yields as a predictor of excess returns.[435] Accordingly, it is not clear this analysis can be implemented in accordance with good practice. Advice from McKenzie and Partington has been that dividend yields are difficult to implement in practice.[436] At the same time, dividend yields are sufficiently flexible to respond to changing market conditions. Similarly, they are comparable and timely.

Application of approach

We propose to use dividend yields as a directional indicator of the return on equity, along with other such indicators.

In the explanatory statement accompanying the draft guideline we noted a report presented to us in 2011 by SFG.[437] In it SFG compared the dividend yield with the mean dividend yield through time.[438] We propose a similar approach. The graph below presents dividend yields taken from Bloomberg with the historical average added. From this graph we can see that the dividend yield is close to its historical average and there is no discernible trend. These observations provide no clear directional indication about changes in market conditions. We note, however, the explanatory power of this evidence is limited. That is, this evidence is not precise or reliably converted to a particular MRP estimate.[439]

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433 See, for example, CEG, *Update to March 2012 Report: On consistency of the risk free rate and MRP in the CAPM*, November 2012, pp. 15-16; SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd,* October 2011, pp. 13–14.

434 See, for example, AER, *Draft decision: Access arrangement draft decision: APA GasNet Australia (Operations) Pty Ltd 2013-17*, September 2012, pp. 47–48.

435 See, for example, AER, *Draft decision: Access arrangement draft decision: APA GasNet Australia (Operations) Pty Ltd 2013-17*, September 2012, p. 47.

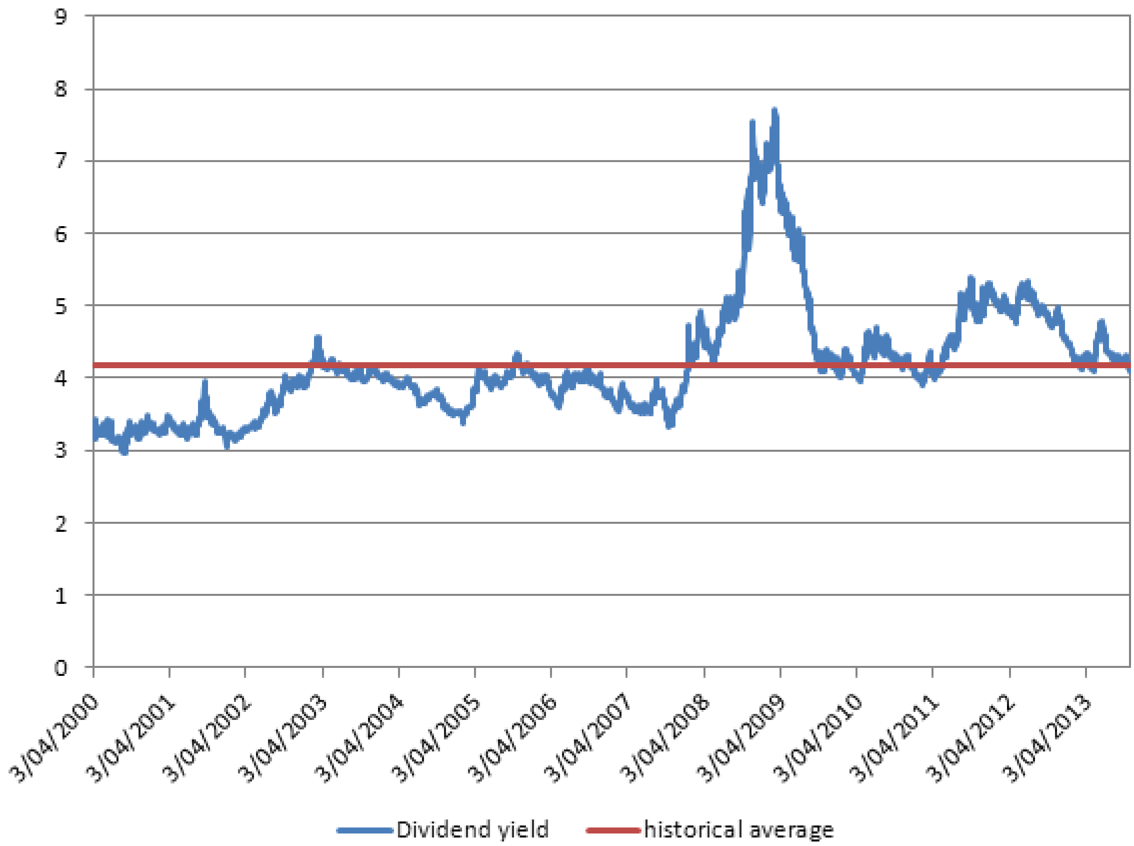
436 McKenzie and Partington, *Supplementary report on the MRP*, February 2012, p. 23.

437 AER, Explanatory statement: Draft rate of return guideline, August 2013, p. 204; SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd,* October 2011, p. 13.

438 SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd,* October 2011, p. 13.

439 M. McKenzie, and G. Partington, *Report to the AER: Supplementary report on the equity market risk premium*, 22 February 2012, pp. 23-25.

Figure D.1 Dividend yields



Source: Bloomberg, AER analysis

D.4.2 Credit spreads

Credit spreads are the spread between the risk free rate and the return on debt for different debt instruments. These spreads change over time and are readily observable as both the return on debt and risk free rate are observable. Changes in credit spreads over time may offer information about changes in the MRP.

Approach

Academic literature offers some theoretical basis for considering credit spreads.[440] The literature explores the ability of credit spreads to explain equity returns as well as excess returns (the MRP). As such, credit spreads reflect economic and finance principles. However, we have expressed concerns in the past about the empirical support for this analysis.[441] There is a body of evidence suggesting this analysis is not robust.[442] Also, we have expressed concerns about the comparability of credit spreads to equity premiums.[443]

440 See, for example, SFG, *Market risk premium: An updated assessment and the derivation of conditional and unconditional estimates: Report for the Victorian electricity distribution businesses*, February 2012, p. 10.

441 See, for example, AER, *Final decision: Access arrangement final decision: APA GasNet Australia (Operations) Pty Ltd 2013-17*, March 2013, Part 3, p. 49.

442 See, for example, AER, *Final decision: Access arrangement final decision: APA GasNet Australia (Operations) Pty Ltd 2013-17*, March 2013, Part 3, p. 49.

443 AER, *Final decision: Access arrangement final decision: APA GasNet Australia (Operations) Pty Ltd 2013-17*, March 2013, Part 3, pp. 48–50.

We noted in the draft explanatory statement it is difficult to convert credit spread observations into a quantitative estimate of either the return on equity or the MRP. SFG also noted that while dividend yields and default spreads have shown to be positively associated with future equity market returns relative to Treasury bill rates, this does not imply equity market returns can be forecast with absolute precision.[444] An indication of changes in market conditions may be the best use for this evidence. That is, an indication of whether spreads are widening, stabilising or falling. We propose, therefore, to use credit spreads as a directional indicator of the MRP, along with other such indicators.

In our draft explanatory statement, we proposed to use credit spreads as additional information at the return on equity level. In this final decision, we propose using credit spreads to inform our estimate of the MRP. As we noted in the explanatory statement accompanying the draft guideline, this reflects the academic literature and suggests credit spreads are most fit for purpose in informing the MRP.

Credit spreads are readily observable and change daily. Therefore, they may reflect prevailing market conditions.

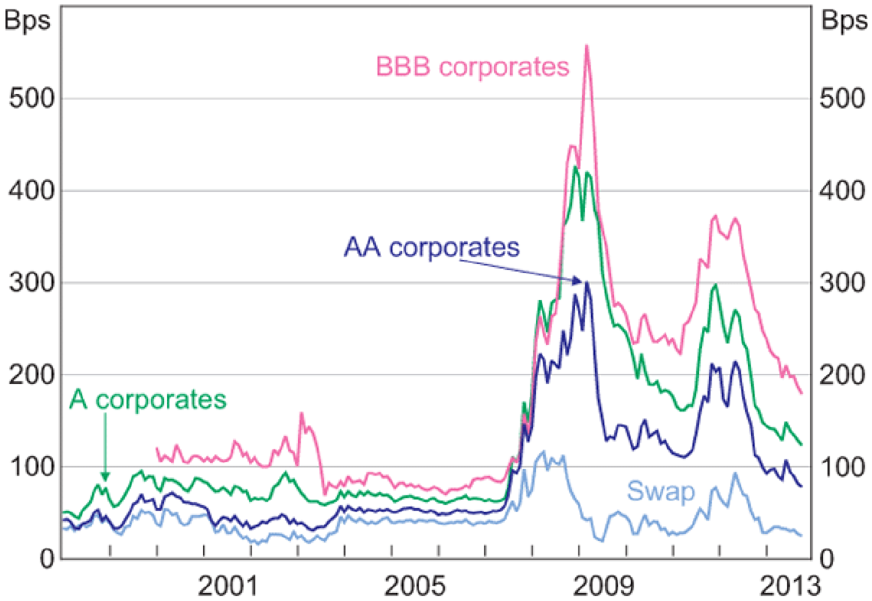
Application of approach

In the explanatory statement accompanying the draft guideline, we noted a report by SFG, where it suggested the credit spread between AAA and BBB rated bonds was larger than 80 per cent of observations in the sample presented, and more than 0.77 standard deviations above the mean.[445] In a more recent report, CEG presented analysis suggesting credit spreads had widened since the GFC.[446]

Figure D.2 shows credit spreads for a range of debt instruments over the yield on Commonwealth Government Securities (CGS). This is a graph the Reserve Bank of Australia (RBA) publishes monthly.[447] From this, we can see that most credit spreads are above their pre–2007 levels, while the swap rate spread is at or below its pre–2007 levels. In essence, lower quality debt is further from pre-2007 levels than higher quality debt. However, all spreads show a clear downward trend over the past twelve months or so.

444 SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd*, October 2011, p. 9.
445 SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd,* October 2011, p. 13.
446 CEG, *Internal consistency of risk free rate and MRP in the CAPM, Prepared for Envestra, SP AusNet, Multinet and APA*, March 2012, p. 13
447 RBA, *Chart pack - Australian Bond Spreads*, 6 November 2013.

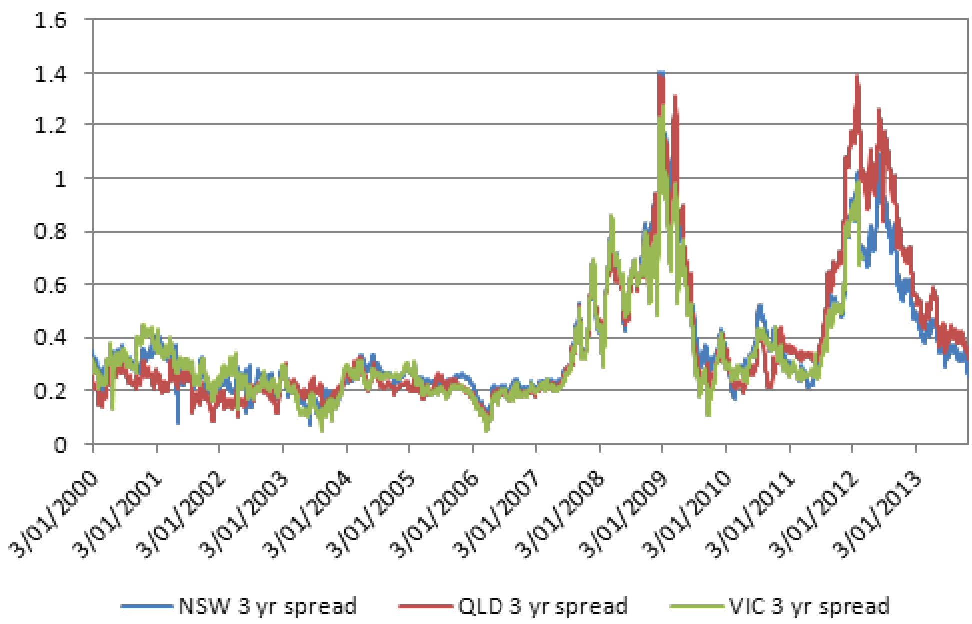
Figure D.2 Australian bond spreads over government yields



Source: RBA, *Chart Pack*, 6 November 2013.
Note: Swap spreads are for 3-year maturity. Corporate bonds are a weighted average of senior bonds with remaining maturities of 1 to 5 years; they include financial and non-financial corporates.

Figure D.3 shows the spread between state government debt and CGS. Maturities of three years are used as more data is available. From this graph we can see that spreads show a clear downward trend and are now near pre–2007 levels.

Figure D.3 State government bond spreads over government yields



Source: RBA, AER analysis.

Credit spreads are evidently falling. This suggests market conditions are stabilising. We note, however, the explanatory power of this evidence is limited.

D.4.3 Implied volatility

In the explanatory statement accompanying the draft guideline, we proposed to use implied volatility, while recognising the limitations of this source of evidence. We maintain our position in this explanatory statement while noting the evidence should be used with caution.

Approach

We consider implied volatility fit for purpose in estimating the MRP. However, we have previously identified limitations to this evidence and noted the difficulties in putting it into practice.[448] On the other hand, implied volatility analysis may reflect changing market conditions and new information.

Service providers have proposed the implied volatility glide path approach in the past.[449] The implied volatility approach is based on an assumption that the MRP is the price of risk times the volume of risk (volatility), which is based on Merton (1980). While we have expressed concerns about the reliability of these estimates we recognise they may have some informative value.[450]

We note the ENA submitted there is a high degree of uncertainty over the relevance of implied volatility.[451] It suggested our comments in the Victorian gas final decision were ambiguous on this point.[452]

In a report commissioned by the ENA, NERA found academic support for a relationship between implied volatility and the MRP.[453] However, it suggested it is unclear whether implied volatility estimates of the MRP provide any information not already contained in DGM estimates.[454]

Application of approach

In the Victorian gas final decision, we considered implied volatility evidence presented by VAA. It estimated the MRP based on an 'implied volatility glide path' approach. The MRP estimate generated from implied volatility will have the same horizon as the underlying options. Therefore, a 'glide path' is required to extend the estimate to the 10 years we require.

We have set out concerns with using VAA's implied volatility methodology and the implied volatility as an indicator for the MRP in previous decisions.[455] Specifically, we consider the VAA implied volatility methodology:

- Inappropriately determines the baseline long run average implied volatility by using a different data series—the realised volatility of a 90 day data window for the S&P/ASX 30 from 1980 onwards.[456] Using this (historical) realised volatility series results in a long run average volatility of 14 per cent. The actual long run average of one of the (forward looking) implied volatility series

448 For example, in the Victorian gas final decision we identified a number of concerns with this approach. This included whether the approach provided a reasonable estimate of the 10 year MRP and determining what is the most reliable methodology. See: AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, pp. 103–105.

449 See, for example, AER, *Final decision: Envestra Ltd access arrangement proposal for the SA gas network 2011–2016*, June 2011, pp. 195–197.

450 AER, *Final decision: Access arrangement final decision: SPI Networks (Gas) Pty Ltd 2013-17*, March 2013, Part 2, pp. 103–105.

451 ENA, *Response to the draft guideline*, October 2013, p. 47.

452 ENA, *Response to the draft guideline*, October 2013, p. 31.

453 NERA, *Market risk premium for the ENA*, October 2013, pp. 35–36.

454 NERA, *Market risk premium for the ENA*, October 2013, p. 36.

455 AER, *Final decision Envestra Ltd access arrangement proposal for the SA gas network*, June 2011, pp. 195–197.

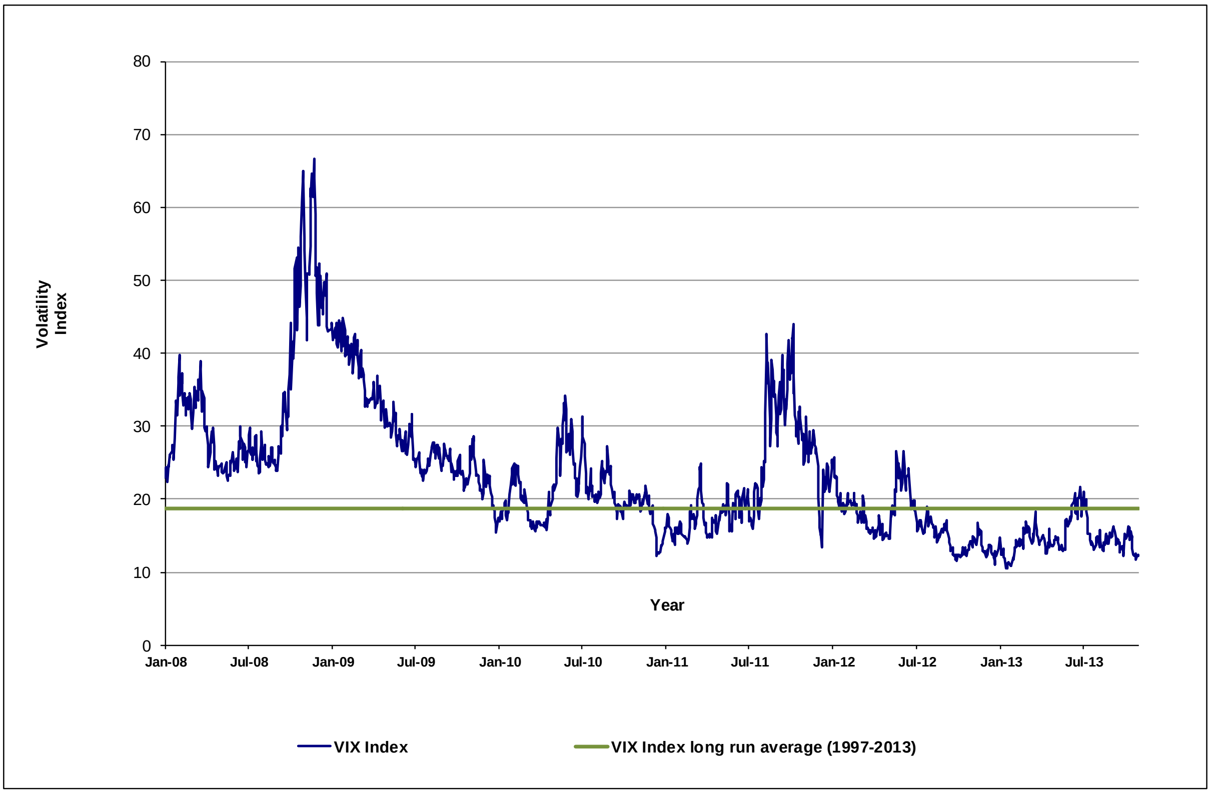
456 VAA, MRP for *Envestra*, March 2011, p. 4 (footnote 7). Further, VAA appears to end its baseline period in 2009 even when using implied volatility data up to the end of 2010. See Bishop, Fitzsimmons, and Officer (2011), pp. 9, 14 (endnote 5).

used by VAA (3 month VIX) is 18.6 per cent. Adopting the higher baseline would reduce the MRP estimated using the VAA approach in all scenarios.

- Incorrectly calculates the price per unit of implied volatility using a 'long run historical average MRP' of 7.0 per cent, when the evidence indicates that this value is approximately 6.0 per cent.[457] Adopting the lower historical average MRP would reduce price per unit of volatility, which in turn reduces the MRP estimated using the VAA approach in all scenarios.

Although implied volatility was high during the global financial crisis (GFC), the level in December 2013 is significantly below the long run average. Using data updated to 31 October 2013, the ASX200 implied volatility index (VIX) is 12.2 per cent, significantly below the long run average of 18.6 per cent (measured from the start of the data series in 1997). Figure D.4 shows the value of this measure of implied volatility relative to its long run average level across the period since the GFC.

Figure D.4 Implied volatility (VIX) over time



Source: ASX200 VIX volatility index, sourced via Bloomberg cost AS51VIX.

By directly applying VAA's methodology, the current one year MRP is 6.1 per cent. This is derived by applying a constant premium per unit risk to implied volatility of 12.2 per cent for the ASX 200 index.[458] Transitioning to a long term average of 6.0 per cent, this implied volatility approach produces an MRP below 6.0 per cent.

Further, correcting the VAA methodology for the concerns we outline above, it produces a current one year MRP of 3.9 per cent (based on a revised constant premium per unit risk to implied volatility of 12.2 per cent for ASX 200 index). The revised constant premium per unit risk is 0.32, which is derived by dividing a more realistic long term MRP of 6.0 per cent by the long run average volatility of 18.6 per

457 The AER sets out earlier in this decision its analysis of the historical excess return series.
458 Note the constant premium per unit risk is 0.5, which is consistently used by VAA.

cent, measured from the start of the data series in 1997. This converts to a 10 year MRP of 5.6 per cent.[459]

We propose to give this estimation method limited consideration at the time of each decision. Our limited consideration reflects our concerns with the robustness of this evidence.

D.5 Recent decisions by other Australian regulators

We propose to review recent decisions by other Australian regulators at the time of each decision. Recent regulatory decisions by Australian regulators have generally applied an MRP of 6.0 per cent.

D.5.1 Approach

Recent decisions by other Australian regulators provide a comparison of what other regulators consider a reasonable MRP estimate. While this is not a direct measure of the MRP itself (as opposed to the measures discussed above) it provides us with an indication of what other practitioners consider a reasonable estimate. While Australian regulators consistently use the CAPM, there are differences in the way the evidence is considered and the way the point estimate is determined.

Australian regulators have determined the MRP under a specific CAPM framework:

- The MRP is forward looking and cannot be directly observed.
- The MRP is a long term forward looking measure (for example, 10 years) rather than a short term forward looking measure (for example, one year). As a result, short term MRP estimates have little relevance.
- The MRP is for a domestic CAPM, which means the relevance of overseas evidence depends on the similarities between overseas and domestic market conditions, and consequently may have limited relevance.[460]

There is the potential for circularity in this source of evidence if each regulator refers to one another. We don't consider this a substantial concern as our observation is that other regulators reach independent conclusions.[461] A broad range of evidence and differing approaches inform regulatory decisions.

We do not propose to rely on recent decisions by other Australian regulators to determine our MRP estimate. However, we do consider this evidence provides a useful cross-check for our estimate. In the DBNGP matter, the Tribunal commented on the desirability of regulatory consistency:[462]

> The Tribunal regards regulatory consistency as a laudable objective, provided the particular regulator (in this case the ERA) independently fulfils its decision-making functions and responsibilities. Each regulator must do so in the context of the particular applicable legislation, and in the context of the particular issue

459 Converting the one-year implied MRP to a 10 year forward looking MRP requires further assumptions, VAA assumed this one-year implied MRP will fade to a long term historical average MRP over three years. It also noted JCP assumed step reversion after two years. The AER is not entirely clear how VAA faded a one-year implied MRP into a long term average MRP, since VAA report provided no further explanation. The AER estimated a 10-year volatility implied MRP of 5.58% based on JCP assumption—that is assuming the MRP will be 3.9% for the first two years and reverts to a long term average MRP for the next eight years. See: Bishop, Fitzsmmons, Officer, 'Adjusting the market risk premium to reflect the global financial crisis', *The Finsia Journal of Applied Finance*, Issue 1, 2011, p. 9 and p. 14. For the long term average MRP the AER has adopted 6 per cent, which reflects long term average historical excess returns.

460 For example, Lally considers and compares evidence on the MRP based on domestic and overseas data.

461 For discussion of other regulators' decisions refer to the Victorian gas final decision: AER, *Final decision: SPI Networks (Gas) access arrangement*, March 2013

462 Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26 July 2012, paragraph 333.

> and relevant material on that issue. The NGL under the NGA WA Act, the National Gas Law and the NGR are in most respects the same. It is not therefore surprising that the ERA should be aware of decisions of the AER, and vice versa, on particular provisions which have to be addressed. It is to be expected, in such circumstances, that experienced and well qualified regulators would also reach similar conclusions on such matters. It is to the benefit of providers of regulated services, the users of those services, and the community that—where appropriate—regulatory consistency should exist.

In a report submitted by the ENA, NERA raised concerns about whether other regulators' decisions would reflect prevailing conditions in the market for funds.[463] We acknowledge timeliness is a potential concern with using this source of evidence. This will depend on the circumstances at the time of each decision.

D.5.2 Application of approach

Australian regulators have generally applied an MRP of 6.0 per cent in recent regulatory decisions. Table D.6 sets out the MRP adopted recently by Australian state and territory regulators responsible for economic regulation across the electricity, water and rail industries.

Table D.6 Recent regulatory decisions

Regulator	Decision date	Sector	MRP (%)
The ERA	July 2013	Rail	6.0
ESC	June 2013	Water	6.0
IPART	June 2013	Water	Mid-point WACC, using 5.5–6.5 (long), 7.4 (short)
ESCOSA	May 2013	Water	6.0
IPART	May 2013	Water	Mid-point WACC, using 5.5–6.5 (long), 7.4 (short)
QCA	April 2013	Water	6.0
ERA	March 2013	Water	6.0
ERA	September 2012	Electricity	6.0
ESCV	June 2012	Rail	6.0
IPART	June 2012	Water	5.5–6.5
IPART	June 2012	Water	5.5–6.5

Source: ERA, ESCV, QCA, IPART, ESCOSA.[464]

463 NERA, *Market risk premium for the ENA*, October 2013, p. 36.

464 ERA, *Determination on the 2013 WACC for the freight and urban railway networks*, July 2013; ESC, *Price review 2013: Greater metropolitan water businesses - Final decision*, June 2013; ESC, *Price review: Regional urban water businesses - Final decision*, June 2013; ESC, *Price review 2013: Rural water businesses - Final decision*, June 2013; IPART, *Hunter Water Corporation: Final report*, June 2013; IPART, *Gosford City Council and Wyong Shire Council*, *Water - Final Report*, May 2013; ESCOSA, *SA Water's water and sewerage revenues 2013/14-2015/16: Final determination - Statement of*

Some of the regulators identified above are currently reconsidering their approaches to determining the rate of return. As the final decisions have not been published at the time of writing, it is too early to determine with certainty what their approaches will be. We can only make some general observations. In its draft rate of return guideline, the ERA proposed an approach similar to what it has used in the past. On the other hand, in its draft decision, IPART proposed a variation on the approach it has used in the past. Most notably for this discussion, it proposed to use the implied MRP from DGM estimates in combination with historical excess returns.[465]

D.6 Other relevant considerations

In this section, we consider a number of other considerations we have taken into account when determining our MRP point estimate in this decision.

D.6.1 Recent Australian Competition Tribunal decisions

In a series of recent decisions, the Australian Competition Tribunal has not found error in a MRP estimate of 6.0 per cent. These include, the APA GasNet appeal, the DBNGP appeal, the WA Gas Networks (WAGN) appeal and the Queensland/South Australia gas appeal.[466]

In 2011, Envestra challenged our decision to adopt an MRP of 6.0 per cent for Envestra's South Australia and Queensland gas distribution businesses. Envestra submitted we should have accepted Envestra's proposed 6.5 per cent MRP. The Tribunal concluded our adoption of a 6.0 per cent MRP was reasonably open to it on the evidence:[467]

> The critical issue in this section of the review is whether the AER's determination of the MRP at 6% was reasonably open to it on the evidence. As has already been mentioned, there was substantial evidence before the AER, both that submitted to it by service providers and that sourced by the AER itself. This evidence was not conclusive. It was incumbent upon the AER to exercise its judgment in deciding on an appropriate MRP.
>
> It is not sufficient for Envestra to persuade the Tribunal that 6.5% should be preferred. It must demonstrate the unreasonableness of the decision made by the AER. Unless this can be done, the Tribunal would be merely reaching a different conclusion as to the preferable result. The mere fact that the Tribunal may prefer a different rate does not entitle it to substitute its preferred MRP for that of the AER unless a ground of review has been made out. In all the circumstances of this matter, it was reasonably open to the AER to choose a MRP of 6%.

The Tribunal made a similar decision in its recent review of APA GasNet's access arrangement.[468] The Tribunal suggested:[469]

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reasons, May 2013; QCA, *Final report: Seqwater irrigation price review 2013-17*, vol. 1, April 2013; ERA, *Inquiry into the efficient costs and tariffs of the Water Corporation, Aqwest and the Busselton Water Board: Revised final report*, March 2013; ERA, *Final decision on proposed revisions to the access arrangement for the Western Power network submitted by Western Power*, 5 September 2012; ESCV, *V/line access arrangement final decision*, June 2012; IPART, *Water – Final report: Review of prices for Sydney Water Corporation's water, sewerage, drainage and other services: From 1 July 2012 to 30 June 2016*, June 2012; *IPART, Water – Final report: Review of prices for Sydney Catchment Authority: From 1 July 2012 to 30 June 2016*, June 2012.

465 IPART, *WACC methodology: Research — Draft report*, September 2013, p. 15.

466 Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8, 18 September 2013, paragraphs 227-308*; Australian Competition Tribunal, *Application by WA Gas Networks Pty Ltd (No 3) ACompT 12*, 8 June 2012, paragraphs 105–8; Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26 July 2012, paragraphs 161–3; Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 4*, 11 January 2012, paragraphs 145 and 148.

467 Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 4*, 11 January 2012, paragraphs 145 and 148.

468 Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8,* 18 September 2013, paragraphs *227–308*.

469 Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8, 18 September 2013, paragraph 305.*

> Accordingly, in estimating a value for the MRP, the AER will need to exercise its discretion based on its own experience and previous decisions, the advice of its experts, historical data, its expectations of future market economic and financial conditions, and, of course, taking fully into its consideration the submissions and expert advice put to it by the regulated entity and any other parties granted standing in the matter.

Ultimately the Tribunal concluded:[470]

> APA GasNet's complaint in reality concerns the result of the AER's investigations, and not the process. In all the circumstances of this matter, it was reasonably open to the AER to choose an MRP of 6 per cent.

Similarly, the Tribunal found no error in the ERA's decisions for ATCO Gas Australia's (formerly WAGN) and DBNGP’s access arrangements.[471] In both these decisions, the ERA considered the available information and exercised its judgement to determine the appropriate MRP. The Tribunal subsequently found no error in the ERA’s determination of a 6.0 per cent MRP.

D.6.2 Expert advice commissioned by the AER

For the Victorian gas final decision we commissioned reports from three consultants: CEPA, McKenzie and Partington, and Lally.[472]

CEPA noted when UK regulators directly estimate the MRP, the starting point is often historical data produced by Dimson, Marsh and Staunton (DMS).[473] Forward looking estimates are often used as cross–checks for the DMS estimates, but are sometimes used to check the reasonableness of the figure, rather than set a figure. The premium of Australian equities over bonds for 1900–2011 from DMS is 5.6 per cent based on a geometric mean and 7.5 per cent based on an arithmetic mean. DMS noted this might be an overestimation as Brailsford, Handley and Maheswaran (2008) identified dividend yields prior to 1958 were overstated.[474]

McKenzie and Partington agreed with us that a 6.0 per cent MRP was not just a choice based on the historic average of the MRP. Rather, it was based upon a broader set of evidence, which includes historical, utility–based, survey based, and implied estimates of the equity MRP. Each source of evidence presents its own unique set of challenges and possesses its own limitations. McKenzie and Partington have comprehensively reviewed the above evidence in their December 2011 paper. In their most recent February 2013 report, they reviewed our method for estimating the return on equity and concluded again that 6.0 per cent was a reasonable estimate of the MRP.

Lally noted we did not estimate the long run average value for the MRP.[475] Rather, we used results from both forward looking methods and historical averaging of excess returns for estimating the MRP and the results from forward looking methods unambiguously constitute estimates of the prevailing rather than the long-term average value for the MRP.

In estimating the MRP, Lally favours an approach that minimises the mean squared error and this considers the results from a wide range of methods. These methods include the historical averaging of excess returns (6.0 per cent), the historical average of excess returns modified for the 'great

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470 Australian Competition Tribunal, *Application by APA GasNet Australia (Operations) Pty Limited (No 2) [2013] ACompT 8, 18 September 2013, paragraph 308.*

471 Australian Competition Tribunal, *Application by WA Gas Networks Pty Ltd (No 3) ACompT 12*, 8 June 2012, paragraphs 105–8; Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26 July 2012, paragraphs 161–3.

472 See CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, February 2013; Lally, *Review of the AER’s methodology*, March 2013; Lally, *The dividend growth model*, March 2013; McKenzie and Partington, *Review of the AER’s overall approach*, February 2013.

473 CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, February 2013, p. 23.

474 Brailsford, T.J., J.C. Handley and K. Maheswaran, 'Re-examination of the historical equity risk premium in Australia', *Accounting and Finance*, Vol. 48, 2008, pp. 73–97.

475 Lally, *Review of the AER’s methodology*, March 2013, p. 5.

inflation shock' in the 20th century (4.9 per cent), the DGM approach (5.9 to 8.4 per cent), and the result from surveys (up to 5.9 per cent).[476]

The median of these approaches is 6.0 per cent. Lally notes a wide range of other methods are available and the cut-off point is a matter of judgement. If the historical average real market return (favoured by Gregory and Wright) was considered, the estimated nominal MRP would be about 8.0 per cent. Adding this to the other methods, the median of these five approaches is still 6.0 per cent.[477]

Lally also suggested evidence from foreign markets could be considered. For the first, second and fourth of the five methods described above, the cross-country averages are 6.0 per cent, 4.0 to 5.0 per cent, and up to 5.8 per cent.[478] These additional results are consistent with those for Australia and therefore Lally considered these reinforce the conclusion that the appropriate MRP estimate for Australia at the time was 6.0 per cent.

D.6.3 Is there a relationship between the risk free rate and MRP?

Recently we have considered whether there is a relationship between the risk free rate and the MRP. During the recent Victorian gas review the regulated businesses submitted several consultant reports in support of a negative relationship between the risk free rate and the MRP, including:

- CEG's arguments informed primarily by the AMP DGM
- Wright's indirect evidence
- SFG's argument that the risk free rate and the MRP must be negatively correlated

We commissioned Associate Professor Lally, Professor McKenzie and Associate Professor Partington and CEPA to consider these submissions. We considered three aspects of this issue:

1. The theoretical argument.
2. The academic research on this topic.
3. The empirical evidence presented by the regulated businesses and their consultants.

McKenzie and Partington undertook a comprehensive literature review. They found there is evidence that supports both a positive and a negative relationship. As a result, the evidence is inconclusive. The evidence has did not persuade us that there is a strong negative relationship between the 10 year risk free rate and the 10 year MRP. Therefore it is not sufficiently well established to form the basis for any adjustment to our estimates of the risk free rate or MRP.

Theoretical argument

SFG argued the risk free rate and the MRP must be negatively correlated because any reduction in the risk free rate arises from an increased desire for risk free assets. This change in preference for risk free assets must simultaneously raise the market return on equity, thereby raising the MRP. Lally noted SFG presented no theoretical analysis that supported this claim. Furthermore, changes in risk free rates may arise from changes in monetary policy, the level of government deficits, the savings

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476 Lally, *Review of the AER's methodology*, March 2013, p. 7.
477 Lally, *Review of the AER's methodology*, March 2013, p. 38.
478 Lally, *Review of the AER's methodology*, March 2013, p. 34.

rate, or the availability of desirable investment projects in the private sector. None of these phenomena suggest that the MRP should change.[479]

CEPA noted the relationship between the risk free rate and the MRP is difficult to test empirically as the MRP is unobservable and any regressions would rely on developing a robust/consistent time series of investors' expectations. As such, the arguments presented by academics, regulators and companies have tended to be more indirect, and conclusions have therefore been presented in more uncertain terms. As a result, CEPA considered there is not enough evidence to justify making a firm conclusion about the relationship between the risk free rate and the MRP.[480]

Lally noted a negative relationship between the CGS rate and the MRP may be plausible. However the significant issue for regulatory purposes is the strength of this relationship and especially its strength in respect of the ten year risk free rate and the ten year MRP.[481] Ang and Bekaert (2007) only found a negative relationship between short term risk free rates and the equity risk premium. As discussed below, McKenzie and Partington noted such results indicate that predictive regressions might help forecast market returns at a one year horizon, but are little use at a ten year horizon.[482]

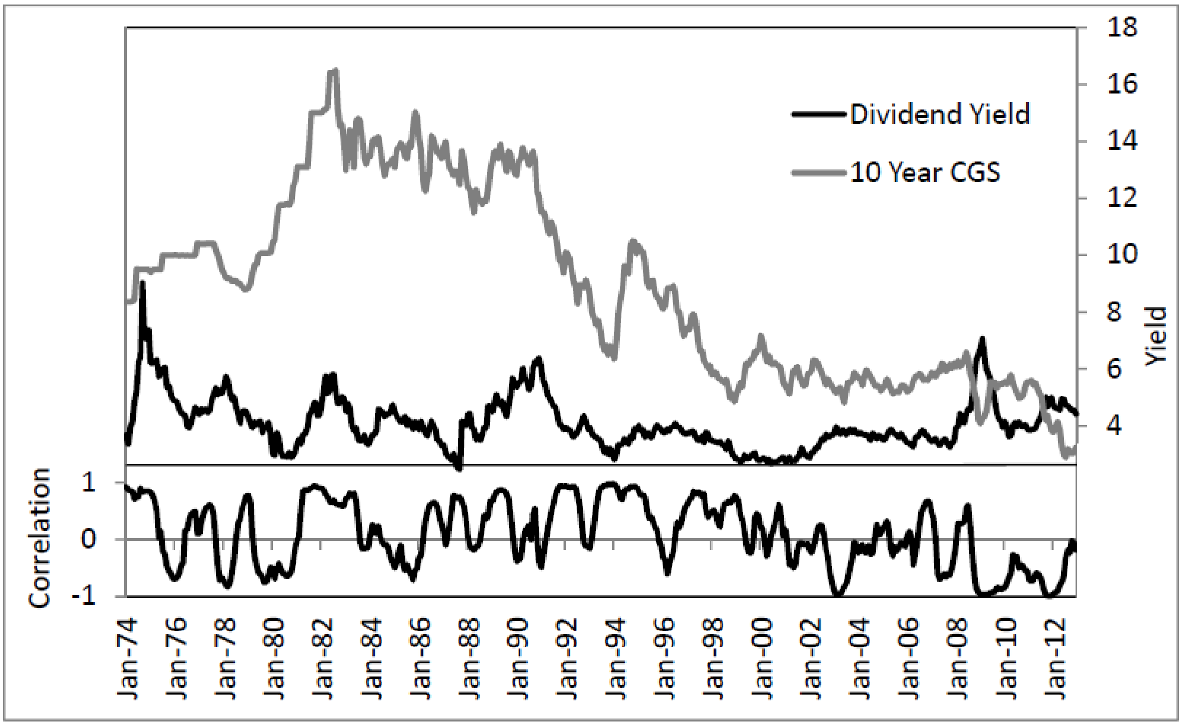
Academic literature

The regulated business' consultants submitted there is a negative relationship between the risk free rate and the MRP. However, McKenzie and Partington performed a comprehensive literature review and found there is academic support for both a negative and a positive relationship. They concluded the relation between the MRP and the level of interest rates is an open question and this relation is not sufficiently well established to form the basis for a regulatory adjustment to the MRP.[483]

Among other findings, McKenzie and Partington noted the 12 month rolling correlation is positive for 55 per cent of the sample and negative for 45 per cent of the sample.[484] Figure D.5 below illustrates this point.

479 Lally, *Review of the AER's methodology*, March 2013, pp.16–17.
480 CEPA, *Advice on estimation of the risk free rate and market risk premium*, March 2013, p.25.
481 Lally, Cost of equity and the MRP, July 2012, p. 7.
482 McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 26.
483 McKenzie and Partington, *Review of the AER's overall approach*, February 2013, pp.5–6.
484 McKenzie and Partington, *Review of the AER's overall approach*, February 2013, pp.24–25. They examined the 10 year CGS yield and the Australian market dividend yield for Datastream's proprietary country indices

Figure D.5 Correlation between 10 year CGS yield and the Australian market dividend yield



Source: McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 24.

McKenzie and Partington found the literature in support of a negative relationship includes:

- Campbell and Cochrane (1999), Lettau and Ludvigson (2011), Li (2001), Bansal and Yaron (2004), Bhamra, Kuehn and Strebulaev (2010) all used consumption based models to show people become more risk averse in recessions, which leads to higher expected equity returns.
- Menzly, Santos and Veronesi (2004), Bekaert, Engstrom and Xing (2009), Guvenen (2009), Verdelhan (2010) and Jouini and Napp (2011) explicitly model time variation in the risk parameters and find evidence of counter-cyclicality.
- Harvey (1989) and Li (2001) show the US equity risk premia are higher at business cycle troughs than at peaks.
- Ang and Bekaert (2007) find a negative relationship between short term risk free rates and the equity risk premium.
- Henkel, Martin Nardari (2011) estimate the market risk premium is higher during recessions across a range of countries.

McKenzie and Partington found the literature in support of a positive relationship includes:

- Li (2007) shows a counter-cyclical variation of risk aversion drives a pro-cyclical conditional risk premium.
- Kim and Lee (2008) find investors become more risk averse during boom periods.
- Damodoran (2012) finds there is a positive relationship between interest rates and equity risk premium.

- Amromin and Sharpe (2009) and Amromin and Sharpe (2012) find when investors believe macroeconomic conditions are more expansionary, they tend to expect both higher returns and lower volatility. The data they have used contains information about the revealed preference of actual investors, rather than the mathematical outcomes of a representative agent model, or broad based conclusion from studying aggregated return information.
- Greenwood and Shleifer (2013) find investor expectations are highly positively correlated with past stock returns and the level of the stock market.
- Graham and Harvey (2005) present evidence from surveying managers, which indicated there is a positive correlation between the expected equity risk premium and real interest rates. However, Graham and Harvey (2010) indicate this positive relationship gets weaker post GFC.

McKenzie and Partington also found there was some support in the literature for oscillating relationship (that is, the relationship is at times positive and at other times negative). Specifically, De Paoli and Zabczyk (2009) show the MRP can be either pro- or counter-cyclical. They also show investors' assessment of future prospects is crucial in determining how the MRP behaves.

McKenzie and Partington's review of the academic literature on the theoretical and empirical evidence on the relationship between the risk free rate and the MRP was comprehensive. For this reason, we relied on the conclusion of their report over the conclusion from the reports submitted by the regulated businesses. The relevant section in McKenzie and Partington's report is section 1.3.2.

Empirical evidence

CEG provided empirical analysis in support of a negative relationship between the CGS yield and the estimated MRP. Lally addressed the analysis in his report to us prior to the draft decision. CEG responded to Lally's criticisms in its November 2012 reports. Lally reviewed CEG's response in his March 2013 reports and maintained the view that CEG's analysis is predisposed to producing such results. This is because it relies on the AMP DGM which assumes that, at any point in time, the market return on equity is the same for all future years. This perfect-offset assumption is neither plausible nor did CEG present any evidence in support of it.[485] Wright presented several pieces of indirect evidence in support of a negative relationship between the risk free rate and the MRP. His principal argument is that the risk free rate is pro-cyclical (lowest in depressed economic conditions and highest in favourable economic conditions), while the MRP is counter-cyclical (highest in depressed economic conditions and lowest in favourable economic conditions).

Lally noted the crucial question is not whether the correlation is negative but whether it is sufficiently negative. A negative correlation is not a sufficient condition for the real market return on equity to be more stable than the MRP. Using the Australian data, Lally found the correlation coefficient between the risk free rate and the MRP needs to be at least -0.76 for the real market return on equity to exhibit greater stability than the MRP. However, the actual correlation between the two in Australia was only -0.12. He also noted other indirect evidence presented by Wright similarly does not reveal the extent of the correlation. Therefore, it is not sufficient to support the argument that the real market return on equity is more stable over time than the MRP.[486]

485 Lally, *Review of the AER's methodology*, March 2013, pp. 8-12. More details of CEG's analysis can be found in section B.6 of the Victorian gas final decision. AER, *Access arrangement final decision: APA GasNet Australia (Operations) Pty Ltd 2013–17*, March 2013, Part 3, Section B.6.

486 Lally, Review of the AER's methodology, March 2013, pp.14–16 (see generally Section 2)

D.6.4 Consistency between the risk free rate and MRP

This section explores whether we estimate the risk free rate and MRP consistently throughout the CAPM.

Consistency with the Capital Asset Pricing Model (CAPM)

We apply the CAPM consistently. The Sharpe–Lintner CAPM is described by the following equation:

(1) E(Ri) = Rf + β.[E(Rm) - Rf]

Where: E(Ri) is the return on the investment

Rf is the risk free rate

β is the equity beta

E(Rm) is the expected market return

The term in the [ ] brackets can also be simplified to:

(2) MRP = E(Rm) - Rf

Therefore, the Sharpe–Lintner CAPM can be simplified to:

(3) E(Ri) = Rf - β.MRP

Regulated businesses and their consultants have submitted that we inconsistently applied the CAPM by combining a long term average MRP with a spot risk free rate.[487]

We disagree with this characterisation. It relies on a misunderstanding of how we determine the MRP. We do not simply employ a long term average MRP. Conceptually, we estimate a 10 year forward looking return on equity. To do so, we determine an estimate of the 10 year forward looking risk free rate and 10 year forward looking MRP.

For clarity, our application of the CAPM can also be expressed mathematically (Lally discusses this equation in more detail):[488]

$$E(R_j) = R_{f0}^{10} + [E(R_{m0}^{10}) - R_{f0}^{10}]\beta_j$$

Perhaps unsurprisingly as the return on equity is unobservable, experts disagree on the best method of estimating the expected return on the market (E(Rm)). As the MRP is unobservable, experts also disagree on the best method of estimating the MRP. Neither of these points makes our approach inconsistent with the CAPM.

McKenzie and Partington also suggest that the consistency argued for misses the point of the exercise:[489]

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487 SP AusNet, *Revised Access Arrangement Proposal: Chapter 5 – Rate of return and corporate tax allowance*, 9 November 2012, p. 2; CEG, *Update to March 2012 Report*, November 2012, p. 5; Gregory, *The AER approach*, November 2012, p. 3; Wright, *Review of risk free rate and cost of equity estimates*, October 2012, p. 2; SFG, *The required return on equity*, November 2012, p. 2; NERA, *Estimating the Cost of Equity under the CAPM*, November 2012, p. 5.

488 See, Lally, *Review of the AER's methodology*, March 2013, p. 24.

> The argument of the consultants that the AER approach mixes current and historic estimates of the risk-free rate in the CAPM and the consultants' insistency that whatever is used as the estimate of the current risk free rate should also be used to estimate the market risk premium, rather misses the point. What matters is getting the best estimate of the current risk free rate and the best estimate of the current market risk premium. Using the same estimate of the risk free rate for both provides no assurance whatsoever that the best estimates will be obtained. Such 'consistency' may simply result in giving consistently the wrong estimate.

CEPA concluded our estimate was consistent as we calculate the risk free rate and the MRP over the same timeframe.[490] CEPA also suggested the central question for consistency in the CAPM is whether there is a relationship between the risk free rate and MRP.[491]

Lally also concluded, the present value principle informs the application of the CAPM:[492]

> ...if the regulatory period were five years, the appropriate values for Rf and E(Rm) would be the five year rates prevailing at the commencement of the regulatory period and β should be defined with respect to the probability distributions for the Rj and Rm over the five year period.

Lally found that a long term average risk free rate is not consistent with the CAPM.[493] He did, however, consider that a long term average estimate of the expected return on the market would be consistent with the CAPM when applied with a prevailing estimate of the risk free rate.[494]

Furthermore, Gregory suggested that the Sharpe–Lintner CAPM is a single period model and is therefore incompatible with the multi-period regulatory application.[495] Lally advised us that the Sharpe–Lintner CAPM is a single period model and therefore not necessarily consistent with the multi-period regulatory application. However, he also advised:[496]

> ...this is merely one of many features of the model that simplify reality and recourse to models with more realistic assumptions generally incurs greater difficulties in estimating parameters, thereby requiring a judgment over the trade-off. The AER's preference for a one-period version of the model is universal amongst regulators, overwhelmingly typical of submissions to them, and consistent with most other applications of the CAPM, presumably in recognition of this trade-off.

Internal consistency

As well as being consistent with the CAPM, we apply an approach that employs consistent definitions and logic throughout.

CEG has stated:[497]

> The AER uses the same terminology to mean different things at different places in its decision and logic. Specifically, the AER uses the same terminology to mean different things when applied to the risk free rate and when applied to the MRP.

A misunderstanding of our MRP estimate appears to underlie this suggestion. We estimate a 10 year forward looking return on equity using an estimate of the 10 year forward looking MRP. Lally suggested:[498]

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489 McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 31.
490 CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p. 7.
491 CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, pp. 6–10
492 Lally, *The present value principle*, March 2013, p.6. Rf represents the risk free rate. Rm represents the expected return on the market. Ri represents the expected return on the investment.
493 Lally, *The present value principle*, March 2013, pp. 7–8.
494 Lally, *The present value principle*, March 2013, p. 10.
495 A. Gregory, *The risk free rate and the present value principle*, 5 November 2012, p. 5.
496 Lally, *The present value principle*, March 2013, p. 16.
497 CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 6.

> CEG's unwarranted belief that there is an inconsistency may arise because the ten-year risk free rate prevailing at the present time is observable, and therefore requires no comment upon its composition, whilst the ten-year MRP prevailing at the present time is not observable, thereby leading the AER to comment upon its components (which include the annual MRPs expected to prevail in each of the next ten years).

CEG's suggestion may also have stemmed from its consideration that prevailing equity prices can provide a reliable estimate of the prevailing MRP—using DGM models for example.[499] If this were the case, it would be appropriate to use these estimates ahead of others. Equity market prices likely reflect market conditions in the same manner as the market for CGS.[500]

However, we do not agree with CEG's view. As discussed above, we do not consider DGM estimates robust enough to place sole reliance on, or even primary reliance. As a result, we estimate a prevailing MRP based on a number of different methods, including historical averages.

CEG also stated:[501]

> The AER also, unsurprisingly given the inconsistency in definitions, adopts inconsistent supporting logic for its definitions. The AER decision employs logic:
>
> - in support of why short run fluctuations in the spot rate for the 10 year CGS must be fully reflected in the risk free rate estimate in the form of recourse to the 'present value principle'; but does not apply the same logic to the determination of the MRP;
>
> - in support of why short term fluctuations in equity market conditions should not be reflected in its long-term cost of equity estimate; but does not apply the same logic to the determination of the risk free rate.

We consider the approach in this decision is consistent with the CAPM. The 'short run fluctuations' that are reflected in the prevailing risk free rate reflect changes in market conditions and market prices. If a perfectly reliable estimate of the MRP could be generated from market prices it would be reasonable to use this estimate. However, no such estimate exists.[502]

D.6.5 Return predictability

Much of the finance literature on the MRP centres on the debate about return predictability. As Gibbard suggests in his recent discussion paper for the ACCC/AER:[503]

> [this is] because of the relationship between expected returns and the cost of equity. If markets are in equilibrium and efficient, expected returns are equal to the cost of equity. Thus if, in addition, returns are predictable on the basis of current information, then (given expectations are rational) not only expected returns but also the cost of equity is dependent on current information.

Further, the literature on return predictability is extensive and complex. Some studies conclude returns are predictable, while others conclude they are not. If excess returns are predictable, we can estimate the MRP using a predictive variable (such as dividend yields or implied volatility) or a valuation model. If excess returns are not predictable, historical excess returns are the best estimate of the MRP.

The concept of return predictability relies on strong assumptions about markets—that markets are in equilibrium and are efficient. If these assumptions do not hold, then it becomes less reliable to test

498 Lally, *Review of the AER's methodology*, March 2013, p. 23.
499 CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 8.
500 CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 8.
501 CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 10.
502 Lally, *Cost of equity and the MRP*, 25 July 2012, pp. 15–18. See appendix B.5 and B.6 for more detail.
503 Gibbard, Peter, *Estimating the Market Risk Premium in Regulatory Decisions: Conditional versus Unconditional Estimates*, ACCC/AER Working Paper Series, Working Paper no. 9, September 2013, p. 5.

estimation methods against realised returns. However, we rely on the same strong assumptions when using the Sharpe–Lintner CAPM.

Over the past decade, there is considerable scepticism about evidence for a relationship between observable variables and the MRP. A few studies indicated there is no better forecast of excess returns than the historical average.

For example, Welch and Goyal examined the performance of variables that academic literature suggested as good predictors of the equity premium.[504] These variables include dividend yields, the earnings price ratio, corporate bond returns and volatility. Welch and Goyal found that, of the variables that have been proposed to predict excess returns, many produced poor in-sample forecasts.[505] Moreover, they find most variables that performed well in-sample performed poorly out-of-sample.[506]

Welch and Goyal distinguished between in-sample and out-of-sample performance of forecasting models. To understand this distinction, it may be helpful to consider the following passage in Brooks (2008), which insists on the importance of out-of-sample forecast performance:[507]

> In-sample forecasts are those generated for the same set of data that was used to estimate the model's parameters. One would expect the 'forecasts' of a model to be relatively good in-sample, for this reason. Therefore a sensible approach to model evaluation through an examination of forecast accuracy is not to use all of the observations in estimating the model parameters, but rather to hold some of the observations back. The latter sample, sometimes known as the holdout sample, would be used to construct out-of-sample forecasts.

The conclusion of Welch and Goyal is stated below:[508]

> Most models are no longer significant even in sample (IS), and the few models that still are usually fail simple regression diagnostics…Most models have poor out-of-sample (OOS) performance, but not in a way that merely suggests lower power than IS tests. They predict poorly late in the sample, not early in the sample…Therefore, although it is possible to search for, to occasionally stumble upon, and then to defend some seemingly statistically significant models, we interpret our results to suggest that a healthy scepticism is appropriate when it comes to predicting the equity premium, at least as of early 2006. The models do not seem robust.
>
> ...
>
> OOS, most models not only fail to beat the unconditional benchmark (the prevailing mean) in a statistically or economically significant manner, but underperform it outright.

In reports submitted by the ENA, NERA and CEG considered the evidence on return predictability and reach different conclusions to those in Welch and Goyal.[509] Both consultants suggest there is strong evidence in favour of predictability.[510] NERA focussed on the work of Campbell and Thompson which

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504 Welch, Ivo and Amit Goyal (2008), '*A Comprehensive Look at the Empirical Performance of Equity Premium Prediction*', *Review of Financial Studies*, 21(4), pp. 1455–1508.

505 Welch, Ivo and Amit Goyal (2008), '*A Comprehensive Look at the Empirical Performance of Equity Premium Prediction*', *Review of Financial Studies*, 21(4), pp. 1455–1508.

506 Welch, Ivo and Amit Goyal (2008), *'A Comprehensive Look at the Empirical Performance of Equity Premium Prediction'*, *Review of Financial Studies*, 21(4), pp. 1455–1508.

507 Brooks, Chris (2008), *Introductory Econometrics for Finance*, 2nd ed. (Cambridge, Cambridge University Press).

508 Welch, Ivo and Amit Goyal (2008), *'A Comprehensive Look at the Empirical Performance of Equity Premium Prediction'*, *Review of Financial Studies*, 21(4), pp. 1455–1508.

509 NERA Economic Consulting, *The market risk premium, analysis in response to the AER's draft rate of return guideline: A report for the Energy Networks Association*, 11 October 2013, pp. 31-32; CEG, *Estimating the return on the market*, June 2013, pp. 8–16.

510 NERA Economic Consulting, *The market risk premium, analysis in response to the AER's draft rate of return guideline: A report for the Energy Networks Association*, 11 October 2013, pp. 31-32; CEG, *Estimating the return on the market*, June 2013, pp. 8–16.

appeared in the same issue of the Review of Financial Studies.[511] Campbell and Thompson consider a variety of different valuation models and reach the conclusion that excess returns are predictable. NERA concluded:[512]

> [Campbell and Thompson's] results, however, imply unambiguously that, using all of the data at their disposal, one cannot reject the hypothesis that valuation models provide forecasts of the return to the market portfolio in excess of the risk free rate that are either identical or better in a mean squared error sense than forecasts generated by the sample mean of a series of historical excess returns.

CEG likewise considers Campbell and Thompson and reaches the same conclusion as NERA.[513] It also considers a wider review of other authors on the topic of predictability. CEG concluded:[514]

> The literature almost uniformly concludes that the E[MRP] is predictable. Those few papers that do conclude that the E[MRP] is not predictable examine only single predictor variables, rather than the larger set of information actually employed by investors.

We consider the literature on return predictability and determining the E[MRP] a contested area. Indeed, this conclusion is supported by Dimson, Marsh and Staunton:[515]

> Yet despite extensive research, this debate [about predictability] is far from settled. In a special issue of the Review of Financial Studies, leading scholars expressed opposing views, with Cochrane (2008) and Campbell and Thompson (2008) arguing for predictability, whereas Goyal and Welch (2008) find that 'these models would not have helped an investor with access only to available information to profitably time the market'. Cochrane's (2011) recent Presidential Address demonstrates the persistence of this controversy.

They further concluded that, for 'practical purposes', it is 'hard' for predictors of equity premia to outperform a long-term historical average:[516]

> In summary, there are good reasons to expect the equity premium to vary over time. Market volatility clearly fluctuates, and investors' risk aversion also varies over time. However these effects are likely to be brief. Sharply lower (or higher) stock prices may have an impact on immediate returns, but the effect on long-term performance will be diluted. Moreover volatility does not usually stay at abnormally high levels for long, and investor sentiment is also mean reverting. For practical purposes, we conclude that for forecasting the long run equity premium, it is hard to improve on extrapolation from the longest history that is available at the time the forecast is being made.

Gibbard suggested that even if the MRP changes over time, regulators face a number of practical problems in conditioning the estimate of the MRP on current information, namely:[517]

- The diversity and complexity of contemporary predictive models—Gibbard identified a range of articles in the 'third phase' of literature which explore claims of predictability through more complex models. As a result of this literature, there is a considerable range of novel and complex models of excess returns in the academic literature. In this literature, there is no consensus—or anything approaching consensus—on the appropriate set of methodologies for modelling future excess returns.

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511 Campbell, John and Samuel B. Thompson, 2008, *Predicting excess stock returns out of sample: Can anything beat the historical average?*. Review of Financial Studies 21, pp. 1509–1531.

512 CEG, *Estimating the return on the market*, June 2013, pp. 8–16.

513 CEG, *Estimating the return on the market*, June 2013, p. 12.

514 CEG, *Estimating the return on the market*, June 2013, p. 8.

515 Dimson, Elroy, Paul Marsh and Mike Staunton, *Credit Suisse Global Investment Returns Sourcebook 2012*, Credit Suisse Research Institute, 2012, p. 36.

516 Dimson, Elroy, Paul Marsh and Mike Staunton, *Credit Suisse Global Investment Returns Sourcebook 2012*, Credit Suisse Research Institute, 2012, p. 37.

517 Gibbard, Peter, *Estimating the Market Risk Premium in Regulatory Decisions: Conditional versus Unconditional Estimates*, ACCC/AER Working Paper Series, Working Paper no. 9, September 2013, pp. 24–29.

- The instability of return predictability—a number of studies have found instability in models of return predictability, that is, the models tend to change over time. As a result, it is not clear whether a predictive model that appears reliable today will perform well in future. If parameters in the model are unstable over time, it is difficult, if not impossible, for the regulator to measure accurately how the MRP should be adjusted in response to changes in the conditioning variables.
- The potential for data mining—data mining (which is also referred to as 'data dredging' and 'data snooping') may be intentional or unintentional. Unintentional data mining is exemplified by multiple econometricians testing the same data set against different variables. As the number of tests increases, a statistically significant result becomes more and more likely, even though there may not be any relationship between the variables. Intentional data mining typically involves conducting analysis with the intention of establishing a desired relationship. This may be where an econometrician interrogates a data set using a number of different variables until one variable produces a statistically significant relationship.

In summary, we consider the debate about return predictability is not settled. There are reasons to be sceptical about the ability of conditioning variables or valuation models to predict excess returns. At the same time, there is support for predictability in the academic literature. The uncertainty suggests we should be hesitant about predicting excess returns.

E Dividend growth models

In this appendix, we discuss methodological issues (or the 'mechanics') involved in constructing a dividend growth model (DGM). Based on that analysis, we present our preferred DGM methodology. We also analyse the use of DGMs to estimate the market risk premium (MRP) compared with the use of DGMs to estimate the return on equity for energy infrastructure businesses, such as the benchmark efficient entity.

In addition to the DGM analysis found in this appendix:

- in appendix A, we assess several return on equity models, including DGMs (under section A.2), against our rate of return criteria
- in appendix D, we analyse the strengths and weaknesses of different sources of evidence on the MRP, including DGMs (see section D.2).

E.1 Methodology

Dividend growth models are based upon a discounted cash flow formula. According to the formula the price of a share is equal to the discounted stream of expected future dividends per share into perpetuity.[518] In order to use this formula to estimate the return on equity, certain assumptions must be made. One common assumption is that there is a single discount rate rather than a different discount rate for each future period.[519] Given this assumption, the discounted cash flow formula can be specified as follows:

$$P_0 = \frac{E(D_1)}{(1+k)^1} + \frac{E(D_2)}{(1+k)^2} + \frac{E(D_3)}{(1+k)^3} + \cdots$$

where:

- P_0 is the current price of equity
- $\mathrm{E}(D_t)$ is the current expectation of dividends per share at time t
- k is the discount rate—that is, the return on equity.

In order to use this equation to estimate the return on equity, an assumption must be made about expected future dividends. The simplest such assumption is that the expected long–term growth rate in nominal dividends per share is constant at g. Given this assumption, the formula can be re-arranged to estimate the return on equity as follows:

$$k = [E(D_1)/P_0] + g = [(D_0(1+g)/P_0] + g$$

That is, the return on equity is equal to the sum of the dividend yield and the growth rate. This is referred to as the constant-growth DGM.

If there is reason to think that investors do not expect that dividend growth is constant, then it may be appropriate to use a version of the DGM that does not assume constant growth. One such model is the two–stage DGM, which relaxes the assumption of constant growth. The two–stage DGM divides future time periods into two stages—in the second stage, dividend growth is assumed to be constant.

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518 Discounting is the process of adjusting each cash flow for the time value of money and for risk.
519 In other words, the assumption is that the discount rate does not have a term structure.

But, in the first stage, the growth rate may vary and is usually determined from estimates of analyst forecasts. A two–stage DGM in which dividend growth is assumed constant after period N is characterized by the following formula:[520]

$$P_0 = \frac{E(D_1)}{(1+k)^1} + \frac{E(D_2)}{(1+k)^2} + \cdots + \frac{E(D_{N-1})}{(1+k)^{N-1}} + \frac{E(D_N)}{(1+k)^N} + \frac{\frac{E(D_N)(1+g)}{k-g}}{(1+k)^N}$$

If data are available on (i) the stock price, (ii) expected dividends over the first N periods and (iii) g, then this formula can estimate the return on equity, k.

The Brattle Group report, which was prepared for the APIA submission, observes that 'most recent' implementations of the DGM avoid the restrictive constant growth assumption, and instead use a multi-stage DGM.[521] Professor McKenzie and Associate Professor Partington also express concerns about the constant growth version of the DGM. They advise that the constant growth version of the DGM ‘may be too rough even to act as a reasonableness check’. Based on these considerations, we propose to use a multi-stage version of the DGM.[522]

There are a variety of different versions of multi-stage DGMs: both two–stage and three–stage models are relatively common; and different models have different characterizations of the trajectory of expected dividends during each stage.

E.2 Using the DGM to estimate the whole market's return on equity and the MRP

In general, in order to implement any version of the DGM, it is necessary to make certain strong assumptions. The estimate of the expected return on equity from any DGM is largely dependent on the assumptions employed in its implementation. In essence, DGM's use assumptions about one unobservable variable (expected growth in future dividends) to derive values for another unobservable variable (expected return on equity). Therefore, the outcome of any DGM will depend crucially on the assumptions the analyst implementing the model uses. Nevertheless, changes in DGM estimates over time may provide information about changes in the market return on equity and the MRP.

The versions of the DGM differ based on which strong assumptions they make. For example, the assumption that the discount rate does not have a term-structure (which, as NERA observes, is typically made for 'commercial use') is a strong assumption.[523] Even when a DGM makes a different assumption about the term-structure of the discount rate, that assumption can still be questioned.[524] Despite the strong assumptions required to apply DGMs, they are still used to inform expected values of the rate of return. This is because of their solid theoretical foundation and their relative simplicity and transparency. In selecting an appropriate form of the DGM, we are guided particularly by

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520 Shannon Pratt and Roger Grabowski, *Cost of Capital: Applications and Examples*, 4th Ed. (Hoboken: Wiley, 2010), p. 32.

521 Brattle Group, *Estimating the Cost of Equity for Regulated Companies: Prepared for APIA, 17 February 2013*, p. 29.

522 McKenzie and Partington, *Report to the AER: Risk, Asset Pricing Models and WACC*, June 27, 2013, p. 36.

523 To assume that the discount rate does not have a term structure is to assume that the discount rate is the same for each cash flow. NERA, *Prevailing Conditions and the Market Risk Premium: Report for APA Group, Envestra, Multinet and SP Ausnet*, March, 2012, p. 34.

524 For an example of a DGM which makes a different assumption about the term structure of the discount rate, see Lally, *The Dividend Growth Model*, 4 March, 2013. Lally also recommends using a model with a term structure in Martin Lally, *Review of the AER's Proposed Dividend Growth Model,* December, 2013. While we agree that it is reasonable to introduce a term structure into a DGM model, we do not incorporate a term structure into our model because it is non-standard. As NERA observe, 'while it is theoretically possible that the term structure of expected returns to the market may not be flat, the incorporation of a term structure that is not flat into the DGM is not standard practice: NERA, *The Market, Size and Value Premiums: A Report for the Energy Networks Association*, June 2013, p. 50.

considerations of simplicity and transparency. On the one hand, to choose a relatively complex and opaque version of the DGM would lose the principal merits of the model. On the other hand, a constant-growth DGM is excessively simplistic.

In balancing these considerations, we will use two comparatively transparent versions of the DGM: a two–stage version and a three–stage version. Two and three stage versions of the DGM are commonly used to estimate the DGM.[525] We note that several consultancy reports submitted by CEG us use a two–stage DGM.[526] While Associate Professor Lally claims that a three–stage DGM is more plausible than a two–stage model, McKenzie and Partington suggest that a two–stage DGM may be appropriate.[527] Accordingly we propose to estimate both a two–stage and a three–stage model.

Like a two–stage DGM, a three–stage DGM has a final stage in which the growth of expected dividends is assumed to be equal to the long–term dividend growth rate; and it also has an initial stage in which expected dividends are assumed to be determined by estimates of analyst forecasts. In contrast to a two–stage DGM, however, a three–stage DGM also has an intermediate stage, in which the growth rate of dividends is assumed to transition between the short-term growth rate and the long–term growth rate. In our three–stage model, the transition between the short-run and long-run growth rate is assumed to take place in a linear fashion. The third–stage, in which growth reverts to its long–term rate, is assumed to begin in the tenth year. The principal difference between the two–stage and three–stage models is the assumption about the time that it takes for growth to revert to its long term level: the two–stage model assumes that the reversion is relatively quick; and the three–stage model assumes that the process takes somewhat longer.

In implementing the two–stage DGM, we propose to make two adjustments to the equation above. First, a 'partial first year' adjustment must be made for the case in which the date at which the model is estimated is not at the beginning of the financial year. Second, we consider a midyear convention is necessary, to adjust for the fact that dividends are distributed not only at the end of the financial year but also during the year. Pratt and Grabowski's method is used for adjusting for partial first year and the midyear convention.[528] We make an analogous adjustment in the three–stage version of the model.

We will use the following equation, which incorporates these two adjustments, to determine the return on equity.

$$P_c = \frac{m \times E(D_c)}{(1+k)^{m/2}} + \sum_{t=1}^{N} \frac{E(D_t)}{(1+k)^{m+t-0.5}} + \frac{\frac{E(D_N)(1+g)}{k-g}}{(1+k)^{m+N-0.5}}$$

where:

525 See, for example, Mika Inkinen, Marco Stringa and Kyriaki Voutsinou, 'Interpreting Equity Price Movements since the Start of the Financial Crisis', Bank of England Bulletin, 2010, Q1; Aswath Damodaran, Equity Risk Premiums (ERP): Determinants, Estimation and Implications - The 2013 Edition, March 2013, pp. 65-73; Pratt and Grabowski, *Cost of Capital: Applications and Examples,* pp. 31-40. Bloomberg provides estimates of the cost of equity using a three-stage model.

526 CEG, *Estimating the Cost of Capital under the NGR: A Report for Envestra*, September, 2010, pp. 37-39; CEG, *Internal Consistency of Risk Free Rate and MRP in the CAPM: Prepared for Envestra, SP Ausnet, Multinet and APA*, March 2012, pp. 50-51.

527 Martin Lally, *Review of the AER's Proposed Dividend Growth Model*, December, 2013; Michael McKenzie and Graham Partington, *Report to the AER: The Dividend Growth Model (DGM)*, December, 2013.

528 Pratt and Grabowski, *Cost of Capital: Applications and Examples*, pp. 36-40. McKenzie and Partington suggest that the mid-year adjustment is unnecessary - 'a form of spurious precision'. However Lally calculates that the adjustment in material. On balance, we propose to retain the mid-year adjustment. See Martin Lally, *Review of the AER's Proposed Dividend Growth Model*, December, 2013; Michael McKenzie and Graham Partington, *Report to the AER: The Dividend Growth Model (DGM)*, December, 2103.

- P_c is the current price of equity
- $\mathrm{E}(D_c)$ is the current expectation of dividends per share for the current financial year
- $\mathrm{E}(D_t)$ is the current expectation of dividends per share for the financial year t years after the current financial year
- m is the fraction of the current financial year remaining, expressed as a decimal point
- N is the time period after which dividend growth reverts to its long-term rate (for the two-stage model, N = 2, for the three-stage model N = 9)
- g is the long-term growth rate in nominal dividends per share
- k is the discount rate—that is, the return on equity.

We use the model to obtain estimates of the market return on equity for each month from March 2006 to June 2013. Data on expected dividends are taken from Bloomberg, which provides a historical series of estimates of forecast dividends per share for (i) the current financial year (ii) the next financial year and (iii) the financial year after the next.[529] The S&P/ASX 200 index is taken as the market proxy. Dividend forecasts must be adjusted for the effect of imputation credits by the following factor:[530]

$$1+\left\{0.7\times 0.75\times \frac{0.3}{1-0.3}\right\}=1.225$$

A crucial parameter for estimating our two–stage and the three–stage versions of the DGM is g, the expected long–term growth rate of nominal dividends per share. Associate Professor Lally has recently estimated g using the long–term expected growth rate of real GDP, which he evaluates to be 3 per cent. Lally observes, however, that this figure is in excess of the expected long–term growth in real dividends per share, citing the reasons given in an article by Bernstein and Arnott.[531] Expected long–term growth in real GDP is higher than expected long–term growth in real dividends per share because of 'the net creation of shares' through (i) new share issuance (net of buybacks) and (ii) the emergence of new companies.[532] To estimate the growth in dividends per share growth from growth in GDP a deduction must be made to account for net creation of shares. While Bernstein and Arnott argue for a deduction of 2 per cent, Lally argues that this is an overestimate, proposing instead a range of deductions: 0.5, 1.0 and 1.5 per cent.[533]

In estimating the expected long–term growth rate of real GDP, Lally relied primarily on historical averages over an averaging period of more than 100 years. So in the illustrative calculation below, we

529 CEG and NERA have also sourced their data on expected dividends per share from Bloomberg: see CEG, *Estimating the Cost of Capital under the NGR*, September, 2010, pp. 37-39; CEG, *Internal Consistency of Risk Free Rate and MRP in the CAPM*, March 2012, pp. 50-51; NERA, *Prevailing Conditions and the Market Risk Premium*, March, 2012, pp. 34-39. Lally recommends using IBES EPS forecasts instead of Bloomberg DPS forecasts, because they are less sensitive to short-term fluctuations in future earnings payout rates and have also been subjected to extensive tests for bias. We do not currently have a subscription for IBES data, but will consider the possibility of using it.

530 This calculation assumes that the corporate tax rate is 30%, the proportion of franked dividends is 75% and theta is 0.7. It is based on the formula for the adjustment factor in Tim Brailsford, John Handley and Krishnan Maheswaran, 'Re-examination of the Historical Equity Risk Premium in Australia', *Accounting and Finance*, 48 (2008), p. 85. The same calculation appears in NERA, *Prevailing Conditions and the Market Risk Premium*, March, 2012, p. 38; CEG, *Internal Consistency of Risk Free Rate and MRP in the CAPM*, March 2012, p. 17, although they use a value for theta of 0.35.

531 Lally, *The Dividend Growth Model*, 4 March, 2013, p. 14.

532 William Bernstein and Robert Arnott, 'Earnings Growth: The Two Percent Dilution', *Financial Analysts Journal*, (September/October 2003), pp. 47-55.

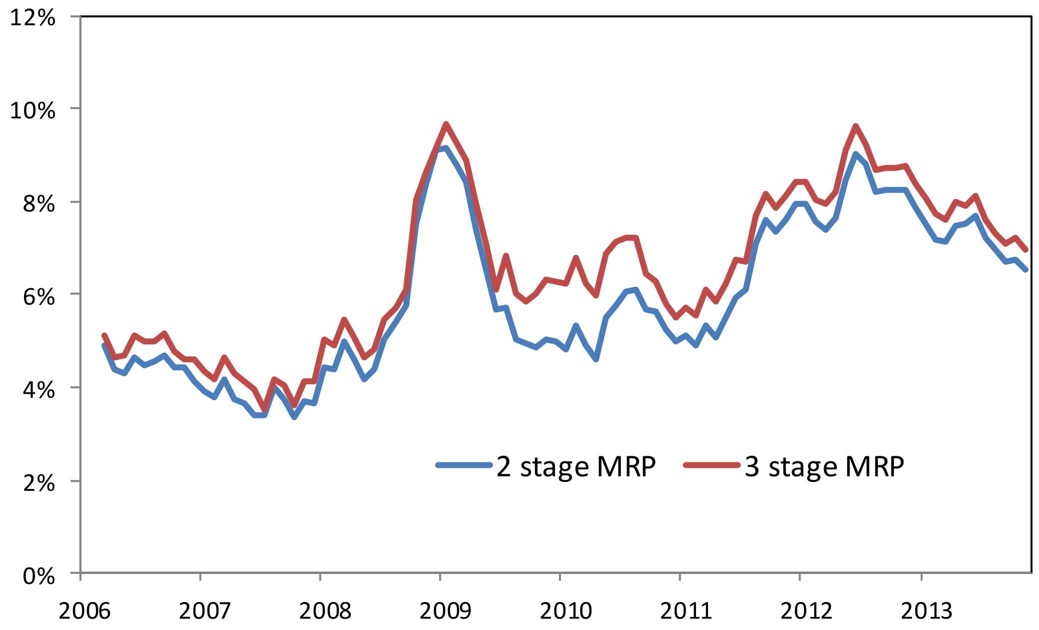
533 Lally, *The Dividend Growth Model*, 4 March, 2013. Lally cites two facts which suggest that 2 per cent is an overestimate of the dilution factor: the 'declining dividend payout rate'; and the extent to which 'market capitalisation grows simply due to listings from foreign firms and from previously unlisted US firms (p. 14).

assume that the expected long–term growth rate of GDP is constant from 2006 to 2013 at 3 per cent. Moreover, in this calculation, the midpoint of Lally's proposed range of deductions is used—a deduction of 1 per cent. Thus the estimate of expected long–term growth in real dividends per share is 3 per cent less 1 per cent, which is 2 per cent.[534] To use this figure to calculate nominal growth, assumptions about inflation expectations must be made. It is assumed that expected inflation is given by the midpoint of the RBA target range of 2 to 3 per cent. That is, it is assumed that expected inflation is 2.5 per cent. It follows that g, expected long–term growth in nominal dividends per share, is:

$$g = 100 \times \{(1 + 0.02)(1 + 0.025) - 1\} = 4.6\ per\ cent$$

McKenzie and Partington suggest that the appropriate number may be even lower, so that 'the AER estimate may be viewed as somewhat on the generous side'.[535] Given this value for g and given an imputation adjustment of 1.225, the AER's two–stage and three–stage models generate estimates of the MRP that are represented in Figure E. below.

Figure E.1 Estimates of the MRP using a two–stage and three–stage DGM



Source: Bloomberg and AER analysis

For the period from March 2006 to November 2013, according to the two–stage model, the average MRP is 5.9 per cent, whereas the three–stage model generates an average MRP of 6.5 per cent. Prior to the Global Financial Crisis, the MRP was significantly lower than over the past few years. From March 2006 to December 2007, the two–stage model yields an average MRP of 4.1 per cent, while according to the three stage model it is 4.4 per cent. On the other hand, from January 2010 to November 2013, the two–stage and three–stage models generate an average MRP of 6.7 per cent and 7.4 per cent respectively.

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534 Instead of estimating the growth parameter on the basis of a historical average of GDP growth, NERA use a historical average of DPS growth (NERA, *The Market, Size and Value Premiums: A Report of the Energy Networks Association*, June 2013, pp. 44-46). Note, however, that NERA's series of DPS data only goes back to 1981, whereas far longer data series are available for GDP growth.

535 Michael McKenzie and Graham Partington, *Report to the AER: The Dividend Growth Model (DGM)*, December, 2013. Lally reaffirms this method for estimating the growth rate his *Review of the AER's Proposed Dividend Growth Model,* December, 2013.

In order to estimate the current MRP, we estimate the average DGM for the months of October and November of 2013. The range of the DGM estimates reflects the range of Lally's estimates of the growth in real dividends per share. He suggests a range of 1.5 per cent, 2.0 per cent and 2.5 per cent. These estimates correspond to estimates of g, the growth in nominal dividends per share, of 4.0 per cent, 4.6 per cent and 5.1 per cent. Table E.1 reports the estimates of the MRP generated by the two–stage and three–stage models for these three values of g:

Table E.1 Average DGM estimates of the MRP for October and November 2013

Growth rate (per cent)	Two–stage (per cent)	Three–stage (per cent)
4.0	6.1	6.6
4.6	6.7	7.1
5.1	7.1	7.5

Source: Bloomberg and AER analysis.

E.3 Using the DGM to estimate the return on equity for energy infrastructure businesses

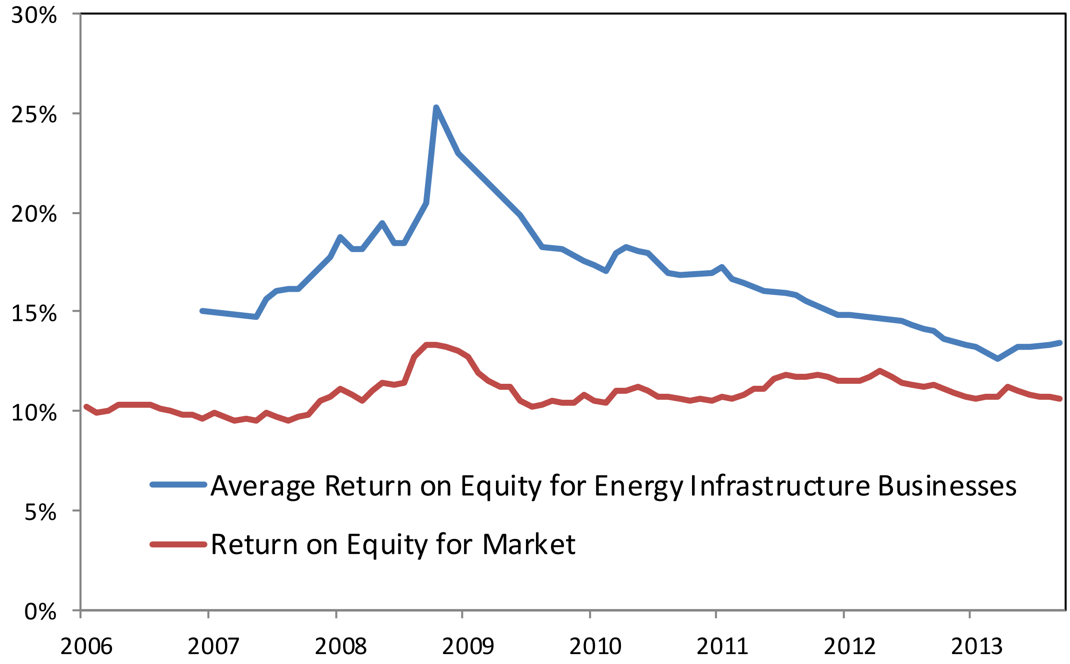
A similar method might be used to obtain estimates of the return on equity for individual energy infrastructure businesses, potentially then averaged in order to obtain an estimate for the industry. In several reports, CEG used DGM modelling to estimate the return on equity for six energy infrastructure businesses. Subsequent to these reports, one of these six businesses, Hastings Diversified Utilities Fund, was taken over by the APA Group.[536] Thus data are now only available for five energy infrastructure businesses: APA Group; DUET; Envestra Limited; SP AusNet; and Spark Infrastructure Group. Given the strong assumptions required when implementing DGMs, we are sceptical about the robustness of deriving a benchmark estimate of the return on equity based on the data of five businesses. In contrast, the DGM estimate of the return on equity for the market, which is based on the S&P/ASX 200 index, draws on information about the prices and expected dividends of 200 companies. In the United States, when DGM estimates are calculated for energy infrastructure proxy groups, there are often many more businesses in the proxy group.[537]

Nevertheless, we investigated the possibility of forming a benchmark estimate of the return on equity based on the return on equity generated by a DGM for the five energy infrastructure businesses. For each of the five firms, a historical series of the return on equity was estimated using the same methodology outlined above for estimating the return on equity for the market. The same two–stage version of the DGM was used. Estimates of expected dividends were obtained from Bloomberg for (i) the current financial year (ii) the next financial year and (iii) the financial year after the next. The same adjustment was made for imputation credits and the same parameter value was used for the expected long–term growth rate in nominal dividends per share. Figure E. below shows, for each month, the estimated average return on equity for the five energy infrastructure businesses, and compares it with the estimated return on equity for the market.

536 CEG, *Estimating the Cost of Capital under the NGR*, September, 2010, pp. 37-39; CEG, *Internal Consistency of Risk Free Rate and MRP in the CAPM*, March 2012, pp. 50-51.

537 See, for example: 137 FERC, issued 14 October 2011.

Figure E.2 **Estimates of the market return on equity and average return on equity for energy infrastructure businesses using a two–stage DGM**

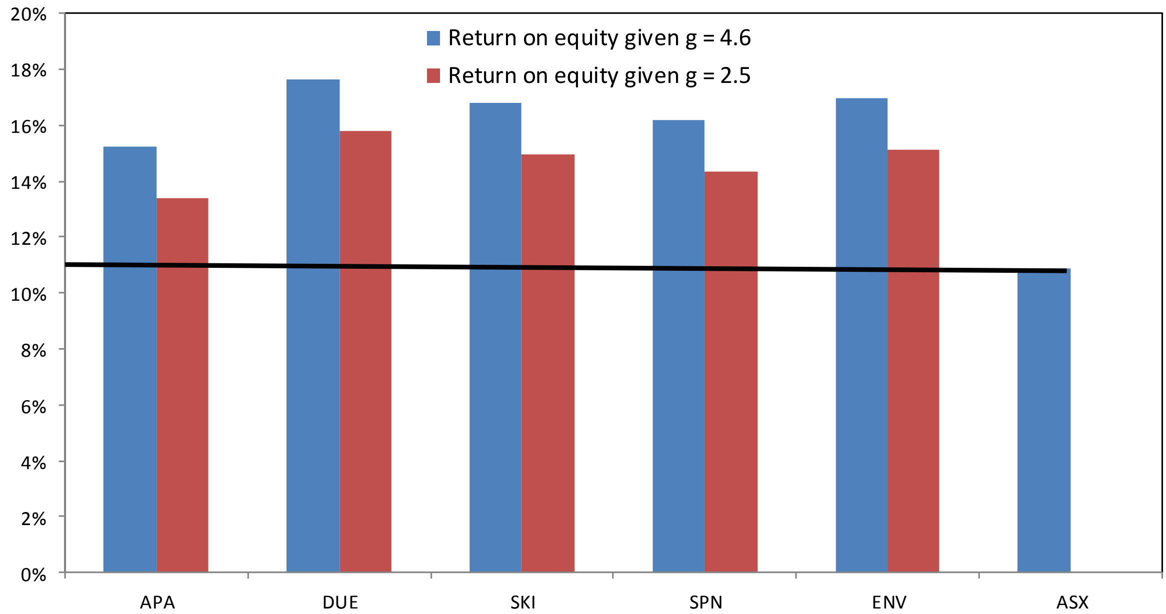


Source: Bloomberg and AER analysis.

According to the above DGM analysis, the average return on equity for the energy infrastructure businesses is consistently higher than that of the market for each month from September 2006 to June of 2013.[538] Moreover, as Figure E. illustrates, for each of the five energy infrastructure businesses, the two–stage DGM generates an average return on equity over this period significantly in excess of the average return on equity for the market.

538 For Spark Infrastructure, data are available only from September, 2006.

Figure E.3 Two–stage DGM estimates of the return on equity for the market and for the energy infrastructure businesses: average from March 2006 to November 2013



Source: Bloomberg and AER analysis.

These estimates give rise to two concerns about the using DGM estimates for the five energy infrastructure businesses to create a return on equity benchmark. First, the DGM estimates fail a basic 'sanity check'. On the assumption that g is 4.6 per cent, for each of the five infrastructure businesses, the average return on equity over the period is more than 400 basis points higher than the average return on equity for the market. But the systematic risk of such infrastructure businesses is below the systematic risk of the market.[539] Therefore, DGM estimates for the five infrastructure businesses are not plausible. Second, as Figure E. illustrates, the DGM estimates of the average return on equity for the energy infrastructure businesses varied considerably over the period: it was in excess of 20 per cent for several months at the onset of the global financial crisis, and remained above 15 per cent from August 2007 until the end of 2011.

What is the explanation for why the DGM is generating these implausible estimates? One possible explanation is that the model is incorrect to assume that the growth of dividends, g, is the same for energy businesses as that of the market as a whole. It might be thought that, instead, energy infrastructure businesses have a lower growth rate than the market. However, even if it is assumed that energy infrastructure businesses have an expected long–term growth in real dividends of zero, the DGM estimates for the energy businesses still have a return on equity estimate in excess of the return on equity for the whole market (that is, it still fails the basis 'sanity check' outlined above). If the expected long–term growth in real dividends per share is zero, and the expected inflation is 2.5 per cent, then g, the expected long–term growth in nominal dividends per share is 2.5 per cent. For each of the five energy infrastructure businesses, Figure E. displays the return on equity under the two growth assumptions of g = 4.6 and g = 2.5. Even if it is assumed that for the energy infrastructure

539 Michael McKenzie and Graham Partington, *Estimation of Equity Beta (Conceptual and Econometric Issues) for a Gas Regulatory Process*, 2012, p. 15 conclude that 'Taken together, the previous conceptual discussion clearly provides evidence to suggest that the theoretical beta of the benchmark firm is very low. While it is difficult to provide a point estimate of beta, based on these considerations, it is hard to think of an industry that is more insulated from the business cycle due to inelastic demand and a fixed component to their pricing structure. In this case, one would expect the beta to be among the lowest possible and this conclusion would apply equally irrespective as to whether the benchmark firm is a regulated energy network or a regulated gas transmission pipeline'.

businesses, g = 2.5 per cent, while for the market g = 4.6 per cent, the DGM estimates of the return on equity for energy infrastructure businesses are substantially higher than the DGM for the market. The average of the DGM estimates of the energy infrastructure businesses is 14.7 per cent, while the DGM estimate for the market is 10.9 per cent.

As discussed above, DGM estimates of the return on equity rely on strong assumptions. If these do not hold, a DGM may generate erroneous results. First, it makes assumptions about the term-structure of the discount rate. Second, even a multi-stage model must make assumptions about the trajectory of expected future dividends. Third, it assumes that at each point of time the price of equity equals its fair value. We judge that the DGM estimates generated for the five energy infrastructure businesses are implausible. Moreover, a benchmark average of these DGM estimates may potentially be excessively variable over time.[540]

For the same period, using the same estimates of g and the imputation factor, we replicated the analysis above using our three–stage model instead of the two–stage model. We reach the same broad conclusions. The three–stage model generated estimates of the return on equity for the energy infrastructure businesses that are implausibly high relative to the market return on equity. Moreover, these estimates for the energy infrastructure businesses are substantially more variable than the estimate of the market return on equity.

We judge that the DGM estimates of the return on equity of the market are more plausible. As these estimates are informed by data for 200 companies, idiosyncratic data for individual companies have a minimal effect on the estimates. Accordingly, since 2006, the DGM estimate for return on equity for the market is significantly more stable than the estimates for the five energy infrastructure businesses.

The submissions in response to our proposal on DGMs in the draft explanatory statement were mixed. On the one hand, at least some of the energy users supported our proposal not to use the DGM to obtain an estimate of the overall return on equity for energy infrastructure businesses.[541] On the other hand, a number of service providers maintained that the DGM should be used to obtain an estimate of the overall return on equity for energy infrastructure businesses. The ENA and the NSW DNSPs propose that the DGM model presented in SFG's submissions should be used to estimate the overall return on equity for energy infrastructure businesses.[542]

SFG's DGM model is presented in its June submission *Dividend Discount Model Estimates of the Cost of Equity* (the 'June report').[543] In the draft explanatory statement, we described SFG's DGM model as 'excessively complex'. SFG responds to the draft guideline in its October submission *Reconciliation of Dividend Discount Model Estimates with those Compiled by the AER* (the 'October report').[544] We broadly agree with McKenzie and Partington's evaluation of SFG's suggestions in the October report: 'While interesting, it is not clear that any real improvement is achieved in the accuracy of the return on equity estimate'.[545] As discussed in more detail below, we are particularly concerned

540 The potential variability in DGM estimates is noted in the Brattle Group report: 'because stock prices (and to a degree forecasted growth rates) change frequently, the model results often vary substantially over time' (*Brattle Group, Estimating the Cost of Equity for Regulated Companies: Prepared for APIA,* 17 February 2013, p. 31).

541 Public Interest Advocacy Centre, *Reasonably Rated: Submission to the AER's Draft Rate of Return Guideline*, October 2013, especially pp. 31–32.

542 ENA, *Response to the Draft Rate of Return Guideline by the Australian Energy Regulator*, October 2013, pp. 41-44; Ausgrid, NSW DNSP Submission on the Rate of Return Guideline, October, 2013, p. 18. The SFG DGM is also endorsed in NERA, *The Market Risk Premium: Analysis in Response to the AER's Draft Rate of Return Guidelines,* October 2013, p. 33. See also Spark Infrastructure, *Response to the AER's Rate of Return Guideline,* October 2013, p. 4, ActewAGL, *Response to Draft Rate of Return Guideline*, October 2013, APIA, *Meeting the ARORO?,* October 2013,

543 SFG, *Dividend Discount Model Estimates of the Cost of Equity*, June 2013.

544 SFG, *Reconciliation of Dividend Discount Model Estimates with those Compiled by the AER*, October 2013.

545 Michael McKenzie and Graham Partington, *Report to the AER: The Dividend Growth Model (DGM)*, December, 2013.

about the complexity of SFG's model and its lack of transparency. McKenzie and Partington express a similar concern with the model. They state: [546]

> we are doubtful whether we could exactly reproduce SFG's results given the same data set. To that extent we wonder how straightforward and transparent this approach is.

In the October report, SFG identifies five respects in which its DGM analysis is different from the DGM analysis in our draft explanatory statement. Commenting on each of these five differences, SFG considers that its DGM model is appropriate for estimating the overall return on equity for energy infrastructure businesses. Therefore, it disagrees with our view in the draft explanatory statement that a DGM model should not be used to estimate the overall return on equity for energy infrastructure businesses. The five respects in which SFG's DGM analysis differs from our analysis in the draft explanatory statement are as follows:

(i) it uses target prices rather than market prices

(ii) it is a three–stage model

(iii) it has a different method for estimating the long–term dividend growth rate

(iv) it matches the timing of price inputs and analyst forecast inputs

(v) it proposes alternative methods for adjusting for imputation credits.

The discussion below responds to SFG's comments on these five differences.

(i) Target prices versus market prices

A target price is a stock price projection by an analyst. Whereas SFG's DGM takes target prices as an input to the model, our DGM relies on market prices. In using market prices rather than target prices, our DGM analysis is consistent with standard approaches to DGM estimation. Indeed, over the past few years, service providers' consultants have generally used market prices in obtaining DGM estimates of the return on equity.[547] Given that the objective is to obtain the market's implied return on equity, it is appropriate to use the market price. As McKenzie and Partington observe, it would be appropriate to use target prices if the objective is not to obtain 'the market's implied return on equity' but instead 'the objective is to discover the implicit discount rate of the analysts'.[548] In its argument for using target prices, SFG observes that there is some evidence that analysts' dividend forecasts are upward biased. To the extent that this is true, our DGM will overestimate the return on equity.

(ii) Three–stage models

SFG's model is a three–stage model whereas the model we presented in the draft explanatory statement is a two–stage model. In its October report, SFG replies to our concern that its model is excessively complex by suggesting that 'there is no more complexity or loss of transparency' in using

546 Michael McKenzie and Graham Partington, *Report to the AER: The Dividend Growth Model (DGM)*, December, 2013.

547 CEG, *Estimating the Cost of Capital under the NGR: A Report for Envestra*, September, 2010; CEG, *Internal Consistency of Risk Free Rate and MRP in the CAPM: Prepared for Envestra, SP Ausnet, Multinet and APA*, March 2012; NERA, *Prevailing Conditions and the Market Risk Premium: Report for APA Group, Envestra, Multinet and SP Ausnet*, March, 2012; NERA, *The Market, Size and Value Premiums*, June 2013.

548 Michael McKenzie and Graham Partington, *Report to the AER: The Dividend Growth Model* (DGM) , December, 2013. They point out that it would be appropriate to use target prices if the objective is not to obtain 'the market's implied cost of equity' but instead 'the objective is to discover the implicit discount rate of the analysts'.

a three–stage model than a two–stage model. [549] We agree that a three–stage model is not substantially more complex than a two–stage model. We do not object to SFG's DGM on the grounds that it is a three–stage model. Rather, we object on the grounds that SFG's DGM uses a novel and complex method for determining long–term dividend growth, which is discussed below. Indeed, as discussed above, we propose to use a three–stage model in its DGM analysis of the MRP. We investigated whether our reasoning in the draft explanatory statement is robust to the use of a three–stage model instead of a two–stage model. Using a three–stage variant of the model, we found that the broad conclusions in the draft explanatory statement still hold. Using a three–stage DGM, estimates of the return on equity for the five businesses are substantially in excess of the return on equity for the market. Moreover, the return on equity for energy infrastructure businesses is substantially more variable than the return on equity for the market.

(iii) The estimation of the long–term growth rate

The long–term dividend growth rate is an input in our proposed model in the draft explanatory statement. In contrast, in the SFG model, the values for growth rates and the return on equity are jointly estimated. Our view is that SFG's method for jointly estimating the growth rates and the return on equity is excessively complex and insufficiently transparent. SFG's model solves for the growth rate and the return on equity by considering '2,672 possible combinations of the cost of equity, long–term growth and return on equity'. One combination is picked from these 2,672 combinations using an algorithm that is designed to choose a combination that provides (i) 'a valuation close to average analyst price target' and (ii) 'a smooth transition from near-term growth to long–term growth'.[550]

It should be noted that our approach, in which the long–term dividend growth rate is an input to the model, is commonly used. Indeed, over the past few years, such an approach has been adopted in a number of submissions by service providers' consultants.[551]

(iv) The timing of price inputs and analyst forecast inputs

SFG provides the following criticism of our model in the draft explanatory statement:[552]

> the AER matches the share price each day with the consensus dividend forecasts from Bloomberg. The consensus dividend forecasts have been input into the database by analysts in previous days, weeks or months. So the consensus dividend forecasts represent the views of equity analysts that have been input into the database in the past.

Given that the forecast data is somewhat 'stale', SFG suggests this stale forecast data may partly explain the volatility observed in the return on equity of the energy infrastructure businesses. However SFG does not provide evidence of the magnitude of this effect, or indeed, whether the effect on the volatility of the return on equity is material.[553] We did some sensitivity analysis, examining the effect on our estimates of the MRP of adjusting for sluggish analyst forecasts.[554] We decided that, given the

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549 SFG, *Reconciliation of Dividend Discount Model Estimates with those Compiled by the AER* ,October 2013, p. 8.

550 SFG, *Dividend Discount Model Estimates of the Cost of Equity*, 19 June 2013, p. 13.

551 CEG, *Estimating the Cost of Capital under the NGR: A Report for Envestra*, September, 2010; CEG, *Internal Consistency of Risk Free Rate and MRP in the CAPM: Prepared for Envestra, SP Ausnet, Multinet and APA*, March 2012; NERA, *Prevailing Conditions and the Market Risk Premium: Report for APA Group, Envestra, Multinet and SP Ausnet*, March, 2012; NERA, *The Market, Size and Value Premiums*, June 2013.

552 SFG, *Reconciliation of Dividend Discount Model Estimates with those Compiled by the AER*, October 2013, p. 16.

553 While SFG compares the output of its model with the output of the AER's model, it does not establish the effect on the output of the AER's model of introducing data matching without making any other changes.

554 McKenzie and Partington allude to measurement errors arising from 'stale' or 'sluggish' forecasts in *Report to the AER: The Dividend Growth Model (DGM),* December, 2013. McKenzie and Partington recommended that we consider the effect on our DGM estimates of using a 5 month lag in matching prices to dividend forecasts. They observe that the procedure recommended by SFG would not solve the 'sluggish adjustment problem': 'it seems likely that the problem is a

moderate magnitude of the adjustments, and also the given uncertainties surrounding the calculation of the adjustment, that we would not incorporate the adjustment into our estimates of the MRP.[555]

(v) Imputation credits

In its October report, SFG proposes that: [556]

> The way in which the AER accounts for imputation benefits in its dividend discount model is inconsistent with the way in which the AER accounts for imputation benefits in its post-tax revenue model.

SFG's remark re-emphasises, and elaborates on, its analysis of imputation credits in its June report. There is a diversity of views on this question. On the one hand, McKenzie and Partington provide support, albeit qualified support, for SFG's view, concluding that if SFG has accurately characterised our revenue model, then SFG are correct.[557] On the other hand, Lally concurs with our formula for adjusting for imputation credits.[558] Moreover, in SFG's reports, no mention is made of our source for the equation used to adjust for imputation benefits - the source is the article by Brailsford et al. 'Re-examination of the Historical Equity Risk Premium in Australia'.[559] This article provides the basis of the methodology we used to obtain historical estimates of the MRP. In addition, a number of service providers' consultants have used the adjustment equation in Brailsford et al. for the purpose of DGM analysis.[560] Given the variety of views on this question, we propose to use the imputation adjustment from the draft explanatory statement, but we will continue to consider this issue.

For these reasons, we propose to maintain our decision in the draft explanatory statement not to use the DGM to estimate an overall return on equity for the energy infrastructure businesses.

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mixture of both stale forecasts in the consensus and sluggish adjustment to information by analysts when they do make a forecast. In this case, time matching of forecasts and prices will not solve the sluggish adjustment problem'.

555 If 2008 and 2009 are omitted to exclude the effects of the Global Financial Crisis, the average absolute difference between the unadjusted and adjusted MRP was less that 20 basis points. Moreover, the adjustment is sometimes positive and sometimes negative, and on average it is 3 basis points over the period from March 2006 to June 2013. The uncertainties in the calculation arise because it is unclear whether 5 months is the appropriate period for Australian data.

556 SFG, *Reconciliation of Dividend Discount Model Estimates with those Compiled by the AER* ,October 2013, p. 30.

557 Michael McKenzie and Graham Partington, *Report to the AER: The Dividend Growth* Model (DGM), December, 2013.

558 Martin Lally, *Review of the AER's Proposed Dividend Growth Model*, December, 2013,

559 Tim Brailsford, John Handley and Krishnan Maheswaran, 'Re-examination of the Historical Equity Risk Premium in Australia', *Accounting and Finance*, 48 (2008), p. 85.

560 NERA, *Prevailing Conditions and the Market Risk Premium*, March, 2012, p. 38; CEG, *Internal Consistency of Risk Free Rate and MRP in the CAPM*, March 2012, p. 17, although they use a value for theta of 0.35.

F Gearing

Gearing is defined as the ratio of the value of debt to total capital (that is, debt and equity), and is used to weight the return on debt and the return on equity when formulating a WACC. A business' gearing, also referred to as its capital structure, may have a bearing on the expected required return on debt and the expected required return on equity.

In theory, the optimal debt to equity ratio is the point at which business value is maximised, where the marginal benefits just offset the marginal cost of debt.[561] However, while an optimal capitals structure theoretically exists, the actual optimal value of debt and equity for any given business is dynamic and dependent on a number of business specific factors.

The benchmark gearing level is used:

- To weight the expected required return on debt and equity to derive a WACC
- To re-lever the asset betas for the purposes of comparing the levels of systematic risk across businesses
- To be a factor in determining a credit rating as discussed in chapter 7.

We consider that the empirical evidence supports a gearing of 60 per cent. Average gearing levels from the 2009 WACC review are presented in table F.1, as are the Bloomberg market valuations using the most recent data and Standard and Poor's book valuations. We observe that the average level of gearing across the four different approaches has a range of 59 to 66 per cent. Accordingly, we propose to maintain the currently adopted benchmark efficient level of gearing of 60 per cent.

[561] M. Jenson, *Agency Costs of Free Cash Flow, Corporate Finance and Takeovers, American Economic Review*, Vol. 76, No 2, 1986, pp. 323–329.

Table F.1 Average gearing levels

Year	2009 WACC review 2002–2007[a]	Bloomberg (market) 2002–2012[b]	Bloomberg (market) 2002–2012 (excluded)[c]	Standard and Poor's (book) 2008–2012[d]
2002	65.1	54.5	65.8	N/A
2003	64.8	51.8	60.5	N/A
2004	61.7	51.2	55.1	N/A
2005	64.6	51.2	62.6	N/A
2006	63.0	56.6	61.9	N/A
2007	60.5	57.6	57.6	N/A
2008	N/A	68.3	68.3	70
2009	N/A	68.8	68.8	69
2010	N/A	65.5	65.5	66
2011	N/A	63.2	63.2	62
2012	N/A	60.6	60.6	65
Average	63.3	59.0	63.1	66

Source: AER analysis.
Notes: (a): AER, *Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, 1 May 2009, p. 124; (b): analysis including full sample of businesses; (c): AGL, Alinta and GasNet excluded from the analysis.; (d): ERA, *Explanatory statement for the draft rate of return guidelines,* 6 August 2013, p. 49.

In the draft guideline, we relied on a range of quantitative evidence to calculate the gearing of a comparator sample of businesses to the benchmark efficient entity. We considered a gearing of 60 per cent for benchmark efficient entity is appropriate. This is because that it was consistent with the empirical evidence drawn from businesses considered to be the closest comparators to the proposed benchmark efficient entity and prior regulatory practice.

F.1 Selection of businesses used to derive an industry benchmark

APA submitted that the gearing must be the gearing of the benchmark efficient entity. It must be properly constructed from comparable businesses which are efficient and have similar degrees of risk to the service provider that provides regulated services. APA stated that the case for a gearing of 60 per cent is not well made, given that benchmark cannot be assumed.[562]

[562] APA Group, *Submission to the draft guideline*, October 2013, p. 18.

For this guideline, we have adopted the definition of the benchmark efficient entity, which is 'a pure play, regulated energy network business operating within Australia'. We consider the evidence illustrates that the risks between gas and electricity, transmission and distribution businesses are similar, as discussed in chapter 3.

However, we observe that no business is a pure play regulated energy network business in practice. Therefore in choosing comparators to inform the value, this requirement must be relaxed. We consider it appropriate to use the gearing level from a sample of close comparable businesses. Firms that have operations in the Australian market and predominantly involve in energy network businesses are considered to be close comparators. If a business is heavily involved with mergers and acquisition activities, we consider it is appropriate to only include the data up to the point where the business predominantly involved energy network business activities. The full sample comparators include:[563]

- Alinta
- AGL
- APA Group
- Diversified Utility and Energy Trusts (DUET)
- Envestra Ltd
- GasNet
- Hasting Diversity Utilities Fund[564]
- SP AusNet
- Spark Infrastructure.

We have undertaken a sensitivity analysis using a sub-sample of businesses, which have a longer time series of gearing data. These include:[565]

- APA Group
- DUET
- Envestra Ltd
- Hasting Diversity Utilities Fund
- SP AusNet
- Spark Infrastructure.

563 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 178.

564 Hasting is included in this analysis because we consider Hasting as a regulated water network in Australia is the closest comparator available to regulated Australian energy networks. This is supported by Frontier Economics, in its report to the AER, *Assessing risk when determining the appropriate rate of return for regulated energy networks in Australia,* June 2013, p. 4.

565 We have excluded AGL, Alinta and GasNet from this sub-sample, given that: AGL was acquired by Alinta in October 2006 and since mainly involved retail energy and generation business; Alinta was acquired by multiple acquires (BNB & SP Consortium) in October 2007; GasNet was acquired by APA in November 2006.

PIAC submitted that the assumed gearing ratio of 60 per cent is conservative (too low) for a regulated network, leading to higher overall the rate of return allowance.[566] COSBA shared a similar view.[567] ENA supported a gearing of 60 per cent, subject to the credit rating being set at BBB.[568] As discussed in chapter 8, we have adopted a credit rating of BBB+ as the benchmark for the return on debt. We consider gearing is only one of many factors in determining a business' credit rating. However, for regulated utilities, a high gearing level does not seem to be a major concern for the rating agencies in determining their credit ratings. As explained in its rating methodology for regulated electricity and gas, Moody's stated:[569]

> … Moody's would therefore see regulated electric and gas networks as exhibiting relatively low business risk, which can in turn translate into a significant capacity to sustain high debt levels. In addition, the high level of future visibility typically associated with the business model of a regulated network can make very long-term debt financing an attractive proposition to leverage shareholder returns.

This is also consistent with Standard and Poor's rating method, as stated by Australian Rating:[570]

> S&P does consider balance sheet leverage, or gearing, as part of its rating of network utilities, however such balance sheet leverage is not typically considered as important for a network utility's financial risk profile as the cashflow metrics described above under 'Cashflow Adequacy'.
>
> Tightly regulated transmission and distribution utilities generally face limited business risk—this translates into stable revenues. As a result, they can operate with... high leverage.

F.2 Empirical evidence

MEU submitted that we should assess gearing in terms of the net debt as a proportion of the RAB. If the gearing is assessed on this basis, the gearing would be closer to 70 per cent (noting the analysis by UBS).[571]

We note various approaches can be adopted in determining benchmark gearing. We examined these approaches in the 2009 WACC review. These approaches included Bloomberg market values, Bloomberg (ACG) values and Standard and Poor's book values. We noted that each of the valuation approaches has some limitations. That said we considered that all valuations methods should be considered. Importantly we considered that these measures taken together, provide a reasonable and valid estimate of the level of gearing of a benchmark efficient service provider.[572] Consequently, we considered the average gearing from the Bloomberg market valuations, as well as both the ACG's adjusted Bloomberg measures and Standard and Poor's book valuations.[573]

As discussed in our consultation paper, we consider that we should apply greater weight to the estimate of gearing using the market value (as opposed to a book value). The use of market values is consistent with the efficient market theory. This theory indicates that the current market value of a company's debt and equity reflects all relevant information. However, there are limitations in calculating the market value of debt as debt is traded infrequently. Therefore, we have used the book value of gearing as a proxy for the market value of gearing.

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566 PIAC, *Submission to the draft guideline*, October 2013, p. 12.
567 COSBA, *Submission to the draft guideline*, October 2013, p. 6.
568 ENA, *Submission to the draft guideline*, October 2013, p. 76.
569 Moody's, *Rating methodology for regulated electricity and gas networks, appendix E*, August 2009, p. 40.
570 Australia Ratings, *Assessment of implied credit ratings arising from the Australian Energy Regulator's draft decision on access arrangements for APA GasNet Australia (Operations) Pty Ltd for 2013–17*, November 2012, p. 21.
571 MEU, *Submission to the draft guideline*, October 2013, pp. 29–33; EUAA, *Submission to the draft guideline*, October 2013, pp. 14–16.
572 AER, *Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, 1 May 2009, p. 120.
573 AER, *Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, 1 May 2009, p. 124.

Consequently, in proposing a benchmark of 60 per cent for gearing in the draft guideline, we took into consideration various empirical evidence. This includes the Bloomberg market valuations using the most recent data and the average gearing levels from the 2009 WACC review.[574] In particular, the average gearing presented in 2009 WACC review was calculated from the Bloomberg market valuations, as well both the ACG's adjusted Bloomberg measures and Standard and Poor's book valuations.[575]

The ERA also considered a 60 per cent gearing level in its recent draft rate of return guideline, based on a number of methods and sample businesses similar to our draft guideline. In particular, the ERA has calculated an average gearing level determined from a benchmark sample of Australian utility businesses which is consistent with the sample used in our draft guideline. It updated the data set from 2008 to 2012.[576]

Further, we noted MEU's proposed gearing level of 70 per cent refers to the data published in the Australian Financial Review on 13 September 2013, provided by UBS based on the Net debt/RAB ratio. We understand this measure uses the market value for debt, but uses the RAB which does not reflect a market value. As a result, this measure varies significantly over time. We present the data provided by Credit Suisse on the same measure relied on by MEU for the same businesses. We note the ratio for SP AusNet and Envestra has varied significantly within one month, that is from 0.67 to 0.75 for Envestra, and from 0.71 to 0.63 for SP AusNet. This indicates that MEU's proposed gearing (70 per cent) for the benchmark efficient entity, measured by the New debt to RAB ratio is based on a snapshot of time. Therefore, it may not be reliable (refer to table F.2).

Table F.2 Average gearing levels (New debt/RAB)

Year	DUET	Envestra	Spark	SP AusNet
MEU - 13 Sep 13[a]	0.78	**0.67**	0.72	**0.71**
Credit Suisse - 15 Oct 13[b]	0.76	**0.75**	0.73	**0.63**

Notes: (a): MEU, *Submission to the Draft Guideline*, October 2013, pp. 29–33; (b): Credit Suisse, *Regulated utilities update–figure 35*, 15 October 2013, p. 11.

574 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 179–180.

575 AER, *Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, 1 May 2009, p. 124.

576 ERA, *Explanatory statement for the draft rate of return guidelines,* 6 August 2013, p. 49. These businesses include: APA Group, DUET, Envestra Ltd, Hasting Diversity Utilities Fund, SP AusNet and Spark Infrastructure.

G Return on debt: transition

This appendix presents the 'QTC method' of transition and diagrammatically shows how the transition to the proposed trailing average portfolio approach to return on debt estimation would work.

The Queensland Treasury Corporation (QTC) described its approach to transition in its supplementary submission during the Australian Energy Market Commission (AEMC) rule change process:[577]

> Under this rule, at the time the NSP elects to use the moving average approach, the prevailing rate during the next rate reset period will apply for the first year. In the second year, the first year rate will in effect have a 90% weighting, absent any increases in debt which affect the weighting, and that weighting will diminish by 10% each year.

Since we propose to use a simple trailing average, no adjustments are needed to the original weights (90 and 10 per cent, and so forth) suggested by the QTC.[578]

In particular, the allowed return on debt in the first regulatory for each business would be the prevailing rate, averaged over the relevant agreed averaging period. This allowance corresponds to the expected return on debt of the benchmark efficient entity that refinances its entire debt portfolio during the averaging period prior to the first regulatory year.

In the second regulatory year, the allowed return on debt would be a weighted sum of the prevailing rates in the first and second years (with weights of 0.9 and 0.1, respectively).[579] This regulatory allowance corresponds to the expected return on debt of the benchmark efficient entity if it refinanced its entire debt portfolio during the averaging period prior to year one and then refinanced 10 per cent of its debt portfolio during the averaging period for year two.

In the third year, the allowed return on debt would be a weighted sum of the prevailing rates in the first, second, and third regulatory years (with weights of 0.8, 0.1, and 0.1, respectively).[580]

This pattern continues across each subsequent year.

In the tenth year of transition, the allowed return on debt would be an equally weighted (with weights of 0.1) sum of the prevailing rates in the ten years of transition.[581] At this stage the transition is complete.

Each of the ten diagrams below refers to one year of transition. The green horizontal bars represent the portion of the debt portfolio receiving an allowance equal to the prevailing rate at the start of year one. The blue horizontal lines represent the portion of the debt portfolio receiving an allowance equal to the prevailing rates at the start of the subsequent years of transition. Each horizontal blue and green line accounts for one-tenth of the total return on debt allowance.

The allowed return on debt in the first year is the prevailing rate (averaged over the agreed averaging period), as shown in Figure G.1.

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577 QTC, *Moving average approach - detailed design issues: Supplementary submission to the economic regulation of network service providers rule change process*, 8 June 2012, p. 2.

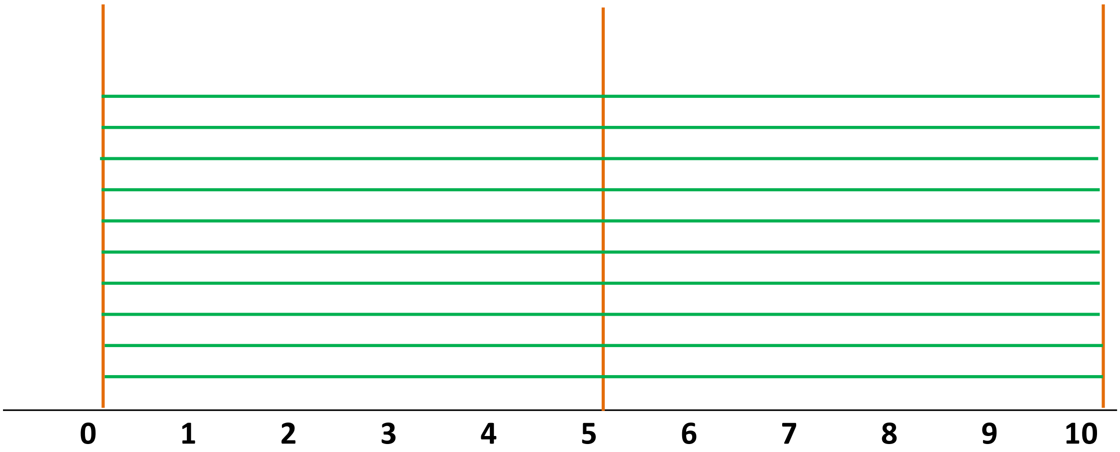
578 That is, we will not be applying weights based on actual debt issuance, changes in RAB, or debt issuance assumptions in the PTRM, as set out in section 7.3.5.

579 Again, the prevailing rates would be averaged over the corresponding averaging period for each regulatory year.

580 The prevailing rates would be averaged over the corresponding averaging period for each regulatory year.

581 The prevailing rates would be averaged over the corresponding averaging period for each regulatory year.

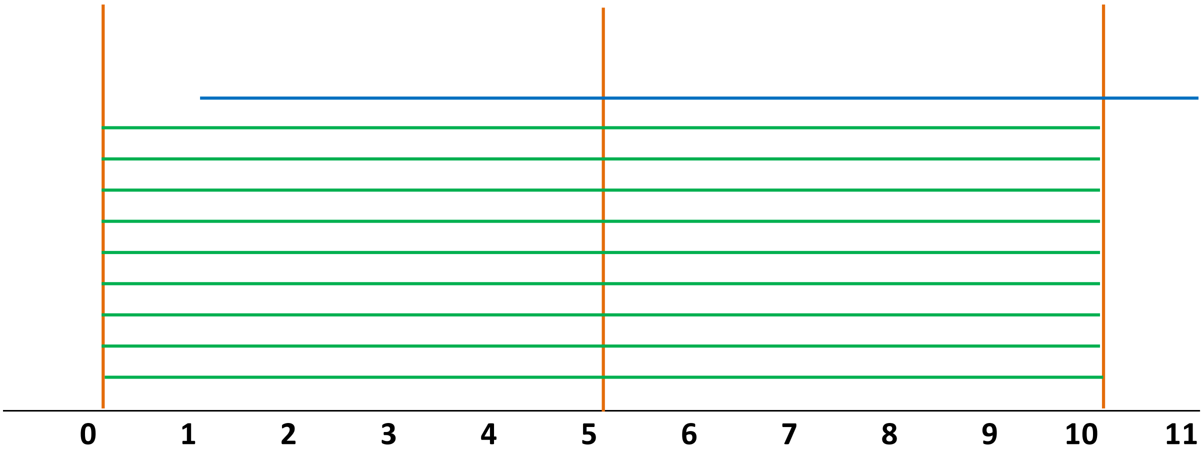
Figure G.1 Transition, year one



Source: AER analysis.

In the second year, the allowed return on debt is a weighted sum of the prevailing rates in the first and second years (with weights of 0.9 and 0.1, respectively), as shown in Figure G.2.

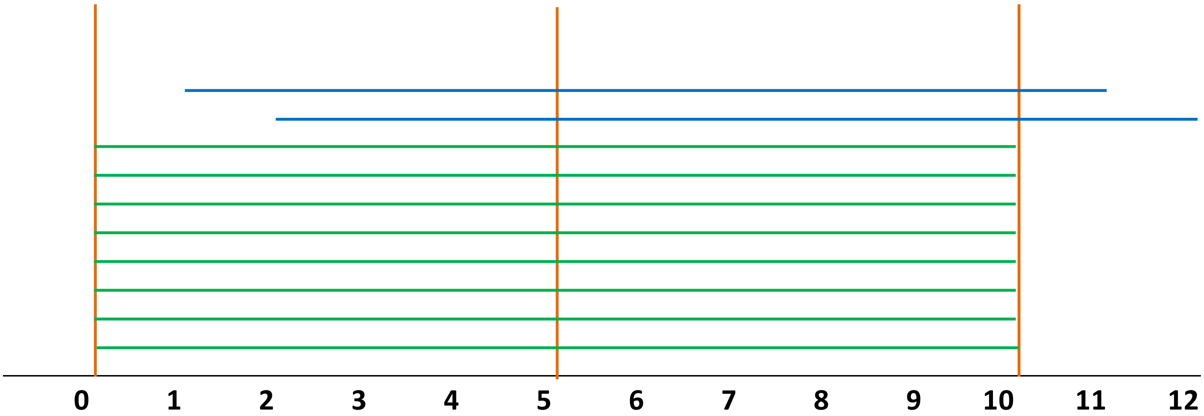
Figure G.2 Transition, year two



Source: AER analysis.

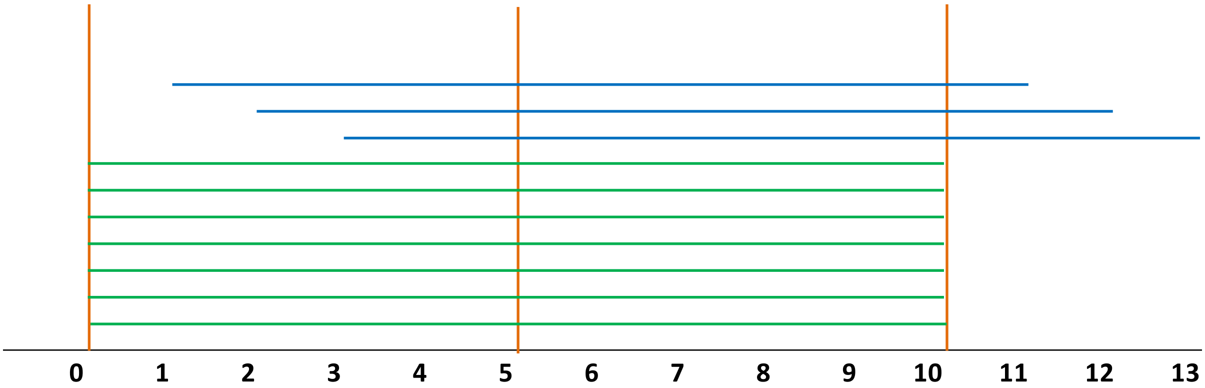
In the third and subsequent years of the transitional period, the allowed return on debt would be a weighted sum of the prevailing rates in the regulatory years starting from year one and up to the current regulatory year. This is shown from Figure G.3 to Figure G.9.

Figure G.3 Transition, year three



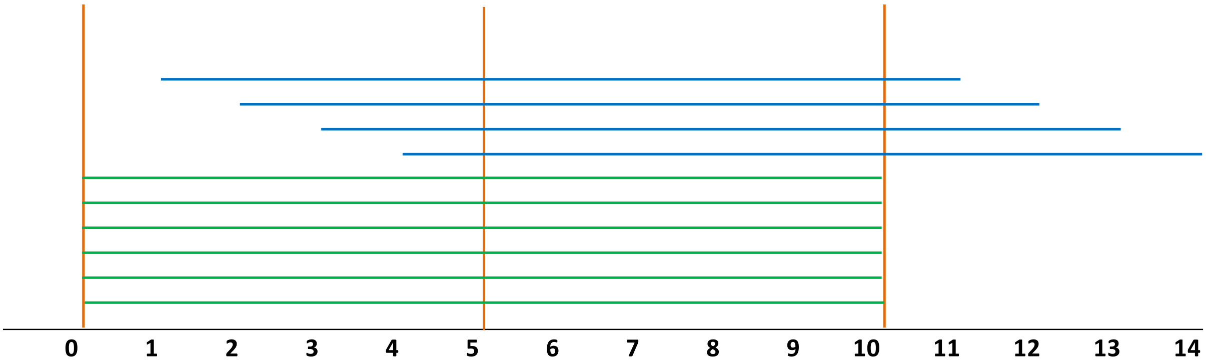
Source: AER analysis.

Figure G.4 Transition, year four



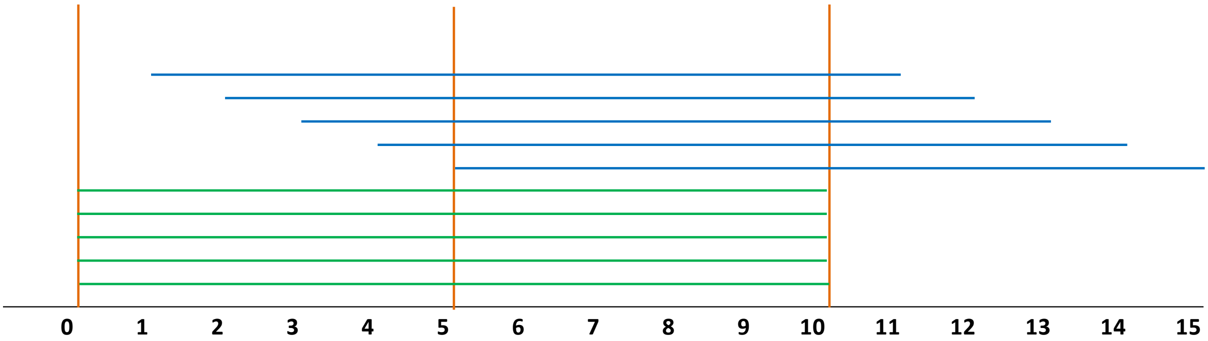
Source: AER analysis.

Figure G.5 Transition, year five



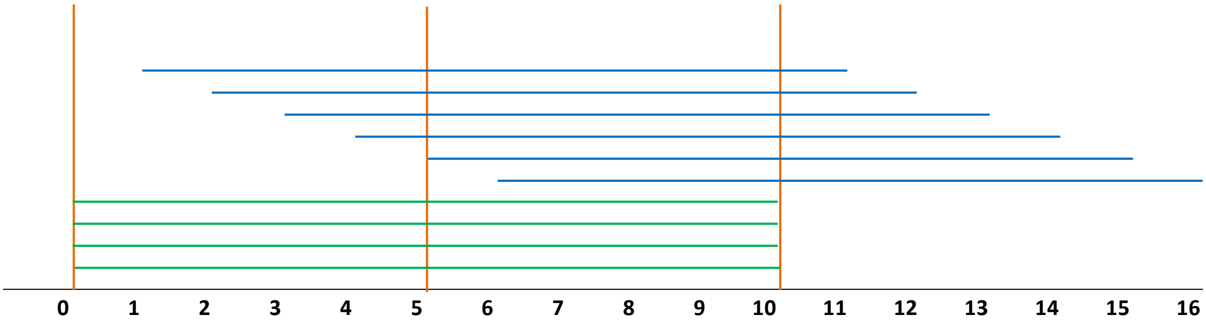
Source: AER analysis.

Figure G.6 Transition, year six



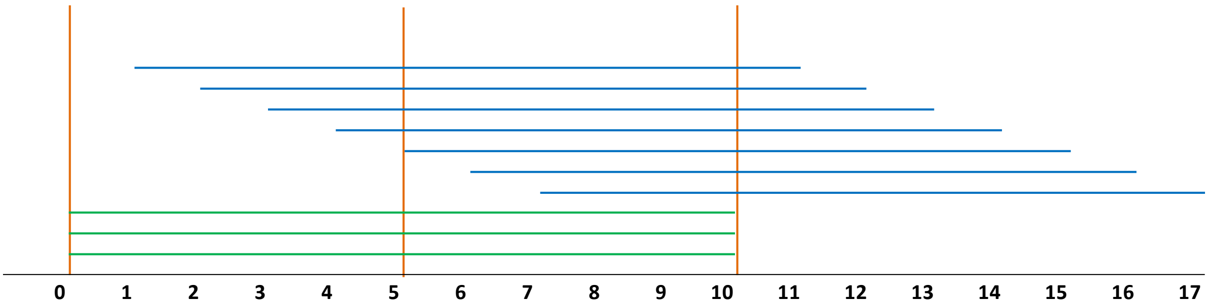
Source: AER analysis.

Figure G.7 Transition, year seven



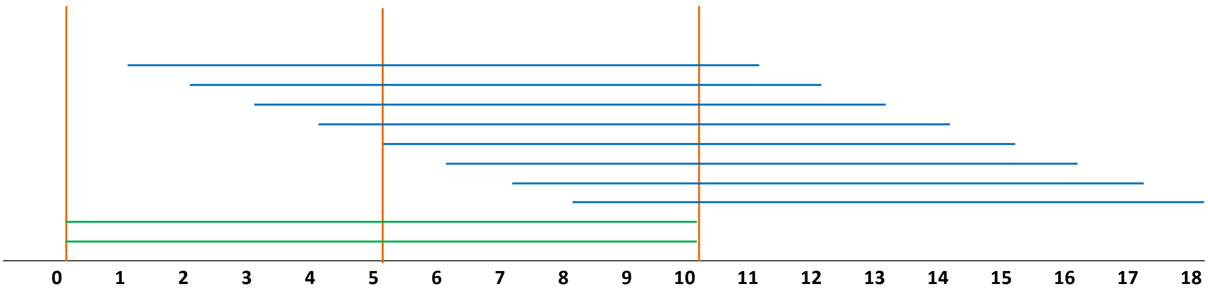
Source: AER analysis.

Figure G.8 Transition, year eight



Source: AER analysis.

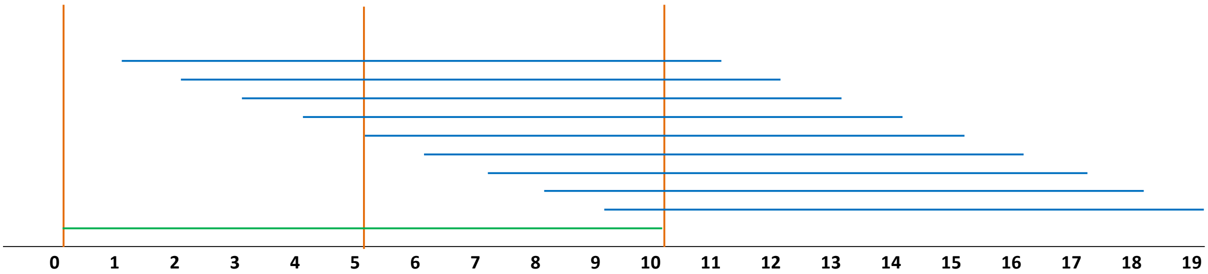
Figure G.9 Transition, year nine



Source: AER analysis.

In the tenth year, the allowed return on debt is an equally weighted (with weights of 0.1) sum of the prevailing rates in the ten years of transition, as shown in Figure G.10. The transition is complete.

Figure G.10 Transition, year ten



Source: AER analysis.

H Imputation credits

This appendix includes further detailed analysis of issues raised in chapter 9. Specifically, it includes:

- an overview of imputation credits and how investors use them
- an analysis of the Officer framework, relating to:
  - the definition of gamma
  - the definition of cash flows
  - the building block framework
- our process of arriving at a value for gamma
- the payout ratio—a detailed analysis of the NERA study
- the utilisation rate—tax statistic estimates
- the utilisation rate—implied market value studies
- the utilisation rate—other supporting evidence

H.1 Overview of imputation credits and how investors use them

This section contains an overview of how the imputation tax system operates. This explains how imputation credits create value for investors.

How and when are they made?

When Australian companies pay tax, they generate imputation credits of equal value. That is, one dollar of Australian company tax generates one dollar's worth of imputation credits.

How do they get from companies to investors?

Companies periodically distribute earnings to shareholders through dividend payments. If they have imputation credits in their franking accounts, they may 'attach' these imputation credits to the dividends and distribute them as 'franked dividends'. However, they do not have to distribute all or even any of their franking credits. If companies choose to retain franking credits in their franking account balance, they can do so. Further, imputation credit distributions are constrained as follows:

- Fully franked dividends include imputation credits that are 42.8 per cent of the dividend's face value.[582]
- All dividends in a distribution during a 'franking period' must be equally franked. This is called the benchmark rule.[583]

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582 This is because the value of credits generated within a year is limited by the company tax rate and dividends are distributed from post-tax income (1 - company tax rate). So, a fully franked dividend includes imputation credits to 0.3/(1-0.3) = 42.8 per cent of its face value.

583 Private companies have one franking period per year, and non-private entities with a 12 month income year have two six-month franking periods per year. See: ATO, *Imputation: The benchmark rule*, Available at: http://www.ato.gov.au/Business/Imputation/In-detail/Dividends---imputation/Reference-guide/Imputation-reference-guide/?default=&page=44#The_benchmark_rule.

How do investors use the credits?

For an investor who is eligible to use imputation credits, their taxable income includes both the face value of the dividends and the face value of the imputation credits they receive. However, the imputation credits also reduce their total tax liability by the face value of the credits. An additional dollar of imputation credits increases their tax liability commensurate with the investor's marginal tax rate.[584] However, one dollar of franking credits reduces the total taxes investors owe by exactly one dollar. So, before personal tax, investors claim back from the government the face value of imputation credits as a return. This is in addition to capital gains and dividends.

However, not all investors are eligible to redeem imputation credits. Only the following resident investor classes are eligible:[585]

- individuals who receive franked dividends, either directly or through a trust or partnership
- trustees liable to be assessed under section 99 (but not sections 981 or 99A) of the *Income Tax Assessment Act 1936* (ITAA 1936)
- complying superannuation funds
- complying approved deposit funds (ADFs)
- life insurance companies and registered organisations (in respect of their superannuation business)
- pooled superannuation trusts (PSTs)
- endorsed income tax exempt charities and deductible gift recipients.

Companies that receive credits from investments in other companies store these credits in their own franking account balances, for possible future distribution. Then, there are other requirements governing eligibility to redeem imputation credits. Importantly, only resident investors are eligible.

Investors must also meet a holding period rule aimed at minimising tax avoidance. Investors have to continuously hold shares 'at risk' for at least 45 days (90 days for certain preference shares) around the time of the distribution to be eligible for the franking tax offset.[586] This rule only applies if an investor's total franking credit entitlement is above $5,000.[587]

H.2 Analysis of the Officer framework

In this section, we provide an analysis of the Officer framework. This is with particular regard to the definition of gamma, the definition of cash flows and the building block framework.

H.2.1 Officer framework and the definition of gamma

The key distinction between the ENA's perspective and our perspective is the interpretation of 'value' as either the end point, or a technique to measure the underlying utilisation rate.

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584 For example, $1x 0.45 = $0.45.

585 ATO, *Refunding imputation credits: Overview*, Available at: http://www.ato.gov.au/Business/Imputation/In-detail/Refunding-imputation-credits--Overview/.

586 ATO, *You and your shares: 2012–13*, Available at: http://www.ato.gov.au/Individuals/Investing/In-detail/Receiving-interest-and-dividends/You-and-your-shares-2012-13/?default=&page=11.

587 ATO, *Imputation: What are the anti-avoidance rules?* Available at: http://www.ato.gov.au/Business/Imputation/In-detail/Refunding-imputation-credits--Overview/?default=&page=3#What_are_the_anti-avoidance_rules?.

Our definition of imputation credits begins with the rate of return framework set out in Officer's seminal 1994 paper.[588] This is the standard foundation for all Australian regulatory decisions on the rate of return.[589]

The ENA quotes several passages from the Officer paper which use the term 'value', and asserts that this supports (only) the market value interpretation of gamma that it adopts.[590] As set out in chapter 9, we consider that the ENA's submission is incorrect to equate the term 'value' in this paper with 'market value'. The ordinary meaning of value—either as estimated or assigned worth, or the numerical value—is much broader. The meaning of value does not need to be read down to just the 'market value' interpretation that the ENA espouses.[591] The Officer paper itself refers to several different aspects of value, not just market value, when defining gamma.[592] We consider this interpretation is reasonable.

This is how Officer introduces the concept of gamma:[593]

> A proportion (γ) of the tax collected from the company will be rebated against personal tax and, therefore, is not really company tax but rather is a collection of personal tax at the company level.

This clearly establishes gamma (γ) as the proportion of company tax that is rebated against personal tax. These are both presented as cash flow concepts, and our definition of the utilisation rate flows directly from this conceptual basis.

The Officer paper then elaborates on this definition of gamma. This is the relevant section, with those parts quoted by the ENA underlined:[594]

> Thus γ is the proportion of tax collected from the company which gives rise to the tax credit associated with a franked dividend. This franking credit can be utilized as tax credit against the personal tax liabilities of the shareholder. <u>γ can be interpreted as the value of a dollar of tax credit to the shareholder.</u>[5]
>
> > [5] For example, if the shareholder can fully utilize the imputation tax credits then ("value") γ = 1, e.g. a superfund or an Australian resident personal taxpayer. On the other hand a tax exempt or an offshore taxpayer who cannot utilize or otherwise access the value in the tax credit will set γ = 0. <u>Where there is a market for tax credits one could use the market price to estimate the value of γ for the marginal shareholder, i.e. the shareholder who implicitly sets the price of the shares and the price of γ and the company's cost of capital at the margin, but where there is only a covert market, estimates can only be made through dividend drop-off rates: see Hathaway and Officer (1992).</u>

From the first section of this text, the ENA quotes only the phrase 'γ can be interpreted as the value of a dollar of tax credit to the shareholder'. The ENA then asserts that by 'value' Officer means 'market value' and hence that the utilisation rate should be defined as a market value.[595] However, this

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588 R. Officer, 'The cost of capital of a company under an imputation system', *Accounting and Finance*, May 1994, vol. 34(1), pp. 1–17.

589 This is common ground with the ENA, who state, 'The fundamental economic framework in relation to dividend imputation was set out by Officer (1994)'. Energy Networks Association, *Response to the draft rate of return guideline of the Australian Energy Regulator*, 11 October 2013, p. 96 (ENA, *Response to the draft guideline*, October 2013).

590 ENA, *Response to the draft guideline*, October 2013, pp. 96–97.

591 As noted by Lally, the 'numerical value' interpretation is the particular value that the parameter takes, and this contains no particular market value connotations. M. Lally, *The estimation of gamma*, 23 November 2013, pp. 12–13. (Lally, *The estimation of gamma*, November 2013).

592 Our approach (following Monkhouse, as is standard practice) calculates gamma as the product of the payout ratio and the utilisation rate. However, the Officer (1994) paper implicitly assumes a payout ratio of 1 at several points. In this situation, gamma equals the utilisation rate.

593 R. Officer, 'The cost of capital of a company under an imputation system', *Accounting and Finance*, May 1994, vol. 34(1), p. 4.

594 R. Officer, 'The cost of capital of a company under an imputation system', *Accounting and Finance*, May 1994, vol. 34(1), p. 5.

595 ENA, *Response to the draft guideline*, October 2013, p. 97.

ignores the context provided by the first two sentences, which clearly establishes gamma with regard to the proportion of tax that is rebated against personal tax, in line with his earlier definition. This supports our interpretation of the utilisation rate. The 'value of a dollar of tax credit to the shareholder' in this paragraph is not the market value of that tax credit, but the value of that tax credit when used to reduce (or rebate) their personal tax.[596]

Similarly, from the footnote quoted above, the ENA quotes only the latter half (as underlined).[597] This section of the Officer paper appears to present a definition of gamma that aligns with the market value perspective. However, including the context fundamentally changes the interpretation of this section. This footnote is introduced as an example, not as a definitional statement. The first two sentences of the footnote do not align with the market value perspective.[598] When Officer then refers to market prices, it appears that this is best understood as a possible method by which the utilisation rate might be estimated, not as a definition of that utilisation rate. It is a means to an end, but it is not the end point.

Officer provides a worked example in his paper, which provides this description of gamma.[599]

> Assume that 50 per cent of the tax collected at the company level represents personal tax, i.e. 50 per cent of tax credits can be utilized against personal tax liabilities so that $\gamma = 0.5$.

Officer emphasises that the example is illustrative and does not constitute a proof.[600] However, the description of gamma provided here does not align with the market value perspective. It is consistent with a definition of gamma that arises from considering investors' ability to redeem the imputation credits and so reduce their personal tax liabilities (or receive a rebate).[601] It is consistent with our definition of the utilisation rate.

As we noted in the explanatory statement accompanying the draft guideline, in past regulatory processes, we have not always clearly articulated the distinction between the Officer definition of the utilisation rate and the available approaches to estimate it. Instead, we had focused too narrowly on the 'market value definition' of the utilisation rate. For instance, in our 2010 final decisions for the Queensland and South Australia electricity networks we included substantial discussion on the estimation of the utilisation rate using market prices.[602] Other approaches, such as the use of taxation statistics, were implicitly evaluated relative to the market value approach.[603] These decisions were then appealed to the Tribunal over the determination of gamma, and this focus influenced the Tribunal's interpretation of the utilisation rate.[604]

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596 At this point the Officer paper appears to implicitly assume that the tax credits have been distributed (that is, the distribution rate is 1). In this situation, gamma equals the utilisation rate.

597 ENA, *Response to the draft guideline*, October 2013, p. 97.

598 Under a market value perspective, the utilisation rate (and therefore gamma) can never reach 1, even if all shareholders were domestic (full segmentation), because of the time delay before credits are redeemed. Yet here, Officer indicates the in such a scenario the (correctly defined) utilisation rate would be 1. See ENA, *Response to the draft guideline*, October 2013, p. 102.

599 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), p. 13.

600 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), p. 11.

601 As in other areas of the paper, this illustrative example provides no explicit breakdown into a payout ratio and a utilisation rate.

602 AER, *Final decision, Queensland distribution determination 2010–11 to 2014–15*, May 2010, pp. 215–227; and AER, *Final decision, South Australia distribution determination 2010–11 to 2014–15*, May 2010, pp. 149–162.

603 For clarity, these decisions did correctly identify that the utilisation rate was not defined by the market value of the credits; but the overall assessment did not reflect this perspective. See for example AER, *Final decision, Queensland distribution determination 2010–11 to 2014–15*, May 2010, p. 222; and AER, *Final decision, South Australia distribution determination 2010–11 to 2014–15*, May 2010, p. 161.

604 This is discussed more in section 3 of this appendix.

In his critical review of our treatment of imputation credits in the draft guideline, Associate Professor Lally supports our definition of the utilisation rate.[605]

> The AER (2013, section 8.3.1, pp. 119-120) defines *U [the utilisation rate]* as the weighted-average over the utilisation rates of all investors in the market, with the weights reflecting both value and risk aversion. This fully accords with the relevant academic literature (Monkhouse, 1993, Lally and van Zijl, 2003). Since it is difficult to estimate differences across investors in their level of risk aversion, the AER treats *U* as a value-weighted average over investors. This implies that variations in risk aversion are uncorrelated with the ability to utilise the credits, and I concur with this simplification.

Lally also directly addresses the alternative position put by the ENA, that only the market value is relevant to the valuation of imputation credits in general (and the utilisation rate in particular):[606]

> The ENA (2013, section 7.2) contests this, claims that *U [the utilisation rate]* is the *value* of the tax credits, as in *market value*, and cites Officer (1994, page 1, page 4) in support of this. However the word "value" is capable of being interpreted in many ways including "numerical value", which has no particular market value connotations. Furthermore, Officer also defines *U* as the "proportion of tax collected from the company which gives rise to the tax credit associated with a franked dividend" (ibid, page 4), which clearly is not a market value. Furthermore his paper confuses the utilisation rate with gamma, and there is no statement, let alone derivation, of how *U* is linked to the individual utilisation rates of investors. Such shortcomings are not present in Monkhouse (1993) or Lally and van Zijl (2003). In both of the latter papers, *U* arises in the derivation of the model as a weighted-average over the utilisation rates of individual investors; this is not a market value concept.

Overall, we consider Lally's critical review suggests our position on the definition of the utilisation rate is reasonable.

H.2.2 Officer framework and the definition of cash flows

In section 9.3.1 of the imputation credit chapter, we set out the conceptual framework linking imputation credits with the regulatory framework. An important part of that link is the Officer (1994) framework. In this section, we set out an expanded analysis of how Officer defines the cash flows.

In his paper deriving the CAPM under imputation, Officer defines the distribution of a firm's operating income as:[607]

$$X_o = X_G + X_D + X_E \text{ (equation 1)}$$

where:

- X_O is operating income
- X_G is income distributed to the government as tax
- X_D is income distributed to debtors as interest payments
- X_E is income distributed to equity holders

Then, under an imputation tax system, Officer defines the income paid to the government as the tax that a company pays, minus some proportion of this paid back to equity holders.[608]

605 Lally, *The estimation of gamma*, November 2013, p. 12.
606 Lally, *The estimation of gamma*, November 2013, pp. 12–13.
607 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), p. 3.

$$X_G = T(X_o - X_D)(1-\gamma) \quad \text{(equation 2)}$$

where:

- γ is the value of imputation credits

This mirrors the rule for estimating the cost of corporate income tax in the building block framework.[609] Table H.1 compares the cost of corporate income tax provisions in the rules with the elements in equation 2.

Table H.1 Comparison of the Officer tax cash flow and the building block provision governing the cost of company income tax.

Rules formula	Officer formula	Description
Estimated taxable income (ETI_t)	$(X_O - X_D)$	An estimate of the revenue on which a firm will have to pay tax. Interest payments are subtracted from operating income because they are a tax deductible expense.
Expected company income tax rate (r_T)	T	The prevailing tax rate used to calculate the company's tax liability.
Adjustment for the value of imputation credits (1–γ)	(1–γ)	This calculation reduces the total tax paid to recognise the company tax which is then distributed to investors via the utilisation of imputation credits.

Source: AER analysis.

So, Officer then substitutes equation (2) into equation (1) to derive the distribution of operating income showing the role of imputation credits.[610]

$$X_o = T(X_o - X_D)(1-\gamma) + X_D + X_E \quad \text{(equation 3)}$$

Officer also clarifies that in this formulation, the equity holders' share of operating income (X_E) is the sum of dividend payments, plus the proportion of tax that is distributed back to shareholders.[611]

$$X_E = X_{E'} + \gamma T(X_o - X_D) \quad \text{(equation 4)}$$

where:

- $X_{E'}$ is income distributed through dividend payment to investors
- $\gamma T(X_O - X_D)$ is income distributed through imputation credits to investors.[612]

608 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), p. 4.
609 NGR, r. 87A; NER, cls. 6.5.3, 6A.6.4.
610 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), p. 5.
611 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), p. 4.
612 Note: this is equal to the adjustment to company tax.

So, to capture the full life cycle of tax cash flows:

- The company pays tax to the government: $T(X_O – X_D)$
- The government keeps some of this tax: $(1–\gamma)\ T(X_O – X_D)$
- But some of it goes back to equity holders: $(\gamma)\ T(X_O – X_D)$

In total, this ensures all operating income earned by the company flowing through the imputation tax system is accounted for.

The only part of the tax cash flows that the government retains (before personal tax) is the $(1–\gamma)$ portion. This portion represents the tax paid by companies, less any tax returned to investors by the government when imputation credits are redeemed. The proportion (γ) is the proportion of company tax paid that investors redeem. Under this definition of operating cash flows, the reduction in company taxes paid to the government must be equal to the value of imputation credits investors expect to redeem.

H.2.3 Officer framework and the building block framework

The Officer framework and the tax provisions in the rules include the value of imputation credits as an adjustment to the estimated cost of company income tax. Specifically, the framework implies that company tax is reduced for the value of the cash flows from the service provider to the government which are then distributed back to investors through imputation credits (see Figure H.1). As stated by Officer:[613]

> The proportion of company tax that can be fully rebated against tax liabilities is best viewed as income tax collected at the company level. In effect, the tax collected at the company level is a mixture of company tax and personal tax, the company tax being that proportion of the tax collected which is not credited (rebated) against personal tax. If all the collection of tax from a company is rebateable (in the Australian context if all the franking credits can be used against personal tax liabilities), then for the company's shareholders, company tax is effectively eliminated. The tax the company pays is simply the shareholders' personal income tax being collected at the company level.

The value of this imputation credit offset is included in the estimated cost of company tax building block. Specifically, it is the representative investor's expected utilisation of franking credits as a proportion of the total company tax paid. Under the Officer and Monkhouse constructions, the value of imputation credits to investors can be broken down into:

- A payout ratio—every dollar of tax that a company pays generates one dollar of imputation credits. However, companies do not have to distribute any of these credits. The payout ratio is the proportion of generated credits that the benchmark efficient entity distributes. This addresses the role of the company in the imputation tax system.
- A utilisation rate —which is the value investors receive through imputation credits as a proportion of the credits that the benchmark efficient entity distributes. This addresses the interaction of the government and the investor in the imputation tax system.

These interactions are illustrated in Figure H.1 below.

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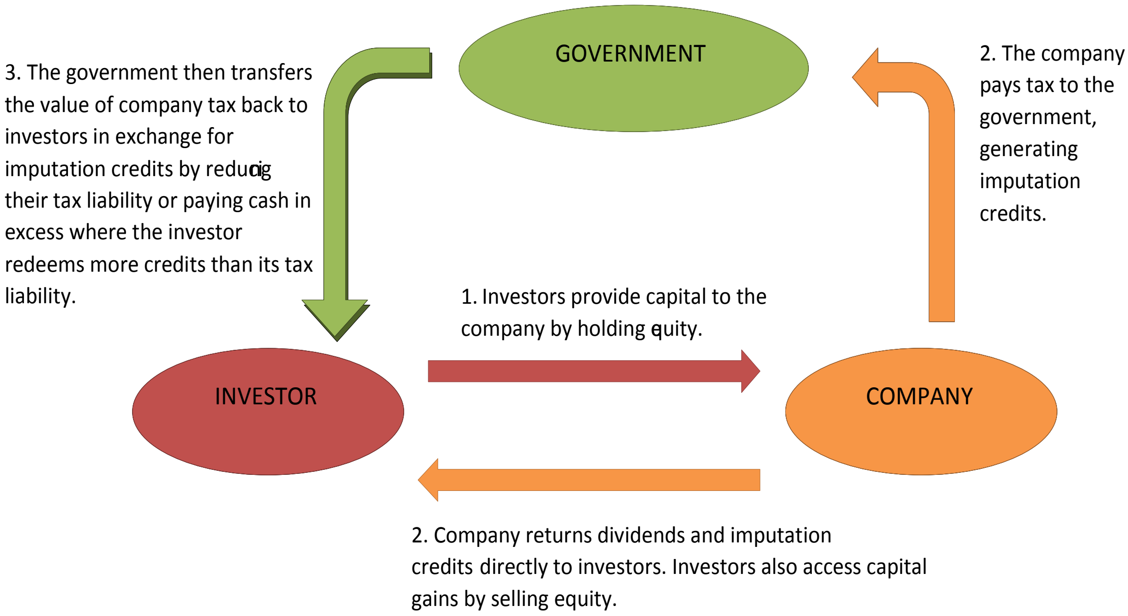
613 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), p. 2.

Figure H.1 How imputation credits become a return to investors



Source: AER analysis

Ultimately, the value of imputation credits to investors can be mapped through the life cycle of the imputation system:

- To calculate the payout ratio, we look at the (face) dollar value of the benchmark efficient entity's distribution of imputation credits as a proportion of the (face) dollar value of tax they pay.
- Then, to calculate the utilisation rate, we look at the before personal tax (face value) reductions of company tax (utilisation of credits) as a proportion of the (face) dollar value of imputation credits that are distributed from companies.

The after-personal-tax value to an investor of one dollar of franking credits—or dividends, or capital gains—depends on the representative investor's marginal tax rate. However, we estimate all rate of return parameters after company tax but before personal tax. Before personal tax, every dollar of franking credits redeemed is equivalent to one dollar of additional return. So, the relevant value in the value of imputation credits depends on the extent to which the representative investor receives credits from companies, and then the extent to which they utilise credits for their full face value. This is also consistent with the common assumption that for simplicity, dividends should be assumed to be worth their face value in the Officer framework.[614] Supporting the cash flow interpretation of the value of imputation credits, Officer and Hathaway state that:[615]

> …it is quite important to recognise that the value factor of credits (the value of distributed credits) is not in itself the "gamma" factor used within the Officer WACC formulae, a point which is often confused or mis-represented. The gamma factor in the various Officer WACC formulae represents that part of the tax paid by companies as company tax but is in reality a pre-payment of personal tax. Because we typically estimate costs of capital after company tax but before personal tax, the portion of company tax prepayments captured as pre-payment of personal tax (ie gamma) is a cash flow that has to be added to shareholders' pre-personal tax cash flow.

614 Specifically, all Australian regulators assume dividends are at face value when calculating the return on equity.
615 N. Hathaway and B. Officer, *The value of imputation tax credits, Update 2004*, November 2004, p. 7.

H.3 Process of arriving at a value for gamma

In this section, we describe the process we have followed to arrive at a value for gamma.

H.3.1 Prior to the draft rate of return guideline

We conducted a review of the value of imputation credits as part of our 2009 WACC review. In that review, we adopted 0.65 as the value for imputation credits, based on:

- a payout ratio of 1
- a utilisation rate of 0.65—calculated as an average of the Beggs and Skeels dividend drop off study (0.57)[616] and the Handley and Maheswaran tax statistic study (0.74).[617]

We then applied a gamma of 0.65 in the Queensland and South Australian electricity distribution determinations. Energex and Ergon successfully sought Tribunal review of this decision. The Tribunal set the payout ratio to 0.7 and commissioned a dividend drop off study from SFG.[618] The Tribunal adopted SFG's recommendation that the utilisation rate be set at 0.35. This resulted in a gamma of 0.25.[619]

In reaching its position, the Tribunal expressed views on the important factors in its decisions. We have carefully considered these views in reaching our proposed position. This included areas where the Tribunal felt its understanding was incomplete. For reference, table H.2 summarises these views.

Table H.2 Summary of the Tribunal's views on gamma issues

Issue	Tribunal commentary (quotes sourced from review)
The conceptual framework for gamma	'The Tribunal has found some deficiencies in its understanding of the foundations of the task facing it, and the AER, in determining the appropriate value of gamma. These issues have not been explored so far because they have not arisen between the parties, who appear to be in agreement about how the Rules should be interpreted regarding the treatment of corporate income tax. They may be matters that the Tribunal will take up in its further decision in these matters; or they may best be left until the next WACC review. Indeed, they may go to the basis for the Rules themselves. The Tribunal would be assisted in its consideration of the issues before it if the AER were to provide relevant extrinsic material explaining: (a) the rationale for including the gamma component in the formula for calculating the estimated cost of corporate income tax; and (b) how it relates to the rest of the building blocks, especially the rate of return (cl 6.4.3(a) and cl 6.5.2(b) of the Rules).'[620]
The payout ratio	'The AER accepts that on the material presently before the Tribunal, there is no empirical data that is capable of supporting an estimated distribution ratio higher than 0.7.'[621]

616 D. Beggs and C. Skeels, 'Market arbitrage of cash dividends and franking credits', *The economic record*, September 2006, vol. 82(258), p. 247.

617 J. Handley and K. Maheswaran, 'A measure of the efficacy of the Australian imputation tax system', *The economic record*, March 2008, vol. 84(264), p. 90.

618 Australian Competition Tribunal, *Application by Energex Limited (No 2) [2010] ACompT 7*, October 2010, para. 147.

619 Australian Competition Tribunal, *Application by Energex Limited (Gamma)(No 5) [2011] ACompT 9*, May 2011, para. 42.

620 Australian Competition Tribunal, *Application by Energex Limited (No 2) [2010] ACompT 7*, October 2010, paras. 149–150.

The utilisation rate	'The Tribunal finds itself in a position where it has one estimate of theta [i.e. the utilisation rate] before it (the SFG's March 2011 report value of 0.35) in which it has confidence, given the dividend drop-off methodology. No other dividend drop-off study estimate has any claims to be given weight vis-À-vis the SFG report value.'[622]
Tax value studies	'A question remains whether dividend drop-off studies are able to provide appropriate estimates for the purposes of the Rules; and whether the results of SFG's March 2011 report should be considered in the light of other approaches. This issue is addressed in the AER's report and in SIRCA's March 2011 report. SIRCA's March 2011 report provided responses to a number of specific questions asked by the AER. Some of these responses raise serious issues regarding the use of dividend drop-off studies and the Tribunal's earlier reasons. For example, SIRCA's March 2011 report suggests that: - estimates from dividend drop-off studies are very imprecise and of questionable reliability; - such studies are likely to produce downwardly-biased estimates of theta; and - taxation studies do not give an upper bound to theta. By way of background, the Tribunal in earlier reasons noted that the AER accepted that tax statistics studies provide an upper bound on possible values of theta. The AER in its report, while being less unequivocal than SIRCA, adopts SIRCA's suggestion that the results of tax statistics studies (now called the redemption rate) could be discounted for factors such as the time between the distribution and the redemption of imputation credits. These adjustments "would need to be made on an economically justifiable basis". The AER referred to a 2004 study by Hathaway and Officer as being an example of such a use of an estimate of the utilisation rate. Beyond these observations, the AER does not seek to adduce material from SIRCA's March 2011 report to advance its submissions. On the material before it, the Tribunal is unable to reach any conclusions about the further use of tax statistics studies in estimating the utilisation ratio, theta. No doubt the AER will in the future have opportunity, and perhaps cause, to investigate further. It has not sought to do so in these proceedings.'[623]
The conceptual basis for dividend drop off studies	'The AER has tendered, largely without comment, material that casts some doubt on the use of dividend drop-off studies in estimating gamma for regulatory purposes. In responding to questions from the AER, SIRCA's March 2011 report raises questions about the theoretical basis for dividend drop-off studies. In doing so, it touches on issues raised in the Tribunal's earlier reasons regarding the arbitrage model underlying dividend drop-off studies. However, SIRCA's March 2011 report does not resolve these issues and the AER has provided no conclusions of its own.'[624]

Source: As specified in table.

Since 2011, we have used 0.25 as the value of imputation credits on the basis of the Tribunal's decision, although we note that other regulators have continued to adopt higher gamma values.[625] Prior to the current rate of return guideline process, we have not sought to substantively revisit or review gamma during individual regulatory determinations. Such a review was not practical given the time constraints and more limited scope for consultation during individual regulatory determinations.

621 Australian Competition Tribunal, *Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompT 9*, December 2010, para 2.

622 Australian Competition Tribunal, *Application by Energex Limited (No 5) [2011] ACompT 9*, May 2011, para. 38.

623 Australian Competition Tribunal, *Application by Energex Limited (No 5) [2011] ACompT 9*, May 2011, paras. 31–33.

624 Australian Competition Tribunal, *Application by Energex Limited (No 5) [2011] ACompT 9*, May 2011, paras. 40–41.

625 Australian Competition Tribunal, *Application by Energex Limited (Gamma)(No 5) [2011] ACompT 9*, May 2011, para. 42. This is summarised in the consultation paper (in appendix H). See: AER, *Consultation paper, Rate of return guidelines*, 10 May 2013, p. 126. (AER, *Rate of return consultation paper,* May 2013).

We considered the development of the rate of return guideline as an ideal opportunity to undertake a further review of this issue.

H.3.2 The draft rate of return guideline

The development of the draft rate of return guideline provided an opportunity to re-evaluate the conceptual framework and estimates underpinning the value of imputation credits. In the draft guideline, we proposed to adopt 0.5 as the value of imputation credits. This was calculated as the product of a:

- 0.7 payout ratio
- 0.7 utilisation rate.

In preparing the draft guideline, we:

- Re-evaluated the role of imputation credits within the building block revenue framework. Specifically, we:
  - re-evaluated the framework papers on imputation credits, such as Officer and Monkhouse[626]
  - re-evaluated papers that extend these foundational models and consider their implications in a regulatory context[627]
  - reviewed the material from the 2009 WACC review.
- Engaged with the Australian Tax Office (ATO) to discuss the life-cycle of franking credits, and to clarify aspects of their operation.
- Considered new empirical evidence, including:
  - new estimates—from the ERA, NERA, SFG[628]
  - new related studies—Abraham, Rantapuska.[629]
- Considered other evidence—such as:
  - The KPMG 2013 valuation practices survey.[630]
  - The ongoing presence of equity imputation funds, whose stated purpose is to invest in shares with high franking proportions.

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626 R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and finance*, May 1994, vol. 34(1), pp. 1–17; and P. Monkhouse, 'The cost of equity under the Australian dividend imputation system', *Accounting and finance*, November 1993, vol. 33(2), pp. 1–18.

627 For example: M. Lally and T. van Zijl, 'Capital gains tax and the capital asset pricing model', *Accounting and finance*, July 2003, vol. 43(2), pp. 187–210; M. Lally, 'The CAPM under dividend imputation', *Pacific accounting review*, December 1992, vol. 4(1), pp. 31–44.

628 ERA, *Explanatory statement for the draft rate of return guidelines: Meeting the requirements of the National Gas Rules*, 6 August 2013, pp. 201–205 (ERA, *Explanatory statement: Draft rate of return guidelines,* August 2013); NERA, *The payout ratio: A report for the Energy Networks Association*, June 2013 (NERA, *The payout ratio for the ENA*, June 2013); SFG, *Updated dividend drop-off estimate of theta: Report for the Energy Networks Association*, 7 June 2013 (SFG, *Updated estimate of theta for the ENA*, June 2013).

629 These studies are related to the estimation of gamma and provide relevant and useful information, but they do not directly estimate either the payout ratio or the utilisation rate. See M. Abraham, 'Tax refund for unused franking credits and shareholder pattern change: Australian evidence', *International journal of social and behavioural sciences*, January 2013, vol. 1(1), pp. 1–15; E. Rantapuska, 'Ex-dividend day trading: who, how and why? Evidence from the Finnish market', *Journal of financial economics,* May 2008, vol. 88(2), pp. 355–374.

630 KPMG, *Corporate finance: Valuation practices survey*, April 2013, pp. 26–28.

  - Recent government moves to 'close the loophole' that currently promotes a practice called 'dividend washing'. In simple terms, this is a complex trading process firms can pursue to access double portions of imputation credits.

- Considered the Tribunal's 2011 decision on imputation credits and its more recent decision concerning Dampier-to-Bunbury Pipeline (DBP).[631]

H.3.3 The final rate of return guideline

In coming to our position in this final guideline, we have:

- Considered comments on this issue in stakeholders' submissions on the draft guideline. Stakeholder comments and our responses in three key areas are discussed in turn below. At a high level:[632]
  - Stakeholders did not provide any further substantive comments on our proposed approach to estimating the payout ratio (or our estimate of 0.7 for this parameter).[633]
  - The ENA and a number of service providers did not support the proposed estimation of the utilisation rate.[634] Specifically, many of these respondents, and most prominently the ENA, did not support the 'equity ownership approach'. Instead, these respondents argued that dividend drop-off studies provided the most appropriate estimates. These respondents particularly supported the SFG study previously endorsed by the Tribunal, which produced an estimate for the utilisation rate of 0.35.[635]
- Commissioned and considered an expert review by Associate Professor Martin Lally of Victoria University in Wellington of our approach to estimating gamma in the explanatory statement accompanying the draft guideline.[636] Among other things, in his review Lally:
  - seeks to clarify the nature of the payout ratio and the utilisation rate in the Officer framework, and ultimately supports our proposed estimation of these parameters on a market-wide basis
  - supports our proposed approach to using tax data to estimate the payout ratio
  - evaluates a number of alternative approaches to estimating the utilisation rate. Lally's conclusion suggests a utilisation rate of 0.7 is reasonable, based on the evidence currently available. However, Lally's first preference and recommendation is a utilisation rate equal to 1, as this is consistent with the assumption of only local investors in the Officer framework.

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[631] Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, July 2012.

[632] See appendix I.

[633] APA Group explicitly supported the estimate in its submission. See APA Group, *Submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013 (APA Group, *Submission on the draft guideline*, October 2013*)*.

[634] ENA, *Response to the draft guideline*, October 2013; ActewAGL, *Response to draft rate of return guideline*, 11 October; APA Group, *Submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013; Australian Pipeline Industry Association Ltd, *Meeting the ARORO? A submission on the Australian Energy Regulator's draft rate of return guideline*, 11 October 2013 (APIA, *Submission to the draft guideline*, October 2013); CitiPower, Powercor, SA Power Networks, *Submission to the draft AER rate of return guideline*, 11 October 2013; Ergon Energy, *Submission on the draft AER rate of return guidelines and explanatory statement: Australian Energy Regulator*, 11 October 2013; Spark Infrastructure, *Response to the AER's draft rate of return guideline*, 11 October 2013; TransGrid, *Submission on the rate of return draft guideline*, 11 October 2013.

[635] When taken with a payout ratio of 0.7, this utilisation rate implies a gamma of 0.25.

[636] Lally, *The estimation of gamma*, November 2013.

H.3.4 The conceptual framework

Several stakeholders raised a number of process issues around our conceptual framework.[637] For example, the ENA stated:[638]

> There was no explicit forewarning in the Issues Paper that the AER might propose what it asserts is a new 'conceptual framework' for gamma nor in consultation with stakeholders prior to the release of the explanatory statement. The explanatory statement also raises a substantial number of new considerations and concerns with valuation studies that have not previously been the subject of consultation and scrutiny.

We consider that, prior to the explanatory statement, the May 2013 consultation paper explicitly raised the central issues underlying our conceptual framework.[639] The consultation paper identified as conceptual issues:

- Market value versus face value—whether the relevant value of an imputation credit stems from its value when traded jointly with a dividend, or from the redemption value when payment is received from the ATO.[640]
- Representative investor versus marginal investor—whether the relevant value of an imputation credit stems from consideration of the circumstances of the marginal investor or the representative investor.[641]

The consultation paper did not set out a detailed response to these issues as we had not yet developed our position. Indeed, the development of our position was necessarily informed by the consultation process and the submissions we received from stakeholders in response to the consultation paper.

The ENA stated this conceptual framework was not new, in the sense of 'novel' or 'original'.[642] Rather, the ENA stated this conceptual framework had already been 'considered and rejected'; including that it had already been rejected by the Tribunal.[643]

Our explanatory statement to the draft guideline did not state we had developed a novel conceptual framework.[644] We agree that this conceptual framework is not new. While this is the first time we have adopted this interpretation, similar perspectives on the valuation of imputation credits have been previously aired publicly.[645]

We acknowledge that we have previously rejected this conceptual framework in favour of a market value framework, similar to that espoused by the ENA and APIA. However, our explanatory statement set out how we had systematically re-evaluated the entire body of evidence on gamma, and why we

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637 Another example is the APIA submission, which stated 'we were surprised at the considerable departure in the DG *[draft guideline]* and ES *[explanatory statement]* on the topic of gamma from the Consultation Paper', see APIA, *Submission to the draft guideline*, October 2013, pp. 34–35.

638 ENA, *Response to the draft rate of return guideline of the Australian Energy Regulator*, 11 October 2013, p. 48.

639 Note the ENA states, 'there was no explicit forewarning in the Issues paper'. This part of their statement is correct, since the issues paper (December 2012) dealt only with high level rate of return issues. However, the consultation paper (May 2013) did contain this explicit forewarning, and this was clearly prior to the release of the explanatory statement, in contradiction to the ENA's statement.

640 AER, *Rate of return consultation paper*, May 2013, p. 60.

641 AER, *Rate of return consultation paper*, May 2013, p. 60.

642 Further, the ENA criticised the AER for asserting that it was a new conceptual framework. ENA, *Response to the draft guideline*, October 2013, p. 48.

643 ENA, *Response to the draft guideline*, October 2013, pp. 49, 90.

644 The explanatory statement does not describe the conceptual framework as new—see AER, *Better Regulation, Explanatory statement, Draft rate of return guideline*, 30 August 2013, pp. 116–136, 232–247. (AER, *Explanatory statement: Draft rate of return guideline*, August 2013).

645 That is, it is correct to say that the explanatory statement position is new for the AER, even though it is not a new position in general.

now reached a different conclusion on the appropriate conceptual framework. This includes considering evidence that was not previously before us or the Tribunal.

One important point here concerns the 2011 report we commissioned from Professor McKenzie and Associate Professor Partington during the Tribunal proceedings on gamma.[646] This report raised fundamental questions over the framework—which was not in dispute between the relevant service providers and us.[647] However, we had already endorsed a market value interpretation of gamma, and, as a model litigant, did not seek to revisit this point during the legal proceedings. Hence, these aspects of the report were not agitated before the Tribunal and so have not been rejected by them, in contradiction to the ENA's statements on this matter.[648]

H.3.5 The AEMC rule change

Prior to the latest rule change, the relevant legislative section referencing the value of imputation credits read:[649]

> γ is the assumed utilisation of imputation credits

This was changed to:[650]

> γ is the value of imputation credits

The ENA considers this change in wording clarifies that gamma is a ‘market value’ concept,[651] and that this precludes our conceptual framework. We do not share this interpretation of the changed wording. We note the relevant statement on imputation credits from the AEMC’s determination:[652]

> The final rule requires the allowed rate of return to be determined on a nominal vanilla WACC basis with proper regard to dividend imputation (gamma). This is also consistent with the existing WACC approach in the NER rate of return frameworks in that it requires a consistent treatment of cash flows and the discount rate to properly incorporate the gamma factor. The current prescription of the gamma value of 0.5 in clause 6A.6.4 has also been removed to allow the regulator the ability to estimate an appropriate value that reflects the best available evidence at the time of a decision and would therefore result in a rate of return that meets the overall objective.

We do not consider that this paragraph (nor any other part of the AEMC’s determination) provides a clear reason for the change in wording. In the absence of a clear statement of rationale from the AEMC, we do not presume to infer one. Moreover, we do not interpret any deliberate omission by the AEMC of the rationale for the change as implying that the AEMC intended to ‘lock in’ the existing approach to estimating gamma. Firstly, we would assume that such intention would be best served by keeping the existing wording. Secondly, we note the Tribunal’s call in its 2011 decision for ongoing consideration of the approach to estimating gamma:[653]

> Further, the Tribunal notes the estimation of a parameter such as gamma is necessarily, and desirably, an ongoing intellectual and empirical endeavour.

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646 M. McKenzie and G. Partington, *Report to the AER: Response to questions related to the estimation and theory of theta*, 7 March 2011. (McKenzie and Partington, *Report to the AER: The estimation and theory of theta*, March 2011.)

647 ENA, *Response to the draft guideline*, October 2013, p. 101.

648 ENA, *Response to the draft guideline*, October 2013, pp. 49, 50.

649 NER cls. 6.5.3, 6A.6.4 (as at version 52). Version 13 of the NGR did not define gamma.

650 NER cls. 6.5.3, 6A.6.4 (current since version 53); NGR r. 87A(1) (current since version 14).

651 ENA, *Response to the draft guideline*, October 2013, p. 94.

652 AEMC, *Rule determination: National electricity amendment (Economic regulation of network service providers) Rule 2012: National gas amendment (Price and revenue regulation of gas services) Rule 2012*, 29 November 2012. (AEMC, *Final rule change determination*, November 2012).

653 Australian Competition Tribunal, *Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9*, May 2011, para. 45.

Finally, we do not accept the ENA's assertion that our conceptual approach to gamma would require a rule change.[654] To be consistent with the AEMC's determination, we consider our approach must involve an economically reasoned definition of the parameter, be consistent with the WACC and contribute to meeting the allowed rate of return objective. Accordingly, we consider our approach is equally applicable under the current wording of the rules as it was under the previous wording.

H.3.6 Interpreting 'the value of imputation credits'

The ENA's interpretation of the change in wording appears to be driven primarily by its interpretation of the word 'value'. The ENA asserts the use of the word 'value' is intended to denote the concept of 'market value'.

We do not agree with this strict interpretation. We do not consider the intended meaning of the word 'value' is made clear in the rules or in the AEMC's determination. Further, we consider the word 'value' in these contexts is being used in a generic sense to refer to the number that a particular parameter takes (that is, its numerical value). Lally comes to a similar conclusion in reviewing the references to 'value' quoted by the ENA:[655]

> The ENA [in section 7.1 of its response to the draft guideline] cites numerous authors in support of defining [the utilisation rate] as the "value" of a distributed credit. However, as with Officer, it is not clear whether these authors are using the word "value" to mean "market value" or simply numerical value (as in "what value does this parameter take?").

Given this ambiguity, we consider there is more than one potentially valid interpretation of gamma and, relatedly, the intended meaning of 'value'. The 'market valuation' concept is one such interpretation. Ultimately, however, our interpretation is based on the economic rationale for the parameter in the underlying framework (namely, that of Officer). In section H.2, we have set out the reasons why the Officer framework supports our interpretation of the parameters relating to imputation credits.

H.4 Payout ratio—analysis of NERA study

In section 9.3.4 of the imputation credit chapter, we propose to use the cumulative payout ratio calculated from tax statistics to estimate the payout ratio.[656] For the reasons outlined below, we consider the cumulative payout ratio method that NERA submitted in its report to the ENA is reasonable. With current data, this suggests a payout ratio of 0.7.

NERA's estimate is calculated by dividing the total franking account balance at the end of 2010–11 (the most recent data available) by the total value of Australian company tax paid from 1987–88 to 2010–11 (since the imputation system commenced). The payout ratio is 1 minus this proportion. The intuition of NERA's approach is that:

1. the total franking account balance (1) should pick up all credits that have been generated but not distributed

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654 ENA, *Response to the draft guideline*, October 2013, p. 94.

655 Lally, *The estimation of gamma*, November 2013, p. 12 (footnote 3). Lally notes that, given the payout ratio is 'clearly not a market value concept', he has interpreted references by the ENA to the value of gamma as references to the value of the utilisation rate.

656 Calculation of the cumulative payout ratio starts with the total value of franking credits that are in firms' franking account balances, reflecting the cumulative additions and subtractions of franking credits since the commencement of the imputation tax system. Then, subtracting this from total company tax paid over the same time period produces an estimate of the franking credits that have been distributed in total. This relies on the idea that every dollar of company tax paid generates an imputation credit, which can either be distributed or retained in franking account balances. Then, dividing this estimate by company tax paid to the ATO over the same time period produces an estimate of the total payout ratio over this time.

2. the total net company tax paid over this time period (2) is the same as the total value of imputation credits generated

3. so, dividing (1) by (2) gives an estimate of franking credits that have not been distributed as a proportion of franking credits that all companies have generated.

Then, by subtracting this proportion from 1, the output is an estimate of all franking credits that have been distributed as a proportion of franking credits that all companies have generated.[657]

Together with the cumulative payout ratio method, NERA considers two measures of the annual payout ratio. This includes a 'tax measure', which considers the annual change in companies' franking account balances. It also includes a 'dividend measure', which considers the net credits distributed by companies. In an assessment of the three approaches, NERA concludes that:

> In our opinion, the cumulative payout ratio is the most reliable estimate that is least likely to be affected by potential distortions in the underlying data set.

Moreover, NERA's analysis demonstrates a discrepancy between the 'tax' and 'dividend' measures of the annual payout ratio, which NERA is unable to explain.[658]

We concur with NERA's assessment of the three alternative approaches, and support the cumulative payout ratio method for estimating the payout ratio. We consider the approach to be simple, transparent and replicable. This is because the method of calculation is relatively straight forward (as outlined above) and the data is publicly available from the ATO.

H.4.1 Evidence of a rising payout ratio

Our initial position that the payout ratio might be rising over time, as set out in the consultation paper and explanatory statement to the draft guideline, was based on the following:

- The expected effect of tax reforms in 2000.
  - Since 2001, investors are guaranteed full compensation for imputation credits, even where those credits exceed the investors' tax liabilities.[659] We proposed this would make imputation credits more valuable to investors, and in turn, would increase the incentive for firms to distribute franking credits.
  - Abraham finds, 'firms were also more likely to distribute franking credits subsequent to the July 2000 tax reforms'.[660] This analysis refers to the number of firms that distribute imputation credits, rather than the proportion of credits that the market distributes. However, we have no evidence to suggest firms that previously paid imputation credits are reducing their payout ratios. Therefore, holding other things constant, growth in the number of firms distributing imputation credits suggests distributing imputation credits has become more attractive to companies and investors since the tax reforms. Nonetheless, we acknowledge this is indirect

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657 However, NERA identifies that this approach treats franking credits as distributed if a company goes bankrupt or fails to report its franking account to the ATO. NERA note that, 'in reality, the credits retained by bankrupt companies are, typically, never distributed' and this could therefore bias the payout ratio upwards. NERA, *The payout ratio for the ENA*, June 2013, p. 5.

658 NERA, *The payout ratio for the ENA*, June 2013, p. 12.

659 ATO, *Refunding imputation credits: Overview*, Available at: http://www.ato.gov.au/Business/Imputation/In-detail/Refunding-imputation-credits--Overview/.

660 M. Abraham, 'Tax refund for unused franking credits and shareholder pattern change: Australian evidence', *International journal of social and behavioural sciences*, January 2013, vol. 1(1), pp. 14–15.

evidence on movements in the market-wide payout ratio. Therefore we are cautious in drawing strong conclusions from it.

- Amendments to the *Corporations Act* in 2010 make it possible for firms to increase the payout of dividends. Previously, companies could only distribute dividends out of profits. However, amendments to section 245T of the *Corporations Act* allow companies to pay dividends out of assets, subject to conditions.[661] This allows these firms to increase their payout of dividends. The payout of dividends constrains the payout of imputation credits, because imputation credits can only be distributed with dividends.[662] Accordingly, if firms use the additional flexibility to increase dividends, it may also increase the distribution of imputation credits (and therefore the imputation credit payout ratio).

- Some experts have suggested it appears unlikely that franking account balances can increase indefinitely without corporate or legislative innovations to access this value.[663]

We do not find these views conclusive. This is because:

- There is no conclusive evidence to suggest the cumulative payout ratio for the period following the tax reforms in 2000 is higher than 0.7. This is consistent with the findings in the NERA report.[664]

- Using the same data-set as NERA, we can recalculate the cumulative payout ratio to 2010-11 for each period since 2002–03. This involves replacing the total franking account balance at the end of 2010–11 with the change in the franking account balance from the relevant start date to 2010–11. We find the cumulative payout ratio is either 0.70 or 0.71 for each period to 2010-11 with a starting date between 2002-03 and 2006-07.[665] The cumulative payout ratios increase substantially for the periods starting 2007-08, 2008-09 and 2009-10. However, this likely reflects the increased weight on the 2010-11 data, which the ATO is yet to adjust. We note, as demonstrated by NERA, adjustments in the past have tended to lower the payout ratio implied by a given year's data on net tax and franking account balance.[666] We may revisit this data in future reviews of the payout ratio to, among other things, assess the effect of any adjustments to 2010-11 data.

- As NERA acknowledged, the potential systematic 'overestimate' biases in the cumulative payout ratio method relating to bankrupt companies and failed reporting cannot be determined with any

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661 Deloitte, *Changes to corporate law rules for payments of dividends*. September 2010. Available at: http://www.deloitte.com/assets/Dcom-Australia/Local%20Assets/Documents/Services/Tax%20services/Corporate%20and%20international%20tax/Alert%20on%20Dividends%20JC%20060910.pdf.

662 Sub-division 202-C of the *Income Tax Assessment Act 1997*.

663 For example: J. Handley, *Further comments on the valuation of imputation credits*, April 2009, p. 8; M. McKenzie and G. Partington on behalf of the Securities Industry Research Centre of Asia Pacific (SIRCA) Pty Ltd, *Report to the AER—Evidence and submissions on gamma*, 25 March 2010, pp. 26–27 (McKenzie and Partington, *Report to AER, Evidence and submissions on gamma*, March 2010).

664 NERA, *The payout ratio for the ENA*, June 2013, p. 13.

665 The total net tax paid over this period is approximately $421.5 billion, and the change in the franking account balance is approximately $122.33 billion. The ratio is calculated as 1 – (122.33/421.5). For data, see: ATO, *Taxation statistics 2010–11—Table 1: Company tax selected items for income years 1979–80 to 2010–11*, Available at: http://www.ato.gov.au/About-ATO/Research-and-statistics/In-detail/Tax-statistics/Taxation-statistics-2010-11/?default=&page=9#Company_tax_and_the_petroleum_resource_rent_tax. Note that in the explanatory statement to the draft guideline, we incorrectly stated that the cumulative payout ratio since 2002-03 was 0.73. This was due to a mismatch in our calculation, whereby changes in net tax were considered over the period 2001-02 to 2010-11 while changes in the franking account balance were considered over the period 2002-03 to 2010-11.

666 NERA, *The payout ratio for the ENA*, June 2013, p. 10.

degree of certainty.[667] As noted by Hathaway, the effects of amendments to the *Corporations Act 2001 (Cth)* in 2010 are not yet observable.[668]

- Regarding the suggestion (including by Handley[669]) that franking account balances cannot increase indefinitely, Lally states that distribution of credits via higher dividends may not be optimal if one recognises that capital gains are taxed at a lower rate to gross dividends.[670] Hathaway states there is no logical reason to assume future governments will permit personal and other investors to redeem past company tax payments.[671]
- There were no other substantive comments in submissions on the issue of whether the payout ratio is rising over time.

H.5 Utilisation rate—tax statistic estimates

In section 9.3.5 of the imputation credit chapter, we discuss the potential role of tax statistic estimates in estimating the utilisation rate. This section sets out a more detailed technical analysis of the available tax statistic estimates, and the strengths and weaknesses of this approach.

Table H.3 sets out the key available tax statistic estimates.

Table H.3 Tax statistic estimates of the utilisation rate

Study	2000 or earlier results	Post-2000 results
Hathaway and Officer (2004)[672]	0.45 (1988–2002)	N/A
Handley and Maheswaran (2008)[673]	0.67 (1988–2000)	0.81 (2001–2004)
Hathaway (2013)[674]	N/A	0.44 or 0.62 (2004–2011)

Source: As specified in table.

This table differs from that presented in the explanatory statement accompanying the draft guideline in two main ways:

- We have included estimates from the new Hathaway report submitted by the ENA in response to the explanatory statement.[675] This has replaced an earlier report by the same author that applied the same approach to a smaller dataset (that is, Hathaway's 2010 estimate for the period 2004–2008 of 0.65).[676]

667 NERA, *The payout ratio for the ENA*, June 2013, p. 5.
668 N. Hathaway, *Imputation credit redemption ATO data 1988-2011, Where have all the credits gone?*, September 2013, p. 41. (Hathaway, *Imputation credit redemption ATO data*, September 2013).
669 J. Handley, *Further comments on the valuation of imputation credits*, April 2009, p. 8.
670 Lally, *The estimation of gamma*, November 2013, p. 52.
671 Hathaway, *Imputation credit redemption ATO data*, September 2013, p. 41.
672 N. Hathaway and B. Officer, *The value of imputation tax credits, Update 2004*, November 2004.
673 J. Handley and K. Maheswaran, 'A measure of the efficacy of the Australian imputation tax system', *The economic record*, March 2008, vol. 84(264), p. 90.
674 Hathaway, *Imputation credit redemption ATO data*, September 2013, p. 7 (paragraphs 23. 25).
675 Hathaway, *Imputation credit redemption ATO data, September* 2013.
676 N. Hathaway, *Imputation credit redemption: ATO data 1988–2008*, July 2010, p. 7.

- We have clarified whether estimates are based on data (primarily) before or after the 2000 tax law change that allowed eligible investors to receive a refund for any unused imputation credits in excess of their tax assessment.

The two Hathaway (2013) estimates arise from different aspects of the ATO data: either using ATO dividend data (0.62) in isolation; or using ATO dividend data in conjunction with ATO taxation data on franking account balances (0.44).

In the remainder of this section, we set out our consideration of the:

- previous Tribunal considerations
- reliability of tax statistics as a class of evidence overall
- reliability of the Handley and Maheswaran study
- relevance of older data (from before the 2000 tax law change) to current conditions
- potential bias in tax statistics estimates.

H.5.1 Previous Tribunal considerations

In the 2009 WACC review, we relied on an average of the two data periods in the Handley and Maheswaran study (0.67 and 0.81), giving a tax statistics estimate of 0.74.[677]

In the Tribunal's review of the value of imputation credits, the Tribunal determined that since tax statistics provided an 'upper bound' for estimates of the utilisation rate, they should not be used to calculate point estimates.[678] We consider this arose from the conclusions that:

- only the 'market value' of the utilisation rate is a relevant conceptual goal
- dividend drop off studies accurately identify the market value of imputation credits
- therefore, the differences between the implied market value from dividend drop off studies and tax statistic estimates were assumed to be costs to investors that tax statistics estimates did not identify.

In turn, we consider these conclusions arose from the incomplete conceptual framework. We have set out earlier in this document the derivation of the utilisation rate under the complete conceptual framework. This shows that the market value of the utilisation rate is not the relevant goal.

Further, during the Tribunal process, we commissioned a report from McKenzie and Partington who addressed some of these issues.[679] In particular, McKenzie and Partington identified that 'taxation statistics do not give an upper bound on either the market value of franking credits, or the utilisation rate of the marginal investor'.[680] Since some of this analysis lay outside the scope of information we

677 The two periods were before and after the 2000 tax law change that guaranteed full refunds for imputation credits in excess of an eligible investor's tax assessment. Given that this tax law change was expected to increase the utilisation rate, we considered that averaging the two periods was a conservative position. AER, *Final decision: Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters*, 1 May 2009, p. 456. (AER, *Final decision: WACC review*, May 2009).

678 Note that we no longer hold the view that tax statistics provide an upper bound for estimates of the utilisation rate. Australian Competition Tribunal, *Application by Energex Limited (No 2) [2010] ACompT 7,*13 October 2010, paragraph 91.

679 McKenzie and Partington, *Report to the AER: The estimation and theory of theta*, March 2011.

680 McKenzie and Partington, *Report to the AER: The estimation and theory of theta*, March 2011, pp. 14–15.

used in the relevant final decision, we did not seek to rely heavily on the report in the Tribunal review. Nonetheless, the Tribunal recognised that:[681]

> By way of background, the Tribunal in earlier reasons noted that the AER accepted that tax statistics studies provide an upper bound on possible values of theta. The AER in its report, while being less unequivocal than SIRCA, adopts SIRCA's suggestion that the results of tax statistics studies (now called the redemption rate) could be discounted for factors such as the time between the distribution and the redemption of imputation credits. These adjustments "would need to be made on an economically justifiable basis". The AER referred to a 2004 study by Hathaway and Officer as being an example of such a use of an estimate of the utilisation rate.
>
> Beyond these observations, the AER does not seek to adduce material from SIRCA's March 2011 report to advance its submissions. On the material before it, the Tribunal is unable to reach any conclusions about the further use of tax statistics studies in estimating the utilisation ratio, theta. No doubt the AER will in the future have opportunity, and perhaps cause, to investigate further. It has not sought to do so in these proceedings.

H.5.2 The reliability of tax statistics

In its response to the draft guideline, the ENA submits taxation statistics are unreliable for regulatory estimation purposes, based upon the expert report it commissioned from Hathaway.[682] Hathaway's position is neatly summarised in his statement of conclusions:[683]

> 3. I conclude that the ATO statistics cannot be relied upon for making conclusions about the utilisation of franking credits. The data contains an apparently very large internal discrepancy.
>
> …
>
> 6. The two sets of taxation data and financial data do not reconcile with each other. They differ by the amount of approximately $87.5 billion of franking credits over the period 2004-2011. In context, this is 32% of the reported total distribution of $270.7 billion of credits. It is also 21% of the total net tax payment of $421.5 billion.
>
> …
>
> 9. Until that reconciliation has occurred or it can be explained to me how to account for those credits, I urge all caution in using ATO statistics for any estimates of parameters concerned with franking credits.

That is, the ATO publishes statistics related to imputation credits from two different perspectives. The first, taxation data, is drawn from the ATO tax assessment for each firm. This includes the tax paid and the resulting franking account balance. The second, financial data, is also drawn from tax forms submitted to the ATO. However, this relates to each company's submission of its financial data. This includes details of imputation credits distributed and received. Where both information sources report certain values related to imputation credits, they differ by a large and economically significant amount. Hathaway considers the entire source of evidence unreliable. He therefore considers it unreasonable to use taxation data to estimate imputation credit parameters. This leads the ENA to submit:[684]

> On the strength of a new report attached from Hathaway, the AER's recurring approach of relying on taxation statistics to establish the gamma, whether as a measure of cash flow or value, must now cease. It would be dangerous and irresponsible to continue to rely on these statistics and reports in light of the evidence now presented by Hathaway.

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681 Australian Competition Tribunal, *Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9,* May 2011, paras 33–34.

682 ENA, *Response to the draft guideline*, October 2013, p. 109.

683 Hathaway, *Imputation credit redemption ATO data*, September 2013, p. 5.

684 ENA, *Response to the draft guideline*, October 2013, p. 50.

However, it is not apparent to us how the ENA can reconcile its submissions on the payout ratio and the utilisation rate.[685] Hathaway states that no parameter related to franking credits—the payout ratio, the utilisation rate, or the overall gamma—should be set with regard to ATO statistics. The ENA endorses that conclusion with regard to the utilisation rate. Yet, the ENA relies on those same taxation statistics to determine the payout ratio. The NERA report used by the ENA to justify its submission on the payout ratio uses the same ATO data as that presented in the Hathaway report.[686] There does not appear to be any reasoning in the ENA submission that explains why it adopts Hathaway's recommendation in one area but ignores it in another.

We consider it is reasonable to use the tax statistics to inform both the payout ratio and the utilisation rate, with appropriate regard to the uncertainty around each of these estimates. We consider tax statistics are more reliable with regard to the payout ratio, than with regard to the utilisation rate.

There is support for this position within the Hathaway report itself. Notwithstanding the overall conclusion from Hathaway—that taxation statistics should not be used to inform any gamma components—his report states:[687]

> Unfortunately, there are too many unreconciled problems with the ATO data for reliable estimates to be made about the utilisation of franking credits. The utilisation rate of franking credits is based on dividend data (from the tax office) and I have demonstrated that this data is questionable. The only reasonably reliable estimate I can obtain from the taxation statistics is the access fraction *[payout ratio]*, which is obtained from the [franking account balance] data.

That is, an estimate of the payout ratio (called the access fraction by Hathaway) can be generated using just one of the two different data sources—the franking account balance data. In Hathaway's opinion, this is the more reliable of the two data sources. Further, this estimate is internally consistent since it uses only one of the ATO data sources (and so does not compare between the two irreconcilable series).

The key point of dispute is whether any consideration can be given to estimates of the utilisation rate from taxation statistics. This necessarily relies on the ATO dividend data—the franking account balance data does not include a figure for the value of imputation credits redeemed by taxpayers. It does not appear that Hathaway considers the ATO dividend data is unreliable because he detects errors in that data series itself. On the contrary, he examines the ATO dividend data against a number of external sources, including ABS data, APRA data and other ATO subcategories of reporting data. In doing so, he does not find a material error— although there are some ambiguities around the categorisation of reported dividend income. Rather, it is the discrepancy between the two series that concerns him, which he assumes is the result of error in the dividend data:[688]

> The conclusion is that I accept the tax payments and [franking account balance] data as given post-2003, and assume that the problem is more likely to have arisen within the franked dividend payments data.

We do not consider it is appropriate to attribute the discrepancy entirely to error in one series, and so ignore the dividend data while placing material reliance on the franking account balance data. Another aspect is that, while there is uncertainty around these estimates, this uncertainty needs to be viewed

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[685] Although the October ENA submission makes no explicit mention of the payout ratio, it does state that gamma should be 0.25, and the utilisation rate should be 0.35, which requires that the payout ratio be 0.7. This matches the June ENA submission, which explicitly stated that the payout ratio should be 0.7 based on tax statistics. Hence, it does not appear to be the case that the ENA has resiled from its previous position on the payout ratio. ENA, *Response to the draft guideline*, October 2013, p. 4, 48, 54. ENA, *Response to AER rate of return guideline consultation paper*, 28 June 2013, pp. 82–83. (ENA, *Response to the consultation paper*, June 2013).

[686] NERA, *The payout ratio for the ENA*, June 2013, p. 4

[687] Hathaway, *Imputation credit redemption ATO data*, September 2013, p. 39.

[688] Hathaway, *Imputation credit redemption ATO data*, September 2013, p. 25.

relative to the uncertainty around other estimation methods, such as implied market value studies. Relative to the shortcomings of the alternative approaches, we consider it is reasonable to have regard to the tax statistics when estimating the utilisation rate.

As to the two possible estimates presented by Hathaway, we note that one involves the consistent interpretation of one data series (the dividend data). However, the other involves comparison across the two series (between dividend data and franking account balance data). Since the discrepancy is the primary concern, we consider it reasonable to give higher regard to the former.

H.5.3 The reliability of the Handley and Maheswaran study

In the explanatory statement accompanying the draft guideline, we noted that Hathaway had previously published a critique of the Handley and Maheswaran tax statistic estimates. This concluded that tax statistics should not be used to estimate the utilisation rate.[689] Some of Hathaway's concerns related to the use of taxation statistics in general, rather than the specific Handley and Maheswaran approach, as discussed above. Professor Handley then published detailed responses to these criticisms. He maintained that tax statistic estimates could validly be used to estimate the utilisation rate, and that the estimates in the Handley and Maheswaran report were reasonable.[690]

In response to the draft guideline, the new Hathaway report continues this dialogue on one particular issue.[691] Hathaway considers that Handley and Maheswaran inappropriately use dividend withholding tax (DWT) data to make assumptions about the imputation credits received by foreign investors. We do not consider this criticism has any force. The Handley and Maheswaran paper clearly set out the process by which the imputation credit flows were estimated for foreign investors, the reasons behind this process and the use made of DWT data. Where Handley and Maheswaran make assumptions about investor behaviour, they have provided reasons for those assumptions. We also note that, although the application of such assumptions does require considerable care and expert judgement, it is justified in certain circumstances. For example, the Hathaway paper itself makes assumptions about investor behaviour for certain classes based on the observed behaviour of other (related) classes.[692]

As set out in the explanatory statement, we are also aware that the Handley and Maheswaran study may not fully account for the impact of the 45 day holding rule. However, this is not expected to be a large discrepancy.[693]

We accept that in this case there is debate between experts about the best implementation of the available tax statistics to estimate the utilisation rate. However, we do not agree with Hathaway's conclusion that these potential problems mean tax statistics should not be used to estimate the utilisation rate.

H.5.4 The relevance of older data

In the explanatory statement accompanying the draft guideline, we included utilisation rate estimates using tax statistics from a variety of time periods.[694] However, in another section of the explanatory

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689 N. Hathaway, *Comment on: 'A measure of the efficacy of the Australian imputation tax system by John Handley and Krishan Maheswaran',* July 2010.

690 J. Handley, *Further issues relating to the estimation of gamma*, October 2010, pp. 21–34.

691 The Hathaway report set out seven separate criticisms of Handley and Maheswaran, and Handley responded (in detail) to each of these seven points. While the new Hathaway report does not appear to accept these responses, it provides no new material on the six other points. Hence, consistent with the explanatory statement accompanying the draft guideline, we consider Handley's responses are reasonable.

692 Hathaway, *Imputation credit redemption ATO data*, September 2013, pp. 20, 36.

693 McKenzie and Partington, *Report to the AER: The estimation and theory of theta*, March 2011, p. 16.

statement, we also noted that one of these estimates (from Hathaway and Officer, 2004) was made using data almost exclusively prior to the changes to the tax law. These changes guaranteed full refund of imputation credits to eligible investors. These changes are expected to increase the utilisation rate, since it was previously possible for eligible investors to waste excess credits they had accrued above their tax assessment. Hence, there are conceptual grounds to expect the estimates from periods prior to the tax change (July 2000) will underestimate the utilisation rate.

In his critical review, Associate Professor Lally states:[695]

> Given that the AER (reasonably) assigns low weight to the results from Hathaway and Officer (2004), because its data is almost entirely drawn from before 2000, they ought to have taken the same view about the results from Handley and Maheswaran (2008) for the period 1988-2000.

We accept this criticism from Lally. We interpret the results from studies prior to 2000 with regard to their weaknesses. In particular, where there have been material changes to the tax law, these estimates are less relevant to current circumstances and the current value of imputation credits. However, we do not intend to entirely exclude imputation credit studies that use data prior to 2000. This would be overly mechanistic and prevent us from making use of these estimates to the limited extent possible (particularly where a directional effect can be inferred).

As set out in chapter 9, our conclusion from taxation statistics is that the utilisation rate falls in the range 0.4 to 0.8. This range encompasses the three estimates using post-2000 data (0.81 from Handley and Maheswaran, 0.62 and 0.44 from Hathaway).[696]

H.5.5 Potential bias in tax statistics estimates

As noted in chapter 9, if tax arbitrage influences the final set of investors at the ex-dividend date, the estimates from tax statistics may diverge from the underlying utilisation rate. This occurs because the tax statistics reflect the eligibility status of those who hold the shares at the time of dividend distribution, not the eligibility of the broader pool of equity providers.[697] If there is a systematic difference between the compositions of these two groups, the tax statistics estimate will overestimate or underestimate the true utilisation rate.

There is a conceptual expectation that, since eligible investors have an incentive to obtain the imputation credits (and the reverse for ineligible investors), the tax statistics will present an overestimate of the utilisation rate. The differing incentives result in trade so that the eligible investors hold the shares at the time when franked dividends are paid, and so their ability to use the imputation credits is overrepresented in the taxation statistics.[698]

However, there is an immediate empirical challenge to this conceptual expectation. Hathaway reports that domestic investors receive a lower proportion of franked dividends (and therefore imputation credits) than the overall proportion of equity they hold.[699] Domestic investors, who are eligible to redeem all the imputation credits they receive, hold 75 per cent of overall equity but receive 71 per cent of imputation credits. The balance is held by foreign investors, who hold 25 per cent of equity but

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694 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, p. 238.
695 Lally, *The estimation of gamma*, November 2013, p. 17.
696 It also reflects a desire to avoid inappropriate specificity, noting the level of uncertainty around each of these estimates.
697 The broader pool of equity providers aligns with the market definition: an Australian domestic market that recognises the presence of foreign investors to the extent they invest in the Australian market. It does not include all potential overseas investors, by construction.
698 This possibility is acknowledged by Lally, though he considers that it is unlikely to have a material effect. Lally, *The estimation of gamma*, November 2013, pp. 17–18.
699 Hathaway, *Imputation credit redemption ATO data*, September 2013, p. 19.

receive 29 per cent of imputation credits, despite being ineligible to redeem them.[700] This is contrary to the initial conceptual expectation and, all else equal, suggests that tax statistics would underestimate the utilisation rate.

A deeper conceptual analysis shows this empirical result is not unexpected:

- The tax arbitrage argument as set out above considers only the relative value of imputation credits to eligible/ineligible investors. However, the imputation credit trades in a package together with a cash dividend and (by construction) the value of the dividend will always outweigh the value of the attached imputation credit. A tax arbitrage argument needs to consider the overall incentives to obtain (or avoid) a franked dividend package.[701] Hence, the dominant factor distinguishing between domestic (eligible) and foreign (ineligible) investors may be the taxation effect arising from the cash dividend component.

- There are a number of legislative requirements that deliberately limit the potential to trade solely in order to use the imputation credits (and from the ATO perspective, avoid tax). These include the requirement that shares must be held at risk for 45 days in order to access the imputation credits. These also include rules that prevent dividend streaming, which is paying different classes of investors different levels of imputation credits.[702] These would limit the ability of any investors to selective access (or avoid) imputation credits. In turn, this would limit the materiality of the possible tax arbitrage effect on imputation credits.[703]

- There are a large number of other relevant factors affecting trades around the dividend date, as set out below in our discussion on market value studies. These may predominate over any possible taxation effects, particularly given the legislative restrictions limiting the materiality of taxation effects as described in point two.

Hence, we consider there is no conceptual expectation that tax statistics will overestimate the utilisation rate. The tax statistics are weighted by the proportion of franked dividends received, rather than the proportion of overall equity ownership.[704] This means that this estimate might differ from the utilisation rate, but there is no clear conceptual expectation of the direction of this difference. This also reinforces one of the strengths of the equity ownership approach, since it is not affected by any trading effects around the time of the dividend payment.

H.6 Utilisation rate—implied market value studies

In section 9.3.5 of the imputation credit chapter, we discuss the potential role of implied market value studies in estimating the value of the utilisation rate. In particular, we identify that while implied market value studies have some potential advantages, the problems with these estimates and the wide range of expert conclusions make it difficult to select a definitive value from the range. Further, regard must

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700 Hathaway notes that the 'rest of world' category might include domestic investors who have not yet lodged a return with the ATO (as well as possible data errors), but does not expect these to be material. Hathaway, *Imputation credit redemption ATO data*, September 2013, p. 19.

701 For instance, consider a domestic investor whose effective tax rate on capital gains is lower than their tax rate on dividends. The tax effect for a fully franked dividend includes two opposing effects: they would prefer not to receive the cash dividend (the capital gain is taxed at a lower rate) but they would prefer to receive the imputation credit (they are eligible to redeem the imputation credit). Hence, their incentive to receive a fully franked depends on the relative magnitude of each effect.

702 There is a concise description of the different tax law changes in the appendix of D. Beggs and C. Skeels, 'Market arbitrage of cash dividends and franking credits', *The economic record*, September 2006, vol. 82(258), pp. 239–252.

703 Lally, *The estimation of gamma*, November 2013, pp. 17–18.

704 Earlier this weighting was described as being 'by the proportion of imputation credits received', This is correct, but may lead the reader to overlook that the imputation credit is only available as part of a dividend package (as has just been described).

be had to the differences between market value and the conceptual definition of the utilisation rate when considering this type of evidence.

The broader class of implied market value studies includes a number of different approaches, most notably dividend drop off studies. The Tribunal estimate of the utilisation rate (0.35) comes from a single dividend drop off study.[705] The value from these studies is an 'implied' value because the imputation credit is never separately observable and there is no direct market for imputation credits. So, the value must be estimated or implied from the movements in security prices, and then separated from the value of attached dividends. In this section, we present the wide range of dividend drop off studies and alternative market value studies that have been conducted, together with observations about the strengths and weaknesses of the various approaches.

Taken together, we observe there is no definitive study, and that all of the published implied market value studies by respected academic professionals are subject to:

- Econometric problems that experts have not been able to resolve. Further, we consider some of these problems are inherent in the methodologies, and possibly cannot be resolved.
- High sensitivity to subtle variations in method, time period and dataset. This includes conflicting variation across time and methods, with a wide range of resulting estimates.
- Divergence between the market value estimate produced by these techniques and the underlying definition of the utilisation rate.

As a result, we consider that good regulatory practice suggests we should not rely exclusively on any one of these studies, or only on these studies. Taken as a body of evidence, there are studies suggesting an implied utilisation rate between zero (no value) to greater than one (full value). In the explanatory statement accompanying the draft guideline, we did not elaborate further on the relative merits of the different studies. Consistent with the position in that explanatory statement, we do not intend to entirely exclude any particular study. However, we did not intend to imply that all studies are equally relevant. We interpret each implied market value study with regard to its strengths and weaknesses.

With regard to the set of implied market value studies, and the strengths and weaknesses of each study, we now consider this evidence suggests a utilisation rate in the range 0–0.5. This broad range reflects the range of results we observe, as well as the uncertainty in these estimates.

There is expert advice supporting the position that implied market value studies should be interpreted with caution. Professor McKenzie and Associate Professor Partington (2010) observe that:[706]

> It is clear that a precise and unambiguous valuation of theta is unlikely to be derived from traditional ex-dividend studies. It would be unwise, therefore, to rely on one ex-dividend study to determine theta (the utilisation rate). Equally, it would be unwise to just rely on combining results across several ex-dividend studies; triangulation with other evidence is desirable.

In his critical review of the explanatory statement accompanying the draft guideline, Associate Professor Lally notes (in detail) the problems affecting implied market value studies (and the interpretation of these studies). He recommends:[707]

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705 SFG, *Dividend drop off estimate of theta, Final report, Re: Application by Energex Limited (No 2) [2010] ACompT 7*, March 2011, p. 3.

706 McKenzie and Partington, *Report to the AER, Evidence and submissions on gamma*, March 2010, p. 11.

> In conclusion, and in view of the concerns listed above, I concur with the AER's view that estimates of [the utilisation rate] *U* derived from market prices warrant low weight.

This section sets out more detailed technical analysis of the available implied market value studies, including:

- types of implied market value studies
- the interpretation of implied market value studies
- the relevance of implied market value studies to the utilisation rate
- estimates from implied market value studies

H.6.1 Types of implied market value studies

In this section, we describe the key characteristics of dividend drop off studies and implied market value studies.

Dividend drop off studies

Dividend drop off studies are the primary type of implied market value study. Along with taxation studies, dividend drop off studies have commonly been used to estimate the utilisation rate. The 2011 Tribunal estimate of the utilisation rate (0.35) is based on SFG's 2011 dividend drop off study. These studies are calculated by comparing share prices between:

- the cum-dividend date—the last day on which investors owning shares will be eligible to receive dividends and the attached franking credits
- the ex-dividend date—the first day on which investors owning shares will not be eligible to receive dividends and attached franking credits.

That is, an investor that buys a share on the cum-dividend date will be eligible to receive a dividend from that company. In theory, an investor who buys a share on the ex-dividend date will not. The difference in these prices should therefore reflect the investors' valuation of the combined package of dividends and franking credits, all other things being equal. Often, dividend drop-off studies will report this as a dividend drop off ratio. This is the reduction in the share price as a proportion of the face value of dividends paid out.

Alternative implied market value studies

Besides dividend drop off studies, there are alternative market based implied valuation approaches to estimating the utilisation rate. Generally, these studies are based on similar arbitrage principles to dividend drop off studies. This means they compare two security prices where one security includes the entitlement and one security excludes the entitlement. They then assume the difference reflects the market valuation of the entitlement. However, they are designed to avoid the other influences in the data that affect traditional dividend drop off analysis. In particular, the studies typically use simultaneous price differentials that make them less affected by general market movements. That is, the differentials should more accurately reflect the implied market value of the specific dividend event. Some examples of alternative market based valuation approaches are:

- simultaneous trading of shares with and without entitlements

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707 Lally, *The estimation of gamma*, November 2013, p. 30.

- simultaneous trading of derivatives and futures and of their underlying shares
- hybrid securities which trade with imputation credits in a narrow range
- comparison of the capital gains and (cash) dividend returns across time.

The available studies

In the explanatory statement accompanying the draft guideline, we set out results from a number of implied market value studies.[708] Following the approach taken by Lally in his critical review, it is helpful to classify them according to the fundamental technique underlying each study.[709] Within each class, it is possible to compare the different data sets. The study is more relevant to the extent it considers a longer data period, more recent data (particularly data from the current tax regime), and encompasses the breadth of the market instead of just selected firms. It is also possible to compare the alternative econometric techniques used within a class, and assess which study or studies provide a reasonable econometric treatment of the data.[710]

Table H.4 shows the available dividend drop off studies, in order from newest to oldest.

Table H.5 shows the implied market value studies that are alternatives to the traditional dividend drop off study. Studies are categorised by the underlying base approach, then presented from newest to oldest within a category.

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[708] AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 240–241, 246.

[709] Lally identifies five core methods. See Lally, *The estimation of gamma*, November 2013, p. 23.

[710] For both data and econometric technique, it is more difficult to compare studies across classes.

Table H.4 Summary of available dividend drop off studies

Authors	Data range	Assessment relative to other studies in that class
Dividend drop off study – Compare share prices before and after dividend events (with and without imputation credits).		
Vo et al (2013)[711]	2001-2012	Builds on SFG (2011), but includes broader analysis with more econometric permutations and sensitivity analysis.
SFG (2013a)[712]	2001-2012	Updates SFG (2011) – same author, longer data series. However, fewer permutations of regression form than Vo et al.
SFG (2011)[713]	2001-2010	Study commissioned by the Tribunal, based on Beggs and Skeels (2006).
Minney (2010)[714]	2001–2009	Partitions by firm size; sub-periods 2001–2005 and 2006–2009.
Beggs and Skeels (2006)[715]	1986-2004	Key study in the AER's 2009 WACC review. Base method adopted by the SFG series of reports. Data calculated yearly.
Truong and Partington (2006)[716]	1995-2005	Makes extensive use of filtering and partitioning.
Hathaway and Officer (2004)[717]	1986-2004	Study partitions by firm size, yield level.
Bellamy and Gray (2004)[718]	1995-2002	Several different regression forms. Partitions by size and basic sector. Note use of simulation to inform regression equation.
Bruckner et al (1994)[719]	1987-1993	Early study with limited data; sub-periods 1987–1990 and 1991–1993.
Brown and Clarke (1993) [720]	1974–1991	Compares dividend drop off before and after imputation; presents yearly figures and sub-period 1988–1991.

Source: As specified in table.

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711 D. Vo, B. Gellard and S. Mero, 'Estimating the market value of franking credits: Empirical evidence from Australia', *ERA working paper*, April 2013.

712 SFG, *Updated dividend drop-off estimate of theta: Report for the Energy Networks Association*, 7 June 2013. (SFG, *Updated estimate of theta for the ENA*, June 2013).

713 SFG, *Dividend drop-off estimate of theta, Final report, Re: Application by Energex Limited (No 2) [2010] ACompT 7,* 21 March 2011.

714 A. Minney, 'The valuation of franking credits to investors', *JASSA: The FINSA journal of applied finance*, vol. 3, 2010, pp. 29–34.

715 D. Beggs and C. Skeels, 'Market arbitrage of cash dividends and franking credits', *The economic record*, vol. 82, 2006, pp. 239–252.

716 G. Truong and G. Partington, 'The value of imputation tax credits and their impact on the cost of capital', *Accounting and finance association of Australia and New Zealand Conference,* 2006.

717 N. Hathaway and B. Officer, *The value of imputation tax credits, Update 2004*, November 2004.

718 D. Bellamy and S. Gray, 'Using stock price changes to estimate the value of dividend franking credits', *Working paper series: University of Queensland Business School*, March 2004.

719 P. Bruckner, N. Dews and D. White, 'Capturing Value from Dividend Imputation: How Australian Companies Should Recognize and Capitalise on a Major Opportunity to Increase Shareholder Value', *McKinsey and Company report*, 1994.

720 P. Brown and A. Clarke, 'The ex-dividend day behaviour of Australian share prices before and after dividend imputation', *Australian journal of management*, vol. 18, June 1993, pp. 1–40.

Table H.5 Summary of alternative implied market value studies

Authors	Data range	Assessment relative to other studies in that class
Dividend drop off using hybrids – Similar to standard DDO but using debt/equity hybrid securities.		
Feuerherdt et al (2010)[721]	1995–2002	Uses hybrid securities (such as convertible preference shares), 165 ex-dividend events for 46 securities which are primarily fully franked.
Futures study (using individual firms or index) – Compare simultaneous prices for securities and futures contracts.		
SFG (2013b)[722]	2000–2013	Updates Cannavan et al. Compares matched trades in individual shares to futures contracts and low exercise price options for 98 firms (52000 trades).
Cannavan et al (2004)[723]	1994–1999	Uses matched trades (four minute window) in individual shares and futures contracts for 19 firms (14000 trades). Sub-periods 1994–1997 and 1997–1999.
Cummings and Frino (2008)[724]	2002-2005	Uses entire ASX200 index (rather than specific firms) and futures over the index, distinct from other studies in this class (which use individual shares).
Rate of return study – Compare past returns (capital gains and cash dividends) or future returns (dividend forecasts).		
NERA (2013b)[725]	1988–2012	Updates the Lajbcygier and Wheatley paper; same authors and more relevant data set. Sub-period splits 1988–2000 and 2000-2012.
Lajbcygier and Wheatley (2012)[726]	1988–2009	Compares current prices to past returns from capital gains and dividends (compare with Siau et al). Includes sub-periods from 1988–2000 and 2000-2009.
Siau et al (2013)[727]	1996–2011	Compares current prices to future returns (compare with Lajbcygier and Wheatley). Uses ASX300 index firms and consensus analyst dividend forecasts.
Simultaneous share trades – Compare simultaneous prices for shares that are/are not entitled to imputation credits.		
Chu and Partington (2008)[728]	1996	Uses shares trading in two forms (one with dividend, one without) as a result of the CRA bonus issue. 154 matched trades (one minute window) across 3 months.
Chu and Partington	1991–1999	Uses shares trading simultaneously with and without dividend after certain rights

721 C. Feuerherdt, S. Gray and J. Hall, 'The value of imputation tax credits on Australian hybrid securities', *International review of finance,* vol. 10(3), 2010, pp. 365-401.

722 SFG, *Using market data to estimate the equilibrium value of distributed imputation tax credits, Report for the Energy Networks Association*, 3 October 2013. (SFG, *Market data and distributed imputation tax credits for the ENA*, October 2013).

723 D. Cannavan, F. Finn, S. Gray, 'The value of dividends: Evidence from cum-dividend trading in the ex-dividend period', *Accounting and finance*, vol. 39, 2004, pp. 275–296.

724 J. Cummings and A. Frino, 'Tax effects on the pricing of Australian stock index futures', *Australian journal of management*, vol. 33(2), December 2008, pp. 391–406.

725 NERA, *Imputation credits and equity prices and returns, A report for the Energy Networks Association*, October 2013. (NERA, *Imputation credits, equity prices and returns for the ENA*, October 2013).

726 P. Lajbcygier and S. Wheatley, 'Imputation credits and equity returns', *The economic record*, vol. 88 (283), December 2012, pp. 476–494.

727 K. Siau, S. Sault and G. Warren, 'Are imputation credits capitalised into stock prices', *ANU Working paper*, 18 June 2013.

728 H. Chu and G. Partington, 'The market valuation of cash dividends: The case of the CRA bonus issue, *International review of finance*, Vol. 8(2), June 2008, p. 19.

(2001)[729]		issues - 3356 trades (matched within a minute) from 26 rights issues for 23 firms.
Walker and Partington (1999)[730]	1995–1997	Looks at shares trading cum-dividend in the ex-dividend period. 1015 data points (trades matched within a minute) for 93 ex-dividend events from 50 securities.

Source: As specified in table.

As shown in Table H.4 and Table H.5, there are a large number of available implied market value studies. First, considering the dividend drop off studies in Table H.4:

- We consider the two 2013 studies (by Vo et al and SFG) appear to be the most relevant. These both use the same core econometric techniques (building on earlier works in this area, including the 2011 SFG study commissioned by the Tribunal).[731] They also have comparable data sets, covering the period since 2000 (when the tax law changed to allow refund of unused credits for eligible investors).
- The Vo et al study does provide additional analysis, including alternative regression forms and sensitivity analysis, relative to the 2013 SFG study. We consider the Vo et al study therefore provides an important assessment of the reliability of these results, in addition to the central analysis scenario (which it shares with the 2013 SFG study).
- We do not consider the earlier DDOs should be excluded entirely from consideration. These still provide some information on the utilisation rate. These also inform us about the variability of estimates across time (including across different tax law regimes).
- The earlier studies might also provide relevant information (in addition to Vo et al and SFG 2013) where they present a particular type of analysis that is not present in those studies.

For the alternative implied value studies, listed in Table H.5, the assessment is less clear:

- We consider the primary limitation for many of these studies is that they require specific circumstances that do not arise frequently or for all firms in the market. As shown in Table H.5, this means they have small data sets that may be selectively sampled from the larger population. We have regard to this weakness when we interpret those studies.
    - In some cases, the distribution of data may exacerbate the problems arising from the small dataset. For example, the 2013 SFG futures study data relates to 98 firms. However, 50 per cent of the data points (matched trades) relate to just six firms and 75 per cent of the data relates to just 12 firms.[732]
    - As an extreme example, the 2008 Chu and Partington study relates to just one particular event, arising from the merger of CRA and RTZ. For three months in 1996, ordinary shares in CRA traded alongside 'bonus' CRA shares that were identical except for the absence of a dividend entitlement. There are 154 data points for this study, where each data point is a matched trade (occurring within one minute) of the two different types of shares.

729 H. Chu and G. Partington, 'The market value of dividends: evidence from a new method', *Paper presented at the Accounting Association of Australia and New Zealand Annual Conference, Wellington,* 2001.

730 S. Walker and G. Partington, 'The value of dividends: Evidence from cum-dividend trading in the ex-dividend period', *Accounting and Finance*, vol. 39(3), November 1999, pp. 293–294.

731 In turn, the 2011 SFG study built on Beggs and Skeels (2006) and earlier works.

732 That is, the firms BHP, CBA, NAB, NCP, RIO and TLS comprise 53 per cent of the data points (matched trades). Adding AMP, ANZ, NCM, WBC, WOW and WPL to this set covers 75 per cent of the data points (matched trades).

- In two cases, authors update their own, earlier studies. This effectively supersedes their earlier work. This includes the 2013 NERA report (by Wheatley) that updates the 2012 Lajbcygier and Wheatley study and the 2013b SFG report (by Gray) that updates the 2004 Cannavan, Finn and Gray study. The two earlier studies retain some limited use when comparing the estimates of the utilisation rate over time from each type of implied market value study.

- In two categories (dividend drop off using hybrids and simultaneous share trades) there are no studies with data drawn entirely from the most relevant tax law period (post 2000).[733] While we do not exclude these studies entirely, we do consider that they are of less relevance to the estimation of the current utilisation rate.

- Within the 'futures study' category, we consider regard must be had to both the 2013 SFG study and the Cummings and Frino study.[734] Ideally, the analysis would encompass all firms in the market (in line with the relevant definition of the utilisation rate). The SFG study uses selected individual firms from that market. Further, as has been noted above, a small number of firms account for a large proportion of the data points. The Cummings and Frino study uses a broad market index (and futures contracts over the index), which spans the relevant market but necessarily entails a level of abstraction that is not present in the SFG study.

- The 'rate of return' studies relate to submissions made by the ENA in response to the draft guideline and so were not included in our previous assessment. We are still assessing the conceptual foundation for these studies. However, we note Associate Professor Lally's assessment that the economically and theoretically implausible results arising from the NERA study (which itself builds on the Lajbcygier and Wheatley study) indicated a methodological shortcoming.[735]

H.6.2 The interpretation of implied market value studies

This section discusses the strengths and weaknesses of implied market value studies. In particular, it explores the problems in deriving a 'true' market value from these studies. It does not (directly) address the relationship between the market value and the utilisation rate. This is set out in section H.6.3.

The potential advantages of implied market value studies are:

- They are based on market transactions, and in theory should therefore identify the market clearing price around the time of dividend distribution.

- They should, if robustly executed, identify all of the factors that affect the value of the combined package of dividends and imputation credits to traders transacting around the time of dividend distribution.

- Relative to dividend drop off studies, the alternative implied market value studies might further allow the disaggregation of the package of cash dividend and attached imputation credit into its two components.

[733] As shown in table H.5, the Feuerherdt et al study includes some trades (particularly for redeemable preference shares) that are drawn from the period after the 2000 tax law change.

[734] A 'futures study' compares simultaneous trades in an ordinary security (which has a dividend entitlement, which may or may not be franked) against trades in a futures contract over the same security (which does not entail a dividend entitlement).

[735] Lally, *The estimation of gamma*, November 2013, p. 25.

In 2011, the Tribunal considered dividend drop off studies were the only approach to estimate the utilisation rate in which it had confidence.[736] However, at the time, the Tribunal noted the conceptual framework for the task of estimating the value of imputation credits remained unclear. We are now in a significantly better position of conceptual understanding from which to draw conclusions about the appropriate use of various sources of evidence. Having done so, we consider the empirical problems in performing dividend drop off studies are such that they are unlikely to achieve these potential advantages. These problems can be broadly classified into two groups:

- the allocation problem
- other econometric issues.

The allocation problem

Dividend drop off studies only 'directly' identify the combined value of dividends and the attached imputation credit. This results in an estimate of the dividend drop off ratio. The market value of a franked dividend on the ex-dividend date consists of a package that embeds the dividend, the franking credit, income taxes, capital gains taxes, discounting for the effect of time, and possibly some transactions costs. In order to determine an estimate of the utilisation rate, this combined value of dividends and attached imputation credits must be allocated between the two components. This is called 'the allocation problem' and is a critical issue with dividend drop off studies. As identified by Cannavan, Finn and Gray, 'it is unlikely that the traditional ex-dividend day drop-off methodology will be able to separately identify the value of cash dividends and imputation credits'.[737]

Resolving this issue requires some assumptions. For example, one approach is to simply assume full valuation of the cash component of the dividend, with the franking credit valued by difference. This effectively assigns all embedded taxes, transaction costs and time value of money effects to the franking credit and none to the cash component.

By estimating separate market values for dividends and franking credits, the choice of a regression model is one possible solution to the allocation problem. To reliably separate these components generally requires observations with different franking levels.[738] However, this kind of variation in franking levels is limited. Nearly all dividends are either unfranked or fully franked.

The process of separating the combined package of dividends and franking credits by regression uses the ratio of the franking credit to the cash dividend to explain price changes due to the loss of the combined package of dividends and franking credits. The ratio of the franking credit to the cash dividend refers to whether a dividend is fully franked, unfranked or partially franked. This type of regression is most effective if there is a lot of variation in the franking proportion. However, this is not the case. Table H.6 below, sets out the proportions of dividend event types in SIRCA data (used in all major dividend drop off studies) for companies and trusts in a sample from 1 July 2000 to 28 February 2010.[739] The table shows that for the total sample (companies and trusts), approximately 75 per cent of the dividends have the same franking proportion, with only 25 per cent of observations varying.

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736 Australian Competition Tribunal, *Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9*, May 2011, para. 38.

737 D. Cannavan, F. Finn and S. Gray, 'The value of dividend imputation tax credits in Australia', *Journal of financial economics*, Vol. 73, 2004, p. 175.

738 Intuitively, if there is very little variation in franking levels, the effects of different franking levels on price drop offs are more difficult to estimate precisely.

739 In compiling this sample, we filtered the SIRCA dataset to remove observations commonly filtered from other dividend drop off studies. In addition, we have also filtered out observations classified as stapled, observations without a positive trading volume, and observations where a price-sensitive announcement has occurred on either the cum-dividend day or the ex-dividend day.

Table H.6 Proportions of dividend event types from 1 July 2000 to 28 February 2010

Dividend event type	Total sample	Trusts	Companies
Fully franked	4598 (75 per cent)	6 (1 per cent)	4592 (84 per cent)
Partially franked	428 (7 per cent)	32 (5 per cent)	396 (7 per cent)
Unfranked	1143 (18 per cent)	645 (94 per cent)	498 (9 per cent)
Total	6169 (100 per cent)	683 (100 per cent)	5486 (100 per cent)

Source: AER/ACCC analysis

There are additional problems when interpreting the value of distributions to trusts, since the nature of trust distributions is complex.[740] While many dividend payments from companies consist simply of a cash component and a franking credit component, trust distributions can include these and many other payment components.[741] Examples include the return of capital, recorded capital gains, attributed foreign income and foreign source income. Different trust payment components can be taxable, tax exempt, tax free, tax deferred or tax concession amounts.[742] The extra payment types and their range of tax treatments increase the possibility for error in the classification and recording of trust distribution events. Errors in either the recorded value of the cash component of the distribution or in its tax status may affect the implied value of the imputation credit and its interpretation.

Other econometric issues

There are a number of other well documented econometric problems with dividend drop off studies. McKenzie and Partington set out an extensive assessment of these issues, including but not limited to:[743]

- They are based on trading prices on two separate days—during this time period, the magnitude of market changes unrelated to dividends can swamp the price drop caused by the dividend and imputation credit. Some studies use a basic market correction factor to account for this, but the effectiveness of this adjustment depends on all sectors responding equally to the same systematic market changes. We consider this is unlikely in practice, because different sectors have different exposure to drivers of market changes. The effect of this adjustment can be significant. The ERA study found that the market correction reduced the average utilisation rate estimates under various model specifications from 0.45 to 0.34.[744]

- Bid-ask bounce—where either a dividend is small, or the difference between bid and ask prices on a share is large, movements in price can simply reflect a 'bounce' between bid and ask (or ask and bid). The bid price is the submitted market price for investors seeking to purchase a share. The ask price is the submitted market price at which investors holding the share are willing to sell. The 'bounce' between these two points can swamp the measured effect of the imputation credit. McKenzie and Partington note this error is likely to have affected both the Beggs and Skeels and SFG studies.[745]

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740 ATO, *Adjusting your cost base and reduced cost base*, Available at: http://www.ato.gov.au/Individuals/Ind/Non-assessable-capital-payments-from-a-trust/?page=4#Adjusting_your_cost_base_and_reduced_cost_base

741 ATO, *Capital gains made by trusts*, Available at: http://www.ato.gov.au/General/Capital-gains-tax/In-detail/Trusts/Capital-gains-made-by-trusts/

742 ATO, *Capital gains tax: Your distribution statement*, Available at: http://www.ato.gov.au/General/Capital-gains-tax/In-detail/Trusts/Non-assessable-capital-payments-from-a-trust/?default=&page=2#Your_distribution_statement

743 McKenzie and Partington, *Report to AER, Evidence and submissions on gamma*, March 2010.

744 ERA, *Explanatory statement: Draft rate of return guidelines*, August 2013, pp. 201–205.

745 McKenzie and Partington, *Report to AER, Evidence and submissions on gamma*, March 2010, p. 19.

- The complete effects of a market event such as the distribution of dividends can take more than one day to be completely embodied in the trading price. This means that even if the market correction described above is effective, the ex-dividend price may not fully incorporate the value of the imputation credit or the dividend.

- Dividend drop off studies are highly sensitive to the input data. For example, in the ERA dividend drop off study, the ERA observed that 'the presence of a relatively small percentage of observations can heavily influence the estimate of theta'.[746] This is a problem because most dividend drop off studies include some form of filtering (such as data exclusion or partitioning) or adjustments (such as robust regression methods) to deal with other problems in the data. Due to the sensitivity of the results to the input data, these methodological choices have a significant impact on the implied market value of imputation credits.[747] The ERA goes on to conclude, '[a]s a result of this study, the Authority considers that any estimate of theta is essentially a function of the most influential observations due to the extreme multicolinearity present in the data'.[748]

- Large numbers of 'zero-drop off' observations, where prices do not change between the cum-dividend and ex-dividend day—this is likely to reflect thin or no trading in a particular stock.

- Estimates in dividend drop off studies have very high standard errors. This does not by itself mean the estimates are uninformative. However, it does demonstrate imprecision.

In general, these studies address the problem of market movements swamping the dividend drop off. However, these studies are still subject to the other problems associated with dividend drop off studies. In all cases, these approaches still estimate the combined package of dividends and imputation credits. This is because, outside of redemption, imputation credits are never separate from dividends. So, there is never a circumstance outside of redemption in which imputation credits are separately observable. As a result, these estimates are still subject to the allocation problem. Due to the infrequency of partially franked credits, many of these studies are also subject to concerns about lack of variability in the regressors that are used to allocate these values. Further, in many cases they are:

- Studies of uncommon market circumstances where shares with and without entitlements are simultaneously available.[749] The rareness of these circumstances means the results are usually based on small samples of data. These small samples could exaggerate issues such as sensitivity to inputs and the clientele effect. This is because they are from an even narrower set of observations and companies.

- Based on an assumption that dividends are fully valued.[750] This is inconsistent with the majority of available evidence and lowers the implied estimate of the utilisation rate. Further, the Tribunal recently referred to this assumption as 'a somewhat arbitrary procedure'.[751]

In total, experts have identified both advantages and disadvantages of alternative implied market value studies in comparison to dividend drop off studies. We consider the alternative implied market value studies are part of the range of credible expert estimates of the implied market value. As a

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746 ERA, *Explanatory statement: Draft rate of return guidelines*, August 2013, p. 205.
747 McKenzie and Partington, *Report to AER, Evidence and submissions on gamma*, March 2010, p. 45.
748 ERA, *Explanatory statement: Draft rate of return guidelines*, August 2013, p. 205.
749 Such as: H. Chu and G. Partington, 'The market valuation of cash dividends: The case of the CRA bonus issue, *International review of finance*, Vol. 8, No. 2, June 2008, p. 19.
750 Such as: D. Cannavan, F. Finn, S. Gray, 'The value of dividends: Evidence from cum-dividend trading in the ex-dividend period', *Accounting and finance*, Vol. 39, pp. 275–296.
751 Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, July 2012, Para 202.

result, we consider it would be good regulatory practice to consider the studies as a range of evidence with regard to its strengths and weaknesses.

H.6.3 Implied market value studies and the utilisation rate

This section discusses the relationship between implied market value studies and the utilisation rate.

Problems with trading around the cum-dividend/ex-dividend dates

We consider that investors trading around the time of dividend distributions are unlikely to approximate the 'representative investor'. We reach this conclusion because there is significant evidence suggesting that trading around the ex-dividend day is not representative of the rest of the year.[752] For example, McKenzie and Partington observe that:[753]

> … the abnormal trading about the ex-dividend date, as evidenced for example by the cum-dividend price run-up, does provide a basis for questioning whether the trading observed reflects the valuation of a representative investor.
>
> Most empirical ex-dividend studies do not rely on a particular arbitrage model of equilibrium to determine the value of imputation tax credits. The estimates they generate are a matter of empirics and whether such studies capture the valuation of a representative investor is an open question. In this context it is worth noting that not only are there abnormal trades arising from ex-dividend arbitrage, but also that trading by long term investors is abnormal about the ex-dividend date.

From a wider review of the literature, there is evidence to suggest that around the ex-dividend and cum-dividend dates:

- There are unusual trading volumes.[754]
- Investors trading during this period have an atypical mix of preferences, which are strongly represented in the price movements.[755] This is an example of 'the clientele effect'.

This is a problem because all dividend drop-off data comes from two trading days per dividend event. These trading days are subject to abnormal trading circumstances. This is different to all other market based equity evidence (such as that used for calculating the equity beta and market risk premium) which draws on trading throughout the year. By largely reflecting the abnormal trading conditions on the two relevant trading days, dividend drop off studies may not identify the market value for the representative investor in other circumstances.

Further, McKenzie and Partington identify that if short term traders are highly involved in trading around the cum-dividend/ex-dividend dates, dividend drop off studies would underestimate the value of dividends and franking credits to those traders.[756] This is because transaction costs are relatively higher as a proportion of expected returns for short term traders. The estimated price drop off,

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752 For example: E. Rantapuska, 'Ex-dividend day trading: who, how and why? Evidence from the Finnish market', *Journal of financial economics,* Vol. 88, Iss. 2, May 2008, pp. 355–374; R. Michaely and R. Murgia, The effect of tax heterogeneity on price and volume around the ex-dividend day: evidence from the Milan stock exchange, Review of financial studies, 1995, Vol. 8, No. 2, pp. 369–399; AB Ainsworth, KYL Fong, DR Gallagher and G Partington, 'Institutional trading around the ex-dividend day', *21st Australian Finance and Banking Conference*, March 2011.

753 McKenzie and Partington, *Report to the AER: The estimation and theory of theta*, March 2011, p. 8.

754 D.E. Bellamy, *An analysis of ex-dividend abnormal trading volumes and share price changes in the Australian equity market, PhD thesis, School of Business*, The University of Queensland, 2002;

755 For example: E. Rantapuska, 'Ex-dividend day trading: who, how and why? Evidence from the Finnish market', *Journal of financial economics,* Vol. 88, Iss. 2, May 2008, pp. 355–374; A.B. Ainsworth, K.Y.L. Fong, D.R. Gallagher and G. Partington, 'Institutional trading around the ex-dividend day', *21st Australasian finance and banking conference paper*, March 2011, p. 29; M. Frank and R. Jagannathan, 'Why do stock prices drop by less than the value of the dividend? Evidence from a country without taxes', *Journal of financial economics*, Vol. 47, No. 2, February 1998, pp. 161–188.

756 McKenzie and Partington, *Report to the AER: The estimation and theory of theta*, March 2011, p. 11.

including the dividend and imputation credit, is net of these relatively high transaction costs. Therefore, this reduces the implied value of the imputation credit. Further, Frank and Jagannathan, studying traditional dividend drop off studies in classical tax environments without imputation, observe that:[757]

> …it is not clear how we should interpret the observed empirical relation between ex-day price drop and the amount of the dividend. All that one can safely conclude, as Michaely (1991) does, is that any change in the relative pricing of dividends and capital gains one observes in the data can be observed as evidence of changing importance of the different trading groups. The consensus opinion seems to be that it is hard to interpret the relation between ex-day price drop and the amount of dividend in the presence of heterogeneous investors who face different transactions costs as well as taxes.

While this does not refer specifically to the challenge of identifying the value of imputation credits, it highlights a more general problem with the dividend drop off methodology. That is, the drop-off in market price between the cum-dividend and ex-dividend days is strongly influenced by the mix of investors trading at that specific point in time.

H.6.4 Estimates from implied market value studies

This section presents the results from the available implied market value studies.

Table H.7 reports estimates of the utilisation rate from the set of available dividend drop off studies. As a high level summary table, it attempts to report the single utilisation rate preferred by the authors, for the scenario most relevant to our WACC framework. The table separately reports results based on whether the underlying data is (primarily) from before or after 2000, when the change in tax law allows a full refund of all imputation credits received by the eligible investor.

Table H.8 is the equivalent table for alternative implied market value studies. In this table, several results are recorded as 'NA', even though there is a specific date range provided. In such cases, that particular technique (or data limitations) did not permit the disaggregation of the value of the dividend component and the imputation credit. In this situation, the study typically reports the combined value of the cash dividend and imputation credit together. The minimum value for the imputation credit component of this package will arise if the cash dividend is fully valued, and these estimates are presented in the 'notes' column.

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[757] M. Frank and R. Jagannathan, 'Why do stock prices drop by less than the value of the dividend? Evidence from a country without taxes', *Journal of financial economics*, Vol. 47, No. 2, February 1998, p. 163.

Table H.7 Estimates of the utilisation rate from dividend drop off studies

Authors	Pre-2000 results	Post-2000 results	Notes
Dividend drop off study			
Vo et al (2013)[758]		0.35–0.55 (2001–2012)	Range derived from large number of permutations and sensitivity tests.
SFG (2013a)[759]		0.35 (2001–2012)	Author's point estimate across a number of different regression forms.
SFG (2011)[760]		0.35 (2001–2010)	
Minney (2010)[761]		0.39 (2001–2009)	For the most recent sub-period (2006–2009), utilisation rate is 0.53.
Beggs and Skeels (2006)[762]	0.20 (1992–1997)	0.57 (2001–2004)	Several other pre-2000 periods are presented.
Truong and Partington (2006)[763]	0.43 (1995–2005)		
Hathaway and Officer (2004)[764]	0.49 (1986–2004)		Authors suggest that estimate has increased post-2000.
Bellamy and Gray (2004)[765]	0.36 (1995–2002)		Range of 0.0–0.60 is also presented.
Bruckner et al (1994)[766]	0.69 (1991–1993)		Also present an earlier period (1988–1990).
Brown and Clarke (1993) [767]	0.80 (1988–1991)		

Source: As specified in table.

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758 D. Vo, B. Gellard and S. Mero, 'Estimating the market value of franking credits: Empirical evidence from Australia', *ERA working paper*, April 2013.

759 SFG, *Updated estimate of theta for the ENA*, June 2013.

760 SFG, *Dividend drop-off estimate of theta, Final report, Re: Application by Energex Limited (No 2) [2010] ACompT 7,* 21 March 2011.

761 A. Minney, 'The valuation of franking credits to investors', *JASSA: The FINSA journal of applied finance*, vol. 3, 2010, pp. 29–34.

762 D. Beggs and C. Skeels, 'Market arbitrage of cash dividends and franking credits', *The economic record*, vol. 82, 2006, pp. 239–252.

763 G. Truong and G. Partington, 'The value of imputation tax credits and their impact on the cost of capital', *Accounting and finance association of Australia and New Zealand Conference,* 2006.

764 N. Hathaway and B. Officer, *The value of imputation tax credits, Update 2004*, November 2004.

765 D. Bellamy and S. Gray, 'Using stock price changes to estimate the value of dividend franking credits', *Working paper series: University of Queensland Business School*, March 2004.

766 P. Bruckner, N. Dews and D. White, 'Capturing Value from Dividend Imputation: How Australian Companies Should Recognize and Capitalise on a Major Opportunity to Increase Shareholder Value', *McKinsey and Company report*, 1994.

767 P. Brown and A. Clarke, 'The ex-dividend day behaviour of Australian share prices before and after dividend imputation', *Australian journal of management*, vol. 18, June 1993, pp. 1–40.

Table H.8 Estimates of the utilisation rate from alternative market value studies

Authors	Pre-2000 results	Post-2000 results	Notes
Dividend drop off study using hybrids			
Feuerherdt, Gray and Hall (2010)[768]	N/A (1995–2002)		Combined drop off of 1.00. With dividends at full value, this is a utilisation rate of 0.
Futures study (individual or index)			
SFG (2013b)[769]		0.12 (2000–2013)	Uses individual firms.
Cannavan et al (2004)[770]	0–0.15 (1994–1999)		Uses individual firms.
Cummings and Frino (2008)[771]		0.53 (2002–2005)	Uses index.
Rate of return study			
NERA (2013b)[772]	-1.57 (1988–2000)	-1.90 (2000–2013)	Uses past returns. For the entire period, estimate is -1.50.
Lajbcygier and Wheatley (2012)[773]	-1.57 (1988–2000)	-1.68 (2000–2009)	Uses past returns. For the entire period, estimate is -1.88
Siau et al (2013)[774]		-0.29–0.30 (1996–2011)	Uses forecast returns. Note range is from *negative* 0.29 to *positive* 0.30.
Simultaneous share trades			
Chu and Partington (2008)[775]	N/A (1996)		Combined drop off of 1.29. With dividends at full value, this is a utilisation rate of 0.68.
Walker and Partington (1999)[776]	0.88–0.96		

768 C. Feuerherdt, S. Gray and J. Hall, 'The value of imputation tax credits on Australian hybrid securities', *International review of finance,* vol. 10(3), 2010, pp. 365-401.

769 SFG, *Market data and distributed imputation tax credits for the ENA*, October 2013.

770 D. Cannavan, F. Finn, S. Gray, 'The value of dividends: Evidence from cum-dividend trading in the ex-dividend period', *Accounting and finance*, vol. 39, 2004, pp. 275–296.

771 J. Cummings and A. Frino, 'Tax effects on the pricing of Australian stock index futures', *Australian journal of management*, vol. 33(2), December 2008, pp. 391–406.

772 NERA, *Imputation credits, equity prices and returns for the ENA*, October 2013.

773 P. Lajbcygier and S. Wheatley, 'Imputation credits and equity returns', *The economic record*, vol. 88 (283), December 2012, pp. 476–494.

774 K. Siau, S. Sault and G. Warren, 'Are imputation credits capitalised into stock prices', *ANU Working paper*, 18 June 2013.

775 H. Chu and G. Partington, 'The market valuation of cash dividends: The case of the CRA bonus issue, *International review of finance*, Vol. 8(2), June 2008, p. 19.

776 S. Walker and G. Partington, 'The value of dividends: Evidence from cum-dividend trading in the ex-dividend period', *Accounting and Finance*, vol. 39(3), November 1999, pp. 293–294.

	(1995–1997)	
Chu and Partington (2001)[777]	N/A (1996)	Combined drop off of 1.5. With dividends at full value, this is a utilisation rate above 1.

Source: As specified in table.

We consider the results presented in Table H.7 and Table H.8, when interpreted with regard to the strengths and weaknesses of each study, support an estimate for the utilisation rate between 0.0 and 0.5.[778] This is because:

- The most relevant dividend drop off studies, by SFG and Vo et al, present estimates in the range 0.35 to 0.55.
  - We consider the most relevant results from the Vo et al study relate to regressions with the market adjustment.[779] From this basis, the sensitivity analysis (including different forms of the regression calculation) in the Vo et al paper still provides grounds to select an equity beta in the range 0.35–0.55, contrary to the ENA's submission.[780]
  - We also note the differing outlier treatment between these studies results in either a substantial increase (Vo et al) or no change (SFG).[781]
- However, there has been considerable variation in the estimates from dividend drop off studies, and this decreases our confidence in these estimates as a whole.[782]
  - There are earlier dividend drop off studies with results above and below the range 0.35–0.55 (for example, Beggs and Skeels).
  - Lally notes the changes across time do not accord with the conceptual expectations arising from changes to tax law.[783]
- Future studies provide estimates in the range from 0.12 (SFG) to 0.53 (Cummings and Frino).
  - The earlier study by Cannavan, Finn and Gray extends down to 0, but this has been given less regard because of the data period (noting there is an updated study by the same author).
- We consider the large negative results from the NERA equity returns study are implausible, and indicate this study is not reliable. This accords with Lally's advice in his expert report.[784]
  - The Siau, Sault and Warren study also includes negative results, but they are closer to zero and there are some positive (but still low) results. We are still considering the interpretation of this study. Although, our utilisation rate range would not go below 0 (by definition).

777 H. Chu and G. Partington, 'The value of dividends: evidence from a new method', *Paper presented at the Accounting Association of Australia and New Zealand Annual Conference, Wellington,* 2001.

778 We have discussed the strengths and weaknesses of these studies in section H.6.1.

779 ENA, *Response to the draft rate of return guideline of the Australian Energy Regulator*, 11 October 2013, p. 118; also M. Lally. *The estimation of gamma*, 23 November 2013, p. 25.

780 ENA, *Response to the draft rate of return guideline of the Australian Energy Regulator*, 11 October 2013, pp. 118–119.

781 Lally, *The estimation of gamma*, November 2013, pp. 24–25.

782 Lally, *The estimation of gamma*, November 2013, pp. 22–23.

783 Lally, *The estimation of gamma*, November 2013, p. 23.

784 Lally, *The estimation of gamma*, November 2013, pp. 25–26.

- As a class, the simultaneous share trades suggest the utilisation rate is in the range 0.68 to 1. However, we interpret these results with regard to their weaknesses. Particularly, they all arise from limited, specific circumstances before 2000.
- In several cases, the cash dividend valuation must be assumed in order to disaggregate the two components and identify the utilisation rate.
  - The hybrid dividend drop off study by Feuerherdt et al suggests a utilisation rate of 0 when using a fully valued cash dividend. However, it suggests a lower value for the dividend would increase the utilisation rate (although still relatively close to 0).
  - The dividend drop off study by Minney assumes a fully valued cash dividend by construction.

An alternative interpretation

In his critical review, Associate Professor Lally presents an alternative view of the interpretation of the regression coefficients from implied market value studies. Typically, these types of calculations produce two different regression coefficients: one for the value of the cash dividend, and the other for the value of the attached franking credit. Lally considers the regression coefficient on the franking credits in these calculations should not be interpreted as the utilisation rate. Rather, it should be interpreted as the product of the utilisation rate and the regression coefficient on the cash dividend. So, to derive the true utilisation rate, it is necessary to divide the observed regression coefficient on the franking credit by the regression coefficient on the cash dividend.

Intuitively, the adjustment suggested by Lally arises because factors that cause the investor to value a cash dividend at less than face value will also apply to the franking credit (which is the equivalent of a cash dividend for eligible investors). These factors are not relevant to the (properly defined) utilisation rate. Therefore, it is necessary to disaggregate them before treating the result as an estimate of the utilisation rate.

We can apply the Lally adjustment to produce estimates of the utilisation rate for dividend drop off studies as shown in table H.9. We note that the estimates presented in this table are for the most recent data period from each study (with the exact years shown). Unlike Table H.8, these estimates are not split into before and after 2000. We have not included studies where the most recent data period concluded before 2000.

Table H.9 Adjusted estimates of the utilisation rate from dividend drop off studies

Authors	Coefficient on dividends	Adjusted utilisation rate	Notes
Dividend drop off study			
Vo et al (2013)[785]	0.88 (2001–2012)	0.40–0.63 (2001–2012)	Average dividend valuation applied to Author's recommended range.
SFG (2013a)[786]	0.88 (2001–2012)	0.40 (2001–2012)	Coefficients from core scenario preferred by authors.
SFG (2011)[787]	0.85 (2001–2010)	0.41 (2001–2010)	Coefficients from author's preferred scenario.
Minney (2010)[788]	N/A	N/A	Assumes dividends are fully valued and coefficient for dividends is not reported.
Beggs and Skeels (2006)[789]	0.80 (2001–2004)	0.72 (2001–2004)	Several other pre-2000 periods are presented.
Truong and Partington (2006)[790]	0.99 (1995–2005)	0.43 (1995–2005)	Core regression figures.

Source: As specified in the table.

Some of the alternative implied market value studies also require this type of adjustment, although in several cases it is not possible to implement. Hence, table H.10 reports the Lally adjustment for only a subset of these studies (relative to earlier tables).

785 D. Vo, B. Gellard and S. Mero, 'Estimating the market value of franking credits: Empirical evidence from Australia', *ERA working paper*, April 2013.

786 SFG, *Updated estimate of theta for the ENA*, June 2013.

787 SFG, *Dividend drop-off estimate of theta, Final report, Re: Application by Energex Limited (No 2) [2010] ACompT 7,* 21 March 2011.

788 A. Minney, 'The valuation of franking credits to investors', *JASSA: The FINSA journal of applied finance*, vol. 3, 2010, pp. 29–34.

789 D. Beggs and C. Skeels, 'Market arbitrage of cash dividends and franking credits', *The economic record*, vol. 82, 2006, pp. 239–252.

790 G. Truong and G. Partington, 'The value of imputation tax credits and their impact on the cost of capital', *Accounting and finance association of Australia and New Zealand Conference,* 2006.

Table H.10 Adjusted estimates of the utilisation rate from alternative market value studies

Authors	Value of dividends	Value of franking credits	Notes
Futures study (individual or index)			
SFG (2013b)[791]	0.94 (2000–2013)	0.13 (2000–2013)	Uses individual firms.
Cannavan et al (2004)[792]	0.95 (1997–1999)	-0.06 (1997–1999)	Uses individual firms.
Cummings and Frino (2008)[793]	0.83 (2002–2005)	0.64 (2002–2005)	Uses index.
Equity return or yield study			
NERA (2013b)[794]	0.95 (2000–2013)	-2.00 (2000–2013)	Uses past returns. For the entire period, estimate is -1.50.
Lajbcygier and Wheatley (2012)[795]	0.65 (2000–2009)	-2.58 (2000–2009)	Uses past returns. For the entire period, estimate is -1.88.
Simultaneous share trades			
Walker and Partington (1999)[796]	0.67 (1995–1997)	0.92 (1995–1997)	

Source: As specified in the table.

We consider the effect of the Lally adjustment is to slightly increase the estimate of the utilisation rate derived from the set of aggregated implied market value studies.[797] However, we accept this adjustment is contentious and requires further examination. Our estimate of the utilisation rate is therefore based on the estimates without this calculation.

H.7 The utilisation rate—other supporting evidence

This section sets out our consideration of other supporting evidence on the utilisation rate. This type of information is not precise enough to imply a specific quantitative estimate. However, it can inform broad observations about the value of imputation credits. The task of estimating the value of

791 SFG, *Market data and distributed imputation tax credits for the ENA*, October 2013.

792 D. Cannavan, F. Finn, S. Gray, 'The value of dividends: Evidence from cum-dividend trading in the ex-dividend period', *Accounting and finance*, vol. 39, 2004, pp. 275–296.

793 J. Cummings and A. Frino, 'Tax effects on the pricing of Australian stock index futures', *Australian journal of management*, vol. 33(2), December 2008, pp. 391–406.

794 NERA, *Imputation credits, equity prices and returns for the ENA*, October 2013.

795 P. Lajbcygier and S. Wheatley, 'Imputation credits and equity returns', *The economic record*, vol. 88 (283), December 2012, pp. 476–494.

796 S. Walker and G. Partington, 'The value of dividends: Evidence from cum-dividend trading in the ex-dividend period', *Accounting and Finance*, vol. 39(3), November 1999, pp. 293–294.

797 We still consider that the large negative result from the NERA equity return study is implausible, noting that it has increased in magnitude (away from zero) as a result. One other result (for Cannavan, Finn and Gray) moves in a negative direction; but the aggregate effect across all studies is an increase of around 0.1.

imputation credits within the building block revenue framework is primarily guided by the rules and the law. However, the ENA submitted it is also relevant to consider actual market practice relating to the valuation of imputation credits.[798]

The explanatory statement accompanying the draft guideline described three recent pieces of evidence that fell in this category. These were:[799]

- The KPMG 2013 valuation practices survey
- The ongoing participation of equity imputation funds
- Government tax policy to 'close the loophole' for dividend washing

These descriptions have not been repeated here.

H.7.1 Imputation funds, dividend washing and the market value definition

In the explanatory statement accompanying the draft guideline, we described two pieces of evidence that we considered supported a significant positive value for the utilisation rate. First, we noted that major financial institutions offered managed funds that exclusively invested in firms which pay a high level of imputation credits.[800] Second, we noted the Australian government had acted to close a loophole that allowed a 'dividend washing' process which resulted in investors claiming imputation credits twice.[801] In these two cases, the ENA's response accepted the evidence as presented, but not the AER's interpretation of that evidence.[802] The ENA stated that the existence of equity imputation funds and dividend washing indicates the utilisation rate is low or close to zero.[803]

In his critical review, Associate Professor Lally identifies that this disagreement arises out of differing perspectives on the definition of the utilisation rate:[804]

> The AER (2013, pp. 135-136) refers to the existence of managed funds that focus upon firms with high imputation credit payout rates, and observes that their existence implies that some investors value these credits. From this the AER concludes that [the utilisation rate] U is positive. By contrast, the ENA (2013, section 7.7.4) notes that the demand for such funds (from investors who can use the credits) will be greater the lower is the extent to which market prices reflect the usefulness of the credits. However there is no inconsistency in these perspectives, because they spring from different definitions of [the utilisation rate] U. If U is defined as the value-weighted average of individual investors' utilisation rates, as the AER (properly) do, the existence of the funds implies that U is positive (and possibly as great as 1). By contrast, if U is defined in market value terms as the ENA do, the existence of the funds implies that U must be less than 1 and possibly as low as zero.

As has already been discussed, we consider the ENA erroneously adopts the market value of imputation credits as an end point. That is, the ENA defines the utilisation rate as the market value of imputation credits. Where there is evidence (as here) that the utilisation rate differs from the market value, the ENA dismisses this evidence because it does not align with their definition:[805]

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798 ENA, *Response to the consultation paper*, June 2013, p. 91.
799 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 135–137.
800 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 135–136.
801 AER, *Explanatory statement: Draft rate of return guideline*, August 2013, pp. 136–137.
802 The AER presented the evidence on imputation funds as an observation, rather than as a formal survey which (as the ENA correctly points out) would require a more rigorous assessment. The AER's regard for this evidence reflects this (significant) limitation.
803 ENA, *Response to the draft guideline*, October 2013, pp. 113–114.
804 Lally, *The estimation of gamma*, November 2013, p. 37. Lally makes a similar statement with regard to dividend washing on page 38.
805 ENA, *Response to the draft guideline*, October 2013, p. 114.

> The statement above suggests that the “implied market price” differs from the “actual value” of imputation credits. It is possible that the equilibrium value of imputation credits differs from the “actual” value to a subset of investors (those who would be attracted to such a fund). However, this does not imply that the equilibrium value that is impounded in market prices is somehow incorrect, or that an assumption about the “actual value” for some subset of investors should be used in place of the equilibrium market value that develops from trading among all investors.

We do not consider this position of the ENA to be reasonable. The value relevant to the utilisation rate is the extent to which investors will be able to use their imputation credits to reduce their personal tax (or get a refund). For eligible investors, this value is 1. For ineligible investors, this value is 0. In accordance with the conceptual definition, we need to use the complex weighted average across all investors, weighted by equity ownership and risk aversion. As the ENA points out, we cannot consider only a specific subset of investors and then apply that to the entire cohort.

However, contrary to the ENA's statement above, the market value that 'develops from trading among all investors' does not reflect the relevant weighting across all investors. This too will be a subset, weighted with regard to all the factors that influence equity ownership around the dividend event.[806] These weights will reflect preferences for and against the dividend, since imputation credits only trade in a package with dividends. These will also reflect taxation effects (including the tax differential between capital gains and dividend income), transaction costs, and other factors that we are yet to explain.[807] All these were described in the implied market value studies section of this appendix.

While the market value of imputation credits does provide one estimate of the utilisation rate, it does not align fully with the conceptual definition. Other estimation techniques also provide a means to estimate the utilisation rate, although they too have limitations. Where other techniques diverge from the market value, this does not mean that those other estimates are automatically incorrect. We need to consider how each approach relates to (and differs from) the conceptual definition of the utilisation rate.

H.7.2 The interpretation of survey evidence

The explanatory statement to the draft guideline noted a recent KPMG survey of valuation practices. This 2013 survey included 23 market institutions (six investment banks, six professional services firms, six infrastructure funds and five other participants). Regarding imputation credits, the survey's key conclusions were as follows:[808]

- There is no agreed estimate or method to estimate the value of imputation credits.
- For business enterprise valuations other than infrastructure projects, 53 per cent of participants assigned some value to imputation credits.
- For infrastructure projects, 94 per cent of participants assigned some value to imputation credits. In particular, 59 per cent of respondents include imputation credits in the cash flows at an assumed utilisation rate.
- As identified by KPMG, 'there was a wide spread of responses on the utilisation of franking credits, but ultimately a clear concentration, with 53 per cent of participants using 70–80 per cent of the benefit'.

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806 Lally, *The estimation of gamma*, November 2013, p. 26.
807 Lally, *The estimation of gamma*, November 2013, pp. 27–29.
808 KPMG, *Corporate finance: Valuation practices survey*, April 2013, pp. 26–28

The ENA's response was critical of the 2013 KPMG survey, noting it did not disclose the names of the respondents, the response rate or the role of those completing the survey at each organisation. Further, the ENA noted some respondents were infrastructure funds who might overestimate the value of gamma out of self-interest.[809]

While we do not entirely agree with each of these points, we do note the 2013 KPMG survey does not meet all of the Tribunal's criteria for the use of survey information.[810] Previous surveys, such as that by Truong, Partington and Peat (2008), set out a more transparent basis for the interpretation of the survey results.[811] Our consideration of the 2013 KPMG survey has regard to this limitation.[812]

We consider the key finding from surveys is that there is no consensus amongst market practitioners on how to value imputation credits, or what value to assign to them. Some assign considerable value to distributed imputation credits, and some do not. The proportion of respondents who assign no value to distributed imputation credits is low. For instance, in the Truong Partington and Peat survey, only eight per cent of respondents considered imputation credits had zero value.[813]

It is important to understand the distinction between considering that imputation credits had no value (few respondents hold this position), and not making an explicit adjustment for the value of imputation credits when evaluating a project (many respondents hold this position). Consistent with our position in the explanatory statement accompanying the draft guideline, we consider the latter does not imply the former.[814] Recently, the ERA adopted this same view in its decision on the Dampier to Bunbury natural gas pipeline (DBNGP). In its review of this decision, the Tribunal affirmed that even if market practitioners include no value for imputation credits, this does not imply imputation credits have no value to investors. The Tribunal observed this was a 'necessary response to the realities of estimation'.[815]

Previously, we stated that one reason market practitioners do not explicitly adjust for imputation credits (even though they might consider them to have value) is that the errors in cash flows and the discount rate will offset each other. In his critical review, Associate Professor Lally considers that we made 'too strong a claim' in this statement.[816] Lally considers this relationship will only hold on average. Specifically, rather than holding in every case, it will hold for firms with a market average beta and imputation credit yield. Lally concludes:[817]

> In summary, it appears that there is a trend towards practitioners explicitly allowing for imputation credits, the latest evidence suggests a value for [the utilisation rate] U of 0.75 amongst this group, and the rest generally appear to believe that U is positive. Furthermore, even without explicit allowance for imputation credits, practitioners will on average correctly value firms in a world in which U is positive so long as they correctly estimate the values of other parameters, and therefore the crucial issue is not whether practitioners explicitly allow for U but what value for U is embedded in market prices and whether analysts reflect this in their estimate of the MRP. All of this supports a positive value for U.

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809 ENA, *Response to the draft guideline*, October 2013, p. 112–113.
810 Australian Competition Tribunal, *Application by Envestra (No 2), ACompT 3*, paras 162–163.
811 For example, Truong, Partington and Peat, 'Cost-of-capital estimation and capital-budgeting practice in Australia', *Australian Journal of Management*, vol. 33(1), June 2008, pp. 95–121.
812 We also have regard to its strengths—for instance, it is more recent than Truong, Partington and Peat.
813 In this paper, 64/77 respondents (83%) indicated that they did not make an adjustment for imputation credits. Of those who did not adjust, 6/60 respondents (10%, noting that 4 respondents did not answer this subquestion) indicated that they did not adjust because they considered imputation credits "have zero market value". 10 per cent of 83 per cent is 8 per cent; the alternative calculation (6/77) rounds to the same figure. Truong, Partington and Peat, 'Cost-of-capital estimation and capital-budgeting practice in Australia', *Australian Journal of Management*, vol. 33(1), June 2008, p. 115.
814 See also AER, *Final decision: WACC review*, May 2009, pp. 404–410.
815 Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, July 2012, Para. 225.
816 Lally, *The estimation of gamma*, November 2013, pp. 33–36.
817 Lally, *The estimation of gamma*, November 2013, p. 37.

I Summary of submissions

Table I.1 Summary of submissions—guideline development process and stakeholders engagement

Respondent	Comments
Council of Small Business Australia (COSBOA)	COSBOA notes the non-binding nature of the guideline under the rules. Whilst COSBOA does not object to this, given the amount of work gone into developing the guideline, the AER and service providers should follow it unless there are strong reasons to depart from it. Any such departure should be clearly set out and explained so that consumers are fully aware of (and can understand) why there has been a departure. This expectation should be clearly set out in the final guideline.
The Energy Networks Association (ENA)	The ENA is concerned that the AER has not released its empirical work on beta and has released a separate equity beta issues paper. The AER should ensure that its consultation process and timelines on outstanding beta and risk issues allow for a comprehensive assessment and testing of empirical information. The ENA is concerned how the ACCC released Regulatory Development Branch (RDB) working papers of not clear status throughout the consultation process. It is also concerned the AER did not respond to direct questions on the operation of its foundation model and implemented a new 'equity ownership' approach to gamma in its draft guideline without foreshadowing this with previous consultation. The AER should clarify how it will integrate the material it is yet to assess from the consultation process into its final guideline. If the AER considers the ENA's submission contains irrelevant information, it should clearly identify that information.
Energex	Energex considers this process provides a significant opportunity for a more pragmatic, workable, yet robust approach to assessing the rate of return. From Energex's perspective, one of the most important goals is to achieve greater regulatory certainty while retaining sufficient flexibility to implement what is an inherently imprecise science, including responding to changes in the financial market outlook.
Ethnic Communities Council of NSW (ECC)	The guideline sets out a new approach, allowing the AER to determine rates of return over times that are consistent with market conditions and in the long term interests of consumers. For this reason, the ECC recommends that the guidelines to be mandatory instead of optional. The ECC supports the position taken by PIAC in its submission.
Energy Users Association Australia (EUAA)	EUAA commends the AER for the effort it has put into developing the draft guideline and explanatory statement. EUAA agrees with many elements (particularly regarding the return on equity). However, it is concerned that the implementation arrangements for the return on debt merit more development before their incorporation in guidelines.
Spark Infrastructure	Spark commends the AER for the transparency of its review processes and for its demonstrated willingness to engage on the various arguments which have been put forward by service providers and financial investors. Spark submits the investment community as a whole has appreciated the thoroughness of this process. Overall, the proposed guideline represents a positive move forward and the rate of return guideline is the most important new guideline. It has the greatest potential impact on Spark Infrastructure's investments and has come about in a period of sustained market uncertainty and volatility.
TransGrid	TransGrid submits that the draft guideline does not provide any real guidance or certainty to stakeholders regarding the AER's allowed return on equity (and therefore the overall rate of return). assessment. Shortcomings in the AER's engagement process might result in a final guideline that is based on an

	inadequate consideration of the positions and evidence put forward by stakeholders. TransGrid continues to support a guideline that appropriately manages rate of return volatility for its customers and stakeholders.
Trevor Baker	The draft guideline is viewed as minor tinkering on the sidelines and not attending to the serious flaws in the rules that are producing this crippling attack on the competitiveness of Australian industries and manufacturing, as well as significantly affecting the standard of living of all Australians. At this time a new government will want to understand what changes in the 'rules' are necessary, as well as in the application of the rules, to achieve internationally competitive electricity network service charges.

Table I.2 Summary of submissions—application of criteria

Respondent	Comments
APA Group	The primary criteria for determining the allowed rate of return is already set out in the rules. The AER's draft guideline and explanatory statement fail to conduct an assessment under these criteria. At step two of its approach to the return on equity, the AER should consider the hierarchy of objectives in the rules, rather than a set of subordinate criteria. While an explicit set of subsidiary criteria might provide a useful framework for the AER's exercise of regulatory judgement that enhances transparency, the hierarchy of objectives in the rules provide the primary criteria for determining the rate of return.
Australian Pipeline Industry Association (APIA)	The AER has insufficiently fulfilled r. 87(14)(a) of the NGR. That is, its draft rate of return guideline insufficiently sets out how the AER's proposed methodologies for estimating the allowed rate of return will produce an estimate consistent with the allowed rate of return objective (the objective). This is because the AER has assessed its methodologies via a set of criteria, as opposed to the objective. As a consequence, the AER inappropriately concludes that the Sharpe–Lintner CAPM is superior to alternative models. Criteria should have been used to support the AER's judgement, rather than as a main decision tool in lieu of the objective. APIA analysed the criteria to see how these link into the objective. It finds the AER links 'economic principles and strong theoretical foundations' to the promotion of efficiency without explicitly making the link. It is unclear how 'fit for purpose' links in with the objective. 'Robust and replicable analysis' under 'good practice' may conflict with the objective. 'Models based on quantitative modelling' and 'market data and other information' may be useful but it is unclear how these are distinct from the criterion of 'good practice'. 'Having the flexibility to reflect changing market conditions' is already inferred in the objective, and therefore adding this criterion is redundant. The AER also uses other ad-hoc criteria, which need to be assessed against their ability to meet the objective. These include familiarity with stakeholders and what consumers favour (favouring the Sharpe–Lintner CAPM), the complexity for stakeholders (rejecting the multiple model approach), the AER's strong commitment to an approach and consistency with incentive based regulation (favouring the trailing average approach).
COSBOA	COSBOA prefers a rate of return guideline that is more straightforward to come to terms with, particularly given that one of the criteria proposed by the AER is to 'promote simplicity over complex approaches where appropriate'. It will be important that the AER and the Consumer Advocacy Panel (CAP) find ways to ensure that small businesses are better informed and educated about rate of return approaches used by the AER.
ENA	A critical risk of the AER's approach is its criteria might lead to failing to give weight and effect to the rules (for example, by excluding the Fama–French model).
Public Interest Advocacy Centre (PIAC)	Supports criteria to more objectively and transparently assess the validity and usefulness of the models and approaches. It supports the AER's transparent and structured approach to evaluating data and establishing a hierarchy of decision making that enables multiple models and data to be considered in coming to a final rate of return decision.

Table I.3 Summary of submissions—benchmark efficient entity, compensation for risk

Respondent	Comments
ENA	The ENA submits that the equity beta material needs to be linked to other qualitative risk assessments the AER has commissioned around networks. It states that there is currently a significant number of technological, commercial and regulatory risks which have not been fully recognised to date in the AER's analysis.
APIA	The AER has no overall framework or 'theory' of risk upon which to base its analysis. The AER has erred in starting from an assumption of similarity and so arriving at a single benchmark on the basis that nobody has provided sufficient evidence of dissimilarity. The AER has not tested this assumption rigorously. APIA submits that there is no need to make a determination on the number of benchmarks nor is there a need to determine which risks are systematic or not and the degree to which the regulatory regime mitigates these risks. APIA submits that alternative distinguishing characteristics (for example, transmission/distribution or the service of large/small customers) may be more appropriate than the gas versus electricity differentiation considered by the AER. APIA submits the AER has ignored differentiating risks between gas and electricity that arise from commercial realities. These include ignoring the effects of competition which occurs prior to contracts being signed. APIA suggests the AER should use international data to expand its data sample for examining the differences between different types of energy firms. APIA points to the Competition Economists Groups' (CEG) consultancy on beta with which the AER did not engage in the draft explanatory statement. APIA submits this data showed that gas transmission pipelines have a credit rating which is one notch below those of other energy firms. APIA submits that CEG's analysis of the 70 US companies, with firm asset betas in the range of 0.10 and 0.79, indicates firms do not face similar risks. It states that Australian evidence, with betas ranging between 0.26 and 0.81 also raises the question of how similar the risks could be. APIA suggests a high level methodology for estimating similar firms econometrically.
APA Group	APA submits there is no discussion of whether the benchmark efficient entity is efficient or whether its risks are of a similar degree to that of service providers in providing regulated services. As a result, there is no reason to expect the allowed rate of return objective shall be met. APA submits the AER has not addressed the requirement for efficiency. It suggests that stochastic frontier analysis or data envelopment analysis should be used to estimate a frontier or that APIA's estimation technique should be applied. It states the AER should use data from outside Australia for estimation purposes. With respect to practical implementation of the benchmark efficient entity, APA argues it is not appropriate to use data from firms within different industry sectors, using different technologies and serving different markets. APA states that the regulatory regimes applying to electricity networks and to gas pipelines are sufficiently different to preclude the use of a single benchmark. These require a careful assessment of individual service providers' risks when establishing the relevant benchmark efficient entity. It submits the revenue impacts on electricity and gas transmission are different regulatory regimes. Revenue caps are in place for electricity transmission businesses while price caps are in place for gas transmission businesses. They also differ in relation to redundant assets, where the regulated asset base (RAB) is not reduced in electricity but it is in gas. APA submits that risks in general should be considered and not just the risks for which investors require compensation.
Envestra	Envestra points to a Ministerial Council on Energy Expert Panel report. This reports states gas and electricity markets display different characteristics in terms of the price elasticity of demand and the ability of

	consumers to seek substitutes. It suggests demand for electricity services is relatively inelastic and that this is less so for gas which is considered a 'fuel of choice'. Further, in areas where space heating is not required there is a stronger substitution effect. Envestra also submits that east coast gas prices are forecast to increase by 50 per cent during 2014–15 to 2015–16, which will translate into a 15 per cent increase in prices for residential and commercial users and greater for commercial and industrial users. Envestra states this will make gas less competitive. It also notes the considerable uptake of reverse cycle air-conditioning which has disadvantaged gas businesses relative to electricity businesses. Envestra notes that credit ratings data suggests there is a difference between gas (BBB to BBB-) and electricity (BBB+) businesses.
Major Energy Users (MEU)	MEU states government-owned service providers face a lower cost of debt than privately-owned service providers and this should be reflected in a separate benchmark. It submits that private debt is more risky than government debt. MEU states the AER's new approach to regulation is designed to increase the accuracy of the expenditure allowance. This should reduce risk, not increase it, as under-allowances are less likely. It states the new incentives provide a way for businesses to increase their profitability, hence any increase in risks is offset. It submits the AER is accessing more information in setting the rate of return, which does not increase risks. MEU agrees that gas and electricity and transmission and distribution should be subject to the same approach for setting the rate of return. MEU recognises that gas service providers are price capped and exposed to greater risk if demand is falling faster than forecasted at the time of a determination. However, in practice, the service provider often achieves its revenue forecast despite lower than expected demand. Gas service providers have been able to achieve revenues higher than forecast even when forecast demand has been achieved.
PIAC	PIAC agrees with using a single benchmark across all network sectors, providing a conceptual definition of the benchmark entity and comprehensively assessing the risks for which an investor would require compensation. PIAC recommends the AER to account for the additional protection that service providers receive under the broader regulatory arrangements from default risk by energy retailers. When assessing risk and historical excess returns, the AER should account for how the new approach to estimating the return on debt reduces financing risks for investors. The AER should also consider that the investment community considers service providers provide sturdy yields and predictable cash flows in a stable regulatory environment.
Trevor St Baker	The AER should be benchmarking against US regulated network costs.
COSBOA	The AER has not accounted for the significantly lower cost of capital of government owned service providers. By not accounting for this, the AER is setting a benchmark rate of return which will perpetuate high network prices in jurisdictions with government ownership.
NSW Irrigators' Council	The benchmark entity should reference competitive firms rather than regulated firms.
Canegrowers	The AER has failed to recognise the state ownership of service providers. The AER has therefore ineffectively incentivised state-owned service providers to efficiently deliver services. The AER overcompensates regulated entities by failing to account for the protection offered by the regulatory regime, in particular in relation to revenue caps and pass throughs. Canegrowers submit that there should be a separate benchmark for state-owned service providers to reflect the different financing practices and risks between private and state-owned service providers. Canegrowers state that it is commonly known that state-owned service providers have significantly lower efficient financing costs than privately owned service providers. It attributes this to: scale economies in issuing debt, access to financial markets where issuance size is prohibitive for private owners, reduced transaction costs from increased regularity of debt raising, improved investor appetite for debt issuances and guaranteed debt offerings through the taxing powers of

		the state.

Table I.4 Summary of submissions—overall rate of return

Issue	Respondent	Comments
Assessing the overall rate of return		
	APA Group	The draft guideline provides insufficient guidance on the proposed reasonableness checks. Of themselves, RAB acquisition and trading multiples provide insufficient information for this purpose.
	Canegrowers	The AER should set a separate reasonableness test for state owned service providers to stop the overall rate of return from providing windfall gains. Using RAB acquisition and trading multiples may provide a broader indication of whether the AER's overall rate of return estimates are above or below those required by investors. However, these fail to account for the non-market investment priorities such as security and reliability standards and the Solar Bonus Scheme. The AER should remodel the reasonableness test to ensure the rate of return (in the context of the revenue cap) reflects the operations of an efficient business, delivering returns of a low risk investment. The reasonableness test needs to have factors such as retail cost and network utilisation (demand impacts) feeding back into setting the rate of return. If the proposed rate of return cannot deliver efficient outcomes in retail pricing or utilisation, either the RAB needs to be discounted or rate of return lowered to reflect a point of efficient operation. Benchmarking should also be undertaken against similar businesses in the UK and USA to determine a reasonable rate of return for monopoly energy service providers in an international context.
	CitiPower, Powercor, SA Power Networks	RAB multiples do not provide a valid cross check, because the rate of return is but one of many factors that affect RAB multiples. Using RAB multiples is only likely to mislead the rate of return determination process.
	ENA	It is currently unclear how reasonableness checks can be usefully implemented in determining the rate of return. With reasonableness checks, stakeholders do not know whether this information carries weight in decision making.
	PIAC	The AER should further develop methodologies for assessing the overall rate of return. This is particularly because of the potential cumulative impact of models and data used to inform the Sharpe–Lintner CAPM and the return on debt methodology. These could collectively create an upward bias in the overall rate of return. It agrees the AER should use RAB and trading multiples with caution because many other factors influence RAB acquisition. Direct measures of service providers' profitability levels could be another important measure to use.
Request for guidance		
	ActewAGL	The AER should provide greater detail on its assessment process for the overall rate of return and return on equity. This should include a worked example of its approach to calculating the return on equity (similar to what IPART did in its draft report for its rate of return review). The AER should better set out how non-model evidence will inform its judgement.
	COSBOA	COSBOA notes the AER's intention to apply a nominal vanilla WACC formula to determine the overall rate of return is required under the rules. This should be done annually, consistent with the proposal to determine the return on debt annually. Whist the AER has proposed to determine the overall rate of return as a point estimate, there would be value in also determining and reporting a range for the rate of return. This will add to the

	transparency of the AER's regulatory decision-making and provide consumers with useful additional information about regulatory determinations.
ENA	The AER needs to provide more information than what it had in the draft guideline and explanatory statement. These documents contain insufficient detail for stakeholders to make reasonably good estimates of the rate of return that the AER would determine for a given business at a given time.
Envestra	The draft guideline provides insufficient detail to allow service providers to make a reasonably good estimate of the rate of return that the AER would determine. This is contrary to the rules.
Other rate of return issues	
APIA	The draft guideline contains nothing regarding inflation rates. The Reserve Bank of Australia's (RBA) forecasts and its charter inflation band are superior when there are liquidity issues. However, APIA supports applying the Fisher equation if there is sufficient liquidity in the markets.
Energex	There is considerable uncertainty regarding the practical application of the AER's foundation model approach in conjunction with other models and market evidence. With the consideration of other models, data and evidence that is now required under the rules, it remains unclear whether this other information will be given any significant weight, or how any material differences between the CAPM-derived estimates and other information will be reconciled.
MEU	The AER should track actual service providers' rates of return and compare these to their allowed rates of return. Longitudinal and lateral comparisons will lead to assessing whether the allowed rate of return has adequately compensated service providers for their risks, whether service providers have managed their risks and if this has resulted in a better or worse outcome. If the AER were to do this, they would observe that government-owned service providers acquire debt at lower rates than privately owned service providers. It is important to recognise this so the AER can overcome the WACC differential for government owned service providers, which leads to significant over-investment.
NSW Irrigators' Council	The guideline must incorporate a mechanism that ensures consumer protection is the guiding principle. It should include a mechanism that ensures no inefficient investments are made in the future. The draft guideline has provided insufficient evidence of how demand-side risk will be mitigated. The AER's approach to the allowed rate of return is complex and not transparent for consumers. Urges the AER to coordinate with state based regulators to establish one common methodology across jurisdictions.
Level of gearing	
MEU	Does not support maintaining a 60 per cent gearing level and suggests gearing should be closer to 70 per cent. The AER has not assessed the gearing of service providers based on current evidence. MEU questions the Bloomberg data the AER uses to make its assessment. MEU claims a separate review performed by UBS suggests that while implied gearing is 47–63 per cent, the net debt to RAB ranges from 67–78 per cent. The AER should assess gearing in terms of the net debt as a proportion of the RAB. This method is consistent with how the AER develops the allowed revenue.
ENA	Supports a gearing of 60 per cent, subject to the credit rating being set as proposed.

	APA Group	The case for a gearing of 60 per cent is not made well. The gearing must be the gearing of the benchmark efficient entity, however that benchmark cannot be assumed.
	COSBA	The combination of 60 per cent gearing and a BBB+ credit rating for the benchmark mark firm is too conservative. Firms would either have a higher credit rating at 60 per cent gearing or higher level of debt for a BBB+ credit rating.
	PIAC	The assumed gearing ratio of 60 per cent is conservative for a regulated network, leading to higher overall allowance for the rate of return.

Table I.5 Summary of submissions—return on equity

Issue	Respondent	Comments
Scope of information considered for the return on equity		
	ActewAGL	The AER may fail to comply with the rules in needing to consider relevant information if it excludes the dividend growth model (DGM) and Fama-French model. It should consider these models as per the ENA's multiple model approach.
	APA Group	There are no strong reasons for rejecting the Black CAPM as a relevant financial model for estimating the return on equity. Arbitrage pricing theory is also relevant to estimating equity returns.
	CitiPower, Powercor, SA Power Networks	The AER's proposed approach gives insufficient or inappropriate weight to market evidence, the Black CAPM, DGM and the Fama French model. The Black CAPM faces less restrictive assumptions than the Sharpe–Lintner CAPM, so is more theoretically robust and more likely to capture how assets are priced. It also has superior empirical performance to the Sharpe–Lintner CAPM when applying regression-based estimates of equity beta.
	ENA	The AER's proposed approach excludes relevant evidence and would therefore breach the rules. It introduces a hierarchy of information that could give certain information disproportionate weight. It also introduces a range, which could prevent relevant information from being used. The AER has reached premature conclusions to exclude certain models (for example, the Fama French three factor model) before considering their potential worth in practice. The AER should also widen its use of the DGM (this can inform estimates of the return on equity for the market and benchmark entity). The AER should not omit financeability and credit metrics as relevant information.
	EUAA	EUAA agrees with the approach that the AER intends to take in establishing the return on equity. EUAA fully endorses the AER's logic that the ability to conduct a balanced review of the return on equity, that involves consumers, is an important factor in deciding the methodology to apply at each regulatory control period. This means preference should be given to approaches that are tractable and transparent. EUAA points to cost pass-throughs, contingent projects, re-openers and service provider-specified averaging periods for the return on debt as features of the regulation that pass risks on to users. These features result in very real reductions in risk, and are reflected in investors' expectations of risks and returns. It is important that the AER takes account of available empirical market and commercial evidence of RAB multiples and service provider investor briefing claims, in determining the appropriate estimate of the return on equity.

MEU	The AER should use market data cautiously because it reflects the performance of all firms in the market — many of which do not enjoy the benefits of regulated monopolies. Market data reflects targeted returns plus the outcomes of better performance. While the allowed return on equity is based on market data, regulated firms are under incentive schemes that allow them to retain the results of better performance, which augments their allowed return on equity.
NSW distribution network service providers—Ausgrid, Endeavour Energy, Essential Energy (NSW DNSPs)	NSW DNSPs are concerned over the time available to finalise a number of substantial matters that will affect its upcoming transitional and five year regulatory proposals. They are concerned with the AER's approach to incorporating a debt transition from the 'on the day' approach to the trailing average. The NSW DNSPs maintain that such an approach is inconsistent with the Revenue and Pricing Principles in the law. It is also inconsistent with the National Electricity Objective (NEO) and the rate of return objective.
PIAC	The AER has indicated that a number of the alternative models proposed to 'inform' the return on equity are highly sensitive to assumptions and can generate volatile and conflicting results. Consumers should not be exposed to the risks of unstable models. These alternative approaches will likely add noise rather than useful information. The use of the DGM and Wright CAPM should be kept to a minimum. The DGM is extremely sensitive to input assumptions, its outputs require adjustment and it consistently biases the return on equity upwards. It is unclear as to why the AER should introduce the Wright CAPM (a relatively untested modelling framework) to 'inform' the outcomes of a reasonably robust and tested model. The assumption of a perfect negative correlation between the market risk premium (MRP) and the risk-free rate has little foundation in theory or practice.
Benefits and limitations of our proposed foundation model and approaches proposed by others	
APA Group	The Sharpe–Lintner CAPM has strengths, but these are insufficient to support its use as a foundation model. The AER should assess its strengths against its potential to achieve the allowed rate of return objective (not the AER's criteria). The Sharpe–Lintner CAPM is imprecise, and the AER should compare its results with estimates using other financial models, estimation methods and data. The AER claims there is strong theoretical support for the Sharpe–Lintner CAPM, but there is no material in the draft guideline or explanatory statement that supports this conclusion. The Sharpe–Lintner CAPM assumes equity beta is constant (which it may not be) and does not explain a large proportion of the variation in actual equity returns. There should be no presumption that the final point estimate lies within the foundation model's initial range. APA Group asks the AER to provide more information on step five of its foundation model approach (how it proposes to evaluate material used in estimating the return on equity).
APIA	It is difficult to assess the foundation model in detail because the AER is yet to detail some of its core operational aspects. However, the rules do not call for a foundation model and this approach may face legal challenge. Prefers a multiple model approach and proposes the following method. Using data sourced from suitable firms, several models could provide ranges (ideally using confidence intervals). These ranges could be examined for a point of intersection and/or mid-point. This would not entail double-counting (as each model is used once) and there would be no need to form weights. This approach would have less scope for regulatory gaming than the proposed foundation model because it would be hard to game the intersection of respective confidence intervals.
CitiPower, Powercor, SA Power Networks	The foundation model approach does not appropriately recognise the Sharpe–Lintner CAPM's weaknesses relative to other sources of information which the AER places limited or no weight on. The approach lacks transparency, particularly in its complex mechanism for weighting the various pieces of evidence to distil a final estimate. It is also inconsistent with the rules in that it restricts the relevant methods, models, data and other evidence that the AER is required to

	consider. Favour the ENA's multiple model approach, which would allow a balanced consideration of evidence. No model should have the privileged position of being a foundation model.
COSBOA	Supports using the Sharpe–Lintner CAPM as the foundation model with the final choice of a point estimate to be informed by other models, such as the Black CAPM and DGM, along with other relevant information. Supports using the Wright formulation of the Sharpe–Lintner CAPM and other information listed in table 5.3 of the explanatory statement to help determine a range for the return on equity. COSBOA favours adding other regulators' WACC estimates (appropriately adjusted) to this list as this will help establish and add credibility to the appropriate range. Does not support the use of the Fama-French model, given its well-known tendency to overstate the return on equity. The AER is correct in its proposal not to use it. Its use would be contrary to the NEO and National Gas Objective (NGO). COSBOA note the AER's proposal to estimate ranges for the equity beta and MRP from which it will select a point estimate. The selection of this point estimate needs to be clearly explained, including the reasoning, and should reflect the NEO or NGO. The AER's proposal to consider additional information in that may mean that its final return on equity differs from the Sharpe–Lintner CAPM point estimate. This opens up scope for argument and conjecture. COSBOA does not want service providers to turn this into an opening whereby they gain an advantage over consumers in the regulatory process.
ENA	Supports a multiple model approach, which is less complex and more transparent than the foundation model approach. It also mitigates potential anomalies associated with reasonableness checks. It does not involve double counting information, but rather ensures estimates of the risk free rate and expected market return are used consistently. The multiple model approach is not more complicated than the AER's proposed approach and only requires estimating a small number of additional parameters. Disagrees that the AER prefers the Sharpe–Lintner CAPM because it is theoretically sound. The Black CAPM is more theoretically sound, Fama-French is supported by 20 years of theoretical development and the DGM is based on the theory that assets can be valued as the present value of expected cash flows. Further, while the AER prefers the Sharpe–Lintner CAPM because of its use in practice, practitioners do not necessarily implement it the way the AER does. For instance, some practitioners adjust beta towards one and some include small minus big (SMB) and high minus low (HML) factors. If the AER implements the foundation model, it should amend the model to transparently give appropriate weight to all relevant evidence. The AER should also identify a 'decision rule' for how it will select a point estimate from the return on equity range. If the AER chooses to filter information through a foundation model, it should do so in a simpler and more transparent manner. That is, after setting out relevant evidence, all evidence relevant to beta should be used to estimate beta and all evidence relevant to the MRP should be used to estimate MRP (so stakeholders can track the relative influence of different pieces of evidence). The AER should not adjust the return on equity in 0.25 per cent increments. This creates an unnecessary level of inertia that places extra weight on the Sharpe–Lintner CAPM. The ENA is concerned that weight to other evidence will be determined entirely by the width of the beta and MRP ranges in the foundation model. If those ranges are narrow, the Sharpe–Lintner CAPM will receive primary weight. The ENA is concerned that the foundation model could deliver outcomes that are, in process and substance terms, essentially the same as those produced under the previous rules. Attachment A of ENA's submission contains a memorandum on applying the foundation model. This examines and poses questions on how the foundation model would work under different scenarios.

Envestra	It is impossible to provide constructive feedback on whether the AER's proposed approach will result in an estimate consistent with the rules. This is because it has not provided a probable range for the equity beta and the MRP.
Ergon Energy	Prefers the ENA's multiple model approach, which is transparent and gives each piece of evidence due weight based on an assessment of its merits. The AER's proposed foundation model is underdeveloped, uncertain in operation, potentially inconsistent with the rules and unlikely to deliver, robust, transparent and predictable outcomes. To the extent the AER pursues its proposed foundation model, Ergon recommends addressing the issues raised in the ENA's submission.
ECC	Supports PIAC's submission and the AER's foundation model. Regulators and investors commonly use the Sharpe–Lintner CAPM. Service providers are low risk businesses. Service providers prefer a range of models so they can take advantage of current market occurrences. While the Sharpe–Lintner CAPM is imperfect, it has standing and will give consumers some security as a firm model that will provide consumers a positive outcome when the market is strong. This will also mean some losses for consumers. However, it is appropriate that consumers share the risk and reward, rather than service providers changing models in a way that gives consumers all the risk.
EUAA	Supports the AER's continued use of the Sharpe–Lintner CAPM. However, makes the following comments: 1. Until the AER releases its equity beta paper, the EUAA reverses its views on using the Black CAPM to determine the equity beta. 2. The EUAA strongly encourages the AER to consider what service providers say to their investors and service providers' RAB multiples. Such information will likely be useful in assessing what service providers' believe, as opposed to what they submit to the AER.
MEU	Prefers the AER's proposed foundation model over the ENA's multi-model approach. The ENA's approach requires extensive discretion regarding which models to use, the weightings (and whether these vary) and whether new models should be introduced. However, stakeholders can use the AER's approach to derive a rate of return estimate before the AER publishes its views. It provides greater stability, predictability, replicability, consistency and transparency with the outcome. The only concern is whether it will consistently provide an outcome that meets the long term needs of investors. Financial models were developed for forecasting returns in financial instruments, which are more volatile than real assets. Therefore, if these models are used to forecast returns on real assets, their application should be tempered with this difference in mind. These models assess returns over a shorter timeframe than the return expected for long lived assets. Further, the AER must be careful with market data, because this does not entirely reflect the outcomes of real investments (it only records successful investments). The volatility in the calculated return on equity must be moderated to reflect a more stable expectation of the return on equity. The MEU agrees that the AER's proposal to adjust the return on equity to incorporate the Wright CAPM, dividend yields and broker assessments will help achieve this. The MEU's residual concern is that the long-term return on equity of regulated service providers has been inefficiently high (approximately 11 per cent).
NSW DNSPs	The AER should examine the final outcome of applying any estimation models to ensure it is consistent with all of relevant evidence, including investor expectations of reasonable equity returns. This should avoid an outcome where individual parameters within a single estimation model are examined in isolation, but when combined provide an unrealistic cost of equity. Further, the return on equity should be set in a way that minimises volatility in regulated revenues and prices. The risk free rate should be estimated using historical data when using the CAPM, with MRP and

	equity beta estimates that primarily rely on historical data. This is an internally consistent approach, particularly when combined with a trailing average approach to the return on debt. This should also provide stability in the regulated return on equity.
NSW Irrigators' Council	Given the AER's proposal refers to multiple models, reports, valuation techniques and a range of data sources, it should provide a detailed analysis of the trade-offs between accuracy and transparency in applying such a complex approach. Is concerned that the use of multiple models will lead to contradicting outcomes which will confuse consumers.
PIAC	Recommends the AER to reject the multi-model approach. Variations of the DGM dominate the ENA's proposed multi-model approach. These are highly sensitive to assumptions. This approach significantly increases complexity with adding little new information. Strongly supports the Sharpe–Lintner CAPM as the foundation model. The AER should be explicit about the limits of alternative models. It should eliminate the ability of service providers to choose between these models according to which provides them a higher return at the time.
Spark Infrastructure	Spark urges the AER to move away from applying the Sharpe–Lintner CAPM with a prevailing risk free rate and fixed MRP. This is not without precedent because IPART now adopts an equal weighted MRP and risk free rate using short and long term averages. The Sharpe–Lintner CAPM should not give rise to a range. It should only be used to determine a point estimate.
TransGrid	TransGrid endorses the ENA's submission. The AER has not demonstrated its proposed foundation model approach will operate in a manner that enables appropriate regard to all relevant evidence, as required by rules. Further, even if it does, the AER has not demonstrated that this is preferable to the ENA's multiple model approach.
Estimation of the equity beta	
APA Group	A comparator set of Australian energy networks will not constitute the benchmark efficient entity of the rules. Since a properly constructed benchmark efficient entity will limit the number of Australian comparators, parameters must be carefully estimated and alternative models and methods should be employed to reveal any small sample biases. Cross-checking observed betas against the betas of other Australian utilities and international energy networks will not provide great assistance. The use of the Black CAPM does not have to be limited to a theoretical proposition.
APIA	In respect to beta, the CAPM has major practical issues. This is because there is a significant difference in beta estimates, even across the firm averages in the sample. Unless the AER ignores its own criteria about arbitrary filtering by basing beta on a single return day's estimate, the return on equity range will likely be very large. Other information that the AER proposes to consider will unlikely overcome this problem. For example, the Black CAPM and Wright CAPM estimate beta in essentially the same way as the Sharpe–Lintner CAPM. Information from other regulators, brokers, takeover reports and valuation reports may contain similar problems to the extent that they have made use of the CAPM (these may not be suitable reference points as they may add no new information). Debt spreads, dividend yields and comparisons to the return on debt only indicate the correct direction, and not where the true return on equity should lie. To overcome this problem without arbitrary filtering data, the AER will need to add more models (for example, Black CAPM, DGM, Fama–French). It could also widen its dataset to include international data and/or use a formal risk similarity approach and/or use a proper multiple model approach.
ENA	The guideline should contain indicative and non-binding equity beta point estimates and ranges. Beta estimates based on regressing stock returns on market returns, especially in small samples, are unreliable estimates of forward-looking systematic risk. Beta estimates will be more reliable if

	the AER considers a broader sample of firms listed overseas, performs any regression analysis using the techniques recommended by the ENA, and considers data (like analyst forecasts, the DGM, etcetera) and other estimation techniques. The AER should use the empirical evidence the ENA has submitted on the Black CAPM to estimate beta in parameterising the Sharpe–Lintner CAPM. The AER must make the links between its beta work and qualitative risk assessments explicit. In its analysis, the AER should recognise how significant, emerging risks will influence beta (for example, risks associated with embedded generation /storage technologies and regulatory rule changes).
Energex	With the delay in completing a separate analysis of beta, it is extremely important to give all stakeholders an adequate opportunity to review and respond to the AER's beta analysis prior to finalising the guideline.
Envestra	The AER should have included its analysis and views on equity beta in its draft guideline. A reasonable timeframe must be allowed for all stakeholders to consider the AER's views on the equity beta. Providing a probable range of values for the equity beta in the final guideline does not allow for a full and transparent review of the AER's approach. Data supports a 0.8 equity beta. CommSec data suggests equity betas range from 0.59 to 1.15, with a simple average of 0.81 and a market capitalisation weighted average of 0.79. The lowest reported equity beta (0.59) is for APA Group, which has the lowest proportion of regulated assets. This indicates the absence of economic regulation lowers systematic risk. Envestra claims it is the closest match to the regulated benchmark BBB+ entity, and has an equity beta of 0.78. Further, the Axioma database currently records Envestra's equity beta as 0.9.
EUAA	The calculation of equity beta cannot be expected to reflect the many features of regulation that pass shareholders' risks to consumers.
PIAC	In assessing equity beta, the AER should recognise that the new approach to estimating the return on debt significantly reduces financing risks. The AER should also recognise that investors consider service providers provide sturdy yields and predictable cash flows in a sturdy regulator environment. The use of the Black CAPM should be limited to a qualitative assessment of the direction of the equity beta. Disagrees with SFG's suggestion to combine Australian and US stocks. International data should not be considered without carefully examining equity betas for other countries. For example, countries like the UK might be more relevant as their incentive based regulatory regime is similar to Australia's (compared to the US).
Spark Infrastructure	Spark will reserve any detailed commentary on beta until the AER releases its work on this topic. Spark notes that empirical issues and sample size will limit any assessment of beta.
SP AusNet	It is concerned with the limited information to date on the equity beta.
Estimation of the risk free rate	
APA Group	Agrees the risk free rate should be estimated as the yield to maturity on 10-year Commonwealth Government Securities (CGSs). A 20 trading day averaging period reduces noise without unduly weighting superseded prior expectations.

ENA	Agrees the risk free rate should be estimated as the yield to maturity on 10 year CGSs.
NSW DNSPs	When applying the CAPM using historical data to estimate the MRP and equity beta, the risk free rate should also be estimated using historical data. This is an internally consistent approach, particularly when combined with a trailing average approach to the return on debt. This should provide stability in the regulated return on equity.
Spark Infrastructure	Spark agrees with using 10 year CGS yields as the proxy for the risk free rate.
Estimation of the MRP	
APA Group	It is incorrect and unnecessary to estimate the MRP using long-term historical data. The Wright implementation of the Sharpe–Lintner CAPM should displace this.
APIA	While the AER proposes to regard the Wright model when estimating the MRP, Wright's model does not entail estimating the MRP in its own right. However, the use of Wright's CAPM model is an improvement on assuming a constant MRP.
COSBOA	COSBOA submits the selection of the MRP point estimate must be clearly explained and reflect the NEO or NGO. As this will also lead to a range for the return on equity, from which a point estimate will be determined, the same reasoning applies here. This should also include reasonableness checks on the equity beta point estimate and ranges, so that full transparency is provided throughout the process. COSBOA noted the AER intends to include an estimate for the equity beta in the guideline but will determine a MRP for each regulatory determination.
ENA	Supports a wider range of evidence informing an MRP estimate, such as estimates from the DGM. While the AER intends to use the DGM, it proposes to adopt a set of estimation techniques and assumptions that will lead to less reliable estimates. ENA suggests using an alternative method, provided by SFG, which uses current market prices to infer what the market believes long-run growth should be. The AER is yet to indicate how the limitations of survey evidence will be taken into account. The AER has stated it would be appropriate to consider implied volatility in the context of estimating MRP. However, it is yet to indicate how it will consider this information. The explanatory statement to the final guideline should set out a value for MRP that results from the AER applying its outlined approach in current market circumstances.
Envestra	The AER should have included its analysis and preliminary views on the MRP in its draft guideline. A reasonable timeframe must be allowed for stakeholders to consider the AER's views on the MRP.
EUAA	The calculation of the MRP cannot be expected to reflect the many features of regulation that pass shareholders' risks to consumers.
NSW DNSPs	When applying the CAPM, using a MRP and equity beta that rely on historical data, the risk free rate should be estimated using historical data.
SP AusNet	The AER should clarify its approach to the MRP. Supports including a worked example of the AER's approach to estimating the MRP in the final guideline.
Use of information to estimate the overall return on equity	

	ActewAGL	The DGM should be used to produce the market return, rather than just being considered in the MRP. The Wright approach, while overstating stability, is more appropriate than assuming a six per cent MRP. It is also less sensitive to inputs than simple DGM models. It should inform the forward-looking market return, rather than being an overall check of the foundation model's return on equity.
	APA Group	The Wright model is better for estimating the return on equity than an approach that treats the MRP as a parameter based on historical excess returns.
	NSW DNSPs	It is fundamental principle that the return on equity is higher than the return on debt. Since debt holders have preference over equity holders to access residual capital in the event of liquidation. When estimating the return on equity, regard should be given to maintaining the relative risk spread on debt and equity. The draft guideline does not provide sufficient visibility on a number of key inputs to enable the NSW DNSPs to calculate an indicative rate of return. It is therefore, not possible to provide meaningful input to the AER's approach on the equity beta, MRP and incorporating market evidence into the AER's foundation model. The AER should circulate as much information as possible on the above matters prior to finalising the guideline to allow stakeholders sufficient time to provide meaningful comment.
Other issues concerning the return on equity		
	APIA	The guideline should include a worked example of the AER's proposed foundation model approach. Also, the AER should clarify how it will make a decision to move away from the initial foundation model point estimate. It should also clarify what would cause it to re-estimate the CAPM range.
	CitiPower, Powercor, SA Power Networks	The AER should set out a complete, non-binding worked example of its final return on equity approach to enable stakeholders to understand its practical operation.
	COSBOA	COSBOA is concerned with the AER's proposal to introduce a 25 basis points multiple in cases where there is a departure from the Sharpe–Lintner point estimate. It is unclear why a multiple as significant as 25 basis points is needed. COSBOA has a genuine difficulty in reconciling how this improves transparency, simplicity and replicability, although it does provide certainty. COSBOA notes using such a multiple could add significantly to network prices. COSBOA notes the Wright could provide some benefit to consumers provided it does not increase the return on equity, such that it would offset any benefits from stability.
	ENA	The AER should set out a complete, non-binding worked example of its return on equity approach so stakeholders can understand its practical operation.

Table I.6 Summary of submissions—return on debt (approach and implementation)

Issue	Respondent	Comments
Approach for of the return on debt		
	ActewAGL	Trailing average is the best approach for ActewAGL's return on debt allowance.

APA Group	APA accepts the trailing average portfolio approach can be used to estimate the return on debt. APA notes that 'no consideration is given in either the draft guideline, or the explanatory statement, to how this approach might result in an estimate that is consistent with the allowed rate of return objective. It states, 'these requirements can … be more easily satisfied by comparing the results from use of a number of models rather than reliance on a single model'.
APIA	Supports a trailing average approach. APIA has issues with precluding other approaches to the return on debt, which the rules have deemed to be acceptable. APIA does not agree with AER's justification for precluding other return on debt models. APIA struggles to understand how the degree of regulatory commitment is relevant to the NGO. The rules required the AER to provide support for or against methodologies that make direct reference to the objectives and the AER has not done this. In relation to gaming, the AER should do what it has done for the equity side, not preclude a methodology because gaming is possible.
COSBOA	Supports a trailing average. Supports the view that a menu approach would not be consistent with incentive regulation or efficient debt financing. The approach to determine the return on debt should include considering the most competitive sources of debt finance as a core element of efficient debt financing, including sourcing debt from overseas.
ECC	Supports the trailing average approach.
ENA	Supports the trailing average approach. As the guideline is not binding, businesses that consider the hybrid approach better reflects efficient debt management practices would have the opportunity to present alternative approaches as part of their revenue determinations.
Energex	The new trailing average approach is a significant improvement on the 'rate on the day' approach.
Envestra	Supports a trailing average approach.
Ergon Energy	Broadly supports the trailing average portfolio approach.
EUAA	Supports a trailing average approach.
Jemena	Favours the hybrid approach as it leads to lower financing costs for smaller networks. Notes the guideline is not binding and Jemena will further consult with the AER on alternative approaches during its price reviews.
MEU	The return on debt allowance must reflect the actual costs incurred. The AER's approach fails to address the fundamental issue that the service providers' allowed return on debt remains well in excess of what is actually incurred.
NSW DNSPs	Support adopting a trailing average approach with annual updates.
NSW irrigators' council	A seven year trailing average portfolio approach will provide less clarity and transparency for the overall determination of the allowed WACC parameter.
PIAC	Strongly supports adopting a trailing average approach with annual updating for all service providers, rather than the 'menu approach', 'on the day', or hybrid approach. Strongly agrees that the same trailing average portfolio approach should apply to all service providers and there should not be additional allowances granted to service providers based on their size. The AER should critically examine claims by service providers for recovering costs associated with the change in the return of debt calculations. If the benefits of moving to trailing average outweigh additional costs, the AER should investigate developing a compensatory scheme to pass those

		benefits on to consumers.
	Queensland Treasury Corporation (QTC)	QTC supports a trailing average portfolio approach to calculate the return on debt. QTC considers this approach reflects efficient practice, provided the benchmark debt tenor and averaging period are an appropriate length'.
	SP AusNet	Supports the trailing average approach set out in the draft guideline.
	Spark Infrastructure	Spark supports the proposed move to a trailing average
	TransGrid	Supports adopting the trailing average approach set out in the guideline.
Annual updating		
	APA Group	APA is generally supportive of annual updating. However, the way in which the AER intends to flow the annually updated rate of return through to regulated revenue should be subject to consultation. At a minimum, key principles should be set out in the guideline.
	COSBOA	Supports annual updating.
	ENA	Supports annual updating. Annual updating avoids storing up the effects of year on year adjustments for a single end-of-period look-back which may result in greater price shocks for customers.
	Envestra	Supports annual updating.
	Ergon Energy	Broadly supports the trailing average approach with annual updates.
	EUAA	Supports annual updating.
	MEU	Supports annual updating. Notes that annual updating will reduce risk to service providers considerably and will provide a closer match to the actual return on debt. In this sense, there is no need to increase the return on equity.
	NSW irrigators' council	The allowed WACC should be set for the entirety of the regulatory control period instead of being re-evaluated every time period.
	PIAC	'PIAC does not have a strong preference with respect to annual updating'. 'PIAC recommends that the AER undertake further assessment on the length of interest rate cycles in order to inform the final decision on annual updating of the return on debt and the trade-off between the cost of this and the long-term benefit to consumers'.
	QTC	'QTC supports the proposal to make annual updates to the return on debt'.
	SP AusNet	Considers annual updating necessary for service providers. It will also result in smoother prices for consumers from one determination to the next.
Weighting		

CitiPower, Powercor, SA Power Networks	Under the simple average approach, it will be impossible for a distribution service provider to effectively hedge its return on debt when its RAB is growing. Request the AER to allow the service providers to propose how the trailing average is weighted.
COSBOA	Supports a simple average.
Energex	Using a simple average creates a mismatch that is unlikely to average out over the long term. Supports QTC's proposed weighted average approach, as it will properly take account of the cost of new borrowings based on approved capex forecasts. This approach is not unreasonably complex and would be transparent.
Ergon Energy	An unweighted simple average may lead to investment distortions, especially for service providers with large capital expenditure programs. Supports QTC's weighted average approach in order to minimise investment distortions and to enable new borrowings to be compensated based on the prevailing return on debt.
EUAA	Supports the AER's proposal to use a simple average.
MEU	There is likely to be considerable variation over time and between service providers as to the proportion of debt that is to be renewed each year. Assuming the same amount of debt matures each year is problematic.
NSW irrigators' council	If a trailing average approach is adopted, the weights should reflect the approximation to the present regulatory period instead of having equal weights.
PIAC	Agrees there should be no weighting applied. The fact that service providers will have a different profile than the 'equal weight' profile is not a relevant consideration unless there is some consistent cycle of debt issuances that would be adopted by a benchmark efficient entity over time.
QTC	QTC does not support using an unweighted average to calculate the return on debt. This approach implies service providers issue debt at historical rates to fund new investment, which is not possible in practice. An unweighted average will significantly increase the potential for investment distortions. This is also contrary to the allowed rate of return objective. It is possible that an unweighted average may perform adequately if normal circumstances occur in the future, with interest rates relatively near to their longer-term average and there is a relatively low RAB growth. However, an unweighted average is likely to prove problematic in circumstances where interest rates are volatile, and where interest rates are persistently higher or lower than the trailing average value. An unweighted average approach will provide an outcome reflective of service providers with relatively small investment programs. In contrast, a service provider with a large investment program faces the risk that the prevailing return on debt is higher than the unweighted trailing average return on debt. QTC considers a weighted average based on the post-tax revenue model (PTRM) debt balances is appropriate.
Transition to a trailing average	
ActewAGL	The portfolio approach (that is, holding a staggered debt portfolio) has always been an appropriate financing practice. As such, a transition may not be necessary for businesses that already follow this approach. The AER should not interpret some service providers preferring a transition as evidence that no transition is inefficient.
APA Group	APA appreciates 'the need to implement transitional arrangements'.

COSBOA	Using a five year period would lessen the need for a messy transition to the new arrangement. There should be a single transition method to avoid undue complications and scope for gaming. The transition period should be no longer than one regulatory control period.
ECC	The use of a five year period for debt would lessen the need for a messy transition to the new arrangement.
ENA	The transition path set out by the AER in its draft guideline is fair and appropriate. However, some of the ENA's members consider an immediate transition is required given their particular circumstances.
Ergon Energy	Supports QTC's method of transition, as outlined by the AER in the draft guideline, without a 10 year term.
EUAA	A seven year transition period is too long. A transition period of this length does not satisfy the AER's objective of mean reversion. Further, no one has argued for the use of a transition on the basis that service providers' current lending practices need to adjust to the new rolling average approach. Proposes a transition period no greater than five years, starting on 1 July 2013 for all service providers except the Victorian distributors, and starting from 1 January 2014 for the Victorian distributors.
Jemena	If the trailing average approach is used, supports a transition because this ensures the assumed efficient debt management practices are fairly transitioned between the two.
MEU	If the AER adopts a five year term of debt, there will be no need for a transition.
NSW DNSPs	Do not support the transitional arrangements set out in the draft guideline. These transitional arrangements perpetuate the inefficient incentives provided by the on the day approach over the transition period. A staggered portfolio approach is an efficient approach to debt management. The NSW DNSPs have managed their debt according to such an approach throughout previous regulatory frameworks and the GFC. Adopting a transition to the trailing average raises serious concerns, as it would under-compensate a benchmark efficient firm with a debt portfolio size of the NSW DNSPs by more than $700 million over a seven year transition period (based on current forward rate projections). Further, for the NSW DNSPs such a transition would not satisfy the revenue and pricing principles, the NEO, and the allowed rate of return objective. The NSW DNSPs have received (confidential) advice from UBS that 'supports the view that the costs of moving away from the current portfolio approach to debt management would be prohibitively high'.
PIAC	Should the AER adopt PIAC's recommendation to use a five year term, PIAC recommends moving directly to the trailing average approach without a transition period. The AER should further consider whether a seven year transition period is the most appropriate way to reduce the risk of gaming the trailing average approach, or whether there are other mechanisms that can be included in the final rate of return guideline to reduce the risk of gaming. The AER approach should not be driven by the particular preferences of service providers with particular ownership characteristics.
QTC	QTC supports the proposed transitional arrangements (but based on the original 10-year benchmark debt tenor and transition period). QTC considers these are appropriate for service providers that have attempted to align their funding with the 'on the day' method. It notes different transitional arrangements may be appropriate for other service providers.
SP AusNet	Provided the benchmark term returns to 10 years, SP AusNet considers the AER's proposed transition path is appropriate to allow service providers and consumers to transition to the new return on debt approach with no windfall gains or losses.

TransGrid	TransGrid does not need a transition, as it already uses a portfolio approach to debt issuance, which is an efficient approach. The transition would likely provide insufficient revenue during the upcoming regulatory control period and would arguably be inconsistent with the rate of return objective and the NEO and the revenue and pricing principles. It states, the 'shortfalls in net present value terms for a seven year and a ten year transition could be expected to be in the order of $135 million and $209 million, respectively'. Further, 'TransGrid would also be likely to face significant costs to restructure its debt portfolio so that it aligned with the AER's transitional period funding model'.
Third party data service provider	
MEU	Does not support using Bloomberg fair value curves (BFVCs) given these have consistently overstated the observed costs for bonds incurred by regulated energy service providers. The AER should select a cohort of bonds that are comparable to those sourced by the service providers as this will provide a more accurate benchmark for service providers' return on debt.
EUAA	Has concern with BFVC over-estimated the return on debt, its methodology not replicable and not in the public domain. Suggests the use of weighted average bond yield of bonds with three to seven years to maturity as proposed by EURCC.
ENA	Supports a curve fitting process to determine the benchmark return on debt and using BBB-rated BFVCs. Considers CEG's curve fitting process a useful cross-check on the proprietary methods employed by Bloomberg.
APA	Supports using a third party data service provider.
COSBOA	Does not oppose the use of third party data, but encourages the AER to develop an in-house dataset.
PIAC	Emphasises a number of known concerns on BFVC. Recommends the AER to develop its own database. To maintain the integrity of the annual updating process, the AER needs to assess the consistency of the third party provider's yield curves from year to year.
Jones Day	The Chairmont report has principles for choosing a debt yield proxy. Jones Day was asked whether the AER could use the principles in future decisions. Jones Day argues that narrowing the bond sample as suggested by Chairmont is inconsistent with the Tribunal's decisions for Envestra and ActewAGL.
Prof Ronn, A/Prof Goldberg for United Energy Distribution and Multinet Gas	Advice based on US empirical evidence and anecdotal Australian evidence indicates the existence of a new issue premium. BFVCs, which rely on secondary market price data, are unlikely to capture the new issue premium, and therefore may underestimate a service provider's true return on debt.
Averaging period	
APIA	Supports an averaging period of 40 days. [Note the AER proposed any averaging period of at least 10 business days in its draft guideline].
CitiPower, Powercor, SA Power Networks	The averaging period will be at least six months prior to the start of the regulatory year to which it applies. Investors require a premium for committing to proving funds between date of pricing and provision of funds, unless the time period is very short. This premium can be reduced if the

	averaging period is closer to the start of the year to which it applies.
Energex	Is concerned that service providers subject to 'a preliminary determination with mandatory re-opener' will only be able to nominate an averaging period within the window of five months for the first year. Proposes such businesses should be able to nominate the dates prior to submitting their regulatory proposal, subject to the averaging period taking place in the future.
Ergon Energy	An averaging period which ends six months before the commencement of the relevant regulatory year is unnecessarily long. In practice, very little primary debt issuance is undertaken in the domestic debt market in November and December. Service providers should have the opportunity to nominate alternative averaging periods and not be constrained by the averaging periods proposed in the draft guideline, particularly in relation to the first agreed averaging period. Supports the start date for the first agreed averaging period being brought forward as it has the greatest impact on the trailing average. Service providers cannot issue debt twice and therefore the AER's proposal for overlapping averaging periods for the first and second agreed averaging periods cannot be replicated in practice.
EUAA	The proposed averaging period calculation effectively enhances the ability of service providers to pass-through its debt costs to users. It reduces service providers' interest rate risk and users do not benefit from it. Proposes the AER use annual averages as proposed by the EURCC instead of an averaging period specified by service providers.
MEU	Interest rates are likely to fall in the third and fourth quarters of a year and rise in the first and second quarters of the year. Service providers can gain a benefit by selecting the averaging period. To overcome this bias, the AER should determine the averaging periods or require the averaging period to be over the entire year.
PIAC	Does not agree with the AER's approach. The allowed averaging period is too long and too open-ended. If there are long-term cycles of interest rates within the year, then these can be 'cherry picked' by the service providers. The AER should assess whether there is an intra-year cycle for bond yields and consider taking average of all business days across a year or selecting a period of 40 consecutive business dates close to the final determination.
QTC	QTC supports the proposal to allow service providers to nominate the averaging period used to re-calculate the return on debt. However, the QTC considers it would be appropriate to allow service providers to nominate averaging periods that end no later than three months prior to the start of the next regulatory year. Some information required to prepare the annual pricing proposals, such as the March quarter Consumer Price Index (CPI), is not available until late April. Given the importance of the starting value of the return on debt, QTC considers service providers should be able to nominate a suitably long initial averaging period (that is, not the 10 –40 day averaging period used under the 'on the day' approach).
Benchmark term of debt/ extrapolation	
ENA	The ENA submits there is no empirical basis for concluding that a seven year term is efficient practice, with actual debt portfolio information indicating a 10-year term. It states the AER has relied on the 2009 WACC review analysis, which is no longer relevant given that hedging is not required under a trailing average. It states that shortening the debt term will lead to firms being materially undercompensated, in a volatile way. It states that it will increase refinancing risk and impose arbitrary windfall losses on networks, depending on the timing of their determinations. As a mechanistic extrapolation method, the ENA proposes using a CGS spread plus either setting a fixed debt risk premium (DRP) spread at the determination for carrying over the five year regulatory period. Alternatively, it proposes specifying an algorithm for mechanistic annual updating at the determination.
QTC	QTC considers the debt term should be 10 years. This is based on observed financing practices of regulated and non-regulated infrastructure businesses, the increase in refinancing risk

	associated with a seven year debt term, the incorrect floating rate note adjustment undertaken in the 2009 WACC review and an incorrect hedging assumption of matching the five year regulatory period as per the 'on the day' approach. In relation to extrapolation, QTC submits extrapolating the risk free rate based on CGS is uncontroversial. It proposes using a formula based on a linear relationship between seven year and 10-year credit margin data from QTC's quarterly credit margin survey. QTC proposes that for implementation, in place of its credit margin survey data, Australian Financial Market Association's (AFMA's) seven and 10-year fixed swap rates could be used. QTC submits that the extrapolation is not immaterial. While the AER analysis looked at the spread when the BFVCs were in existence, QTC has analysed the AER's recent decisions which relied on paired bond analysis. This analysis yielded an average spread of 64 basis points. Under QTC's proposed extrapolation method, depending on the time period, the spread ranged between 26–46 basis points.
NSW Treasury Corporation (NSW TCorp)	TCorp submits that the reduction in debt tenor from 10 to seven years would impose a modest reduction on the return on debt. However, it would cause the average maturity of the debt portfolio to be 3.5 years and require an increase from 10 per cent to 14.3 per cent of the debt portfolio to be refinanced in any one year. It submits this would increase service providers' vulnerability in financial crises. It would also increase pressure on the NSW AAA credit rating by increasing the liquidity requirements in proportion to the increase portfolio refinancing requirements. TCorp encourages the AER to find a third party data service provider which can publish the required data.
Transgrid	Transgrid submits the move to a seven year debt tenor is not supported by the evidence. It states a 10 year term continues to reflect efficient commercial practice. Also, the data collected by the AER for the 2009 WACC review, upon which the AER concludes the debt term is likely less than 10 years, was heavily influenced by the GFC and incentives for the regulated service providers to enter into hedging arrangements to minimise their exposure to the regulatory benchmark. Also, the difference between the 10 and seven year tenors is material and volatile over time, and where third party data is not available for 10 years, there are a number of robust methodologies that can be used to extrapolate from seven to 10 years.
ActewAGL	ActewAGL submits the change in the debt term to seven years is unrepresentative of the longevity of assets used by the industry and it will likely lead to material under-recovery of the benchmark firm's efficient cost base and encourage service providers to adopt shorter-term financing arrangements. It is inconsistent with market participants' increased debt issuance in the 10 year or more tenor range to accommodate an increasing appetite for longer debt by superannuation funds. Setting a lower benchmark tenor exposes service providers to the risk of under-recovery of efficient costs or increases the rollover risk and debt raising costs substantially. This is particularly for smaller service providers where costs would not scale proportionately with the size of financing needs. To overcome the extrapolation difficulty, ActewAGL suggests using the CGS 10-year/seven-year spread as per the ENA's submission.
APIA	Does not support the seven year term. APIA submits that the current use of swaps is primarily to match the one return on debt estimated for the five year regulatory control period. Under a trailing average approach, APIA states swaps will no longer be required. APIA agrees the term at issuance, rather than the term to maturity should be used. APIA submits a reduction in the debt term provides the wrong incentives for investors to take up longer term debt. APIA notes the ENA's suggested alternatives to address the extrapolation issue. APIA submits recent ANZ evidence on the 10 year/seven year spread on A- to A+ bonds is on average 30 basis points. This creates a WACC difference of 18 basis points or $2 million per

	annum for a $1 billion pipeline. APIA questions the AER's determination of materiality.
APA Group	APA submits the return on debt should be estimated using a benchmark term at issuance. This should be established by reference to the average term at issuance of the debt of the benchmark efficient entity. This will likely be longer than seven years and probably around 10 years. APA points to the CEG and PwC work, suggesting a term of around 10 years. APA states that annual updating issues should not impact upon the determination of the debt term.
NSW DNSPs	NSW DNSPs state the benchmark debt term should remain 10 years. This would ideally match the life of the assets as it allows management to plan over the long-term and reduces potential exposure to financial market distress in any one debt raising period. However, the bond market is not deep enough to provide debt well beyond 10 years. They point to the PwC and CEG analysis indicating a debt term of around 10 years. They state that reducing the term to seven years increases the proportion of debt to be refinanced each year from 10% to 14.3 per cent. This materially increases refinancing risks and increases the liquidity requirements imposed by the credit ratings agencies, thereby increasing costs. The increase in short-term debt would increase and cause the credit metric to deteriorate, thereby requiring reconsideration of the benchmark credit rating and increasing the return on debt and equity. They disagree with Lally, arguing that issuing shorter term debt will proportionately shift premiums away from longer term debt to shorter term debt.
Spark Infrastructure	The trailing average should be calculated over 10 years rather than seven years to better reflect the longevity of the underlying assets and efficient financing practice.
Energex	Energex is concerned with the AER's proposed move from a 10 year to a seven year debt tenor. It states business' prefer to raise debt for as long as possible to reduce exposure to refinancing risk. It states the AER does not have a robust empirical foundation and relies upon data that reflects business' practice associated with the 'on the day' approach. It states adopting a seven year term exposes service providers to material financing risk. Energex submits there is a material difference in the return on debt between seven and 10 years. It states there are workable and transparent options to address the extrapolation problem.
Envestra	Envestra submits the AER’s analysis and reasoning for determining the seven year benchmark term of debt is flawed and not representative of the actual efficient financing practices of Australian energy service providers. It points to the ENA's evidence on debt portfolios.
Ergon Energy	Ergon does not support reducing the term from 10 to seven years. It considers the AER should have included its proposed position and supporting evidence in the consultation paper to afford stakeholders the opportunity to review and scrutinise its evidence before releasing the draft guideline. It submits a debt term less than 10 years will unlikely be commensurate with the return on debt for the benchmark efficient entity nor meet the allowed rate of return objective. It states a sufficiently long tenor is required to manage refinancing risk such that only a small percentage of the total borrowings mature each year. It states a longer debt term will be more stable which is in the long term interests of consumers. It points to the evidence provided by the QTC and the ENA which supports at least a 10 year term. It points to the QTC’s analysis of Lally and the AER WACC review. It states that 21 basis points is material. It supports the QTC's and the ENA’s suggested extrapolation techniques. It states the AER should specify its extrapolation technique in the guideline.
SP AusNet	SP AusNet does not support shortening the debt term on the basis that hedging will no longer be required and so should not be considered when calculating the effective term. It submits the seven year/10 year spread is material, particularly when markets are concerned with risk. It points to the QTC's and the ENA's methods for extrapolation.

Australian Financial Market Association (AFMA)	AFMA submits a seven year debt term limits the capacity of managers to allocate funds into debt products which match their liability profile. It submits a longer debt term better matches the asset life and minimises interest rate risk and refinancing risk. It contends that the evidence indicates a 10 year debt term. It states that while interest rate swaps are a cost management tool, they add to, rather than reduce costs. It also notes some of the current debt strategies reflect the current regulatory approach. With respect to extrapolation, AFMA suggests using its 10 year swap rate plus a margin for the BBB versus swap component at the 10 year mark. It suggests this margin could be estimated using the difference between the seven year BFVC yield and the seven year AFMA swap rate as a starting point with some form of additional adjustment for the seven year to 10 year BBB curve. AFMA states the spread between the seven year and 10 year swap rate for the last 10 years has ranged between -23 and 40 basis points. It states the current spread is approximately 35 basis points. It indicates that the swap difference is only a proxy for the BBB curve spread, which is likely to be wider, as lower credits tend to have steeper curves. It states this indicates the term premium is likely to be quite material at times. AFMA states that by reducing the debt term, the AER is limiting the development of the Australian debt capital markets when it could be taking a more leading role in facilitating longer term issues.
EUAA	The EUAA support a seven year term. It agrees with the AER's criticisms of the PwC and CEG analysis. It agrees with the AER's observations on bank debt and the use of interest rate swaps to effectively shorten the tenor of issued bonds. EUAA notes the EURCC's analysis of debt issuance since 2009 points to shorter terms being issued post 2009.
PIAC	PIAC's preference is for a five year term to match the regulatory control period. It is also on the basis of Davis' and Lally's recommendation to IPART to achieve net present value (NPV) neutrality of regulated cash flows under the building block model. A five year debt term is also practically advantageous, leading to more accurate estimation of yields via the BFVCs.
MEU	The AER should consider the extensive evidence, provided by the ERA, which suggests the average term of debt is closer to five years.
COSBOA	COSBOA finds the rationale for a seven year term unclear— that it is not directly observable from third party data and will require a degree of extrapolation or interpolation. COSBOA notes it does not accord with the five year regulatory control period and observes that the ERA has adopted a five year term as it is consistent with current financing practices. It states this would also lessen the need for a messy transition.
ECC	The ECC prefers a five year term on the basis that it is consistent with current debt financing practice, provides more accurate and consistent data and would lessen the need for a messy transition.
Credit rating of a benchmark efficient entity	
ENA	Recommends a BBB credit rating based on the most recent observations of credit ratings. Considers there is no basis to have regard to credit ratings prior to 2008–09. The AER needs to consider the interrelationships between the financial risk profile and the credit rating. The AER must ensure the combination of allowed rate of return, expenditures and related revenue building blocks in the PTRM result in funds from operations (FFO) -to-interest and FFO–to–debt commensurate with the benchmark credit rating.
MEU	The AER should identify a cohort of bonds reflecting a range of credit ratings and tenors applying to similar firms to energy networks. From these, it should build a model which, when applied with actual inputs for industry, term and credit ratings, delivers outcomes similar to what has been

	achieved. Suggests all investment-rated bonds be used.
SP AusNet	The benchmark credit rating should be forward looking. Recommends a BBB credit rating.
APA Group	There is no basis for using a single credit rating, given there is no basis for the single benchmark. APA is concerned about the reliance placed on the credit rating in estimating the return on debt.
EUAA	Has concerns with the AER's approach of relying on credit ratings for specifying the benchmark. Suggests alternative approaches, such as including all investment grade debt rather than BBB bonds in calculating of the return on debt, or restricting the bonds for calculating the return on debt to BBB+ bonds issued by Australian regulated network utilities.
Spark Infrastructure	Recommends a BBB rating, based on recent market evidence.
Envestra	Recommends a BBB credit rating. Credit ratings are forward looking and the analysis on historical credit rating medians between 2002 and 2012 is irrelevant. The main reason for this is that until 2009, the AER adopted an equity beta value of 1.0, which provided higher equity returns and a larger cash flow buffer for servicing interest payment obligations. . Current service providers' credit ratings provide the best indicator of future credit ratings.
PIAC	Given the relatively low risk profile of the regulated networks, the actual return on debt is relatively low compared to other BBB+ rated companies.
Ergon Energy	Supports the ENA's submission that only the most recent observations of credit ratings should be used to determine the benchmark credit rating. Based on the 2013 observations, a credit rating of BBB- to BBB is appropriate. The AER should set a forward looking credit rating in the guideline.
CitiPower, Powercor, SA Power Networks	Recommends a rating no higher than BBB, which reflects the change in the risk profile of service providers in recent years.
Additional comments on the return on debt	
CitiPower, Powercor, SA Power Networks	The debt maturity profile of CitiPower, Powercor and SA Power Networks will not allow 1/7 debt to be refinanced each year. Therefore, they are likely to continue issuing floating rate debt and hedge the interest rate. The increase in hedging transaction will lead to incremental costs and therefore an additional debt raising allowance is required.
ENA	The draft guideline does not examine the issue of debt raising costs and the need to invest in maintaining liquidity reserves to obtain an investment grade credit rating. CEG examined the actual debt portfolios of private Australian energy network businesses regulated by the AER and confirmed the use of undrawn facilities is necessary to run a business. Yields on debt in primary issue markets are higher than the yields on debt in the secondary markets from which the AER derives its estimates of the return on debt. The draft guideline does not address the impact of the new issue premium on the yields on debt recorded in secondary market.
QTC	The draft guideline has not addressed the issue of compensation for costs associated with early debt issuance to manage refinancing risk. Compensating these costs is consistent with the allowed rate of return objective.

Table I.7 Summary of submissions—imputation credits

Respondent	Comments
ActewAGL	Supports the ENA's submission. The dividend drop-off studies remain the best evidence on the market value of imputation credits. Theta should reflect the value of imputation credits and cannot be calculated from Australian Tax Office (ATO) statistics. There have been no significant changes since the Tribunal determined 0.25 for gamma.
APA Group	Supports a 0.7 estimate of the payout ratio. However, the explanatory statement does not make a case for a utilisation rate of 0.7. This does not seem to be an estimate that could lead to a market value of imputation credits, and would therefore fail to meet r 74(2) of the gas rules. There is no reason for departing from the dividend drop-off method adopted by SFG for the Tribunal, which indicated an utilisation of around 0.35.
APIA	Does not support the AER's proposed gamma. Regarding theta, taxation statistics do not accurately reflect redemption rates. Is concerned with the AER's 'equity ownership' conceptual framework, since the rules require that the value of imputation credits contain an expectation of market value.
CitiPower, Powercor, SA Power Networks	The AER's new conceptual framework for estimating theta is primarily based on cash flow analysis, the potential rate of redemption and analysis of equity ownership. However, it does not provide any relevant empirical evidence as to the value of imputation credits. This is a market-based concept. Therefore, this can only be properly measured by market-based studies. The AER's proposed approach is inconsistent with the rules, which confirm that theta must be estimated as the value of imputation credits, rather than via a cash flow tracking analysis of the average utilisation or redemption of the credits. Theta should be 0.35, as per the ENA's submission.
COSBOA	COSBOA supports the AER’s proposed gamma of 0.5. There appears to be sound rationale for this change. This reflects: the AER's re-evaluation of the treatment of imputation credits, the AER's focus on more accurately defining some conceptual issues, and on support (including from empirical evidence) for a utilisation rate of 0.7. The re-evaluation undertaken by the AER appears to be consistent with points made by the Tribunal in its decision on gamma. Further, the focus of the Tribunal’s decision was narrower than the AER’s re-evaluation.
ENA	Supports a gamma of 0.25. The role of gamma is to determine the return from the value of imputation credits (and consequent reduced return to be paid out of allowed revenues). It should not be interpreted as the expected proportion of corporate tax to be redeemed by the representative investor. There are issues with using taxation data to estimate redemption rates because this data is unreliable and unusable for estimating what shareholders ultimately receive for imputation credits. Even if the AER was to use taxation statistics as an upper bound (which may not be suitable anymore), it would have to make a number of adjustments to the data. Is concerned with the AER's proposed 'equity ownership' approach based on cash flow tracking and redemption rates. If the AER were to define theta as the average redemption rate, it should do so for the benchmark firm as opposed to using aggregate market data. The standard market clearing conditions are not met in the AER's proposed representative investor framework. If these conditions are not met, no equilibrium can be derived, not representative investor can be determined and the CAPM pricing relation cannot be obtained. If the AER were to adopt this conceptualisation of theta, it would need to undertake an energy network cash flow/equity ownership analysis, and the ENA would wish to be consulted on such a valuation. The equity ownership conceptual framework is a rebadging of the same definition representative investor arguments that were used in the 2009 WACC review and subsequent Tribunal hearing. Franking credit yield studies show that returns are independent of the imputation credit yield, since firms with high imputation credit yields to do not require lower returns. If the AER is to use the KPMG survey information to inform its theta estimate, the guideline should set out

	how it was used and why the AER considers this information reliable. The guideline should indicate whether and how the evidence about dividend washing would influence the AER's estimate of theta. The AER does no estimate the value of imputation credits, which is required under the rules. The guideline must give weight to evidence that determines the value of imputation credits from market prices, and this valuation must be established on a consistent basis to other WACC parameters and the allowed rate of return objective. It should be estimated using established empirical techniques applied to observed market data (not on the basis of a series of highly unrealistic theoretical assumptions). The best available dividend drop-off estimate of theta is 0.35, as reported by SFG. This also approximates the results of the ERA study when the standard market adjustment is applied. If the AER considers gamma represents the value of imputation credits, it should clarify how it considers the Tribunal to have erred when it applied the valuation concept.
Energex	Energex is concerned with the new conceptual framework the AER has applied, which is based on its interpretation of Officer's seminal work on dividend imputation. Energex is also concerned with the estimation methods and data used by the AER to 'value' franking credits Consistent with the other rate of return parameters, this needs to be informed by robust empirical analysis using market data. Significant weight should continue to be placed on SFG's dividend drop off study which was subject to intense scrutiny by the Tribunal. The updated version of this study commissioned by the ENA as well as other evidence it submits confirm that 0.25 currently remains the most appropriate estimate of gamma.
Ergon Energy	Supports a theta of 0.35, derived from dividend drop off studies. Ergon does not support the AER's equity ownership conceptual framework, for reasons outlined in the ENA's submission.
MEU	The proposed gamma of 0.5 is a move in the right direction.
Spark Infrastructure	Spark supports maintaining a gamma of 0.25, as determined by the Tribunal in 2011
TransGrid	The AER's new 'equity ownership' approach to assessing the value of gamma is inconsistent with the requirements of the rules.

On 11 October, we released an equity beta issues paper as a separate consultation process to the draft rate of return guideline. Submissions closed 28 October.

Table I.8 Summary of submissions—equity beta

Issue	Respondent	Comments
Equity beta range		
	APIA	APIA considers the range of 0.4–0.7 chosen by the AER significantly underrepresents the actual range of beta values in the dataset. Due to the lack of robustness in its beta estimates, the AER will be forced to use data from overseas or different sectors, or to use a wider suite of models that are not subject to this beta problem. The AER has not derived its range transparently and has not based it on confidence intervals. While the AER claims to have chosen the upper bound as the point estimate, it is difficult to understand where the upper bound of the range should be without the confidence interval. Further, all else being equal, confidence intervals can be used to support one model over another (which is important considering the AER is empowered to make use of any relevant models).

	The AER's proposed range is unrealistically narrow because the empirical analysis assumes investors use just one day of the week/month to estimate returns. APIA provides 'a more accurate representation of the range' by relaxing this one assumption and maintaining the other AER assumptions like the Australian comparator set. APIA emphasises that its representation is not a final estimate and could likely be an underestimate of the true range. APIA finds the average betas range from 0.29–0.94, depending on whether beta was estimated on the 6th or 17th day of the month.
COSBOA	Agrees that the evidence presented by the AER leads to a range of 0.4–0.7. Supports choosing a point estimate from a range for return on equity.
ENA	The AER should estimate the equity beta without first assigning a range. In its proposed approach, the AER does not alter its range on the basis of cross-checks. ENA considers this to be a problem. The AER should explain what its range captures. The ENA considers there is no coherent logic behind what the range represents, particularly the upper boundary. The AER bases its range on historical estimates produced by Henry (2009), the ERA (2012, 2013), SFG (2013) and a conceptual analysis that suggests beta should be below 1.0. However, other evidence suggests the upper bound of the range could, with similar validity, be above 1.0.
MEU	The AER's approach to identifying the range is rigorous and has incorporated considerable analysis.
PIAC	It is reasonable for the AER to conclude that the equity beta range is 0.4–0.7.
Equity beta point estimate	
CitiPower, Powercor, SA Power Networks	CitiPower, Powercor and SAPN are concerned that, given the proposed equity beta, the inferred return on equity may be insufficient to attract an efficient level of investment. Over the last four years, the AER has lowered the equity premium. The proposed guideline suggests this will continue, such that the equity premium would have fallen 180 basis points from its pre-2009 level. This is very different to Ofgem's approach, which follows a policy of keeping the real return on equity relatively stable. This is such that the current regulated equity premium in Australia may be 182 basis points less than in the UK (which is understated since the AER values imputation credits which foreign investors cannot redeem). Further, an investor is likely to require a higher equity premium in Australia compared with the UK for regulated assets because of the re-politicising of energy prices and the relatively immature Australian regulatory regime which implies higher investment risk.
COSBOA	Strongly objects to a point estimate of 0.7. A point estimate at the top of the range will lead to unnecessarily high network charges. The AER's justification is limited and inconsistent with conceptual evidence. It is inconsistent with McKenzie and Partington 's conclusions that the beta would be 'very low' and 'the lowest possible' and that the industry is one of the 'more insulated'. Further, empirical estimates from Henry, the ERA and SFG seem to support a point estimate well below 0.7.
ENA	If the AER adopts the foundation model approach, it should select an equity beta point estimate of 0.94. This is based on estimates from regression analysis involving Australian and US-listed firms (0.82), evidence that regression-based estimates have little association with realised returns (1.00), DGM analysis of the Australian comparator set (0.96) and the expected return which accounts for the relationship between size, book-to-market ratio and returns (0.91). The ENA computes this point estimate as 1/6 × 0.82 + 1/3 × 1.00 + 1/3 × 0.96 + 1/6 × 0.91 = 0.94. It applies the same weights as proposed in its submission to the AER's rate of return consultation paper.

MEU	The evidence identified by the AER suggests the equity beta should not be at the top of the range. MEU is not satisfied with the AER's reasoning. The AER should also consider whether any biases support selecting an equity beta in the lower end of the range. For instance, regulated energy networks have been purchased at higher multiples than what the regulated rates of return imply (suggesting the actual equity beta is lower than that used by regulators in the past). An equity beta of 0.7 would not be considered 'very low' as Mackenzie and Partington advise. The mid-point of the range (0.55) would provide a more appropriate estimate. The ERA's empirical analysis in 2013 suggests re-levered portfolio equity beta estimates range from 0.39 to 0.59 with 0.5 as a mean. 0.7 is well above the upper end of this range.
NSW DNSPs	Are concerned by the AER's proposal to adopt an equity beta of 0.7. Consider the available evidence suggests using an equity beta between 0.8-1.0 when applying the CAPM.
PIAC	The AER has not appropriately exercised its discretion in selecting from the top of the range. This inadequately reflects its consultants' conceptual analyses (Frontier, McKenzie and Partington), which suggests the equity beta should be significantly less than 1.0—it should be at the lowest possible level. As a matter of policy, the AER should adopt a point estimate closer to the mid-point (between 0.5 and 0.6) and only vary the point estimate if there is a compelling case to do so. Even without Henry's 2013 empirical study, there is sufficient evidence to indicate that the highest point in the range is not justified by the available information. Further, the international comparators and the water industry results are equally consistent with an estimate of equity beta between 0.5 and 0.6.
Spark Infrastructure	A beta of 0.7 will prevent service providers from effectively competing for capital. In selecting this, the AER has relied on an extremely limited dataset and has used an unnecessarily narrow definition of beta that over-emphasises the importance of covariance between stock and market returns as a measure of risk. This definition ignores a wide range of risks that are priced by investors.
International evidence	
ActewAGL	Constraints in the AER's proposed foundation model approach mean that the equity beta should reflect much more information than only Australian regression data. US data is more voluminous and can demonstrate the links between service providers and market wide risks more precisely than Australian data alone.
APA Group	Using international comparators may increase sample size, but if the data for those comparators are from different populations, the meaning of the beta estimate and its reliability are unclear. APA Group does not see data from international comparators as necessarily relevant for constructing the benchmark efficient entity, or for estimating rate of return parameters. International comparators may have a role to play in certain circumstances, but not in beta estimation.
APIA	The AER has too quickly, and with insufficient evidence, dismissed evidence from international energy firms. APIA disagrees that using international data is a trade-off between relevance and statistical robustness. Beta data provided by the AER contradicts the assertion that Australian energy utilities face similar levels of risk. The AER rejects using US data because some firms are vertically-integrated, even though its Australian comparator set includes integrated firms like Alinta and AGL. While the AER states that it is impossible to correct for the different systematic risks in international data, regulators in Ireland and New Zealand have successfully done this. APIA suggests a potential method entails re-weighting the Australian market index to reflect the weights of different US industries, recalculating betas and then making use of US energy firms with similar beta values. APIA did not develop a worked example of this process (due to the short time-frame), however, APIA references a similar process conducted by SFG for the Dampier to Bunbury Pipeline (DBP) in its submission to the ERA's draft rate of return guideline. APIA claims

	this evidence suggests that Australian and US energy firms face similar levels of systematic risk. Further, US betas are higher than what the AER suggests.
COSBOA	Agrees with the need for a cautious approach to using international comparisons. Is perplexed as to why the AER, knowing the pitfalls, has included international comparisons to justify setting a beta at the high end of its range.
ENA	The AER has given no material weight to US beta estimates provided by the ENA. The AER should place greater weight on the US listed firms than under its previous approach, because of the thorough and transparent way in which the sample of US comparators were compiled. Disagrees that international data suggests beta estimates are between 0.5 and 0.9. This is based on dated evidence (Henry 2008, 2009) that, in any case, does not support a beta range of 0.5–0.9. CEG finds the AER made a number of errors in representing the results of these studies. However, even if the ENA agreed with this range, this would not support bounding beta at 0.7. More comprehensive and more recent estimates are available (CEG 2013, SFG 2013) that support a range of 0.7–1.0, with a point estimate of 0.9 for international equity betas. The AER should give material weight to the US sample because business-specific announcements currently have the potential to bias equity beta estimates. The AER's domestic comparator set has been subject to numerous merger announcements over the sample period. Since the AER's domestic sample is very small, it has not benefited from large sample diversification of business specific announcements. Disagrees with the AER's choice to dismiss US evidence on the basis that vertical integration 'could' have an effect on beta estimates. The AER should assess whether vertical integration actually does have an effect on beta estimates. It should also consider the likely directional effect, if any, of vertical integration (this could lower beta estimates).
MEU	The AER uses biased overseas outcomes as a cross-check.
PIAC	Cross-checking with international comparators does not support selecting a beta at the top of or above the range, given the 2009–2011 data from NERA and the 2013 data from Damodaran. There is consistency with the Australian empirical results. International studies are inconsistent in suggesting the equity beta should be higher. The AER should use international comparators to cross check the mid-point of the range, not the top of the range. The AER should focus on the systematic analysis of Australian firms over time, in preference to international studies. Reliability should not come at the expense of validity. US integrated energy companies vary in structure, risk exposure, and regulatory, business and operational environments such that their inclusion would risk undermining the validity of the equity beta estimate for the benchmark efficient entity. The AER should only consider proposed estimates based on international studies if these proposals are supported by evidence that suggests including international data will enhance the reliability and validity of the estimates. Preferably, this evidence would include data from various countries (not just the US). Studies generally find that US utilities have higher observed equity betas than Australian firms.
Spark Infrastructure	The AER's approach ignores potentially useful international data, particularly from the US. The AER has not provided compelling evidence for giving more weight to UK water assets than to US energy stocks. Supports the ENA's arguments on this topic.
Black CAPM	
ActewAGL	Evidence from the theory underpinning the Black CAPM (as per NERA's report to the ENA)

	suggests using a beta of 1.0.
APA Group	Reference to the Black CAPM as a theoretical proposition does little to assist in determining a range or point estimate for beta.
COSBOA	Using the Black CAPM to justify a point estimate is difficult to understand. The AER has noted there are 'major problems deriving a reasonable empirical estimate using this model' and that 'theoretical analysis does not lead to a clear indication of the magnitude of the difference between the Black CAPM and the standard CAPM'. At the very least, the AER needs to clearly explain why it has formed the view that the Black CAPM, despite its shortcomings, can justify a beta at the top of the range.
ENA	This evidence suggests giving consideration to a beta estimate of 1.0.
MEU	It is excessive to use 0.7 instead of a 0.55 mid-point because of an unproven theory (the Black CAPM).
PIAC	The Black CPM has overly-influenced the AER and is recognised as lacking consistent empirical support. The final guideline should clarify that the Black CAPM is just one of the various measures of equity beta and has no special role in setting the quantum equity beta. Use of the Black CAPM should be strictly limited to a qualitative assessment of the direction of the equity beta, rather than informing equity beta.
Water networks as a cross check	
ActewAGL	There are issues with the AER's referencing of SFG's 2011 report to IPART. The AER should review SFG's more recent report to ACTEW. In its report to IPART, SFG found that water utilities' betas were higher in falling markets than in rising markets, exposing investors to greater risk. SFG also found this in its advice to ACTEW– this suggests the beta should be set with consideration to the downward market beta estimate. With the gamma at 0.25, IPART adopted a beta of 0.6–0.8. Further, IPART's rate of return methodology contains additional elements that offset potential under-compensation for risk. For instance, this report was in relation to Sydney Desalination Plant's risk profile, which is characterised by contractional terms that transfer considerable risk away from the Plant.
APA Group	Regulated Australian water networks are not relevant comparators. Water networks provide no direct evidence which might inform energy sector betas because they do not have traded shares. Using water betas to inform energy betas would introduce regulatory circularity.
APIA	The AER has too quickly accepted the water sector as a means of cross-checking its beta estimates. This data is not particularly robust and introduces circularity into the regulatory process. Further, rural water service providers' demand risks are influenced by weather, whereas energy producers' demand risks are influenced by economic conditions. Further, consultants have found that water utilities have lower betas than energy utilities in the UK (and vice versa in the US).
COSBOA	Using estimates from the water sector is problematic. The AER should have far less confidence in this information. There are no listed Australian firms with regulated water assets. Also, these estimates reflect circularity as they utilise decisions from the energy sector.
ENA	The AER should assign no weight to its conceptually based comparisons between energy and water networks, unless there is a transparent quantification of what those comparisons imply for the equity beta.

MEU	Using equity betas from the water sector is circular.
PIAC	There is considerable circularity in the regulatory determinations between the regulated water and energy sectors. Therefore, this provides little new information.
Changes in equity beta over time (including potential impact of regulatory changes)	
APIA	Disagrees that equity betas are stable through time. Observing beta stability between 2008 and 2013 is insufficient to draw this conclusion. While the AER asserts there was stock market stability prior to 2008, this was a period of dramatic market gains in resource stocks. In considering the forward-looking risk profile for investors in the energy sector, the AER will need to consider whether this will continue over the next decade. If it will not, the AER should consider how this should influence beta calculations using historical data from a period of significant change in the Australian stock market.
CitiPower, Powercor, SA Power Networks	Future systematic risk may not be the same as the past.
ENA	Between 2011 and 2013, the average beta estimates for Envestra and DUET Group increased 20% and decreased 25% respectively. This suggests either the systematic risk of these firms varied significantly over a two year period, or these beta estimates are unreliable.
MEU	Moving to a trailing average with annual updating will reduce the risks networks face. This implies relevant equity betas should be lower than what we have historically seen.
PIAC	The AER should further investigate the impact of its proposed rate of return approach on systematic risk. Historical beta averages should be adjusted to reflect the significant reduction in service providers' exposure to financial risks. PIAC expects the AER's approach will reduce the volatility of a benchmark entity's cash flows because it entails adopting trailing average debt, more stable rates of return and transitions to the new approach.
Unidentified risk factors	
APA Group	Frontier, McKenzie and Partington advised there is no reliable way of determining the relationship between risks that are likely to affect investors' required returns and an entity's systematic risk exposure.
APIA	The AER should commission an empirical arbitrage pricing model study rather than a qualitative study if it wishes to understand the different facets affecting risk and return. McKenzie and Partington appear to hold similar views, noting the impossibility of mapping from a list of systematic risks to values of beta.
CitiPower, Powercor, SA Power Networks	The AER's proposed range is based on the assumption that historical covariance between the comparators' returns and the market return distinguishes service providers' risks from the market average. Empirical evidence indicates there is, at best, a very weak relationship between the return on equity and the covariance between stock and market returns. Investors price factors other than the covariance between stock and market returns. For example, McKenzie and Partington indicate that most of the asset models surveyed in their paper theoretically allow for the pricing of multiple risk factors.
ENA	Regression-based estimates of beta have little or no reliable association with historical returns.

Comparator sets	
APA Group	Substantial variation in the empirical beta estimates indicates that firms in the comparator set do not face comparable levels of systematic risk. For instance, the recent empirical evidence referenced by the AER indicates a beta range of 0.05–1.3. Therefore, comparable levels of systematic risk cannot justify the proposed benchmark entity. There are also potentially important differences between these comparator entities. For example, AGL Energy is a retailer, a substantial proportion of APA's revenue is from unregulated services and Alinta has experienced financial difficulties and no longer exists as a company with traded shares. Beta estimation may have to proceed using a smaller sample at the expense of statistical reliability.
APIA	The empirical evidence contradicts the AER's assumption that Australian regulated energy firms face similar systematic risks. This should have profound implications on the AER's approach. The AER should not be ignoring this contradiction.
COSBOA	Supports the AER's proposed comparator set. While there are a limited number of comparators, the available data and the way the AER proposes to use the data should be a sufficiently robust and reliable basis for setting the return on equity.
ENA	Beta estimates from the ERA (2011, 2013) and SFG (2013) suggest re-levered equity beta estimates for the AER's comparator set range of 0.05–1.34. The fact that these cover such a wide range should lead the AER to question the reliability of the beta estimates produced from this small sub-sample of available data.
PIAC	On a preliminary basis, the AER's comparator set and empirical data are reasonable. However, PIAC cannot take a final position until the AER publishes Henry's 2013 empirical analysis. This study will explicitly consider multiple permutations and ensure that assumptions are transparent.
Regression techniques	
APA Group	The ERA's and Henry's beta estimates use arbitrary starting points during the weeks or months for which historical returns are calculated. This results in a lack of precision. Work undertaken by CEG suggests beta estimates are not robust to a change in the starting points of weekly and monthly historical returns.
APIA	Argues against mechanistically removing outliers without considering their potential information content. Further, the AER should be cautious in using techniques which limit the influence of outliers in general. Data points far from the centre of the distribution may contain highly relevant information to investors. For example, stocks that are counter-cyclical in down periods but reflect the market at other times would be highly valued by investors seeking to diversify risk. APIA endorses the ENA's view that least absolute deviations (LAD) systematically biases betas downwards.
COSBOA	Supports the AER's instructions to Henry for updating his 2009 empirical estimates. COSBOA notes issues associated with the treatment of outliers and unusual market events. COSBOA supports the AER's decision to request advice on this from Henry.
ENA	The AER has instructed Henry to use a very narrow approach to estimate beta. This raises the question of what is the expert's best view, and what are simply the results of methodological choices already made by the AER. The AER has not considered the evidence that: LAD analysis exhibits a material downward biased, Blume and Vasicek adjustments lead to more reliable beta estimates and regression-based beta estimates, especially in small samples, are high unstable. For instance, beta

	estimates can vary materially depending on which day of the month is used as a reference point when determining returns.
PIAC	The AER should further investigate the impact of gearing on the equity beta to see if the relationship between gearing and systematic risk is linear or non-linear. The AER should also investigate the sensitivity of average and portfolio beta estimates to events affecting a single firm in the sample. Any empirical studies considered should clearly state all the specifications and permutations of the econometric regressions so reasonable comparisons can be made.
Reasonableness of the implied allowed return on equity	
APA Group	The AER should give consideration to whether the point estimate for beta can, when used with the foundation model, lead to an estimated return on equity which contributes to the allowed rate of return objective. The APA Group submit that if the CAPM cannot explain investor returns with precision, and estimates made from the model's parameters are also imprecise, then there is no reason to expect that return on equity estimates made using the model can contribute to achieving the allowed rate of return objective. The APA Group submits that, if the AER uses the CAPM, it should also use other financial models, estimation methods, data and evidence in a comparative analysis to estimate a rate of return that achieves the allowed rate of return objective.
The Financial Investors Group (FIG)	The AER's 0.4–0.7 equity beta range, combined with the FIG's inference that the AER's MRP will not materially depart from 6%, will mean the maximum allowed return on equity will be 4.2% above the risk free rate. The FIG is concerned that this cause investors to redirect their capital to other investments.
PIAC	The AER should develop a broader suite of measures to assess the overall rate of return and return on equity. This would provide a top–down reasonableness check of the equity beta.
The AER's use of conceptual analysis	
APA Group	Conceptual analysis does not lead far, and recourse must be had to empirical evidence. The AER conceptual analysis cannot support a low value for beta or a value below 1.0.
APIA	APIA is not supportive of the AER making use of conceptual analysis for anything other than forming priories to be empirically tested.
ENA	The AER should assign no weight to its conceptual analysis since it has advanced no computation to reach this conclusion. The AER's conceptual analysis draws conclusions largely from preconceived notions regarding the risk profile of energy networks. This analysis is inconclusive as it implies a benchmark entity has below-average operating risk and above-average finance risk. This provides no basis to conclude beta would be less than 1.0, as the low operating risk may have a smaller impact than the high financial risk. If the AER maintains its conceptual analysis supports an equity beta less than 1.0, the final guideline should clearly set out the quantitative basis for concluding the benchmark firm has only 23-43% of the business risk of the average firm to corroborate the reasonableness of its 0.4 to 0.7 range.
Other comments	
ActewAGL	DGM estimates calculated by SFG for the ENA suggest beta should be 0.96.
APIA	Empirical evidence provides mixed support as to whether energy firms are likely to face less risk than the market as a whole. Australian evidence presented by the AER suggests that most (but not all) utilities have low systematic risk. US evidence suggests betas are around 0.9. Other evidence cited by the AER suggests the range is between 0.5 and 1.09, although most estimates

	appear around the 0.8 mark.
COSBOA	Notes the AER adopted 0.8 in its 2009 WACC review as a 'conservative approach…as a step towards moving the businesses to the range from pervious decisions, which set equity betas of 0.9–1.0'. If this conservative approach remains a part of the AER's thinking in not setting a beta below 0.7, this would seem unjustified. The AER's ability to set a return on equity has now improved because of additional conceptual advice, improved empirical evidence and less uncertainty associated with events like the GFC and 'tech bubble'.
NSW DNSPs	Do not consider they have had sufficient time to consider and fully respond to the equity beta issues paper.
PIAC	Selecting a beta from the top of the range reinforces PIAC's concerns with the practical application of the AER's approach to using other models and data to inform their return on equity decision. Consumers should not be exposed to the risks of unstable models. The final guideline should be explicit about the limitations of alternative models. The AER should place greater reliance on the more recent empirical investigations on the equity beta and the updated conceptual analyses of its expert advisors.

Table I.9 Summary of issues raised at CRG or CRG subgroup meetings—CRG meeting 19 September 2013

Issue	AER response
In determining the benchmark entity the AER should look outside Australia at international entities for determining the comparator group, with appropriate adjustments for differences to the Australian market.	Due to the differences in regulatory environment, the drivers of fuel consumption and choice, we do not consider that international entities provide a relevant comparison for the purpose of determining the benchmark efficient entity in Australia.
As the equity beta is based more on gas market entities because of the small number of private electricity market entities, this should not result in equity betas for electricity entities moving up towards those for riskier gas entities.	We base our empirical range for equity beta on firms that provide regulated electricity and/or gas network services operating within Australia. This aligns with our benchmark efficient entity definition and our conceptual analysis suggesting systematic risks between gas and electricity networks are sufficiently similar as to justify one benchmark. We can only use firms traded on the Australian Stock Exchange (ASX) to derive empirical estimates of equity beta. More gas service providers are listed on the ASX than electricity service providers. However, this is not an issue given our defined benchmark efficient entity applies to both electricity and gas networks. Further, electricity service providers are represented in our empirical comparator set. And several listed firms are also combined electricity and gas businesses.
The combination of 60 per cent gearing and a BBB+ credit rating is too conservative for the benchmark firm. Gearing for electricity entities is higher than the benchmark efficient firm assumption of 60 per cent debt. Debt is cheaper than equity meaning there is a higher rate of return and firms with 60 per cent gearing would have a higher credit rating than BBB+.	We consider a gearing of 60 per cent for benchmark efficient entity is appropriate given that it is consistent with the empirical evidence drawn from businesses considered to be the closest comparators to our proposed benchmark efficient entity definition. We also consider gearing is only one of many factors in determining a business' credit rating.
Using other models in calculating WACC alongside the Sharpe–Lintner model gives	To determine the allowed rate of return, we propose to incorporate information from a range of models. This may reduce the significance of

recognition to models that have little to offer. For example, there is too much emphasis on the dividend growth model.	weaknesses in any one model or source of information. The emphasis that we propose to place on the difference models, including dividend growth models, reflects our assessment of the strengths and weaknesses of the different models.
There is too much emphasis on the Professor Wright approach.	Our approach includes the Wright approach as one of the sources of other information we propose to have regard to at the return on equity level. The amount of emphasis we place on the Wright approach will be considered at the time of a determination. We note however that our approach to the market risk premium (MRP) in the final explanatory statement places greater emphasis on dividend growth model (DGM) estimates than we have in the past. DGM estimates, like the Wright approach, are responsive to changes in interest rates. This may mean that the Wright approach does not provide a substantial amount of additional information on the return on equity, given our new proposed MRP approach.
It should be considered whether there are downsides in using a full year in calculating return on debt rather than a window selected by NSPs.	We consider that if the averaging period is nominated prospectively, this would minimise incentives for the service providers to choose the averaging periods strategically. We consider it is important to specify the minimal length of the averaging period to smooth any short-term volatility in interest rates. Accordingly, we propose that the minimum averaging period for estimating the return on debt should be 10 or more consecutive business days.
The AER should not move in 25 basis point steps when adjusting the equity beta as small increments in the equity beta drive significant changes in prices. Moving in 25 basis points does not resolve the problem of imprecise input data.	Our proposed approach to estimating the expected return on equity (as opposed to the equity beta) is to determine estimates as multiples of 25 basis points (if departing from our foundation model point estimate). We consider the nature and breadth of the task before us does not support finer gradations. A 25 basis point difference in estimates of the return on equity would result in a 10 basis point difference in the overall rate of return (based on our gearing assumption). This is expected to translate to revenue differences of less than one per cent. We consider, therefore, that our approach appropriately balances the imprecise nature of the task before us with the materiality of our decision.
Using a five year trailing average period rather than seven years reduces the need for a transitional arrangement and aligns with the regulatory control period.	We have based our proposed benchmark term of debt on the available observed practice regarding the average term of the closest comparators to the benchmark efficient entity. We do not consider that the benchmark term needs to necessarily align with the length of regulatory control period given that business will minimise their financial risks. Further, we support a gradual transition to the trailing average portfolio approach for a number of reasons, independent of the length of the benchmark debt term.
The AER should include overseas investors in determining the utilisation rate.	Our approach to determining a value for the utilisation rate recognises the presence of overseas investors in the Australian market. This is reflected primarily in the 'equity ownership' approach to estimating the utilisation rate, to which we give significant regard. This approach recognises that overseas investors are ineligible to redeem imputation credits, therefore the proportion of equity held by local investors provides an estimate of the underlying utilisation rate.
Changes in the regulatory regime such as the risk of ex post review are accounted for in the current WACC and do not justify a higher WACC. NSPs should bear the risks of the current regime.	We have assessed the impact of the proposed changes to the regulatory regime (for example, changes to the ex-post review of capex and our opex efficiency benefit sharing scheme). As noted in the draft explanatory statement we do not consider that these changes are likely to materially alter the risks faced by regulated energy entities.