Discussion paper

Market Risk Premium, risk free rate averaging period and automatic application of the rate of return

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AUSTRALIAN ENERGY REGULATOR

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Shortened forms

Shortened form	Extended form
ABS	Australian Bureau of Statistics
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
ATO	Australian Tax Office
CCP	Consumer Challenge Panel
COAG	the Council of Australian Governments
DGM	dividend growth model
energy networks	electricity and gas network service providers
the Guideline	the allowed rate of return guideline
MRP	market risk premium
NEL	national electricity law
NEO	national electricity objective
NER	national electricity rules
NGL	national gas law
NGO	national gas objective
NGR	national gas rules
RBA	the Reserve Bank of Australia
regulatory period	an access arrangement period for gas network service providers and/or a regulatory control period for electricity network service providers
the rules	collectively, the NER and NGR

Contents

1 Introduction

The Rate of Return Guideline (Guideline) outlines our approach to setting the allowed rate of return for regulated gas and electricity network services. We are currently reviewing the Guideline.

Our role is to determine a rate of return that meets the National Electricity Objective (NEO)/National Gas Objective (NGO). Concurrent evidence can bring efficiency and disciple to the process of examining issues. By holding the concurrent evidence sessions, the AER Board can elicit expert evidence with more input and assistance from the experts themselves. The Board can use the experts' differing views to assist in arriving at its own.

The purposes of this discussion paper are to:

- summarise submissions received from stakeholders
- outline background financial and academic material relevant to further consideration
- set out the reasons for current approach to date as a starting point for discussion and the concurrent expert evidence sessions
- provide references to some differing expert views presented to us in the past
- outline questions to frame that discussion.

This paper covers three topics. In sections 2 to 5 we discuss the market risk premium (MRP). Sections 6 and 7 discuss the risk free rate averaging period and the automatic application of the return on equity. Section 8 sets out the questions for discussion at the concurrent evidence session.

This discussion paper is prepared for these sessions to assist with this purpose. We also note that the discussion papers and questions for the topics, including those contained in this discussion paper, cover a broad range of material that stakeholders wish to have considered in the Guideline review. This material should not be taken to imply the AER has already formed views on the appropriate methodological approaches to apply, or numerical values to use, in the 2018 Guideline to determine the allowed rate of return.

2 Background

We consider the debate around the evidence and how that evidence should be employed to determine the appropriate point estimate for the MRP.

This section sets out:

- An introduction to the market risk premium and estimation methods
- The correlation between risk free rate and MRP
- The submissions received in response to our issues paper.

2.1 Introduction to MRP & estimation methods

The MRP, according to the application of the SL-CAPM, is the excess return above the risk free rate that investors require (in an ex-ante sense) to invest in the market portfolio. The basic form of the SL-CAPM is return on equity (ROE) = Rf + β((E(R_m) – Rf)). The term ((E(R_m) – Rf)) is commonly known as the MRP.

The MRP is commonly defined as the realised return the market portfolio makes above the prevailing risk free rate. There are alternative definitions which step away from the traditional SL-CAPM which is common in both finance and academic literature, they are discussed later in this paper.

Methods for estimating the MRP may be broadly characterised as either return based or forward looking. Return based methods use actual, realised returns as a proxy for future returns. Forward looking methods use forecasts, current market variables and predictions to estimate future returns. Both forward looking and return based methods of estimation are based on historical data, or interpretations of it. Whilst return based methods are more explicit in their use of historical data, forward looking methods use either analyst forecasts or historical estimates. Stakeholders have also put forward the Wright approach as a forward looking method.

The main two methods commonly used in MRP estimation are the Historical Excess Returns (HER) and the Dividend Growth Model (DGM). HER works by looking at realised returns from Australian market data in order to calculate a historic average of returns above a determined risk free rate. As such, HER is considered a returns based method and is discussed in more detail in Historical Excess Returns. DGM's use analyst forecasts of dividend growth, estimated future growth rates, current share prices and historical returns on equity in order to estimate the market risk premium. As such the DGM is largely considered a forward looking method and the evidence surrounding the model is discussed in Dividend Growth Models.

Our role is to estimate an MRP for a future time period, in order to set the allowed rate of return. The forward looking MRP is estimated over a term period of 10 years. In

2003 the Australian Competition Tribunal decided in its GasNet decision that 10 years is the appropriate term of the risk free rate in the CAPM.[1] This was based on the points that:

- it is a convention for economists and regulators to use a long-term risk free rate as the life of the assets in question are also long[2]
- the CAPM and the estimate of the MRP should use the same risk free rate to maintain consistency throughout the decision.

Arguments were put forward in the 2013 guideline decision about altering the term structure for equity to 5 years, however we decided on balance to keep it at 10 years.[3]

Under the 2013 guideline we have set an MRP of 6.5.

2.2 Risk free rate and MRP correlation

There is debate between experts whether there could be a correlation between the risk free rate and the MRP. Underlying this debate is the question of whether the cost of equity is implied to be stable, and how this impacts the MRP under the SLCAPM.

We received submissions when considering our 2013 guideline which proposed a negative correlation existed[4] and others which stated there was no cause to believe there was a strong relationship at all.[5]

Strategic Financial Group (SFG) submitted a paper to the Queensland Competition Authority (QCA) in 2013 stating that there was evidence in the corporate bonds that suggested the cost of equity should remain stable, at least far more stable than the risk free rate and the DRP are individually.[6] This is derived from the perceived correlation between the cost of equity and the cost of debt on the market. Figure 1 shows the risk free rate and the debt risk premium (DRP) between March 2006 and March 2012.

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1 Australian Competition Tribunal, Application by GasNet Australia (Operations) Pty Ltd [2003] ACompT 6, 23 December 2003.

2 In a Valuation survey KPMG found that 85% of particpants used the yield of the 10 year government bond as a proxy for the risk free rate in Australia. KPMG, *Valuation Practices Survey 2013*, p. 12.

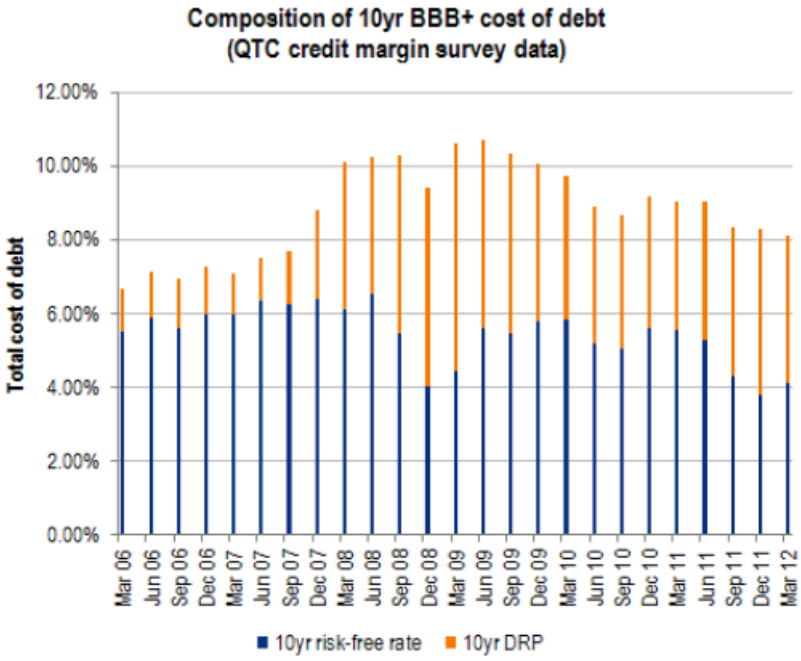
3 AER, *Explanatory statement on Draft Rate of Return Guideline*, August 2013 ,p184

4 CEPA, *Advice on Estimation of the risk free rate and market risk premium*, 12 March 2013, p25

5 Partington and McKenzie*, Review of the AER's Overall Approach to the risk free rate and market risk premium,* February 2013, p7

6 SFG, *Response to the QCA Discussion Paper on risk free rate and market risk premium*, 19 March 2013

Figure 1 Graph Showing BBB+ cost of debt and its composition

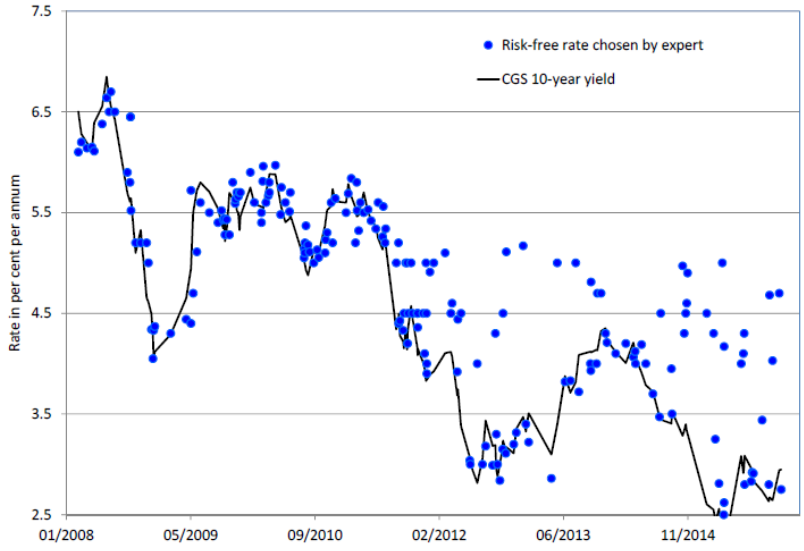


HoustonKemp, in their 2016 paper, stated that there is clear evidence from valuation reports that suggests an inverse relationship between the MRP and the Risk Free Rate.[7] It highlights that in valuation reports there is evidence the consultants impart an uplift on the risk free rate in order to keep the return on equity stable, which is shown in Figure 2.[8]

[7] HustonKemp, *The Cost of Equity, Response to the AER's Draft Decisions for the Victorian Electricity Distributors*, January 2016

[8] HustonKemp, *The Cost of Equity, Response to the AER's Draft Decisions for the Victorian Electricity Distributors*, January 2016, p.44

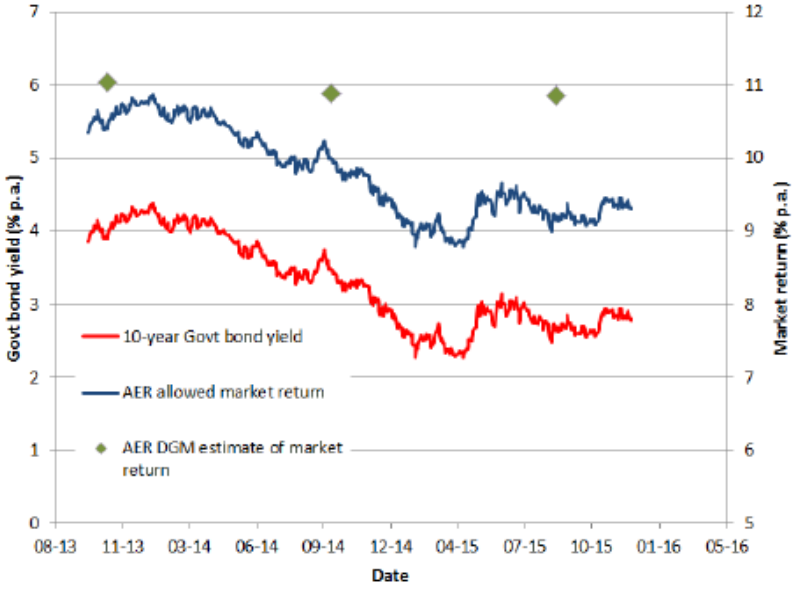
Figure 2 Plot of Expert chosen RFR vs 10 year CGS yield



Note: Data are from the Connect-4 database, the ASX and the RBA. The 10-year CGS yields are interpolated from the RBA files f16.xls, f16hist.xls and f16hist2013.xls.

Frontier's 2016 paper states that there is evidence of an inverse relationship between the two variables as shown by valuation reports as well as the AER's own DGM estimate of the ROE.[9] Frontier cites HoustonKemp's report and Figure 2 above. Frontier also presents evidence showing that the AER's DGM gives a much more stable ROE than has been allowed by the AER. This is shown in Figure 3.

Figure 3 Graph showing AER's DGM ROE vs 'allowed' market return



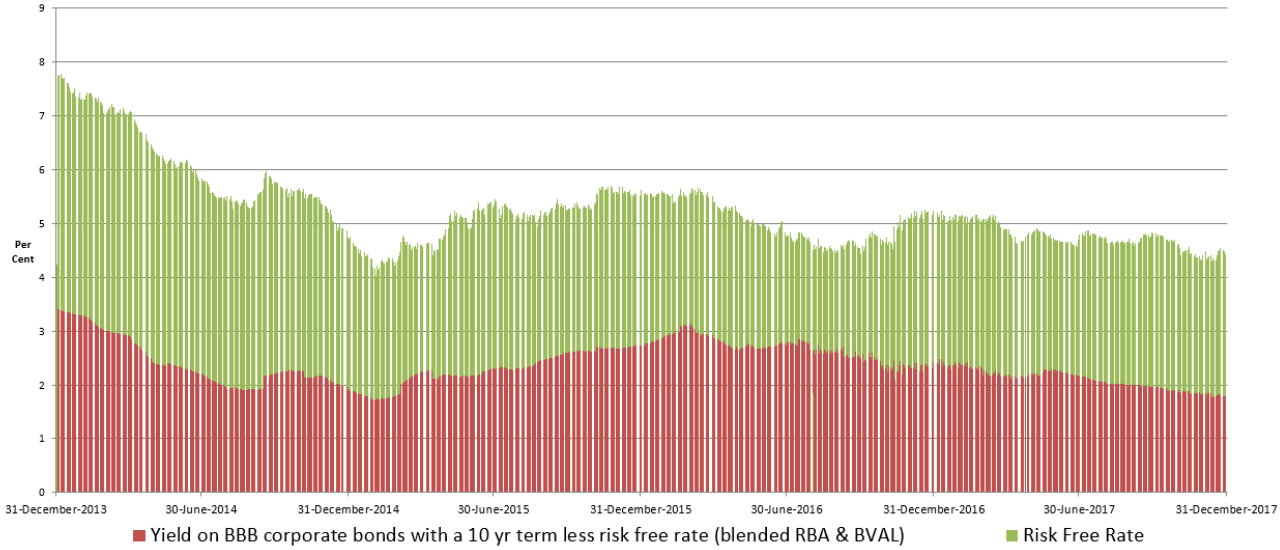
9 Frontier, *The Relationship between government bond yields and the market risk premium*, January 2016, p.12

APA has also submitted an approach which implies a negative correlation between the risk free rate and the MRP.[10]

There are a number of academic reports which suggest a positive relationship between the risk free rate and the MRP. Li[11], Kim and Lee[12] and Damodoran[13] all propose that there is a positive relationship between interest rates and equity risk premiums. In previous decisions we have acknowledged that uplifts are given to the risk free rate in independent valuations. We have also noted that we have been advised that this method may not be applicable in a regulatory context.[14]

Extending the graph shown by SFG in Figure 1, it can be seen that since 2013 both the debt risk premium and the overall return on equity have decreased Figure **4** shows these results.

Figure 4 Cost of BBB debt and its composition since 2013



McKenzie and Partington advise that any relationship between the MRP and risk free rate is an open question, and any relationship that may exist is not sufficiently well established to form the basis for regulatory adjustment to the MRP.[15] We also received advice that a negative correlation between the risk free rate and the MRP has no well accepted theoretical support and is not used much in practice.[16]

2.3 Submissions

10 APA, *Access Arrangement Revised Proposal*, August 2017, pp.78-82

11 Li, *Time-varying risk aversion and asset prices, Journal of Banking and Finance*, 2007

12 Kim & Lee, Stock returns, asymmetric volatility, risk aversion and business cycle: Some new evidence, July 2007,

13 Damodoran, *Equity Risk Premiums (ERP): Determinants, Estimation and Implications – the 2012 Edition*

14 Partington and Satchell, *Report to the AER: Discussion of estimates of the return on equity,* 12 April 2017, P16

15 McKenzie and Partington*, Review of the AER's Overall Approach to the risk free rate and MRP*, February 2013, p28

16 Partington and Satchell, *Cost of Equity issues 2016 Electricity and Gas Determinations*, April 2016, pp30-31

Table 1 Summary of submissions on MRP

Submission	Comment
Energy Consumers Australia	The ECA stated it has a methodological objection to the use of the Dividend Growth Model to inform the MRP. It also wants the MRP estimate to be set closer to the mid-point of the historical range of the geometric and arithmetic excess returns.
APA	APA submit that the AER's method of calculating the MRP as a single exogenous variable is incorrect and not applicable to the SLCAPM. The AER should be viewing the MRP as simply the expected market return, calculated using the DGM, minus the prevailing risk free rate.
ATCO Gas Australia	ATCO put forward that a fixed Equity Risk Premium would not be appropriate over a regulatory period and that in considering an estimate for the MRP it would be inappropriate to not consider DGM evidence as part of forward looking methods.
APGA	APGA respond to the idea of a fixed ERP by stating it is not an issue if it is fixed, but whether it is estimated in a robust, transparent and replicable manner. It also suggests that the SLCAPM requires a forward looking estimate of the MRP, and so the DGM should be given strong consideration.
Cheung Kong Infrastructure	CK Infrastructure state that the MRP estimation should have regard to both the DGM and the Wright Approach to the SLCAPM. It states their support for the ENA's submission to the AER.
CCP (subpanel 16)	The CCP submit that the MRP should be estimated using as wide a range of methods as updated evidence deems appropriate. It puts forward that assumptions underpinning the DGM make it more useful as a conceptual tool rather than a forecasting model. The weight to be placed on the DGM cannot be specified quantitatively.
ENA	The ENA state that a guideline that does not consider the DGM and Wright approach evidence would be lacking, and that a fixed ERP could lead to an extremely volatile Return on Equity estimate over the lifespan of the guideline. Re-opening conditions for a prescriptive MRP would need to be predictable and transparent to work.
Ergon Energy and Energex	This submission raises that there should be less discretion on behalf of the AER once the Guideline is finalised. The service providers also want the DGM to directly inform the estimate of the MRP. A prescriptive Risk Premium would need clear examples as to how a re-opener would work to be acceptable.
Ian McAuley	McAuley raises issues around the excess returns received by Australian firms in the past being abnormal, and deems the arithmetical calculation of the MRP questionable. The geometric mean should definitely be considered as part of the MRP estimation.
Jemena	Jemena submits that fixing the ERP during this guideline review will promote stability, predictability and consistency of the allowed rate of return. It does not want to change the current MRP estimation methodology.
CANEGROWERS	CANEGROWERS submit that the standard calculation of MRP is likely to overstate the risks faced by a natural monopoly network firm.
Major Energy Users	The MEU state in their submission that the only parameter that should change once the guideline has been set is risk free rate to provide certainty for investors and consumers. It continues to state that the DGM should not be used in the RoE calculation due to the large number of assumptions the model makes.
Public Interest Advocacy Centre	The PIAC supports a bottom up analysis of the risk allocation between networks and consumers to provide transparency of the Market Risk Premium
Queensland Treasury Corporation	The QTC submission puts forward a prescriptive approach for estimating the

	MRP, similar to the previous multi-model approaches. The QTC also wants to see the DGM given a prescriptive weight in determining the MRP.
Spark Infrastructure	Spark make clear that any prescriptive MRP would need to be transparent and have the ability to be flexible given a change in market conditions. It reaffirms their previous position on the DGM stating that it should not be relegated to a cross-check due to the forward looking nature of the evidence.
The Australia Institute	The Australia Institute says the AER should ignore the equity premium when setting permitted rates of return.

Source: ECA, *Response to the AER Issues Paper*, December 2017, p.27; APA, *APA submission responding to AER issues paper,* 12 December 2017, pp.7-9, 11-12; ATCO Gas Australia, *Response to Revie of Rate of Return Guideline – Issues Paper* , 12 December 2017, pp.7-9; APGA, *Submission to the Issues Paper*, 12 December 2017, pp.8-11; Cheung Kong Infrastructure, *Review of the Rate of Return Guideline*, 12 December 2017, p.4; CCP (subpanel 16), *CCP Submission to the AER on its Rate of Return Guideline Issues Paper*, December 2017, pp81-108; ENA, *Response to AER Issues Paper*, 12 December 2017, pp21-35; Ergon Energy and Energex, *Ergon Energy and Energex submission on AER Issues Paper*, 12 December 2017, pp.5-7; Ian McAuley, *Submission to Australian Energy Regulator on Rate of Return Guideline*s, December 2017, p.4; Jemena, Submission on Rate of Return issues paper, December 2017, pp.3-4; CANEGROWERS, *Letter to AER re:RoR Review*, 19 December 2017, p.4; Major Energy Users, Submission by the MEU to the review of the rate of return guideline, 18 December 2017, p16; PIAC; *PICA letter to the AER*, December 2017, p.2; Queensland Treasury Corporation, *QTC submission to the RoR Guideline Review Issues Paper*, December 2017, pp.3-5;

In chapters 3 and 4 we discuss how HER and DGM methods have been previously utilised in determining the value of the MRP for our regulatory task. In Other MRP Estimation Evidence we set out some of the other evidence that has some relevance in selecting the MRP point estimate.

3 Historical Excess Returns

The Historical Excess Returns (HER) method works by measuring realised market returns above the annualised risk free rate during a period. These are then averaged over varying time periods to give an estimate of a forward looking MRP.

3.1 Approach to date

We have used HER as a primary source of information when estimating the MRP under the 2013 guideline. Both the geometric and arithmetic averages are taken into account. We have acknowledged the respective advantages of the two types of average in previous decisions[17] and decided that using both to form a point estimate was the best use of all information available. This estimate was then supplemented by further evidence.[18]

We looked at HER data over differing time periods in order to take into account changing conditions in different years. The time periods which we previously considered as important to calculate averages are displayed in Table 2 below. We have also added in an extra time period, from 2000-2018, for consideration.

We also acknowledged potential issues with HER data, such as it is slow to change year on year. However, it is also unlikely to be influenced by a single year's results even if extreme.

3.2 Updated Data

Table 2 shows the 5 sampling periods for HER as suggested by Brailsford, Handley and Maheswaran (BHM)[19], as well as a more recent period starting in 2000.[20]

Table 2 Updated MRP averages

Sampling period	Arithmetic average	Geometric average
1883–2017	6.2	4.9
1937–2017	5.9	4.1
1958–2017	6.4	4.1
1980–2017	6.3	4.1
1988–2017	5.8	4.3
2000–2017	5.7	4.0

17 Partington and McKenzie, *Return of equity and comment on submissions in relation to JGN*, May 2015, p.17

18 Partington and Satchell, *Report to the AER: Cost of equity issues–Final decisions for the VIC DNSPs*, April 2016, pp. 49–52

19 Brailsford, Handley and Maheswaran, *Re-examination of the historical equity risk premium in Australia,* Accounting and Finance, vol. 48, 2008, pp. 85–86.

20 AER, *Rate of Return Explanatory Statement*, December 2013. p82

3.3 Expert Views & Evidence

In this section we lay out the views and evidence which have been put forward to us or discussed in financial literature since the 2013 guideline.

3.3.1 Geometric Average

A common issue raised in respect of HER is how to employ geometric averages. As summarised in the Table **1**, some stakeholders have stated that geometric averages should not be used at all whilst others consider that we should place greater reliance on geometric averages. Discussion of this nature has been common over recent decisions and further details of previous arguments and critiques can be found in our publications.[21]

In the past we have been informed that the geometric average is likely to be downward biased while the arithmetic average is likely to have an upward bias.[22] Frontier has stated in recent reports that the geometric average should play no part in the estimation of the MRP because it does not provide an appropriate estimate of the expected return.[23] HoustonKemp and Lally submitted that the geometric average should not be considered in regulatory estimation of the MRP in order to satisfy the zero-NPV condition.[24] NERA has also raised concerns with the use of a geometric mean.[25]

In reviewing evidence for the 2018 guideline review, we have identified various pieces of academic literature which state the geometric average is useful in estimating a forward looking MRP.[26] The mathematics involved with the two methods suggests that with low current volatility the geometric average is likely to compensate an allowed return more fairly. Other academics stated that when considering a multi-year MRP (our current approach is to estimate a 10 year forward looking MRP) a geometric average should be given weight to provide an accurate estimate.[27] This is due to the compounding nature of the geometric average.

We have previously taken into account the view that the geometric average is considered to have a downward bias, and in light of that we used the highest result from the geometric averages to form the floor of our excess returns range.[28] Partington

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21 (For example) AER, *Multinet Gas Access Arrangement draft decision*, July 2017, pp88-93;

22 Partington and McKenzie, *Return of equity and comment on submissions in relation to JGN*, May 2015, p.17

23 Frontier, *The Market Risk Premium*, September 2016, p.74

24 Lally, M*., The cost of equity and the market risk premium*, Victoria University of Wellington, 25 July 2012, p.32; HoustonKemp, *The Cost of Equity: Response to the AER's Draft Decisions of the Victoria Electricity Distribution,* January 2016 ,p34

25 NERA, *Further Assessment of the Historical MRP: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors,* June 2015 p12

26 Damodoran, *Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2016 edition*, March 2016, P.33; JP Morgan, *The Quest for the Market Risk Premium*, May 2008, p.4;

27 Damodoran, http://people.stern.nyu.edu/adamodar/New_Home_Page/AppldCF/derivn/ch4deriv.html,

28 AER, *Multinet Gas Access Arrangement draft decision*, July 2017, p85

and Satchell also provided a short example in their 2015 report, in which they stated the geometric average can in some instances be more useful than the arithmetic average in predicting a single year estimate.[29]

3.3.2 Historical Returns Method

Under the 2013 guideline, HER is the method we use when first arriving at a point estimate for the forward looking MRP. We then use this point estimate as the base of our decision, then apply directional evidence from the DGM and then take into account other evidence in accordance with the 2013 guideline.

NERA, in its 2015 report for networks, stated that we should be using the longest time series available without any overlapping periods and it quote Goetzmann and Ibbotson on the matter.[30] This is in order to minimise the standard deviation of the time series while providing as accurate an average as possible.

Partington and Satchel advised that they are in favour of using as much information as possible, and acknowledged that the more recent sample periods are likely to provide changing information regarding taxation rule changes and currency regimes.[31] However, they did state that we risk making our estimates less precise by using overlapping sets of data and there should be more acknowledgement of potential issues of this method in our process.

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[29] Partington and Satchell, Analysis and Criticism of 2015 determinations, October 2015, pp44-45;

[30] NERA, *Further Assessment of the Historical MRP: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors,* June 2015

[31] Partington and Satchell, Analysis and Criticism of 2015 determinations, October 2015, pp45-46;

4 Dividend Growth Models

The Dividend Growth Model (DGM) is a general term that applies to variations of the Gordon Growth Model and Dividend Discount Model. The DGM takes current analyst forecasts of future dividend payouts, predictions of future dividend growth rates, a potential 'adjustment period' for these growth rates and historical measures of the return on equity to arrive at a 'forward looking' MRP. Because of the current market conditions built into analyst forecasts the DGM is given a lot of credit as a 'forward looking' MRP predictor.

The DGM was one of the topics most talked about in submissions to the Issues Paper, the arguments ranged from pushing for the DGM to not be given any consideration by us in the MRP estimation to using the DGM to mechanistically define the MRP with one or more other approaches considered. The submissions are summarised in Table **1**.

4.1 Approach to date

In the 2013 Guideline we considered evidence surrounding the DGM sufficiently relevant to give our own construction of the DGM secondary influence on the MRP estimation, after the HER.

We constructed our own DGMs in order to account for a 'partial first year' as well as a midyear convention to address the fact that dividends are paid out throughout the financial year. This has both a 2 stage and 3 stage version. The 2 stage version allows for analyst forecasts for the first 'N' periods then moves to a constant growth rate, whereas the 3 stage version allows for a linear move from the analyst forecast to the long term growth rate between the N^{th} and 10^{th} period. More details on the construction can be found in the appendices of our 2013 guideline decision.[32]

4.2 Updated Data

Table 3 shows the current estimates of MRP drawn from our construction of the DGM. We adjust for potential changes in growth rate as well as analyst forecasts. As such there are a large number of results produced. In forming the MRP estimate we consider results from all three growth rates, but not the adjusted analyst forecasts. These are part of the sensitivity analysis deemed important by us in forming a judgement of the DGM's results.

[32] AER, Explanatory Statement Rate of Return Guideline (appendices), December 2013, p.114-125

Table 3 Dividend Growth Model Results

Sensitivity	Two stage model	Three stage model
3.78% long-term growth rate		
unadjusted analyst forecasts		
2 month average to end December-2017	6.78	6.88
6 month average to end December-2017	6.81	6.92
12 month average to end December-2017	6.72	6.79
analyst forecast - 10%		
2 month average to end December-2017	6.21	6.30
6 month average to end December-2017	6.23	6.33
12 month average to end December-2017	6.15	6.21
analyst forecast + 10%		
2 month average to end December-2017	7.36	7.46
6 month average to end December-2017	7.40	7.51
12 month average to end December-2017	7.29	7.37
4.6% long-term growth rate		
unadjusted analyst forecasts		
2 month average to end December-2017	7.58	7.55
6 month average to end December-2017	7.60	7.57
12 month average to end December-2017	7.49	7.44
analyst forecast - 10%		
2 month average to end December-2017	7.01	6.98
6 month average to end December-2017	7.02	7.00
12 month average to end December-2017	6.93	6.88
analyst forecast + 10%		
2 month average to end December-2017	8.15	8.12
6 month average to end December-2017	8.18	8.15
12 month average to end December-2017	8.06	8.01
5.1% long-term growth rate		
unadjusted analyst forecasts		
2 month average to end December-2017	8.06	7.96
6 month average to end December-2017	8.08	7.98
12 month average to end December-2017	7.97	7.84
analyst forecast - 10%		
2 month average to end December-2017	7.49	7.40
6 month average to end December-2017	7.50	7.41
12 month average to end December-2017	7.41	7.29
analyst forecast + 10%		
2 month average to end December-2017	8.63	8.52
6 month average to end December-2017	8.66	8.55
12 month average to end December-2017	8.53	8.40
Minimum	**6.15**	**6.21**
Maximum	**8.66**	**8.55**

4.3 Expert Views and Evidence

There have been many submissions concerning the DGM.

4.3.1 Model Construction

The DGM has many different potential constructions and mathematical functions. For example, IPART uses five separate constructions in informing its MRP estimate.[33] However, in general, there have been no submissions addressing our particular construction of the DGM.

4.3.2 Dividend Growth Rates

A significant part of the DGM is the future growth rates applied to dividends. Not only does it have a large impact on the final MRP result, it is a significant part of the model being considered 'forward looking'. Handley, in his advice to us in 2015, stated that "DGM can simply transfer uncertainty and difficulties in estimating the parameters of an asset pricing model to uncertainty and difficulties in estimating the expected future dividend stream and in particular estimating the expected growth rate in dividends".[34]

There are multiple different ways of calculating the growth rate, all of which have advantages and disadvantages and are supported by different groups. Damodoran suggested a growth rate equal to that of the 10 year government yield which is therefore dynamic and updating month to month.[35] IPART use a growth rate of 5.5% in three of their five DGM's, which it decided upon in their 2013 review and have kept since.[36] The other two DGM's it uses have variable growth rates.

There are also other growth rates used which include Fenebris'[37] proposal of Damodoran's rate minus 2% and Lally's suggestion of 4.6%.[38] As part of the 2013 guideline we judged the evidence to be in favour of selecting Lally's method of calculation, which suggested also testing for differing 'leaks' from the nominal GDP growth rate (between 0.5% and 1.5%). Since deciding that growth rate, there have been reports that our growth rate may have been above what should be considered suitable for Australia, in the context of long term growth.[39] There have also been reports which stated that the DGM estimate should be computed without making a downward adjustment to the long-run GDP growth rate.[40]

When considering applicable growth rates in the 2013 guideline, we looked at a variety of potential growth rates from a number of different models. Capital Research

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33 IPART, *Final review of our WACC Methodology*, February 2018, p.52

34 Handley, *Advice on the Return on Equity*, 16 October 2014, p13

35 Damodoran,, Closure in Valuation, http://people.stern.nyu.edu/adamodar/pdfiles/eqnotes/dcfstabl.pdf

36 Jenny Suh, IPART, *IPART's review of WACC Methodology*, December 2013

37 Fenebris, *Determination of a Market-Wide Implied Cost of Capital*, May 2016

38 Lally, *DGM Final Report – Rate of Return Guideline*, December 2013

39 Partington, Report to the AER, April 2015, p26

40 Frontier Economics*, The Market Risk Premium*, September 2016, p66;

suggested that a growth rate of 7% was most applicable in its 2012 approach, they claimed that in some cases growth in industry can outstrip that of GDP.[41] NERA also gave an estimate of the growth rate in their 2012 paper, they arrived at a value of 5.65%, claiming that with past volatility in dividend growth it is an extremely hard task to accurately forecast with any certainty.[42]

SFG arrived at a growth rate of 5.8%, although this is not explicitly expressed in the 2013 paper instead it is the growth rate arrived at implicitly with its construction of the DGM.[43] However, Handley advised that SFG's model was not appropriate for use in a regulatory environment.[44]

In analysing the results of the DGM in relation to the growth rate, it was highlighted that the risk free rate and the MRP outputs from the DGM have an extremely strong negative correlation (from -81% to -89%). As a result, the R squared value for the risk free rate in relation to this DGM was between 0.66 and 0.78, which indicates that the model's MRP results can largely be explained by movements in the risk free rate. This means that the results of a DGM with a fixed growth rate is similar to the Wright approach, which we previously considered should have no role in estimating the MRP and is discussed later in this paper.

A changeable growth rate, such as supported by Damodaran and Fenebris, could shed more light on how applicable our current growth rate would be moving forward. It could also reduce the impact the risk free rate has on the DGM estimate of the MRP. Table 4 shows that when we made the 2013 guideline decision, the Damodaran growth rate was similar to our final growth rate. However, since then the risk free rate has decreased.

Table 4 DGM Growth Rate Comparisons

	December 2013	December 2017
AER – Chosen Growth Rate	4.6%	4.6%
Damodaran	4.24%	2.58%
AER – Top Sensitivity	5.1%	5.1%
AER – Lower Sensitivity	3.86%	3.86%
IPART	5.5%	5.5%

41 AER, Explanatory Statement Rate of Return Guideline (appendices), December 2013, p.88

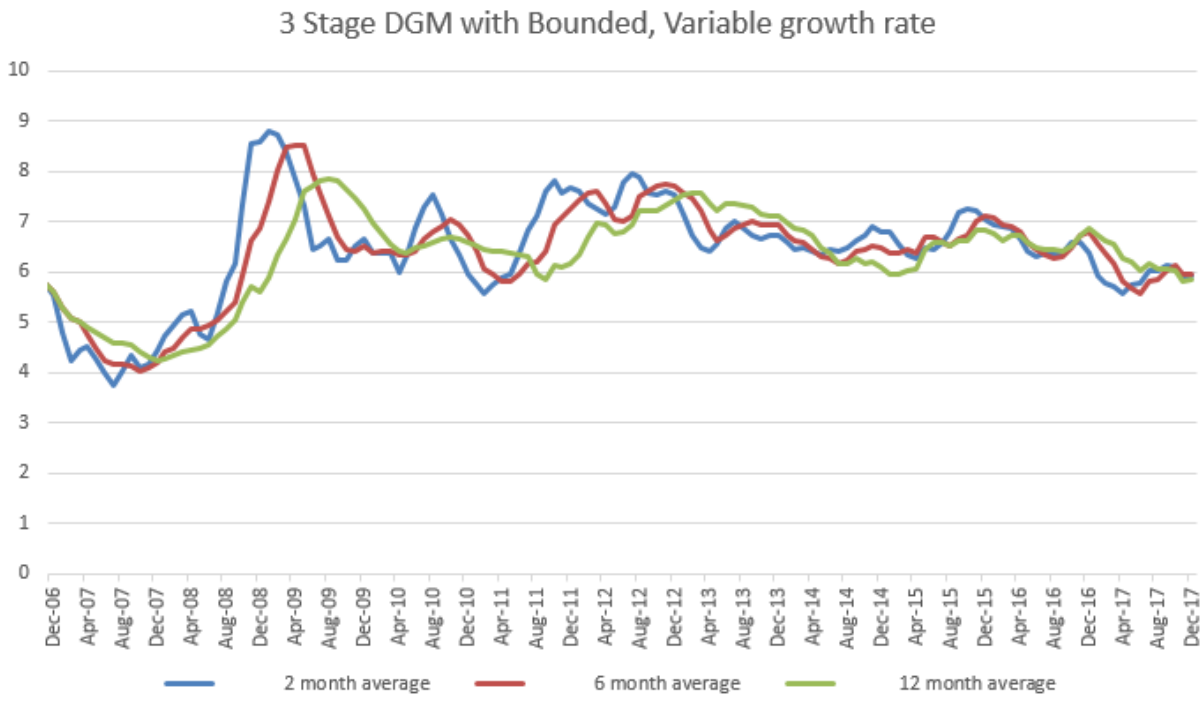
42 NERA, *The Market Risk Premium*, 20 February 2012, pp24-26

43 SFG, *Cost of equity estimates implied by analyst forecasts and the dividend discount model*, October 2013, p3,29-31

44 Handley, *Advice on the Return on Equity*, 16 October 2014, p15

Based on work from Damodaran and Fenebris[45], we have also analysed how our construction of the DGM would work with growth rate based on the monthly 10 year government bond yield. This could potentially produce a result that relies more on the forward looking elements of the model to enact changes in the MRP, rather than mirroring the changes in the risk free rate. However there are issues of extreme swings in the risk free rate. Such a modification could assist in achieving the objectives of the regulatory framework. Potential fixed bounds of 2% and 5% provide the following result for our 3 stage DGM with differing averaging periods for analyst forecasts (as is currently done). The results of estimated MRP are shown in Figure 5.

Figure 5 3 stage DGM with bounded, variable growth rate



4.3.3 Analyst Forecasts & Sensitivity Analysis

One of the main features of the DGM is the fact that it allows up to date analyst forecasts to be input into the model and have an impact on the estimate of the MRP. Currently we take updated consensus dividend forecasts from Bloomberg to update the model which work with current share prices in the formula.

It is possible to look at analyst price targets instead of share prices whilst it is also an option to look at individual analyst forecasts rather than consensus forecasts. However, as noted in the 2013 guideline decision, there is very little to decide on

[45] Fenebris, *Determination of a Market-Wide Implied Cost of Capital*, May 2016; Fenebris, *Australia – Determination of Market-Wide Implied Risk Premium;* Damodaran*, Closure in Valuation;*

between the inputs, nor are there submissions from stakeholders regarding a potential move by us between the different sources.

Our previous decisions have highlighted upward bias in the analyst reports as an issue that limited the use of DGM data in estimating the MRP previously, and that is a point that is still being raised by experts in their submissions to us. However, this is an issue that cannot readily be solved by switching inputs and is simply an issue with the fundamentals of the model.

Frontier submitted a report in 2017 stating that there was evidence of a downward bias in analyst reports[46], however this survey was limited to the ASX20 and expert advice to us suggested it was not a prevailing issue.[47]

In order to highlight any issues with analyst forecasts we have built in sensitivity analysis to the DGM, which highlights the effect +/- 10% change in the forecasts. As shown in the DGM results in Table 3, a 10% change in analyst forecasts can cause up to a 60 basis point change in the resultant MRP predicted.

4.3.4 Number of Models

It has previously been proposed to us that if we have issues with the DGM, we should use a method similar to IPART's and look at multiple versions of the model.[48]

IPART uses a combination of 6 methods to estimate the current MRP, 5 of which are DGMs. Into three of these IPART uses its own chosen growth rate of 5.5%, whilst the other two use a construction of the model with variable growth rates. These variable growth rates are calculated relative to the historical return on equity. Prior to 2018 IPART took the midpoint of these 5 dividend growth models to inform its current MRP estimate, however as part of its WACC review it decided to switch to take the median of these 5 DGMs.[49] IPART has done this in order to reduce the effect outliers have on the value and more closely track the changes seen in the bond market, as shown below in Figure 6 IPART Graph showing their MRP estimates vs corporate bond spread.

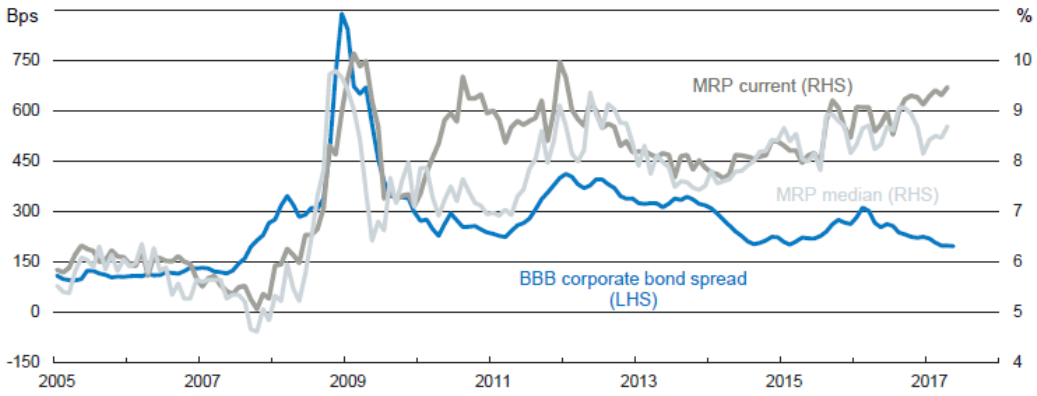
[46] Frontier Economics, *The Market Risk Premium*, September 2016, p63;

[47] Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, p32;

[48] Frontier Economics, *The Market Risk Premium*, September 2016, p52

[49] IPART, *Review of our WACC method*, February 2018, pp. 52-55

Figure 6 IPART Graph showing their MRP estimates vs corporate bond spread



Data source: IPART and SFG analysis of RBA, Bloomberg and Thomson Reuters data

Expert advice has also put forward that averaging results from separate models does not necessarily improve results, unless there is reason to believe this will reduce bias over time.[50] Most academic literature tends towards the belief that a single well-constructed DGM should provide sufficient information when considered correctly.[51]

4.3.5 Overall Model

Under the 2013 guideline the DGM evidence was given a directional role in estimating the MRP. This means that after the point estimate was made from the HER evidence, the DGM results were used to decide whether this point estimate should be moved up or down. This has resulted in the point estimate being moved from 6.0% to 6.5% in the 2013 guideline, and in each subsequent decision.

The decision in the 2013 guideline to apply the DGM was in reference to our view that the DGM gives an overview of current market conditions. Submissions since the 2013 guideline have stated the DGM use in MRP estimation should be mathematically weighted.[52]

Over a series of decisions service providers submitted that we applied less weight to the DGM. In the 2016 report commissioned by several networks, Frontier showed that although the results from our DGM had increased it seemingly had no effect on the point estimate for the MRP. [53]

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[50] Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, p28

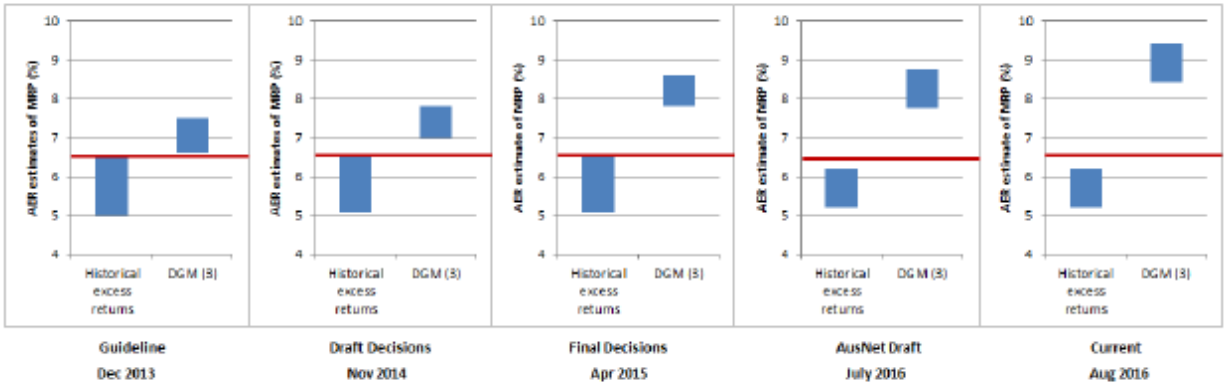
[51] Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, pp25-26

[52] Frontier Economics, *The Market Risk Premium*, September 2016

[53] Frontier Economics, *The Market Risk Premium*, September 2016, p14;

Figure 7 Historical Excess Returns vs AER's DGM results

Figure 9: The AER's primary MRP estimates



Source: Rate of Return Guideline; Ausgrid Draft Decision; Ausgrid Final Decision; AusNet Draft Decision; Current estimate using risk-free rate of 1.9%.

Frontier submitted Figure 7. It submitted that if our approach to processing the relevant evidence had not changed since the 2013 Guideline, then it could only be said that the DGM evidence played a minor part in determining the MRP.[54]

Experts have put forward that in times of low interest rates, which we are now seeing, the DGM can increasingly produce upwardly biased results.[55] We have also been advised that the DGM could best be viewed as a conceptual tool rather than a forecasting model[56] and that despite the DGM consistently giving numbers above 7% for a predicted MRP since the 2013 guideline, the MRP is more likely to be below the long run average than above it.[57]

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54 Frontier Economics, *The Market Risk Premium*, September 2016, p27

55 Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013, pp. 11–12.

56 Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, p25

57 Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, pp.16-19

5 Other MRP Estimation Evidence

As part of the 2013 guideline we took account of a wider range of evidence when considering our point estimate of the MRP. With the view to a binding guideline, there is a question as to whether this other evidence is robust enough to help estimate an MRP over the period of the guideline. We also have to consider the suitability of the evidence for our regulatory task.

5.1 Estimation Methods

5.1.1 Wright approach

The Wright approach is an alternative specification of the SL-CAPM, in which the MRP is not its own parameter, but simply defined as the difference between an estimate of the return on equity and the prevailing risk free rate.

5.1.1.1 Approach to date and Updated Data

Under the 2013 guideline we use the Wright Approach as a cross check for our MRP and ROE estimates. However, due to issues raised by experts at the time in regards to the model's assumed relationship between the risk free rate and the MRP we made the decision in 2013 to limit its influence in our estimation process.

To estimate the MRP using the Wright approach we start by averaging the historical total market returns, similar in method to Table 2 but inclusive of the risk free rate. Once we have a range of answers we select the minimum and maximum from this (here it is 10% and 12.4%). From these the current risk free rate is subtracted to give the MRP estimate, shown in Table **5**.

Table 5 Wright Approach Estimate of MRP

Min (based on 10% total market return)	Max (based on 12.4% total market return)
7.4	9.8

5.1.1.2 Expert Views and Evidence

There have been submissions since the 2013 guideline that have stated we should give more weight to the evidence from the Wright approach. However Partington and Satchell have advised us that the Wright approach has no support based on any clear evidence in the Australian context.[58] APA has put forward that its specification of the CAPM, which is a version of the Wright CAPM, as the correct way to estimate the MRP.[59]

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[58] Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, p28

[59] APA, *APA submission responding to AER issues paper,* 12 December 2017, pp.7-9, 11-12;

The significance of the Wright approach is highly dependent on the existence, or not, of an inverse relationship between the Risk free rate and MRP correlation.

5.1.2 Survey Evidence

A number of academics and financial institutions run surveys on MRPs. These tend to be fairly regular, but can vary significantly in both method and number of participants.

5.1.2.1 Approach to date and Updated Data

The 2013 guideline gave some weight to survey evidence. It can be viewed as a cross-section of opinions from across both financial and academic exponents of the risk premium.

Surveys vary in technique and style but as a broad rule they ask a series of questions to market participants and academics. Some of these questions will cover the respondent's opinion on what he current MRP or Equity Risk Premium is. As shown in Table 6 there is a large variance in the number of responses. Some of the surveys did not make the raw data available, so it is not possible to calculate some of the Mean, Median or Mode values.

Table 6 Key findings from Surveys

Survey	Numbers of responses	Mean (%)	Median (%)	Mode (%)
Fernandez et al (2013)	73	5.9	6.0	N/A
KPMG (2013)[a]	19	N/A	6.0	6.0
Fernandez et al (2013)	17	6.8	5.8	N/A
Asher and Hickling (2013)	46	4.8	5.0	6.0
Fernandez et al (2014)[b]	93	5.9	6.0	N/A
Asher and Hickling (2014)[c]	27	4.4	4.6	6.0
Fernandez et al (2015)	40	6.0	5.1	N/A
KPMG (2015)[d]	~27	N/A	6.0	6.0
Asher and Carruther (2015)	29	4.9	N/A	N/A
Fernandez et al (2016)	87	6.0	6.0	N/A
Carruther (2016)	24	5.3	N/A	N/A
Fernandez et al (2017)	26	7.3	7.6	N/A
KPMG (2017)	45	N/A	6.0	6.0

Sources: Several survey reports.[60]

5.1.2.2 Expert Views and Evidence

Since the 2013 guideline most submissions around survey evidence have suggested that surveys are an unreliable source of evidence.[61] However, in 2017 Frontier stated that the Fernandez survey had shown an increase in MRP and it should be used as a significant sign the MRP had increased.[62] We have received submissions from experts stating that survey evidence can be useful in informing judgements about the current MRP.[63]

5.1.3 Broker/Valuation Reports

We take note of broker reports on regulated businesses as well as independent valuations. Both valuation methods and numbers are taken into account.

5.1.3.1 Approach to date and Updated Data

Broker and Valuation report data was given advisory weight in the 2013 guideline. However, it was noted at the time that it has been developed in a different context to our regulatory task. There have been very few independent valuations on regulated businesses in recent years.

Table 7 contains the minimum and maximum value found for various parameters from broker reports over the past 12 months. The Imputation adjusted data is calculated using ATO data.

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60 Fernandez, Ortiz, Acín, M*arket risk premium used in 71 countries in 2016: a survey*, May 2016; KPMG, *Australian valuation practices survey 2015*, May 2015; Fernandez, Ortiz, Acín, *Discount rate (risk-free rate and market risk premium) used for 41 countries in 2015: a survey*, April 2015; Asher and Hickling, *Equity Risk Premium Survey 2014*, Actuaries Institute, April 2015; Fernandez, Linares, Acín, *Market Risk Premium used in 88 countries in 2014*, IESE Business School, June 2014; Asher and Hickling, *Equity Risk Premium Survey*, Actuary Australia, December 2013; Fernandez, Arguirreamalloa and Linares, *Market Risk Premium and Risk Free Rate used for 51 countries in 2013*, IESE Business School, June 2013; KPMG, *Valuation Practices Survey 2013*, February 2013; Fernandez, Arguirreamalloa and Corres, *Market Risk Premium used in 82 Countries in 2012*, IESE Business School, January 2013; Asher and Carruther , *Equity Risk Premium Survey 2015, Actuaries Digital*, May 26 2016; David Carruthers, Equity Risk Premium Survey 2016, 8 March 2017; Fernandez, Linares, Acín, *Discount Rate (Risk-Free Rate and Market Risk Premium) used for 41 Countries in 2017: a survey*, April 2017; KPMG, *KPMG Valuation Practices Survey*, July 2017.

61 AusNet, *AusNet Revised Revenue Proposal*, 21 September 2016, p150

62 Frontier Economics*, Updated rate of return parameter estimates*, August 2017, pp21-22

63 Partington and Satchell*, Report to the AER: Cost of Equity Issues 2016 Determinations*, April 2016, p.44

Table 7 Broker Report Data

	Risk free Rate	MRP	ERP	Return on Equity	Imputation adjusted MRP	Imputation adjusted ERP	Imputation adjusted ROE
Min	2.50	5.00	3.50	6.16	5.80	4.06	6.66
Max	4.10	6.57	5.35	8.30	7.37	6.07	8.87

5.1.3.2 Expert Views and Evidence

Submissions during decisions have stated that independent valuations, on non-related companies, suggest a higher MRP than the 6.5 put forward by the AER.[64] These included uplifts made to both the risk free rate and risk premium.

Our data, summarised above, does not include premiums which were highlighted in broker reports as separate to their estimate of either the market risk premium or prevailing risk free rate. We were informed that these methods and assumptions were unsuitable under a regulatory framework.[65]

5.1.4 Other Regulators

Other regulators also produce decisions detailing their estimates of MRP and other WACC parameters, and so we take note of the decisions that are made around Australia.

5.1.4.1 Approach to date and Updated Data

These outcomes do not directly inform our MRP estimation, but provide an indication as to the relative positioning of our estimate.

Table 8 summarises the data we collected over 2017. We record all parameters mentioned in various reports, however some do not specify parameters such as the MRP.

[64] Frontier Economics, *Updated rate of return parameter estimates*, August 2017, pp33-35

[65] Partington and Satchell, *Report to the AER: Cost of Equity Issues 2016 Determinations*, April 2016, p.48

Table 8 Other Regulator Decisions During 2017

Regulator	Date	Business Type	MRP	ROE
IPART	14/03/2017	Water	7.3	8.7
IPART	27/03/2017	Water	7.55	8.8
IPART	13/06/2017	Water	6	6.8
IPART	13/06/2017	Water	7.75	8.8
IPART	27/06/2017	Water	7.75	8.8
IPART	30/06/2017	Water	7.3	8.7
IPART	15/09/2017	Transport	7.75	10.2
ERA	6/10/2017	Rail	7.2	9
QCA	1/11/2017	Water	7	7.05
ESCV	07/12/2017	Water	N/A	4.9

5.1.4.2 Expert Views and Evidence

Businesses have submitted previously that we should not be considering other regulators final results, as it is a circular exercise.[66] There have not been many submissions on our use of other regulatory decisions.

5.1.5 Conditioning Variables

Conditioning Variables used as part of the MRP decision were readily available market data which allowed us to take into account current market conditions.

5.1.5.1 Approach to date and Updated Data

The 2013 guideline stated that we would look at three separate Conditioning Variables, all built from readily available data on Bloomberg. These are Volatility, Dividend Yields and Credit Spreads. Given evidence at the time we decided that this data allows us to contextualise our MRP estimate based on the market data.

[66] Frontier Economics, *The Market Risk Premium*, September 2016, p32;

Figure 8 Volatility Index

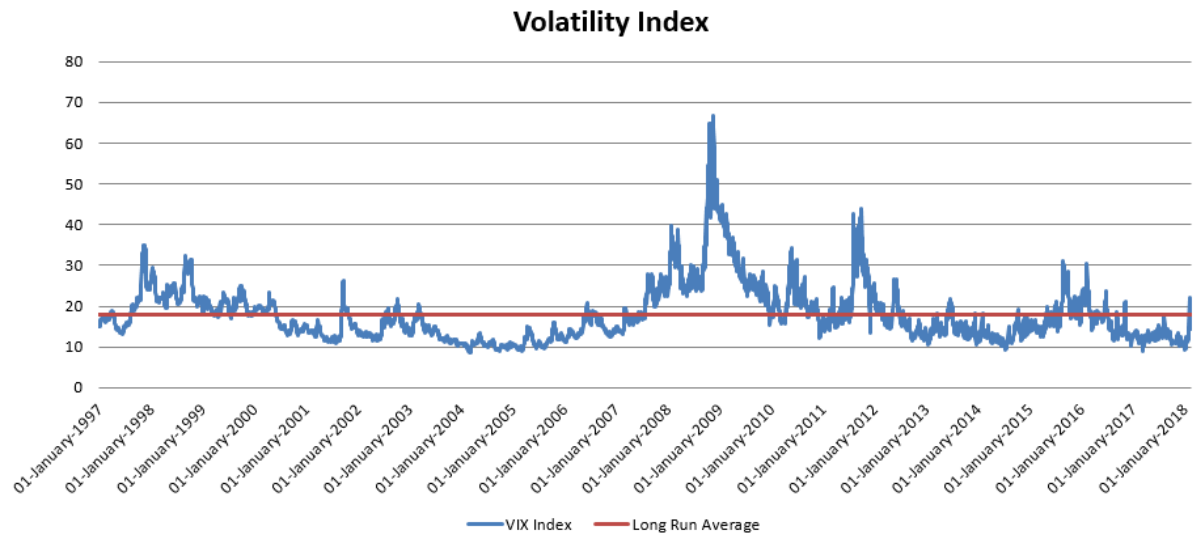


Figure 9 Dividend Yield

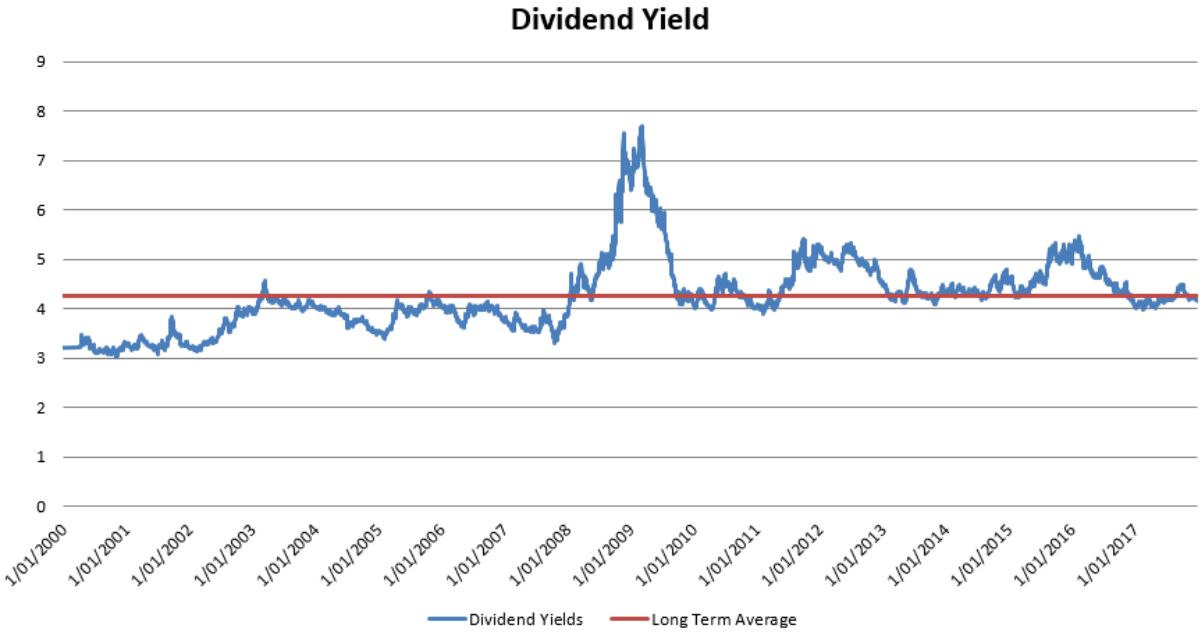
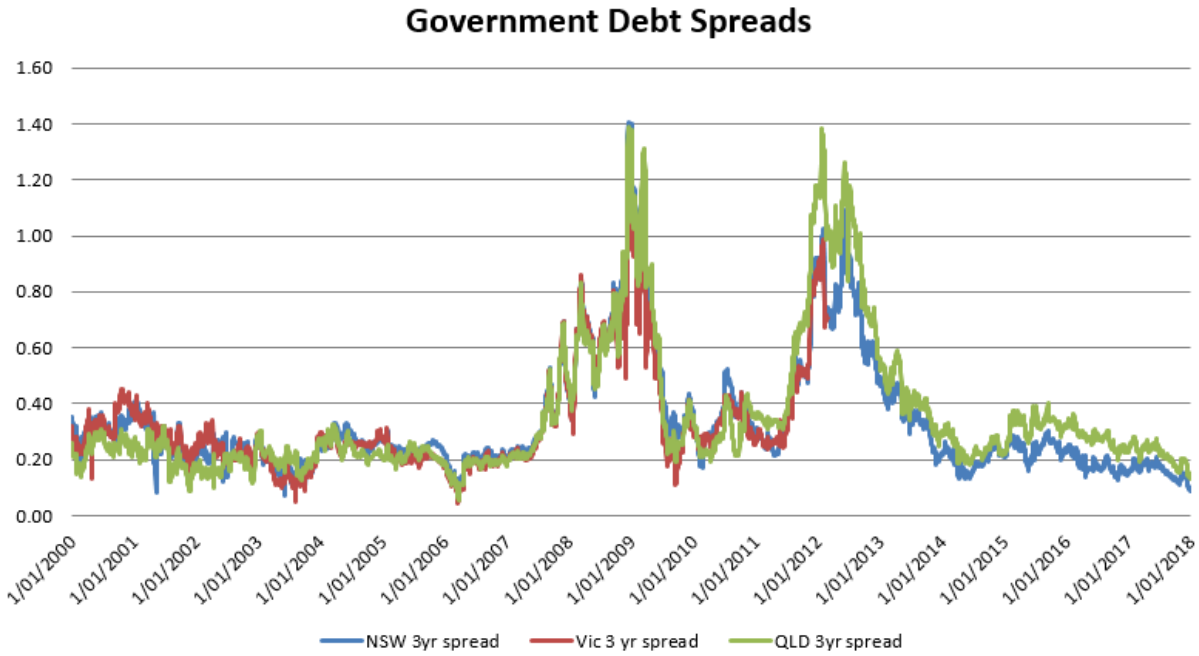


Figure 10 Government Debt Spreads vs Commonwealth



5.1.5.2 Expert Views and Evidence

We have received submissions previously that Conditioning Variables should not be used in the absence of formal econometric mapping,[67] however there have also been submissions stating the use of them in this guidance role is appropriate.[68]

5.1.6 Debt Risk Premium

The DRP, in this instance, is the cost of debt reported for BBB corporations above the prevailing risk free rate.

5.1.6.1 Approach to date and Updated Data

We currently view the DRP in relation to the current Equity Risk Premium (ERP).

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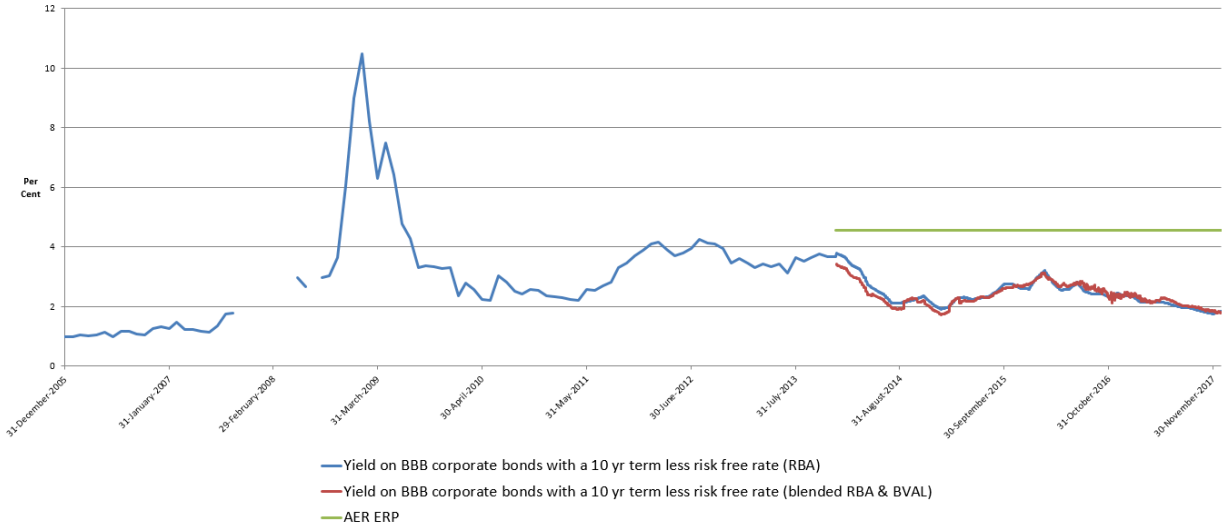
[67] Frontier Economics, *The Market Risk Premium*, September 2016, p40;

[68] Partington and McKenzie, *Supplementary Report on the equity Market Risk Premium*, February 2012, pp24-25

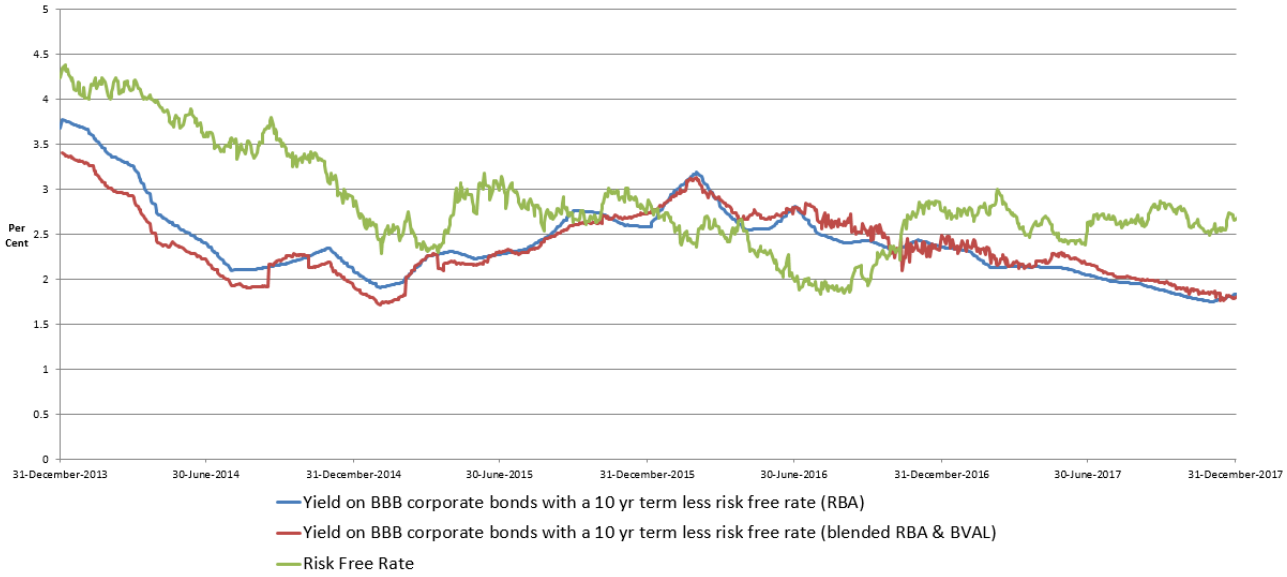
Figure 11 Estimated Corporate DRP and AER allowed ERP



5.1.6.2 Expert Views and Evidence

The February 2016 decision from the Tribunal suggested that the comparison of the ERP and DRP was an appropriate and obvious cross-check, and suggested that it could provide reasonable evidence for the overall return on equity decision.[69] Both the risk free rate at the DRP have fallen since the guideline decision in 2013, as shown in Figure 12

Figure 12 Estimated DRP vs Annualised Risk Free Rate



69 Tribunal, *Applications by PIAC Ltd and AusGrid AComT1*, February 2016, paragraph 812

6 Risk Free Rate Averaging Period

6.1 Background

The risk free rate forms one of three parameters which contribute to the SLCAPM's formation of the return on equity. The product of the Beta and the MRP is added to the risk free rate in order to give the allowed return on equity as part of the model.

Generally, there has been agreement on the method to estimating the risk free rate. In particular, the use of the annualised yield from the 10 year Commonwealth Government Securities (CGS) to calculate the risk free rate is not contentious.

However, there is some divergence of views in relation to the period over which we measure the risk free rate. In a recent proposal, AusNet proposed an 8 month averaging period. This was on the basis that it would reduce its exposure to sudden market movements but still allow to capture fundamental changes in the equity markets and protect against a 'lottery' approach.[70]

Submissions on the averaging period are summarised below in Table 9.

6.2 Submissions

Table 9 Submissions on the risk free rate averaging period

Submission	Comment
APA	APA submit there should be no changes in the setting of averaging periods as this would lead to unnecessary inflexibility.
ATCO Gas Australia	ATCO put forward that reducing volatility and facilitating consistent outcomes should be the goal of any refinements. Keeping the choice with the regulated business in question should also be a focus
APGA	APGA respond to potential averaging period refinements by stating there is need for discussion on the appropriate length of the averaging period and a discussion would need to take place in the context of the entire process.
Cheung Kong Infrastructure	CK Infrastructure state that consideration should be given to lengthening the averaging period in order to smooth out the volatility.
CCP (subpanel 16)	The CCP submit that the current method is satisfactory as long as the period finishes close enough to commencement to the regulatory period.
ENA	The ENA state that discussions on the risk free rate averaging period should be held considering the stability of the return on equity estimate.
Energy Users Association Australia	The EUAA supports that the averaging period definition should be a straightforward, mechanistic process.

[70] AusNet Services, *Gas Access Arrangement Review 2018–22: Access Arrangement Information*, 16 December 2016, p. 191.

Ergon Energy and Energex	This submission proposes that the processes around setting averaging periods tend to be reasonable, and engagement in the past was straightforward.
Jemena	Jemena submits that it feels a longer averaging period would promote stability in the risk free rate estimate, and that a common averaging period for all networks in the same jurisdiction and regulatory cycle should be imposed
Major Energy Users	The MEU state in their submission that the AER should be mechanistic in their approach to the averaging period and not allow the businesses to set it themselves.
Spark Infrastructure	Spark make clear that any changes must be tested against practical conditions, and that it supports the current process.
Victorian electricity distributors	The Distributors state that the current equity averaging period of 20 days is not long enough to provide stability across all regulated businesses.

Source: APA, *APA submission responding to AER issues paper,* 12 December 2017, p.6, 11-12; ATCO Gas Australia, *Response to Revie of Rate of Return Guideline – Issues Paper* , 12 December 2017, p.5; APGA, *Submission to the Issues Paper*, 12 December 2017, pp.8-11; Cheung Kong Infrastructure, *Review of the Rate of Return Guideline*, 12 December 2017, p.4; CCP (subpanel 16), *CCP Submission to the AER on its Rate of Return Guideline Issues Paper*, December 2017, p.6 ; ENA, *Response to AER Issues Paper*, 12 December 2017, p.21; EUAA, *Submission on rate of return issues paper*, 18 December 2018. p8,Ergon Energy and Energex, *Ergon Energy and Energex submission on AER Issues Paper*, 12 December 2017, p.4; Jemena, Submission on Rate of Return issues paper, December 2017, pp.3-4; Major Energy Users, Submission by the MEU to the review of the rate of return guideline, 18 December 2017, p15; PIAC; *PICA letter to the AER*, December 2017, p.2; Queensland Treasury Corporation, *QTC submission to the RoR Guideline Review Issues Paper*, December 2017, pp.3-5;

6.3 Approach to date

We currently estimate the risk free rate using the annualised 10 year CGS rate which we average over a 20 business day period. This is a period nominated by the regulated business and it must be as close as practicable to the commencement of the upcoming regulatory period. We require the period to be nominated in advance of the period starting as allowing a nominated period which has already been observed is likely to lead to a biased outcome.[71]

6.4 Expert Views and Evidence

As summarised in Table 9, most stakeholders do not consider there is a need for change. However, there are some concerns about the 20 day averaging period in the context of the stability of the risk free rate and the return on equity. The underlying issue is how we should balance the need to capture the prevailing risk free rate (current market conditions) with that of avoiding unnecessary volatility. A short term averaging period is a pragmatic alternative to using a prevailing rate[72], and that this

[71] Lally, M., *Expert Report of Martin Thomas Lally*, 13 February 2011, pp. 9–10.

[72] Lally, *The present value principle*, March 2013, p. 5.

provides a reasonable estimate of the prevailing rate while not exposing service providers to unnecessary volatility.[73]

The regulatory regime is an ex-ante (forward looking) regime.[74] As such, the rate of return must provide ex-ante compensation for efficient financing costs and thereby provide a reasonable opportunity to service providers to recover at least their efficient financing costs. Satchell and Partington describes this zero net present value (NPV) investment condition, as follows:[75]

> The zero NPV investment criterion has two important properties. First, a zero NPV investment means that the ex-ante expectation is that over the life of the investment the expected cash flow from the investment meets all the operating expenditure and corporate taxes, repays the capital invested and there is just enough cash flow left over to cover investors' required return on the capital invested. Second, by definition a zero NPV investment is expected to generate no economic rents. Thus, ex-ante no economic rents are expected to be extracted as a consequence of market power. The incentive for investment is just right, encouraging neither too much investment, nor too little.

Further, in their view, for the WACC used in NPV calculations, the *current* required returns on debt and equity should be used[76]:

> The allowed rate of return should be the rate of return consistent with regulated assets being a zero NPV investment. The NER rules require that rate of return be determined as a weighted average of debt and equity. The theory of finance (and common practice) is that in computing the weighted average cost of capital for use in NPV calculations it is the *current* required returns on debt and equity that should be used for the WACC. Thus with respect to the cost of debt it is the current cost of debt (as currently required in the market) that should be used in the WACC, not the historic cost of debt.

Satchell and Partington also consider, in order to maintain the zero NPV condition, regular updating of the WACC should be undertaken[77].

A longer averaging period will, holding other things constant:

- Over the long term have the same mean outcome as shorter averaging periods because they are both ultimately averages of the same underlying yield estimates.
- Reduce the volatility of risk free rate outcomes relative to a shorter averaging period.

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[73] Lally, *Risk free rate and present value*, August 2012, p. 7.

[74] The AEMC describes, 'allowed revenues for network businesses are now set using the expenditure required by prudent, efficient operators as a benchmark. Companies have incentives to beat the benchmarks so they can keep some of their savings and pass the rest on to customers'. See AEMC, *Overview 2014–15*.

[75] Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.

[76] Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.

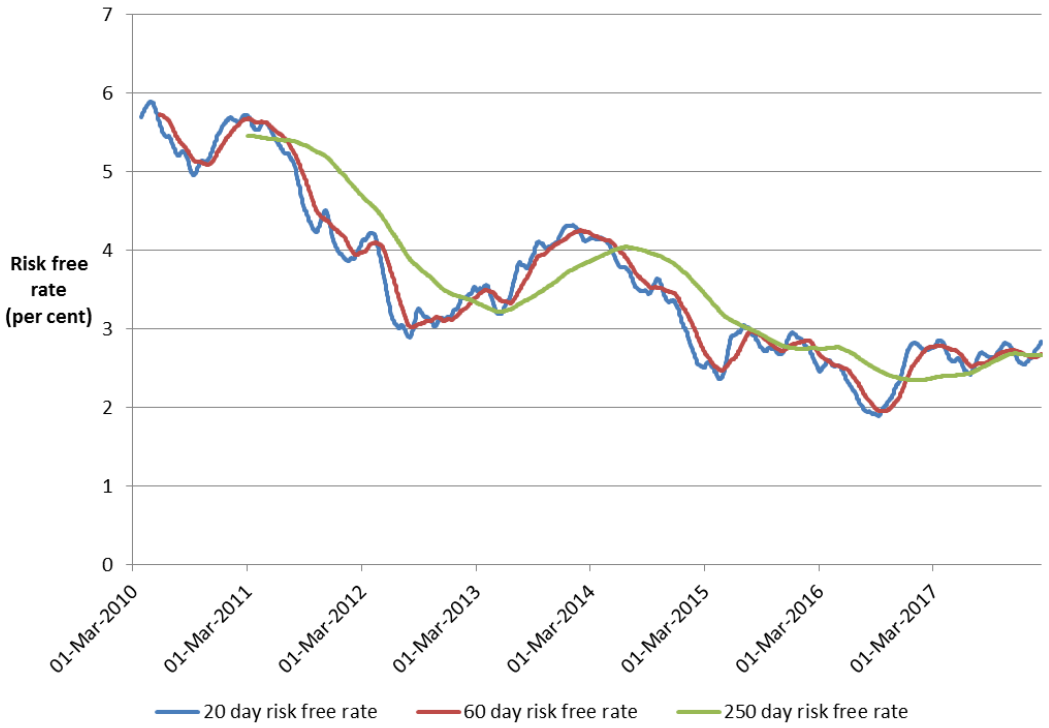
[77] Partington, G., Satchell, S., *Report to the AER: Discussion of the allowed cost of debt*, 5 May 2016, p. 14.

- Become less reflective of prevailing market conditions at the time of the regulatory determination.

Figure 13 below, illustrates this by comparing risk free rate outcomes:

- estimated using a 20-day period (our current approach)
- estimated using a 60-day period
- estimated using a 250-day (~ 1 year) period

Figure 13 The impact of different length averaging periods for estimating the risk free rate



Source: RBA data, AER analysis.

The length of the averaging period chosen for comparison has no particular significance. However, they illustrate that:

- All three series follow the same underlying trends
- The 60-day series exhibits somewhat diminished volatility while still tracking quite closely to the 20-day series (our current approach)
- The 250-day series exhibits markedly lower volatility than the shorter series. However at any given point in time, this results in material differences in its outcomes relative to our current approach.

6.5 Other regulators approach

ERAWA

Risk free rate of return is measured by CGS with 5- year maturity over an averaging period of 40 trading days prior to the release of the regulatory decision.

IPART

IPART recently reviewed its WACC methodology. IPART has maintained a 40 business day averaging periods for the risk free rate. Also:

- IPART chooses the averaging period (for debt and equity) and notifies the firms ahead of time (confidentially).
- It aligns the start and the end of the sampling periods for debt and equity 'as closely as possible'. Because it relies on the RBA series only (publish once per month) and the RBA often sets its publication date as a non-business, it uses 40 business days for risk free rate and 'two months' for debt.
- It has maintained a 10 year benchmark term to maturity and broad band credit rating.

6.6 Option for discussion

Based on the evidence above, we propose an option for refining the risk free rate averaging period. This option would continue to allow the regulated businesses to propose the timing of the averaging period but provide additional flexibility.

Whilst the current methodology allows for only 20 business days to be nominated, under this option we could allow a period from 20 days up to 60 business days to be nominated by the business as long as it:

- is nominated ahead of time
- closes as close as practically possible to the start of the regulatory period.

If the averaging period is not nominated ahead of time then it shall automatically revert to a 20 day period which fits the criteria above.[78]

[78] We note that under the draft legislation for a binding rate of return guideline, this approach will necessarily have to be expressed so that it can be applied automatically.

7 Automatic application of the rate of return

The draft legislation on a binding rate of return guideline was published recently.[79] This legislation requires us to either set the rate of return or value for imputation credits (gamma) or a way to calculate them in the Guideline. [80] In the event we set a way rather than a rate of return, then we must set out a methodology that can be automatically applied during the life of the Guideline without any exercise of discretion on our part. We refer to this approach of setting a way as the automatic application.

As an example, the draft legislation states:

> The instrument cannot include different methodologies or a band of values from which the AER could choose in applying the instrument.[81]

We briefly discuss our approach to date to estimating the return on equity, debt and the value for gamma,[82] and how amenable our approach is to an automatic application. We then set out 3 options for an automatic application to the return on equity.

The requirement for an automatic application is new to us and the industry. We seek the views of the experts participating at our concurrent evidence sessions to assist us in arriving at a decision.

7.1 Our approach to date

Our approach to date to estimate the return on equity is based on our foundation model approach. This has six distinct steps where we have regard to relevant information, including various equity models. At different steps in our approach we consider material relevant to inform the return on equity estimate, by exercising our regulatory judgement and discretion.

Our approach to date to estimate the return on debt is as follows:

- estimate the return on debt using an on-the-day approach (that is, based on prevailing interest rates near the commencement of the regulatory period) in the first regulatory year
- transition this approach into a trailing average (that is, a moving historical average) over 10 years by annually updating 10 per cent of the return on debt to reflect prevailing market conditions in that year.
- estimate the return on debt in each regulatory year by reference to:
    - a benchmark credit rating of BBB+

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79 COAG, Draft legislation to create a binding rate of return instrument, 02 March 2018

80 Statutes Amendment (National Energy Laws) (Binding Rate of Return Instrument) Bill 2018, cl.18 and 30.

81 Statutes Amendment (National Energy Laws) (Binding Rate of Return Instrument) Bill 2018, cl.18 J (3)(b) & 30 E(3)(b).

82 AER, Better Regulation, Rate of Return Guideline, December 2013

- a benchmark term of debt of 10 years
- independent third party data series—specifically, a simple average of the broad BBB rated debt data series published by the Reserve Bank of Australia (RBA) and Bloomberg, adjusted to reflect a 10 year estimate and other adjustments
- an averaging period for each regulatory year of between 10 business days and 12 months (nominated by the service provider and agreed to by us).

Our approach to date to estimating the value for imputation credits (gamma) was set out as the product of the payout ratio (proportion of imputation credits generated and distributed by companies) and the utilisation rate (the amount of credits redeemed by investors).

We now look at how amenable our approach to date to estimating the return on equity, cost of debt and value for gamma is to a mechanistic application. What we mean by this is whether the return on equity, cost of debt and value for gamma can be expressed as a self-executing formula where only the data has to be entered at the time of application.

Our foundation model approach to estimating the return on equity cannot be automatically applied as it involves a six-step process. This necessarily includes different methodologies or a band of values from which we judge to be the most suitable to achieve the regulatory objective at the time of application. Hence, this approach does not easily lend itself to formulaic application.

On the other hand, our approach to date to estimating the cost of debt and the value for gamma are quite formulaic and are likely to be amenable to an automatic application (although recognising that there is ongoing discussion about the parameters and data sources). Under our approach to debt, we can determine the final value by utilising updated data at the time of application of the rate of return. Our approach to estimating gamma, essentially results in a single value (again, noting ongoing discussion about the parameters and data sources) that can be set in the Guideline and may not even need a formulaic expression.

7.2 Options for discussion

Given the above, we focus on options for the automatic application of the return on equity. We recognise that there is ongoing discussion about the role of the SL–CAPM. Whilst we propose three options, we recognise and encourage discussion of other options by the experts at the concurrent evidence sessions.

These options are:

1. Setting one rate of return for the period of the Guideline.

2. Setting one ERP[83] for the period of the Guideline to be used with a risk free rate commensurate with the timing of each regulatory determination to estimate return on equity.
3. Setting out a methodology that allows some or all of the SL–CAPM parameter inputs to vary during the period of the Guideline.

Of the three options, option 1 clearly is the simplest. This will provide stakeholders the greatest certainty of the rate of return. However, these features must be balanced with the need to recognise the movements in the risk free rate. For example, if there are large movements in the risk free rate, this option will not capture such changes.

Option 2 removes the concerns relating to the risk free rate associated with option 1 whilst allowing for automatic application. This option will also provide stakeholders certainty of the rate of return in addition to the return being commensurate with swings in the risk free rate at the time of application.

Under option 2, the MRP and equity beta values are considered via the process of reviewing the Guideline. The ERP is then set in the Guideline process after considering the available information. The risk free rate will be set out in the Guideline as the yield of the 10 year government bond rate over the specified averaging period. The automatic application will be achieved by the return on equity being expressed as a fixed ERP and the risk free rate expressed as a self-executing formula.

Option 3 is different to option 2 in that it would require a method that allows for the equity beta, MRP and/or ERP value to vary over the period the Guideline is in force. That is, unlike option 2 the ERP is not fixed. Option 3 will require careful designing to develop a method that can be applied automatically to capture variations (beyond reasonable market volatility). Option 3 provides the least certainty of the rate of return to stakeholders.

It is unclear how we could express option 3 as a self-executing formula. An approach that appears to target an outcome similar to option 3 has been used by the IPART in its 2013 WACC method decision.[84] The 2013 method is now superseded by IPART WACC method decision 2018.[85]

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83 We refer to the product of the MRP and equity beta in the SL-CAPM formula as the equity risk premium.

84 Available at: https://www.ipart.nsw.gov.au/Home/Industries/Special-Reviews/Reviews/WACC/Review-of-method-for-determining-the-WACC/09-Dec-2013-Final-Report/Final-Report-Review-of-WACC-Methodology-December-2013

85 Available at: https://www.ipart.nsw.gov.au/Home/Industries/Special-Reviews/Reviews/WACC/WACC-Methodology-2017/20-Feb-2018-Final-Report/Final-Report-Review-of-our-WACC-method-February-2018

8 Discussion Questions

MRP - General

1. What are the determinants of market returns?
2. How can required market returns be estimated and what information is available and likely to be useful for this task? Does this indicate change?
3. How should we use the available evidence to select an MRP point estimate?

MRP - Historical Excess Returns (HERs)

4. Does the Geometric Average Historical Return have a part to play in determining the point estimate of MRP?
5. Should HERs be the main method of estimation for the MRP?

MRP - Dividend Growth Models

6. Is the DGM a useful model when directly estimating a forward looking MRP? What are its strengths and weaknesses?
7. To what extent are investor's return expectations likely to be relatively constant (in real or nominal terms)? Has there been a change in evidence regarding the potential negative correlation between the risk free rate and the MRP?
8. Should the AER be considering alternative specifications of the DGM?
9. Should the DGM, and in particular the growth rate, be adjusted from its current construction/estimates in the upcoming guideline review? More generally, how should the growth rate (or rates) be estimated?

MRP - Other Estimation Methods

10. What role should other information (e.g. the Wright approach, survey evidence) play in estimating the MRP?
11. Should any of the 'other' MRP estimation methods listed above play a significant role in the estimation of a potentially fixed MRP under the proposed binding rate of return instrument?

The risk free rate averaging period for estimating the required return on equity

12. Is our proposed option for the RoE averaging periods supported?

Automatic application of the Guideline

13. Is the approach to date for estimating the cost of debt and the value for gamma amenable to automatic application?
14. What are the pros and cons of the 3 options proposed in this paper for the automatic application of the return on equity?
15. How do you design a method to achieve the approach proposed in option 3?

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