



# **Access arrangement final decision**

**Envestra Ltd**

**2013–17**

**Part 3: Appendices**

March 2013

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## Shortened forms

Shortened form	Full title
2008-12 access arrangement	Access arrangement for Envestra effective from 1 January 2008 to 31 December 2012
2013-17 access arrangement	Access arrangement for Envestra effective from 1 January 2013 to 31 December 2017
2018-22 access arrangement	Access arrangement for Envestra effective from 1 January 2018 to 31 December 2022
ACCC	Australian Competition and Consumer Commission
AER	Australian Energy Regulator
access arrangement information	Envestra, Access arrangement information, 30 March 2012
revised access arrangement information	Envestra, Revised access arrangement information, 9 Nov 2012
access arrangement proposal	Envestra, Access arrangement proposal, 30 March 2012
revised access arrangement proposal	Envestra, Revised access arrangement proposal, 9 November 2012
capex	capital expenditure
CAPM	capital asset pricing model
CPI	consumer price index
Code	National Third Party Access Code for Natural Gas Pipeline Systems
DRP	debt risk premium
Envestra	Envestra Limited (ACN 078 551 685)
Envestra Albury	Envestra's distribution network in Albury, NSW and surrounding area
Envestra Victoria	Envestra's distribution network in Victoria
ESC	Essential Services Commission (Victoria)
MRP	market risk premium
NGL	National Gas Law
NGO	National Gas Objective
NGR	National Gas Rules
opex	operating expenditure
PTRM	post tax revenue model
RAB	regulatory asset base
RFM	roll forward model
RPP	revenue pricing principles
WACC	weighted average cost of capital

## A Real cost escalation

Real cost escalation is a method for accounting for expected changes in the costs of key factor inputs. Due to market forces, these costs may not increase at the same rate as inflation. The AER must accept proposals for real cost escalators which are arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances.

### A.1 Final decision

The AER's final decision is not to approve Envestra's proposed labour cost escalators. Applying the proposed escalators will not result in forecast operating expenditure (opex) and capital expenditure (capex) that is arrived at on a reasonable basis.<sup>1</sup> Nor do they provide the best possible forecasts of opex and capex in the circumstances.<sup>2</sup>

The AER's decision is to approve Envestra's proposal materials cost escalators of CPI only.

The AER considers Deloitte Access Economics' (DAE) forecast of the labour price index (LPI) represents the best possible forecast of labour cost escalations in the circumstances.<sup>3</sup>

**Table A.1 AER determined real cost escalators (per cent)**

	2012	2013	2014	2015	2016	2017
EGWWS labour <sup>4</sup>	2.2	0.9	0.5	1.0	1.0	0.9
Construction labour <sup>5</sup>	1.2	-0.1	0.2	0.5	0.3	0.7
Network materials	-	-	-	-	-	-

Source: AER analysis.

### A.2 Envestra revised proposal

In its revised labour cost escalation proposal Envestra proposed the use of an average of Deloitte Access Economics (DAE) and BIS Shrapnel forecasts of changes in the labour price index (LPI) for the Victorian electricity, gas, water and waste services (EGWWS) sector for 2015–2017.

Envestra adopted the AER's draft decision to apply the same real cost escalations for Envestra Victoria and Envestra Albury networks.<sup>6</sup> Envestra also adopted the AER's draft decision for zero real cost escalation of materials.

Envestra engaged BIS Shrapnel and Professor Jeff Borland for advice on labour costs for the 2013–17 access arrangement period. Based on this advice, Envestra proposed the labour cost escalators in table A.2

<sup>1</sup> NGR, r. 74(2)(a).

<sup>2</sup> NGR, r. 74(2)(b).

<sup>3</sup> NGR, r. 74(2).

<sup>4</sup> Labour cost escalations for EGWWS labour applies to all internal labour.

<sup>5</sup> Outsourced labour where specified for capex is assumed to be provided by firms in the construction sector.

<sup>6</sup> Envestra, *Access arrangement proposal: 6.7 Response to Draft Decision: operating expenditure*, 9 November 2012, p. 3.

**Table A.2 AER determined real cost escalators (per cent)**

	2013	2014	2015	2016	2017
EGWWS labour	1.2	1.5	1.7	1.4	1.5
Construction labour	0.8	1.4	1.6	1.2	1.3
Network materials	–	–	–	–	–

Source: Envestra revised proposal.

### A.3 Assessment approach

The AER used the same assessment approach as for its draft decision. The AER's assessment approach for real cost escalation is set out in appendix C of the AER's draft decision.<sup>7</sup>

In undertaking this assessment the AER considered the following information which it received following its draft decision:

- revised labour cost forecasts from BIS Shrapnel,<sup>8</sup> commissioned by Envestra, Multinet and SP AusNet, and DAE commissioned by the AER<sup>9</sup> reflecting updated economic data
- Professor Borland's recommendations commissioned by Envestra, Multinet, SP AusNet and APA GasNet for forecasting the wage price index (WPI)/LPI<sup>10</sup>
- a response report by the Energy Users Coalition of Victoria (EUCV) on the AER's draft decision.<sup>11</sup>

### A.4 Reasons for final decision

The AER approves Envestra's zero cost escalation for materials.

The AER's final decision is not to approve Envestra's proposed labour cost escalators. The AER considers that applying Envestra's proposed escalators will not result in forecast opex and capex that are arrived at on a reasonable basis, or provide the best possible forecasts of opex and capex in the circumstances.<sup>12</sup>

The AER considers DAE's forecast of the LPI represents the best possible forecast of real cost escalations in the circumstances and is arrived at on a reasonable basis. It takes into account that Envestra has not provided a productivity adjustment to its labour cost escalation forecasts.

#### A.4.1 The choice of labour price index measure

In the draft decision the AER rejected Envestra's use of productivity adjusted average weekly ordinary time earnings (AWOTE) and applied an unadjusted LPI forecast by DAE.

<sup>7</sup> AER, *Draft decision, Envestra access arrangement proposal for 1 January 2013 – 31 December 2017*, Part 3, September 2012, p. 71.

<sup>8</sup> BIS Shrapnel, *Update of labour and materials cost escalators for the Victorian and NSW utilities sectors*, 6 November 2012.

<sup>9</sup> Deloitte Access Economics, *Forecast growth in labour costs in Victoria – report prepared for the AER*, 4 February 2013.

<sup>10</sup> Professor Jeff Borland, *Recommendations for methodology for forecasting WPI: report for Envestra Limited, SP AusNet, APA GasNet and Multinet Gas*, October 2012.

<sup>11</sup> Energy Users Coalition of Victoria, *Submission to the AER: AER draft decision and revised applications from Envestra, Multinet and SP AusNet*, January 2013, pp. 30–31.

<sup>12</sup> NGR, r. 74(2).

The AER noted the difficulty in accurately forecasting the change in labour productivity using the standard Australian Bureau of Statistics (ABS) measures of labour productivity for the EGWWS sector as the reason for not applying a labour productivity adjustment.

As in its draft decision, the AER considers in its final decision the best forecast of labour costs to be the one that most accurately measures the change in the labour price adjusted for labour productivity. The AER consider the best forecast of labour cost escalation in the circumstances is DAE's LPI.

### Materiality of quality adjusted labour productivity

The AER considers labour prices should be adjusted for labour productivity improvements to show the impact on labour costs. The quality adjusted labour productivity measure is the appropriate measure to adjust the LPI. This is because quality adjusted labour productivity is largely driven by worker productivity and does not include compositional productivity. The AER considers quality adjusted labour productivity to be material based on the AER's analysis of the ABS data and Professor Borland's productivity data.

In the draft decision the AER considered current estimates of the ABS measure of labour productivity in the utilities industry were subject to estimation difficulties.<sup>13</sup> BIS Shrapnel and DAE produced conflicting labour productivity forecasts for the 2013–2017 access arrangement period. For these reasons the AER did not apply a matching labour productivity adjustment to the LPI forecasts in the draft decision. However the AER considers that labour productivity and worker productivity improves over time and labour price measures should be adjusted for labour productivity if reasonable data is available.

The EUCV submitted in response to the AER's draft decision, that labour cost escalations should be adjusted for labour productivity and that by excluding productivity adjustments on the basis that it is difficult to not be reasonable.<sup>14</sup>

Professor Borland stated any adjustment to LPI for changes in labour productivity should be minimal because the largest share of changes to labour productivity is explained by compositional productivity effects. Consequently the adjusted measure of labour productivity that would be subtracted from forecast changes to LPI is very small.<sup>15</sup>

Professor Borland's empirical analysis of data at the national level is shown in table A.3.

**Table A.3 Professor Borland's empirical analysis on the average annual rate of change (per cent)**

	1997-98 to 2009-10 <sup>16</sup>	1997-98 to 2010-2011 <sup>17</sup>
Labour productivity	1.55	1.35

<sup>13</sup> AER, *Draft decision, Envestra access arrangement proposal for 1 January 2013 – 31 December 2017*, Part 3, September 2012, pp. 74-76.

<sup>14</sup> Energy Users Coalition of Victoria, *Submission to the AER: AER draft decision and revised applications from Envestra, Multinet and SP AusNet*, January 2013, pp. 30–31.

<sup>15</sup> Professor Jeff Borland, *Recommendations for methodology for forecasting WPI: report for Envestra Limited, SP AusNet, APA GasNet and Multinet Gas*, October 2012, p. 9.

<sup>16</sup> Professor Jeff Borland, *Labour cost escalation: Choosing between AWOTE and LPI Report for Envestra Limited*, March 2012, p. 6.

<sup>17</sup> Professor Jeff Borland, *Labour cost escalation: Choosing between AWOTE and LPI Report for Envestra Limited*, March 2012, p. 12.

LPI	3.60	3.60
AWOTE	4.55	4.60
CPI	2.90	3.05

Source: Professor Jeff Borland, *Labour cost escalation: Choosing between AWOTE and LPI Report for Envestra Limited*, March 2012

In his analysis Professor Borland considers at the national level the compositional productivity effect can be inferred to be around one per cent by taking the difference between the AWOTE and LPI.<sup>18</sup>

Expanding on Professor Borland's analysis the AER considers the change in quality adjusted labour productivity can be calculated by:

- $\Delta \text{Labour productivity} + (\Delta \text{LPI} - \Delta \text{AWOTE})$

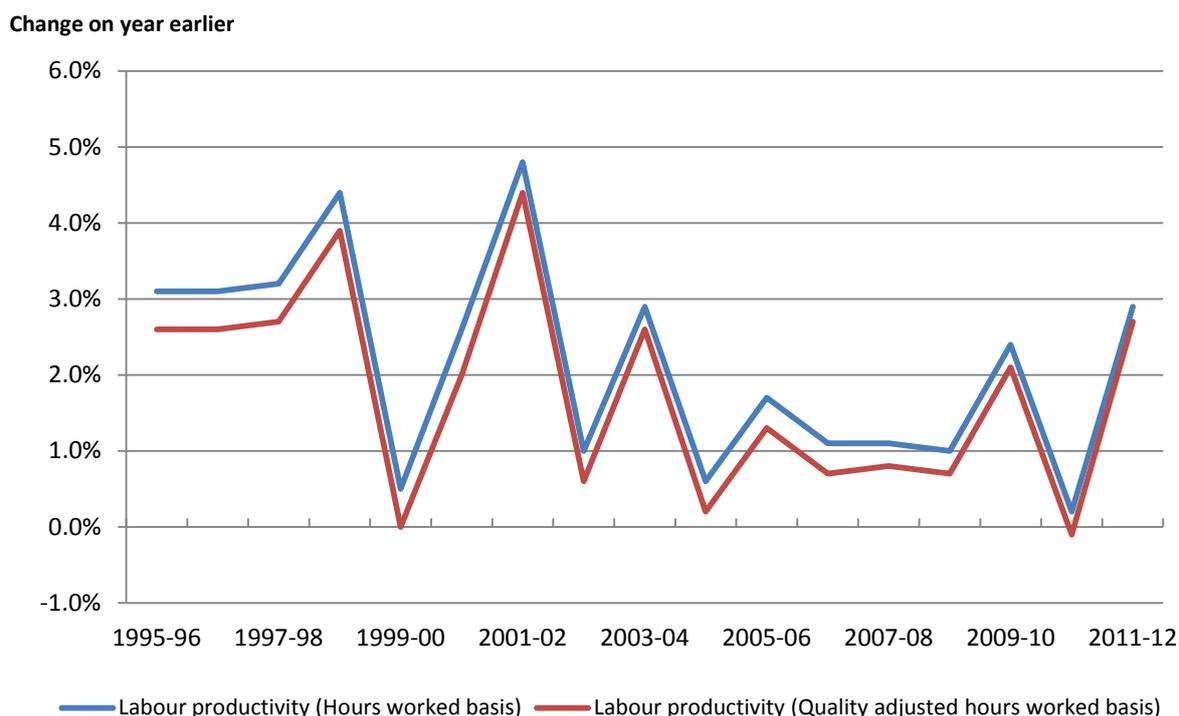
This would imply a quality adjusted labour productivity value between 0.60 using Professor Borland's original data and 0.35 using Professor Borland's updated data submitted in the businesses' initial proposal. The AER notes, however, the AWOTE and the LPI published by the ABS are not from the same source so the two series may not be consistent with each other. Further, the AWOTE may capture wage changes due to other factors such as change in average number of hours worked in a week.

The AER also examined ABS time series data to determine whether worker productivity in the long run makes up a material proportion of labour productivity. The time series trend is illustrated in Figure A.1, which shows the year on year change in labour productivity and quality adjusted labour productivity from June 1996 to June 2012. The ABS data indicates the long-run average quality adjusted labour productivity at the market sector level is 1.78 per cent which makes up a significant proportion of the 2.17 per cent for the long-run labour productivity.

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<sup>18</sup> Professor Jeff Borland, *Labour cost escalation: Choosing between AWOTE and LPI Report for Envestra Limited*, March 2012, p. 13. Further Professor Borland noted the change in labour productivity and the change in CPI reflects the change in AWOTE.

**Figure A.1 Comparison of market sector labour productivity indexes**



Source: ABS, 5204.0, Table 13 Productivity in the market sector

Based on this ABS data, DAE also considered the overall impact of compositional productivity at the national level is not large. DAE also considers the difference between the two series is decreasing overtime indicating a decline in the growth of compositional productivity.<sup>19</sup>

The ABS time series trend as well Professor Borland's data and DAE's analysis indicates that worker productivity is material, and makes up a material proportion of labour productivity. Further the broad range of positive values also indicates that the measure of worker productivity can vary depending on how it is measured but, based on available information worker productivity, is positive.

### Choice of LPI forecasts

The AER considers the best labour price measure in the circumstances is an average of DAE and BIS Shrapnel's LPI forecasts. However, the best labour price measure is not the best labour cost measure. The AER considers the choice of the LPI should take into consideration the accuracy of the labour price measure and the use of labour productivity adjustments. Envestra's revised proposal does not include an adjustment for labour productivity.

In its draft decision the AER applied DAE's LPI forecasts to set labour cost escalations, although the LPI is a labour price measure and not a labour cost measure. The AER considered DAE's LPI forecasts, which are lower than BIS Shrapnel's forecasts, more closely reflect changes in labour costs.

The AER agrees with Envestra and Professor Borland that the average of the two forecasts produces a better forecast of the labour price than using either BIS Shrapnel's or DAE's forecast exclusively.

<sup>19</sup> Deloitte Access Economics, *Productivity measures to adjust LPI and AWOTE*, 8 November 2011, p. 7.

This is consistent with the AER's own analysis of six forecast series of LPI where the average had the lowest mean absolute error on three occasions, DAE on two occasions and BIS Shrapnel once.<sup>20</sup>

Envestra would be over compensated for labour cost escalations if the AER were to apply the best measure of the LPI without taking into account quality adjusted labour productivity. This is because the AER considers quality adjusted labour productivity to be material at the national level and therefore would have a material impact on total forecast opex and total forecast capex.

The AER's final decision is to not approve Envestra's forecast for its labour cost escalations. The AER considers that DAE's LPI forecast for Envestra's labour cost escalations should be applied as this will result in the best forecast possible in the circumstances.<sup>21</sup> DAE's LPI forecast, which is lower than the average of DAE and BIS Shrapnel's forecast, would partially offset the over compensation to Envestra for not adjusting its labour cost escalations for labour productivity.

The AER considers the difference between DAE's LPI forecast and the average of DAE and BIS Shrapnel's forecast to be a reasonable estimate for quality adjusted labour productivity in the circumstances. It is arrived at on a reasonable basis as it takes into account all relevant data. The AER notes that this number is similar to the AER's analysis of worker productivity from Professor Borland's data and lower than DAE's analysis of worker productivity. The AER considers by using this lower value, the risk of over-adjusting for labour productivity is less likely than if the AER were to adopt the long run average from the ABS quality adjusted labour productivity time series or DAE's forecast of quality adjusted labour productivity. This will result in the best forecast possible in the circumstances.<sup>22</sup>

## A.5 Materials cost escalation

In its revised proposal Envestra adopted the AER's draft decision to apply zero materials cost escalation. The AER approves Envestra's revised proposal on materials cost escalation in the final decision for the reasons set out in the AER's draft decision.<sup>23</sup>

## A.6 Revisions

The AER requires the following revisions to make the Access arrangement proposal acceptable:

**Revision A.1:** Opex and capex forecasts should be amended to reflect the labour cost forecasts set out in **Error! Reference source not found.**

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<sup>20</sup> AER, *Powerlink Transmission determination 2012–13 to 2016–17: Final decision*, April 2012, p. 54.

<sup>21</sup> NGR, r. 74.

<sup>22</sup> NGR, r. 74.

<sup>23</sup> AER, *Draft decision, Envestra access arrangement proposal for 1 January 2013 – 31 December 2017*, Part 3, September 2012, p. 82.

## B Rate of return

In attachment 5, the AER sets out its key reasons for adopting a rate of return of 7.39 per cent for Envestra. This includes its key reasons for adopting a risk free rate of 3.53 per cent and market risk premium (MRP) of 6 per cent. In this appendix, the AER provides a detailed technical analysis of the substantial amount of material presented to it by the Victorian gas businesses on the cost of equity. The AER also expands upon its reasoning in the attachment in some areas.

In this appendix the AER identifies the conclusions that the different consultants (both those commissioned by the Victorian gas businesses and the AER) have presented. To the extent possible, the AER prefers that their reports speak for themselves (in terms of both reasons and conclusions) and has identified the relevant sections in the reports.

In this appendix, the AER:

- Outlines Envestra's main arguments on the cost of equity in its revised proposal and provides a map of where those arguments are addressed in this final decision
- Briefly outlines the various cost of equity approaches recommended by different experts.
- Considers the internal consistency of the AER's cost of equity approach, the relevance of "flight to quality" periods, and the discount rates used by market practitioners in takeover valuation reports as surveyed by Ernst & Young.
- Considers whether interest rates are currently "abnormally" low and considers the specific dates of the averaging period proposed by Envestra.
- Sets out further detailed analysis on measures of the MRP (including historical estimates, survey evidence, and forward looking estimates).
- Sets out further detailed analysis on dividend growth model (DGM) estimates—both to estimate the MRP and overall cost of equity for regulated businesses
- Considers market commentary and reasonableness checks on the overall rate of return.
- Explores the cost of equity practices of other regulators in Australia, the UK and the US.

### B.1 Envestra's main arguments

The main arguments that Envestra put to the AER in its revised proposal are identified in Table B.1 below.<sup>24</sup> This decision considers each of these arguments, along with additional relevant material.

**Table B.1 Envestra's main arguments**

Argument	Considered in this section
<ul style="list-style-type: none"><li>▪ AER's cost of equity estimate is inconsistent with the following observations in the market:<ul style="list-style-type: none"><li>▪ It is below lower bound estimated derived from market information on dividend yields, calculated by</li></ul></li></ul>	<p>Appendix B.7.2</p> <p>Appendix B.6.4</p>

<sup>24</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, Sections 4 and 5.

SFG.	Attachment 5.3.3 and Appendix B.6
<ul style="list-style-type: none"> <li>Dividend yields have increased as CGS yields have fallen, indicating higher MRP is required.</li> </ul>	Appendix B.3.4 and Appendix B.7.2
<ul style="list-style-type: none"> <li>DGM estimates of MRP substantially above 6%, including initial proposal DGM estimates.</li> </ul>	Appendix B.7.2
<ul style="list-style-type: none"> <li>The spread between low risk assets and the yield on CGS has increased, indicating a higher MRP is required.</li> </ul>	
<ul style="list-style-type: none"> <li>The yield on APA's hybrid securities exceeds the AER's cost of equity estimate, hybrid securities have lower risk than equities.</li> </ul>	
<ul style="list-style-type: none"> <li>Ernst &amp; Young's review of independent expert reports indicate the AER's cost of equity is too low.</li> </ul>	Appendix B.3.6
<ul style="list-style-type: none"> <li>The AER has incorrectly interpreted rule 87.</li> </ul>	Attachment 5.2.1
<ul style="list-style-type: none"> <li>AER has inconsistently applied the CAPM. There are two legitimate methods for selecting the parameter values in the CAPM: <ul style="list-style-type: none"> <li>Adopt 'spot estimates' of the risk free rate and MRP</li> <li>Adopt long-term averages of the risk free rate and MRP.</li> </ul> </li> </ul>	Attachment 5 Appendix B.3.1
<ul style="list-style-type: none"> <li>The AER incorrectly combines the 'spot' risk free rate from method 1 with the long-term average MRP from method 2. Either of the two methods would be appropriate, but mixing the two is not.</li> </ul>	Attachment 5 Appendix B.3.1
<ul style="list-style-type: none"> <li>Current market circumstances are unusual; there is a 'flight to quality' effect on the CGS.</li> </ul>	Appendix B.3.1
<ul style="list-style-type: none"> <li>AER's MRP estimate is a long term historic average.</li> </ul>	Attachment 5.3.3 Appendix B.5
<ul style="list-style-type: none"> <li>Survey results used by the AER reflect a period when the risk free rate was substantially higher than the current spot rate.</li> </ul>	Appendix B.5.2
<ul style="list-style-type: none"> <li>It is commonly accepted the MRP varies over time, however, the AER's MRP estimates do not change.</li> </ul>	Attachment 5.3.3 Appendix B.5
<ul style="list-style-type: none"> <li>Fund managers noted the AER's overly mechanistic approach produced unprecedentedly low cost of equity estimates and they do not meet the current market conditions.</li> </ul>	Appendix B.5
<ul style="list-style-type: none"> <li>Regulatory precedent from IPART and the UK suggests that the adoption of a long-term average is appropriate.</li> </ul>	Appendix B.8

- The AER's reasonableness checks are out of date and provide no meaningful information about the relationship between investors' required returns and the AER's estimate of the cost of capital. Appendix B.7.2

- The present value principle as described by Lally relies on overly simplistic assumptions that do not apply in practice. Appendix B.3.1

- AER has given no consideration to the asymmetric and adverse consequences that would arise if the cost of capital were set too low. Attachment 5.2.1

## B.2 Cost of equity approaches recommended by different experts

In the draft decision and attachment 5 of this final decision, the AER noted there is no consensus among experts on the best method to estimate the MRP (or the overall cost of equity). Different experts have different views both on the best method to estimate the MRP, and on the best design and inputs into particular methods. These differences, both in relation to the different methods and different inputs, have a material impact on the resultant MRP and cost of equity results.

Envestra submitted 10 consultant reports on the cost of equity issue in its revised proposal. In this final decision, the AER considers views from different experts on the best method to estimate the MRP and cost of equity. These views include:

- advice commissioned by the AER—that is, the approaches preferred by McKenzie and Partington, Lally and CEPA
- views submitted by Envestra in support of its initial proposal—that is, the CEG approaches, Capital Research DGM estimates, and NERA regime switching model
- new views submitted by Envestra in support of its revised proposal—Gregory and Wright's recommended approaches
- approaches to estimate MRP proposed by other regulated businesses in recent regulatory processes—that is, the VAA implied volatility glide path approach and the SFG method.

**Table B.2 Different approaches recommended by different experts**

	Preferred approach	Current / most recent estimate
McKenzie and Partington	Prevailing CGS yield as risk free rate proxy combined with unconditional mean MRP of 6 per cent triangulated using other evidence, such as surveys, DGMs and other market indicators.	prevailing CGS yield and 6 per cent MRP
Lally	Prevailing CGS yield as risk free rate proxy and use a range of evidence to minimise the mean squared error of the MRP estimate. Evidence includes historical excess returns, survey evidence, Siegel approach, DGM analysis, real market cost of equity and international data	prevailing CGS yield and 6 per cent MRP
CEPA	Estimate cost of capital over the life of the asset as in the established UK approach and assume a	Values not specified.

constant expected cost of equity over the long run.

CEG	<ol style="list-style-type: none"> <li>1. Use DGMs to directly estimate the cost of equity for comparable firms</li> <li>2. Use DGMs to estimate the cost of equity for the market portfolio and apply within the CAPM to derive a DGM estimate for the MRP</li> <li>3. Estimate the cost of equity by combining a historical average risk free rate with a historical average MRP.</li> </ol>	<p>Nominal market cost of equity 10.4-14.1%</p> <p>Prevailing risk free rate and an MRP of 8.89%</p> <p>A historical average risk free rate of 5.86% and a 6% MRP.</p>
Capital Research	Use DGMs to estimate the MRP, no comment on the risk free rate	An MRP of 9.6%
NERA	<p><u>Initial proposal report:</u></p> <p>Regime switching model and DGM estimates of the MRP. No comment on the risk free rate.</p> <p><u>Revised proposal report:</u></p> <p>Long term historical average risk free rate with historical average MRP.</p>	<p>Regime switching model: an MRP of 8.44%</p> <p>DGM MRP estimates in the range of 7.69-7.72%.</p> <p>Values not specified,</p>
Gregory	<ol style="list-style-type: none"> <li>1. Estimate the expected return on the market directly and use this estimate with the preferred risk free rate in the CAPM.</li> <li>2. Estimate both the risk free rate and the MRP from historically observed data.</li> </ol>	<p>Nominal expected return on the market of 11.31% (with imputation credits adjustment).</p> <p>Historical risk free rate (5% as currently proposed by the Victorian gas distribution businesses) and historical MRP of 6%</p>
Wright	<ol style="list-style-type: none"> <li>1. Assume a constant real market cost of equity</li> <li>2. Combine historical average risk free rate with a historical average MRP</li> </ol>	<p>Real market cost of equity in the range of 7.25-7.5% according to recent Ofgem decisions. Australian rate not specified.</p> <p>Historical risk free rate (5% as currently proposed by the Victorian gas distribution businesses) and historical MRP of 6%</p>
VAA	Prevailing risk free rate with implied volatility estimate of the MRP	<p>Prevailing risk free rate and a 7% MRP</p> <p>(The AER estimated a 10 year MRP of 5.54 per cent after correcting for its concerns discussed in the attachment.)</p>
SFG	Use financial market indicators (implied volatility, dividend yields, credit spreads, ASX price earnings ratio) to estimate MRP, no comment on the risk free rate	No specific MRP estimate but considers these indicators show the current MRP is above 6%

Table B.2 above summarises different views of different experts. After carefully assessing these views, the AER considers its current approach is reasonable and it appropriately reflects prevailing conditions in the market for funds. Its reasons are set out in attachment 5 and below. The AER's approach most closely resembles the approaches of McKenzie and Partington and Lally.

## B.2.1 McKenzie and Partington's recommended cost of equity approach

McKenzie and Partington considered the current yield on 10 year CGS is a reasonable estimate of the 10 year forward looking RFR. It is possible to invest for ten years at this rate at the current point in time. Thus, it is the natural benchmark with which to compare other investments over a ten year horizon.<sup>25</sup>

In relation to the MRP, they noted the objective should be to estimate the unconditional mean MRP, but supplemented by triangulation and reasonableness checks using alternative approaches in determining the current MRP to be used in regulatory decisions.<sup>26</sup> In the December 2011 MRP report, they considered four areas of evidence: historical excess returns, survey evidence, DGM analysis and other methods (including using international data, credit spreads and implied volatilities). They advised placing weight on historical excess returns and survey evidence: DGM and other methods can be used only as reasonableness checks and need to be interpreted with caution.

They concluded there is little persuasive evidence for deviating from the long standing regulatory consensus of a market risk premium estimate of 6 per cent. If anything, the risk with this estimate is that it may prove to be an overstatement.<sup>27</sup> They remained of this view in their February 2012 report, August 2012 report and the most recent February 2013 report, after having reviewed further materials submitted by regulated businesses.<sup>28</sup>

McKenzie and Partington have also critically evaluated the AER's approach in their February 2013 report. They interpreted the AER's approach as combining an estimate of the current risk free rate with an estimate of the current market risk premium, thus it is an internally consistent approach and consistent with finance theory. They acknowledged the 6 per cent adopted by the AER is not just a choice based on the historical average of the MRP. Rather it is based on a broader set of evidence they reviewed in their December 2011 report.<sup>29</sup>

In their most recent report, McKenzie and Partington considered getting the best estimate of the current risk free rate and the best estimate of the current MRP is the key. They supported the AER's approach of using the prevailing yield on the 10 year CGS and a 6 per cent MRP.<sup>30</sup>

## B.2.2 Lally's recommended cost of equity approach

Lally suggested using a risk free rate prevailing at the commencement of the regulatory period, as this ensures the present value of the regulated business's future cash flows matches its initial investment. He further suggested the risk free rate should be the rate on bonds whose term matches the regulatory cycle (five years) in order to satisfy the present value principle.

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<sup>25</sup> M. McKenzie, and G. Partington, *Review of the AER's overall approach to the risk free rate and market risk premium*, 28 February 2013, pp. 31-32 (McKenzie, and Partington, *Review of the AER's overall approach*, February 2013).

<sup>26</sup> McKenzie, and Partington, *Review of the AER's overall approach*, February 2013, p.20.

<sup>27</sup> M. McKenzie, and G. Partington, *Report to Corrs Chambers Westgarth: Equity market risk premium*, December 2011, pp. 36–37. (McKenzie and Partington, *Equity market risk premium*, December 2011)

<sup>28</sup> M. McKenzie, and G. Partington, *Report to the AER: Supplementary report on the equity market risk premium*, February 2012, p.5. (McKenzie, and Partington, *Supplementary report on the MRP*, February 2012)

M. McKenzie, and G. Partington, *Report to the AER: Review of regime switching framework and critique of survey evidence*, September 2012, pp. 24–25. (McKenzie, and Partington, *MRP: Regime switching framework and critique of survey evidence*, September 2012)

McKenzie, and Partington, *Review of the AER's overall approach*, February 2013, pp.30-32.

<sup>29</sup> McKenzie, and Partington, *Review of the AER's overall approach*, February 2013, p.31.

<sup>30</sup> McKenzie, and Partington, *Review of the AER's overall approach*, February 2013, p.6.

In relation to the MRP, he suggested an approach that minimises the mean squared error (MSE) and this leads to a consideration of the results from a wide range of methods. These methods should include:

- the historical averaging of excess returns (6 per cent)<sup>31</sup>,
- the historical average of excess returns modified for the 'great inflation shock' in the 20th century (4.9 per cent),
- the result from the DGM approach (5.9-8.5 per cent),
- the result from surveys (up to 5.9 per cent),
- evidence from foreign markets as well as other methodologies can also be considered.

Lally noted the median of these approaches (6.0 per cent) provides an appropriate MRP estimate.<sup>32</sup>

Lally's estimated MRP matches the AER's current estimate.<sup>33</sup> The AER also applies a risk free rate prevailing at the commencement of the regulatory period. However, it uses a 10 year risk free rate rather than the 5 year CGS yield as recommended by Lally. By doing so, the AER is likely to estimate a cost of equity higher than that suggested by Lally.<sup>34</sup>

### B.2.3 CEPA's recommended cost of equity approach

CEPA noted there is evidence for a constant expected cost of equity over the long run, in this case it is important to apply a consistent approach. It therefore suggested estimating the cost of capital over the life of the asset as in the established UK approach.<sup>35</sup>

The AER has also commissioned CEPA to consider the valuation reports presented by Ernst and Young. CEPA recommended that the AER should not change its current estimation approach after reviewing these valuation reports and considering various criteria it identified in the report.<sup>36</sup>

As discussed in section B.3.1, the AER considers its current approach has consistently estimated a 10 year forward looking risk free rate and a 10 year forward looking MRP. The evidence has not persuaded the AER that the cost of equity is relatively stable or there is a sufficient negative relationship between the risk free rate and the MRP. The reasons are discussed in sections B.3.2 and B.3.3.

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<sup>31</sup> Lally notes he prefers arithmetic averages. The AER considers arithmetic average and geometric average of historical excess returns in B.2.1 of the draft decision and further in section **Error! Reference source not found.** of this final decision. **Error! Reference source not found.**

<sup>32</sup> Lally explained as some methods provide estimated ranges rather than point estimates, the mean cannot be determined and therefore the median is considered.

<sup>33</sup> M. Lally, *Review of the AER's methodology for the risk free rate and the market risk premium*, 4 March 2013, p. 33-34. (Lally, *Review of the AER's methodology*, March 2013)

<sup>34</sup> This is because the longer term bonds carry more risk than the shorter term bonds and therefore require higher returns. The 5 year CGS yield is generally lower than the 10 year CGS yield.

<sup>35</sup> CEPA, *Advice on estimation of the risk free rate and market risk premium*, March 2013, pp. 35-36.

<sup>36</sup> CEPA, *Advice on estimation of the risk free rate and market risk premium, report prepared for the Australian Energy Regulator*, 12 March 2013, p. 62. (CEPA, *Advice on estimation of the risk free rate and market risk premium*, March 2013)

## B.2.4 CEG's recommended approaches (DGM or historical average based approaches)

In both the March and November 2013 reports, CEG proposed three alternative approaches to estimate the cost of equity:

- use DGM to directly estimate the cost of equity for comparable firms
- use DGM to estimate the cost of equity for the market portfolio and apply within the CAPM to derive a DGM estimate for the MRP
- Proxy prevailing conditions in the market for funds by combining a historical average MRP with a historical average risk free rate.<sup>37</sup>

CEG's estimated DGM cost of equity combines dividend yield forecasts with estimated dividend per share growth forecasts. This approach assumes that, at any point in time, the market cost of equity is the same for all future years. With the first method, CEG estimated a cost of equity for Australian regulated businesses of between 10.4-14.1 per cent. By applying a prevailing risk free rate, it estimated a prevailing market cost of equity of 10.16 per cent and an MRP of 8.89 per cent from the second method.

CEG's third approach combines an average historical 10 year CGS between 1 July 1993 and 28 September 2012 (5.86 per cent nominal) with a beta of 0.8 and an MRP of 6 per cent. It estimated a nominal cost of equity of 10.66 per cent. This cost of equity estimate can then be crosschecked with the DGM cost of equity estimates derived from the first two methods.<sup>38</sup>

Based on advice from Lally, the AER considers CEG's DGM method overstates a reasonable MRP and cost of equity estimates when the risk free rate is low. The AER's analysis on the use of DGM methods generally, and concerns of CEG's particular DGM method is set out in section B.6.

In section B.3.1 the AER considers using a historical average risk free rate according to the third CEG approach will violate the present value principle. CEG recommended this approach as it suggested the AER has incorrectly combined a spot risk free rate with a long term average MRP. However, as discussed in section B.3.1, the AER has consistently estimated a 10 year forward looking risk free rate and a 10 year forward looking MRP.

## B.2.5 Capital Research's recommended MRP approach (DGM based approach)

Envestra submitted a Capital Research report which used a DGM to directly estimate the forward MRP in its initial proposal. It did not submit another Capital Research report with its revised proposal. In its March 2012 report, Capital Research suggested the best forward looking MRP was 9.6 per cent, assuming a risk free rate of 3.73 per cent and a net theta of 0.2625.<sup>39</sup>

The AER noted Capital Research's DGM estimate is subject to some limitations as discussed in sections B.2.3 and B.2.4 of the draft decision. As no further Capital Research report was submitted in

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<sup>37</sup> CEG, *Internal consistency of risk free rate and MRP in the CAPM*, Prepared for Envestra, SP AusNet, Multinet and APA, , March 2012, p. 49. (CEG, *Risk free rate and MRP in the CAPM*, March 2012); CEG, *Update to March 2012 Report: on consistency of the risk free rate and MRP in the CAPM*, November 2012, p.31. (CEG, *Update to March 2012 Report*, November 2012)

<sup>38</sup> CEG, *Risk free rate and MRP in the CAPM*, March 2012, p. 49.

<sup>39</sup> Capital Research, *Forward Estimate of the Market Risk Premium: Update: A report prepared for the Victorian gas transmission and distribution businesses: APA Group, Envestra, Multinet Gas and SP AusNet*, March 2012, p. 33. (Capital Research, *MRP estimate for the Vic NSPs*, March 2012)

the revised proposal, the AER does not address Capital Research's DGM estimates again in this final decision.

## B.2.6 NERA's recommended cost of equity approaches

In its initial proposal, Envestra submitted a report from NERA on the MRP. In that report, NERA proposed estimating the MRP based on a regime switching model. NERA suggested this method would provide the most suitable MRP in prevailing market conditions. The model produced an MRP estimate of 8.44 per cent. The AER raised concerns about the regime switching model in the draft decision. In particular, it considered this model was complex and involves:

- determining the appropriate assumptions of high and low volatility states
- estimating the current probability of being in the high volatility state
- using a Markov chain to roll over this probability
- calculating a short term MRP in relation to the three month bill return
- deriving a forward one year bill rate
- converting the short term MRP to a five year MRP.<sup>40</sup>

The AER is not aware of any regulators that have used a regime switching model in deriving their MRP estimates. In their August 2012 report, McKenzie and Partington noted the available sample size is too small for any meaningful statistical model fitting. NERA's regime switching model is not a good fit of the data and does not provide sensible volatility estimates. Further, the SFG report that reviewed the NERA regime switching model did not provide insights to address this problem.<sup>41</sup>

In its initial report, NERA also calculated DGM estimates of 7.69 and 7.72 per cent based on Bloomberg and I/B/E/S forecasts. However, it considered the regime-switching model provided the most suitable MRP estimate as the model provided an estimate of the MRP in each future year.<sup>42</sup>

Envestra submitted another NERA report in the revised proposal. The AER notes the Terms of Reference asked a different set of questions. Therefore, instead of updating its regime switching model and DGM estimates, NERA provided an account of the historical development of the determination of the cost of equity by Australian regulators. It presented evidence such as dividend yield and US regulatory decisions and recommended that current market circumstances warrant a departure from the standard AER approach.<sup>43</sup> It concluded using a long term average risk free rate is appropriate in current market circumstances if the long term historical MRP is used.

It is not clear which of the two approaches is preferred by NERA as the two NERA reports addressed different questions. However, the AER is not persuaded that either approach is appropriate. Dividend yields and the US regulatory decisions do not warrant a change in the AER's current approach. These issues are discussed in sections B.6.4 and B.8.4, respectively. In addition, the AER does not consider it appropriate to use a long term average risk free rate for the reasons discussed in attachment 5.

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<sup>40</sup> NERA Economic Consulting, *Prevailing conditions and the market risk premium: A report for APA Group, Envestra, Multinet and SP AusNet*, March 2012, pp. 24–31. (NERA, *Prevailing conditions and the MRP*, March 2012)

<sup>41</sup> McKenzie, and Partington, *MRP: Regime switching framework and critique of survey evidence*, September 2012, pp. 21–22.

<sup>42</sup> NERA, *Prevailing conditions and the MRP*, March 2012, p.42

<sup>43</sup> NERA, *Estimating the Cost of Equity under the CAPM: Expert report of Gregory Houston*, November 2012, pp.18-30. (NERA, *Estimating the Cost of Equity under the CAPM*, November 2012)

### B.2.7 Gregory's recommended cost of equity approaches

Gregory considers the historical return on equities has a relatively stable mean over time.<sup>44</sup> Therefore, he suggested the AER could adopt one of two approaches:<sup>45</sup>

- Estimate the expected return on the market directly and use this estimate with its preferred risk free rate in the CAPM.
- Make allowance for the exceptional conditions in global government bond markets following the GFC by estimating both the risk free rate and the MRP from historically observed data.

Gregory suggested these approaches to address what he considered were errors in the AER's approach. He compared the AER's approach to those used by UK regulators and found the AER is in error in the assessment of the cost of equity capital for the Victorian Gas Businesses. Gregory considered this is a result of the AER inconsistently applying its approach to estimate the MRP and risk free rate. He suggests that in doing so the AER has combined two different measures of the risk free rate in the CAPM.

The AER considers its approach in estimating the cost of equity is internally consistent as discussed in section B.3.1 below. It estimates a forward looking 10 year risk free rate and MRP, although different methods are used due to the different nature of these parameters.

The cost of equity is inherently unobservable.<sup>46</sup> The AER examined the theoretical and empirical evidence and concluded the evidence does not support a relatively stable cost of equity as discussed in section B.3.2. In the absence of evidence to support a relatively stable cost of equity in the Australian context, the AER is not persuaded that it is appropriate to adopt Gregory's preferred approaches.

### B.2.8 Wright's recommended cost of equity approach (assumed constant cost of equity approach)

Wright considered both the cost of equity and the MRP are inherently unobservable. However he believed regulators have to commit themselves to a particular set of assumptions about these unobservable magnitudes. Two strategies he considered are that regulators can either assume the real market return is stable or the MRP is stable. He suggested regulators should work on the core assumption that the real cost of equity is relatively stable, consistent with Mason, Miles and Wright (2003). As a direct implication of this assumption, the implied MRP must move point by point in the opposite direction of the risk free rate.<sup>47</sup>

Wright suggested the current AER methodology introduces instability into the assumed figure for the real cost of equity. The preferred approach should assume a constant real market cost of equity as adopted by UK regulators. However, if the AER continues to assume a constant MRP, a possible compromise approach would be to combine this with a historical average risk-free rate.<sup>48</sup>

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<sup>44</sup> A. Gregory, *The AER approach to establishing the cost of equity – Analysis of the method used to establish the risk free rate and the market risk premium*, November 2012, pp.4-7. (Gregory, *The AER approach*, November 2012)

<sup>45</sup> Gregory, *The AER approach*, November 2012, p.3.

<sup>46</sup> See, for example, S. Wright, *Review of risk free rate and cost of equity estimates: A comparison of UK approaches with the AER*, October 2012, p.2. (Wright, *Review of risk free rate and cost of equity estimates*, October 2012)

<sup>47</sup> Wright, *Review of risk free rate and cost of equity estimates*, October 2012, p. 2.

<sup>48</sup> Wright, *Review of risk free rate and cost of equity estimates*, October 2012, p. 3.

Applying Wright's approach to Australian data, Lally found the estimated MRP series is more stable than the average real market return series.<sup>49</sup> Therefore, the evidence does not currently support Wright's preferred approach. This is discussed in detail in sections B.3.2 and B.3.3. Further, Lally noted Wright in principle agrees with the present value principle and the use of Sharpe-Lintner CAPM.<sup>50</sup>

### B.2.9 VAA's recommended MRP approach (implied volatility glide path approach)

The AER also considers Value Adviser Associates' (VAA's) implied volatility "glide path" approach. Envestra did not propose this approach in this review. However, in previous reviews, Envestra and other regulated businesses have proposed the AER should have regard to this approach.<sup>51</sup> The VAA approach has been put forward:<sup>52</sup>

- by the Victorian electricity distribution network service providers (noting the which overlap in ownership between these businesses and with the Victorian gas networks) in their 2010 regulatory determination,<sup>53</sup> as well as the 2011 Advanced Metering Infrastructure determination<sup>54</sup>

by Envestra in the South Australia and Queensland gas access arrangements in 2011.<sup>55</sup>

The AER notes NBN Co. submitted a VAA report for its Special Access Undertaking in September 2012. In this report, VAA suggested it is appropriate to derive a cost of equity by combining a prevailing 10 year risk free rate with a 7 per cent MRP, derived from the implied volatility glide path approach in the CAPM.<sup>56</sup> In the attachment, the AER applied VAA's approach directly to the current volatility data and estimated a current one year MRP of 5.8 per cent. Further, if VAA's approach is corrected for the AER's concerns discussed in the attachment, it produces a current one year MRP of 3.7 per cent. This converts to a 10 year MRP of 5.54 per cent.<sup>57</sup>

VAA's approach in estimating the risk free rate coincides with the AER's current approach. The AER considers using a prevailing 10 year CGS rate is reasonable for the reasons discussed in the

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<sup>49</sup> Lally found the standard deviation of average real market returns is 1.5 per cent. The standard deviation for the average real government bond yield is 1.4 per cent. For the estimate MRP time series, it is 0.9 per cent. These standard deviations imply the average real market return is considerably more volatile than that for the estimated MRP.

<sup>50</sup> M. Lally, *The present value principle: risk, inflation and interpretation*, 4 March 2013, p.9. (Lally, *The present value principle*, March 2013)

<sup>51</sup> SP AusNet and Multinet, *Envestra draft decision market risk premium submission*, 2 May 2011, p.9

<sup>52</sup> In addition to those listed below, the VAA approach has also been put forward by ETSA (SA electricity transmission) in June 2009, Westnet Energy (WA gas distribution) in December 2009 before the ERA, in a published journal article, and by NBN Co (national telecommunications) in December 2011 before the ACCC. VAA, *Market risk premium: An estimate for 2010 to 2015: Prepared for ETSA*, June 2009; VAA, *Market risk premium: Estimate for January 2010 – June 2014: Prepared for WestNet Energy*, December 2009; S. Bishop, M. Fitzsimmons, and B. Officer, *JASSA The Finsia Journal of Applied Finance*, 'Adjusting the market risk premium to reflect the global financial crisis', May 2011 (Issue 1 2011), pp. 8–14 (Bishop, Fitzsimmons and Officer (2011)); and VAA, *Report on WACC component of NBN Co's Special Access undertaking*, December 2011.

<sup>53</sup> VAA, *Market Risk Premium: Estimate for 2011–2015: Draft*, October 2009; and VAA, *MRP for Vic electricity DNSPs*, July 2010. Note that although labelled as 'draft', the October 2009 report was submitted by the service provider as a finalised report.

<sup>54</sup> VAA, *Market Risk Premium, An update prepared in response to the draft determination by the AER on the Victorian Advanced Metering Infrastructure Review: 2012–15 budget and charges applications*, August 2011.

<sup>55</sup> VAA, *Comments on the Market Risk Premium in Draft Decision by AER for Envestra February 2011*, March 2011 (VAA, MRP for Envestra, March 2011).

<sup>56</sup> VAA, *Report on WACC component of NBN Co's Special Access Undertaking*, September 2012, p.19

<sup>57</sup> 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 5.54% based on JCP assumption—that is assuming the MRP will be 3.7% for the first two years and reverts to a long term average MRP for the next eight years. See: Bishop, Fitzsimmons, 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.

attachment. It does not consider VAA's implied volatility glide path approach<sup>58</sup> produces an appropriate estimate of the forward looking 10 year MRP as discussed in attachment 5.3.3. However, even if weight were to be given to this approach, it would currently support an MRP estimate below 6 per cent.

### B.2.10 SFG's recommended MRP approach (three conditioning variable based approach)

In the draft decision, the AER considered the use of other financial market indicators put forward in recent SFG reports. SFG used three financial market indicators as 'conditioning variables' to adjust the MRP estimate around its long run average of 6 per cent.<sup>59</sup>

- Implied volatility—Implied volatility relies on contentious assumptions to derive an MRP estimate.<sup>60</sup> In particular, the AER does not agree with the assumption that the price of risk per unit of implied volatility is constant on theoretical and empirical grounds.<sup>61</sup> This method provides only a short term estimate of the MRP (usually three months, matching the term of the implied volatility measure). Further, the AER is unaware of any settled method to extrapolate to a longer term. Given the relevant MRP is the 10 year forward looking rate, the AER placed limited weight on the MRP estimate derived on this basis.
- Credit spreads—Credit spreads in this context refer to the difference in yields between bonds with high (AAA rated) and low (BBB rated) credit ratings. Similarly, relative credit spreads will differ based on the method chosen to measure the bond yields. McKenzie and Partington noted there is no well developed, reliable or precise way to separate out the effect of changes in the MRP from other effects.<sup>62</sup> Given this key limitation to the credit spread analysis, the AER placed limited weight on this method when determining the 10 year forward looking MRP.
- Dividend yields—Dividend yields in this context is calculated for the entire market, using forecast distributions (dividends) for all firms in a broad share market index divided by the total value of those shares. The dividend yield estimate will differ based on the choice of index, the method of obtaining and aggregating dividend forecasts, and the horizon of those dividend forecasts. The AER considers the key limitation is the unclear relationship (if any) between dividend yield and the 10 year forward looking MRP.<sup>63</sup>

In the revised proposal, SFG agreed with the AER that the literature has not reached the state where there is a consensus about the precise mathematical relationship between each financial indicator variable and the MRP.<sup>64</sup> However, SFG again pointed to indicators such as regulatory risk premiums on debt, ASX dividend yields and ASX price/earnings ratios in support of a higher required return on equity.<sup>65</sup>

SFG's implied volatility indicator is similar to VAA's implied volatility glide path approach discussed above. The AER notes SFG did not present implied volatility data in this most recent report, however,

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<sup>58</sup> The detail of the implied volatility approach is discussed in attachment 5.3.3.

<sup>59</sup> SFG, Market risk premium: *An updated assessment and the derivation of conditional and unconditional estimates: Report for the Victorian electricity distribution businesses*, 20 February 2012, pp. 8–13, 26–30 (SFG, *Conditional and unconditional MRP for the Vic DNSPs*, February 2012).

<sup>60</sup> Further, the appropriate measure of implied volatility is difficult to determine, with different measures (based on different underlying options) producing conflicting figures.

<sup>61</sup> See discussions in AER, *Draft decision: Envestra Ltd: Access arrangement proposal for the SA gas network 2011–2016*, 17 February 2011, pp. 282–283.

<sup>62</sup> McKenzie, and Partington, *Equity market risk premium*, 21 December 2011, pp. 30–31.

<sup>63</sup> The AER considered these matter further in section B.2.6 of the draft decision.

<sup>64</sup> SFG, *The required return on equity*, November 2012, p.39.

<sup>65</sup> SFG, *The required return on equity*, November 2012, pp. 42-44.

it did present data on the other market indicators. While the AER does not consider implied volatility can provide an appropriate indicator for the forward looking 10 year MRP, it would currently support an MRP estimate below 6 per cent. SFG does not explain why it no longer gives weight to this approach. Attachment section 5.3.3 considers implied volatility analysis in more detail.

Price/earnings ratio analysis is in many ways similar to the dividend yield analysis. The fundamental driver is the relationship between the current share price and cash flows—either at the firm level (earnings) or to shareholders (dividends). The AER does not separately discuss price earnings ratio. Section B.6.4 and B.5.3 discuss dividend yield and credit spreads in more detail.

### B.3 Cost of equity issues

There is a general consensus that the cost of equity is not directly observable and therefore a model is required in order to estimate it. Envestra acknowledged this fact.<sup>66</sup> This position is similarly acknowledged by Wright<sup>67</sup> and Ernst and Young.<sup>68</sup>

The AER and the Tribunal agree that the Sharpe Lintner CAPM is a well accepted financial model and is appropriate to use in order to estimate the cost of equity. Implicitly, Envestra must also consider that the Sharpe Lintner CAPM is a well accepted financial model because it proposed the model, and a requirement of the NGR is that a well accepted financial model must be used.<sup>69</sup> The AER therefore estimates the cost of equity by combining the best estimate of each parameter that is required within the CAPM. The AER determines the cost of equity ( $r_e$ ) using the CAPM formula:

$$r_e = r_f + \beta_e \times MRP$$

where:

the AER and Envestra agree the equity beta estimate ( $\beta_e$ ) is 0.8.<sup>70</sup>

The cost of equity is the key area of disagreement between the AER and Envestra.

In this section the AER considers a number of issues that are relevant to the cost of equity as a whole, namely:

- The consistency of the approach
- Is the cost of equity is relatively stable over time?
- Is there is a negative relationship between risk free rate and MRP?
- Flight to quality periods
- State government bond yields

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<sup>66</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.2.

<sup>67</sup> Wright, *Review of risk free rate and cost of equity estimates*, October 2012, p.2.

<sup>68</sup> Ernst & Young, *Market evidence on the cost of equity: Victorian gas access arrangement review 2013-2017*, 8 November 2012, p. 7. (Ernst & Young, *Market evidence on the cost of equity*, November 2012)

<sup>69</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 3.

<sup>70</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 3.

- The appropriate term of the risk free rate and the MRP
- Ernst and Young's analysis of market evidence
- RBA advice.

The AER discusses each of these issues below.

### B.3.1 The consistency of the approach to the cost of equity

In attachment section 5.3.2, the AER briefly discusses the importance of consistency with the present value principle and building block model. This section explores these concepts in more detail and also considers other aspects of consistency.

#### Consistency with present value principle

The present value principle is a fundamental principle underlying the building block model and the application of the CAPM.

Lally defines the present value principle in this manner:

The Present Value principle states that the present value of a regulated firm's revenue stream should match the present value of its expenditure stream plus or minus any efficiency incentive rewards or penalties...the Present Value principle applies equally to risk free and risky situations and, in the latter case, requires both a risk free rate and a risk premium that are defined over the regulatory period and based upon conditions prevailing at the start of that period.<sup>71</sup>

In the present context, the present value principle requires that the cost of equity that should apply in the building block model is the cost of equity that is prevailing at the commencement of the access arrangement period and reflects the length of the period.

The AER makes two departures from strict compliance with the present value principle as defined as:

- a short averaging period as close as practically possible to the commencement of the access arrangement period is applied
- a 10 year term is applied.

These departures do not justify the application of a long term average risk free rate. Elsewhere in this appendix the AER discusses the averaging period and the term of the cost of equity.<sup>72</sup>

For this decision, the AER estimates:

- a 10 year forward looking risk free rate
- a 10 year forward looking MRP
- taking into account the economic interdependencies between these parameters
- based on expectations prevailing at the commencement of the access arrangement period.

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<sup>71</sup> Lally, *The present value principle*, March 2013, pp. 5-6.

<sup>72</sup> See appendix sections **Error! Reference source not found.** and **Error! Reference source not found.**

Accordingly, the AER estimates the prevailing 10 year cost of equity as close as practicably possible to the commencement of the access arrangement period. This cost of equity is, to the extent possible, consistent with the present value principle, the building block model and the CAPM. The AER has formed its estimate using a prevailing estimate of the risk free rate, a prevailing estimate of the MRP and a prevailing estimate of the equity beta. The AER has also considered a possible relationship between the risk free rate and the MRP and whether the cost of equity is stable through time.

The AER also applied the present value principle in forming its estimate of the cost of equity in the draft decision.<sup>73</sup> In its revised proposal, Envestra submits that the AER's reliance on the present value principle is in error.<sup>74</sup> Advice from Professor Wright and Professor Gregory informs Envestra's position.<sup>75</sup> CEG also provides advice that supports Envestra's position.<sup>76</sup>

Prior to the draft decision, Associate Professor Lally provided advice on the present value principle. That advice focussed on the risk free rate as this was the focus of the AER's questions to him, based on the material submitted by the businesses.<sup>77</sup>

Envestra's consultants submit that Lally's advice was too simplistic and did not take into account the effect of risk and inflation.<sup>78</sup>

In response to the advice from Professors Wright and Gregory, and CEG, Lally states:

...in respect of the implications of risk for the Present Value principle, the principle applies equally to risk free and risky situations. In the former case, the risk free rate is defined over the regulatory period and based upon conditions prevailing at the start of that period. In the latter case, both the risk free rate and the risk premium are defined over the regulatory period and based upon conditions prevailing at the start of that period.<sup>79</sup>

Lally concludes that Wright agrees with the present value principle.<sup>80</sup> The central issue from Professor Wright's advice appears to not be with the present value principle itself, but with the preferred application of the CAPM to satisfy that principle.

CEG makes an additional suggestion about the application of the present value principle through time. It suggests that there are two alternative versions of the principle.<sup>81</sup> Lally also identifies this proposal and suggests:

I agree that these two versions of the present Value principle exist, with the first version merely being that one used by a regulator to operationalise the second version.<sup>82</sup>

See section 5.3 of that report for further discussion of this proposal.

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<sup>73</sup> AER, *Draft decision: Access arrangement draft decision: Envestra Ltd 2013-17*, September 2012, Attachments, p. 127.  
<sup>74</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.7.  
<sup>75</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.7.  
<sup>76</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, pp. 47-51.  
<sup>77</sup> M. Lally, *The risk free rate and the present value principle*, 22 August 2012, p. 3.  
<sup>78</sup> S. Wright, *Response to Professor Lally's analysis*, 2 November 2012, p. 2; Note that Lally considers also the material on the present value principle submitted by Envestra in his report: Lally, *The present value principle*, March 2013  
<sup>79</sup> Lally, *The present value principle*, March 2013, p. 16.  
<sup>80</sup> Lally, *The present value principle*, March 2013, pp. 16-17.  
<sup>81</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 49.  
<sup>82</sup> Lally, *The present value principle*, March 2013, p.13.

## Consistency with the building block model

The NGR prescribe the use of the building block model when the AER is calculating the total revenue allowance.<sup>83</sup> The building block model has a long history in regulation in Australia.<sup>84</sup>

An important principle of the building block model is the present value principle. In a 2011 paper on public utility regulation in Australia, Dr Darryl Biggar explained the origins of the building block model and its goals.<sup>85</sup>

Lally states:

...the Building Block model requires use of the risk free rate at the beginning of the regulatory period and therefore the rate should be averaged over a short period as close as practical to the start of the regulatory period. Rates averaged over a much longer historical period would be inconsistent with the Building Block model.<sup>86</sup>

As this decision is consistent with the present value principle, it is also consistent with the building block model.<sup>87</sup>

## Consistency with the Capital Asset Pricing Model (CAPM)

The AER has applied the CAPM consistently. Envestra proposed the Sharpe-Lintner CAPM be applied for this decision.<sup>88</sup> The AER accepts that proposal. The AER has also ensured that there is consistency within the CAPM.

The Sharpe-Lintner CAPM is described by the following equation:

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

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

$R_f$  is the risk free rate

$\beta$  is the equity beta

$E(R_m)$  is the expected market return

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

$$(2) MRP = E(R_m) - R_f$$

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

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<sup>83</sup> NGR r. 76

<sup>84</sup> Biggar, D., *Public utility regulation in Australia: Where have we got to? Where should we be going*, Working paper no. 4, ACCC/AER working paper series, July 2011.

<sup>85</sup> Biggar, D., *Public utility regulation in Australia: Where have we got to? Where should we be going*, Working paper no. 4, ACCC/AER working paper series, July 2011, p. 58. A similar description of the building block model supported by more detailed analysis can be found in Biggar, D., *Incentive regulation and the building block model*, 28 May 2004, pp. 2-21, accessed on 27 August 2012, <[http://editorialexpress.com/cgi-bin/conference/download.cgi?db\\_name=ACE2004&paper\\_id=133](http://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=ACE2004&paper_id=133)>.

<sup>86</sup> Lally, *The risk free rate and the present value principle*, August 2012, p. 8.

<sup>87</sup> Lally, *The risk free rate and the present value principle*, August 2012, p. 8.

<sup>88</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 3.

$$(3) E(R_i) = R_f - \beta \cdot \text{MRP}$$

Envestra, CEG, Professor Gregory, Professor Wright, SFG and NERA all submit that the AER has inconsistently applied the CAPM by combining a long term average MRP with a spot risk free rate.<sup>89</sup>

The AER disagrees with this characterisation. It relies on a misunderstanding of how the AER determines the MRP. As discussed in attachment 5, the AER does not simply employ a long term average MRP. Conceptually, the AER estimates a 10 year forward looking cost of equity. To do so, the AER determines an estimate of the 10 year forward looking risk free rate and 10 year forward looking MRP.

For clarity, the AER's application of the CAPM can also be expressed mathematically (Lally discusses this equation in more detail<sup>90</sup>):

$$E(R_j) = R_{f0}^{10} + [E(R_{m0}^{10}) - R_{f0}^{10}] \beta_j$$

Perhaps unsurprisingly as the cost of equity is unobservable, experts disagree on the best method of estimating the expected return on the market (E(R<sub>m</sub>)). As the MRP is unobservable, experts also disagree on the best method of estimating the MRP. Neither of these points makes the AER's approach inconsistent with the CAPM.

McKenzie and Partington also suggest that the consistency argued for by Envestra and its consultants misses the point of the exercise:

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.<sup>91</sup>

CEPA concludes the AER's estimate is consistent as the AER calculates the risk free rate and the MRP over the same timeframe.<sup>92</sup> CEPA also suggests the central question for consistency in the CAPM is whether there is a relationship between the risk free rate and MRP.<sup>93</sup>

Lally also concludes, the present value principle informs the application of the CAPM:

...if the regulatory period were five years, the appropriate values for R<sub>f</sub> and E(R<sub>m</sub>) would be the five year rates prevailing at the commencement of the regulatory period and β<sub>j</sub> should be defined with respect to the probability distributions for the R<sub>j</sub> and R<sub>m</sub> over the five year period.<sup>94</sup>

Lally finds that a long term average risk free rate is not consistent with the CAPM.<sup>95</sup> He does, 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.<sup>96</sup>

<sup>89</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 1; 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.

<sup>90</sup> See, Lally, *Review of the AER's methodology*, March 2013, p. 24.

<sup>91</sup> McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 31.

<sup>92</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p. 7.

<sup>93</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, pp. 6-10

<sup>94</sup> Lally, *The present value principle*, March 2013, p.6. R<sub>f</sub> represents the risk free rate. R<sub>m</sub> represents the expected return on the market. R<sub>i</sub> represents the expected return on the investment.

Furthermore, Gregory suggests that the Sharpe Lintner CAPM is a single period model and is therefore incompatible with the multi-period regulatory application.<sup>97</sup> Lally has advised the AER 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:

...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.<sup>98</sup>

In any case, Envestra has proposed the Sharpe Lintner CAPM in this decision, and the AER agrees with the use of this model.<sup>99</sup>

## Internal consistency

As well as being consistent with the CAPM, the AER applies an approach that employs consistent definitions and logic throughout.

CEG states:

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.<sup>100</sup>

A misunderstanding of the AER's MRP estimate appears to underlie this suggestion. The AER estimates a 10 year forward looking cost of equity using an estimate of the 10 year forward looking MRP. Lally suggests:

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).<sup>101</sup>

CEG's suggestion may also stem from its consideration that prevailing equity prices can provide a reliable estimate of the prevailing MRP—using DGM models for example.<sup>102</sup> 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.<sup>103</sup>

However, the AER does not agree with CEG's view. As discussed in section B.6 below, the AER does not consider DGM estimates to be sufficiently reliable indicators of prevailing MRP estimates. As a result, the AER estimates a prevailing MRP based on a number of different methods, including historical averages.

CEG also states:

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<sup>95</sup> Lally, *The present value principle*, March 2013, pp. 7-8.

<sup>96</sup> Lally, *The present value principle*, March 2013, p. 10.

<sup>97</sup> A. Gregory, *The risk free rate and the present value principle*, 5 November 2012, p. 5.

<sup>98</sup> Lally, *The present value principle*, March 2013, p. 16.

<sup>99</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 3. For further consideration see: Lally, *The present value principle*, March 2013, p. 16; A. Gregory, *The risk free rate and the present value principle*, 5 November 2012, p. 5.

<sup>100</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 6.

<sup>101</sup> Lally, *Review of the AER's methodology*, March 2013, p. 23.

<sup>102</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 8.

<sup>103</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 8.

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.<sup>104</sup>

The AER considers that the approach in this decision is consistent with the present value principle. The 'short run fluctuations' that are reflected in the prevailing risk free rate reflect changes in market conditions and market prices. If a reliable estimate of the MRP could be generated from market prices it would be reasonable to use this estimate. However, no such estimate exists.<sup>105</sup>

In support of the second dot point, CEG points to evidence in other sections of its advice.<sup>106</sup> Elsewhere in this appendix the AER considers the evidence in CEG's report, and concludes that the approach used in this decision is appropriate. Also, there is insufficient evidence to conclude there are superior alternatives.<sup>107</sup>

CEG also suggests that a period of flight to quality at the time of the APTPPL averaging period provides the clearest example that the AER's approach is inconsistent.<sup>108</sup> The AER considers flight to quality periods below.

### Consistency in flight to quality periods

This section considers the evidence presented to support the suggestion flight to quality periods are increasing the MRP. This suggestion is not well supported and does not provide a sufficient basis to justify departing from the current approach. Envestra, CEG and SFG have raised concerns that 'flight to quality' periods make the AER's approach for determining the cost of equity unreasonable.<sup>109</sup>

The AER does not consider it has applied the cost of equity in an inconsistent manner by failing to consider flight to quality periods.<sup>110</sup>

Little evidence has been presented supporting the suggestion that flight to quality periods make the AER's approach unreasonable. CEG has not provided a definition of flight to quality periods, nor identified academic literature that does so. In the draft decision the AER attempted to identify a possible definition from academic literature.<sup>111</sup> CEG has not responded to this definition, nor provided its own in response.

The following statement offers an understanding of CEG's position:

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<sup>104</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 10.

<sup>105</sup> Lally, *Cost of equity and the MRP*, 25 July 2012, pp. 15–18. See appendix B.5 and B.6 for more detail.

<sup>106</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 10.

<sup>107</sup> See attachment 5 and appendix B.2, B.3 and B.5 for more discussion.

<sup>108</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 10.

<sup>109</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.1; CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 12; SFG, *The required return on equity*, November 2012, p. 56.

<sup>110</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 14.

<sup>111</sup> AER, *Draft decision: Access arrangement draft decision: Envestra Ltd 2013-17*, September 2012, Appendix B, p. 4.

...there will be times when market conditions are such that very low spot CGS yields are associated with a normal (or even heightened) spot cost of equity for the market—such that the spot MRP is heightened relative to normal.<sup>112</sup>

It appears CEG suggests there is a negative relationship between the risk free rate and the MRP during flight to quality periods. CEG concludes that such periods make the AER's approach unreasonable:

...if even a very brief flight to quality occurs during a business's averaging period then CGS yields will be pushed down even though the cost of equity (neither spot nor long term forecast) is not similarly pushed down.<sup>113</sup>

On the other hand, SFG states:

...it is well-known, and generally accepted by finance academics and financial market professionals, that periods of historically low government bond yields are caused by a phenomenon known as "flight to quality".<sup>114</sup>

The AER is unable to verify this statement as SFG provides no evidence to support it. Lally also notes this point.<sup>115</sup>

The suggestion Envestra, CEG and SFG put forward is also not well supported with evidence. CEG identifies a number of sources of information it suggests may provide evidence of flight to quality periods.<sup>116</sup> These include various debt spreads and dividend yields.<sup>117</sup> Sections B.5.3 and B.6.4 consider the explanatory power of these sources of evidence. The evidence presented is anecdotal and inconclusive.

In any case, it may be true that during flight to quality periods the risk free rate and the MRP falls. It may also be true that this provides some explanation for bond yields that are low by historical comparison. This would not make the AER's approach inconsistent.

Flight to quality periods do not make CGS an inappropriate proxy for the risk free rate; CEG acknowledges this.<sup>118</sup> During such periods the MRP may increase. However, the AER has considered the available evidence on the MRP and concludes that 6 per cent is the best estimate of the 10 year forward looking MRP at this time. The flight to quality theory is one of a number of competing theories about the MRP, some of which suggest there may be a positive relationship.

As the evidence Envestra and CEG have presented is anecdotal and inconclusive, it is not sufficient to justify an adjustment to the MRP.

Further, in the draft decision the AER identified a statement by RBA Governor Glenn Stevens that suggested a flight to quality had occurred in the middle of 2012.<sup>119</sup> The AER then identified advice provided by the RBA at around the same time that concluded that CGS yields remained the best proxy for the risk free rate.<sup>120</sup>

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<sup>112</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 12.

<sup>113</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 14.

<sup>114</sup> SFG, *The required return on equity*, November 2012, p. 56

<sup>115</sup> Lally, *Review of the AER's methodology*, February 2013, pp.16-17.

<sup>116</sup> CEG, *Update to March 2012 Report*, November 2012, p. 11-18.

<sup>117</sup> CEG, *Update to March 2012 Report*, November 2012, p. 11-18.

<sup>118</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 14.

<sup>119</sup> AER, *Draft decision: Access arrangement draft decision: Envestra Ltd 2013-17*, September 2012, Appendix B, p. 4.

<sup>120</sup> AER, *Draft decision: Access arrangement draft decision: Envestra Ltd 2013-17*, September 2012, Appendix B, pp. 4-5.

As the RBA simultaneously supported the use of CGS yields as a proxy for the risk free rate, the AER's cost of equity could only have been found unreasonable if:

- the MRP was inappropriate
- the AER had not considered any relationship between the risk free rate and the MRP.

In the APTPPL decision the AER considered the evidence before it and concluded an MRP of 6 per cent was appropriate.<sup>121</sup> The AER also considered the possibility of a relationship between the risk free rate and the MRP.<sup>122</sup> There was insufficient evidence of a relationship to suggest the MRP was inappropriate or justify a change of approach.<sup>123</sup>

In this decision the AER has likewise considered the most appropriate estimate of the MRP. The AER has also considered the possibility of a relationship between the risk free rate and the MRP. As was the case in the APTPPL final decision, there is insufficient evidence of a strong relationship to suggest the MRP is inappropriate or justify a change of approach.<sup>124</sup>

### B.3.2 Is the cost of equity stable?

In this section, the AER considers whether the cost of equity is relatively stable over time. In the next section, it considers the evidence on whether there is a negative relationship between the risk free rate and the MRP. Envestra referred to the UK consultants report in the revised proposal that suggested the cost of equity is relatively stable over time. Therefore, there is a negative relationship between the risk free rate and the MRP.<sup>125</sup>

The UK consultants engaged by Envestra suggested the real cost of equity is relatively stable over time<sup>126</sup>. In addition, CEG and NERA suggested the market cost of equity is more stable than the MRP based upon US regulatory decisions on the cost of equity.<sup>127</sup> The AER commissioned Associate Professor Lally to consider the evidence these consultants presented.

CEPA considered Siegel's research, Gregory and Wright's reports submitted by Envestra in the revised proposal and Lally's July 2012 advice to the AER. CEPA found evidence in favour of a stable real long run cost of equity based on:<sup>128</sup>

- Siegel (1998) and Smithers and Co (2003) analysis on US returns data,
- Gregory and Wright's conclusions, and
- Competition Commission's proposition that market returns have a lower volatility than the MRP.

Based on this assumption, CEPA's general approach to the cost of capital is to "utilise long-term estimates for these components based on market evidence". However, it noted:<sup>129</sup>

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<sup>121</sup> AER, Final decision: APT Petroleum Pipeline Pty Ltd, Access arrangement final decision, Roma to Brisbane Pipeline 2012–13 to 2016–17, August 2012, p. 21.

<sup>122</sup> AER, Final decision: APT Petroleum Pipeline Pty Ltd, Access arrangement final decision, Roma to Brisbane Pipeline 2012–13 to 2016–17, August 2012, p. 23.

<sup>123</sup> AER, Final decision: APT Petroleum Pipeline Pty Ltd, Access arrangement final decision, Roma to Brisbane Pipeline 2012–13 to 2016–17, August 2012, p. 23.

See attachment 5.3.3, sections B.3.3 and B.5.

<sup>125</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, Sections 5.3-5.5.

<sup>126</sup> Gregory, *The AER approach*, November 2012, pp. 4-7; Wright, *Review of risk free rate and cost of equity estimates*, October 2012, p.12; S. Wright, *Response to Professor Lally's analysis*, 2 November 2012, pp.4-9.

<sup>127</sup> CEG, *Update to March 2012 Report*, November 2012, pp.26-27; NERA, *Estimating the Cost of Equity under the CAPM*, November 2012, pp.26-29.

<sup>128</sup> CEPA, *Advice on estimation of the risk free rate and market risk premium*, March 2013, p.24.

... this approach would need to be tested with Australian data to ensure that this approach would be fit-for-purpose in AER's context.

The AER has considered all of the consultants' views. The evidence has not persuaded the AER that the cost of equity is relatively stable, for the reason discussed below. Lally notes that if Australian data is used (instead of US data as used by Wright), the conclusions from Wright's analysis are reversed. This suggests the MRP is relatively more stable than the cost of equity.

Associate Professor Lally noted Wright's view on a relatively stable cost of equity is influenced by the relatively stable time-series of rolling 30-year average market returns for the US from 1831. This evidence does not persuade Lally for the following reasons.<sup>130</sup>

- the concern here is with the cost of equity in Australia, accordingly Australian evidence would be more relevant than US evidence.
- the definition of the MRP used by the AER is the excess of the expected market return over the bond yield rather than the bond return. The time-series behaviours of the bond yield vs bond return series is quite different. For example, in the last few years, bond yields have been very low whilst Wright's figure shows bond returns in recent years to be extremely high.
- since Wright's point is that the expected market return is more stable over time than the MRP, he ought to have reviewed the time-series of MRP estimates.
- Wright refers only to the visual evidence in the figure included in his report. An appropriate statistical test would be the standard deviations for both the average market return series and the estimated MRP series.

When Lally applied Wright's approach using Australian data, he found the estimated MRP series is much more stable than the average real market return series.<sup>131</sup>

Gregory's submission supports a relatively more stable real market cost of equity. It reports the average real returns on equities and the estimated MRP for 19 markets over the period since 1900. Gregory estimated the standard deviation of the real estimated MRPs across these markets. He found it exceeds the standard deviation of the average real market returns (1.66 per cent versus 1.26 per cent). Lally identified two issues with Gregory's observation:<sup>132</sup>

- Firstly, Gregory's standard deviations relate to cross-country variation rather than time-series variation and are therefore not relevant. The comparison of cross-country variations on the estimated MRPs does not provide information on their relative stability over time.
- Secondly, the definition of the MRP used by Australian regulators and more generally is the excess of the expected market return over the bond yield. Instead Gregory has employed the bond return. The time-series behaviours of the two series are quite different.

The relevant section in Associate Professor Lally's report is section 2.

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<sup>129</sup> CEPA, *Advice on estimation of the risk free rate and market risk premium*, March 2013, p.24.

<sup>130</sup> Lally, *Review of the AER's methodology*, March 2013, pp.12-13.

<sup>131</sup> Lally found the standard deviation of average real market returns is 1.5 per cent. The standard deviation for the average real government bond yield is 1.4 per cent. For the estimate MRP time series, it is 0.9 per cent. These standard deviations imply the average real market return is considerably more volatile than that for the estimated MRP.

<sup>132</sup> Lally, *Review of the AER's methodology*, March 2013, p.16.

### B.3.3 Is there a relationship between the risk free rate and MRP?

Envestra submitted several consultant reports in support of a negative relationship between the risk free rate and the MRP, these include:

- CEG's AMP DGM chart
- Wright's indirect evidence
- SFG's argument that the risk free rate and the MRP must be negatively correlated

The AER commissioned Associate Professor Lally, Professor McKenzie and Associate Professor Partington and CEPA to consider these submissions.

The AER considered three aspects of this issue: the theoretical argument, the academic research on this topic and the empirical evidence presented by Envestra and its consultants. McKenzie and Partington undertook a more comprehensive literature review than what was presented by Envestra's consultants. They found there is evidence that supports both views. As a result, the evidence is inconclusive. The evidence has not persuaded the AER 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.

#### 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 cost of equity, thereby raising the MRP. Lally noted SFG presented no theoretical analysis that supports this claim. Furthermore, changes in risk free rates may arise from changes in monetary policy, the level of government deficits, the savings rate, or the availability of desirable investment projects in the private sector. None of these phenomena suggest that the MRP should change.<sup>133</sup>

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.<sup>134</sup>

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.<sup>135</sup> 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.<sup>136</sup>

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<sup>133</sup> Lally, *Review of the AER's methodology*, March 2013, pp.16-17.

<sup>134</sup> CEPA, *Advice on estimation of the risk free rate and market risk premium*, March 2013, p.25.

<sup>135</sup> Lally, *Cost of equity and the MRP*, July 2012, p. 7.

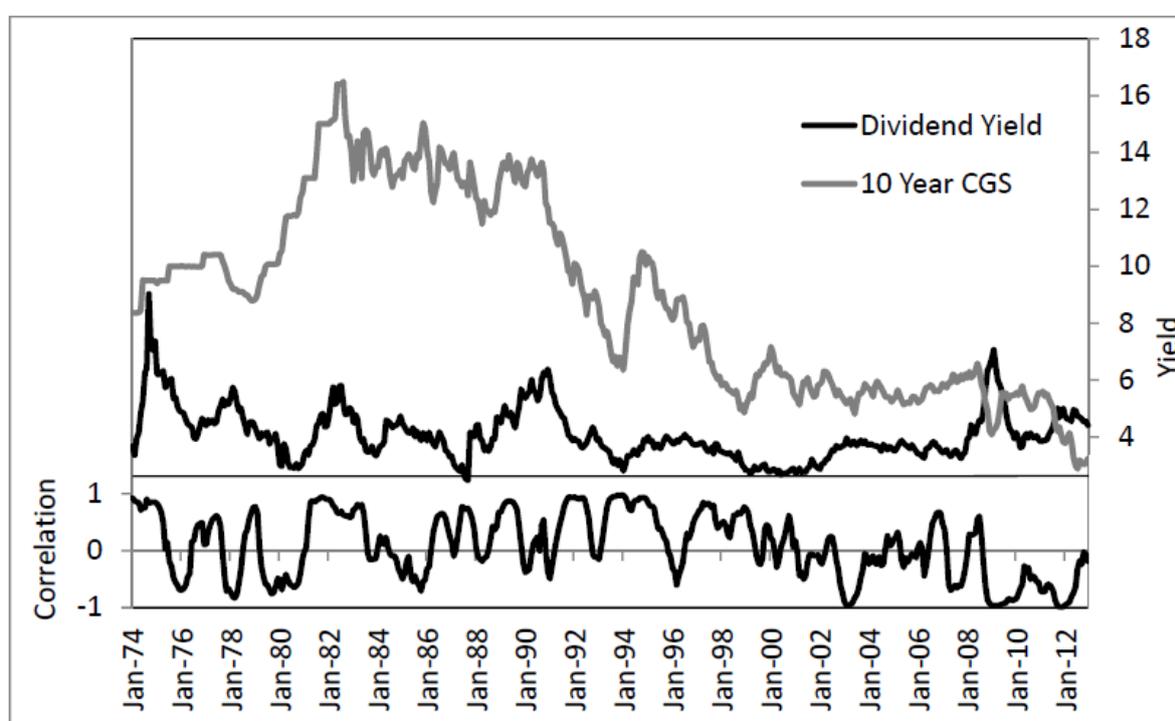
<sup>136</sup> McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p.26.

## Academic literature

Envestra's consultants submitted there is a negative relationship between the risk free rate and the MRP. However, McKenzie and Partington have performed a comprehensive literature review and found there is academic support for both a negative and a positive relationship. They conclude 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<sup>137</sup>.

Among other findings, McKenzie and Partington noted when examining the 10 year CGS yield from the RBA website and the Australian market dividend yield for Datastream's proprietary country indices, McKenzie and Partington found the 12 month rolling correlation is positive for 55 per cent of the sample and negative for 45 per cent of the sample.<sup>138</sup> This is illustrated in Figure B.1 below.

**Figure B.1 Correlation between 10 year CGS yield and the Australian market dividend yield**



Source: McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p.24.

McKenzie and Partington found the literature in support of a negative relationship includes:

- Campbell and Cochrane (1999), Lettau and Ludvigson (2011), Li (2001), Bansal and Yaron (2004), Bhamra, Kuehn and Strebulaev (2010) all used consumption based models to show people become more risk averse in recessions, which leads to higher expected equity returns.
- Menzly, Santos and Veronesi (2004), Bekaert, Engstrom and Xing (2009), Guvenen (2009), Verdelhan (2010) and Jouini and Napp (2011) explicitly model time variation in the risk parameters and find evidence of counter-cyclicality.

<sup>137</sup> McKenzie and Partington, *Review of the AER's overall approach*, February 2013, pp.5-6.

<sup>138</sup> McKenzie and Partington, *Review of the AER's overall approach*, February 2013, pp.24-25.

- 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) shows the MRP can be either pro- or counter-cyclical and investors' assessment of future prospects is crucial in determining its behaviour.

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 more comprehensive than the review of the academic literature in any of the consultant reports submitted Envestra. For this reason, the AER has relied on the conclusion of McKenzie and Partington's report over the conclusion from the reports submitted by Envestra.

- The relevant section in McKenzie and Partington's report is section 1.3.2.

### **Empirical evidence presented by Envestra's consultants**

CEG updated its AMP DGM chart from its March 2012 report in support of a negative relationship between the CGS yield and the estimated MRP. Lally addressed the CEG chart in his report to the AER prior to the draft decision. CEG responded to Lally's criticisms in its reports submitted with the revised proposal. Lally reviewed CEG's response in its March 2013 reports and he continues to hold the view that CEG's analysis is predisposed to producing such results. This is because it assumes that, at any point in time, the market cost of equity is the same for all future years. This perfect-offset

assumption is neither plausible nor do CEG present any evidence in support of it.<sup>139</sup> More details of the CEG chart and the limitation of the DGM is discussed in section B.6.

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 cost of 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 cost of 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 cost of equity is more stable over time than the MRP.<sup>140</sup>

The relevant section in Associate Professor Lally's report is section 2.

#### B.3.4 State government bond yields

The AER has considered the spread between the State government bond yield and the 10 year CGS yield. The increasing spread does not persuade the AER that CGS is an inappropriate proxy for the risk free rate. The AER is also not persuaded by this evidence that the MRP is currently higher than it has been in the recent past.

CEG submitted there is an increasing spread between the prevailing 10 year CGS yield and state government bond yields.<sup>141</sup> However, this is not a unique situation. During the 2009 WACC review, CEG submitted that the fall in CGS yields in the latter half of 2008 coincided with a rise in the required cost of equity. CEG submitted that this outcome was consistent with two possible explanations:

- the yield on CGS is a poor proxy for the risk free rate used to estimate the cost of equity in the CAPM, or
- the yield on CGS is a good proxy for the risk free rate used in the CAPM but the MRP had recently moved in the opposite direction to the yield on CGS.

In support of the first possible explanation, CEG noted the divergence between the yields on CGS and other (zero beta) risk free assets.<sup>142</sup> It submitted this was evidence that CGS were no longer a true reflection of the risk free rate. CEG submitted that this divergence represented a 'convenience yield.' It reflected investors willingness to pay a premium for the 'non-beta' attributes of CGS, which CEG submitted included liquidity.<sup>143</sup>

As part of Envestra's revised proposal, CEG again noted widening spreads between State Government bond yields and CGS yields.<sup>144</sup> CEG again appears to consider that liquidity is a major

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<sup>139</sup> Lally, *Review of the AER's methodology*, March 2013, pp. 8-12.

<sup>140</sup> Lally, *Review of the AER's methodology*, March 2013, pp.14-16.

<sup>141</sup> CEG, *Update to March 2012 Report*, November 2012, p. 13.

<sup>142</sup> State Government bonds and Commonwealth Government guaranteed bank debt

<sup>143</sup> AER, Final decision—WACC review, pp.134-136.

<sup>144</sup> CEG, *Update to March 2012 Report*, November 2012, pp.11-13.

driver of this difference. The AER agrees that CGS are more liquid than State Government bonds. However, the key issue is whether this has made CGS an inappropriate proxy for the risk free rate.

In the WACC review, the evidence did not persuade the AER that CGS were an inappropriate proxy for the risk free rate.<sup>145</sup> Advice from Associate Professor Handley supported this view.<sup>146</sup> While not directly responding to the AER's and Associate Professor Handley's argument from the WACC Review, it appears that CEG does not consider the greater liquidity of CGS affect its appropriateness as the risk free rate proxy. This is because CEG states in its latest report:

The AER goes on to address the issues that I raised and, in each case, the AER concludes that CGS is nonetheless the best proxy for the risk free rate. However, I did not argue otherwise...<sup>147</sup>

Also, without being conclusive, the higher yields on some State Government bonds may reflect the increased risk of those bonds. For example, the Queensland government lost its AAA rating in February 2009. Lally notes that the rise in the expected rate of return on state government debt might have been due entirely to increases in expected default losses and liquid premium relative to CGS yield. In this case, the MRP would not increase with the debt risk premium.<sup>148</sup>

The relevant section in Associate Professor Handley's report is section 2.1.

### B.3.5 Term of the risk free rate and MRP

In attachment section 5.3.2, the AER noted that there would be further discussion of the term of the cost of equity. This section contains that discussion.

The AER applies a 10 year term for the cost of equity in this decision. Envestra's proposed the use of a 10 year term and the AER accepts a 10 year term is appropriate. However, the use of a 10 year term is a departure from strict compliance with the present value principle.<sup>149</sup> This section discusses the reasons for using a 10 year term.

The selection of an appropriate term is not straightforward. When determining the term of the risk free rate there are a number of considerations involved. It is important to consider consistency with the present value principle. The AER has also previously considered average debt maturities at time of issuance by regulated businesses.<sup>150</sup> Finally, a 10 year term ensures consistency in this decision between the cost of equity and the cost of debt, including in the calculation of the MRP and DRP. On balance, the AER considers using a 10 year term is appropriate for this decision.

The present value principle is a fundamental element when determining the term of the cost of equity. The AER notes that there are divergent schools of thought on the appropriate term to ensure consistency with the present value principle.

Associate Professor Lally suggests that the AER should use a term that is consistent with the regulatory period when estimating a risk free rate at the start of the period.<sup>151</sup> This suggests the AER should use a 5 year term.

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<sup>145</sup> AER, Final decision—WACC review, pp.136-140.

<sup>146</sup> Handley, Comments on the CEG report "Establishing a proxy for the risk free rate", November 2008.

<sup>147</sup> CEG, *Response to the AER Vic gas draft decisions: Internal consistency of MRP and risk free rate*, November 2012, p. 14.

<sup>148</sup> Lally, *Cost of equity and the MRP*, July 2012, pp. 8-9.

<sup>149</sup> Lally, *Review of the AER's methodology*, March 2013, p. 33.

<sup>150</sup> AER, *Final Decision: WACC Review*, May 2009, p. 148–149.

<sup>151</sup> Lally, *Risk free rate and present value*, August 2012, p. 16.

Lally has also advised:

...the particular risk free rate should be the rate whose term matches the regulatory period and this is incompatible with the ten year bonds used by the AER. However, this second issue is much less important than the first issue because the choice of the current ten-year rather than the current five-year risk free rate raises the rate by only about 0.40% (from 2.86 to 3.26%) whilst the use of a historical average ten-year rate rather than the prevailing then-year rate raises it by about 2.60% (from 3.26% to 5.86%).<sup>152</sup>

On the other hand, the AER notes that there are arguments in favour of using a longer term to more closely match the life of the assets.<sup>153</sup> Broadly, the argument suggests that regulated assets have long lives and corresponding cash flows. Therefore, the duration of the risk free rate should be as long as is practically possible.

In the WACC Review in 2009, the AER also considered arguments put forward by businesses that common practice was to use long dated financing to manage refinancing risk.<sup>154</sup> This formed an important consideration for the estimation of the DRP using a 10 year term.<sup>155</sup> In contrast, the ERA has recently analysed the average maturity of debt issued by regulated businesses and found this was approximately 5 years.<sup>156</sup> The AER applies a 10 year term for the cost of debt in this decision.

Consistency between the cost of equity and the cost of debt may also be important. This would mean that the MRP and DRP would need to be estimated consistently. In the recent DBNGP matter, the Tribunal supported the ERA's consideration that this consistency is important.<sup>157</sup> The Tribunal considered consistency with the calculation of the DRP to be most important.<sup>158</sup>

In summary, while there are arguments in favour of a shorter term, it is appropriate at this time to continue to use a 10 year term. The AER therefore accepts Envestra's proposal. The AER also notes that a 10 year term is likely to provide an estimate of the risk free rate that is above an estimate using a 5 year term. This is a result of the fact that a term premium is generally observed between bonds of different maturities.<sup>159</sup> That is, a bond with a 10 year maturity will generally carry a premium (higher yield) over a bond with a 5 year maturity.

### B.3.6 Ernst and Young's survey of takeover report discount rates

In the revised proposal, Envestra submitted a report from Ernst and Young (EY) surveying takeover valuation report discount rates.<sup>160</sup> Envestra suggested EY's analysis supported its view that the cost of equity provided by the AER in the draft decision is too low. The AER has considered EY's report, which indicated the prevailing cost of equity is 10.7 per cent. It commissioned CEPA to consider the market evidence presented by EY.

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<sup>152</sup> Lally, *Review of the AER's methodology*, March 2013, p. 28.

<sup>153</sup> A. Damodaran, *What is the riskfree rate? A search for the Basic Building Block*, December 2008, p. 6-7.

<sup>154</sup> AER, *Final Decision: WACC Review*, May 2009, pp. 156-166.

<sup>155</sup> AER, *Final Decision: WACC Review*, May 2009, p. 168.

<sup>156</sup> ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline, Submitted by DBNGP (WA) Transmission Pty Ltd*, 31 October 2011, pp. 126-130 (ERA, *Final decision: DBNGP access arrangement*, October 2011).

<sup>157</sup> Australian Competition Tribunal, *Application by DBNGP(WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26 July 2012, paragraph 131.

<sup>158</sup> Australian Competition Tribunal, *Application by DBNGP(WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26 July 2012, paragraph 132.

<sup>159</sup> See, for example, Lally, *The present value principle*, February 2013, p. 12.

<sup>160</sup> Valuers estimate the value of takeover target firms by applying discount rates to discount future cash flows. Ernst and Young compiled the discount rates in these valuation reports and presented the 2012 average as market evidence on the prevailing market cost of equity.

CEPA did not find the evidence presented by EY compelling. Further if anything, it considered the results are more supportive of a short term risk free rate and a 6 per cent MRP.<sup>161</sup> Its analysis of the EY information suggested:<sup>162</sup>

- the credibility of some reports is undermined by unexplained "swings" in estimates over short time horizons;
- there is a strong time trend—more recent studies should be considered more relevant—cost of equity discount rates decrease over 2012 and so the latest discount rates are lower than the 2012 average presented by EY;
- modal estimates of the individual parameters indicate the discrepancy between the valuers and AER is less marked; and
- the analysis of the KPMG Consolidated Media Holdings report shows how important each report's idiosyncrasies are.

CEPA did not consider the data presented by EY represented direct empirical evidence. It agreed that the appropriate regulatory approach should utilise cross-checks, such as EY's analysis of takeover reports. However, any adjustment should be justified and based on criteria. It found neither Grant Samuel nor Deloitte made an appropriate justification for their adjustments.<sup>163</sup> Further, the credibility of some findings of expert reports is hard to understand.<sup>164</sup>

As 2012 reports are a focus for the EY review, CEPA identified a useful check would be looking at how the market cost of equity implied by independent experts changes over the ten months to October 2012 (as analysed by EY).<sup>165</sup> CEPA's analysis is replicated in Figure B.2 below. Figure B.3 shows the relevant estimates of the risk free rate and MRP. There is a general downward trend of the independent expert cost of equity estimates since the start of 2012. Contrary to the relatively stable cost of equity concept submitted by Envestra, most valuers do change their cost of equity estimates over time (based on their underlying risk free rate and MRP assumptions), which resembles the downward movement of the prevailing risk free rate across 2012. Their cost of equity estimates are generally below 10 per cent in the second half of 2012. Therefore, comparing AER's cost of equity determined in the draft decision (which was made in September 2012) with the 2012 average is not comparable.

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<sup>161</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p.50.

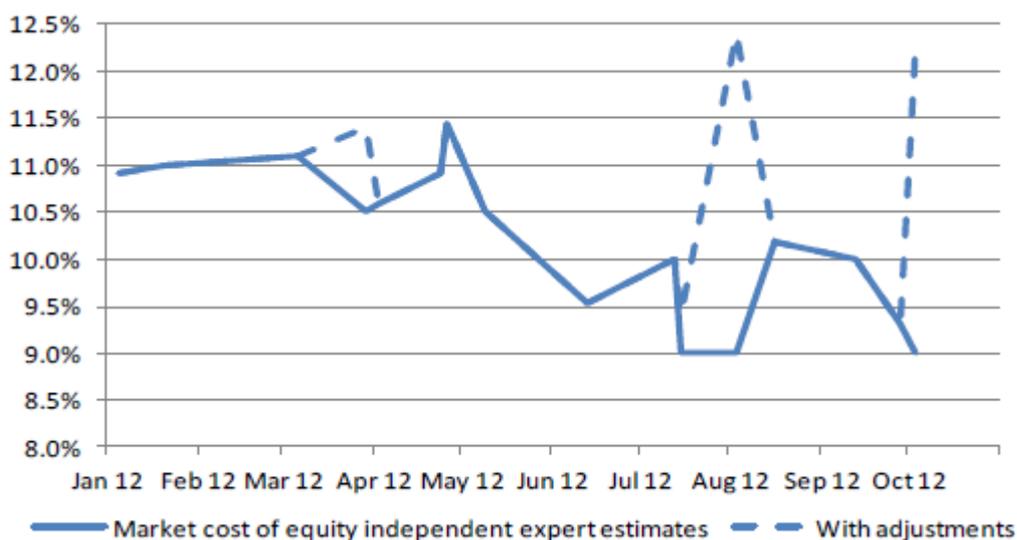
<sup>162</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p.50.

<sup>163</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p.44.

<sup>164</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p.44.

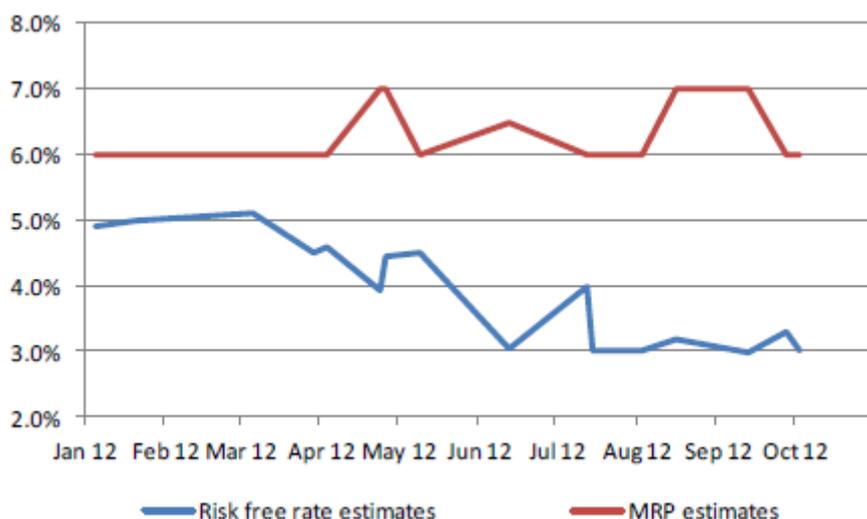
<sup>165</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p.47.

**Figure B.2 Takeover valuation report estimates of the cost of equity in 2012**



Source: CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p.47.

**Figure B.3 Takeover valuation report estimates of the risk free rate and MRP in 2012**



Source: CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p.47.

CEPA also examined other direct market evidence such as trading multiples and share prices of the regulated utility firms. The trading multiples would be expected to fall if the AER's approach in the draft decision produced a rate of return that is too low. However, CEPA noted the trading multiples continued to rise over this period. Similarly, CEPA found the share price of these regulated utility firms stayed stable (if not increasing) after the AER released its draft decision. Share price of regulated utility firms is likely to decrease sharply if the AER's draft decision results in a return that is unreasonably low for these businesses. However, this is not the case.

The AER has considered EY's report and CEPA's advice. It concludes EY's analysis, which recommended a prevailing 10.7 per cent cost of equity estimate based on 17 independent expert reports in 2012 provides limited value.

Further to the above conclusion, the AER notes that there may be concerns with the approaches typically taken by valuers in estimating discount rates. Damodaran's 2008 report supported the use of the current risk free rate even if the rates deviate from what people regard as "normal". He identified three potential problems associated with analysts bringing in their 'idiosyncratic views on interest rates':<sup>166</sup>

- "Normal" is in the eyes of the beholder, different analysts make different judgments on what comprise that number.
- Use a "normal" risk free rate, rather than the current interest rate, will have valuation consequences. Applying a higher risk free rate than the current rate may over value a company.
- Interest rates generally change over time due to changes in the underlying fundamentals. Making adjustments to the current rate, without also adjusting the fundamentals that caused the current rate will result in inconsistent valuation.

The relevant section in Damodaran's report is *Common (and dangerous) practices* section.

### B.3.7 RBA advice

In this decision and the draft decision the AER refers to advice provided by the RBA that suggests that CGS yields remain the best proxy for the risk free rate in Australia.<sup>167</sup> In advice to Envestra, CEG considers the RBA letter and concludes:

The draft decision refers to these letters as support for rejecting arguments that CGS is not the best proxy for the risk free rate. However, in my view, these letters provide support for my core contention which is that the factors driving down CGS yields cannot be presumed to be driving down equity yields.<sup>168</sup>

The AER does not agree with CEG's interpretation of the RBA letter. The central area of contention relates to this section of the RBA letter:

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

That said, market risk premia are unlikely to be stable through time. While it is a reasonably simple matter to infer changes in debt risk premia from market prices, it is less straightforward to do so for equity premia. In making use of a risk-free rate to estimate a cost of capital, it is important to be mindful of how the resulting relativity between the cost of debt and that of equity can change over time and whether that is reasonable.<sup>169</sup>

In the draft decision, the AER referred to the last two sentences of this quote and concluded:

...the RBA cautioned against directly equating changes in the cost of debt with changes in the cost of equity...Consistent with this advice from the RBA, the AER is mindful of the relative positions of the cost of debt and cost of equity set in this decision. The AER considers that, since the cost of equity exceeds the cost of debt, this check indicates that the AER's estimates are reasonable.<sup>170</sup>

In this decision, the AER has extensively reviewed material on the stability of the market risk premia over time. The AER's conclusions can be found in sections B.3.2, B.3.3 and B.5. In any case, what is

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<sup>166</sup> Damodaran, A, *What is the riskfree rate? A search for the Basic Building Block*, Stern School of Business, New York University, December 2008, p.26.

<sup>167</sup> See attachment 5 and AER, *Draft decision: Access arrangement draft decision: Envestra Ltd 2013-17*, September 2012, Appendix B.1.2.

<sup>168</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 28

<sup>169</sup> RBA, *Letter to the ACCC: The CGS market*, July 2012, pp. 1-2.

<sup>170</sup> AER, *Draft decision: Access arrangement draft decision: Envestra Ltd 2013-17*, September 2012, Appendix, p. 66.

clear from the RBA letter is that CGS yields remain a good proxy for the risk free rate in Australia.<sup>171</sup> Elsewhere in this decision, the AER considers the evidence on MRP estimates and concludes that 6 per cent is the best estimate of the MRP at this time.<sup>172</sup>

## B.4 Risk free rate issues

In this section the AER consider a number of risk free rate specific issues, namely:

- Are interest rates abnormally low?
- The averaging period

These issues are considered below.

### B.4.1 Are interest rates abnormally low?

As discussed briefly in attachment 5.3.2 above, while interest rates are currently low by historical comparison with recent decades, there is insufficient evidence to suggest they are "abnormally" low. This section discusses in more detail why the AER reaches this conclusion.

There are references in Envestra's revised proposal, and in CEG and SFG's reports, that suggest that CGS yields and/or the cost of equity are likely to return to 'normal'. For example, Envestra states:

Ordinarily, therefore, the standard regulatory approach would produce an estimate of the cost of equity that is consistent with Rule 87(1). However, current market conditions are far from normal.<sup>173</sup>

This position finds support in the advice from CEG.<sup>174</sup>

The AER is unable to discern precisely what Envestra and CEG consider normal to mean. As McKenzie and Partington suggest, determining whether something is normal, or not, is a relative statement.<sup>175</sup>

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

What history reveals is that current Australian bond yields rates are low, but not abnormally so, particularly when compared to the first seventy or so years of the twentieth century.<sup>176</sup>

They also state:

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

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<sup>171</sup> RBA, *Letter to the ACCC: The CGS market*, July 2012, p. 1.

<sup>172</sup> See attachment 5.

<sup>173</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.1.

<sup>174</sup> CEG, *Update to March 2012 Report*, November 2012, p. 32.

<sup>175</sup> McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 7.

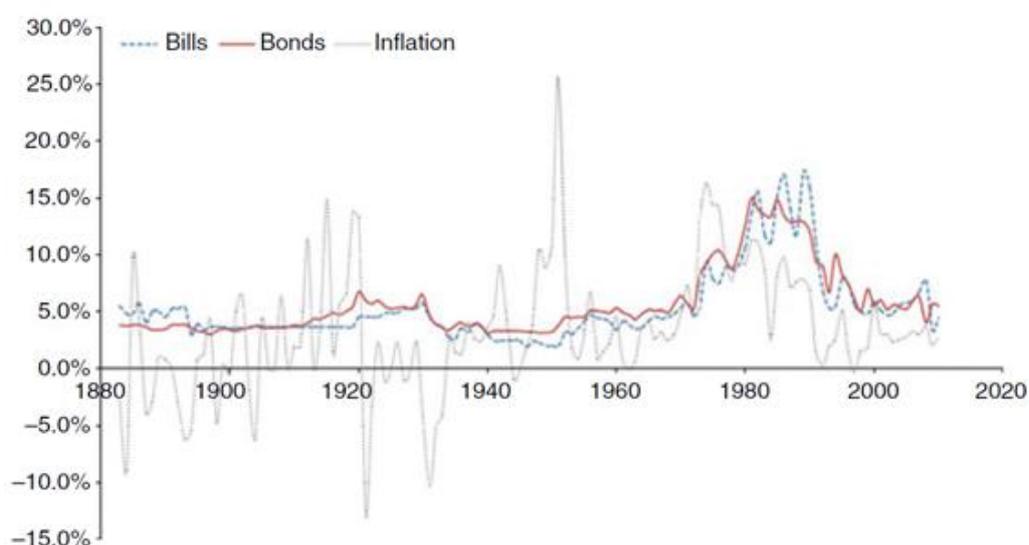
<sup>176</sup> McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 8.

financial markets. It is difficult to determine whether this is the case or not - only in the fullness of time will we be able to comment on this with any certainty.<sup>177</sup>

McKenzie and Partington investigate various sources of historical yields and conclude that very long term nominal yields have been 5.5 per cent as reported by Dimson, Marsh and Staunton, and 5.65 per cent as reported in Brailsford et al. (2012).<sup>178</sup> However, the difference between the long term average and the prevailing yield is less pronounced if the high interest rate period is excluded.<sup>179</sup> They find the average return over the period 1883 to 1972 is 4.23 per cent using the Brailsford et al. (2012) data.<sup>180</sup> The risk free rate in this decision is 3.53 per cent. While the current yield is less than these long term averages, it is not clear it is unusually low.

The McKenzie and Partington report also presents the following figure from Brailsford et al (2012).<sup>181</sup>

**Figure B.4 Bond yields, bill yields and inflation rates over time**



The figure shows two important things clearly:

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

There is no clear evidence that CGS yields are currently abnormally low. The AER has considered the stability of the cost of equity and the interaction between the risk free rate and MRP in forming the cost of equity in sections B.3.2 and B.3.3 above.

At this point the AER notes that in the EnergyAustralia matter, the Tribunal considered the normality of interest rates.<sup>182</sup> The AER considers the relevance of the EnergyAustralia matter in more detail in

<sup>177</sup> McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 5.

<sup>178</sup> McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 13.

<sup>179</sup> McKenzie and Partington consider the period beginning about the 1970s and returned towards more normal levels about the start of the current century. McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 8.

<sup>180</sup> McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 13.

<sup>181</sup> McKenzie and Partington, *Review of the AER's overall approach*, February 2013, p. 13.

<sup>182</sup> See for example, Australian Competition Tribunal, *Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009) [2009] ACompT 8*, 12 November 2009, paragraph 91.

the draft decision.<sup>183</sup> In discussing the EnergyAustralia matter, SFG and CEG do not engage with the AER's comments in the draft decision<sup>184</sup>. Accordingly, this section does not repeat that discussion.

The applicability of forward interest rates was also considered in the EnergyAustralia matter. In the draft decision, the AER considered this issue and concluded that there are both in principle and practical difficulties with using forward interest rates in determining the risk free rate.<sup>185</sup> As no submissions were made on this topic, that discussion is also not repeated here.<sup>186</sup>

## B.4.2 Averaging period

In attachment 5.3.2 the AER noted that there would be further discussion of Envestra's averaging period in this appendix. This section contains that discussion.

As discussed at section B.3.1 above, the present value principle requires the prevailing risk free rate to be estimated on the first day of the access arrangement period. The AER makes a pragmatic departure from strict compliance with this principle. The AER allows discretion to regulated businesses in the selection of the averaging period, subject to three principles:

- the averaging period must be short (i.e. at least 10 and not more than 40 business days)
- the averaging period must be as close as practicably possible to the commencement to the access arrangement period the averaging period must be nominated in advance.

The draft decision contained a detailed discussion of the correspondence between the AER and Envestra on this topic.<sup>187</sup> In a letter to Envestra on April 5 the AER outlined conditions for nominating an averaging period:

1. At the time of publishing Envestra's proposal the AER will publish an indicative timeline for decisions.
2. The AER will notify Envestra, at least 20 business days before and not more than 25 business days before, the release of its draft decision on the revisions to the Envestra access arrangement, of the date on which that draft decision is expected to be released and the date on which the final decision is expected to be released.
3. Not later than 10 business days following the AER's notification, Envestra undertakes to advise the AER of its nominated averaging period. Envestra's nominated averaging period will be for a period commencing after the expected release date of the draft decision and ending not later than 15 business days before the expected release date of the final decision. The advice will specify the term of the averaging period which must be at least 10 and not more than 40 business days.<sup>188</sup>

The range of acceptable dates (not before the expected release of the draft decision; not later than 15 business days before the expected release of the final decision) was the condition the AER applied to determine if the proposed averaging period was as close as practicably possible to the

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<sup>183</sup> AER, *Draft decision: Access arrangement draft decision: Envestra Ltd 2013-17*, September 2012, Appendix, pp. 17-19.

<sup>184</sup> SFG, *The required return on equity*, November 2012, pp. 53-54; CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 19; CEG, *Update to March 2012 Report*, November 2012, pp. 24-25. CEG suggests the AER did not apply the logic from its discussion of the EnergyAustralia matter to the MRP. This decision considers the consistency of the AER's approach in section B.3.1.

<sup>185</sup> AER, *Draft decision: Access arrangement draft decision: Envestra Ltd 2013-17*, September 2012, Appendix B, pp. 21-23.

<sup>186</sup> The AER notes Envestra commented on interest rate forecasts from the US Congressional Budget Office. See attachment 5 for discussion of the AER's approach to estimating the risk free rate and cost of equity. Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 4.3.

<sup>187</sup> AER, *Draft decision: Access arrangement draft decision: Envestra Ltd 2013-17*, September 2012, Appendix B, pp. 1-3.

<sup>188</sup> AER, *Letter to Envestra*, 5 April 2012.

commencement of the access arrangement period. This allowed Envestra to nominate an averaging period in a broad window.<sup>189</sup>

Table B.3 below shows that the Victorian gas businesses proposed different averaging periods. However, each period proposed by the Victorian gas businesses adhered to the above conditions. The AER is indifferent to the particular averaging period that is chosen by the businesses, so long as it is consistent with the principles outlined above. The AER understands that regulated businesses generally managing their borrowing and hedging arrangements around the nominated averaging period, in order to reduce their exposure to interest rate risk. CEG acknowledges this understanding in its report.<sup>190</sup>

As a result of the different averaging periods, the risk free rate varies somewhat between each business. The variation also affects the cost of debt. The AER considers that the estimate of the MRP applied in this decision (6 per cent) is appropriate for Envestra's averaging period. Similarly, the AER considers a 6 per cent MRP to be appropriate for each of the averaging periods identified below.

**Table B.3      Averaging periods**

Business	Averaging period	Risk free rate
APA GasNet	13 Sep - 26 Sep	3.22
Multinet	24 Oct - 20 Nov	3.12
SP AusNet	12 Nov - 7 Dec	3.14
Envestra	31 Jan - 20 Feb	3.53

## B.5 Market risk premium issues

In the attachment, the AER presented its considerations on why an MRP of 6 per cent is commensurate with prevailing conditions in the market for funds. The AER also noted that some matters would be addressed, or addressed in more detail, in the appendix.

In this section, the AER addresses:

- concerns raised by some consultants on the use of arithmetic averages of historical excess returns
- SFG's concerns on the use of survey evidence
- SFG's credit spread analysis.

### B.5.1 Arithmetic average vs. geometric average

In the draft decision, the AER explained the difference between arithmetic averages and geometric averages. It concluded the arithmetic average of the data was an overestimate of the relevant

<sup>189</sup> The draft decision was due to be released on 12 September 2012 with the final decision expected to be released on 13 March 2013.

<sup>190</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 19.

benchmark and the best estimate of historical excess returns over a 10 year period was likely to be somewhere between the geometric and arithmetic averages of annual excess returns.<sup>191</sup> Section B.2.1 of the draft decision discusses the AER's considerations in detail.

Nothing in the revised proposal has persuaded the AER to change from this view. Therefore, the AER still holds the position in the draft decision. In this appendix, the AER addresses the further concerns raised by SFG in a report submitted by Envestra in the revised proposal.

In a report prepared by SFG in the Roma to Brisbane Pipeline process, SFG submitted it was wrong to place any reliance on geometric averages and to the extent that reliance is (incorrectly) placed on geometric averages, the resulting MRP estimate is downwards biased. SFG presented a Harvard Business School case note in support of this position.<sup>192</sup>

The AER sought advice from McKenzie and Partington on the SFG report and Harvard Business School case note. In their February 2012 supplementary MRP report, McKenzie and Partington explained the Harvard case study 'assumes away the source of bias in arithmetic averages'.<sup>193</sup> The AER does not consider it is appropriate to assume no uncertainty about the mean of the distribution when analysing historical excess returns. According to Blume (1974), the one year returns are assumed to be normally distributed random variables, therefore the arithmetic average of these one year returns would also be a random variable<sup>194</sup>. (For example, let  $R_t$  represent a one year return,  $R_t$  is an independent normally distributed random variable, then the arithmetic average of these one year returns is also random variables  $(R_1+R_2+R_3...)/N$ .) Whereas the Harvard case study takes the expectation of these one year returns when calculating arithmetic average, by doing so, it turns the arithmetic return into a constant (ie.  $E[(R_1+R_2+R_3...)/N]$ ). Therefore, the Harvard Business School case assumes away the bias created as a result of taking arithmetic average of random variables. Accordingly, the AER did not find SFG's view persuasive.

In the revised proposal, SFG again renewed its view by presenting the Harvard Business School Case and argued the calculation of an arithmetic average does not in fact require any assumption about the mean being known exactly. Nor does the calculation of a geometric average.<sup>195</sup> The AER does not contend that the calculation of an arithmetic average or a geometric average requires the mean being known exactly. As discussed above, the AER only notes the arithmetic average calculation in Harvard Business School case takes the expectation of the arithmetic average of the one year returns, which are random variables, thereby assumes away the source of bias in the arithmetic average. SFG has not presented any new arguments that persuade the AER to change from this view.

SFG further submitted the Harvard Case Study has been used by leading business schools for over 20 years and no error has ever been raised in relation to its conclusion that the arithmetic mean is an appropriate estimate of the expected return and the geometric mean is not.<sup>196</sup> It appears that SFG is suggesting that there is no debate in the academic literature on the use of arithmetic or geometric

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<sup>191</sup> Corrs Chambers Westgarth, *Appendix B – market risk premium, the Australian Energy Regulator's submissions*, 11 November 2011, pp. 17–18.

<sup>192</sup> SFG, *Market risk premium, Report for APT Petroleum Pipelines Ltd*, 11 October 2011, p. 16 (SFG, *MRP for APTPL*, October 2011).

<sup>193</sup> In the Harvard case study, it assumes the probability of distribution is known. Since there is no uncertainty about the arithmetic mean of the return, the probably of measuring the MRP as discussed in the MRP section largely goes away. See further discussion at: M. McKenzie and G. Partington, *Report to the AER, Supplementary report on the equity market risk premium*, 22 February 2012, pp. 5–6 (McKenzie and Partington, *Supplementary report on the MRP*, February 2012).

<sup>194</sup> Blume, "Unbiased estimators of long-run expected rates of return", *Journal of the American Statistical Association*, September 1974, Volume 69, Number 347, Applications Section, p.634

<sup>195</sup> SFG, *The required return on equity*, November 2012, p.21.

<sup>196</sup> SFG, *The required return on equity*, November 2012, p.22.

averages. Clearly this is not the case, as McKenzie and Partington's report makes evident.<sup>197</sup> That said, it is reasonably well recognised in the academic literature that if the one year historical excess returns are variable, then the arithmetic average of one year historical excess returns overstates the arithmetic average of historical excess returns for a term greater than one year.<sup>198</sup>

## B.5.2 Surveys

In the draft decision, the AER considered McKenzie and Partington's detailed analysis of survey evidence on the MRP. Specifically, McKenzie and Partington applied the Tribunal's criteria on survey evidence. They also explained how triangulation across surveys enhanced their confidence in survey results. The AER discussed these in section B.2.2 of the draft decision.

No new information in Envestra's revised proposal has persuaded the AER to change from this view. Therefore, the AER maintains its position from the draft decision that survey evidence should be considered. In this appendix, the AER addresses the further concerns raised by SFG in a report submitted by Envestra in the revised proposal.

SFG submitted that this MRP varies over time with changes in prevailing conditions in the market for funds. Therefore the survey evidence is only reliable when respondents are asked what they actually do and it is timely in the sense that their response is unlikely to have changed since the survey was conducted.<sup>199</sup>

Asher and Fernandez et al. have recently published their 2012 survey results for surveys conducted in March 2012 and June 2012, respectively. These surveys explicitly asked the respondents what MRP they use not what they "think". In this sense, the AER considers the recent Asher and Fernandez et al. surveys satisfy SFG's criteria discussed above. As noted in the attachment, these two recent surveys indicate the MRP is currently below 6 per cent.

Further, Lally also supported the use of survey evidence and suggested the recent Fernandez survey is the most relevant survey evidence. In addition, he noted the average of 5.9 per cent in the Fernandez survey should be considered as an upper bound. This is because some respondents to this survey might have provided responses for an MRP defined against bills. The AER's MRP estimate is defined against bonds and bond yields both currently and typically exceed bill yields. Therefore, the estimates provided by respondents who define the MRP against bills will be too high.<sup>200</sup> In addition, the AER notes the Asher survey explicitly asked the respondents for an MRP with regard to 'government bonds of the same term' and it reported survey responses on both the respondents expected 1 year MRP and expected 10 year MRP.<sup>201</sup> This addresses SFG's concern that the MRP estimates respondents should correspond to the term of the respondents' risk free rate.<sup>202</sup>

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<sup>197</sup> McKenzie and Partington, *Equity market risk premium*, December 2011, pp.10-12

<sup>198</sup> See: Blume, "Unbiased estimators of long-run expected rates of return", *Journal of the American Statistical Association*, September 1974, Volume 69, Number 347, Applications Section, pp.634-638. Indro, D.C. and Lee, W.Y. "Biases in arithmetic and geometric averages as estimates of long-run expected returns and risk premia", *Financial Management*, 26, 1997, pp.81-90; Dimson, E., Marsh, P. and Staunton, M. "Global Evidence on the Equity Risk Premium", *Journal of Applied Corporate Finance*, 15, 2003, pp. 27 - 38; Hathaway, N. *Australian Market Risk Premium*, Capital Research Pty Ltd. 2005 and Campbell, J. "Estimating the Equity Risk Premium", Working Paper 13423, *NBER Working Paper Series*, September, 2007

<sup>199</sup> SFG, *The required return on equity*, November 2012, p.30

<sup>200</sup> Lally, *Review of the AER's methodology*, March 2013, p.30.

<sup>201</sup> Asher, Equity risk premium survey 2012: results and comments, *Actuaries Australia*, July 2012, issue 171, p. 28

<sup>202</sup> SFG, *The required return on equity*, November 2012, p.31

### B.5.3 Credit spreads

Credit spreads, in this context, refer to the ability to predict changes in the market risk premium from movements in observable debt premiums.<sup>203</sup> Specifically, SFG proposed that the market risk premium cannot move independently of the debt risk premium.<sup>204</sup> CEG also proposed a similar line of reasoning.<sup>205</sup>

The AER considered the use of credit spreads to inform the forward looking MRP. However, there is no consensus in academic literature on the direction or magnitude of the relationship between observed credit spreads and the MRP. The lack of academic consensus on the direction of any relationship casts doubt on the reliability of drawing any conclusions on the MRP from observable debt premiums. Moreover, the inability to reliably quantify the magnitude of any relationship limits its usefulness in a regulatory framework. For these reasons, the AER has given limited weight to credit spreads when estimating the MRP.

For the following reasons, the AER has also given limited weight to SFG's and CEG's analysis (in support of using credit spreads to inform the MRP):

- For the cost of equity, expected cash flows (and not required returns) adjust to reflect changes in the level of default risk.
- SFG have compared promised debt returns with expected equity returns, and post-tax debt returns with pre-tax equity returns. Comparisons of debt and equity returns, however, should be made on a consistent basis.

The AER discusses these reasons, including the lack of academic and empirical evidence, in greater detail below.

#### Lack of academic consensus and empirical evidence that observed debt premiums can predict the MRP

The relationship between observable debt risk premiums and unobservable equity risk premiums is complex. As discussed in attachment 5.3.3, there is no consensus in academic literature on the direction or magnitude of this relationship.

McKenzie and Partington, in a report prepared for the AER, also provided a comprehensive review of the academic literature on this issue. In regard to the relationship between debt and equity risk premiums, McKenzie and Partington concluded that:<sup>206</sup>

[T]here are competing theoretical and empirical models which support both positive and non-positive relations between the debt risk premium and the equity risk premium. There is no clear consensus, but the weight of evidence may somewhat favour a non-positive relation. What is clear, given the mixed evidence, is that the relation is not strong and stable.

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<sup>203</sup> SFG, *MRP for APTPL*, October 2011, p. 11.

<sup>204</sup> SFG, *The required return on equity*, November 2012, pp. 12, 35–45.

<sup>205</sup> Specifically, CEG stated that given increasing risk premiums on low risk assets, there is no plausible basis for concluding that risk premiums on riskier equity assets have remained constant. CEG, however, stated previously that it is a well accepted empirical fact that spreads between government bonds (that is, low risk assets) and others assets are explained by more than just differences in risks. CEG, Update to March 2012 report, p. 13; CEG, *Establishing a proxy for the risk free rate – A report for the APIA, ENA and Grid Australia*, 17 September 2008, p. 5.

<sup>206</sup> M. McKenzie and G. Partington, *The relationship between the cost of debt and the cost of equity*, March 2013, p. 10. (McKenzie and Partington, *Relationship between cost of debt and cost of equity*, March 2013)

The above analysis, including the summary included in the McKenzie and Partington report, demonstrates that the relationship between debt and equity premiums is complex and unresolved. For these reasons, the AER has given limited weight to the analysis provided by SFG and CEG.

### Default spreads can move independently of the MRP

The AER considers default spreads can move independently of the MRP. McKenzie and Partington explained that for the cost of debt, the DRP captures changes in default risk. There is, however, no corresponding default risk adjustment in the CAPM. Instead, for the cost of equity, expected cash flows adjust to reflect changes in the level of default risk. The required return on equity, therefore, does not necessarily change given a change in default spreads.<sup>207</sup>

The explanation above is particularly important in the context of SFG's and CEG's assumption that increases in default spreads must correspond with a higher MRP. On the basis of the McKenzie and Partington report, it appears that SFG's and CEG's fundamental assumptions are incorrect. The relevant section in McKenzie and Partington's report is section 1.

### Comparability of debt and equity returns

Setting aside the lack of consensus on the relationship between debt and equity premiums, comparisons between the relative costs of debt and equity should still be considered with caution. In particular, to the extent that debt and equity returns are compared, it is important comparisons be made on a consistent basis. For example, the return on equity estimated by the AER is an expected return, while the return on debt is a promised return. Additionally, the return on equity estimated by the AER is a post-tax measure, while the return on debt is a pre-tax value. The need to compare estimates on a consistent basis is supported by McKenzie and Partington.<sup>208</sup>

The need for adjustments is discussed in greater detail in section B.7.2. It is notable, however, that SFG do not make any adjustments when comparing promised debt returns to expected equity returns.<sup>209</sup> This underestimates the existing spread between regulatory debt and equity returns. In contrast, it is likely to lead to overstated expectations of any increases in the MRP inferred from relative debt premiums.<sup>210</sup> This is because promised returns will be greater than expected returns, and pre-tax returns greater than post-tax returns.

## B.6 Dividend Growth Model

In both the initial proposal and the revised proposal, Envestra submitted consultant reports that derived DGM based MRP estimates. In attachment 5, the AER considers the use of DGM to estimate the prevailing MRP and noted it would discuss further considerations on the DGM in the appendix. This appendix considers four aspects of the dividend growth model:

- use of the dividend growth model to estimate the MRP
- use of the dividend growth model to estimate the cost of equity

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<sup>207</sup> McKenzie and Partington, *Relationship between cost of debt and cost of equity*, March 2013, pp. 6–7.

<sup>208</sup> McKenzie and Partington, *Relationship between cost of debt and cost of equity*, March 2013, p. 21.

<sup>209</sup> For example, SFG fail to consider the impact of promised debt returns versus expected equity returns when comparing the returns available to non-resident investors. SFG, *The required return on equity*, November 2012, p. 14.

<sup>210</sup> For clarity, the return on equity estimated by the AER is an expected return, while the return on debt is a promised return. The AER is not suggesting adjustment to these estimates for the purpose of calculating the AER's overall rate of return estimate. If comparisons between debt and equity returns are being made, or inferences drawn from comparisons, then the corresponding estimates should reflect a consistent basis.

- the dividend growth model as a source of evidence of a negative relationship between the risk free rate and the MRP, and
- dividend yields (which are a key input into the DGM constructed by CEG)

### B.6.1 Dividend growth model estimates of the market risk premium

Envestra submitted DGM based MRP estimates derived by CEG, Capital Research and NERA in its initial proposal. However, in its revised proposal, only an update of DGM based MRP estimates from CEG was submitted. The AER considers DGM analysis can provide some information on the expected MRP, but it is subject to a number of limitations.

In response to Envestra's revised proposal and CEG's updated cost of equity submission, the AER commissioned and received a further report from Associate Professor Lally on the dividend growth model. In the February 2013 DGM report, Lally found CEG's DGM approach is subject to the following problems:<sup>211</sup>

- CEG's conventional DGM approach will overestimate the MRP when the risk free rate is low, because the DGM assumes that the market cost of equity never changes over time, and therefore that any changes in the MRP and the risk free rate are perfectly offsetting.
- The DGM estimates assume equity prices are equal to the present value of future dividends and therefore that the market's expectation of the growth rate in dividends both exists and is rational. If this expected growth rate does not exist or is not rational, then an analyst could not hope to accurately estimate it and therefore could not hope to accurately estimate the market's discount rate. CEG's observation that the CGS yield might also not be rational is not only irrelevant to this point but would in any case nets out in the MRP estimate.
- DGM is prone to errors in the presence of both short term and long term changes in the market's earnings retention rate. CEG does not contest this point.
- In relation to Lally's previous point that CEG's formula for the market cost of equity is mathematically wrong, CEG neither contest this point nor does it correct it in its latest paper.
- CEG's argument that the long run growth rate in the dividends per share of existing firms matches that for GDP, because new firms are funded from the dividends paid by existing firms, is not valid. CEG's argument that the expected growth rate in dividends per share for existing companies might initially be larger than the expected GDP growth rate and then converge on a rate lower than that for GDP, so that the resulting MRP estimate approximates that provided by them, is valid in principle but CEG does not supply any analysis in support of this argument.

Aside from the CEG, Capital Research, NERA and Associate Professor Lally all recommended the use of DGM analysis in estimating a forwarding looking MRP, although to a different degree. The DGM estimates derived by CEG, Capital Research and NERA support an MRP estimate significantly above 6 per cent.<sup>212</sup> Lally estimated a prevailing DGM based MRP in the range of 5.9-8.4 per cent<sup>213</sup>. As noted in attachment 5.3.3, the AER considers DGM based analysis of the MRP can provide some information on the expected MRP. However, due to the sensitivity of results to input assumptions in

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<sup>211</sup> M. Lally, *The dividend growth model*, February 2013, pp.20-21.

<sup>212</sup> CEG, *Update to March 2012 Report*, November 2012; Capital Research, *Forward estimate of the market risk premium: update*, March 2012; NERA, *Prevailing conditions and the MRP*, March 2012;

<sup>213</sup> Lally, *The dividend growth model*, March 2013, p. 22

the model, it considers the DGM estimates should be treated with caution. This view is also consistent with McKenzie and Partington's recommendation.<sup>214</sup>

Capital Research's DGM analysis demonstrated the DGM analysis can be very sensitive to the assumptions made. In the February 2012 report, Capital Research estimated an implied MRP range of 6.6 to 7.5 per cent. In estimating this range, it assumed a compound average growth rate of 7 per cent based on analysts' forecasts, and a theta value of between 0 and 0.5.<sup>215</sup> It also illustrated an increase of 0.5 in the theta assumption translates to a 0.8 to 1.2 per cent increase in the implied MRP.<sup>216</sup> Further, in the March 2012 report, just one month apart, Capital Research updated this estimate to 9.6 per cent (an increase of more than 2 per cent) with a more recent risk free rate and a net theta value of 0.2625.<sup>217</sup>

The AER also notes Capital Research has derived negative MRP estimates from DGM analysis for the period 1980–2004 in its 2005 report. Capital Research suggested a negative result is 'nonsense'.<sup>218</sup>

Similarly, the CEG AMP method was producing MRP estimates at or below zero per cent back in 1994. Lally identified this problem in its July 2012 report. CEG accepted Lally's criticism and has revised the chart using 10 year inflation indexed CGS yields. This leads to a new time series of MRP estimates that is free of the implausible zero values.<sup>219</sup> However, Lally further noted even with this revision, the MRP estimates are still subject to the problem that they will be too extreme when the risk free rate is extreme. The AER notes the revised CEG chart was still producing an MRP close to 2 per cent back in 1994.

### Bias in the dividend growth model estimates

In the July 2012 report, Lally noted other problems with the DGM analysis:

- At a given time, the estimated cost of equity for the market is assumed to be the same for all future years. This 'perfect offsetting' hypothesis is implausible.
- The method assumes the current value of the market matches the present value of future dividends. If the current value of the market is below the present value of future dividends, then the resulting estimate of the market risk premium will be too high.
- Short term fluctuations in the market's earnings retention rate have a significant impact on the estimates. The DGM method does not account for these changes.<sup>220</sup>

In addition to the above limitations, Lally identified two further problems with the DGM MRP estimate derived by CEG:

- By using the historical dividend yield, CEG ignores the (1+g) term in deriving the market cost of equity.

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<sup>214</sup> McKenzie and Partington, *Equity market risk premium*, December 2011, p. 27.

<sup>215</sup> Capital Research, *Forward estimate of the market risk premium: Update: A response to the draft distribution determination by the AER for Aurora Energy Pty Ltd*, February 2012, pp. 19–23 (Capital Research, *MRP estimate for the Aurora determination*, February 2012).

<sup>216</sup> Capital Research, *MRP estimate for the Aurora determination*, February 2012, Table 2, p.21.

<sup>217</sup> Capital Research, *Forward estimate of the market risk premium: Update: A report prepared for the Victorian gas transmission and distribution businesses: APA Group, Envestra, Multinet Gas and SP AusNet*, March 2012, p. 33 (Capital Research, *MRP estimate for the Vic NSPs*, March 2012).

<sup>218</sup> Capital Research, *Australian market risk premium*, January 2005, pp. 31–32.

<sup>219</sup> CEG, *Update to March 2012 Report*, November 2012, pp.17-18.

<sup>220</sup> Lally, *Cost of equity and the MRP*, 25 July 2012, pp. 15–18.

- It is inappropriate for CEG to set the dividend growth to the long term GDP growth. By making such an assumption, the expected long term growth rate in all dividends from all companies would exceed that for gross domestic product. This outcome is logically impossible.<sup>221</sup>

Lally considered the net effect of these two problems is to overestimate the MRP by about 1 per cent. This overestimation is additional to the limitations discussed above.<sup>222</sup>

## Conclusion

Based on the above considerations, the AER considers DGM estimates should be treated with caution when estimating the appropriate MRP. While DGM analysis is producing high MRP estimates, it was producing MRP estimates below 6 per cent prior to 2008.. In addition, the AER's preferred MRP estimate of 6 per cent falls in the DGM MRP estimation range calculated by Lally.

Further, some fund managers believe the DGM MRP estimates in the US provide a lower bound while the DGM estimates in Australia represent an upper bound for developed capital markets.<sup>223</sup> Based on this observation, the AER considers Australian DGM estimates might be somewhat anomalous. It does not consider Australia has the highest market risk across all the developed countries.

The relevant sections in Associate Professor Lally's report are sections 2 to 7.

### B.6.2 Dividend growth model estimates of the cost of equity

A DGM can also be used to derive overall cost of equity estimates, rather than MRP estimates. CEG estimated a DGM based nominal cost of equity for regulated businesses in the range of 10.4 - 14.1 per cent and a DGM nominal cost of equity for the market of 10.16 per cent.<sup>224</sup> However, none of the Victorian gas businesses proposed this approach. Therefore the AER does not discuss this approach extensively here. It notes using DGM to estimate the cost of equity is subject to similar limitations as using DGM to estimate MRP.

In the July 2012 report, Lally noted if the DGM approach is applied to individual firms, then this DGM approach is subject to additional problems, such as:<sup>225</sup>

- greater exposure to fluctuations in the earnings payout rate,
- incentives for the firms in question to manipulate their earnings payout rate, and
- implicitly (and wrongly) assumes that the entire firms' activities are regulated.

### B.6.3 DGM as evidence of negative relationship between the risk free rate and MRP

The AER considered CEG's chart on the AMP method estimate of the return of equity and MRP relative to 10 year CGS rates, which featured in both Envestra's initial and revised proposals. The most recent chart is reproduced in Figure B.5 below. Lally has considered CEG's DGM chart in both his July 2012 report and March 2013 report.

The AER has considered CEG's and Lally's view. As noted above, the MRP estimate based on DGM was slightly above 2 per cent in 1994 and was below 6 per cent for the entire pre-GFC period. The

<sup>221</sup> Lally, *Cost of equity and the MRP*, 25 July 2012, pp. 18–20.

<sup>222</sup> Lally, *Cost of equity and the MRP*, 25 July 2012, p. 20.

<sup>223</sup> RARE Infrastructure, *RARE cost of capital*, September 2012, p.9.

<sup>224</sup> CEG, *Update to March 2012 Report*, November 2012, p.31.

<sup>225</sup> Lally, *Cost of equity and the MRP*, July 2012, p.3.

AER is not aware of any proposals submitted by the businesses or their consultants prior to the GFC that the MRP should be below 6 per cent. CEG's chart has not persuaded the AER that there is sufficient empirical evidence of a negative relationship between the risk free rate and the MRP.

CEG estimated the return of equity time series by first estimating the prevailing cost of equity (the red line) and then calculating the MRP (the green line) by subtracting the prevailing 10 year CGS yield at any point in time (the blue line).<sup>226</sup> The red line is relatively stable over time. As the risk free rate (blue line) varies over time, subtracting the blue line from the red line thus creates the appearance of a strong negative correlation between the risk free rate (green line) and MRP (blue line).

Lally identified this problem in his recent reports. Lally found the CEG AMP method uses a perfect offset assumption<sup>227</sup> and thus generates results showing a stable cost of equity over time.<sup>228</sup> In his July 2012 report, Lally described CEG's chart as being 'predisposed' to the result that it displays.<sup>229</sup> Both CEG and Lally agreed the assumption of a constant cost of equity is unavoidable when applying the DGM. Lally noted such disadvantages must be recognised and this 'perfect offset assumption' problem is particularly significant when the risk free rate is high or low.<sup>230</sup>

Given the perfect offset assumption is a well accepted disadvantage of the DGM, the AER considers this chart does not present a persuasive empirical evidence of a negative relationship between the prevailing market risk premium and the prevailing risk free rate. Additionally, because CEG's AMP method is based on the DGM model, the model's general limitations (outlined in section B.6.1 above) also apply to this analysis.

In the July 2012 report, Lally pointed out CEG's AMP method produced an MRP estimate of zero in 1994—an 'implausible' result. Combining these points, Lally concluded:<sup>231</sup>

Thus, if the perfect-offset hypothesis should be rejected in 1994 when the risk free rate was unusually high, it should also be rejected in 2012 when the risk free rate was unusually low.

CEG accepted Lally's criticism and has revised the chart using 10 year inflation indexed CGS yields, which leads to a new time series of MRP estimates that is free of the implausible zero values.<sup>232</sup> However, Lally noted even with this revision, the MRP estimates are still subject to the perfect offset assumption that leads to predetermined outcome. Such a position does not hold unless the MRP and the risk free rate have a perfectly negative relationship. CEG neither presented evidence to support this assumption nor even claimed it to be true.<sup>233</sup>

The relevant section in Associate Professor Lally's report is section 2.

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<sup>226</sup> CEG, *Internal consistency of risk free rate and MRP in the CAPM: Prepared for Envestra, SP AusNet, Multinet and APA*, March 2012, pp. 20–32 (CEG, *Risk free rate and MRP in the CAPM*, March 2012).

<sup>227</sup> By applying the AMP method, CEG assumed the market cost of equity at any point in time is the same for all future years. If, for example, the current risk free rate were very low, then the MRP would assume to be very high by an exactly offsetting amount.

<sup>228</sup> Lally, *Cost of equity and the MRP*, July 2012, pp. 9–12, 15.

<sup>229</sup> Lally, *Cost of equity and the MRP*, July 2012, p. 11.

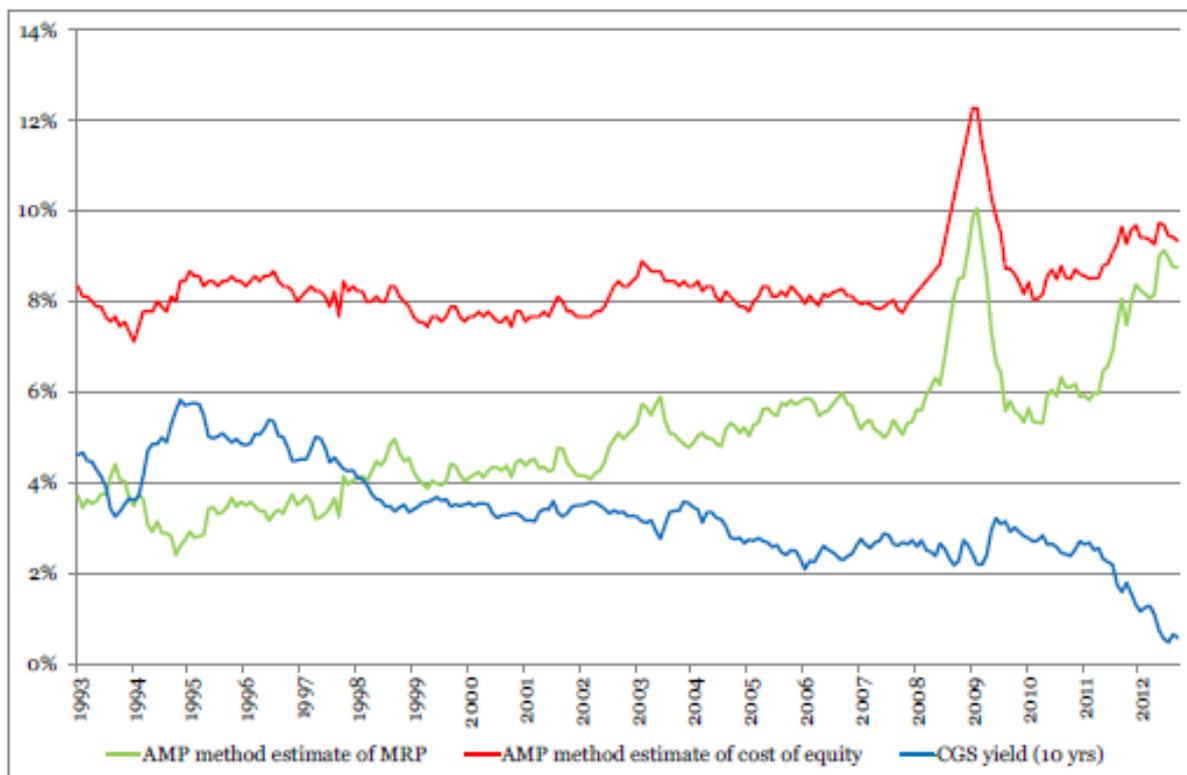
<sup>230</sup> Lally, *The dividend growth model*, March 2013, p.8-9.

<sup>231</sup> Lally, *Cost of equity and the MRP*, July 2012, p. 15.

<sup>232</sup> CEG, *Update to March 2012 Report*, November 2012, pp.17-18.

<sup>233</sup> Lally, *Cost of equity and the MRP*, July 2012, pp. 7-8.

**Figure B.5 CEG AMP method estimate of Return on Equity and MRP relative to 10 year CGS yields**



Source: CEG, *Update to March 2012 Report*, November 2012, Figure 7

### B.6.4 Dividend yields

Dividend yields refer to the current observable dividends for all shares in a broad based market index divided by the current price of all shares in that index. The dividend yield is thus a simple indicator for prevailing level of risk aversion..

CEG, NERA and SFG have all referred to the recent increase in dividend yield as an indication of heightened MRP in their most recent reports.<sup>234</sup> As noted by CEG, dividend yield on listed equities can be used to arrive at a MRP estimate by way of a DGM.<sup>235</sup> The AER considers the dividend yields are closely related to the DGM estimates. The high DGM based MRP or cost of equity estimates submitted by Envestra's consultants are the result of the current high current dividend yield.

The AER considers the evidence of a relationship between the dividend yield and the MRP is insufficient. McKenzie and Partington conducted a broader consideration of the academic literature in their February report. They found the relationship between the dividend yield and the MRP is still a developing area of research and the literature does not indicate this relationship is statistically reliable.<sup>236</sup>

The AER considers the underlying mechanism relating dividend yields and the MRP (as presented by CEG, NERA and SFG) is not persuasive. They appear to overlook other factors that could result in a

<sup>234</sup> CEG, *Update to March 2012 Report*, November 2012, p.15; NERA, *Estimating the Cost of Equity under the CAPM*, November 2012, pp.24-25; SFG, *The required return on equity*, November 2012, p.43

<sup>235</sup> CEG, *Update to March 2012 Report*, November 2012, p.15

<sup>236</sup> McKenzie, and Partington, *Supplementary report on the MRP*, February 2012, p. 23.

higher observed dividend yield even when the MRP was unchanged (or lower).<sup>237</sup> McKenzie and Partington noted the dividend yield calculation does not account for expectations about capital gain or loss. So, a change to expect relatively more of the total return from dividends instead of capital appreciation would also result in a higher dividend yield, even if the MRP did not change.<sup>238</sup>

## B.7 Other considerations

In this section the AER considers some other considerations, namely:

- market commentary
- reasonableness checks

These considerations are discussed below.

### B.7.1 Market commentary

The AER has considered the material submitted by Envestra and the other Victorian gas businesses on the opinions of investors, fund managers and credit rating agencies. This section discusses that material.

#### Investors and fund managers

Envestra and others submitted that there are concerns in the investment community about the AER's recent cost of capital decisions.<sup>239</sup> The statements highlighted were submitted to the AEMC as part of its recent rule change process and provide insights into the opinions of investors about regulatory decisions.<sup>240</sup>

This submission included the following statement from Paradise Investment Management Pty Ltd:

...the current low risk free rate in the form of the 10 year bond yield is a function of the heightened level of uncertainty that exists in the market at the moment which in turn should be reflected by a higher equity risk premium. There is ample evidence of this higher equity risk premium in the current subdued activity levels in the primary and secondary issuance markets. Additionally, there is also a fair argument that the Australian 10 year bond yield is being artificially subdued by high levels of foreign buying given its place in the increasingly scarce pool of AAA rated securities.<sup>241</sup>

Similarly, the submission included a statement from RARE Infrastructure:

Regulators need to ensure returns are sufficient for companies to attract capital, both debt and equity, to expand networks to meet customer requirements. Global Funds like RARE have a choice whether to invest in regulated assets in Australia. Despite RARE liking the Australian regulatory framework, if allowed returns are insufficient to compensate us for the risk, we will invest our clients' capital elsewhere in the world.<sup>242</sup>

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<sup>237</sup> Other techniques build on the dividend yield approach in an attempt to address these shortcomings. The DGM projects dividend movements beyond the immediate dividend forecast horizon. The SFG 'market based' assessment using dividend yields combines the dividend yield with a forecast for capital gain/loss.

<sup>238</sup> McKenzie, and Partington, *Supplementary report on the MRP*, February 2012, pp. 12–13.

<sup>239</sup> SP AusNet, *Revised Access Arrangement Proposal: Chapter 5 – Rate of return and corporate tax allowance*, 9 November 2012, pp. 30-32; AER, *Draft decision: Access arrangement draft decision: Multinet Gas (DB No. 1) Pty Ltd, Multinet Gas (DB No. 2) Pty Ltd*, September 2012, pp. 159-161; Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.4.

<sup>240</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.4.

<sup>241</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.4.

<sup>242</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.1.

The AER has given consideration to this feedback when forming this final decision. Elsewhere in this decision careful consideration is given to many of the issues identified in this feedback. For example, section B.4.1 considers the suggestion that the 10 year bond yield is artificially subdued. Similarly, section B.5 considers the MRP in detail. Elsewhere in this appendix the possibility of a negative relationship between the risk free rate and the MRP is also considered.

## Credit rating agencies

Envestra submitted reports from two credit rating agencies on the Victorian gas review draft decisions. These reports were from Standard & Poor's and Moody's.<sup>243</sup> The AER considers these reports in this section.

On face value, these reports may appear to predict dire consequences from the AER's draft decision approach on the cost of equity for the Victorian gas businesses. However, upon examining these reports more closely, this is not the case. Rather, these statements are more circumspect than they might seem and would apply equally to any reduction in the rate of return. Below, we explain in detail why this is the case. Credit ratings are also discussed in more detail in appendix D of the APA GasNet final decision.

Envestra made the following statement about the Moody's report:

Moody's in its report on the Draft Decisions released on 1 October was more direct [than Standard & Pours], stating that the Draft Decisions for Envestra would be "credit negative" if they were to be made final.<sup>244</sup>

Firstly, the AER notes Moody's does not say the AER's rate of return is not commensurate with prevailing conditions in the market for funds or the risks in providing reference services. Rather, Moody's says the draft decision approach is "credit negative". These two concepts are very different.

The AER understands that any reduction in the regulatory rate of return would be credit negative. Moody's appears to rank specific events as credit positive, negative or neutral. These events are combined into Moody's outlook which can either be positive, negative, stable or developing.<sup>245</sup> The fact that a lower regulator cost of equity means a lower revenue allowance is, all else the same, necessarily credit negative.<sup>246</sup>

As Moody's notes, the actual impact of that event on the credit rating is dependent on a number of factors:

Furthermore, while Moody's suggests the Envestra's draft decision would be credit negative, it also suggests:

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<sup>243</sup> Standard & Poor's, *Industry Report Card: Australian And New Zealand Network Utilities Maintain Stable Credit Quality*, 14 November 2012; Moody's, *Proposed Tariff Reductions for Australia's Gas Distributors Are Credit Negative*, 1 October 2012.

<sup>244</sup> Envestra, *Letter to the AER - Market reaction to draft decisions*, 29 November 2012, p. 1.

<sup>245</sup> Moody's, *Rating Symbols and Definitions*, January 2013, p. 34.

<sup>246</sup> Further, as Moody's notes, the actual impact of that event on the credit rating is dependent on a number of factors: "Notwithstanding the draft decision's material cut, the actual credit effects depend on the ability of the distribution companies to manage their costs in response to the final tariff cut. For instance, we expect the companies to lock in a lower base interest rate for the next five years using swaps and reduce their interest costs relative to the last regulatory period ending in 2012. In addition, we expect these companies to have some capacity to manage their operating costs and capital expenditure. Their obligation to maintain network reliability ultimately constrain their ability to reduce costs. Therefore, a 23% cut in tariffs in the regulator's final revenue decision would be credit negative for Energy Partnership Gas." Moody's, *Proposed Tariff Reductions for Australia's Gas Distributors Are Credit Negative*, 1 October 2012, p. 2.

Despite the sector's high financial leverage compared to industrial companies, its predictable revenue stream provides visibility to a utility's ability to service its debt in the long run and underpins its investment-grade credit profile.

Envestra highlighted the following statement from the Standard & Poor's report:

The allowed WACC is significantly lower compared to the levels allowed in the past. This is mostly due to the fact of a lower risk-free rate prevailing in the market. While the impact of a lower risk-free [sic] is mitigated through a typical interest rate hedge reset, which coincides with the regulatory reset, we believe the proposed return on equity may not reflect current market conditions and may not be adequate for equity investors. As a result, the perceived lower rate of return for equity may reduce shareholders' long-term commitment.<sup>247</sup>

As a market participant, Standard and Poor's view that the cost of equity in the draft decision may not reflect market conditions is a relevant consideration. But Standard and Poor's view is one of many competing and divergent views between various market participants and academic experts. As Standard & Poor's does not provide reasons for its view, it is difficult for the AER to assess the basis of their position.

Further, while Standard & Poor's suggest the cost of equity in the draft decision may be too low, they do not quantify this statement. Specifically, they do not indicate what cost of equity they consider would be appropriate, nor whether they consider the cost of equity to be as high as Envestra and the other Victorian gas businesses have proposed.

### B.7.2 Reasonableness checks

In attachment 5, the AER evaluates the evidence on each WACC parameter individually. It also takes into account the interdependencies between WACC parameters where relevant. In this section the AER evaluates the overall rate of return derived from the individual WACC parameter values. The AER considers its determined overall rate of return is commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.<sup>248</sup> In turn, the AER considers this overall rate of return provides a reasonable opportunity for Envestra to recover at least its efficient costs.<sup>249</sup>

In this appendix, the AER examines:

- assets sales
- trading multiples
- broker WACC estimates
- recent decisions by other regulators and the AER
- recent decisions by overseas regulators
- the relationship between the cost of equity and the cost of debt
- cash flow analysis.

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<sup>247</sup> Standard & Poor's, *Industry Report Card: Australian And New Zealand Network Utilities Maintain Stable Credit Quality*, 14 November 2012, p. 3.

<sup>248</sup> NGR, r. 87(1).

<sup>249</sup> NGL, s. 24

## Recent regulated asset sales

For recent transactions of regulated assets, for which relevant data is available, the AER compares the market value (i.e. the sale price) with the book value (i.e. the regulatory asset base).

Over the past few years, regulated assets have generally been sold at a premium to the RAB. If the market value is above the book value, this may imply that the regulatory rate of return is above that required by investors. Conversely, when the market value is below the book value, this may imply that the regulatory rate of return is below that required by investors.

Caution must be exercised before inferring that the difference indicates a disparity in WACCs, particularly where the difference is small. A range of factors may contribute to a difference between market and book values. A RAB multiple greater than one might be the result of the buyer:<sup>250</sup>

- expecting to achieve greater efficiency gains that result in actual operational and capital expenditure below the amount allowed by the regulator
- increasing the service provider's revenues by encouraging demand for regulated services
- benefiting from a more efficient tax structure or higher gearing levels than the benchmark assumptions adopted by the regulator, and growth options
- expecting to achieve higher returns if regulation is relaxed.<sup>251</sup>

The AER considers that the above list is not exhaustive. SFG have provided alternative explanations of the sale price in excess of the RAB.<sup>252</sup>

Regulated asset sales in the market are also infrequent allowing limited opportunity to conduct this analysis. This is of particular relevance at present as the AER is setting a lower overall rate of return than in previous decisions. While asset sales in the future may reflect changes to the overall rate of return that are occurring at present, sales that have already occurred will not.

Regulated asset sales do, however, provide a useful real-world indication of whether market participants consider the AER's benchmark WACC to be, broadly speaking, reasonable. The consistent positive trend as discussed below provides evidence that the AER's WACC approach is not unreasonable.

Further, CEPA consider the Market Asset Ratio [RAB multiple] to be a well established tool used by equity analysts to compare allowed and actual returns on capital.<sup>253</sup>

Deloitte also confirm that a commonly used industry rule of thumb for valuing regulated assets is the RAB multiple.<sup>254</sup>

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<sup>250</sup> Each of these reasons assumes the purchasing firm is making a rational purchasing decision. Another reason for a RAB multiple greater than one might be that the purchasing firm misjudged the value of the target assets and paid too much for those assets. Each transaction considered by the AER involved sophisticated investors with significant knowledge of the industry. Accordingly, the AER does not consider it likely that the RAB multiples greater than one result from poor valuations of the target assets.

<sup>251</sup> Grant Samuel & Associates Pty Limited, *Financial Services Guide and Independent Expert Report in relation to the Recapitalisation and Restructure of Babcock and Brown Infrastructure*, 9 October 2009, p. 77 (Grant Samuel, *Expert report: Babcock and Brown Infrastructure*, October 2009).

<sup>252</sup> SFG, *The required return on equity: Response to AER Victorian gas draft decisions*, 7 November 2012, p. 47.

<sup>253</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p. 51.

<sup>254</sup> Deloitte, *Determining the fair value of Australia's water infrastructure assets*, March 2010, p. 11.

In theory, where the WACC applied is the same as the regulatory return determined and the regulator and market have the same view as to the costs of operating the regulated asset, the RAB multiple should be one.

The RAB multiples from each of these transactions, together with the transactions discussed above, are summarised in Table B.4 from most recent to least recent.

**Table B.4 Selected acquisitions – RAB multiples**

Date	Acquirer	Entity/Asset acquired	RAB multiple (times)
Dec 2012	State Grid Corp of China	41.1% of ElectraNet SA	1.29
Dec 2011	Marubeni Corp/RREEF	Allgas	1.20
Dec 2011	Marubeni Corp/RREEF	Allgas	1.02
July 2011	ATCO	25.9% of West Australian Gas Networks	1.20
July 2011	DUET	20% of Multinet Gas	1.13
July 2011	DUET	20% of Dampier to Bunbury Natural Gas Pipeline	0.95 <sup>255</sup>
Dec-06	APA	Directlink	1.45
Oct-06	APA	Allgas	1.64
Aug-06	APA	APA GasNet	2.19
Apr-06	Alinta	AGL Infrastructure assets	1.41-1.52
Mar-06	APA	Murraylink	1.47

Source: DUET<sup>256</sup>, APA<sup>257</sup>, Grant Samuel, AER calculations.

In December 2012, Powerlink sold its share of ElectraNet SA to the State Grid Corporation of China.<sup>258</sup> The 41.1 per cent stake was purchased at a RAB multiple of 1.29.<sup>259</sup> The AER notes that this is a recent sale which makes it relevant as a cross check.

<sup>255</sup> Dampier to Bunbury Natural Gas Pipeline (DBNGP) presents an unusual case because it is 96% contracted until 2016 under shipper contracts. As the Economic Regulation Authority (ERA) of Western Australia states, these contracts 'are substantially independent of the access terms and reference tariffs established under the access arrangement for the DBNGP.' ERA, *Final decision: DBNGP access arrangement*, October 2011, p. 14. For this reason the DBNGP RAB multiple appears to be not driven by regulatory rates of return and does not provide a useful comparison for RAB multiples analysis.

<sup>256</sup> DUET, *ASX announcement: Presentation to Macquarie Retail Adviser Network*, 19 January 2012, p. 3, viewed 9 February 2012, <<http://www.asx.com.au/asxpdf/20120119/pdf/423tx0cd2v7qq3.pdf>>.

<sup>257</sup> APA Group, *ASX announcement: Completion of the sale of 80% of Allgas*, 16 December 2011, viewed 10 January 2012, <<http://www.asx.com.au/asxpdf/20111216/pdf/423b5mnt9sqvzh.pdf>> (APA Group, *ASX announcement on sale of Allgas*, December 2011).

<sup>258</sup> ElectraNet, *Sale of ElectraNet shareholding*, 30 November 2012 <http://www.electranet.com.au/media-centre/media-archive/2012/sale-of-electranet-shareholding/>

<sup>259</sup> Macquarie, *APA Group: EPIC pipeline of growth*, 5 December 2012, p. 7.

In particular, this sale has occurred after the ElectraNet draft decision. The method for determining the rate of return was not in dispute in the draft decision. So, the purchaser could predict with reasonable certainty the approach the AER would take in its final decision. The indicative return on equity in the draft decision was below 8 per cent.

Additionally, the approach in the ElectraNet draft decision was very similar to the approach taken in the Victorian gas businesses.<sup>260</sup> Therefore this ElectraNet RAB multiple is relevant as a cross check for the Victorian gas businesses. That said, the AER recognises that there may have been special circumstances surrounding this sale, given it was purchased by a sovereign owned entity.

In December 2011, APA divested 80 per cent of its holding of APT Allgas (a gas distributor in South East Queensland) to Marubeni Corporation and RREEF; each acquiring 40 per cent equity stakes.<sup>261</sup>

APA stated that net funds released from the sale were \$477 million after transaction costs and the net enterprise value was \$526 million.<sup>262</sup> Applying a RAB value, estimated at the sale date, to this enterprise value produces a multiple of 1.20.

This transaction involved the sale of both regulated and unregulated assets. Accordingly the RAB multiple may overstate the premium on the regulated assets as unregulated assets generally require a higher cost of capital.<sup>263</sup>

APA also stated that the sale price was in line with the book value of the assets. The gross sale price was \$500.9 million, with the book value of assets sold at \$488.8 million.<sup>264</sup> This equates to a multiple of 1.02. These multiples can be considered the upper and lower bound estimates of the RAB multiple for this transaction.

In July 2011, DUET sold its 25.9 per cent stake in West Australian Gas Network (WAGN) to ATCO Ltd in return for a 20 per cent interest in the Dampier to Bunbury pipeline (DBP) and a 20.1 per cent interest in Multinet.<sup>265</sup> These transactions were at multiples of 1.20, 0.95 and 1.13 respectively.

In October 2010, Envestra purchased Country Energy's NSW gas network at a multiple of 1.25 times the 2010 RAB.<sup>266</sup> Further details on this transaction can be found in the AER's draft decision for the QLD/SA gas distribution networks.<sup>267</sup>

Other historical sales have been at premiums of between 20 and 119 per cent to the regulated asset base.<sup>268</sup>

As Grant Samuel has previously explained, listed infrastructure entities should theoretically trade at, and be acquired at, 1.0 times the RAB.<sup>269</sup> However, nearly all recent asset sales have been transacted at RAB multiples of greater than one.

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<sup>260</sup> The AER was bound to apply the 6.5% MRP and 0.65 gamma from the 2009 WACC review for the ElectraNet determination, as this is a transmission business.

<sup>261</sup> APA Group, *ASX announcement on sale of Allgas*, December 2011

<sup>262</sup> APA Group, *ASX announcement on sale of Allgas*, December 2011

<sup>263</sup> Allgas is a holding company that also owns the unregulated Moura pipeline and the Gatton-Gympie easement.

<sup>264</sup> Net proceeds after transaction costs was \$478.4 million, with transaction costs of \$22.5 million and a gain on sale of \$12.1 million. APA Group, *Interim Financial Report for the half year ended 31 December 2011*, 22 February 2012, p. 3.

<sup>265</sup> DUET, *ASX announcement: Completion of AET&D sale process*, 29 July 2011, viewed 9 February 2012, <<http://www.asx.com.au/asxpdf/20110729/pdf/420312nw1jxhdv.pdf>>

<sup>266</sup> AER, *Final decision: Country Energy Gas Pty Ltd: Access arrangement proposal for the Wagga Wagga natural gas distribution network, 2010–2015*, March 2010 and Envestra, *ASX announcement: Envestra's to acquire NSW gas networks - Market presentation*, 26 October 2010, pp. 3, 6–7, viewed 10 January 2012, <<http://www.asx.com.au/asxpdf/20101026/pdf/31tcv1nblp4xqc.pdf>>.

<sup>267</sup> AER, *Draft decision: Envestra access arrangement SA*, February 2011, p. 63.

<sup>268</sup> Grant Samuel, *Expert report: Babcock and Brown Infrastructure*, October 2009, p. 78.

Acquisition premiums have been substantial and are, as a result, unlikely to be solely explained by the factors noted above. This suggests that the regulated rate of return has been at least as high as the actual cost of capital faced by regulated businesses. Moreover, the consistency of the numbers across many transactions lends support to the conclusion that the regulated rate of return has been at least consistent with the efficient rate of return.

The AER notes that it is not possible to use RAB multiples analysis as an input when assessing individual parameters. The AER does not place any weight on this analysis during that process.

Recent regulated asset sales analysis provides a degree of confidence that the approach used in calculating the rate of return is reasonable. The AER has maintained a largely consistent approach to the calculation of the rate of return since the WACC review and that approach has been maintained for this decision.<sup>270</sup> This suggests the AER’s approach in this decision will also provide Envestra with a reasonable opportunity to recover efficient costs.

### Trading multiples

A comparison of the asset value implied by share prices against the regulatory asset base—often expressed as a ‘trading multiple’—also provides insight into the required rate of return.<sup>271</sup>

As with regulated asset sales, a trading multiple above one may imply that the market discount rate is below the regulated WACC. The AER acknowledges there are other factors which may explain a trading multiple above one.<sup>272</sup> The same cautions with interpreting the results of the regulated asset sales approach apply to trading multiples. In addition, this assessment relies on the assumption that share prices reflect the fundamental valuation of the company.

Recent broker reports have identified RAB trading multiples.<sup>273</sup> These multiples are consistently greater than one, as shown in Table B.5 to Table B.8. None of these multiples are less than or equal to one. In particular, the trading multiples have not changed significantly since the draft decision.

**Table B.5 JP Morgan trading multiples**

Date of report	Company	2010–11	2011–12	2012–13
16 January 2013	DUET	1.26	1.18	1.20
16 January 2013	ENV	1.20	1.25	1.29
16 January 2013	SKI	1.26	1.22	1.27

<sup>269</sup> Grant Samuel, *Expert report: Babcock and Brown Infrastructure*, October 2009, p. 77.

<sup>270</sup> Changes have been made to the value of gamma, the value of the MRP and the estimation approach for the DRP.

<sup>271</sup> The AER has not made any calculations of its own in this section. Trading multiples have only been stated where they could be identified in an external report. The AER does not have specific information regarding the precise nature of the brokers' calculations.

<sup>272</sup> CEPA have identified factors which may result a trading multiple above one - expectations of earnings from incentives and efficiencies; an actual cost of capital that is below the allowed cost; and wider stock market or M&A activity. The AER considers that this list is not exhaustive. CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, February 2013, p. 53.

<sup>273</sup> The AER has reported trading multiples from reports published from August 2012—noting that the brokers do not always provide these figures. Where possible, trading multiples for the previous year have also been presented to provide context, but only for those broker reports where a recent update was available.

16 January 2013	SPN	1.21	1.20	1.24
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Source: JP Morgan<sup>274</sup>

**Table B.6 Macquarie trading multiples**

Date of report	Company	2011	2012
29 November 2012	DUET	1.14	1.23
29 November 2012	SKI		1.34
6 December 2012	SPN	1.16	1.16

Source: Macquarie Group<sup>275</sup>

**Table B.7 Credit Suisse trading multiples**

Date of report	Company	2012	2013
12 February 2013	DUET	1.15	1.19
12 February 2013	ENV	1.35	1.43
12 February 2013	SKI	1.39	1.39
12 February 2013	SPN	1.14	1.18

Source: Credit Suisse<sup>276</sup>

**Table B.8 Bank of America Merrill Lynch trading multiples**

Date of report	Company	2012	2013
19 October 2012	DUET	1.20	
23 August 2012	ENV	1.10	
5 February 2013	SKI	1.25	1.27
9 November 2012	SPN	1.15	

Source: Bank of America Merrill Lynch<sup>277</sup>

<sup>274</sup> JP Morgan, *Utilities 2013 Outlook: Regulatory Risks Recede*, 16 January 2013, pp. 54, 58, 61, 64.

<sup>275</sup> Macquarie, *Macquarie Marquee Ideas: The forgotten yield play*, 6 December 2012, p.3; Macquarie, *SP AusNet: ElectraNet underwriting the value*, 29 November 2012, p. 2.

<sup>276</sup> Credit Suisse, *Regulated Utilities Monthly, Sector review*, 12 February 2013, p. 10; Credit Suisse, *Regulated Utilities Monthly, Sector review*, 7 November 2012, p. 14.

<sup>277</sup> Bank of America Merrill Lynch, *Spark Infrastructure Group: Sparkling performance unlikely to continue*, 5 February 2013, p. 1; Bank of America Merrill Lynch, *Australian Utilities: Moving to a lower WACC world*, 19 October 2012, p. 6; Bank of

Further, CEPA highlight the range of trading multiples in their sample, with a minimum of 1.10, and suggest that there is outperformance by these companies. CEPA also states that the degree to which there is outperformance on the cost of equity is unclear. But this suggests that the rates are not too low.<sup>278</sup>

Finally, Spark Infrastructure recently released a *Fact Book* showing an unadjusted trading multiple of 1.34 as at 24 February 2012. The *Fact Book* reports that this decreases to 1.10 when adjusted for total revenue excluding customer contributions.<sup>279</sup>

There are also other listed entities that hold regulated assets, such as APA and Hastings Diversified Utilities Fund. These companies are not conducive to RAB multiples analysis because they have a diverse portfolio of assets, sometimes unregulated, which makes it difficult to isolate the RAB.

Each of these figures cannot be considered definitive without careful consideration of the assumptions and methodologies used. They do, however, provide a useful insight into whether market analysts, and indeed industry analysts, consider the AER's benchmark WACC is appropriate. Importantly, each multiple is calculated after the GFC and also after the AER's WACC review.<sup>280</sup>

The consistently high multiples shown above suggest the regulatory rate of return has been at least as high as the actual cost of capital, and may have been in excess of it. The conclusion then is that the AER's approach to setting WACC parameters provides a degree of confidence that the rate of return has been reasonable. It also provides a degree of confidence that the rate of return has allowed service providers a reasonable opportunity to recover at least efficient costs.

As with recent regulated asset sales, the AER notes that it is not possible to use RAB trading multiples analysis as an input when assessing individual parameters. The AER does not place any weight on this analysis during that process.

However, recent regulated asset sales analysis may provide a degree of confidence that the approach used in calculating the rate of return is reasonable. The AER has maintained a largely consistent approach for calculating of the rate of return since the WACC review and that approach has been maintained for this decision.<sup>281</sup> This suggests the AER's approach in this decision will also provide Envestra with a reasonable opportunity to recover efficient costs.

## Broker reports

Equity analysts publish broker reports on listed companies operating regulated energy networks in Australia. These reports generally include WACC estimates along with a range of information, including analysis of current financial positions and forecasts of future performance.

In several previous decisions, the AER has used the WACC estimates from those broker reports as a reasonableness check on the rate of return determined by the AER through its detailed assessment of each individual parameter. In the *Envestra* matter, the Tribunal noted the reasons put forward by Envestra that the use of broker WACC estimates was an unreliable methodology. In response, the Tribunal stated:

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America Merrill Lynch, *SP Ausnet: Re-iterating 7.7% 2013 divi, growing at 2%*, 9 November 2012, p. 5; Bank of America Merrill Lynch, *Envestra Limited, Earnings review, Flat divi in FY13*, 23 August 2012, p. 5.

<sup>278</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p. 54.

<sup>279</sup> Spark Infrastructure, *2012 Fact Book*, 27 February 2012, p. 9.

<sup>280</sup> While the WACC review has no legal standing under the NGL or NGR, the AER has maintained a largely consistent approach across gas and electricity decisions since the WACC review final decision was published.

<sup>281</sup> Changes have been made to the value of gamma, the value of the MRP and the estimation approach for the DRP.

It is fair to note that, as to those matters, the AER largely recognised the possible reasons why broker estimates might be unreliable and sought to make adjustments in that light. More importantly, the Tribunal accepts the AER submission that it did not estimate the WACC or the DRP by reference to the broker reports. It used them as a “useful reasonableness check” that its WACC estimate did not produce results which did not broadly accord with a range of market opinions concerning firms that are a reliable proxy to the benchmark firm. Its use of the broker reports was thus an “output” test of the nominal vanilla WACC rather than an input into its calculation of the WACC.<sup>282</sup>

The Tribunal emphasised that its finding that the AER’s use of broker WACC estimates did not fall into reviewable error was in the context of the ‘limited use’ to which the AER applied the broker WACC estimates.<sup>283</sup>

Consistent with its approach in previous decisions, the AER uses broker WACC estimates as a reasonableness check on the overall rate of return.

The limitations of the use of broker WACC estimates include:

- the broker reports generally do not state the full assumptions underlying their analysis, or provide thorough explanations of how they arrive at their forecasts and predictions. As such, caution should be exercised in the interpretation of these broker reports<sup>284</sup>
- the five listed companies considered undertake both regulated and unregulated activities, which are assessed by the brokers in aggregate. However, only the regulated activities are directly relevant to the risk in providing reference services. It is generally considered that the regulated activities of the firms—operation of monopoly energy transmission and distribution networks—tends to be less risky than the unregulated activities they undertake in competitive markets. As the regulated activities tend to be less risky, the return required on these activities could be expected to be less than the return required by these firms as a whole.<sup>285</sup> This means that the overall WACC estimate implied by broker reports may overstate the rate of return for the benchmark firm
- it is generally not clear what assumptions the brokers have relied upon when developing their WACC estimate. Further, variation in WACC estimates suggests that these assumptions are not consistent across the different brokers
- the broker reports do not always provide sufficient information for the AER to calculate a nominal vanilla WACC estimate. Only those brokers who report the WACC in nominal vanilla form or provide sufficient detail to enable conversion to this form were considered. These figures are not necessarily precise estimates of the broker’s nominal vanilla WACC, since the AER has relied on its interpretation of the information provided
- Based on this analysis, Table B.9 sets out the range for the broker WACC estimates (converted to a nominal vanilla WACC) which is 7.38-10.02 per cent.<sup>286</sup> The nominal vanilla rate of return determined by the AER for Envestra in this final decision is 7.39 per cent. This is at the lower end of the range of the broker WACC estimates.

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<sup>282</sup> Australian Competition Tribunal, *Application by Envestra Ltd (No 2)[2012] ACompT 3*, 11 January 2012, paragraph 166.

<sup>283</sup> Australian Competition Tribunal, *Application by Envestra Ltd (No 2)[2012] ACompT 3*, 11 January 2012, paragraph 167.

<sup>284</sup> In particular, the AER considers that the price and dividend forecasts from these reports do not constitute a sufficiently reliable basis for calculation of an overall rate of return. However, the broker reports do often report discount rates, which are equivalent to the broker’s estimate of the WACC for the company.

<sup>285</sup> Associate Professor Lally makes this point in relation to dividend growth model (DGM) estimates of the cost of equity which are based on listed regulated energy networks. That is, he states that as the unregulated activities tend to be have higher risk, the estimated cost of equity (based on data which takes into account the entirety of the firm’s activities) will tend to overestimate that for its regulated activities. Lally, *Cost of equity and the MRP*, July 2012, p. 14.

<sup>286</sup> The table presents broker reports from August 2012 to February 2013.

The lower bound of the broker WACC estimates have decreased by 38 basis points since the draft decision. This is due to lower WACCs in more recent broker reports, in part reflecting lower risk free rate assumptions. The upper bound was calculated from a report dated 24 October 2012 and excluding this report the upper bound would reduce by 50 basis points to 9.52%. Excluding the next highest broker report reduces the upper bound further to 9.30%. This is also the upper bound when referencing broker reports from November 2012 to February 2013.

The AER considers that broker WACC estimates do not demonstrate that the overall rate of return, which is based on analysis of individual parameters, is not commensurate with prevailing conditions in the market for funds and the risk involved in providing reference services. For the reasons outlined in the specific parameter sections above, the AER is satisfied this is the case. The broker WACC technique is subject to known limitations and inherent imprecision.

**Table B.9 Broker WACC estimates (per cent)<sup>a,b</sup>**

Measure	Minimum	Maximum
Broker headline post-tax WACC	6.20	8.60
Calculated nominal vanilla WACC	7.38	10.02

Source: AER calculations.

a Issuers of broker reports considered: Credit Suisse, Goldman Sachs, JP Morgan, Deutsche Bank.

b Regulated energy networks evaluated in broker reports: APA, DUET Group, Envestra Limited, Spark Infrastructure Group, SP AusNet.

## Recent decisions by other regulators and the AER

The AER reviews a range of returns it approved for other gas and electricity service providers and also the rates of return in recent decisions by other Australian regulators. This provides a test of the reasonableness of the rate of return in this determination. Recent rate of return values set by the AER since the WACC review are lower than those previously provided. However, recent decisions by other regulators suggest that these values—and 7.39 per cent in this case—are reasonable.

The rate of return range applied by the AER in recent decisions for other gas and electricity service providers is 7.31 to 10.43 per cent.<sup>287</sup> This range covers gas and electricity decisions made by the AER since the WACC review was completed in 2009 and includes the Roma to Brisbane final decision.

The AER has also considered recent decisions by other regulators giving a rate of return range from 5.78 to 8.65 per cent (converted to nominal vanilla form).<sup>288</sup> The decisions reviewed are shown in

<sup>287</sup> AER, *Final Decision: APTPPL access arrangement*, August 2012; AER, *Final Decision: Aurora distribution determination*, April 2012; AER, *Final Decision: Powerlink Transmission determination 2012–13 to 2016–17*, April 2012; AER *Final Decision: Victorian distribution determination*, October 2010, p. 519; AER, *Final Decision: Queensland electricity distribution network service providers: Distribution determination 2010–11 to 2014–15*, May 2010, p. 267; AER, *Final decision: N. T. Gas access arrangement proposal for the Amadeus gas pipeline 2011–2016*, July 2011, p. 80; Australian Competition Tribunal, *Envestra: Annexure A (Part 2), Amended Access Arrangement*, February 2012, p. 13; Australian Competition Tribunal, *APT Allgas: Annexure A, Amended Access Arrangement*, February 2012, p. 17; Australian Competition Tribunal, *NSW Gas Networks: Annexure A, Amended Access Arrangement*, June 2011, p. 18; Australian Competition Tribunal, *ActewAGL Gas Distribution Network: Order*, September 2010, p. 2.

<sup>288</sup> Essential Service Commission of South Australia (ESCOSA), *Final Advice: Advice on a Regulatory Rate of Return for SA Water*, February 2012, p. 50; Queensland Competition Authority, *Final Report: SunWater Irrigation Price Review: 2012–17, Volume 1*, May 2011, p. 503; Essential Service Commission of Victoria (ESCV), *V/line access arrangement final decision*, June 2012, p. 208. Independent Pricing and Regulatory Tribunal (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*,

Table B.10 and have been taken from those made in the last 12 months. The WACC of 7.39 per cent applied for Envestra falls within this range. This suggests that the rate of return for this determination is reasonable and in line with regulatory decisions that have been made in the past year.

**Table B.10 Recent decisions by Australian regulators (per cent)**

Regulator	Decision	Date	Nominal vanilla WACC
ESCOSA	Advice on a regulatory rate of return for SA Water – Final decision	Feb 2012	8.07
QCA	SunWater – Final decision	May 2012	7.49
ESCV	V/Line Access Arrangement – Final Decision	Jun 2012	8.65
IPART	Sydney Catchment Authority – Final decision	Jun 2012	8.16–8.38 <sup>a</sup>
IPART	Sydney Water Corporation – Final decision	Jun 2012	8.16–8.38 <sup>a</sup>
ERA	Western Power – Final decision	Sep 2012	5.78
QCA	Seqwater - Draft decision	Dec 2012	5.86

Notes: For comparative purposes, all WACCs have been converted to the nominal vanilla WACC formulation consistent with the AER's reported figure for Envestra (which excludes debt raising costs).  
 (a) Ranges are presented for recent decisions by the IPART where the point estimate (real post-tax or real pre-tax) was not sufficiently disaggregated to allow precise conversion to the correct formulation (nominal vanilla WACC).

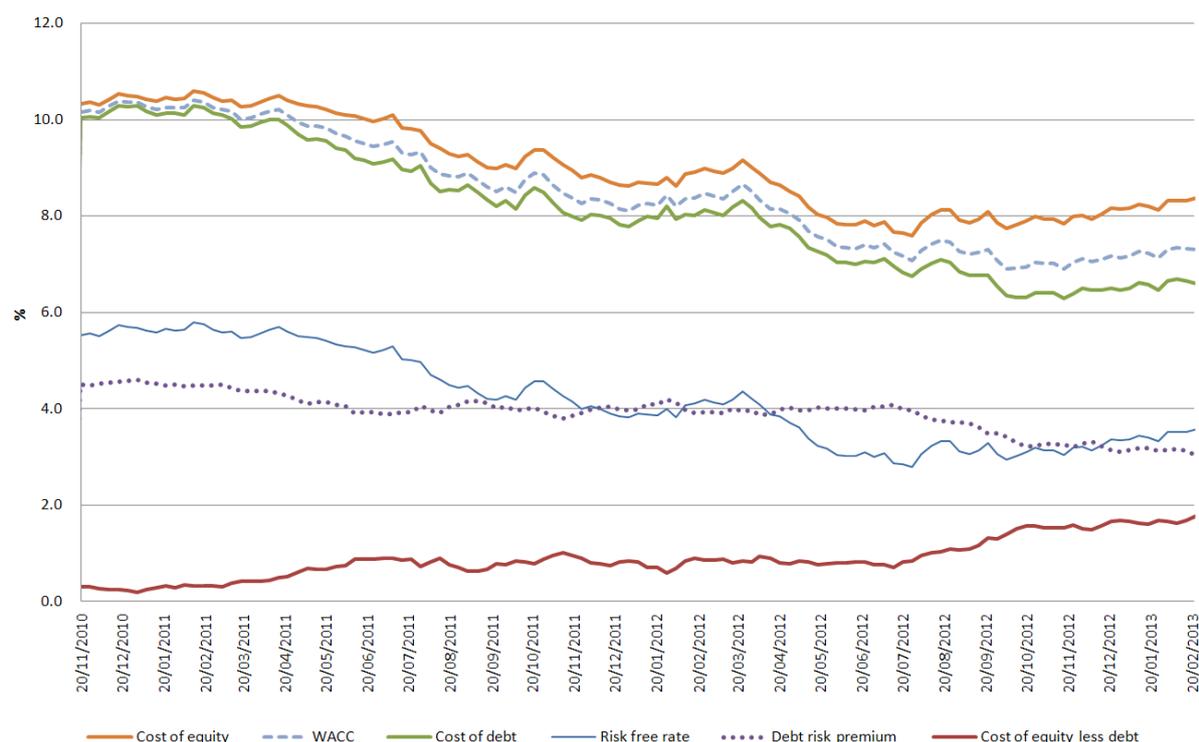
The AER does not agree with SFG's position that there is circularity in considering the AER's recent decisions against its current decision.<sup>289</sup> Rather recent decisions are more likely to reflect similar market conditions.

### Cost of equity versus the cost of debt

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 cost of equity should exceed the cost of debt. This relationship has held in all of the AER's WACC decisions to date, as shown in Figure B.6.

June 2012, pp. 198, 204; IPART, *Water – Final report: Review of prices for Sydney Catchment Authority: From 1 July 2012 to 30 June 2016*, June 2012, pp. 90, 118, 123; ERA, *Final decision on proposed revisions to the access arrangement for the Western Power network* submitted by Western Power, 5 September 2012, p. 241. QCA, *Draft Report: Seqwater Irrigation Price Review: 2013–17, Volume 1*, December 2011, p. 259.  
<sup>289</sup> SFG, *The required return on equity: Response to AER Victorian gas draft decisions*, 7 November 2012, p. 51.

**Figure B.6 Comparison between the AER's estimates of the costs of debt and equity**



Source: AER analysis.

Note: The cost of debt in the above chart is estimated using the paired bonds approach adopted in this decision. The specific bonds reflect those used in the AER's recent final decision for Powerlink. This chart would not change materially if the paired bonds sample were updated. The start date for the chart reflects the availability of bond data required to implement this approach. Further details of the AER's approach to estimating the cost of debt are in section 5.3.5 of the attachment.

The relationship between debt and equity returns, however, is more complex than any simple heuristic implies. For example, as discussed previously in this appendix (section B.5.3), the size and strength of any relationship between debt and equity premiums is inconclusive. Notably, no academic consensus exists on the extent of any such relationship.

Comparisons between the relative costs of debt and equity, therefore, should be considered with caution. In particular, to the extent that debt and equity returns are compared as an overall reasonableness check, it is important that comparisons between the costs of debt and equity are made on a consistent basis. In the context of debt and equity returns, two primary factors are relevant:

- promised versus expected returns
- pre-tax versus post-tax returns.

This section also discusses recent market evidence of observed debt issuances, and compares these to the allowed regulatory returns on debt and equity.

***Promised versus expected returns***

The return on equity estimated by the AER is an expected return, while the return on debt is a promised return. 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, support this view.<sup>290</sup>

If conclusions are to be drawn from the relative spread between debt and equity premiums, however, any comparisons must be made on a consistent basis. McKenzie and Partington make this point in their recent report.<sup>291</sup> In particular, McKenzie and Partington demonstrated that when comparing promised and expected returns, it is not unreasonable for the promised return on debt to exceed the expected return on equity.<sup>292</sup>

The importance of comparing debt and equity premiums on a consistent basis is that any adjustments will widen the spread between the two premiums. That is, 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. This provides the AER with some comfort that the current spread between its allowed returns on debt and equity are reasonable.

### ***Pre-tax returns versus post-tax returns***

The AER estimates the cost of debt as a pre-company tax measure. Conversely, the AER estimates the cost of equity on a post-company tax basis. This reflects the relevant financing costs faced by the benchmark firm.<sup>293</sup>

Consistent with the comparison of promised and expected returns, the AER considers that any conclusions based on the spread between allowed regulatory debt and equity premiums should be made on a consistent tax basis. The aforementioned McKenzie and Partington report also supports the need to compare estimates on a consistent basis.<sup>294</sup>

Similar to the impact of adjusting promised and expected returns, any adjustments to compare pre-tax and post-tax returns will widen the spread between the debt and equity premiums. That is, pre-tax returns will always exceed corresponding post-tax returns. This provides the AER with some comfort that the current spread between its allowed returns on debt and equity are reasonable.

### ***Market evidence***

Notwithstanding the complexity of the relationship between debt and equity returns, the AER has compared the allowed regulatory returns on debt and equity against recent market evidence. This includes two debt issuances from the APA Group. The AER, however, considers that the available market evidence is of limited use for regulatory purposes. That is, they are useful as a broad cross-check only.

Specifically, in September 2012, the APA Group completed the issuance of \$515 million of subordinated notes in Australia. This hybrid capital was issued at 450 basis points above the BBSW. Shortly thereafter, in November 2012, the APA Group raised £350 million of debt financing in the UK. The APA Group swapped this debt into AUD at an average fixed rate of 7.36 per cent. Envestra

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<sup>290</sup> Specifically, as SFG stated, using expected debt yields implies that debt investors in the benchmark firm should expect a return that is materially lower than the allowed return on debt (because there is a material chance the revenue the regulator has allowed will be insufficient to pay what has been promised to those debt holders). However, a determination that resulted in there being a material chance that the revenue the regulator has allowed will be insufficient to pay what has been promised to those debt holders would likely be inconsistent with the NGL. SFG, *The required return on equity: Response to AER Victorian gas draft decisions*, 7 November 2012, p. 38.

<sup>291</sup> McKenzie and Partington, *Relationship between cost of debt and cost of equity*, March 2013, p. 21.

<sup>292</sup> McKenzie and Partington, *Relationship between cost of debt and cost of equity*, March 2013, p. 8.

<sup>293</sup> For clarity, both the cost of debt and equity are estimated on a pre-personal tax basis.

<sup>294</sup> McKenzie and Partington, *Relationship between cost of debt and cost of equity*, March 2013, p. 21.

highlighted both these issuances as evidence that recent allowed regulatory returns on equity were too low.<sup>295</sup>

The AER considers that while market evidence can provide an important cross check, the financing costs of a single entity should not be considered to be reflective of either the market as a whole, or the benchmark regulatory firm. This is consistent with the Tribunal's direction regarding the estimation of the debt risk premium.<sup>296</sup> It is also notable that the term of the UK debt financing was 12 years and carried a BBB credit rating. This compares to the benchmark term of 10 years and a BBB+ rating.

Additionally, the yields on hybrid forms of capital depend heavily on the characteristics of the product itself. While the corresponding yields should fall between the issuers respective costs of debt and equity, hybrid financing can be structured to have greater debt, or greater equity features. Further complicating where along the spectrum of debt and equity yields hybrid financing should be is the correlation with the market itself. As put by Macquarie Research, hybrids perform like debt when equity markets perform well, and perform like equity when equity markets perform poorly.<sup>297</sup> In this context, it may not be unreasonable that the yield on the hybrid debt is near the return on equity estimated by the AER (as proposed by Envestra).<sup>298</sup> The preceding discussion on the cost of debt versus equity is also relevant, inasmuch as comparisons are made between promised debt yields and expected equity returns.

Finally, comparisons between the cost of debt and equity implicitly assume that both debt and equity markets are efficiently priced. In practice, this may not be the case. For example, to the extent that relative spread between the allowed regulatory returns on debt and equity is considered to be too narrow, this may reflect an overly conservative estimate of the regulatory cost of debt.

## SFG's lower bound

SFG proposes a lower bound estimate on the return that investors might reasonably expect from an investment in comparable firms. It concludes that a lower bound on the return including imputation credits is 10.5 per cent.<sup>299</sup> This consists of a dividend yield of 7 per cent, a growth rate of 2.5 per cent and an allowance for the value of imputation credits.<sup>300</sup>

This lower bound estimate appears to be a simple dividend growth model (DGM). The AER considers DGMs in more detail in section B.6 and concludes that they are highly sensitive to the assumptions made and inputs used. Indeed Lally considers it appropriate to develop a range of estimates from DGM models as a result of these uncertainties.<sup>301</sup>

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<sup>295</sup> Envestra, *Letter to Andrew Reeves*, 21 August 2012.

<sup>296</sup> Australian Competition Tribunal, *Application by United Energy Distribution Pty Limited [2012] ACompT 1*, 6 January 2012, paragraph 429; Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 3*, 16 January 2012.

<sup>297</sup> Macquarie Investment Management, *Hybrid securities: Lured by yield, Investment perspectives*, Issue 6.

<sup>298</sup> Specifically, the return on equity in this decision is 7.94 per cent. In comparison, the corresponding yields on the APA Group bond and hybrid capital are approximately 7.64 and 7.36 per cent respectively. (The yield of 7.64 per cent on the hybrid issuance is likely to be a slight underestimate, as the margin of 450 basis points was quoted relative to the BBSW). For clarity, the APA Group yields have been estimated using the same risk free rate used to estimate the return on equity for this final decision.

<sup>299</sup> SFG, *The required return on equity*, November 2012, p. 18.

<sup>300</sup> SFG, *The required return on equity*, November 2012, p. 18.

<sup>301</sup> Lally, *The dividend growth model*, March 2013, p. 4.

Moreover, the AER has considered industry specific DGMs in the past and raised concerns about the appropriateness of the dividend yields from these businesses for DGMs.<sup>302</sup> SFG has not dealt with these concerns.

In conclusion, the AER does not regard SFG's lower bound as a reasonable lower bound estimate.

## B.8 Regulatory practice

Envestra and its consultants have noted the approaches adopted by IPART, and US and UK regulators. It suggested its revised proposal is supported by the recent IPART and UK regulators' decisions.<sup>303</sup>

In addition to IPART's approach (and UK and US regulatory practice), the AER has also considered recent regulatory decisions made by other Australian regulators. There is no consensus among regulators on how to estimate the cost of equity. The AER acknowledges that the cost of equity adopted in this decision is lower than rates adopted by some overseas regulators, and by IPART, in recent decisions. However, the AER also points out that, to its knowledge, no Australian or overseas regulator adopts the specific approach proposed by Envestra. In contrast, some Australian regulators adopt very similar approaches to the AER. And furthermore, the cost of equity adopted by some other Australian regulators in recent decisions is lower than that determined by the AER in this decision.

### B.8.1 ERA and QCA

Envestra's consultants have compared the AER's approach with those of IPART, the UK regulators and the US regulators. However, none of them noted the approach adopted by the Economic Regulation Authority of Western Australia (ERA) or the Queensland Competition Authority (QCA). The ERA's and QCA's approaches to the cost of equity are very similar to the AER's approach.

The ERA released its most recent final decision in September 2012 for Western Power. In this decision, ERA used a 5 year term for both the risk free rate and the MRP. It estimated a nominal risk free rate of 2.52 per cent based on Western Power's nominated averaging period, a MRP of 6 per cent and an equity beta of 0.65. This produced a nominal after tax cost of equity of 6.42 per cent and a nominal vanilla WACC of 5.78 per cent. ERA applied no uplift to this final WACC figure.<sup>304</sup>

The ERA adopts a 5 year term for both the risk free rate and the MRP, as it is consistent with the present value principle. In estimating the MRP, the ERA considers an MRP of 6 per cent is appropriate based on its own historical analysis of the MRP using 5 year as the term of the nominal risk free rate, survey evidence and current Australian regulatory practice. Further the ERA was not convinced that Western Power and its consultant (CEG) had provided convincing arguments to support an upwards adjustment to the estimate of the MRP when the observed yields on CGS are at historically low levels.<sup>305</sup> The AER considers ERA's recent decisions are relevant as they are made under a similar regulatory framework and both estimate an allowed rate of return for regulated energy businesses. The AER notes it uses a 10 year term for both the risk free rate and the MRP instead of a

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<sup>302</sup> AER, *Final decision: Envestra Ltd access arrangement proposal for the SA gas network 2011–2016*, June 2011, p. 158.

<sup>303</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.9.

<sup>304</sup> ERA, *Final decision on proposed revision to the access arrangement for the Western Power Network*, 5 September 2012, pp.241-242.

<sup>305</sup> ERA, *Final decision on proposed revision to the access arrangement for the Western Power Network*, 5 September 2012, pp.305-381.

5 year term as adopted by the ERA. By adopting a 10 year term, and a 0.8 equity beta, the AER's approach estimates a higher cost of equity than the ERA.<sup>306</sup>

The QCA released its most recent draft decision in December 2012 for Seqwater. The QCA estimated a nominal risk free rate of 2.55 per cent based on the annualised four year CGS averaged over 20 trading days. An MRP of 6 per cent was mandated in the Ministerial Direction for the 2012-13 GSC review. Combining these with an equity beta of 0.55, it produced a nominal after tax cost of equity of 5.85 per cent and a nominal vanilla WACC of 5.86 per cent. The QCA did not make any adjustments to this final WACC figure.<sup>307</sup> Similarly, the AER notes by adopting a 10 year term for the risk free rate, and a 0.8 equity beta, it produces a higher cost of equity estimate than the QCA. While QCA's decision is for a water network, the water network and energy network industries are of comparable risk.<sup>308</sup>

## B.8.2 IPART

In attachment section 5.3.2, the AER noted that there would be further discussion of IPART's approach to determining the rate of return in appendix B. This section contains that discussion.

The AER concludes that recent IPART decisions indicate other regulators have made allowance for the possibility of an inverse relationship between the risk free rate and the MRP. However, it is not exactly clear how IPART do so. Furthermore, IPART's approach is considerably different to the AER's approach, and likewise to that proposed by Envestra in its revised access arrangement proposal.

IPART's approach to setting the WACC has many similarities with the AER's, but it also has some important differences. Importantly, IPART's approach is to determine a WACC range that it considers appropriate before determining a point estimate from within that range.<sup>309</sup> This is very different from the AER's approach which is to determine a WACC point estimate from the underlying parameters.

In the Sydney Desalination Plant final decision for example, IPART estimated a WACC range (real pre-tax) of 5.1 per cent to 6.9 per cent.<sup>310</sup> The boundaries of this range was based on IPART's point estimate or range for each parameter. In setting the limits of this range IPART adopted a prevailing risk free rate point estimate (not a long term historical average) and a 5.5–6.5 per cent MRP range. IPART then selected a point estimate of 6.7 per cent.<sup>311</sup> IPART's point estimate was therefore 80 basis points above the mid-point of the calculated WACC range. IPART state:

We determined the values for the parameters of the WACC based on market conditions over the 20 days to 28 October 2011. The risk free rate and debt margin have been affected by market volatility and the prolonged weak market following the credit crisis of 2008. The change in these factors has potentially created a disparity between these parameters (for which we use short term average data) and the market risk premium (for which we use long term average data).

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<sup>306</sup> This is because the longer term bonds carry more risk than the shorter term bonds and therefore require higher returns. The AER notes the 5 year CGS yield is normally lower than the 10 year CGS yield.

<sup>307</sup> QCA, *Draft report Seqwater irrigation price review 2013-17*, Volume 1, December 2012, p.259.

<sup>308</sup> AER, *Final decision: APT Petroleum Pipeline Pty Ltd, Access arrangement final decision, Roma to Brisbane Pipeline 2012–13 to 2016–17*, August 2012, p. 87.

<sup>309</sup> See for example, IPART, *Final Report - Review of water prices for Sydney Desalination Plant Pty Limited - From 1 July 2012*, December 2011, p. 80.

<sup>310</sup> IPART, *Final Report - Review of water prices for Sydney Desalination Plant Pty Limited - From 1 July 2012*, December 2011, p. 80.

<sup>311</sup> IPART, *Final Report - Review of water prices for Sydney Desalination Plant Pty Limited - From 1 July 2012*, December 2011, p. 80.

However, the effects of this disparity are mitigated by our decision to use a point estimate of 6.7%, which is 80 basis points higher than the midpoint of our estimated WACC range. In doing so we had strong regard to the calculated WACC using longer term averages for market parameters.<sup>312</sup>

CEG highlights this statement in its discussions of IPART's approach.<sup>313</sup> SFG highlight similar statements from the same decision as well as IPART's review of electricity retail and generation prices.<sup>314</sup> Both CEG and SFG acknowledge that IPART do not rely on a long term historical average risk free rate explicitly.<sup>315</sup> Indeed, SFG note the following statement by IPART:

Rather than adjusting the risk free rate or revaluing the MRP, we make a judgment when selecting the WACC point estimate from within the range.<sup>316</sup>

This differs from what Envestra proposed in its revised proposal.<sup>317</sup> Envestra did not propose a WACC range be determined with a point estimate selected by the AER. Envestra proposed a long term average risk free rate be used determinatively.<sup>318</sup>

On the issue of the risk free rate and MRP relationship, IPART states:

We note that there may be an inconsistency between using short term data for the risk free rate and using long term data for the MRP. As stakeholders have noted, there may be an inversely proportional relationship between the MRP and the risk free rate.<sup>319</sup>

Firstly, the AER notes that it estimates a 10 year forward looking MRP and combines that with a 10 year forward looking risk free rate.<sup>320</sup> Conceptually, there is no inconsistency with that approach.

Secondly, IPART, as an independent regulator, is entitled to form its own view on the strength of evidence of an inverse relationship between the risk free rate and MRP. The AER, as an independent regulator, is also entitled to form its view on the matter. McKenzie and Partington's review of the theoretical and empirical evidence on this matter is, to the AER's knowledge, more comprehensive than that contained in any of the consultant reports submitted by the Victorian gas businesses, or considered as part of IPART's recent decisions. Therefore, the AER's view in this regard has been strongly influenced by the work of McKenzie and Partington.

Shortly prior to the release of this decision IPART released its draft decision for Hunter Water.<sup>321</sup> In this decision IPART estimated a real post-tax WACC of 4.2 per cent.<sup>322</sup> Converted into a nominal vanilla WACC form this is approximately 6.9 per cent. The approach IPART used in its decision appears to be broadly consistent with that discussed above from the Sydney Desalination Plant and Electricity Retail Prices decisions. However, given the timing of the decision, the AER has not considered the approach in detail.

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<sup>312</sup> IPART, *Final Report - Review of water prices for Sydney Desalination Plant Pty Limited - From 1 July 2012*, December 2011, p. 80.

<sup>313</sup> CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 55.

<sup>314</sup> SFG, *The required return on equity*, November 2012, pp. 52-63.

<sup>315</sup> SFG, *The required return on equity*, November 2012, p. 60; CEG, *Response to the AER Vic gas draft decisions*, November 2012, p. 55.

<sup>316</sup> SFG, *The required return on equity*, November 2012, p. 55.

<sup>317</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 7.

<sup>318</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 7.

<sup>319</sup> IPART, *Final Report - Changes in regulated electricity retail prices from 1 July 2012*, June 2012, p. 52

<sup>320</sup> See attachment 5.1.2 for more detail.

<sup>321</sup> IPART, *Draft Report - Hunter Water Corporation: Prices of water, sewerage stormwater drainage and other services from 1 July 2013 to 30 June 2017*, March 2013.

<sup>322</sup> IPART, *Draft Report - Hunter Water Corporation: Prices of water, sewerage stormwater drainage and other services from 1 July 2013 to 30 June 2017*, March 2013, p. 182.

### B.8.3 UK

There are a number of regulators in the United Kingdom, including Ofgem, Ofwat and Ofcom. The Competition Commission is the review body to which parties can appeal decisions by these regulators. Each regulator takes a slightly different approach to estimating the cost of capital, although there are many similarities between them.

There are a number of important differences between the approach the AER uses to set the cost of equity and the approaches used by regulators in the UK. These include:

- the term of the cost of equity
- the risk free rate proxy
- the use of cross-checks.

Regulators in the UK tend to apply a term that is equal to the life of the assets.<sup>323</sup> This has important implications for the way the cost of equity is determined. CEPA states:

First, when thinking about whether the approach is commensurate with prevailing conditions in the market depends in part on the time horizon being considered. AER has tended to focus on a ten year time horizon while UK regulation has tended to focus on the life of the asset under consideration. This latter approach is a significantly longer time horizon and consequently can lead to different views about how markets operate – for example, the degree of mean reversion.<sup>324</sup>

The AER and Envestra agree that a 10 year term is appropriate for this decision.<sup>325</sup> Therefore, the relevance of the long term approaches used in the UK must be considered in this context.

Regulators in the UK often have as a starting position that the cost of equity is relatively stable through time.<sup>326</sup> The work of Wright, Mason and Miles informs this position.<sup>327</sup> These authors found that the cost of equity is relatively stable through time when compared to the MRP.<sup>328</sup> Elsewhere in this appendix the AER considers the stability of the cost of equity in more detail.<sup>329</sup> There is not sufficient evidence to support the conclusion that the cost of equity is relatively more stable over time than the MRP.<sup>330</sup> Indeed, Lally concluded that in an Australian context, the evidence suggests that the MRP is relatively more stable than the cost of equity.<sup>331</sup>

Regulators in the UK also tend to use a different proxy for the risk free rate compared to the AER. Generally, the yield on index-linked gilts (ILG) is used.<sup>332</sup> This is a security similar to the Indexed CGS in Australia. In the UK, there is a legislative requirement for pension funds to hold ILGs.<sup>333</sup> Coupled with the quantitative easing that has been employed by the central bank in the UK, regulators have been concerned that the market for ILGs is distorted.<sup>334</sup> The AER does not hold similar concerns that

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<sup>323</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p. 3.

<sup>324</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p. 3.

<sup>325</sup> See section B.3.5 for further discussion.

<sup>326</sup> See, for example, Ofgem, *Decision on strategy for the next transmission and gas distribution price controls - RIIO-T1 and GD1 Financial Issues*, March 2011, p. 33;

<sup>327</sup> S. Wright, R. Mason and D. Miles, *A study into certain aspects of the cost of capital for regulated utilities in the U.K.*, Smithers and Co, 13 February 2003.

<sup>328</sup> S. Wright, R. Mason and D. Miles, *A study into certain aspects of the cost of capital for regulated utilities in the U.K.*, Smithers and Co, 13 February 2003, p. 4.

<sup>329</sup> See section B.3.3 above.

<sup>330</sup> See section B.3.3 above.

<sup>331</sup> Lally, *Review of the AER's methodology*, March 2013, p. 13.

<sup>332</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p. 21.

<sup>333</sup> Competition Commission, *Bristol Water plc Price Limits Determination - Final Determination - Appendixes*, 2010, p. N15.

<sup>334</sup> See for example A. Gregory, *The expected cost of equity and the expected risk premium in the UK*, Review of Behavioral Finance, 3: 1-26, (2011), p. 4.

the nominal CGS market is distorted.<sup>335</sup> Accordingly, the AER continues to apply a prevailing risk free rate. This position is based on advice from the RBA and the Treasury and AOFM.<sup>336</sup>

Further, until recently, estimates of the risk free rate in UK regulatory decisions have approximately followed the prevailing yield downwards.<sup>337</sup> Only in recent years has there been a large departure from the observed yield.

Finally, regulators in the UK also use cross-checks in a significant way. Generally, the CAPM is applied and cross-checked against other cost of equity models, RAB multiples and regulatory precedent.<sup>338</sup> Envestra has highlighted UK regulators' use of a relatively stable cost of equity, but it has not highlighted UK regulators' use of RAB multiples.<sup>339</sup> This is despite both elements being integral to UK regulators' overall approach to the cost of equity. In contrast, Envestra has criticised the AER's use of RAB multiples.<sup>340</sup> RAB multiples suggest the AER's approach in this decision is reasonable.<sup>341</sup>

With these differences in mind, the cost on equity allowed by Ofgem in its most recent decision was higher than the AER allows in this decision. In the RIIO-GD1 Final decision Ofgem allowed a real post-tax cost of equity of 6.7 per cent.<sup>342</sup> In this final decision the AER applies a real post-tax cost of equity of 5.69 per cent. The AER acknowledges that the cost of equity allowed in this decision is lower than recent decisions in the UK. However, these differences must be considered in the context of the differing approaches. In that context, the AER considers the cost of equity in this decision is appropriate when compared with returns allowed in the UK.

As Ofgem is the equivalent energy regulator in the UK this section considers its approach in more detail.

## Ofgem

Britain's energy regulator, Ofgem, employs a different approach to setting the rate of return compared to the AER. This difference of approach makes it difficult to make a meaningful comparison of Ofgem's approach with the AER's. This section considers Ofgem's approach and highlights some of the significant differences in the approach to setting the rate of return.

Ofgem has refined the building blocks approach to setting price controls under a regime labelled 'RIIO (Revenue = Incentives + Innovation + Outputs)'.<sup>343</sup> Under the RIIO framework, Ofgem sets its price controls for a period of eight years. In December 2012 it issued the final decision documents for the first application of its RIIO price controls.<sup>344</sup>

In its price controls, Ofgem sets the allowed return (cost of capital) on a real vanilla basis, while the RAB is calculated on historic cost basis and uplifted for inflation. Ofgem considers its allowed return in

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<sup>335</sup> See attachment 5.3.2 for further discussion.

<sup>336</sup> See attachment 5.3.2 for further discussion.

<sup>337</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p. 22.

<sup>338</sup> CEPA, *Australian energy regulator: Victorian gas networks market evidence paper*, March 2013, p. 21

<sup>339</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.5.

<sup>340</sup> Envestra, *Revised Access Arrangement Information, Attachment 9.11 Response to Draft Decision – Rate of return*, 9 November 2012, section 5.6.

<sup>341</sup> See section B.7 for further discussion.

<sup>342</sup> This becomes 6.2 per cent if an equity beta of 0.8 is applied. Ofgem, *RIIO-GD1: Final Proposals - finance and uncertainty supporting document*, December 2012, p. 22.

<sup>343</sup> Ofgem, *RIIO: a new way to regulate energy networks - final decision*, October 2010.

<sup>344</sup> Ofgem, *RIIO-GD1: Final Proposals - overview*, December 2012 and Ofgem, *RIIO-T1: Final Proposals for National Grid Electricity Transmission and National Grid Gas*, December 2012.

the context of the entire price control package. It sets the allowed return such that it reflects Ofgem's assessment of the businesses' cash flow risk. This means that, where there is material difference in cash flow risk, Ofgem may set different allowed rates of return for companies within the same sector.<sup>345</sup> Ofgem's cash flow risk assessment consists of qualitative and quantitative comparisons of:

- the businesses to each other;
- the sectors (electricity transmission, electricity distribution, gas transmission, gas distribution) to each other; and
- the price control that is being set to the one that is currently in place.

Ofgem then tests the overall reasonableness of its allowed return in the context of the entire price control package by assessing financeability and the return on regulatory equity (RoRE).<sup>346</sup> Below are some of the significant areas of difference in Ofgem's approach to the components of the WACC and the cross-checks that it applies:

- Gearing—Ofgem sets the gearing component of the WACC on a notional basis. The decision is based on Ofgem's cash flow assessment, and cross-checked against financeability assessment, RoRE assessment, regulatory precedent, and the businesses' actual gearing.<sup>347</sup>
- Cost of debt—Ofgem sets the cost of debt component of the WACC by taking the 10 year trailing average of two indices, and deflating them by expected inflation.<sup>348</sup>
- Cost of equity—In the initial (strategy) stage of its price control review, Ofgem seeks consultants' advice in order to derive a range for the cost of equity.<sup>349</sup> Ofgem uses the consultants' advice informatively, rather than deterministically, and also carries out its own analysis.<sup>350</sup> The range reflects long term estimates of the risk free rate and MRP. The specific cost of equity and, therefore, the beta are chosen from within the range following Ofgem's cash flow risk assessment. Ofgem may set different cost of equity allowances for businesses within and across sectors, if it identifies material cash flow risk differences.
- Cash flow risk assessment—Ofgem's cash flow risk assessment covers a number of factors and places particular emphasis on the ratio of allowed capex to (opening) RAB when attempting to differentiate between the relative risk of businesses within and across sectors. It considers that this ratio best captures systematic risk, as represented in the CAPM framework by the asset beta.<sup>351</sup>
- RoRE assessment—Ofgem's RoRE assessment provides an estimate of the rewards and penalties that are built into the price control package by assessing the impact of variations in expenditure from the allowance, as well as additional cash flows (or penalties) associated with outperforming (underperforming) the regulator's benchmark on various incentives and output measures.

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<sup>345</sup> Ofgem, *RIIO-GD1: Final Proposals - finance and uncertainty supporting document*, December 2012, p. 13.

<sup>346</sup> Ofgem, *RIIO: a new way to regulate energy networks - final decision*, October 2010, p. 40.

<sup>347</sup> Ofgem, *RIIO-GD1: Final Proposals - finance and uncertainty supporting document*, December 2012, p. 21.

<sup>348</sup> That is, Ofgem sets an overall cost of debt allowance, without specifying the risk-free rate and DRP.

<sup>349</sup> Ofgem, *Decision on strategy for the next transmission and gas distribution price controls - RIIO-T1 and GD1 Financial issues*, 31 March 2011, p. 31-35.

<sup>350</sup> For example, Ofgem's consultants for the strategy phase for RIIO-T1 and GD1 advised on a range of 3.8-6.3%, while Ofgem decided to go with a range of 6.0-7.2%.

<sup>351</sup> Ofgem, *RIIO-GD1: Final Proposals - finance and uncertainty supporting document*, December 2012, p. 14.

- Financeability assessment—Ofgem has a duty to ensure that its decisions allow efficient companies to raise finance (the 'financeability duty').<sup>352</sup> This is at the core of Ofgem's approach to financeability testing. The assessment, however, also provides a cross-check to ensure that the allowed return is appropriate for the cash flow risks that the businesses would be exposed to during the price control period.

## B.8.4 US

The AER acknowledges its current cost of equity estimate is lower than the recent return on equity allowed in US regulatory decisions, as noted in the CEG submission.<sup>353</sup> However, the AER notes the US regulatory decisions are not directly comparable to those of the AER's for the reasons discussed below.

FERC and the other US regulators use DGM as the US has better available proxy data, while Australian regulators do not have access to such information. This view is supported by NERA in a submission to ESCOSA in 2005.<sup>354</sup>

The problem with using DCF analysis to estimate the cost of equity is that it requires one to know, or estimate, investors' forward looking expectations of future dividends (and dividend growth). In most capital markets there are relatively few independent forecasts of future earnings and, consequently, there is a high level of statistical uncertainty surrounding DCF projections of the cost of equity for a particular company. However, in the US there is a very deep market for analysts' projections of company's future earnings. (In this regard it is illustrative to note that between 2001 and 2004 70 US regulated electricity distribution companies had their return on equity set.)

Given this, US regulators have available to them extra information on investors' forward-looking expectations than Australian regulators do not. Unsurprisingly, US regulators take advantage of this when estimating the cost of equity.

This issue is similarly noted by NERA in its equity beta report in 2007:<sup>355</sup>

Given the maturity and size of the US financial sector, decisions on the required rate of return on equity are based on the testimony of financial experts that typically present market evidence on the appropriate sample of companies as well as the suitability of accepted approaches for determining the required return on equity from available market data.

...

In the US, there is sufficient information on investors' expected future earnings to apply 'discounted cash flow' (DCF) analysis to estimate the expected rate of return on equity directly.

The AER further notes the US regulators sometimes deliberately set a constant cost of equity as the stability in rate of return allowance is their goal. For example, NECCG:<sup>356</sup>

Stability in rate allowance is sometimes an explicit goal of the regulator. The California Public Utilities Commission notes: we consistently consider the current estimate and anomalous behaviour of interest rates when making a final decision on authorizing a fair ROE. In PG&E's 1997 cost of capital proceeding we stated "Our consistent practice has been to moderate changes in ROE relative to changes in interest rates in order to increase the stability of ROE over time." That consistent practice has also resulted in the practice of only adjusting rate of return by one half to two thirds of the change in the benchmark interest rate.

In addition, it noted:<sup>357</sup>

<sup>352</sup> Ofgem, *RIO-GD1: Final Proposals - finance and uncertainty supporting document*, December 2012, p. 27.

<sup>353</sup> CEG, *Update to March 2012 Report*, November 2012, pp. 27-29.

<sup>354</sup> National Economic Research Associates, *Review of ESCOSA's decision on ETSA utilities equity beta*, April 2005, p. 23.

<sup>355</sup> NERA Economic Consulting, *Equity beta for gas distribution*, 29 October 2007, pp.9-12.

<sup>356</sup> Network Economics Consulting Group, *International comparison of WACC decisions*, September 2003, pp.30-31

[In the US] Pipeline operators are required to file a schedule of rates with the Federal Energy Regulatory Commission (ERC). Under section 717c of the Natural Gas Act the onus is placed on the companies to demonstrate that the rates are fair and reasonable, a process that does not necessitate use of the WACC model.

Accordingly, a key component of the approach by US regulators is the use of DGM estimates to calculate the overall cost of equity. The AER's analysis of the use of DGM estimates to calculate the overall cost of equity is set out in section B.6.2. This is in addition to the different in data quality between the US and Australia noted in this section.

A second key component of the approach of US regulators appears to be an explicit "goal" to set a stable regulatory cost of equity. The AER considers a stable regulatory cost of equity should be adopted if the weight of theoretical and empirical evidence supports the position that the cost of equity is stable. However, the weight of evidence does not support this position. The AER's analysis on the evidence on a stable cost of equity is set out in section B.3.2.

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<sup>357</sup> Network Economics Consulting Group, *International comparison of WACC decisions*, September 2003, pp.25-26

## C Capex

See confidential appendix.

## D Depreciation approach to capital base roll forward at the next access arrangement review

This appendix includes the AER's detailed analysis of the choice of depreciation approach. This includes:

- the incentive properties of the forecast and actual depreciation approaches
- consistency between regimes
- the dynamics of the gas sector.

### D.1 Incentive properties of the forecast and actual depreciation approaches

This section addresses:

- the incentive power of the depreciation approaches
- stylised examples
- the symmetry of the incentive effect
- the interaction with the ongoing capex incentive.

#### D.1.1 Incentive power of the depreciation approaches

The difference between the two approaches is the relative strength of the additional incentive to over-forecast or to underspend capex.<sup>358</sup> This arises during the capital base roll forward at the end of the access arrangement period. To roll forward the capital base, service providers:

- start with the opening capital base for the access arrangement period
- add actual net capex for each year to the capital base
- remove forecast or actual depreciation for each year from the capital base
- determine the closing capital base at the end of the access arrangement period.

Regardless of the depreciation approach, the capital base is always updated to reflect actual (conforming) capex. Therefore, when applying different depreciation approaches in the roll forward process, the closing capital base value will only vary due to differences in the depreciation removed from the capital base.

Under a forecast depreciation approach, a service provider's capital base reduces to reflect the depreciation forecast set at the beginning of the access arrangement period.<sup>359</sup> However, under an actual depreciation approach, the service provider's capital base reduces to reflect the depreciation amount linked to each year's actual capex. Where actual capex differs from forecast, actual

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<sup>358</sup> The AER sets out the differences between these approaches in its draft decision: AER, *Draft decision: Envestra access arrangement proposal for 1 January 2013 – 31 December 2017*, September 2012, pp. 26–27.

<sup>359</sup> Adjusted for actual CPI.

depreciation will be different to the depreciation forecast. Therefore, the two approaches result in different closing capital bases at the end of the access arrangement period.

For example, if an underspend occurs, use of forecast depreciation will nonetheless reduce the capital base by the amount that was forecast at the beginning of the access arrangement period. In turn, this means a lower closing capital base than that forecast at the beginning of the access arrangement period. Using an actual depreciation approach results in a different outcome. It would reduce the capital base by an amount that reflects only the actual (underspent) capex. In turn, it would result in a higher closing capital base than under the forecast depreciation approach. The two approaches operate in this fashion, regardless of whether the underspend is due to efficiency gains, inaccurate forecasting, efficient or inefficient deferrals.

Accordingly, in the event of an underspend, the actual depreciation approach will result in a higher capital base relative to the forecast depreciation approach. Also, a higher capital base results in higher revenue going forward. Therefore, in the event of an underspend, an actual depreciation approach will result in higher revenue in the next access arrangement period. This can be problematic. Service providers have the ability to derive these higher revenues from both efficient and inefficient capex reductions. Specifically, it means that the actual depreciation approach provides a greater incentive to implement inefficient underspends than the forecast depreciation approach. This is because, in the event of an inefficient underspend, service providers receive an additional financial benefit under the actual depreciation approach but not under the forecast depreciation approach. Therefore, all things being equal, the actual depreciation approach is less consistent with the revenue and pricing principle that a service provider be provided with effective incentives in order to promote economic efficiency.

The AER notes the AEMC recently engaged Economic Insights to investigate the different incentive properties of the two depreciation approaches. Economic Insights outlined these incentive properties, and stated:

Using actual capex and actual depreciation in the RAB [capital base] roll-forward produces a medium incentive power for capex. NSPs now not only keep the benefit of capex underspends within the regulatory period [access arrangement period] but have an additional benefit in future regulatory periods because the opening RAB is reduced by the lower actual depreciation rather than the higher forecast depreciation (and conversely for capex overspends). However, this method produces a considerably higher incentive power for short life assets than for longer life assets encouraging NSPs to reduce spending (or not increase spending) on the shortest life assets in preference to longer life assets. And it encourages NSPs to over-inflate their capex forecasts and exploit their information advantage because the size of the benefit they obtain is directly influenced by the gap between forecast and subsequent actual capex.<sup>360</sup>

## D.1.2 Stylised examples

To illustrate the operation of these approaches, this section includes stylised examples where a service provider has:

- underspent capex relative to approved amount
- overspent capex relative to approved amount.

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<sup>360</sup> Economic Insights, *The use of actual or forecast depreciation in energy network regulation: Report prepared for Australian Energy Market Commission*, May 2012, p. 39.

## Stylised example of an underspend

Suppose a service provider started with an opening capital base of \$1000 million at 1 January 2013. Further, suppose the AER allowed \$100 million of forecast capex per year for the next 5 years. Using the PTRM, suppose the AER also allows a depreciation forecast of \$10 million per year for the next 5 years.<sup>361</sup> This means that over 2013–17, the service provider recovers \$50 million of total depreciation regardless of the choice of actual or forecast depreciation approach to be employed in the capital base roll forward at the next access arrangement review. Also, suppose the AER allows \$80 million of return on capital per year over 2013–17. The service provider will also recover this amount as revenue regardless of the choice of depreciation approach.

Then at the next access arrangement review in 2017, the AER has to forecast revenue for 2018–22. To do that, it has to determine an opening capital base at 1 January 2018. Suppose that the service provider actually spent \$50 million capex per year instead of the allowance of \$100 million per year (underspend). Therefore, the service provider should only have been allowed a lower depreciation forecast of, for example, \$5 million per year instead of \$10 million at the last review. Table D.1 and table d.2 show stylised capital base roll forwards under the two depreciation approaches, and table d.3 provides a summary highlighting the resulting differences in the closing capital base.

**Table D.1 Stylised capital base roll forward under forecast depreciation approach (underspend) (\$m, nominal)**

	2013	2014	2015	2016	2017	Total
Opening capital base	1000	1040	1080	1120	1160	–
Plus actual net capex	50	50	50	50	50	250
Minus forecast depreciation	10	10	10	10	10	50
Closing capital base	1040	1080	1120	1160	1200	–

**Table D.2 Stylised capital base roll forward under actual depreciation approach (underspend) (\$m, nominal)**

	2013	2014	2015	2016	2017	Total
Opening capital base	1000	1045	1090	1135	1180	–
Plus actual net capex	50	50	50	50	50	250
Minus actual depreciation	5	5	5	5	5	25

<sup>361</sup> This is a simplified estimate of depreciation. Normally, the AER would determine an opening capital base with multiple asset classes and would depreciate according to their approved remaining economic lives. Then, the AER adds capex forecasts to these asset classes each year which would depreciate according to their approved standard economic lives.

Closing capital base	1045	1090	1135	1180	1225	–
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**Table D.3 Summary of differences in the event of an underspend (\$m, nominal)**

	Forecast depreciation approach	Actual depreciation approach
Depreciation recovered through tariffs from 2013–17	\$50	\$50
Return on capital recovered through tariffs from 2013–17	\$400	\$400
Total capex added to capital base	\$250	\$250
Total depreciation removed from capital base	\$50	\$25
<b>Closing capital base (future value to recover through depreciation and value that determines return on capital)</b>	<b>\$1200</b>	<b>\$1225</b>

Despite recovering the same depreciation and return on capital in revenues during 2013–17, the service provider has a higher closing capital base under the actual depreciation approach. This means the service provider will earn higher future depreciation and return on capital for revenue purposes. Therefore, under an actual depreciation approach, a service provider receives an extra financial benefit for over-forecasting or underspending capex.

### Stylised example of an overspend

Assume the same opening capital base and forecasts as in the previous example. However, suppose that the service provider actually spent \$150 million capex per year instead of the allowance of \$100 million per year (overspend). Therefore, the service provider should have been allowed a higher depreciation forecast of, for example, \$15 million per year instead of \$10 million at the last review. Table D.4 and table d.5 show stylised capital base roll forwards under the two depreciation approaches, and table d.6 provides a summary highlighting the resulting differences in the closing capital base.

**Table D.4 Stylised capital base roll forward under forecast depreciation approach (overspend) (\$m, nominal)**

	2013	2014	2015	2016	2017	Total
Opening capital base	1000	1040	1080	1120	1160	–
Plus actual net capex	150	150	150	150	150	750
Minus forecast depreciation	10	10	10	10	10	50

Closing capital base	1140	1280	1420	1560	1700	–
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**Table D.5 Stylised capital base roll forward under actual depreciation approach (overspend) (\$m, nominal)**

	2013	2014	2015	2016	2017	Total
Opening capital base	1000	1045	1090	1135	1180	–
Plus actual net capex	150	150	150	150	150	750
Minus actual depreciation	15	15	15	15	15	75
Closing capital base	1135	1270	1405	1540	1675	–

**Table D.6 Summary of differences in the event of an overspend (\$m, nominal)**

	Forecast depreciation approach	Actual depreciation approach
Depreciation recovered through tariffs from 2013–17	\$50	\$50
Return on capital recovered through tariffs from 2013–17	\$400	\$400
Total capex added to capital base	\$750	\$750
Total depreciation removed from capital base	\$50	\$75
<b>Closing capital base (future value to recover through depreciation and value that determines return on capital)</b>	<b>\$1700</b>	<b>\$1675</b>

Despite recovering the same depreciation and return on capital in revenues during 2013–17, the service provider has a lower closing capital base under the actual depreciation approach. This means the service provider will earn lower future depreciation and return on capital for revenue purposes. Therefore, under an actual depreciation approach, a service provider receives a financial penalty for under-forecasting or overspending capex.

### D.1.3 Symmetry of the incentive effect

The AER agrees with Envestra that the actual depreciation approach is symmetrical in terms of its effect on the overall capex incentive.<sup>362</sup> An actual depreciation approach creates a financial incentive to underspend and a financial disincentive to overspend. However, the forecast depreciation

<sup>362</sup> Envestra, *Access arrangement proposal: 8.1 Response to Draft Decision: capital base*, November 2012, p. 2.

approach also has symmetrical incentive properties. It does not create a financial incentive or disincentive for either underspends or overspends. If Envestra overspends its capex, the forecast depreciation approach will result in a higher capital base than the actual depreciation approach. However, due to the ongoing capex incentive, Envestra retains a financial benefit if it reduces its capex relative to forecast.

### Interaction with the ongoing capex incentive

Envestra is subject to an ongoing capex incentive from the return on capital allowance. Envestra submitted that its preference was for a capex incentive scheme coupled with the forecast depreciation approach. That is, if the AER approved a capex incentive scheme, Envestra would change its preference to a forecast depreciation approach. The AER does not accept Envestra's proposed capex incentive scheme.<sup>363</sup> This is because, under the AER's final decision, Envestra has an ongoing capex incentive, making an additional scheme unnecessary. That is, Envestra will receive a financial benefit if it makes capex efficiency gains. This benefit is unrelated to the choice of depreciation approach.

The rate of return incentive is also linked to the value of the capital base, but operates separate to the depreciation approach. It arises because the return on capital is set based on forecasts of capex to be included in the capital base. As the forecast capital base increases, Envestra receives a higher return on capital allowance. However, if Envestra spends less than its forecast capex, it still recovers the forecast return on capital allowance. This means that Envestra keeps the return on capital associated with the difference between forecast and actual capex. In such circumstances, this is a financial benefit because actual return on capital would be lower than forecast return on capital.

#### D.1.4 Consistency between regimes

While not a primary factor in the AER's decision, consistency of depreciation approach across the sector is nonetheless a relevant factor. The forecast depreciation approach is consistent with the:

- approach applied by all other gas service providers regulated by the AER, including Envestra's Queensland and South Australian networks
- ESC's approach for determining Envestra's opening capital bases
- approach outlined in the AER's *Access Arrangement Guideline*.<sup>364</sup>

The AER's decision on the depreciation approach has important incentive properties which may affect a service provider's investment decisions during an access arrangement period. This in turn would affect future revenue recovery. Were the AER to apply different depreciation approaches, differences in future cash flow certainty may affect service providers' attractiveness to investors compared against other service providers.

#### D.1.5 Dynamics of the gas sector

In its draft decision, the AER stated that gas service providers have greater flexibility to defer expenditure than electricity service providers.<sup>365</sup> In its revised proposal, Envestra submitted that this view is incorrect. Specifically, Envestra stated that because of safety requirements, un-accounted for

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<sup>363</sup> See attachment 8.

<sup>364</sup> AER, *Final access arrangement guideline*, March 2009, pp. 65–66.

<sup>365</sup> See: AER, *Draft decision: Envestra access arrangement proposal for 1 January 2013 – 31 December 2017*, September 2012, p. 26.

gas (UAFG) liabilities and reliability standards, gas service providers have little or less scope than electricity service providers to defer capex.<sup>366</sup>

The AER does not agree with Envestra's conclusions, for the reasons discussed below. The AER has not, however, relied on gas sector dynamics in reaching its final decision on the depreciation approach. Rather, the AER has relied primarily on the analysis above.

### D.1.6 Safety

Both gas and electricity service providers are required to replace assets to ensure safe and reliable network operation. The AER does not agree that only major failures in gas networks pose critical safety risks. Both gas and electricity network assets can fail with implications for safety. Service providers in both industries should manage their capex allowances to prioritise such risks.

Envestra underspent its capex allowance by approximately \$155 million (\$ June 2012), or 30 per cent from 2007–11. The AER therefore considers Envestra has had scope to manage its safety requirements and still defer large capex amounts.

### D.1.7 Un-accounted for gas

The AER accepts that Envestra is liable where un-accounted for gas (UAFG) is above the forecast benchmark, resulting in additional opex requirements. This financial liability arises because Envestra is given a forecast opex allowance. A higher UAFG rate than forecast implies that actual opex would also exceed forecast opex. However, electricity service providers are also liable where their actual opex exceeds forecast opex.

There are no subsequent true-up mechanisms for opex under the regulatory regimes applying to either gas or electricity service providers. Both gas and electricity service providers manage trade-offs between opex and capex as part of the incentive regulatory regime. The AER therefore does not agree with Envestra's view that electricity service providers are not liable where network degradation results in increased opex.

### D.1.8 Reliability of supply

The AER also does not agree with Envestra's comments relating to reliability of supply. Envestra submitted that, because gas is a fuel of choice, incentives for maintaining service quality are identical across gas and electricity networks. The AER notes, however, that electricity must be generated and used simultaneously, with negligible capacity to store excesses on the network. Relatively minor faults in the network may therefore completely disrupt supply.

In contrast, natural gas is commonly stored in gas distribution and transmission pipelines. This gives natural gas pipelines relatively greater flexibility to manage short term minor network failures, easing reliability of supply pressures. The AER therefore considers it likely that gas service providers have greater scope to defer expenditure relating to reliability of supply.

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<sup>366</sup> Envestra, *Access arrangement proposal: 8.1 Response to Draft Decision: capital base*, November 2012, p. 2.