



Better Regulation

Explanatory Statement Rate of Return Guideline (Appendices)

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

Shortened forms	3
Contents.....	5
A Return on equity: assessment of models	7
A.1 Sharpe–Lintner CAPM.....	10
A.2 Dividend growth models	14
A.3 Black CAPM.....	16
A.4 Fama–French three factor model	18
B Return on equity: assessment of other information	24
B.1 Relevant material used to inform the estimation of the return on equity	24
B.2 Relevant material not used to estimate the return on equity	33
C Return on equity: equity beta	35
C.1 Conceptual analysis.....	36
C.2 Australian empirical analysis	46
C.3 International comparators	59
C.4 The Black CAPM	68
C.5 Selection of range and point estimate	73
D Return on equity: evidence informing the market risk premium	78
D.1 Historical excess returns	78
D.2 Dividend growth models	84
D.3 Survey evidence	88
D.4 Conditioning variables	93
D.5 Recent decisions by other Australian regulators	100
D.6 Other relevant considerations.....	102
E Dividend growth models	114
E.1 Methodology	114
E.2 Using the DGM to estimate the whole market's return on equity and the MRP	115
E.3 Using the DGM to estimate the return on equity for energy infrastructure businesses.....	119
F Gearing	126
F.1 Selection of businesses used to derive an industry benchmark	127
F.2 Empirical evidence.....	129
G Return on debt: transition.....	131

H	Imputation credits	136
H.1	Overview of imputation credits and how investors use them	136
H.2	Analysis of the Officer framework.....	137
H.3	Process of arriving at a value for gamma.....	144
H.4	Payout ratio—analysis of NERA study	150
H.5	Utilisation rate—tax statistic estimates	153
H.6	Utilisation rate—implied market value studies.....	159
H.7	The utilisation rate—other supporting evidence	177
I	Summary of submissions	181

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
<p>Where applicable, reflective of economic and finance principles and market information:</p> <ul style="list-style-type: none"> – estimation methods and financial models are consistent with well accepted economic and finance principles and informed by sound empirical analysis and robust data. 	<p>The Sharpe–Lintner CAPM reflects economic and finance principles. Empirical shortcomings of the model may be addressed by alternative implementations of the model.</p>	<p>The Black CAPM reflects economic and finance principles. However, there are difficulties aligning the theoretical model with the available empirical analysis.</p>	<p>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.</p>	<p>There is no clear theoretical foundation to identify the risk factors, if any, that the Fama–French three factor model captures.</p>
<p>Fit for purpose:</p> <ul style="list-style-type: none"> – 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. 	<p>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.</p>	<p>Estimation of the Black CAPM is technical and involves complex econometric techniques.</p>	<p>Most DGMs are relatively simple. However, the model proposed by SFG is unusually complex for a DGM.</p>	<p>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.</p>
<p>Implemented in accordance with good practice:</p> <ul style="list-style-type: none"> – supported by robust, transparent and replicable analysis that is derived from available, credible datasets. 	<p>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.</p>	<p>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.</p>	<p>The simplicity of most DGMs enable them to be estimated in a robust, transparent and replicable manner.</p>	<p>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</p>

stable, also provide reasons to be cautious about using the model.

<p>Where models of the return on equity and debt are used these are:</p> <ul style="list-style-type: none"> – 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. 	<p>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.</p>	<p>The econometric derivation of input parameters leads to concerns about the potential for data mining.</p>	<p>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.</p>	<p>The econometric derivation of input parameters leads to concerns about the potential for data mining.</p>
<p>Where market data and other information is used, this information is:</p> <ul style="list-style-type: none"> – credible and verifiable – comparable and timely – clearly sourced. 	<p>Not applicable.</p>	<p>Not applicable.</p>	<p>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.</p>	<p>Not applicable.</p>
<p>Sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.</p>	<p>Responsive to changing market conditions through adjustment of input parameters (in particular, the risk free rate and the MRP)</p>	<p>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.</p>	<p>The model can readily incorporate changes in the market data, such as share prices and interest rates.</p>	<p>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.</p>

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.

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

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

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.

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

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, inasmuch 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.

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

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

⁶¹ See discussion in: AER, *Draft decision—Public, Jemena Gas Networks Access arrangement proposal for the NSW gas networks, 1 July 2010 – 30 June 2015*, 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
Halliwel, 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

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 Partington, *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.

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.

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:

$$k_e = r_f + \beta_e \times (r_m - r_f)$$

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

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.

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.

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, *Inquiry 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

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.

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

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.

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,

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.

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 priorities 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

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

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,

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.

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.

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

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 section 6.2.3 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
<i>Equal weighted</i>								
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
<i>Value weighted</i>								
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
<i>Equal weighted</i>								
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
<i>Value weighted</i>								
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, DUE, APA,	ENV, DUE, APA, HDF	ENV, DUE, APA, HDF, SPN, SKI	ENV, DUE, APA, HDF, SPN, SKI
<i>Equal weighted</i>						
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
<i>Value weighted</i>						
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, *Equity beta from US companies*, June 2013, pp. 37–41.

²⁵⁷ CEG, *Equity 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, *Equity 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 riskier 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'.

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 mechanically 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 Damodaran of the Stern School of Business at New York University.²⁷⁵ Damodaran 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

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-g geared equity beta are as follows:²⁸¹
 - 0.88 for the average re-g geared equity beta of individual firms
 - 0.91 for the average re-g 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

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.

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.

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.

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.

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

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

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

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 providers 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).

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.

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

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

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, *APTPL 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)

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 particular, these estimates are highly sensitive to the assumptions used. It is necessary that all assumptions used have a sound

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 to 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.4 below 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 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.

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

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.

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

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

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.

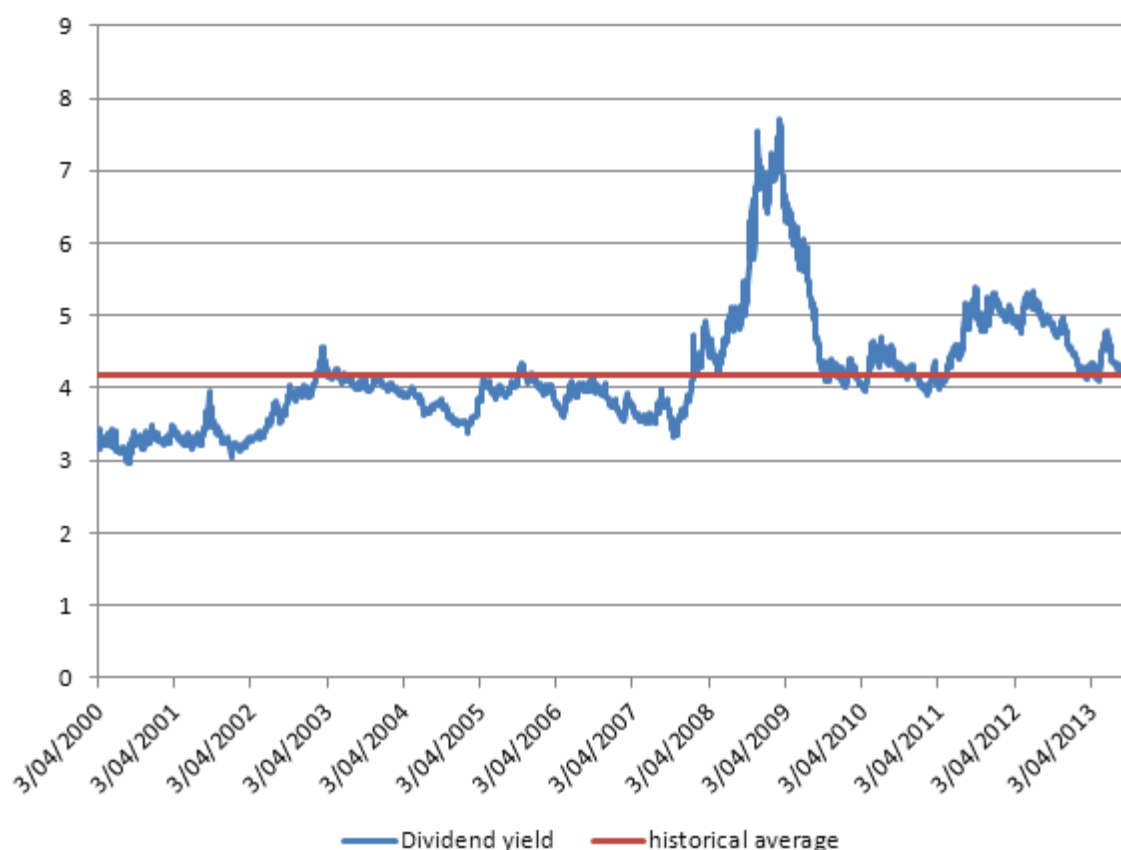
⁴³⁶ McKenzie and Partington, *Supplementary report on the MRP*, February 2012, p. 23.

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.

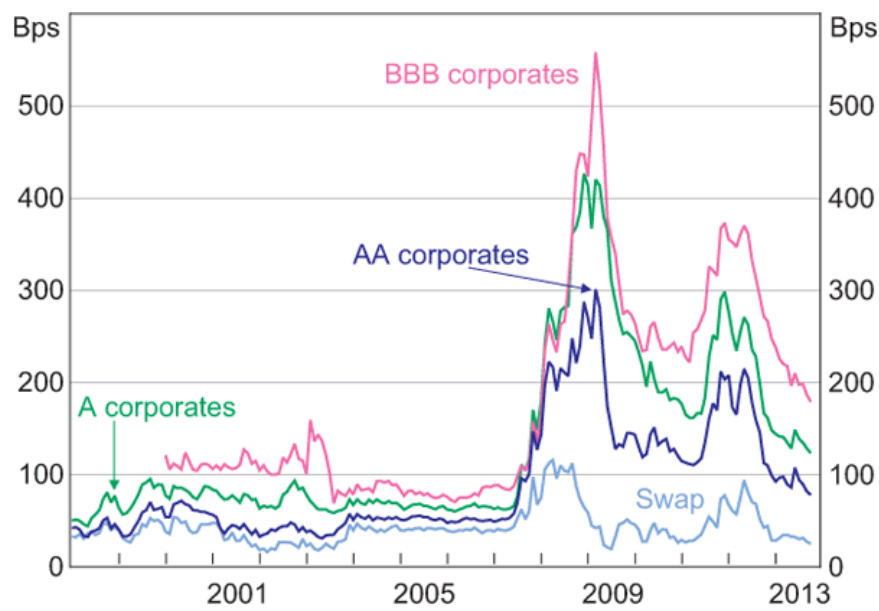
⁴⁴⁴ SFG, *Market risk premium: Report for APT Petroleum Pipelines Ltd*, October 2011, p. 9.

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

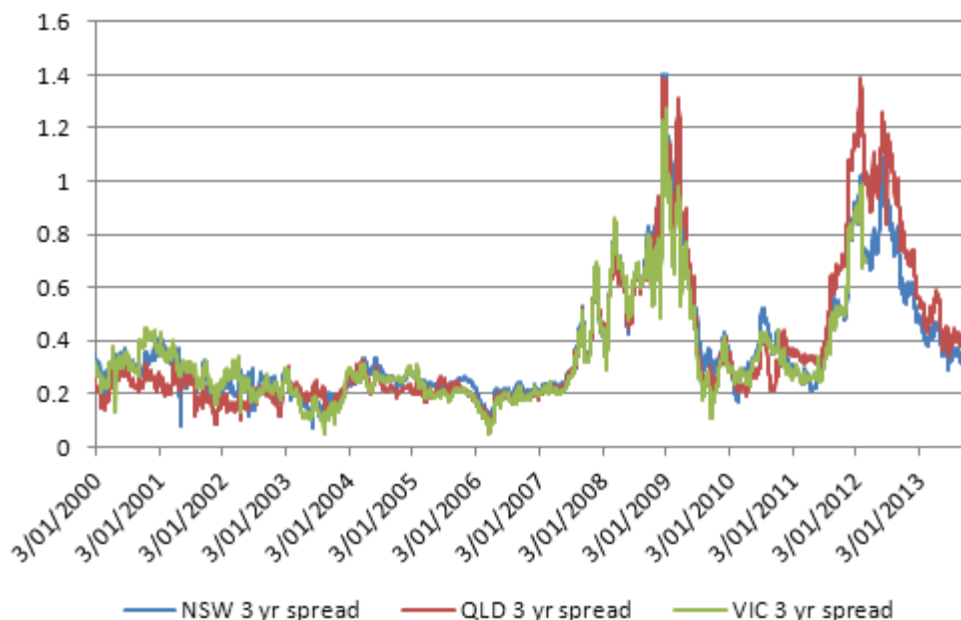


Source: RBA, *Chart Pack*, 6 November 2013.

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.

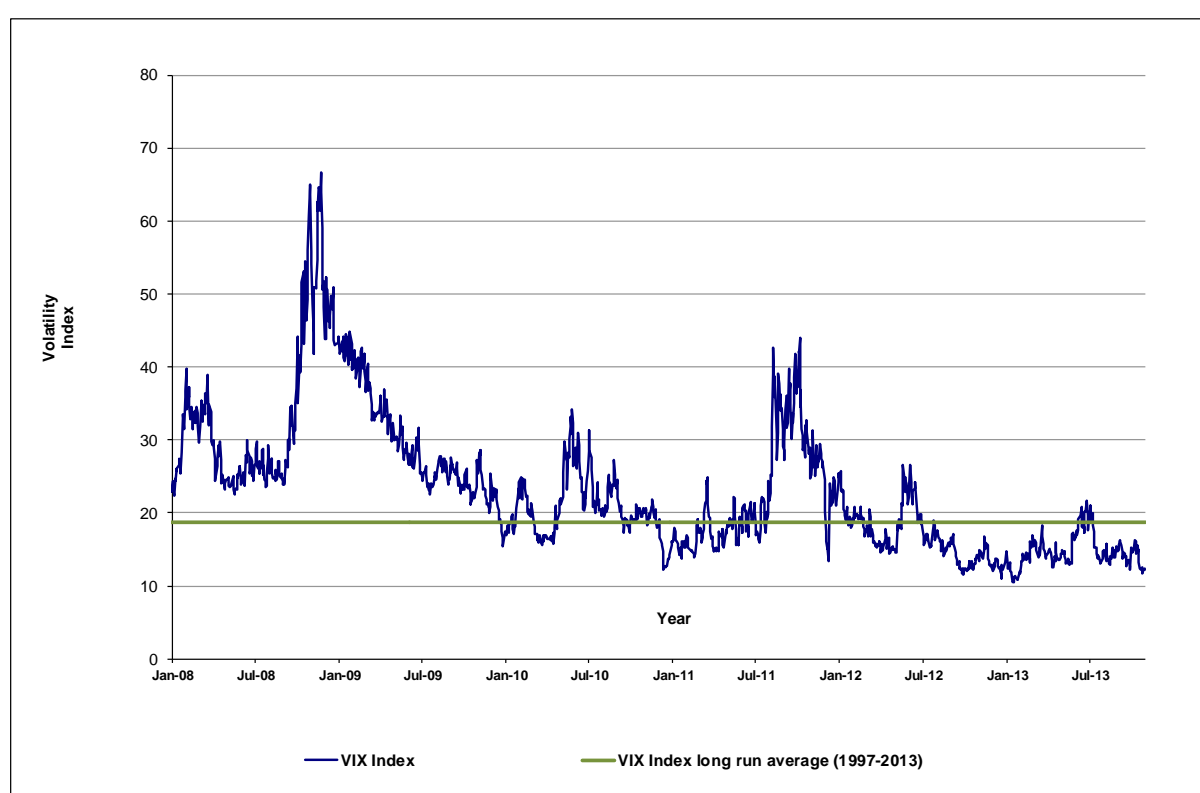
⁴⁵⁶ VAA, MRP for *Envestra*, March 2011, p. 4 (footnote 7). Further, VAA appears to end its baseline period in 2009 even when using implied volatility data up to the end of 2010. See Bishop, Fitzsimmons, and Officer (2011), pp. 9, 14 (endnote 5).

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

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

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

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.

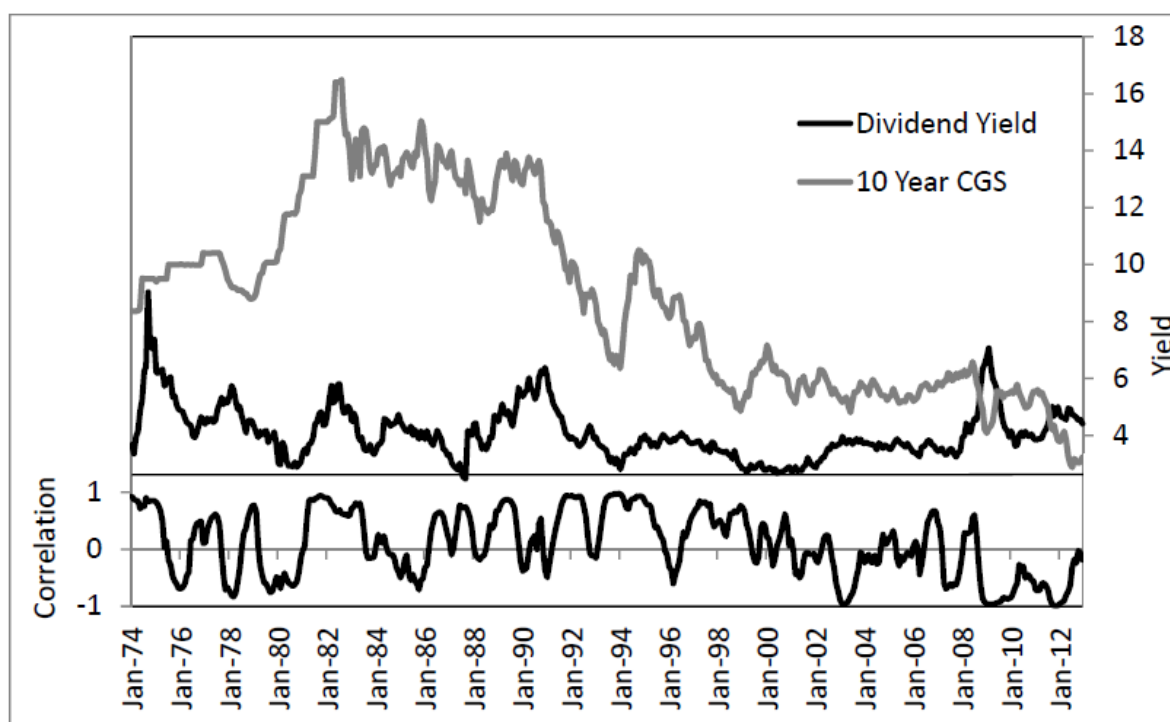
⁴⁸¹ Lally, *Cost of equity and the MRP*, July 2012, p. 7.

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-cyclical.
- 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:

$$(1) E(R_i) = R_f + \beta_j [E(R_m) - R_f]$$

Where: $E(R_i)$ is the return on the investment

R_f is the risk free rate

β_j is the equity beta

$E(R_m)$ is the expected market return

The term in the [] brackets can also be simplified to:

$$(2) \text{MRP} = E(R_m) - R_f$$

Therefore, the Sharpe–Lintner CAPM can be simplified to:

$$(3) E(R_i) = R_f + \beta_j \cdot \text{MRP}$$

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 ($E(R_m)$). 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

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 R_f and $E(R_m)$ 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 R_j and R_m 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

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. R_f represents the risk free rate. R_m represents the expected return on the market. R_i 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

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.

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:

$$P_0 = \frac{E(D_1)}{(1+k)^1} + \frac{E(D_2)}{(1+k)^2} + \frac{E(D_3)}{(1+k)^3} + \dots$$

where:

- P_0 is the current price of equity
- $E(D_t)$ 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.

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

$$P_0 = \frac{E(D_1)}{(1+k)^1} + \frac{E(D_2)}{(1+k)^2} + \dots + \frac{E(D_{N-1})}{(1+k)^{N-1}} + \frac{E(D_N)}{(1+k)^N} + \frac{\frac{E(D_N)(1+g)}{k-g}}{(1+k)^N}$$

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

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.

$$P_c = \frac{m \times E(D_c)}{(1+k)^{m/2}} + \sum_{t=1}^N \frac{E(D_t)}{(1+k)^{m+t-0.5}} + \frac{E(D_N)(1+g)}{(1+k)^{m+N-0.5} \frac{k-g}{k-g}}$$

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
- $E(D_c)$ is the current expectation of dividends per share for the current financial year
- $E(D_t)$ 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.

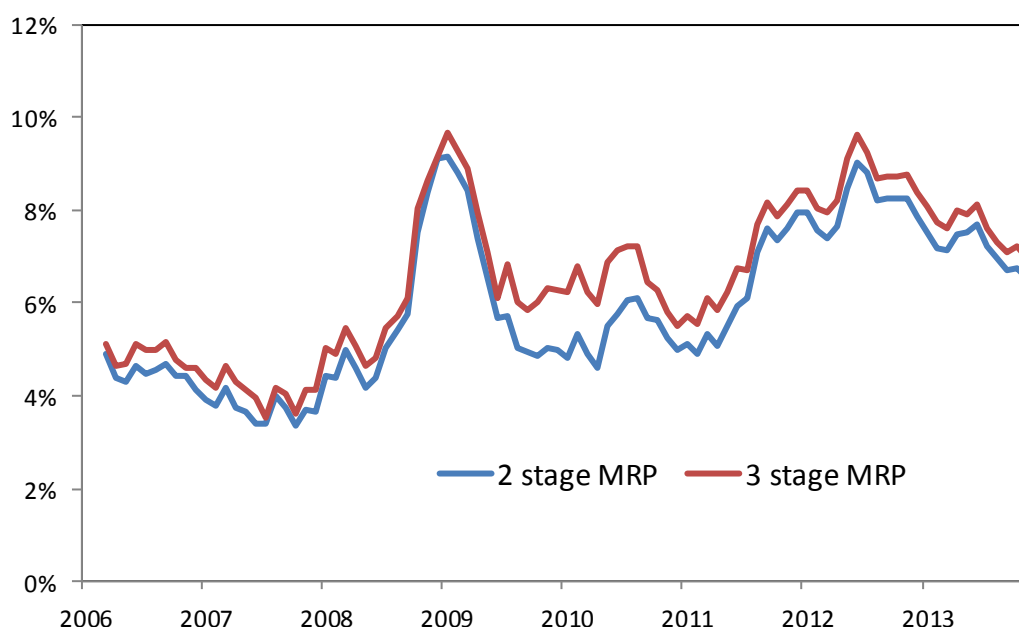
⁵³³ Lally, *The Dividend Growth Model*, 4 March, 2013. Lally cites two facts which suggest that 2 per cent is an overestimate of the dilution factor: the 'declining dividend payout rate'; and the extent to which 'market capitalisation grows simply due to listings from foreign firms and from previously 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:

$$g = 100 \times \{(1 + 0.02)(1 + 0.025) - 1\} = 4.6 \text{ per cent}$$

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.

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

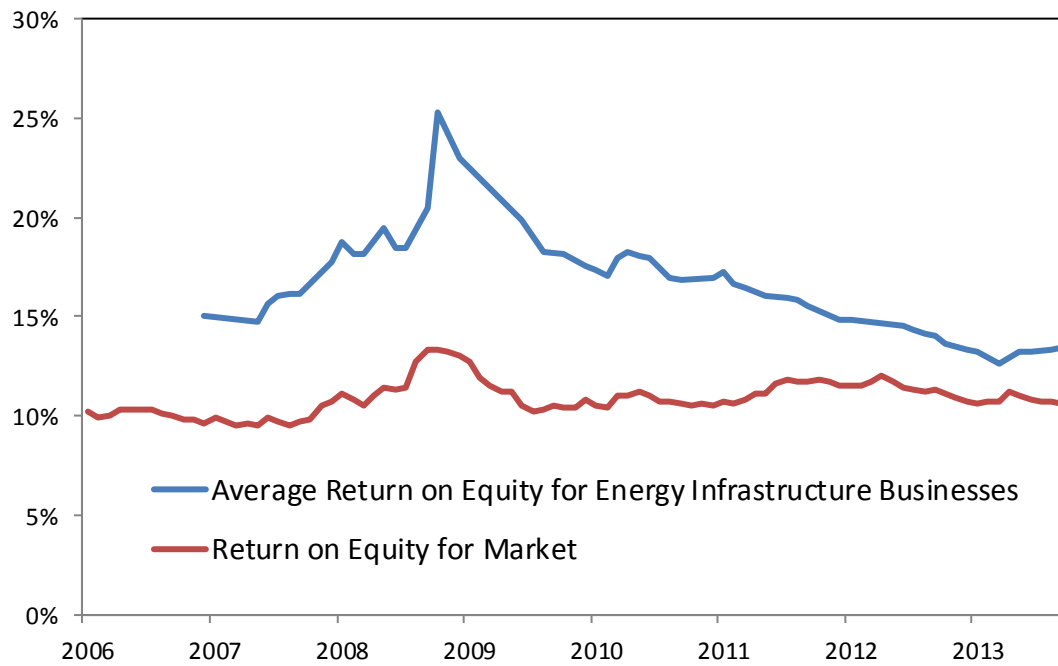
A similar method might be used to obtain estimates of the return on equity for individual energy infrastructure businesses, potentially then averaged in order to obtain an estimate for the industry. In several reports, CEG used DGM modelling to estimate the return on equity for six energy infrastructure 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

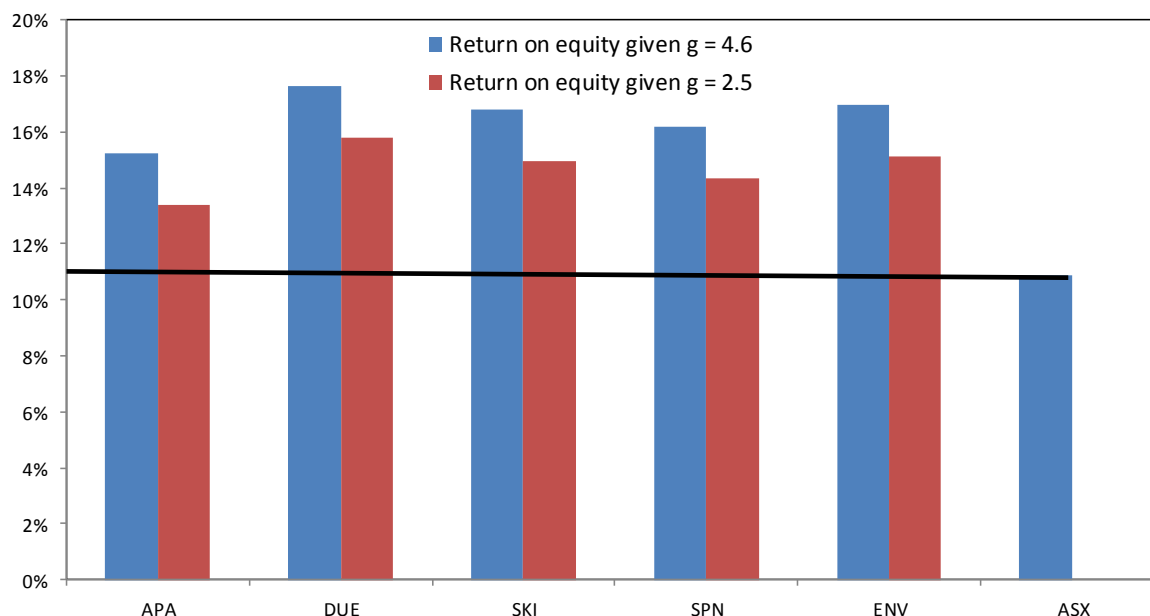


Source: Bloomberg and AER analysis.

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, 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

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.

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 than 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. Jensen, *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	Bloomberg (market)	Bloomberg (market)	Standard and Poor's (book)
	2002–2007 ^a	2002–2012 ^b	2002–2012 (excluded) ^c	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 Fund⁵⁶⁴
- 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.

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.

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.

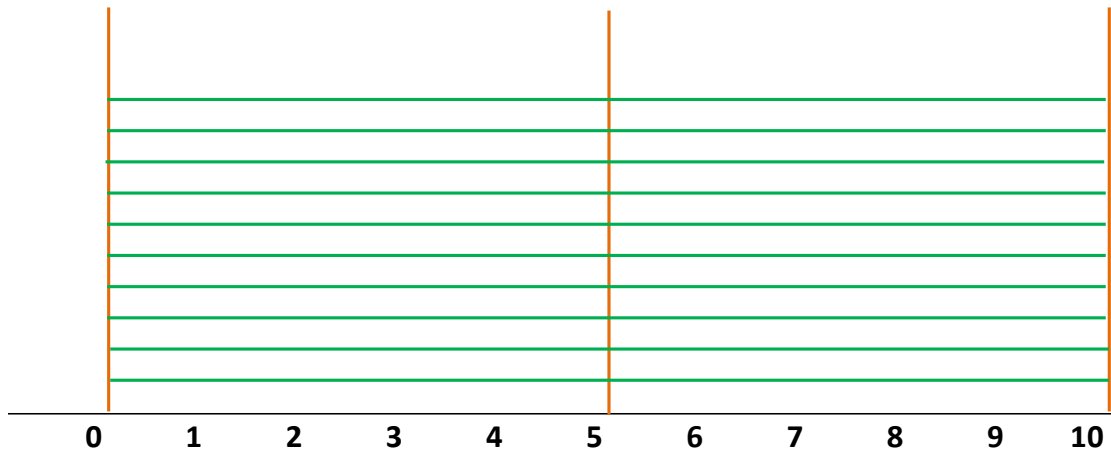
⁵⁷⁸ That is, we will not be applying weights based on actual debt issuance, changes in RAB, or debt issuance assumptions in the PTRM, as set out in section 7.3.5.

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.

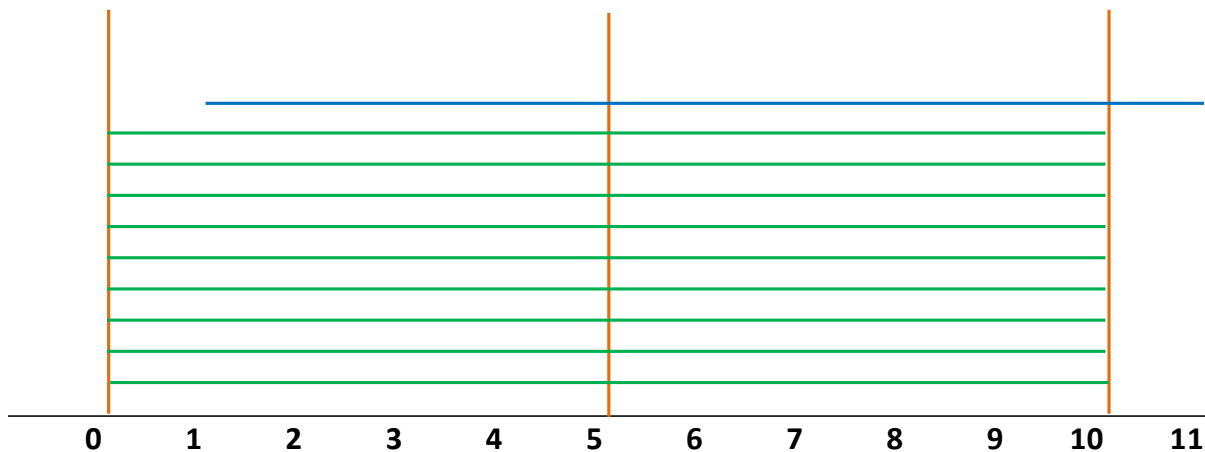
Figure G.1 Transition, year one



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.

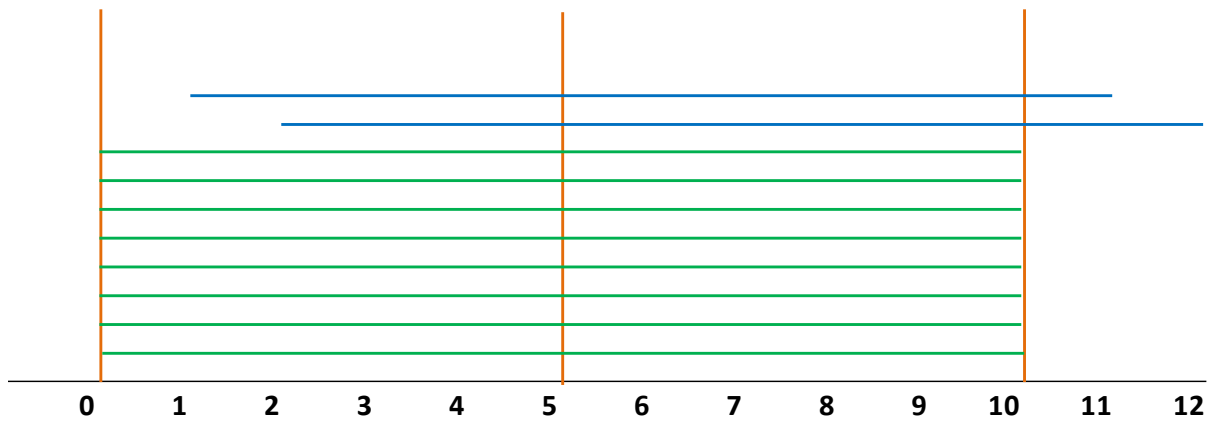
Figure G.2 Transition, year two



Source: AER analysis.

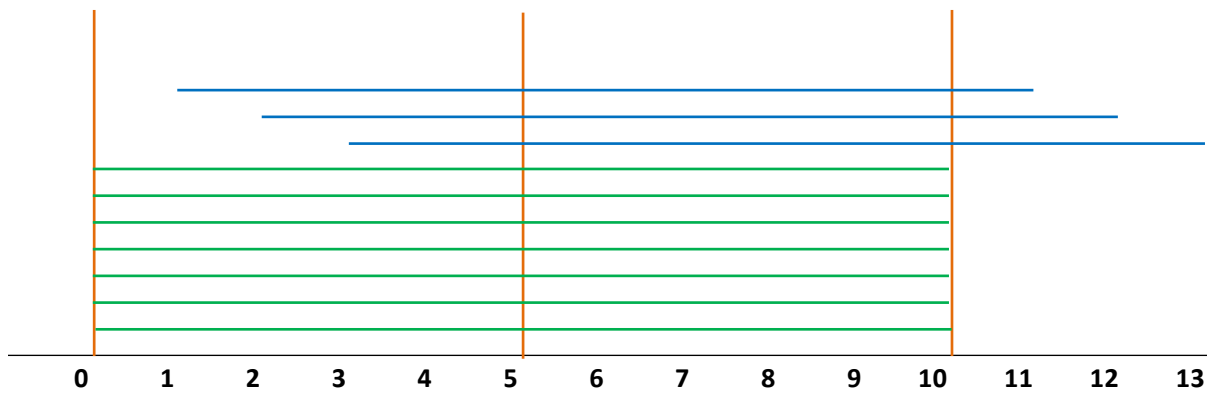
In the third and subsequent years of the transitional period, the allowed return on debt would be a weighted sum of the prevailing rates in the regulatory years starting from year one and up to the current regulatory year. This is shown from Figure G.3 to Figure G.9.

Figure G.3 Transition, year three



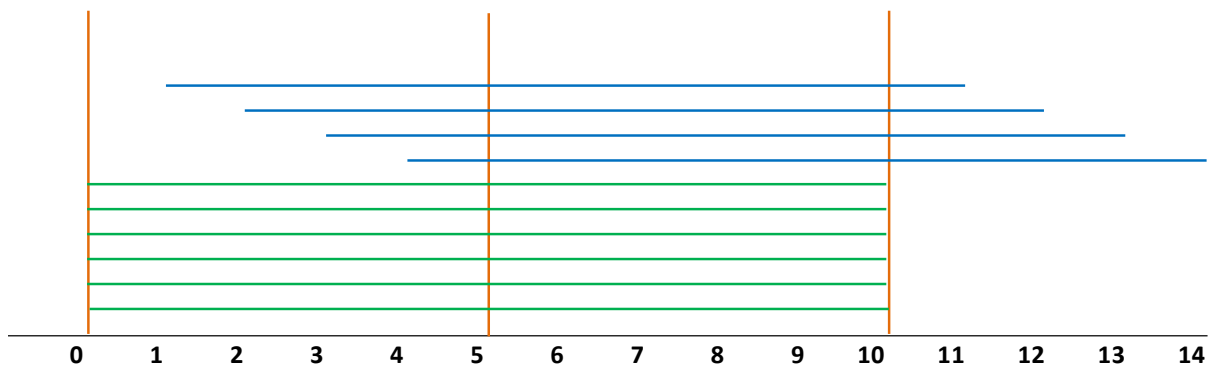
Source: AER analysis.

Figure G.4 Transition, year four



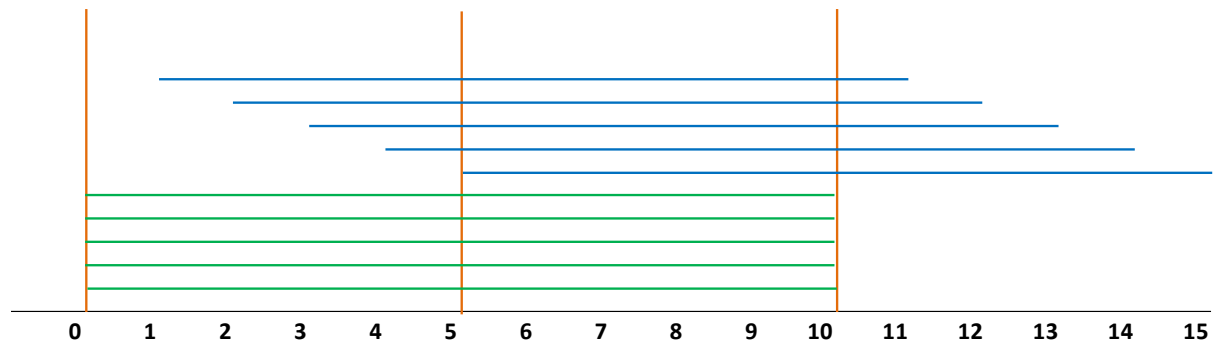
Source: AER analysis.

Figure G.5 Transition, year five



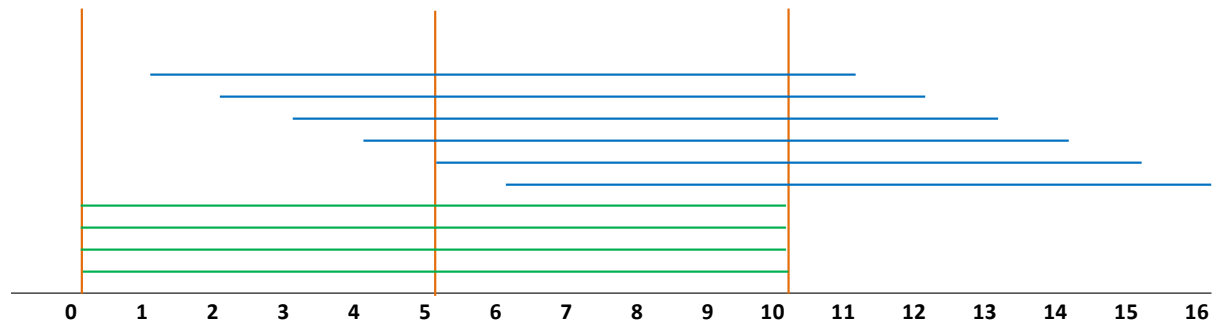
Source: AER analysis.

Figure G.6 Transition, year six



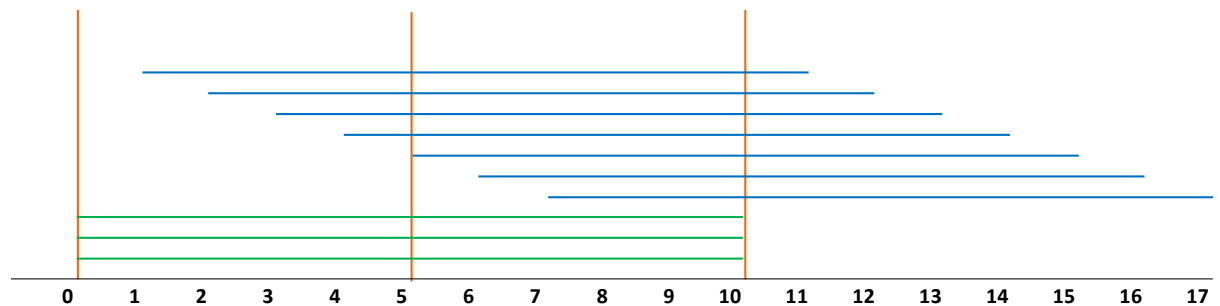
Source: AER analysis.

Figure G.7 Transition, year seven



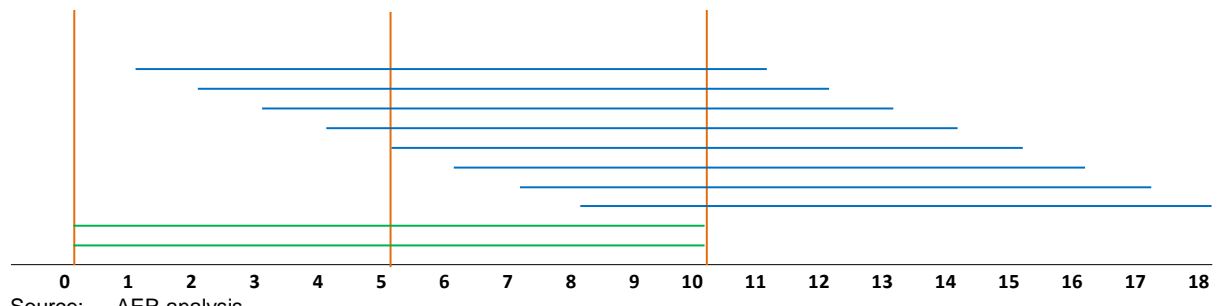
Source: AER analysis.

Figure G.8 Transition, year eight



Source: AER analysis.

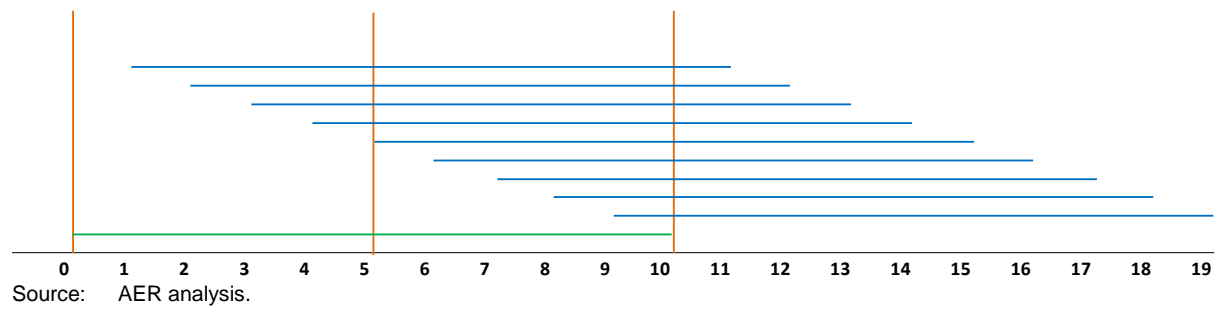
Figure G.9 Transition, year nine



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



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

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.

⁵⁸⁴ For example, $\$1 \times 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. γ can be interpreted as the value of a dollar of tax credit to the shareholder.⁵

⁵ For example, if the shareholder can fully utilize the imputation tax credits then ("value") $\gamma = 1$, 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 $\gamma = 0$. 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).

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

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

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.

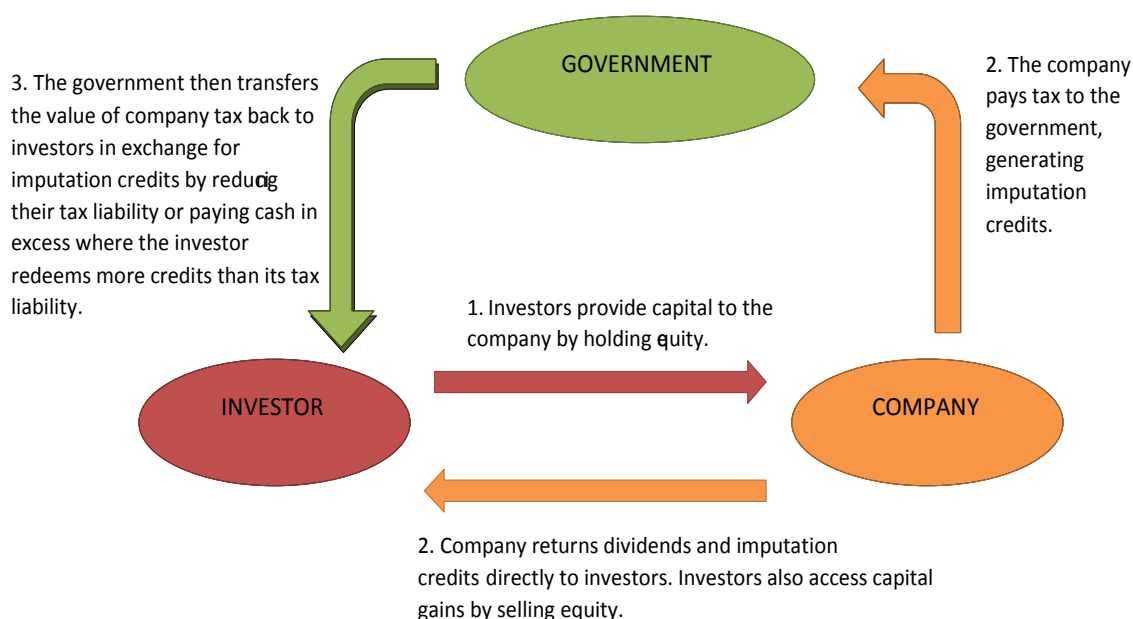
The value of this imputation credit offset is included in the estimated cost of company tax building block. Specifically, it is the representative investor's expected utilisation of franking credits as a proportion of the total company tax paid. Under the Officer and Monkhouse constructions, the value 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.

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 misrepresented. 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	<p>'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.</p> <p>The Tribunal would be assisted in its consideration of the issues before it if the AER were to provide relevant extrinsic material explaining:</p> <p>(a) the rationale for including the gamma component in the formula for calculating the estimated cost of corporate income tax; and</p> <p>(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</p>
The payout ratio	<p>'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</p>

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] AComptT 7*, October 2010, para. 147.

⁶¹⁹ Australian Competition Tribunal, *Application by Energex Limited (Gamma)(No 5) [2011] AComptT 9*, May 2011, para. 42.

⁶²⁰ Australian Competition Tribunal, *Application by Energex Limited (No 2) [2010] AComptT 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 Monkhouse⁶²⁶
 - re-evaluated papers that extend these foundational models and consider their implications in a regulatory context⁶²⁷
 - 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, SFG⁶²⁸
 - 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.

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.

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

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.

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

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

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

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 Handley⁶⁶⁹) 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.

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

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

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

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

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

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

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.

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
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.

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.

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

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 multicollinearity 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

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,

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.

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.

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 <i>negative</i> 0.29 to <i>positive</i> 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.
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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

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'.

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.

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)	<p>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.</p> <p>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.</p> <p>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.</p>
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)	<p>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.</p> <p>The ECC supports the position taken by PIAC in its submission.</p>
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	<p>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.</p> <p>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.</p>
TransGrid	<p>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.</p> <p>Shortcomings in the AER's engagement process might result in a final guideline that is based on an</p>

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	<p>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.</p> <p>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.</p>
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Table I.2 Summary of submissions—application of criteria

Respondent	Comments
APA Group	<p>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.</p>
Australian Pipeline Industry Association (APIA)	<p>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.</p> <p>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).</p>
COSBOA	<p>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'.</p> <p>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.</p>
ENA	<p>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).</p>
Public Interest Advocacy Centre (PIAC)	<p>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.</p>

Table I.3 Summary of submissions—benchmark efficient entity, compensation for risk

Respondent	Comments
ENA	<p>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.</p>
APIA	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>
APA Group	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>APA submits that risks in general should be considered and not just the risks for which investors require compensation.</p>
Envestra	<p>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</p>

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. Whilst 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.
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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.
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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.
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NSW Irrigators' Council	<p>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.</p> <p>The AER's approach to the allowed rate of return is complex and not transparent for consumers.</p> <p>Urges the AER to coordinate with state based regulators to establish one common methodology across jurisdictions.</p>
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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.

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.

PIAC 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).

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.

APIA 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.

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.

ENA

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	<p>Supports the AER's continued use of the Sharpe–Lintner CAPM. However, makes the following comments:</p> <ol style="list-style-type: none"> 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	<p>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.</p> <p>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).</p> <p>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).</p>
NSW DNSPs	<p>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.</p> <p>The risk free rate should be estimated using historical data when using the CAPM, with MRP and</p>

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.
	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.
Envestra	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.
	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.
PIAC	<p>The use of the Black CAPM should be limited to a qualitative assessment of the direction of the equity beta.</p> <p>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).</p>
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.
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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	<p>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.</p> <p>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.</p>
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.
	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.
NSW DNSPs	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 ¹ .
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'.
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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.
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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.
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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.
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APA	Supports using a third party data service provider.
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COSBOA	Does not oppose the use of third party data, but encourages the AER to develop an in-house dataset.
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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.
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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.
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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.
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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].
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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
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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

	<p>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.</p> <p>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.</p> <p>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.</p>
<p>NSW Treasury Corporation (NSW TCorp)</p>	<p>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.</p> <p>TCorp encourages the AER to find a third party data service provider which can publish the required data.</p>
<p>Transgrid</p>	<p>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.</p>
<p>ActewAGL</p>	<p>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.</p>
<p>APIA</p>	<p>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.</p> <p>APIA agrees the term at issuance, rather than the term to maturity should be used.</p> <p>APIA submits a reduction in the debt term provides the wrong incentives for investors to take up longer term debt.</p> <p>APIA notes the ENA's suggested alternatives to address the extrapolation issue.</p> <p>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</p>

	annum for a \$1 billion pipeline. APIA questions the AER's determination of materiality.
APA Group	<p>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.</p> <p>APA states that annual updating issues should not impact upon the determination of the debt term.</p>
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.

<p>Australian Financial Market Association (AFMA)</p>	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>
<p>EUAA</p>	<p>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.</p>
<p>PIAC</p>	<p>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.</p>
<p>MEU</p>	<p>The AER should consider the extensive evidence, provided by the ERA, which suggests the average term of debt is closer to five years.</p>
<p>COSBOA</p>	<p>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.</p>
<p>ECC</p>	<p>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.</p>
<p>Credit rating of a benchmark efficient entity</p>	
<p>ENA</p>	<p>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.</p>
<p>MEU</p>	<p>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</p>

	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	<p>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.</p> <p>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.</p>
ENA	<p>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.</p> <p>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.</p> <p>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 rebranding of the same definition representative investor arguments that were used in the 2009 WACC review and subsequent Tribunal hearing.</p> <p>Franking credit yield studies show that returns are independent of the imputation credit yield, since firms with high imputation credit yields do not require lower returns.</p> <p>If the AER is to use the KPMG survey information to inform its theta estimate, the guideline should set out</p>

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 not 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	<p>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.</p> <p>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).</p>

	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 $1/6 \times 0.82 + 1/3 \times 1.00 + 1/3 \times 0.96 + 1/6 \times 0.91 = 0.94$. 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	<p>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.</p> <p>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.</p>
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	<p>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.</p> <p>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</p>

	<p>this evidence suggests that Australian and US energy firms face similar levels of systematic risk.</p> <p>Further, US betas are higher than what the AER suggests.</p>
COSBOA	<p>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.</p>
ENA	<p>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.</p> <p>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.</p> <p>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.</p> <p>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).</p>
MEU	<p>The AER uses biased overseas outcomes as a cross-check.</p>
PIAC	<p>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.</p> <p>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.</p> <p>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.</p>
Spark Infrastructure	<p>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.</p>
Black CAPM	
ActewAGL	<p>Evidence from the theory underpinning the Black CAPM (as per NERA's report to the ENA)</p>

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	<p>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.</p> <p>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 contractual terms that transfer considerable risk away from the Plant.</p>
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

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.

APA Group

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 mechanically 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 priorities 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 previous 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	<p>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.</p> <p>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.</p>

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.

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.

There is too much emphasis on the Professor Wright approach.

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.