

Access arrangement draft decision

APA GasNet Australia (Operations) Pty Ltd

2013–17

Part 3

Appendices

September 2012

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1. Rate of return

In attachment 4, the AER presented its considerations on why a rate of return of 7.16 per cent (subject to updating) is a preferable alternative that is commensurate with prevailing conditions in the market for funds.[[1]](#footnote-1) It noted this appendix would address some matters including arguments raised by APA GasNet and further technical analysis of the evidence.

* 1. Risk free rate

In attachment 4.3.1, the AER presented why a risk free rate based on 10 year CGS measured as close as practically possible to the commencement of the regulatory period is the most appropriate.

This appendix discusses additional material relevant to the risk free rate:

* the selection of an appropriate averaging period
* contentions raised in the CEG report submitted by APA GasNet
* a long term average as an alternative averaging period
* the term of the risk free rate
* the EnergyAustralia matter
* the Telstra matter
* the expectations theory on the term structure of interest rates.
  + 1. The selection of an appropriate averaging period

The AER agrees with APA GasNet's proposed method for determining the averaging period used to estimate the risk free rate and debt risk premium. APA GasNet proposed the same risk free rate averaging period method be used to estimate the cost of equity and the cost of debt. The method involves three steps:

1. At the time of publishing APA GasNet's proposal the AER will publish an indicative timetable for decisions.

2. The AER will notify APA GasNet, 20 business days in advance of the release of its draft decision on the revisions to the VTS AA, 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, APA GasNet undertakes to advise the AER of its nominated averaging period. The APA GasNet 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 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.[[2]](#footnote-2)

The AER followed the first two steps of APA GasNet’s proposed process.[[3]](#footnote-3)

In section 4.3.2, the AER explains why the averaging period should be estimated over a short period (between 10-40 business days) as close as practically possible to the commencement of the access arrangement period. The three criteria of the third step in APA GasNet's proposed method are consistent with the AER's position in section 4.3.2. Those three criteria are that:

* the averaging period be after the expected date of the draft decision
* end not later than 15 business days before the expected release of the final decision
* be between 10-40 business days in length.

These criteria are also consistent with those that the AER proposed to SP AusNet, Envestra and Multinet.[[4]](#footnote-4)

On 29 August (10 business days after the AER's notification on 15 August) APA GasNet contacted the AER to request a change in its proposed process to instead nominate an averaging period on 3 September.[[5]](#footnote-5) The reason APA GasNet provided was:

APA GasNet consider that knowledge of the results of Bernanke's QE3 speech (expected Friday in US) will be so significant to global financial markets, that it would be unreasonable for the AER to expect us to nominate an averaging period prior to this looming on the horizon.[[6]](#footnote-6)

The AER did not accept APA GasNet's request.[[7]](#footnote-7) The reasons the AER did not accept this request are set out in a letter the AER sent back to APA GasNet.

On 30 August 2012, APA GasNet provided the AER with an averaging period on a confidential basis.[[8]](#footnote-8) The proposed averaging period was consistent with the three criteria in APA GasNet's proposed method. Accordingly, the AER agrees with APA GasNet's proposed averaging period.

However, APA GasNet again raised concerns about the effect the speech by Ben Bernanke might have on the outlook for global financial markets.[[9]](#footnote-9) APA GasNet also proposed a condition:

Considering the material impact the Bernanke speech may have on global financial market prospects, APA GasNet reserves the right to provide a revised averaging period should the outcome of the Bernanke speech indicate that a different averaging period would result in a more appropriate estimate of the risk free rate and the debt risk premium.[[10]](#footnote-10)

The AER accepts the nominated averaging period but does not accept the condition. Leaving open the "right" to revise the averaging period would introduce unbalanced incentives. In order to maximise their profits, service providers have an incentive to seek a rate of return that is as high as possible. If a service provider can select an averaging period by observing market yields, this may introduce the possibility of an upward bias because it could select a period with the highest yield available.[[11]](#footnote-11) A service provider would be unlikely to depart from the process where such departure is not in its financial interests.

It is also important for the AER to hold APA GasNet to the method as proposed. Doing so promotes certainty, consistency and predictability in regulatory decision making.[[12]](#footnote-12) Further, SP AusNet undertook to propose its averaging period on the same day as APA GasNet and it did so.[[13]](#footnote-13) Permitting APA GasNet to depart from the process while SP AusNet adhered to it would be unfair to SP AusNet.

It is therefore preferable for there to be no conditions attached to a proposed averaging period. This allows certainty for both the AER to make a draft decision and APA GasNet to make any necessary financial arrangements. These concerns are also discussed in section 4.3.2.

For this draft decision, the AER has used an indicative 20 business day averaging period ending on 10 August. The indicative risk free rate has been applied for both the cost of equity and the cost of debt. For the final decision the risk free rate for both the cost of debt and the cost of equity will be updated to reflect the averaging period proposed by APA GasNet.

* + 1. CEG contentions

APA GasNet submitted a report it commissioned from CEG that makes a number of contentions about the risk free rate. This appendix addresses these additional matters. CEG's main contentions specific to the operation of the CGS market appear to be[[14]](#footnote-14):

* There is unprecedented demand for CGS
* There is a shortage of supply of CGS in Australia
* The CGS market is out of line with other bond markets in Australia
* CGS yields have been volatile over the last few years

The AER considers each of these issues below. In some cases, the AER largely agrees with CEG's observations, whereas in other cases the AER disagrees. However at the outset it is important to highlight that it is unclear to the AER what conclusion CEG seeks to draw from these observations and contentions. CEG does not argue these contentions make CGS an inappropriate proxy for the risk free rate in Australia.

CEG contention: There is unprecedented demand for CGS

Under this contention there appear to be three main arguments:

* There is a flight to quality
* Demand from non-resident investors is high
* Basel III requirements are placing huge demands on the CGS market

Each of these arguments is discussed below.

There is a 'flight to quality'

The AER accepts that there may have been 'flight to quality' periods since the onset of the Global Financial Crisis (GFC) or at least, behaviour that fits that description.

A definition of a flight to quality may include:

Flight to quality episodes involve a combination of extreme risk- or uncertainty-aversion, weaknesses in the balance sheets of key financial intermediaries, and strategic or speculative behavior, that increases credit spreads on all but the safest and most liquid assets.[[15]](#footnote-15)

There have been periods since the onset of the GFC that could be described as being flight to quality periods. However, the AER does not consider there has been a sustained flight to quality since the onset of the GFC. Glenn Stevens recently made the following comment:

We saw one such one bout of anxiety in the middle of this year when financial markets displayed increasing nervousness about the finances of the Spanish banking system and the Spanish sovereign.

The general increase in risk aversion saw yields on bonds issued by some European sovereigns spike higher; while those for Germany, the US and the UK declined to record lows. This flight to safety also saw market yields on Australian government debt decline to the lowest levels since Federation. Meanwhile many European economies saw a further contraction of economic activity and share markets decline sharply.[[16]](#footnote-16)

A flight to quality would not provide justification to depart from a prevailing estimate of the risk free rate. Demand for highly liquid assets is likely to increase in a flight to quality period.[[17]](#footnote-17) This would, all else the same, push the yield on risk free assets down. These actions reflect changes in investor expectations and perceptions of the relative value of a risk free asset and would not undermine the risk free nature of that asset.[[18]](#footnote-18)

Shortly before RBA Governor Glenn Stevens made the comments above, the RBA provided the following advice:

I therefore remain of the view that CGS yields are the most appropriate measure of a risk-free rate in Australia.[[19]](#footnote-19)

This suggests that the RBA does not consider a flight to quality period makes CGS an inappropriate proxy for the risk free rate.

Demand from non-resident investors is high

The AER accepts that demand for CGS from non-resident investors has increased over the past few years and non-resident investors now hold a large portion of CGS. This conclusion is supported by the RBA in its advice to the AER:

Within the Australian market, one notable source of demand for risk-free assets has come from non-resident investors, whose holdings of CGS now comprise more than three-quarters of outstanding supply.[[20]](#footnote-20)

The number of AAA rated sovereigns globally has fallen over the past few years. The Treasury and AOFM note that 'Australia is currently one of only eight sovereigns to have a AAA rating with a stable outlook from all three major credit rating agencies.'[[21]](#footnote-21)

The AER does not consider an increase in demand for CGS from non-resident investors, and subsequent decline in CGS yields, suggests a short averaging period is inappropriate. In the WACC Review final decision (2009), the AER stated its position that the benchmark firm operates in markets that inevitably include non-resident investors.[[22]](#footnote-22) The Joint Industry Association also considered this to be appropriate in a submission on the topic:

(A)ny empirical domestic data on the risk-free rate, MRP, equity beta and gamma parameters have, or will certainly continue to be influenced by, both domestic and international investors.[[23]](#footnote-23)

While the WACC Review is not binding in a gas context, the AER continues to hold this view. Increased non-resident ownership of CGS is reasonable in today's global markets. The increase in demand for CGS from non-resident investors is likely to reflect the low risk nature of CGS and the deep and liquid AAA-rated market.

Basel III requirements are placing huge demands on the CGS market

The AER accepts that Basel III requirements are imposing requirements on the way an Authorised Deposit-taking Institution (ADI) manages its risk. However, the AER does not accept that Basel III requirements are placing undue strain on the CGS market.

The effect of the Basel III requirements is to require these institutions to hold quantities of liquid assets on their balance sheet large enough to withstand a 30-day stress scenario.[[24]](#footnote-24) CEG argued that these requirements are placing strain on the CGS market.[[25]](#footnote-25)

CEG also referred to a speech by Guy Debelle, Assistant Governor of the Reserve Bank, in which he describes the creation of the Committed Liquidity Facility.[[26]](#footnote-26) CEG submitted that the creation of this facility demonstrates that the CGS market is constrained. CEG stated:

Importantly, Assistant Governor Debelle was clearly expressing the view that the liquidity premium in the CGS market was, in November 2011, at historically very high levels (and seemingly well in excess of 15bp). The implementation of Basel III can be expected to ensure that this remains so in the foreseeable future.[[27]](#footnote-27)

The Committed Liquidity Facility was in fact created for the very purpose of ensuring the CGS market continues to function well:

Specifically, the creation of a committed liquidity facility (CLF) by the Reserve Bank is intended to prevent a situation in which the liquidity in the CGS market is impaired or in which the premia attached to CGS are increased beyond reasonable levels.[[28]](#footnote-28)

The AER accepts this advice that the CGS market will continue to function well in the presence of Basel III requirements. Furthermore, Assistant Governor Debelle's comments suggest that, over the years prior to the onset of the GFC, the liquidity premium may have been unusually low.[[29]](#footnote-29)

Advice from the RBA and Treasury in 2007 suggested the use of nominal CGS as a proxy for the risk free rate was appropriate.[[30]](#footnote-30) The AER does not consider it appropriate to attempt to determine an average, or 'normal', liquidity premium and only accept prevailing CGS when the observed premium is equal to the 'normal' premium.

The AER has confidence those authorities understand the requirements in their jurisdiction and have put in place adequate measures to address potential concerns. The AER concludes that the current demand for CGS does not undermine its usefulness as a proxy for the risk free rate.

CEG contention: There is a shortage of supply of CGS in Australia

The AER does not accept that there is a shortage of supply of CGS in Australia. Consequently, the AER does not accept that there is a 'scarcity premium' included in CGS yields.

As discussed in attachment 4.3.2 above, the Australian Government has a stated position recognising the need to ensure sufficient CGS are available to maintain liquidity in the market.[[31]](#footnote-31)

CEG made the following statement:

This shortage of CGS is well understood to have resulted in a scarcity premium for CGS in recent years - and hance a depressed yield.[[32]](#footnote-32)

CEG provided no empirical evidence of a shortage of supply in the CGS market. CEG also did not discuss how a shortage of supply might be defined or investigated. CEG refer to a quote from Assistant Governor Debelle that 'government paper has been in short supply for many years.' CEG appear to suggest that Assistant Governor Debelle is suggesting that government paper is currently in short supply and that this is commonly understood. For the following reasons, the AER does not consider this to be an accurate suggestion.

Assistant Governor Debelle's comments were made in the context of estimating a historical average liquidity premium that necessarily included the period before the onset of the GFC. CGS were in relatively lower supply at that time.[[33]](#footnote-33) Contrary to CEG's assertion, it does not follow that the supply of CGS is currently low or that prevailing CGS yields are an inappropriate proxy for the risk free rate.

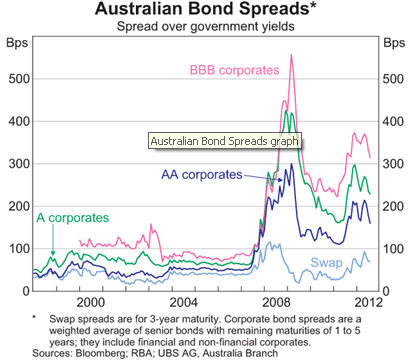
Prior to the GFC the supply of CGS was lower than it is now. In 2007 CGS on issue was approximately $50 billion. As a result of changes to fiscal policy since that time, CGS on issue is now around $235 billion.[[34]](#footnote-34) The AER does not consider that an increase in supply of this magnitude is likely to suggest a shortage of supply. Further, the advice from the Australian Treasury and AOFM provides the AER with confidence that there is currently no shortage of supply in the CGS market.

As there is no shortage of supply in the CGS market, there is unlikely to be a scarcity premium unreasonably pushing the yield on CGS down.

CEG contention: The CGS market is out of line with other bond markets in Australia

The AER accepts that the spread between the yield on CGS and other debt securities has increased since the onset of the GFC. This likely reflects relatively greater demand for CGS from non-resident investors and changes in market participants' assessment of the relative riskiness of the assets. The AER does not accept that this suggests that prevailing CGS are not the most appropriate proxy for the risk free rate.

The figure below shows that the spread between the yield on CGS and other debt securities rose significantly after the onset of the GFC and has not returned to pre-GFC levels.

* + - 1. Australian Bond Spreads
* 

Source: RBA

The figure below shows that the widening of spreads can also be observed in the semi-government bond market.

* + - 1. Semi-government spreads to CGS

Source: Bloomberg, AER

The RBA advice notes that '(t)his widening [of spreads] indeed confirms the market's assessment of the risk-free nature of CGS and reflects a general increase in risk premia on other assets.'[[35]](#footnote-35)

The Treasury and AOFM advice makes the following statement:

Other issuers of Australian dollar-denominated debt may not have benefited from this increased demand to the same extent as the Commonwealth owing to investment mandate limitations and/or perceived or actual lower levels of liquidity in other types of debt.[[36]](#footnote-36)

Possibly adding to the spread for semi-government bonds, the September Quarter RBA Bulletin states:

The increase in spreads during periods of heightened risk aversion may in part reflect the fact that some investors, particularly offshore investors, are not always familiar with the extent of vertical fiscal integration in Australia, whereby state governments receive a large share of their revenue via redistributions of Australian Government tax receipts.[[37]](#footnote-37)

Increased demand from non-resident investors has likely had an influence on the increase in spread. Demand from non-resident investors has been proportionately larger in the CGS market over the past few years. The Treasury and AOFM advice notes that non-resident ownership of CGS increased from around 50 per cent in mid-2009 to around 76 per cent in March 2012.[[38]](#footnote-38) The advice also notes that non-resident ownership of semi-government securities has increased in the same period, albeit by a smaller amount.[[39]](#footnote-39) As discussed above, the AER does not consider that increased demand from non-resident investors makes CGS an inappropriate proxy for the risk free rate.

Relative risk assessments are considered in the context of the MRP; found in attachment 4.3.3.

The AER notes that CEG assert that the yield on semi-government securities have not fallen to the same degree as CGS.[[40]](#footnote-40) The AER accepts this is the case. However, semi-government bonds have fallen considerably since the onset of the GFC.

Over the period from mid-2009 to March 2012 the yield on semi government debt has fallen by approximately 100 basis points on average. Before the onset of the GFC the yield on semi government bonds was higher than at present. This suggests that while semi-government bond yields have not moved in lock-step with CGS yields, the forces acting upon them have been very similar. The figure below demonstrates this clearly.

* + - 1. CGS and semi-government indices over time

Source: Bloomberg, AER

CEG contention: CGS yields have been volatile over the last few years

The AER acknowledges that CGS yields change over time; this does not make CGS yields an inappropriate proxy for the risk free rate. Changes in CGS yields reflect changes in investor expectations and CGS yields therefore remain the best estimate of the forward looking risk free rate at any point in time.[[41]](#footnote-41)

CEG comment that CGS yields have been very volatile over the past few years:

The nominal and CPI indexed yield on 10 year CGS have been very volatile over the last three years. Twice in this period, first in early 2009 and then in late 2011, yields have fallen to levels not previously seen in the last fifty years.[[42]](#footnote-42)

The CEG report does not explore in any detail what the volatility of CGS yields has actually been over the last three years. CEG point to a graph of CGS yields and suggest this demonstrates volatility.[[43]](#footnote-43)

The AER has examined observed changes in average CGS yields since 1981. The observed change in the monthly average yield is displayed in Figure B.4 below. This analysis is not strictly volatility analysis. Nevertheless, it is useful as it provides an indication of how much CGS yields have historically changed from period to period.

* + - 1. Observed change of monthly average nominal CGS yields

Source: RBA, AER analysis

The figure suggests that CGS yields have not been relatively more volatile when compared to observed changes. This observation is likewise reflected in the observed change of daily average yields since 1995 as shown in figure b.5 below.

* + - 1. Observed change of daily average nominal CGS yields

Source: RBA, AER analysis

CEG's concerns appear to rest primarily with the low level of prevailing CGS yields, rather than volatility. This is clear from CEG's statement above. The AER has considered the effect of the low level of prevailing CGS yields in sections 4.3.4 and 4.3.9 when considering the relationship between the MRP and the risk free rate, and the overall rate of return.

* + 1. Long term average as an alternative option

The AER has given consideration to the alternative of using a long term average historical estimate of the risk free rate and concludes that this would not be an acceptable approach, given the requirements of the NGR. This is because, as discussed below, there is limited evidence that the cost of equity is stable through time, a long term average is not consistent with the present value principle and would expose regulatory decisions to bias.

The AER has consistently employed an approach where it estimates a forward looking MRP and risk free rate based on the best evidence available. CEG proposed departure from this consistent approach to the use of a long term historical average for estimating the risk free rate.[[44]](#footnote-44) CEG proposed the use of inflation indexed bonds averaged over the period from July 1993.[[45]](#footnote-45) This approach was proposed by Envestra Victoria and Albury, SP AusNet and Multinet in their respective initial access arrangement proposals, but not by APA GasNet.[[46]](#footnote-46)

CEG stated:

An historical average estimate of the cost of equity can be a reliable proxy for the prevailing cost of equity if the cost of equity is stable through time.[[47]](#footnote-47)

The AER gives consideration to the relationship between the risk free rate and MRP in section 4.3.4 above and considers that there is little evidence that the cost of equity is stable through time.

The reasoning for a departure from the use of prevailing estimates is not clear. Firstly, Envestra Victoria and Albury, SP AusNet, Multinet and CEG appear to argue that there are problems in the CGS market. These concerns are addressed in section B.1.2 above. Secondly, they appear to suggest that using prevailing estimates of CGS yields is inconsistent with using historical estimates of the MRP. This is a mischaracterisation of the AER's approach as discussed in section 4.3.4.

The AER has a number of concerns with using a long term average approach. Importantly, a long term average is not consistent with the present value principle. Lally found that 'the Present Value principle requires use of the risk free rate at the beginning of the regulatory period.'[[48]](#footnote-48)

As discussed in section 4.3.2, a strict interpretation of the present value principle requires the use of the risk free rate on the first day of the period. However, a pragmatic allowance is made from using this strict interpretation of the present value principle. The allowance is to use a short averaging period as close as practically possible to the beginning of the regulatory period. This reduces the exposure of regulated businesses to unreasonable variation that can be reflected in the yield for a single day.

As Lally points out:

Rates averaged over a much longer historical period would be inconsistent with the present value principle, i.e., they would violate it without offering any incremental pragmatic justification.[[49]](#footnote-49)

Indeed, the AER considers that a long term average would likely introduce problems that are not involved with using a prevailing rate.

A long term average is unlikely to produce an unbiased estimate of the risk free rate. On the face of it, using a long term average may seem a reasonable approach. A difficulty is that the time that is selected for the beginning of the period has a significant influence on the output. The selection of an appropriate averaging period is subjective and therefore subject to manipulation for desired results.

The AER has calculated historical average yields on nominal and indexed CGS using monthly average yields provided by the RBA.[[50]](#footnote-50) These yields show variation as the time period changes, as shown in Table B.1 below. These averages are likely to differ from CEG's as the AER has used monthly average yields as opposed to daily average yields. The difference is not likely to be significant for the purposes of this discussion.

* + - * 1. Historical average yields on nominal and indexed CGS

|  |  |  |
| --- | --- | --- |
|  | Nominal 10 year CGS | Indexed CGS |
| All data |  |  |
| 1969 | 8.72 |  |
| 1986 |  | 3.76 |
| 20 year | 6.25 | 3.35 |
| 10 year | 5.34 | 2.63 |
| 5 year | 5.16 | 2.38 |
| 1 year | 3.92 | 1.60 |

Source: RBA, AER analysis

The declining average yields over the period reflect the lagged impact of the decline in CGS yields over the past 30 years. The figure below demonstrates this lagged impact. When interest rates decline, or increase, over time, a longer historical averaging period produces a greater difference between the observed yield and the historical average. The 20 year average is higher than the 10 year average, for example.

* + - 1. Average nominal CGS yields through time

Source: RBA, AER analysis

CEG proposed the use of inflation indexed CGS from July 1993 plus an estimate of the future inflation rate of 2.50 per cent.[[51]](#footnote-51) CEG suggested that July 1993 is a reasonable time to begin the estimation period because this is approximately when the RBA formally adopted an inflation targeting regime.[[52]](#footnote-52)

The AER has a number of reservations with this reasoning. Firstly, the selection of the starting point for the averaging period is subjective. In this case, for example, there is a question about whether the adoption of inflation targeting was seen as credible by market participants at that point in time. The credibility of the inflation targeting regime is important because if expectations did not immediately match the target band, then the yield on CGS may have been higher than if expectations did match the target band.[[53]](#footnote-53) This suggests that a historical average over this period might not be a reliable proxy for the real risk free rate in combination with an inflation estimate of 2.5 per cent.

Secondly, the quality of the historical data is important and at times uncertain. As CEG note, indexed CGS went through a period of very limited supply in the years prior to the GFC.[[54]](#footnote-54) Indeed, the RBA and Australian Treasury confirmed this in advice to the AER.[[55]](#footnote-55) This suggests that a historical average of indexed CGS is unlikely to provide an accurate reflection of the real risk free rate over the period.

There are likely to be many alternative long term historical periods that could be used to determine a historical average with positives and negatives for all such historical periods. However, each of these alternatives is an inferior alternative compared to prevailing yields on long dated CGS.[[56]](#footnote-56)

The Tribunal recently acknowledged the difficulties in determining an appropriate long term averaging period:

Clearly, the 'right' period for the estimation of capital market parameters that are to be included in calculations of the WACC under the CAPM is one that is likely never to be agreed by parties in a rate of return calculation.[[57]](#footnote-57)

These comments were made in the context of the Tribunal's decision on MRP where long term averages are commonly used. Nevertheless, they capture the AER's concerns about using a long term average for the risk free rate, particularly as a short term average captures market participant's current expectations for the future.

The AER concludes that a long term averaging period is not appropriate and does not result in the best possible estimate in the circumstances. The inherent subjectivity in selecting a period for a long term average increases the likelihood of bias in the estimate of the risk free rate.

* + 1. The term of the risk free rate

The term of the risk free rate

APA GasNet proposed the use of a 10 year term and the AER accepts a 10 year term is appropriate. The AER notes, however, that 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 actual practices by regulated businesses.[[58]](#footnote-58) Finally, a 10 year term ensures consistency in this decision between the risk free rate used for the cost of equity and that used for the cost of debt, including in the calculation of the MRP and DRP. On balance, the use of a 10 year term is appropriate for this decision.

The present value principle is a fundamental element when determining the term of the risk free rate. 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.[[59]](#footnote-59) This suggests the AER should use a 5 year term. Professor Davis has also expressed support for this approach.[[60]](#footnote-60)

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.[[61]](#footnote-61) 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.[[62]](#footnote-62) This formed an important consideration for the estimation of the DRP using a 10 year term.[[63]](#footnote-63) In contrast, the Economic Regulation Authority (ERA) of Western Australia has recently analysed the average maturity of debt issued by regulated businesses and found this to be approximately 5 years.[[64]](#footnote-64)

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.[[65]](#footnote-65) The Tribunal considered consistency with the calculation of the DRP to be most important.[[66]](#footnote-66)

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 APA GasNet's proposal. The AER also notes that a 10 year term is likely to provide a conservative estimate of the risk free rate.

* + 1. The EnergyAustralia matter

CEG’s submission referred to the Tribunal’s decision in Application by EnergyAustralia and Others [2009] ACompT 8 (the EnergyAustralia matter) to support the position that the averaging period does not need to be as close as practically possible to the commencement of the regulatory control period.[[67]](#footnote-67) The AER has considered carefully whether the Tribunal's decision in the EnergyAustralia matter demonstrates that the approach applied in this decision inappropriate.

There is a history of the AER applying Tribunal decisions. There are two such examples in this determination. The AER has applied the Tribunal’s decision on gamma.[[68]](#footnote-68) Also, the AER has followed the Tribunal’s decision on the use of the Bloomberg fair value curve to estimate the DRP.[[69]](#footnote-69)

In the time since the EnergyAustralia matter, the Federal Court has handed down its judgement in ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639 (the ActewAGL matter). Also, the Tribunal handed down its decision in Application by Telstra Corporation Limited ABN 33 051 775 556 [2010] ACompT 1 (the Telstra matter).[[70]](#footnote-70) Further, as the EnergyAustralia matter considered provisions in the transitional chapter 6 of the NER, there are differences in the legislation involved. Therefore, despite its history of applying the Tribunal's decisions, the circumstances surrounding the risk free rate for this determination and the EnergyAustralia matter are somewhat different. Specifically:

* The APA GasNet decision is made under the NGL and NGR. In contrast, the Energy Australia decision was made under the NEL and NER. Further, the Energy Australia decision was made under transitional provisions of the NER. There are differences in the legislation involved in the EnergyAustralia matter and the legislation the AER applies for the APA GasNet decision.
* The legislation in the EnergyAustralia matter included provisions deeming the MRP to be 6 per cent.[[71]](#footnote-71) It is not clear to the AER the extent to which these provisions influenced the Tribunal's decision.[[72]](#footnote-72) To the extent this occurred, the AER considers this interpretation was not appropriate. In the ActewAGL matter, the Federal Court upheld the AER's reasons for rejecting ActewAGL's submission that the risk free rate should be adjusted to take into account variations in the MRP. A key reason of the AER was that adjusting the risk free rate to make up for a higher MRP was an attempt by ActewAGL to circumvent the legislation and would undermine the intended certainty provided under the regulatory regime through the deeming provisions.[[73]](#footnote-73)
* At any rate, the legislation here does not include deeming provisions and instead enables the rate of return, including the MRP where the CAPM is adopted as the well accepted financial model, to reflect prevailing conditions in the market for funds. As discussed in attachment 4, the AER has consistently held a position that each WACC parameter should be estimated based on considerations relevant to that parameter, rather than to deal with issues relating to another parameter. In the Telstra matter, the Tribunal made its position clear that CGS yields during the global financial crisis remained representative of the risk free rate, and the mere fact that the yields were 'low' did not change this conclusion.
* In the EnergyAustralia matter, the Tribunal considered that the NER's drafting results in cost of capital needing to represent the return required by investors at the start of each regulatory year. As mentioned above, the legislation here has no such drafting. Also, the Federal Court recognised that the capital asset pricing model (CAPM) requires the use of the most current information for deriving the cost of capital. According to the Federal Court, in theory, this involves the use of the risk free rate at the beginning of the regulatory control period. For the reasons set out in section 4.3.2, the use of the risk free rate near the beginning of the regulatory control period is also consistent with the building block model required under the NGR. Advice from Associate Professor Lally supports both that the CAPM requires the most current risk free rate and that the building block model requires the use of a risk free rate commensurate with prevailing market conditions at the start of the regulatory control period.
* In the EnergyAustralia matter, the Tribunal’s reasons for finding that the AER acted unreasonably in withholding consent to EnergyAustralia’s proposed averaging period included that the AER did not examine the evidence regarding forward interest rates.[[74]](#footnote-74) However, the Federal Court noted evidence that no Australian regulator has done so. It also very much doubted that the NER required the AER to deploy forward rates to make the averaging period decision.[[75]](#footnote-75)
* Further the EnergyAustralia matter involved a legislative regime where a service provider's proposal has presumptive approval, and the AER cannot unreasonably withhold its approval. In contrast, the rate of return provision in the NGR is a full discretion provision. This means the AER retains the discretion to not approve a service provider's proposal, even where that proposal complies with and is consistent with the relevant legislative requirements and criteria. If the AER considers there is a preferable alternative that also complies with and is consistent with the relevant legislative provisions it may implement it.[[76]](#footnote-76)

As the Federal Court noted, the Tribunal and the Federal Court apply different tests. However, given the differences noted above, the AER does not consider it appropriate to merely apply the Tribunal’s decision in the EnergyAustralia matter as if it were a precedent. Accordingly, in these circumstances, the AER does not consider that it should accept on face value that the Tribunal’s decision demonstrates that the approach applied in this decision is inappropriate. Instead, throughout attachment 4 and this appendix the AER has assessed all of the evidence available on its merits.

For the reasons set out in this decision the AER does not consider the Tribunal's decision in the EnergyAustralia demonstrates that the approach applied in this decision is inappropriate.

In the remainder of this section the AER considers:

* The Tribunal's and the Federal Court's interpretations of the statutory scheme under clause 6.5.2 of the NER.
* The usefulness of forward interest rates in assessing a proposed risk free rate averaging period.
* In section 4.3.2 the AER considers the economic insights that can be gained from the 'present value principle' and how this principle is consistent with both the use of the building block model and the use of the CAPM. In section B.1.6 below the AER considers the Tribunal's considerations in the Telstra matter.

The Tribunal's and the Federal Court's interpretation of the statutory scheme

In withholding its approval to EnergyAustralia's proposed averaging period, the AER stated that the AER's regulatory practice was supported by accepted expert views in the economic and finance literature.[[77]](#footnote-77) In response to the reports referenced by the AER, the Tribunal set out its interpretation of the statutory scheme:

The rate of return, or WACC, is applied to the value of the regulatory asset base of the NSP as at the beginning of a regulatory year to produce the return on capital (in dollar terms) for that regulatory year (cl 6.5.2(a)). (The regulatory asset base is updated each year (cl 6.5.1(e)(2).) Thus the WACC is applied in each of the five regulatory years within the regulatory control period. It follows that the WACC to be applied each year should in principle be the rate of return required by investors at the beginning of that year. This rate of return would naturally be expected to differ from year to year.

That is not, however, the scheme set out in cl 6.5.2. Rather it provides for a single value of the WACC to be calculated and applied to each year's starting regulatory asset base.

…

The risk free rate, whether agreed or specified, is, it seems to be agreed by all parties, that which prevails at some time (the averaging period) prior to the start of the regulatory control period; similarly with the benchmark corporate bond rate. Those inputs might generate a rate of return value reasonably close to that actually required by investors at the start of the regulatory control period, and applied to the first year's starting regulatory base. But with changes in market conditions over the regulatory control period, it is hard to see why the rate of return value would represent the return required by investors at, say, the start of the final year of the regulatory control period.

In the meantime, the risk free rate and corporate bonds rates would almost certainly have varied from their initial values. Consequently, there appears to be no virtue in setting those rates at values that prevailed close to the start of the regulatory control period, or to the publication of a final determination.

It may be accepted that, [the AER's practice] …and the practice of regulators more generally has been to apply a nominal risk free rate averaging period closer to the start of the regulatory period. This practice has been supported by economic experts. The Tribunal observes, however, that this is not a universal practice. In market conditions that are not wildly out of the norm, this may be expected to provide a figure that is fairly close to being an unbiased estimate of the risk free rate consistent with market conditions at the time of the final determination; and may consequently be expected to provide a reasonable estimate of the rate of return on capital that would be required by investors at the time of the final determination.

But as explained above, there is no proper basis for seeking such an estimate. The views of economic experts appear to be based on a model where the regulatory control period is considered to be a single period (of five years), not five consecutive one-year periods. In the scheme set out in the Transitional Rules, the nexus is broken between the period to which the rate of return applies and the period for which that rate of return is estimated. Once that is realised, the basis for withholding agreement to an averaging period proposed by EA falls away. [Emphasis added][[78]](#footnote-78)

As is clear from this quote, the Tribunal considered that the statutory scheme rendered expert economic advice in support of the AER's position irrelevant. The Tribunal's view appears to be that the rate of return set under clause 6.5.2 of the NER needs to be representative of the (10 year) return required by investors at the start of each year of the regulatory control period.[[79]](#footnote-79) Once again, the NGR do not contain any drafting similar to that the Tribunal referred to. Therefore, it appears that the EnergyAustralia decision has limited influence in the present circumstances.

In the ActewAGL matter, the Federal Court was careful to point out that the tests it applied on judicial review are different from the tests applied in the Tribunal's merits review. The Federal Court expressly stated that the Tribunal's view on the merits of the AER's decision were irrelevant in the judicial review.[[80]](#footnote-80) However, in commenting on the statutory scheme, the Federal Court also stated:

The relevant equation is that which determines the return on equity (ke), which paragraph (b) provides must be determined using the Capital Asset Pricing Model (“CAPM”) and certain defined parameters. …

The Capital Asset Pricing Model requires the use of the most current information for deriving the rate of return. This in theory involves the use of the risk-free rate on the day that required returns are to be estimated (in this case, the beginning of the regulatory period). Nevertheless, there are recognised problems with the use of an on-the-day rate which an averaging period is intended to address. In particular, deploying an averaging period will minimise day-to-day volatility in the market.[[81]](#footnote-81) [Emphasis added]

Clearly, this is not an express statement that the Tribunal's interpretation is incorrect. However, it appears that the Tribunal considered clause 6.5.2(a) to require the rate of return to be that required by investors at the beginning of each regulatory year. On the other hand, the Federal Court recognised that the CAPM—proposed by APA GasNet and approved by the AER—requires the rate of return to be that required by investors at the beginning of the regulatory period. It seems difficult to reconcile the two statements. Based on this reason and others,[[82]](#footnote-82) the AER considers that the economic evidence it presented in the EnergyAustalia matter remains relevant. Further, the economic evidence presented in Associate Professor Lally's report to the Federal Court in the ActewAGL matter and recent advice to the AER is also relevant. Those reports are considered in the section 4.3.2.

On this basis, the AER considers that, conceptually, the rate of return set under the CAPM should represent the return required by investors at the beginning of the regulatory control period (over the relevant forward looking period). The AER does not consider that rule 87 of the NGR requires a rate of return (over the specified term) representative of the return required by investors at the start of each year of the regulatory control period.

The use of forward interest rates

In the EnergyAustralia matter, the Tribunal said the AER should use forward interest rates to assess a service provider's proposed averaging period. The Tribunal stated:

Rather than assume that the rate at a closer date would give a better estimate, the AER should have examined the evidence regarding expected future rates. Such evidence of forward interest rates, ie, rates that will apply at some future time for a prospective period, is available from market data. Comparisons could be made between the rates expected to prevail during the averaging period proposed by the NSP and rates expected at later periods. But it follows from the Tribunal's reasoning that it would be insufficient and inappropriate to only compare with rates expected to prevail close to the time of the final determination.[[83]](#footnote-83)

The AER has considered the usefulness of forward interest rates to assess the averaging period's predictability of the risk free rate at a future point in time. In their reports to the Federal Court, Lally and Houston advised that they were not aware of any Australian regulatory decision in which forward rates had been used to guide the selection of an averaging period for the risk free rate.[[84]](#footnote-84)

Lally further advised that there were 'two major difficulties' in using forward interest rates in this way. On the first major difficulty, he advised that the appropriate predictor of a future interest rate is not the forward rate but the forward rate less the term premium.[[85]](#footnote-85) On estimating the term premium, Lally stated:

However, the sizes of the term premiums vary over time and they are not precisely determinable. So, any attempt to estimate the extent to which an interest rate at a given point in time is a biased predictor of a subsequent rate would be fraught with difficulty.

Lally concluded:

…in choosing an interest rate to serve as the best predictor of the rate prevailing at a particular future point in time, the best interest rate will be that which is closest in time to the predicted date.[[86]](#footnote-86)

As is clear from the Tribunal's decision, the Tribunal's view on the usefulness of forward interest rates was based on its view that the relevant rate of return is that required by investors at the start of each year of the regulatory control period rather than the rate required at the start of the regulatory control period. The AER does not agree with this position, as explained above.

The problems associated with using forward interest rates that Lally raised were in the context of predicting the 'spot' interest rate at the start of the regulatory control period—a period only two months after the publication of the AER's final decision. If forward interest rates are an unsuitable predictor of interest rates over such a short time horizon, they would appear to be at least an equally unsuitable predictor of the 'spot' interest rate at more distant points in the future (which is the context in which the Tribunal considered them).

Accordingly, there are both in principle and practical difficulties with using forward interest rates in determining the risk free rate.

In the ActewAGL matter there was some debate between the experts on the use of forward interest rates, in a context that involves a deemed MRP value. That aside, Justice Katzmann concluded:

Whether or not the criticism of the AER's decision is valid, I very much doubt the AER is bound by the statutory scheme to deploy forward rates to make the averaging period decision.[[87]](#footnote-87)

Based on the Federal Court's view, the AER concludes that the use of forward interest rates to assess averaging periods is not a requirement of the NER (let alone the NGR). Based on Lally's advice, the AER also concludes there are sound economic reasons for not using forward interest rates. The AER has not used forward interest rates to assess APA GasNet's proposed averaging period.

For the above reasons, the AER considers that the Tribunal's comments do not demonstrate that an averaging period as close as practically possible to the commencement of the regulatory control period is not appropriate.

* + 1. The Telstra matter

The AER has reviewed the Tribunal decision in Telstra Corporation Limited ABN 33 051 775 556 [2010] ACompT 1, 10 May 2010. The Tribunal's reasons appear to support the approach adopted by the AER in this decision.

Like this decision, the Telstra matter also involved the appropriate estimation of the risk free rate at a time when CGS yields were 'low' compared to historically observed rates. The ACCC adopted a 4.51 per cent risk free rate. Telstra submitted the risk free rate was 6.33 per cent.[[88]](#footnote-88)

Telstra submitted that the global financial crisis had significantly impacted on the yields of CGS resulting in an anomalous or unrepresentative risk free rate value during the relevant averaging period. The Tribunal disagreed. The Tribunal considered:

The dispute turns on whether the data derived over the period chosen by the ACCC is anomalous or unrepresentative.

The risk free rate refers to the return from an asset with no risk of default. There is every reason to assume (and little evidence to doubt) that the yields on commonwealth bonds over this period continued to provide an accurate proxy for a return on assets bearing no risk of default. To the extent that the yields factored the impacts of the global financial crisis, the bond rate continued to provide a representative indicator of the risk-free rate.

It is also not unusual for yields to move from time to time in order to reflect prevailing market conditions and the expectations about the prospect for prices into the future. A downward movement in yields over this period is therefore hardly anomalous, given market conditions.[[89]](#footnote-89)

The Tribunal also stated that Telstra's proposal introduced value judgements. This is similar to the AER's findings, in this Appendix, that a long term average creates the potential for arbitrariness and introduces subjectivity into the estimation of the risk free rate. The Tribunal considered:

… that the approach advanced by Telstra would impose an obligation on the regulator (or the Tribunal) to make value judgments. Those value judgments include whether the period over which the data is taken is in some manner unusual, and whether the data derived is in some way anomalous or unrepresentative of the value that should apply to that parameter. This could involve predicting future rates, although means are available to do that.[[90]](#footnote-90)

It is clear that the Tribunal did not consider that the decrease in CGS yields caused by the effects of the global financial crisis impinged upon CGS yields being an appropriate proxy for the risk free rate.[[91]](#footnote-91)

The Tribunal made its position clear that CGS yields during the global financial crisis remained representative of the risk free rate. The mere fact that the yields were 'low' did not change this conclusion.

The averaging period in the Telstra matter was in March to April 2009 and resulted in a risk free rate of 4.51 per cent. The indicative averaging period adopted by the AER for APA GasNet is in August 2012 and results in a risk free rate of 2.98 per cent. The Tribunal's reasons why CGS yields remained an appropriate proxy for the risk free rate in March to April 2009 continue to apply in August 2012.

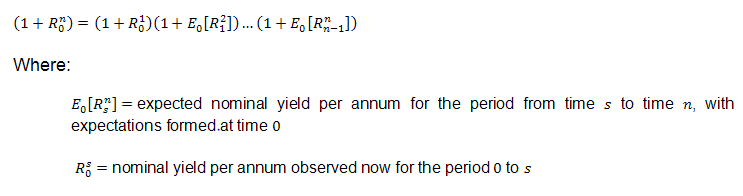
* + 1. The expectations theory on the term structure of interest rates

In sections 4.3.2 and 4.3.4 the AER raised the concept of the term structure of interest rates and the relevance of the ‘expectations theory’ when considering a forward looking estimate of the risk free rate. The expectations theory provides support for the use of prevailing 10 year CGS yields as forward looking estimates. The theory is further explained in this section.

The expectations theory is generally regarded as an important part of the explanation of the term structure of interest rates.[[92]](#footnote-92) The term structure is also commonly referred to as the yield curve.[[93]](#footnote-93) As Brailsford, Heaney and Bilson describe:

The expectations theory suggests that longer maturity yields are a function of the current interest rates and expected future interest rates. For example, under this theory an investor is indifferent between the yield on a six month bill and a series of two consecutive three month investments or, alternatively, three consecutive two-month bill investments. Thus, with this theory, a multi-period rate can be written in terms of a series of one-period rates consisting of the current one-period rate and the series one-period expected future rates.[[94]](#footnote-94)

The expectations theory suggests then that current yields on long-dated bonds incorporate current market yields on short dated bonds and expectations of future market yields on short dated bonds. This relationship is explained in the following mathematical expression[[95]](#footnote-95):



The expectations theory is not the only theory that has been developed to explain the term structure of interest rates. Other theories are the ‘liquidity premium theory’, the ‘segmented markets theory’ and the ‘preferred habitat theory’.

The expectations theory is unlikely to provide a complete explanation of the term structure of interest rates.[[96]](#footnote-96) There are many factors that may influence the term structure. Notwithstanding this, the expectations theory provides an important and relevant understanding of the term structure of interest rates.

* 1. Market risk premium

While APA GasNet advocated the dividend growth model (DGM) and NERA’s regime switching model to estimate the MRP, the AER considered other methods (namely, the SFG method and the VAA implied volatility glide path approach) because they are forms of forward measure, currently do not support an MRP above 6 per cent, and have been previously proposed by the businesses.

In this appendix, the AER considers:

* further analysis on the use of arithmetic and geometric averages to estimate historical excess returns
* survey evidence:
* an assessment of survey evidence against the criteria suggested by the Australian Competition Tribunal in the Envestra matter
* an explanation of ‘triangulation’ and its use in refining survey evidence
* DGM estimates
* consultants' view
* CEG's approaches
* Capital Research's DGM estimates
* NERA's regime switching model
* the report by Professor McKenzie and Associate Professor PartingtonAssociate Professor Lally's advice
* the SFG method (implied volatility, credit spread and dividend yield)
* VAA's implied volatility glide path approach
* further analysis of NERA's regime switching model
* further analysis of the SFG method (implied volatility, credit spreads, dividend yields)
* further analysis on the VAA implied volatility glide path approach
* market commentary
* reasons for the AER's departure from the WACC review

After considering all available approaches to estimate the MRP, the AER applied its judgement and considered an MRP of 6 per cent is the best estimate in the circumstances and commensurate with prevailing conditions in the market for funds.

* + 1. Arithmetic and geometric averages of historical excess returns

Historical excess market returns are highly sensitive to the method of averaging returns over multiple periods. Handley, for example, found the historical excess market return (relative to bonds) for the period 1958-2011 was 3.5 per cent using a geometric average or 6.1 per cent using an arithmetic average.[[97]](#footnote-97)

If returns vary over time, then a geometric average will always be less than an arithmetic average—the greater the volatility in returns is, the greater is the difference between an arithmetic average and a geometric average.[[98]](#footnote-98) With the level of volatility present in historical stock market returns, a difference of around 200 basis points (2 per cent) is common. Box B.1 uses a simple numeric example to explain the difference between an arithmetic average and a geometric average.

Box 1.1 The difference between arithmetic averages and geometric averages

Arithmetic averages are more appropriate when observations are considered independent in a statistical sense. In contrast, geometric averages are more appropriate when observations are related to each other over time—for example, if yearly excess returns are the relevant observations, then returns can be expected to accumulate over time. As long as returns vary over time a geometric average will always be less than an arithmetic average. The greater the volatility in returns is, the greater is the difference between arithmetic and geometric averages.

The difference between arithmetic and geometric averages becomes apparent through a simple example. Suppose an index starts at 100, falls to 80 (a loss of 20 per cent) by the end of year 1 and then increases again to 100 (a gain of 25 per cent) by the end of year 2.

The arithmetic average return simply takes the average of the rates of return over the life of the investment. In this example, the arithmetic average rate of return = (rate of return in year 1+ rate of return in year 2) / total years of investment = (-20% + 25%) /2 = 2.5%.

On the other hand, a geometric average rate of return measures the change between the initial value and final value of the investment over the life of the investment. In this example, the geometric average rate of return = (final value of the investment / initial investment) ^ (1 / total years of investment) - 1 = (100 / 100 ) ^ (1/2) – 1 = 0%.

If 0 per cent annual return is applied to the index for two years, then the index is at 100 by the end of year 2. This zero return is consistent with the outcome that the index has not changed after two years. By contrast over a two year investment horizon, the arithmetic average would overstate the return because the index value has not changed after two years.

However, if the investment horizon is one year, then the arithmetic return would be the correct estimate. To form an expectation about one year in the future based on historical evidence one would look at what is possible over a one year horizon. In this example, we assume either a loss of 20 per cent or a gain of 25 per cent. Assuming these outcomes are of equal possibility, the expected return would be 2.5 per cent. In this case, the geometric average would be an underestimate of the expected forward looking return.

Since the WACC review, the AER has developed a deeper understanding of the averaging of historical excess returns over multiple periods. It considered the arithmetic average of one year historical excess returns overstates the arithmetic average of 10 year historical excess returns. It held this position in the Envestra South Australia decision (and subsequent decisions),[[99]](#footnote-99) so had regard to both arithmetic and geometric averages in considering the appropriate value for the MRP in this decision.

In July 2011, Envestra sought review by the Australian Competition Tribunal of the AER's reliance on geometric averages, among other matters.[[100]](#footnote-100). In that matter, the AER considered the following:

* The arithmetic average of 10 year historical excess returns would likely be an unbiased estimator of a forward looking 10 year return (the appropriate benchmark).
* However, historical excess returns are conventionally estimated as the arithmetic or geometric average of one year returns. The historical excess return evidence available to the AER was based on this one year returns. Accordingly, the AER interpreted the (one year return) data based on the strengths and weaknesses of how closely the data reflected the relevant benchmark (being a 10 year rate, expressed in annual terms).
* Mathematically, if the one year historical excess returns are variable, then the arithmetic average of one year historical excess returns overstates the arithmetic average of 10 year historical excess returns. This overstatement occurs because the process of averaging one year returns does not account for the cumulative effect of returns over a 10 year horizon.
* Also mathematically, if the one year historical excess returns are variable, then the geometric average of one year historical excess returns understates the arithmetic average of 10 year historical excess returns.
* The AER concluded the arithmetic average of the data it considered was an overestimate of the relevant 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.[[101]](#footnote-101)

The Tribunal stated it did not have to decide this matter, but made some comments. It appeared to agree with the AER when noting:

It may be accepted that an arithmetic mean of historical excess returns is an unbiased estimate of expected future one year returns. It is not, however, an unbiased estimate of expected future returns over longer time horizons. A geometric mean of historical annual returns does not provide an unbiased estimate of expected returns over longer time horizons, either.[[102]](#footnote-102)

The AER considered a report prepared by SFG in the Roma to Brisbane Pipeline process. In that report, 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.[[103]](#footnote-103)

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'.[[104]](#footnote-104) The AER does not consider it is appropriate to assume no uncertainty about the mean of the distribution when analysing historical excess returns. Accordingly, it did not find SFG's evidence persuasive.

SFG also submitted the MRP in the CAPM is an expected return, so the arithmetic average (not the geometric average) 'must' be used.[[105]](#footnote-105) The Tribunal previously dismissed this argument when Envestra presented it:

Envestra's submission that, because the CAPM model uses expected returns, only the arithmetic mean may be used cannot be accepted once it is understood that the arithmetic mean of annual historic returns is not an unbiased estimate of expected ten-year returns.[[106]](#footnote-106)

McKenzie and Partington supported the AER's view. After a review of literature on arithmetic and geometric averages, they concluded:

The evidence solidly supports the AER's position that over the ten year regulatory period the unbiased MRP lies somewhere between the arithmetic average and the geometric average of annual returns.[[107]](#footnote-107)

The AER also considered a recent NERA report, which argued against using geometric averages[[108]](#footnote-108). NERA argued the WACC is used to determine regulated revenue using the building block equation; this equation deals with one year returns. Similarly, the AER noted the new advice from Lally that no compounding effect occurs in regulatory situations. Without a compounding effect, the arithmetic mean is preferable to geometric mean if annual returns are independent and drawn from the same distribution.[[109]](#footnote-109)

The AER noted the building block model is a tool to achieve an outcome whereby the present value of expected revenue equals the present value of expected expenditure over the life of the regulated assets. From this perspective, the AER considers an appropriate discount rate requires the evaluation of an expected multi-period cost of equity.[[110]](#footnote-110) Further as shown in attachment 4, the arithmetic averages of historical excess returns range from 4.9 to 6.1 per cent. Accordingly, even if the AER were to only rely on the arithmetic average, this would not change its position on the appropriate MRP value.

Further, in the Envestra matter, the Tribunal also queried whether there is a method to produce an unbiased estimate. It stated it could not form a conclusion on that issue based on the material before it.

The AER sought McKenzie and Partington's advice on whether such a method is available. They analysed alternative proposals in the literature and concluded in their February 2012 MRP report that no single best estimator is indisputably best for long run excess returns. Given current knowledge, McKenzie and Partington recommended the use of both arithmetic averages and geometric averages, tempered by an understanding of their inherent biases.[[111]](#footnote-111) The advice of McKenzie and Partington supported the AER continuance with its current approach.

The AER notes the consultants have different views, which need assessing to determine a reasonable approach. In view of the conflicting evidence, the AER considers it should review both arithmetic and geometric averages when considering the historical estimates of the MRP. It is aware of potential deficiencies with both averages, so does not exclusively rely on one or the other. In attachment 4.3.3, the AER had regard to both arithmetic and geometric averages of historical excess returns tempered by an understanding of the biases associated with these averages.

* + 1. Survey evidence

Addressing the Tribunal’s comments on the use of survey evidence

The AER considers survey results are relevant as they reflect the forward looking MRP applied in practice. The Tribunal reviewed the final decision for Envestra, which included the issue regarding the use of survey evidence to inform the value of MRP.[[112]](#footnote-112) The Tribunal stated while it did not have to decide this matter, it made a few comments:

Surveys must be treated with great caution when being used in this context. Consideration must be given at least to the types of questions asked, the wording of those questions, the sample of respondents, the number of respondents, the number of non-respondents and the timing of the survey. Problems in any of these can lead to the survey results being largely valueless or potentially inaccurate.

When presented with survey evidence that contains a high number of non-respondents as well as a small number of respondents in the desired categories of expertise, it is dangerous for the AER to place any determinative weight on the results.

In its February 2012 report, NERA raised similar questions about the use of survey evidence. About the surveys that the AER cited, NERA stated:

* the surveys typically do not explain how those surveyed were chosen
* a majority of those surveyed did not respond
* it is unclear what incentives were provided to ensure respondents would provide accurate responses
* whether respondents supplied MRP estimates that use continuously compounded or not continuously compounded returns is unclear
* the risk-free rate that respondents use is unclear
* the relevance of some of the surveys is unclear given changes in market conditions since the surveys were conducted.[[113]](#footnote-113)

In light of the Tribunal's comments, the AER engaged McKenzie and Partington to review the Tribunal's criteria on survey evidence. The following sections discuss the main findings of McKenzie and Partington and the AER’s own review. These findings apply to much of the concerns raised by NERA.

Timing of the survey

The AER considers the timing of the surveys is reasonably clear: Across the surveys, it ranged from 2000 to February 2011. Comparison of survey results over different time periods can provide information on how market practitioners’ perception of the MRP change over time. By considering survey results for the past 10 years, the AER notes market participants have not changed their view on the MRP. This consistency in survey responses over time suggests the AER can reasonably rely on the earlier surveys.

Sample of respondents

Financial managers, expert valuers, actuaries and finance academics were the target respondents of surveys. These professionals apply the MRP, so the AER considers the surveys' target populations can make informed judgments about the MRP. McKenzie and Partington supported this view in their February 2012 MRP report.[[114]](#footnote-114) In their August 2012 report, McKenzie and Partington further noted many surveys clearly described the selection of the sample surveyed. These academic papers would be published only with a clear explanation of how the sample was chosen.[[115]](#footnote-115)

Wording of survey questionnaires

The quality of questionnaire wording is important for reducing bias and promoting the accuracy of survey results. The AER agrees with McKenzie and Partington that the adequacy of survey wording can be subjective to judge and often relies on the quality of the authors. [[116]](#footnote-116)

It also agrees that confidence can be enhanced when the work is published in a refereed academic journal, or when the survey is repeated. In the former case, the work has to be peer reviewed. In the latter case, a stable set of questions allows comparison of responses over time. With repeated surveys, the observed changes over time are less susceptible to issues with the wording. Further, any significant problems with wording and respondents' interpretation of questions may be detected and corrected over time.[[117]](#footnote-117) In terms of the surveys cited here, most were published in refereed journals and/or repeated over time.[[118]](#footnote-118) The AER is thus reasonably satisfied with the adequacy of the wording in the survey questionnaires.

Adjustment for imputation credits

The AER noted some surveys implicitly acknowledged imputation credits:

* Truong, Partington and Peat (2008) found 15 per cent of responses adjusted for the value of imputation credits. Of the remaining 85 per cent of responses, the main reasons given for not adjusting for imputation credits were:
* it was too difficult
* it would have a very small impact
* it was unnecessary because the market already adjusts stock prices for the value of imputation credits, which are thus already reflected in the cost of capital estimate.
* In Asher (2001) survey, 27 of 49 respondents indicated they adjusted their MRP estimates for imputation credits.

The AER also notes other surveys suggested respondents do not typically allow for imputation credits. Even for the surveys that discussed imputation credits, the extent of adjustments made to the MRP estimate was unclear. McKenzie and Partington acknowledged this uncertainty and noted any adjustment for imputation would likely be within the margin of measurement error. They thus recommended the AER take the survey evidence at face value, but tempered by the uncertainty of whether an imputation credit adjustment is needed.[[119]](#footnote-119) The AER accounted for this uncertainty when interpreting survey evidence.

Survey response rate and non-response bias

The AER considers a sufficient level of response rate is important for survey evidence. But what constitutes a sufficiently large sample is subjective. McKenzie and Partington suggested a sample size of more than 30 is sufficiently large statistically so a representative sample of 30 respondents is expected to be adequate.[[120]](#footnote-120) Most surveys considered in this decision received around 30 responses.

The AER recognises low response rates are a common problem with the survey evidence. However, while the number of responses in a survey is important, the main concern is whether respondents are representative of the target population. That is, for some reason, non respondents may systematically favour a different MRP from that of the respondents of the survey. McKenzie and Partington supported this view.[[121]](#footnote-121)

A direct assessment of representativeness is difficult because the responses of the non-respondents are unknown. McKenzie and Partington noted Graham and Harvey (2010) concluded the response rate is not a significant concern for representativeness, for the following reasons:

* The response rate was within the range documented in many other survey studies.
* Graham and Harvey (2001) conducted a standard test for non-response biases and found no evidence of bias.
* Brav, Graham, Harvey and Michaely (2005) conducted a captured sample survey at a national conference in addition to an Internet survey. The captured survey responses (to which over two-thirds participated) were qualitatively identical to those for the Internet survey (to which 8 per cent responded)
* Brav, Graham, Harvey and Michaely (2005) contrasted survey responses to archival data from Compustat and found archival evidence was consistent with the responses from the survey sample.
* Campello, Graham, and Harvey(2010) showed the December 2008 response sample was fairly representative of the firms included in the commonly used Compustat database.

The AER recognises the surveys considered in this decision do not specifically address the non-response bias. However, Graham and Harvey's findings are likely to apply to the other survey evidence, so the AER is reasonably satisfied low response rates or a potential non response bias is not reason to exclude the survey evidence from consideration.

Triangulation

McKenzie and Partington placed weight on the survey evidence because triangulation across surveys enhanced their confidence in the results. The idea behind triangulation is that a specific survey may be subject to a type of bias, even if that bias is not evident. However, this problem would be much less likely to be consistent across surveys with diverse methods and different target populations.

McKenzie and Partington illustrated triangulation in survey evidence considered by the AER. They found the Australian surveys conducted using different methods and different target populations at different times supported a MRP estimate of 6 per cent:

...consider an illustration of triangulation in action. The KPMG survey looks at the market risk premiums used in expert reports. This might be criticised on the basis that the same expert might have produced many reports and thus that one expert’s views are overweighted. If that expert’s view is divergent from other experts, then the result will be a biased estimate of the MRP for the expert sample. The effect is analogous to non-response bias in a traditional questionnaire survey. Bishop (2009) addresses this problem by surveying experts’ reports and collecting the MRP by expert, so each expert’s opinion is equally weighted. Bishop also uses a different, although probably overlapping, sample of reports to KPMG. Both studies give a MRP of 6%, thus confidence is enhanced that the MRP used by experts is 6%.[[122]](#footnote-122)

The triangulation of survey results is a relevant consideration. By examining a wide range of survey evidence, which uses different methods and targets different respondents, it improves the reliability of survey results.

Conclusion on survey evidence

Survey evidence reflects the forward looking MRP when applied in practice. It is subject to limitations, such as the uncertainty on imputation credit adjustment. However, based on its own review and the advice from McKenzie and Partington, the AER considers survey based estimates of the MRP are relevant to inform the forward looking MRP. In this decision, it considered a range of survey evidence conducted in different time periods and targeted at different respondents. The evidence supported a forward looking MRP of 6 per cent as the best estimate in the current circumstances.

* + 1. DGM estimates

DGM analysis can provide information on the expected MRP. It examines the forecast future distributions of businesses and derives the cost of equity that makes these distributions consistent with the market valuation of the equity of those businesses. However, the AER considers the DGM based estimates of the return on equity and inferred estimates of the MRP are highly sensitive to the assumptions made. If all assumptions are not sound, estimated results from DGM analysis may be inaccurate.[[123]](#footnote-123) McKenzie and Partington supported this view in their December 2011 MRP report:Clearly valuation model estimates are sensitive to the assumed growth rate and a major challenge with valuation models is determining the long run expected growth rate. There is no consensus on this rate and all sorts of assumptions are used: the growth rate in GDP; the inflation rate; the interest rate; and so on. A potential error in forming long run growth estimates is to forget that this growth in part comes about because of injections of new equity capital by shareholders. Without allowing for this injection of capital, growth rates will be overstated and in the Gordon model this leads to an overestimate of the MRP.[[124]](#footnote-124)

In the WACC review and its recent decisions, the AER considered the following:

* The implied MRP produced by DGM estimates is sensitive to both the model specification and the exact point in time of estimation.
* No input assumptions are reliable. Generally, the expected market growth rate in dividends per share (a key input) is proxied with analysts' short term forecasts of market wide earnings per share growth, or long term expectations of GDP growth (or both). Associate Professor Lally advised such proxies are likely to produce an upward bias in the MRP estimates.[[125]](#footnote-125)
* Regulators had previously been wary to lower the MRP when DGM estimates were below 6 per cent.[[126]](#footnote-126) The AER is similarly wary to increase the MRP (based on DGM estimates) even though the DGM estimates can produce estimates above 6 per cent.
* At the WACC review, academics (Officer and Bishop, and CEG) and industry representatives (ENA) considered DGM estimates should be used as a 'cross check' on the reasonableness of other methods to estimate the MRP, rather than as the primary method.[[127]](#footnote-127)
* Although DGM is extensively used by the US economic regulators in estimating the return on equity[[128]](#footnote-128), it is not well accepted for use in the Australian context.[[129]](#footnote-129)

The AER considered submissions advocating DGM inferred MRP estimates. CEG, Capital Research, NERA and Lally all recommended the DGM for estimating a forwarding looking MRP. The DGM estimates derived by CEG, Capital Research and NERA supported an MRP estimate above 6 per cent. But, while DGM based analysis can provide information on the expected MRP, the AER considers the limitations discussed below limit the emphasis that should be attached to that analysis.

DGM estimates and its assumptions

BHP, McKenzie and Partington, and Lally supported the view that DGM estimates are highly sensitive to the assumptions made.[[130]](#footnote-130) Further, different consultants produce widely different DGM based MRP estimates over a short period. Table B.2 illustrates the consultants' current estimates, which range from 6.18 per cent to 9.56 per cent.

* + - * 1. Recent DGM based MRP estimates produced by consultants

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Dividend yield | Dividend per share growth | RFR | MRP estimate |
| CEG (March 2012) | 5.68% | 6.60% | 3.77% | 8.52% |
| Capital Research (Feb 2012) | 4.70% | 7.00% | 5.08% | 6.62% |
| Capital Research (Feb 2012) | 5.23% | 7.00% | 5.08% | 7.15% |
| Capital Research (Feb 2012) | 5.71% | 7.00% | 5.08% | 7.63% |
| Capital Research (Mar 2012) | 6.29% | 7.00% | 3.73% | 9.56% |
| NERA (Feb 2012) | Bloomberg and IBES forecasts | 5.65% | 3.96% | 7.72–7.75% |
| NERA (Feb 2012) | Bloomberg and IBES forecasts | 5.65% | 5.50% | 6.18–6.21% |
| NERA (March 2012) | Bloomberg and IBES forecasts | 5.65% | 3.99% | 7.69–7.72% |

Sources: CEG, Capital Research, NERA.

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' forecast, and a theta value of between 0 and 0.5.[[131]](#footnote-131) Capital Research's analysis demonstrated the sensitivity of the DGM analysis to its assumptions. Capital Research 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.[[132]](#footnote-132) Further, in the March 2012 report, 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.[[133]](#footnote-133)

NERA’s DGM estimates also illustrated this problem. NERA estimated an MRP of 5.06 per cent in February 2011 based on the DGM analysis. Using the same dividend yield and growth assumptions, the MRP estimate was at 8.01 per cent in December 2011—a difference of 295 basis points.[[134]](#footnote-134) This difference was a result of the lower risk free rate. Table B.3 illustrates the sensitivity of NERA's DGM analysis to different risk free rates.

* + - * 1. NERA MRP estimates with different risk free rates

|  |  |  |  |
| --- | --- | --- | --- |
| Risk free rate | Dividend yield | Dividend per share growth | MRP estimate |
| 5.47% | Bloomberg consensus forecasts | 5.65% | 5.06% |
| 3.99% | Bloomberg consensus forecasts | 5.65% | 7.69% |
| 3.67% | Bloomberg consensus forecasts | 5.65% | 8.01% |

Source: NERA, Prevailing conditions and the market risk premium, March 2012, pp. 39 and 50.

Similarly, tables 1.4-1.6 below illustrate how sensitive CEG's DGM based estimate is to different assumptions. The MRP estimates move ‘one-for-one’ with the changes in assumptions.

* + - * 1. MRP estimates with different growth assumptions

|  |  |  |  |
| --- | --- | --- | --- |
| DPS growth | Div yield | RFR | MRP estimate |
| 6.60% | 5.68% | 3.77% | 8.52% |
| 6.00% | 5.68% | 3.77% | 7.91% |
| 3.50% | 5.68% | 3.77% | 5.41% |
| 0.00% | 5.68% | 3.77% | 1.91% |

Source: AER analysis

* + - * 1. MRP estimates with different dividend yield assumptions

|  |  |  |  |
| --- | --- | --- | --- |
| DPS growth | Div yield | RFR | MRP estimate |
| 6.60% | 5.68% | 3.77% | 8.52% |
| 6.60% | 5.00% | 3.77% | 7.83% |
| 6.60% | 3.00% | 3.77% | 5.83% |
| 6.60% | 1.00% | 3.77% | 3.83% |

Source: AER analysis

* + - * 1. MRP estimates with different prevailing risk free rates

|  |  |  |  |
| --- | --- | --- | --- |
| DPS growth | Div yield | RFR | MRP estimate |
| 6.60% | 5.68% | 3.77% | 8.52% |
| 6.60% | 5.68% | 3.00% | 9.28% |
| 6.60% | 5.68% | 5.00% | 7.28% |
| 6.60% | 5.68% | 6.00% | 6.28% |

Source: AER analysis

Bias in DGM estimates

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.[[135]](#footnote-135)

In addition to the above limitations, Lally identified two further problems with the 8.5 per cent MRP estimate derived by CEG:

* By using the historical dividend yield, CEG ignores the (1+g) term in deriving the market cost of equity.
* 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.[[136]](#footnote-136)

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.[[137]](#footnote-137)

The AER also considered a report by Capital Research in 2005, which derived negative MRP estimates from DGM analysis for the period 1980–2004. Capital Research suggested a negative result is ‘nonsense’ and noted:

...We must be careful not to ask too much of this model. Recall that it is based on a constant growth assumption. Any model which makes such highly stylised and constant assumptions about the world is going to struggle to be relevant in a world undergoing dramatic changes. The result of the model suggesting negative risk premia is an outcome of a too precious model rather than the investment world being irrational.[[138]](#footnote-138)

Similarly, the AER notes the CEG AMP method was producing MRP estimates at or below zero per cent back in 1994. The AER does not consider a zero or a negative MRP is realistic at any particular point in time. Lally supported this view:

...this assumption underlying Figure 8 can be tested by observing that the model gives rise to an estimated market risk premium of zero in 1994; this outcome is not plausible and therefore suggests that the underlying assumption is not plausible.[[139]](#footnote-139)

The AER notes DGM analysis is producing high positive MRP estimates. However, it is not aware of evidence suggesting the estimates derived from DGM analysis are more reliable now than in 1994. Further, no new information has come to light that causes the AER to rely more on DGM estimates.

* + 1. Consultants’ views

The AER considered views from different consultants on the best estimate of the MRP. These views included:

* views submitted by APA GasNet in support of its proposal—that is, the CEG approaches, Capital Research DGM estimates, and NERA regime switching model
* advice received by the AER—that is, the McKenzie and Partington report and Lally's advice
* approaches proposed by other regulated businesses in recent regulatory processes—that is, the VAA implied volatility glide path approach and the SFG method.

Different consultants have widely different views. After carefully assessing these views, the AER places limited emphasis on DGM, the regime switching model, implied volatility glide path approach and other financial market indicators in estimating the value of the 10 year forward looking MRP. Its reasons are set out below.

CEG's approaches

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 derive a DGM estimate for the MRP
* estimate a normal level for cost of equity for the reference service and make adjustments based on the current market evidence.[[140]](#footnote-140)

The DGM estimates proposed by CEG are subject to the same limitations as discussed in the previous section. Lally further noted the CEG approaches are subject to problems, including errors in the AMP method, exposure to fluctuations in the earnings payout rate and ambiguity over the appropriate averaging period.[[141]](#footnote-141) The AER considers these problems are relevant, so places limited emphasis on the CEG approaches.

Capital Research's DGM estimates

Capital Research advocated using DGM to directly estimate the forward MRP. It suggested the best forward looking MRP is 9.6 per cent, assuming a risk free rate of 3.73 per cent and a net theta of 0.2625.[[142]](#footnote-142)

Capital Research's DGM estimate is subject to the same limitation as discussed in the DGM section. In addition, the DGM assumes growth at a constant rate in perpetuity. Capital Research use analysts' forecast dividend growth as a proxy. [[143]](#footnote-143) Analysts' forecast is often based on short to medium terms. The AER considers using analysts' forecast growth rate in the DGM analysis is likely to result in an upward bias in the MRP. Mckenzie and Partington supported this view:

Since analysts only cover a subset of firms, whether we get a representative estimate for the market is an open question. Another problem is that analyst’s forecasts are known to be biased (generally upwards) and subject to gaming (see Scherbina, 2004, and Easton and Sommers, 2006).[[144]](#footnote-144)

NERA's regime switching model

NERA produced DGM estimates of 7.69 and 7.72 per cent based on Bloomberg and I/B/E/S forecasts. However, NERA proposed a regime switching model would provide the most suitable MRP in the prevailing market condition. This model is highly 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.[[145]](#footnote-145)

The AER is not aware of any regulators that used a regime switching model in deriving their MRP estimates. Further, this complex process could create errors in calculation.[[146]](#footnote-146) In their August 2012 report, McKenzie and Partington found the NERA regime switching model is not a good fit of the data and does not provide sensible volatility estimates. They also noted the SFG report that reviewed the NERA regime switching model did not provide insights to address this problem.[[147]](#footnote-147) Section B.2.5 details the AER’s considerations of the NERA regime switching model.

McKenzie and Partington report

In their December 2011 MRP report, Professor McKenzie and Associate Professor Partington 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. McKenzie and Partington 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.[[148]](#footnote-148) McKenzie and Partington remained of this view in their February 2012 and August 2012 report, after having reviewed further materials submitted by businesses.[[149]](#footnote-149) The AER accepts McKenzie and Partington’s advice and considers their approach supports an MRP estimate of 6 per cent.

Lally's advice

Associate Professor Lally reviewed the AER's current approach and three approaches suggested by CEG. Lally found a number of problems with the CEG DGM approach and concluded DGM should be considered as a complement to rather than a substitute for the AER's current approach.[[150]](#footnote-150)

The AER considers that Lally broadly supported the methodology to estimating the MRP adopted by the AER. In addition to the historical excess returns and survey evidence, Lally advised weight should also be placed on other methodologies including the Siegal approach, the DGM analysis and results from international markets.[[151]](#footnote-151)

SFG's method

SFG proposed the three financial market indicators (implied volatility, credit spread and dividend yield) for estimating a 10 year forward looking MRP:

* Implied volatility relies on contentious assumptions to derive an MRP estimate.[[152]](#footnote-152) In particular, the assumption that the price of risk per unit of implied volatility is constant is disputed on theoretical and empirical grounds.[[153]](#footnote-153) As noted above, this method provides only a short term estimate of the MRP (usually three months, matching the term of the implied volatility measure), and 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 spread refers to the difference in yields between bonds with high (AAA rated) and low (BBB rated) credit ratings. Similarly, relative debt spreads will differ based on the method chosen to measure the bond yields. McKenzie and Partington noted this method has no well developed, reliable and precise way to separate out the effect of changes in the MRP from other effects.[[154]](#footnote-154) 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 yield in this context this 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.

Section B.2.6 details the AER’s assessment of the three financial market indicators.

VAA's implied volatility approach

In its 2010 report, the VAA suggested an implied volatility glide path approach in estimating the MRP.[[155]](#footnote-155) It derived the one year MRP estimate from the Black-Scholes option pricing formula for 12 month ASX200 index call options, then estimated a geometric average MRP over five years. The AER considers this approach is not a reliable method of estimating a forward looking 10 year MRP. It has the following concerns with this approach:

* The MRP estimate relies on an assumption that the market risk per unit of option implied volatility is constant at 0.5.
* Academic literature suggests option implied volatility is too highly variable to be used as a basis for estimating the forward looking 10 year MRP.
* Projecting MRP estimates on this short term basis can result in highly variable estimates being produced over different short periods of time.[[156]](#footnote-156)

Section B.2.7 details the AER's consideration of implied volatility.

* + 1. NERA's regime switching model

NERA estimated an MRP of 8.44 per cent from the regime switching model. NERA submitted this estimate provided the most suitable guide to the MRP prevailing in the market because it provided an estimate of the MRP in each future year.[[157]](#footnote-157)

NERA’s regime switching model was based on Hamilton (1989), in which the probability of being in each state is governed by a Markov chain (the probability of being in the high-volatility state next year will depend only on whether the process is currently in the high-volatility state). It calculated continuously compounded MRP estimates for each of the five future years using Brailsford, Handley and Maheswaran (2011) data and annualised 3 month bill rates. NERA then converted these continuously compounded MRP estimates into average not continuously compounded return of 8.44 per cent. [[158]](#footnote-158) SFG peer reviewed NERA's regime switching model. SFG concluded NERA approach is appropriate for obtaining a prevailing MRP estimate in current circumstances.[[159]](#footnote-159)

The AER engaged McKenzie and Partington to review this approach. They concluded the NERA regime switching model was not a good fit of the data and did not provide sensible volatility estimates. McKenzie and Partington fitted Handley (2012) data to a number of models. Although none of the switching models fit the data particularly well, relatively, the restricted switching model was the best fit. Further, McKenzie and Partington examined a simple GARCH model and found this model was more consistent with events in the equity markets than regime switching models. They advised the AER to reject NERA's approach on the grounds of misspecification of the functional form of the model.[[160]](#footnote-160)

The AER notes McKenzie and Partington's view is relevant. It does not consider NERA's regime switching model can provide the best MRP estimate prevailing in the market when this model is misspecified. The AER also notes this model uses a Markov chain to govern the transition from one state to another. The stochastic nature of the states implies there is great uncertainty of the estimated current state. Tsay (2010) noted it is much harder to estimate a Markov switching model than other models because the states are not directly observable.[[161]](#footnote-161) Mckenzie and Partington illustrated this uncertainty with the Brailsford, Handley and Mahareshwan (2012) data:

... Figure [9] also features two horizontal dashed lines that represent one and two standard deviations of this data. These standard deviation based reference points serve to highlight the arbitrary nature of the two regime approach NERA (2012) take to modelling volatility. One could just as easily argue that rather than two regimes (high and low), a three regime approach is more sensible with a low, average and high volatility regime classified using these standard deviation based reference points. In fact, an n‐regime approach is possible, where n is > 1, with no compelling argument to be made for any one approach. The two regime model is certainly easier to estimate, however, ease of estimation is not a particularly valid justification for model choice.[[162]](#footnote-162)

* + - * 1. Brailsford, Handley and Mahareshwan (2012) data with different source indices highlighted



Source: McKenzie and Partington, Review of regime switching framework and critique of survey evidence, 27 August 2012, Figure 9

* + 1. SFG financial market indicators

The AER considered the use of other financial market indicators put forward in recent SFG reports as relevant to the estimation of the prevailing MRP. SFG used three financial market indicators—implied volatility, dividend yields and relative debt spreads—as 'conditioning variables' to adjust the MRP estimate around its long run average.[[163]](#footnote-163)

The SFG approach using financial market indicators was put forward:

* by Envestra in March 2011 as part of the South Australia and Queensland gas access arrangements[[164]](#footnote-164)
* by APTPPL (a subsidiary of APA Group) in October 2011 as part of the Roma to Brisbane Pipeline gas access arrangement[[165]](#footnote-165)
* by the Victorian electricity distribution network service providers (noting the overlap in ownership between these businesses and the Victorian gas networks) in a February 2012 submission on Aurora's regulatory determination[[166]](#footnote-166)

This technique was not proposed by APA GasNet in this review. The Victorian gas networks (including APA Group) did jointly commission two reports from SFG on the estimation of the MRP,[[167]](#footnote-167) but neither report included this technique.

Before assessing the combined SFG approach, the AER considers below each of the three financial market indicators put forward by SFG as relevant to the estimation of the MRP.

Implied volatility

Implied volatility is calculated from observing the price of put or call options over a broad share market index, such as the S&P/ASX 200. Applying a mathematical formula allows the calculation of the level of market volatility expected by market participants over the life of the underlying options.[[168]](#footnote-168) Hence, the term of the implied volatility will accord with the option term—usually three months, but ranging between one year and one month.[[169]](#footnote-169) The underlying principle is that higher implied volatility is indicative of higher risk and consequently a higher MRP.

The AER considered the use of implied volatility to inform the forward looking MRP in the WACC review and its previous decisions.[[170]](#footnote-170) The AER considers it cannot be used directly to estimate the MRP for the following reasons:

* Term mismatch—the implied volatility measures are short term and there is no reasonable method to extrapolate to a longer term, but the relevant MRP term is 10 years.[[171]](#footnote-171)
* Measurement problems—different implied volatility measures produce different (and sometimes conflicting) results. Further, there is evidence that these measures are systematically biased (upwards).[[172]](#footnote-172)
* Contentious assumptions—observing the amount of risk (via implied volatility) does not equate to the price of that risk (which is what is relevant to the MRP). This gap is most commonly breached by assuming a constant ratio (for example, if the current implied volatility is double the long run average, then the MRP will also be double its long run average. This assumption is disputed on theoretical and empirical grounds.[[173]](#footnote-173)

The AER’s view is shared by McKenzie and Partington who concluded in their February 2012 supplementary MRP report:[[174]](#footnote-174)

Further work on this technique (implied volatility) might be warranted, but given the current state of play it could hardly be regarded as a validated method, let alone an accurate and reliable adjustment to the MRP.

When using its conditioning variables approach, SFG assessed implied volatility using 3 month options over the S&P/ASX 200 (labelled the Citibank Volatility Index or VIX). In its various reports, SFG stated that since the VIX was above its long run average, this indicated that the MRP was similarly above its long run average.[[175]](#footnote-175) Figure B.7 shows the value of this measure of implied volatility relative to its long run average level across the period since the global financial crisis.

* + - 1. Implied volatility (VIX) over time

Source: Citibank VIX implied volatility index (3 month put/call options on S&P/ASX 200), sourced via Bloomberg code CITJAVIX.

As is evident from this figure, implied volatility is quite variable and can change substantially in months. The AER considers that this variability suggests implied volatility is not a reliable method to estimate the MRP. Figure also shows that although implied volatility rose dramatically during the GFC, this peak has subsided and the level of implied volatility has dropped below the long run average on several occasions.

SFG advocated using the most recent data available when inferring the current MRP from implied volatility.[[176]](#footnote-176) Using data updated to 10 August 2012, it measures at 15.2 per cent, slightly below the long run average of 18.8 per cent (measured from the commencement of the data series in 1997). If this latest point estimate is used to inform the forward looking 10 year MRP, it appears to support a value at or slightly below the long term average MRP (that is, 6 per cent).[[177]](#footnote-177)

Credit spreads

SFG also proposed the use of credit spreads to inform the estimation of the MRP. The idea is that the difference between an index of the yield to maturity on BBB-rated bonds and a corresponding index of AAA-rated bonds proxies for credit or default risk. During recessions, this debt yield spread widens, commensurate with an increase in risk premiums generally which implies a higher risk premium for equity.[[178]](#footnote-178)

The AER considered the use of credit spreads to inform the forward looking MRP. But the AER considers a direct comparison of the yield on debt and the MRP is problematic. McKenzie and Partington supported this view for the following reasons:[[179]](#footnote-179)

* McKenzie and Partington expected the widening credit spreads during the GFC were substantially driven by increasing concern about the risk of default and this concern dries up the liquidity in debt markets. A combination of default premiums and liquidity premiums, therefore drove up returns in debt markets.
* Given the GFC, the default risk component of the credit spread might reasonably be expected to have increased. Consequently, much of the change in debt yields during and after the GFC is likely due to a changed assessment of default risk.
* A key element of the GFC was increasing credit risk, with a widespread perception that default risk had increased sharply. Consequently, the expected cash flow on risky debt declined, which caused the price of the debt to fall. Because the yield is calculated on the promised cash flow relative to the price, the yield on risky debt went up and the credit spread widened. This outcome would have happened even if the MRP, or debt betas, did not change.
* An increase in credit spreads due to increased default risk does not automatically require a shift in the MRP. The MRP is an expected return and the yields on debt are a promised return. The promised return is only the same as the expected return for debt when there is no default risk. For all other debt the promised return is higher than the expected return. Because the debt yield and the MRP measure different things, effectively they are measured in different dimensions, they are not constrained to move in the same way and comparisons between them can be misleading.

Dividend yields

Dividend yields refer to the forecast dividends (or other distributions) for all shares in a broad based market index divided by the current price of all shares in that index. A data provider generally aggregates the dividend forecasts from reports by different equity analysts, with the forecast horizon generally one year. The dividend yield is thus a simple indicator of the expected return to equity holders through dividends (although not allowing for capital gains/losses or imputation credits) over the next year. While closely related to the DGM, dividend yields are a different direct indicator of MRP.[[180]](#footnote-180)

SFG stated higher dividend yields indicate a higher MRP. It is based this claim on several academic studies that found a statistically significant relationship when using dividend yields to predict equity market returns. [[181]](#footnote-181) The intuitive explanation was that when dividend yields were high, a given set of cash flows was being discounted at a higher rate, indicating a higher MRP. In the February 2012 report, SFG estimated the dividend yield for the Australian share market at 31 January 2012 was 4.69 per cent. This value was above the long run average dividend yield, supporting an MRP above its long run average (SFG proposed 7 per cent).[[182]](#footnote-182)

But the AER does not use the dividend yield approach to inform its MRP estimate because evidence of a relationship between the two is insufficient. While the AER acknowledges the three reports cited by SFG[[183]](#footnote-183) a broader consideration of the academic literature (by McKenzie and Partington) does not indicate the relationship is statistically reliable.[[184]](#footnote-184) The AER agrees with McKenzie and Partington's conclusion on this matter:[[185]](#footnote-185)

SFG presents the dividend yield as a conditioning variable as though it were established fact. In contrast, in our main report we begin by excluding consideration of predictive models based on dividend yield. This is because in our view, this is still a developing area of research, rather than a well developed practical tool. We are not alone in this view as it is shared by others such as Dimson, Marsh and Staunton (2011), who are leading scholars in the area of the MRP.

The AER considers the underlying mechanism relating dividend yields and the MRP (as presented by SFG) is not persuasive. SFG appears to overlook other factors that could result in a higher observed dividend yield even when the MRP was unchanged (or lower).[[186]](#footnote-186) The forecast horizon for the dividends is short (generally one year); so a reduction in expected dividends beyond this point would result in a lower price and a higher dividend yield. That is, a change in expected cashflow (not the discount rate or MRP) explains the result. McKenzie and Partington explained this point.[[187]](#footnote-187) 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.

Finally, as with the other financial market indicators, as assessed higher than average dividend yield is predicated on an accurate estimate of the baseline figure. SFG calculated its long run average using data from 2000, but did not justify using this time period.[[188]](#footnote-188) In this case, the relevant data series is available back to 1973.[[189]](#footnote-189) Using the longer data series would result in a higher baseline dividend yield. In turn, this increase would reduce the extent to which the current dividend yield was above the average and thus support a lower MRP.

Updated data using SFG method

Across recent reports, the conditioning variables presented by SFG have been relatively high. The core argument from SFG is that where there is a consistent pattern across these three financial market indicators, the prevailing MRP will be consistent with this pattern. For instance, if all three indicators are above their long run average, the prevailing MRP will be similarly above its long run average.

Table B.8 summarises the SFG results by presenting one key figure for each variable—the standardised difference between the current value and the long run average. 'Standardised' means that the difference is expressed in terms of the standard deviation for that data series. For example, a standardised value of +1.5 means that the current value is above the average value by 1.5 times the standard deviation for that series.

* + - * 1. Conditioning variables presented by SFG in recent reports

|  |  |  |  |
| --- | --- | --- | --- |
| SFG report date | Implied volatility | Dividend Yield | Relative debt spread |
| March 2011 | +0.80 | +0.44 | +0.87 |
| October 2011 | +2.17 | +1.59 | +0.77 |
| February 2012 | +2.17 | +1.02 | +1.95 |

Source: SFG figures provided to the AER, AER analysis

The AER updates the SFG data using a baseline that encompasses the longest available data series. Table B.9 shows the standardised difference between the current value and long run average for the three financial market indicators. However, the AER does not update the relative debt spread figures, because there is no reasonable data available. The table includes the uncorrected relative debt spread figures for comparative purposes.

* + - * 1. Conditioning variables after correction

|  |  |  |  |
| --- | --- | --- | --- |
| Data period | Corrected implied volatility | Corrected dividend yield | Uncorrected relative debt spread |
| To 15 March 2011 | +0.10 | +0.10 | +0.87 |
| To 23 September 2011 | +2.25 | +1.17 | +0.77 |
| To 31 January 2012 | –0.12 | +0.53 | +1.95 |
| To 10 August 2012 | –0.49 | +0.76 | NA |

Source: SFG figures provided to the AER, Bloomberg, AER analysis

Notes: The dates of the first three rows coincide with the data presented in the three SFG reports. The Datastream data on the relative debt spread (used by SFG) is not available to the AER and so cannot be updated. The Datastream data on dividend yields is not available to the AER, but an alternative series from Bloomberg has been used (correlation of 0.97).

As is evident in table b.9, based on recent data, there is no consistent pattern across these three indicators. Implied volatility is slightly below its long run average. Dividend yield is slightly above its long run average. It is difficult to speculate on the value of an updated relative debt spread (the most recent SFG figure is now 7 months out of date).[[190]](#footnote-190)

The AER does not consider SFG’s approach, using three financial market indicators to establish a conditional MRP, is a relevant basis to estimate a forward looking 10 year MRP. However, even if weight were to be given to this approach, it would support an MRP of 6 per cent.

* + 1. VAA implied volatility glide path

VAA previously proposed the use of option implied volatility combined with a 'glide path' to estimate the forward looking MRP.[[191]](#footnote-191) The VAA approach has been put forward:[[192]](#footnote-192)

* by the Australian Pipeline Industry Association (the industry group that represents all of the Victorian gas networks) in its January 2009 submission to the AER's WACC review[[193]](#footnote-193)
* by the Victorian electricity distribution network service providers (noting the overlap in ownership between these businesses and the Victorian gas networks) in their 2010 regulatory determination,[[194]](#footnote-194) as well as the 2011 Advanced Metering Infrastructure determination[[195]](#footnote-195)
* by Envestra in the South Australia and Queensland gas access arrangements in 2011.[[196]](#footnote-196)

The AER considered this approach, although APA GasNet did not propose it in this review.

Like the DGM and NERA's regime switching model, the VAA's approach estimates the prevailing MRP. Since the MRP estimate generated from implied volatility will have the same horizon as the underlying options, VAA estimated the MRP based on a ‘glide path’ approach. The basis of this technique is to:

* first, estimating the volatility implied by the Black-Scholes option pricing formula for 3 month or 12 month S&P/ASX 200 index options.
* second, converting this to a short term (3 month or 12 month) estimate of the MRP by assuming a constant market risk per unit of option implied volatility (in the range of 40–50 basis points per unit of risk)
* third, estimating the geometric average MRP over five years assuming the MRP would revert (glide) down from the short term MRP estimate to a long term historical average.

VAA has considered different possible glide paths, such as a quicker return to the long term average, or a sustained elevated period before the decline commences. VAA has also given some consideration to 1 month and 6 month options, overseas implied volatility estimates, and the use of realised volatility (that is, the observed historical volatility using a rolling window containing the previous 30 or 90 days of data) as a proxy for implied volatility.

The AER has already set out above (in the discussion of SFG's approach using financial market indicators) concerns with using implied volatility when estimating the MRP. Further to those general concerns, the AER considers that the VAA implied volatility approach:

* inappropriately determines the baseline long run average implied volatility by using a different data series—the realised volatility of a 90 day data window for the S&P/ASX 30 from 1980 onwards.[[197]](#footnote-197) Using this (historical) realised volatility series results in a long run average volatility of 14 per cent. The actual long run average of one of the (forward looking) implied volatility series used by VAA (3 month VIX) s 18.8 per cent. Adopting the higher baseline would reduce the MRP estimated using the VAA approach in all scenarios.
* incorrectly calculates the price per unit of implied volatility using a 'long run historical average MRP' of 7 per cent, when the evidence indicates that this value is 6 per cent.[[198]](#footnote-198) Adopting the lower historical average MRP would reduce price per unit of volatility, which in turn reduces the MRP estimated using the VAA approach in all scenarios.

The AER also has concerns with the glide path approach used to extend this (short term) implied volatility estimate. The glide path approach incorporates a variable three or twelve month estimate of implied volatility and then combines it with a long term historical estimate over a five year time horizon.[[199]](#footnote-199) The AER has previously noted the realised MRP could be below long term estimates in some years. The glide path approach excludes this possibility by construction. The AER also noted that the VAA approach averages five years of MRP estimates, and that this is inconsistent with the 10 year horizon assumed for the risk free rate. Further, the time period for reversion cannot reasonably be determined. Figure B.1 demonstrates that from the peak, it took just 15 months for implied volatility to fall back below its long run average. This is considerably shorter than the three year reversion period preferred by VAA in their reports.

As noted above, although implied volatility was high during the worst of the GFC, the current level is below the long run average. Using data updated to 10 August 2012, it measures at 15.2 per cent, slightly below the long run average of 18.8 per cent (measured from the start of the data series in 1997). It is not entirely clear what glide path would be proposed by VAA in these circumstances, since no VAA report has been submitted where implied volatility was below the long run average.

Figure B.8 shows the same implied volatility measure as the previous figure, generated from 3 month options on the S&P/ASX 200 (plotted against the left hand axis). Superimposed on this are a number of MRP estimates submitted by VAA (plotted against the right hand axis), with a diamond marking the date of the report. These are the implied volatility estimates prior to the application of a glide path. Accordingly, the MRP estimates are for either 3 months or 12 months, as per the underlying option—this is shown by a dashed line extending across the relevant time period. This figure has been rescaled such that the long run average volatility (18.8 per cent, plotted against the left hand axis) matches the long run average MRP proposed by VAA (7 per cent, plotted against the right hand axis).

* + - 1. Implied volatility and VAA MRP estimates



Source: Citibank VIX implied volatility index (3 month put/call options on S&P/ASX 200), sourced via Bloomberg code CITJAVIX; VAA reports; AER analysis

Figure B.8 shows the central relationship of the VAA implied volatility glide path approach—where the implied volatility is above its long run average, VAA considers that the MRP will also be above its long run average. In current circumstances, where implied volatility is below its long run average, the VAA approach to estimating the prevailing MRP would indicate that it is below the long run average.

The AER does not consider that VAA's implied volatility glide path approach is a relevant basis to estimate a forward looking 10 year MRP. However, even if weight were to be given to this approach, it would support an MRP estimate of 6 per cent (or slightly below).

* + 1. Market commentary and economic outlook

General market commentary and economic outlook provided by eminent bodies gives useful insights into the current and future state of the financial market. However, because most commentaries do not specifically refer to returns in equity markets, the link between the market commentary and the MRP is difficult to quantify. Consistent with comments by the Australian Competition Tribunal in a recent decision[[200]](#footnote-200) and the views of Multinet[[201]](#footnote-201) and SFG[[202]](#footnote-202), the AER places limited weight on this evidence.

* + 1. Reasons for the AER’s departure from the WACC review

The AER agrees with the view of APA GasNet and SFG that the AER’s decision to increase the MRP to 6.5 per cent in mid 2009 was not well justified.[[203]](#footnote-203) It was being conservative at a time of significant uncertainty. In the WACC review at that time, the AER considered a range of evidence to decide on the best estimate of the forward looking 10 year domestic MRP. Acknowledging significant uncertainty in financial markets, it considered one of two scenarios could explain the market conditions:

* either the prevailing medium term MRP was above the long term MRP, but would return to the long term MRP over time, or
* a structural break had occurred in the MRP, and the forward looking long term MRP (and thus also the prevailing MRP) was above the long term MRP that previously prevailed.[[204]](#footnote-204)

These reasons led to the AER's departure from the previously adopted value of 6 per cent.

The global financial crisis (GFC) was a significant event, and its magnitude should not be understated. However, the impact of the GFC for Australian capital markets was moderate relative to international experience. The alternative scenario contemplated by the AER in the WACC review does not warrant keeping the MRP above the long run average in perpetuity. Information and data available since the release of the WACC review suggests the prevailing medium term MRP has not been above the long term MRP. The AER reached this conclusion based on the following evidence:

* Survey measures since the height of the GFC accord with those from before the GFC.[[205]](#footnote-205)
* Implied volatility since the height of the GFC has returned to its long run average.[[206]](#footnote-206)

Cyclical trends are observed in financial markets over time and typically involve shifts between periods of strong economic growth (boom) and periods of relative stagnation or sharp decline (recession). The fluctuations in financial markets are unpredictable, and cycle duration varies from more than a year to 12 years.[[207]](#footnote-207) When an investor considers the likely return across a 10 year horizon, these cyclical fluctuations are a normal experience. The long term expected return takes account of the expected future investment growth and decline. That is, the long term MRP has always been determined in the inevitable presence of these business cycles.

McKenzie and Partington noted the AER's decision in the WACC review to increase the MRP to 6.5 per cent was not well justified. In their February 2012 MRP report, they stated:

We further consider that the decision to increase the MRP by 0.5% for a ten year regulatory period was not well justified as we would not expect the crisis conditions and extreme volatility to extend over such a long period. With the benefit of observing what has happened post-GFC it is appropriate for the AER to move back to the relatively safe ground of the unconditional MRP of 6% rather than persist with the conditional MRP of 6.5%. To put it another way the conditions justifying the shift to a conditional MRP have substantially abated so there is good reason to move back to the unconditional MRP.[[208]](#footnote-208)

The AER has developed its understanding since the WACC review. Now, rather than increasing the MRP due to any short term effects, it considers it is reasonable to determine a long term (10 year) forward looking MRP.

The Energy Users Coalition of Victoria (EUCV)supported this view:

Regulated firms were supportive of the AER increasing the MRP in the depths of the GFC because the outcome increased their WACCs at a time when there was great uncertainty. The result of this move was to over-provide a rate of return for a considerable period and provide an unearned and unnecessary benefit to regulated firms. Quite sensibly the AER reduced the MRP when stability returned to the market as a whole and it was seen that the WACC based on a MRP of 650 bp was then providing a WACC that was excessive. Such an approach reflected the requirement for setting an efficient WACC based on best practice – both aspects that are explicitly required by the Gas Rules.[[209]](#footnote-209)

* 1. Reasonableness checks on overall rate of return

In attachment 4, 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.[[210]](#footnote-210) In turn, the AER considers this overall rate of return provides a reasonable opportunity for APA GasNet to recover at least its efficient costs.[[211]](#footnote-211)

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.

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: [[212]](#footnote-212)

* 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.[[213]](#footnote-213)

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.

The RAB multiples from each of these transactions, together with the transactions discussed above, are summarised in Table B.10 from most recent to least recent.

* + - * 1. Selected acquisitions – RAB multiples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date | Acquirer | Entity/Asset acquired | | RAB multiple (times) |
| 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 Bunburry Natural Gas Pipeline | | 0.95[[214]](#footnote-214) |
| 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[[215]](#footnote-215), APA[[216]](#footnote-216), Grant Samuel, AER calculations.

In October 2010, Envestra purchased Country Energy’s NSW gas network at a multiple of 1.25 times the 2010 RAB.[[217]](#footnote-217) Further details on this transaction can be found in the AER’s draft decision for the QLD/SA gas distribution networks.[[218]](#footnote-218)

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.[[219]](#footnote-219) These transactions were at multiples of 1.20, 0.95 and 1.13 respectively.

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.[[220]](#footnote-220)

APA stated that net funds released from the sale were $477 million after transaction costs and the net enterprise value was $526 million.[[221]](#footnote-221) 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.[[222]](#footnote-222)

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.[[223]](#footnote-223) 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.

Other historical sales have been at premiums of between 20 and 119 per cent to the regulated asset base.[[224]](#footnote-224)

As Grant Samuel has previously explained, listed infrastructure entities should theoretically trade at, and be acquired at, 1.0 times the RAB.[[225]](#footnote-225) However, nearly all recent asset sales have been transacted at RAB multiples of greater than one.

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.[[226]](#footnote-226) This suggests the AER’s approach in this decision will also provide APA GasNet 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.[[227]](#footnote-227)

As with regulated asset sales, a trading multiple above one may imply that the market discount rate is below the regulated WACC. 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.[[228]](#footnote-228) These multiples are consistently greater than one, as shown in Table B.11 to **Error! Reference source not found.**. None of these multiples are less than or equal to one.

* + - * 1. JP Morgan trading multiples

|  |  |  |  |
| --- | --- | --- | --- |
| Date of report | Company | 2010–11 | 2011–12 |
| 10 August 2012 | DUET | 1.26 | 1.18 |
| 24 August 2012 | ENV | 1.20 | 1.25 |
| 27 August 2012 | SKI | 1.26 | 1.22 |
| 29 August 2012 | SPN | 1.21 | 1.20 |

Source: JP Morgan[[229]](#footnote-229)

* + - * 1. Macquarie trading multiples

|  |  |  |  |
| --- | --- | --- | --- |
| Date of report | Company | 2011 | 2012 |
| 1 August 2012 | DUET | 1.14 | 1.17 |
| 27 August 2012 | SKI |  | 1.35 |
| 28 June 2012 | SPN | 1.16 | 1.17 |

Source: Macquarie Group[[230]](#footnote-230)

* + - * 1. Credit Suisse trading multiples

|  |  |  |
| --- | --- | --- |
| Date of report | Company | 2012 |
| 7 August 2012 | DUET | 1.14 |
| 7 August 2012 | ENV | 1.32 |
| 7 August 2012 | SKI | 1.36 |
| 7 August 2012 | SPN | 1.14 |

Source: Credit Suisse[[231]](#footnote-231)

* + - * 1. Bank of America Merrill Lynch trading multiples

|  |  |  |
| --- | --- | --- |
| Date of report | Company | 2012 |
| 23 August 2012 | ENV | 1.10 |
| 27 August 2012 | SKI | 1.39 |

Source: Bank of America Merrill Lynch[[232]](#footnote-232)

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.[[233]](#footnote-233)

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.[[234]](#footnote-234)

Recent comments by Macquarie in a broker report also suggest the AER’s WACC approach does not under-compensate service providers:

The importance of the RAB growth reflects our belief there is a sustainable arbitrage beyond the current regulatory period, that justifies paying a premium above RAB for these assets…This arbitrage reflects WACC calculations in the regulatory setting have a degree of conservatism.[[235]](#footnote-235)

Comments made by the AEMC in its recent Directions Paper also lend support to the AER’s interpretation of broker reports and suggest the cost of debt may be a driver of the RAB multiple premiums:

A number of these [broker] reports indicate that the recommended valuations placed on these businesses by the equity analysts assume an ability for the NSPs to raise debt at a rate lower than the cost of debt allowed by the regulator. A number of the reports have indicated that a major reason why they value the NSPs at above their RAB is due to their ability to out-perform their cost of debt allowance. [[236]](#footnote-236)

When coupled with the consistently high multiples shown above, these comments 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.[[237]](#footnote-237) This suggests the AER’s approach in this decision will also provide APA GasNet 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:

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. [[238]](#footnote-238)

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.[[239]](#footnote-239)

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[[240]](#footnote-240)
* 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.[[241]](#footnote-241) 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.15 sets out the range for the broker WACC estimates (converted to a nominal vanilla WACC) which is 7.76-10.02 per cent.[[242]](#footnote-242) The nominal vanilla rate of return determined by the AER for APA GasNet in this draft decision is 7.16 per cent. This is approximately 60 basis points below the range of the broker WACC estimates.

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. Further, the review of broker WACCs is the only aspect of the overall reasonableness check that has indicated a potential concern.

* + - * 1. Broker WACC estimates (per cent)a,b

|  |  |  |
| --- | --- | --- |
| Measure | Minimum | Maximum |
| Broker headline post-tax WACC | 6.50 | 8.60 |
| Calculated nominal vanilla WACC | 7.76 | 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 7.16 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.[[243]](#footnote-243) 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 5.70 to 9.08 per cent (converted to nominal vanilla form).[[244]](#footnote-244) The decisions reviewed are shown in Table B.16 and have been taken from those made in the last 12 months. The WACC of 7.16 per cent applied for APA GasNet 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.

* + - * 1. Recent decisions by Australian regulators (per cent)

|  |  |  |  |
| --- | --- | --- | --- |
| Regulator | Decision | Date | Nominal vanilla WACC |
| ACCC | FAD Fixed line services – Final decision | Jul 2011 | 8.54 |
| ESC | Metro Access Arrangement – Final decision | Aug 2011 | 9.08 |
| ACCC | Airservices Australia – Final decision | Sep 2011 | 8.60 |
| ERA | Dampier to Bunbury Pipeline – Final decision | Oct 2011 | 7.57 |
| QCA | SunWater – Final decision | Nov 2011 | 7.55 |
| IPART | Sydney Desalination Plant – Final decision | Dec 2011 | 8.16–8.59a |
| ESCOSA | Advice on a regulatory rate of return for SA Water – Final decision | Feb 2012 | 8.07 |
| ESCV | V/Line Access Arrangement – Final decision | Jun 2012 | 8.65 |
| IPART | Sydney Catchment Authority – Final decision | Jun 2012 | 8.16–8.38a |
| IPART | Sydney Water Corporation – Final decision | Jun 2012 | 8.16–8.38a |
| ERA | Western Power – Final decision | Sep 2012 | 5.70 |

Notes: For comparative purposes, all WACCs have been converted to the nominal vanilla WACC formulation consistent with the AER’s reported figure for APA GasNet (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).

Cost of equity vs. Cost of debt

While not necessarily directly relevant to the overall rate of return, comparing the cost of equity with the cost of debt can provide a useful indication of reasonableness. Consistent with previous decisions,[[245]](#footnote-245) the AER considers that the expected cost of equity should be greater than the expected cost of debt.[[246]](#footnote-246) This relationship holds in this decision.

The AER has prepared a graph showing the cost of equity, cost of debt and WACC over time, using the DRP estimation methodology proposed by APA GasNet. This graph shows that the cost of equity has been consistently greater than the cost of debt over the last two years, using the AER’s approach in this decision. If the cost of debt had been estimated using the ERA’s approach then the difference between the cost of equity and cost of debt would have been greater.

It is also worth noting that this graph clearly shows that a large portion of the change in the overall rate of return can be attributed to the decline in the cost of debt. The fact that the overall rate of return in this decision is lower than in previous decisions does not of itself make it unreasonable. The cost of debt in this decision makes up 60 per cent of the overall rate of return. The AER accepts APA GasNet’s approach in determining the cost of debt. If flows from this that the AER and APA GasNet would agree that this reduction reflects prevailing conditions in the market for funds and the risk involved in providing reference services. This provides the AER with a degree of confidence that a fall in the overall rate of return, in itself, is not unreasonable.

APA GasNet’s concerns surround the cost of equity and the extent to which the cost of equity determined by the AER in this decision is lower than that determined in previous decisions. The AER has discussed these concerns in detail in attachment 4.

* + - 1. Cost of Debt, Cost of Equity and WACC – AAA paired bonds approach



The conceptual relationship set out above holds when the cost of equity and the cost of debt are expressed in consistent terms—as expected returns. However, there is a distinction between the expected cost of debt and the promised cost of debt:

* the promised cost of debt is calculated by assuming that the bond issuer does not default, and the promised payments of interest and capital occur (in full and on time)
* the expected cost of debt extends this calculation to include consideration of the likelihood of default, where the bond issuer does not make the promised payments of interest and capital[[247]](#footnote-247)
* where there is a non-zero probability of default, the promised cost of debt will exceed the expected cost of debt
* there is no conceptual reason why the expected cost of equity should be greater than the promised cost of debt.[[248]](#footnote-248)

There has been some debate about whether the cost of debt graphed above (and adopted by the AER) reflects the expected or promised cost of debt.[[249]](#footnote-249) The point is inconsequential in current conditions, since under either interpretation the expected cost of debt is below the expected cost of equity.[[250]](#footnote-250) If the cost of debt were to rise above the cost of equity, it would be necessary to carefully examine the cost of debt to ensure that it did not reflect promised returns.

Further, recent advice from the Reserve Bank of Australia (RBA) also touches on the relationship between the cost of debt and the cost of equity.[[251]](#footnote-251) The RBA noted that there was a general increase in the spread between CGS and other Australian-denominated debt securities (i.e. an increase in the DRP). However, the RBA cautioned against directly equating changes in the cost of debt with changes in the cost of equity:

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.[[252]](#footnote-252)

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.

1. 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.

Draft decision

The AER's draft decision is not to approve APA GasNet's proposed labour cost escalators. The AER considers that applying APA GasNet's proposed escalators will not result in forecast opex and capex arrived at on a reasonable basis.[[253]](#footnote-253) Nor do they provide the best possible forecasts of opex and capex in the circumstances.[[254]](#footnote-254)

The AER instead considers escalating labour by forecast annual increases in the unadjusted Labour Price Index (LPI) will result in the best possible forecasts of opex and capex in the circumstances.[[255]](#footnote-255)

The AER engaged Deloitte Access Economics (DAE) to develop forecasts of labour cost changes.[[256]](#footnote-256) The AER has determined the appropriate labour cost and materials escalators set out in table C.1.

* + - * 1. AER determined real cost escalators (per cent)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Internal labour - specialist | 1.7 | 1.1 | 1.1 | 1.2 | 0.9 | 1.1 |
| Internal labour - general | 1.7 | 1.1 | 1.1 | 1.2 | 0.9 | 1.1 |
| Contractors | 1.3 | 0.6 | 0.8 | 1.0 | 0.4 | 0.9 |

Source: AER analysis, Deloitte Access Economics, Forecast growth in labour costs in Victoria: Report prepared for the AER, 28 May 2012, p. 67.

APA GasNet's proposal

APA GasNet proposed that real cost escalations be applied to its opex and capex forecasts in order to forecast real labour cost increases for both internal and contract labour. APA GasNet engaged BIS Shrapnel to forecast real changes in labour costs for the 2013–17 access arrangement period. APA GasNet proposed three escalators:

* forecast growth in real adjusted average weekly ordinary time earnings (AWOTE) for the electricity, gas and water (EGW) industry for gas network related labour.
* forecast growth in real adjusted productivity weighted index AWOTE for professional services general labour.[[257]](#footnote-257)
* forecast growth in real adjusted productivity weighted index AWOTE construction labour for outsourced labour.[[258]](#footnote-258)
  + - * 1. APA GasNet proposed real labour cost escalators (per cent)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| EGW labour | 4.3 | –0.2 | 7.4 | 5.4 | 1.3 | 0.1 |
| General labour | 4.0 | 0.6 | 7.3 | 4.8 | 1 | 0.6 |
| Construction labour | 7.1 | 4.5 | 2.1 | 1.1 | 0.2 | 2.1 |

Source: GasNet, RIN, Table 7.1.

APA GasNet has not claimed any network materials real cost escalation.

Assessment approach

The AER assessed APA GasNet's proposed real cost escalators against the forecasts and estimates requirements in rule 74 of the NGR:[[259]](#footnote-259)

74 Forecasts and estimates

(1) Information in the nature of a forecast or estimate must be supported by a statement of the basis of the forecast or estimate.

(2) A forecast or estimate:

(a) must be arrived at on a reasonable basis; and

(b) must represent the best forecast or estimate possible in the circumstances.

The AER has taken into consideration Professor Borland's report commissioned by Envestra, and BIS Shrapnel's report commissioned by APA GasNet. In forming its views the AER has also considered advice from DAE on labour cost escalators.

Reasons for draft decision

The AER's draft decision is not to approve APA GasNet's proposed labour and materials cost escalators. The AER considers that applying APA GasNet'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.[[260]](#footnote-260) This is because:

* forecast movements in labour costs for the electricity, gas, water and waste services (EGWWS) industry provide the best forecast of movements in all internal labour costs possible in the circumstances, rather than the property and business services (PBS) industry for general labour and EGW industry for network labour
* the LPI provides a better measure of labour cost changes compared to AWOTE.
* real labour cost escalation should not be productivity adjusted due to issues in measuring and forecasting productivity

The following sections discuss these issues in detail.

Use of labour force industries

The AER does not approve APA GasNet's proposed use of the EGW industry in relation to network related labour, and the PBS industry in relation to general labour, to estimate labour cost escalations. The AER does not consider that they are the best possible forecasts or estimates in the circumstances.[[261]](#footnote-261)

The AER considers that using forecast growth in the EGWWS industry to escalate both network related labour and general labour better reflects labour costs for all internal APA GasNet labour during the 2013–17 access arrangement period.

The Australian Bureau of Statistics (ABS) has previously advised:

... regardless of the type of job, if the job was selected from a business classified to the electricity, gas, water and waste services industry, the jobs pay movements contributes to this industry. [[262]](#footnote-262)

The ABS takes into account the nature of the business, not the nature of the work undertaken, when allocating a job to an industry. The ABS labour price statistics for the EGWWS industry reflects both specialised gas distribution network related labour and general labour.

Since late 2009 the ABS has reported AWOTE and LPI data under the ANZSIC[[263]](#footnote-263) 2006 industry classification, where waste services have been included with the EGW industries, producing an EGWWS industry data series. This replaces the ANZSIC 1993 classification which discontinues the publication of the EGW industry data series.

BIS Shrapnel stated the inclusion of the waste services sub-sector in the classification will lead to lower wage growth outcomes for the combined EGWWS industry, which will no longer accurately reflect the occupations in the EGW industry. Consequently BIS Shrapnel estimated the waste services component and excluded it from both its historical data and forecasts, thus deriving an EGW estimate.[[264]](#footnote-264)

APA GasNet's proposed labour cost escalation rates are based on BIS Shrapnel forecasts for the EGW industry rather than the EGWWS industry used by the ABS.

BIS Shrapnel note that between 1998 and 2009 the LPI for the EGW industry grew by 4.3 per cent per annum as compared to 4.2 per cent for the EGWWS industry.[[265]](#footnote-265)

The AER does not consider that BIS Shrapnel's reasons for excluding the waste service component (that it would result in a lower wage growth) are sufficient to adjust the EGWWS data. In the absence of any compelling evidence of a difference between the EGW and EGWWS industries, the AER considers it is not necessary to remove the forecast waste services component from EGWWS data. The AER considers removing the waste services component from the data introduces a potential source of forecasting error since it is necessary to estimate the waste services components. Further, there is likely to be forecasting error from applying the discontinued EGW industry data series which concluded in June 2009 when the ABS moved to the ANZSIC 2006 classification. This forecasting error will be magnified over time as the period between the last available EGW data (2009) and the forecast period increases.

For these reasons, the AER considers that BIS Shrapnel's use of EGW and PBS industries to escalate labour costs would not result in the best labour cost forecast or estimate possible in the circumstances.[[266]](#footnote-266)

DAE has estimated labour costs using the ANZSIC 2006 classification for the EGWWS labour force industry to represent APA GasNet's internal labour force. The AER is of the view that applying forecasts based on the EGWWS industry rather than the EGW industry will result in the best forecast or estimate possible in the circumstances.

The AER has previously accepted the use of a single ABS labour force industry to represent the total workforce of a network service provider.[[267]](#footnote-267)

The choice of labour price measure and use of productivity adjustments

The AER does not approve APA GasNet's proposed use of forecast AWOTE growth rates adjusted for forecast labour productivity for the 2013–17 access arrangement period. The AER does not consider that it permits a forecast to be made on a reasonable basis, and the best possible forecast in the circumstances.[[268]](#footnote-268)

The AER considers that LPI forecasts, unadjusted for productivity effects, permits the best possible forecast of labour cost movements in the circumstances because:[[269]](#footnote-269)

* productivity measures for the EGWWS industry exhibit estimation bias for the reasons outlined in recent Productivity Commission (PC) analysis[[270]](#footnote-270)
* although productivity adjusted labour price movements provide the best estimate of labour cost movements, estimated productivity adjustments cannot be relied on due to the estimation bias in productivity measures
* the LPI contains less productivity effects than the AWOTE, where the AWOTE includes all productivity effects;
* although the AER considers that LPI forecasts, unadjusted for productivity effects, provide the best possible forecast of labour cost movements, the AER recognises that this will over compensate businesses to the extent that worker productivity gains over the forecast period are positive.

Each of these issues is considered in the sections below.

Labour productivity adjustments

Labour price changes are driven by both productivity effects and other effects. Productivity effects drive labour price changes since more productive labour receives higher wages.[[271]](#footnote-271) Other effects include CPI increases and any price changes driven by labour market supply/demand imbalances.

It is important to make the distinction between labour prices and labour costs. DAE stated:

... labour costs will rise at a different rate [than labour prices] due to the effects of labour productivity growth. Effectively, labour productivity measures the number of units of output an individual employee can produce in a given time period. The more units of output each worker can produce, the fewer workers are required to create a given level of industry output. If productivity is rising, the total cost of labour (the price of each employee multiplied by the number of employees) will rise less rapidly than the individual employee's price.[[272]](#footnote-272)

Broadly labour price changes can be described by three effects:

1. Composition productivity effects reflect increases in workforce productivity due to changes in the skill composition of the workforce. For example, an increase share of high skill workers will increase average workforce productivity and average wage rates per worker. However, because average workforce productivity has increased, fewer workers are required to produce the same amount of output, and any increase in labour costs will be less than the increase in the average labour price.
2. Worker productivity effects are increases in workforce productivity due to increases in the productivity of individual workers. For example, workers may become more productive from working with better capital equipment. Again, because average workforce productivity has increased fewer workers are required and any increase in labour costs will be less than the increase in the average labour price.
3. Other effects unrelated to productivity. For example, wage increases due to inflation or labour supply or demand imbalances. Because these effects are unrelated to productivity the same amount of labour is required to produce a given amount of output and the change in labour price results in a corresponding change in labour costs.

Conceptually at least, either the AWOTE or LPI labour price measures can quantify the change in labour costs. However, it is important to use matching labour price and productivity measures.[[273]](#footnote-273) The ABS publishes a number of productivity measures, including labour, capital and multifactor measures. The labour productivity measures are published annually for the market sector as a whole, as well as at the industry division level (for example, the electricity, gas and water industry). These measures indicate value added per hour worked. This conventional measure of labour productivity includes all productivity effects: composition productivity, worker productivity effects and other effects and as AWOTE includes all of these effects; it is the appropriate labour productivity measure for adjusting AWOTE.

A quality adjusted measure of labour productivity which includes worker productivity effects and other effects is the appropriate measure to adjust the LPI. The ABS recently developed quality adjusted measures of labour input and labour productivity. It released estimates for 1982–83 to 1999–2000 in 2005, and has since published yearly statistics from 1994–95. [[274]](#footnote-274) The measure of labour captures the change in the aggregate quality of labour due to compositional changes such as higher education, or longer work experience, so the effect is not ascribed to productivity. Generally, the quality adjusted labour productivity index increases at a slower rate than the conventional labour productivity index, because the conventional index includes compositional productivity effects that may reflect increased skill composition of the workforce. An increase in the skill composition of the workforce, which may manifest itself in an increase in the labour price, does not necessarily suggest a simultaneous increase in the labour cost. This is because an increase in the skill level may mean fewer workers such that labour costs may fall.

The AER considers that APA GasNet should not be compensated for labour price changes driven by labour productivity effects. This is because labour price changes do not equate to labour cost changes. To the extent labour prices compensate workers for increased productivity, those price increases do not increase labour costs, since fewer workers are required to produce the same output.

Further, the AER has previously stated that to the extent that labour prices are rising due to increased labour productivity (due to either compositional productivity or worker productivity), the increase in labour costs will be less than the increase in the labour price. [[275]](#footnote-275) To determine the impact of labour price increases on the total labour cost to produce a constant level of output, the price impacts of labour productivity effects should be removed from the labour price measure used.[[276]](#footnote-276) However, the PC has noted four broad issues which impact measurement of marginal factor productivity (MFP) growth in EGW industries:

1. cyclical investment—the lumpy nature of capital in relation to measured output[[277]](#footnote-277)
2. output measurement—difficulty in measuring output which can lead to unanticipated changes in MFP[[278]](#footnote-278)
3. shifts to higher cost technologies—investments as a result of climate-related issues increasing the cost per unit of output[[279]](#footnote-279)
4. unmeasured quality improvements—changes in government regulations mandating improvements in the network that are not directly measured, such as mandatory underground electricity cabling. [[280]](#footnote-280)

The AER considers that the estimation issues identified by the PC contribute to the uncertainty in forecasting productivity adjustments.

Productivity adjustments may also double-count other effects such as scale adjustments. Further, accurately forecasting labour productivity in the medium to long term is extremely difficult, leading to high risk of forecasting error. [[281]](#footnote-281)

APA GasNet has applied a productivity adjusted AWOTE estimated by BIS Shrapnel. BIS Shrapnel forecasts weak productivity growth over the next six years due to constrained demand and output growth.[[282]](#footnote-282) The AER considers that BIS Shrapnel's productivity forecasts do not take into account the factors described by the PC listed above.

Envestra sought advice from Professor Jeff Borland on whether the AWOTE or the LPI should be used for the purposes of real labour cost escalation for the 2013–17 access arrangement period.

Professor Borland stated that the productivity adjusted LPI underestimates changes to labour costs by an amount equal to the change in the skill composition of the workforce. [[283]](#footnote-283) The AER agrees with this view if the conventional labour productivity measure is used to adjust the LPI.

In response to Professor Borland, DAE stated its forecasts of LPI and productivity implicitly assume a zero value for composition productivity. If the compositional productivity adjustment is different from zero, this result would be deducted from both LPI growth and productivity growth resulting in a net effect of zero.[[284]](#footnote-284)

Professor Borland further notes in his empirical analysis that, over the long run, changes in labour costs is equal to changes in other productivity effects such as CPI.[[285]](#footnote-285)

The AER considers that in theory productivity adjustments should be applied to real cost escalations if productivity adjustments are not undertaken elsewhere in opex and capex forecasts.

However, the AER notes the high degree of difficulty in estimating both quality adjusted labour productivity and conventional labour productivity as evidenced by the conflicting productivity estimates from BIS Shrapnel and DAE and the analysis conducted by the PC. Thus, while the AER expects worker productivity to improve over the long run, due to estimation difficulties, it has not sought to address this effect, at this stage, in APA GasNet's forecasts of labour costs.

Choice of labour price measure

Given the difficulty in measuring and forecasting labour productivity movements, the AER considers that productivity adjustments should not be applied to APA GasNet's labour cost escalations. The AER notes that currently unadjusted labour forecasts of the AWOTE and LPI are above inflation. This approach will allow APA GasNet to benefit from changes in labour productivity effects. In light of the difficulties in estimating productivity, the AER considers an unadjusted LPI is the best forecast in the circumstances[[286]](#footnote-286) although this figure is upwardly biased by including labour productivity improvements.

APA GasNet proposed the use of forecast movements in productivity adjusted AWOTE, provided by BIS Shrapnel, to escalate its labour costs for anticipated real labour price increases.

AWOTE measures average employee earnings from working the standard number of hours per week. It is not strictly a price index (that measures the pure price effect) because the composition of labour is not held constant. It captures composition productivity effects, worker productivity effects and other effects. In contrast the LPI is a Laspeyres type price index. As a Laspeyres type price index the LPI measures the change in labour costs with the quantity and quality of work performed held constant. [[287]](#footnote-287) It measures the pure price effect, showing how much the same quantity of labour costs in the current period, relative to the base period. The weights used are for the base period and are updated annually to represent job distribution.[[288]](#footnote-288)

Conceptually at least, either labour price measure can quantify the change in labour costs, provided a correctly matched productivity measure is used.[[289]](#footnote-289)

BIS Shrapnel considers the LPI measures underlying wage inflation but does not measure variations in the quality or quantity of work performed. The AWOTE measures both the change in the cost of labour and skill level changes within an industry. For this reason BIS Shrapnel prefers the use of AWOTE over the LPI.[[290]](#footnote-290)

DAE noted that there are drawbacks to both the LPI and AWOTE measures. However it considered LPI to be a better measure than AWOTE, because compositional changes such as the pace of recruitment and retirement and the changed relativities in the employment of men and women can distort AWOTE as a proxy for changes in the price of labour. [[291]](#footnote-291)

DAE further notes the advantages of the LPI over the AWOTE as a measure of labour price changes will increase as the ABS commences publishing the AWOTE on a six monthly basis and ceases publishing all AWOTE by state by industry information. [[292]](#footnote-292)

However, the AER notes that using the LPI has its own difficulties because of the limited availability of quality adjusted labour productivity index data. The ABS publishes unadjusted labour productivity for the EGWWS industry but its quality adjusted labour productivity index is available only at the overall market sector level.

The ABS also considers the LPI to be their preferred indicator of changes in the price of labour because average weekly earnings (AWE) estimates are affected by changes in both the price of labour and changes in the composition of the labour market. [[293]](#footnote-293)

The AER considers the problems with using AWOTE are greater than those with using the LPI. This is because the higher volatility of the AWOTE, and the inclusion of the composition productivity effects, makes AWOTE unreliable for forecasting labour costs for the utilities industry in comparison with the more stable LPI time series (see figure C.1).

The LPI unadjusted for labour productivity, which includes worker productivity effects, will more closely represent the true change in labour costs than the unadjusted AWOTE which includes both worker and composition productivity effects.

The AER considers that any labour cost increases associated with compositional change should be offset by productivity benefits. To estimate the efficient labour cost, it is appropriate to hold the labour force composition stable over the forecast period and allow APA GasNet to retain any efficiency benefits of workforce compositional change.

* + - 1. Annual growth in LPI and AWOTE, EGWWS industry, Australia (per cent)



Source: ABS, catalogue 6302.0, table H; ABS, catalogue 6345.0, table 9b; AER analysis.

The AER notes that the inclusion of labour productivity effects will provide an upwardly biased forecast of labour cost movements if APA GasNet has positive labour productivity over the forecast period.

Choice of LPI forecasts

BIS Shrapnel estimated APA GasNet's forecast movements in both the LPI and AWOTE. DAE analysis has shown BIS Shrapnel's forecasts of LPI have consistently been higher than the actual LPI and DAEs forecasts have been too low. [[294]](#footnote-294) BIS Shrapnel's LPI forecasts, unadjusted for productivity, are higher than those forecast by DAE, consistent with this analysis (figure c.2)

APA GasNet has proposed that if the AER were to reject the use of BIS Shrapnel's forecast AWOTE then the AER should apply BIS Shrapnel's LPI forecasts. [[295]](#footnote-295)

The AER considers on balance the downward bias in the difference between DAEs forecast LPI and actual LPI is less than the magnitude of DAEs forecast of quality adjusted labour productivity. That is, productivity adjustments are likely to outweigh any potential downward bias in DAEs forecasts Therefore the AER considers the LPI estimated by DAE represents the best forecast possible in the circumstances.[[296]](#footnote-296)

* + - 1. Real LPI forecasts (per cent)

Source: BIS Shrapnel, Real Cost Escalation Forecasts to 2017—Australia and Victoria, March 2012; Deloitte Access Economics, Forecast growth in labour costs in Victoria, 28 May 2012.

The AER undertook its own analysis and compared both BIS Shrapnel's and DAEs forecasts of LPI movements for the Australian economy (table c.3). For the forecast series commencing 2006 to 2011 included in the analysis, the average of DAEs and BIS Shrapnel's forecasts had the lowest mean absolute error on three occasions, DAEs forecasts on two and BIS Shrapnel's once. This result is consistent with a significant body of literature concluding forecast accuracy can be improved by combining multiple individual forecasts.[[297]](#footnote-297) It is also consistent with DAEs finding that its forecasts were too pessimistic but BIS Shrapnel's were too optimistic. The AER did not have the necessary data to undertake the same analysis for Victoria

* + - * 1. Comparison of past LPI forecast

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Forecast | 2006-07 | | 2007-08 | 2008-09 | 2009-10 | 2010-11 | Mean absolute error |
| Utilities | | | | | | | |
| Actual | | 5.0 | 4.1 | 4.5 | 4.3 | 4.2 |  |
| BIS Shrapnel (March 2007) | | 5.8 | 5.8 | 5.2 | 4.5 | 4.7 | 0.78 |
| DAE (April 2007) | | 5.6 | 5.7 | 5.1 | 3.6 | 3.9 | 0.76 |
| BIS Shrapnel (April 2009) | |  |  | 4.8 | 4.7 | 4.4 | 0.30 |
| DAE (September 2009) | |  |  | 4.5 | 3.5 | 3.4 | 0.53 |
| BIS Shrapnel (December 2009) | |  |  |  | 4.3 | 4.2 | 0.00 |
| DAE (March 2010) | |  |  |  | 4.0 | 3.9 | 0.30 |
| All industries | | | | | | | |
| Actual | | 3.9 | 4.1 | 4.1 | 3.1 | 3.8 |  |
| BIS Shrapnel (March 2007) | | 4.2 | 4.5 | 3.8 | 3.7 | 4.2 | 0.40 |
| DAE (April 2007) | | 4.1 | 4.6 | 4.4 | 4.0 | 4.3 | 0.48 |
| BIS Shrapnel (April 2009) | |  |  | 4.1 | 3.3 | 3.1 | 0.30 |
| DAE (September 2009) | |  |  | 4.1 | 3.5 | 3.9 | 0.17 |
| BIS Shrapnel (December 2009) | |  |  |  | 3.1 | 3.3 | 0.25 |
| DAE (March 2010) |  | |  |  | 3.2 | 3.7 | 0.10 |

Source: AER analysis; BIS Shrapnel, Labour cost escalation forecasts to 2016–17—Australia and Queensland, January 2012, table 6.1.

The AER notes BIS Shrapnel's forecast real productivity adjusted LPI exhibits a high level of volatility. The AER considers BIS Shrapnel's labour productivity adjusted forecasts will overstate labour cost movements. These forecasts exhibit a strong increase in 2014 which is driven by BIS Shrapnel's forecast steep decline in labour productivity (figure c.3). Given the issues raised by the Productivity Commission regarding measured productivity in the EGWWS industry the AER is not satisfied BIS Shrapnel's forecast real productivity adjusted LPI will accurately reflect APA GasNet's labour costs in the 2013–17 access arrangement period.

* + - 1. Real productivity adjusted LPI forecasts (per cent)

Source: BIS Shrapnel, Real Cost Escalation Forecasts to 2017—Australia and Victoria, March 2012; Deloitte Access Economics, Forecast growth in labour costs in Victoria, 28 May 2012.

Revisions

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

Revision C.1: Opex and capex forecasts should be amended to reflect the labour cost forecasts set out in table c.1.

1. NGR, r. 87(1). [↑](#footnote-ref-1)
2. APA GasNet, Access Arrangement Submission—Confidential appendix D-6, March 2012, p. 288. APA GasNet subsequently informed the AER that the material in appendix D-6 is not confidential. APA GasNet, Information Request—Disclosure of Confidential Information No. 5, August 2012. [↑](#footnote-ref-2)
3. On 15 August 2012, the AER sent APA GasNet a letter requesting an averaging period be provided consistent with this method. AER, Letter to APA GasNet, 15 August 2012. [↑](#footnote-ref-3)
4. See for example: AER, Letter to SP AusNet, 16 April 2012. [↑](#footnote-ref-4)
5. Email to AER, VTSAA - Nomination of the Averaging Period - DRP and RFR, 29 August 2012. [↑](#footnote-ref-5)
6. Email to AER, VTSAA - Nomination of the Averaging Period - DRP and RFR, 29 August 2012. [↑](#footnote-ref-6)
7. Email to APA GasNet, RE: VTSAA - Nomination of the Averaging Period - DRP and RFR, 29 August 2012. [↑](#footnote-ref-7)
8. APA GasNet, Letter to the AER, 30 August 2012. [↑](#footnote-ref-8)
9. APA GasNet, Letter to the AER, 30 August 2012. [↑](#footnote-ref-9)
10. APA GasNet, Letter to the AER, 30 August 2012. [↑](#footnote-ref-10)
11. Lally, M., Expert Report of Martin Thomas Lally, February 2011, pp. 9-10. Lally's comments in this report were made about a specific approach proposed in the relevant determination but are consistent with the approach taken by the AER in this decision. [↑](#footnote-ref-11)
12. The absence of either an averaging period or a process of nomination from Envestra’s, Multinet’s and SP AusNet’s proposals was significant enough for the AER to find their proposals deficient (see for example AER, Letter to SP AusNet, 16 April 2012). Those examples illustrate that the AER considers maintaining the integrity of APA GasNet’s proposed nomination process is important. Further, the AER is required to consider submissions made within the time allowed by the AER for the making of submissions, which expired on 18 June 2012. APA GasNet did not make any such submission regarding the averaging period. [↑](#footnote-ref-12)
13. SP AusNet, Letter to the AER, 29 August 2012. [↑](#footnote-ref-13)
14. 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) [↑](#footnote-ref-14)
15. Caballero, R. and Kurlat, P., MIT Department of Economics Working Paper No. 08-21, Flight to Quality and Bailouts: Policy Remarks and a Literature Review, 9 October 2008, p. 1. [↑](#footnote-ref-15)
16. Glenn Stevens, Opening Statement to the House of Representatives - Hansard script, 24 August 2012, p. 2. [↑](#footnote-ref-16)
17. Caballero, R. and Kurlat, P., MIT Department of Economics Working Paper No. 08-21: Flight to Quality and Bailouts: Policy Remarks and a Literature Review, 9 October 2008, p. 2. [↑](#footnote-ref-17)
18. Discussed further in section 4.3.2. [↑](#footnote-ref-18)
19. Reserve Bank of Australia, Letter to the ACCC: The Commonwealth Government Securities Market, 16 July 2012, p. 1 (RBA, Letter regarding the CGS market, July 2012). [↑](#footnote-ref-19)
20. RBA, Letter regarding the CGS market, July 2012, p. 1. [↑](#footnote-ref-20)
21. Australian Treasury and Australian Office of Financial Management, Letter to the ACCC: The Commonwealth Government Securities Market, 18 July 2012, p. 2 (Treasury and AOFM, Letter regarding the CGS Market, July 2012). [↑](#footnote-ref-21)
22. AER, Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, 1 May 2009, p. 101 (AER, Final Decision: WACC Review, May 2009). [↑](#footnote-ref-22)
23. Joint Industry Associations (Energy Networks Association, The Australian Pipeline Industry Association Ltd and Grid Australia), Network industry submission: AER Issues Paper, Review of the Weighted Average Cost of Capital (WACC) parameters for electricity transmission and distribution, 24 September 2008, p. 28 (see also pp. 22, 24, 160, 174). [↑](#footnote-ref-23)
24. G. Debelle (Assistant Governor, Financial Markets, RBA), Speech to the APRA Basel III Implementation Workshop 2011: The Committed Liquidity Facility, 23 November 2011, p. 1 (Debelle, Speech on the committed liquidity facility, November 2011) [↑](#footnote-ref-24)
25. CEG, Risk free rate and MRP in the CAPM, March 2012, pp. 30-32. [↑](#footnote-ref-25)
26. CEG, Risk free rate and MRP in the CAPM, March 2012, pp. 30-32. [↑](#footnote-ref-26)
27. CEG, Risk free rate and MRP in the CAPM, March 2012, p. 32. [↑](#footnote-ref-27)
28. RBA, Letter regarding the CGS market, July 2012, p. 1. [↑](#footnote-ref-28)
29. Debelle, Speech on the committed liquidity facility, November 2011, p. 2. [↑](#footnote-ref-29)
30. RBA, Letter to the AER, August 2007, p. 1; Australian Treasury, The Treasury Bond yield as a proxy for the CAPM risk-free rate, August 2007, p. 1. [↑](#footnote-ref-30)
31. Initially stated in 2002–03 Budget <www.budget.gov.au/2003-04/bp1/html/bst7.htm>; reaffirmed in 2011–12 budget. <www.budget.gov.au/2011-12/content/bp1/html/bp1\_bst7-03.htm>. [↑](#footnote-ref-31)
32. CEG, Risk free rate and MRP in the CAPM, March 2012, p. 29. [↑](#footnote-ref-32)
33. Treasury and AOFM, Letter regarding the CGS Market, July 2012, p. 2. [↑](#footnote-ref-33)
34. Treasury and AOFM, Letter regarding the CGS Market, July 2012, p. 2. [↑](#footnote-ref-34)
35. RBA, Letter regarding the CGS market, July 2012, p. 1. [↑](#footnote-ref-35)
36. Treasury and AOFM, Letter regarding the CGS Market, July 2012, p. 2. [↑](#footnote-ref-36)
37. Lancaster and Dowling, The Australian Semi-government Bond Market, RBA bulletin, September Quarter 2011, p. 54. [↑](#footnote-ref-37)
38. Treasury and AOFM, Letter regarding the CGS Market, July 2012, p. 2. [↑](#footnote-ref-38)
39. Treasury and AOFM, Letter regarding the CGS Market, July 2012, p. 2. [↑](#footnote-ref-39)
40. CEG, Risk free rate and MRP in the CAPM, March 2012, pp. 21-25. [↑](#footnote-ref-40)
41. Discussed further in section 4.3.2. [↑](#footnote-ref-41)
42. CEG, Risk free rate and MRP in the CAPM, March 2012, p. i. [↑](#footnote-ref-42)
43. CEG, Risk free rate and MRP in the CAPM, March 2012, p. 4. [↑](#footnote-ref-43)
44. CEG, Risk free rate and MRP in the CAPM, March 2012, p. 41–47. [↑](#footnote-ref-44)
45. CEG, Risk free rate and MRP in the CAPM, March 2012, p. 45–46. [↑](#footnote-ref-45)
46. Envestra, Access arrangement information, 30 March 2012, p. 156; SP AusNet, Access arrangement information, 30 March 2012, p. 189 ; Multinet, Access arrangement information, 30 March 2012, p. 154; APA GasNet, Access arrangement submission, 31 March 2012, p. 132–133. [↑](#footnote-ref-46)
47. CEG, Risk free rate and MRP in the CAPM, March 2012, p. i. [↑](#footnote-ref-47)
48. M. Lally, The risk free rate and the present value principle, 22 August 2012, p. 3 (Lally, Risk free rate and present value, August 2012) [↑](#footnote-ref-48)
49. Lally, Risk free rate and present value, August 2012, p. 7. [↑](#footnote-ref-49)
50. RBA, Capital market Yields - Government Bonds - Monthly - F2, available at

    <<http://www.rba.gov.au/statistics/tables/index.html>>, accessed 15 August 2012. [↑](#footnote-ref-50)
51. CEG, Risk free rate and MRP in the CAPM, March 2012, p. 45. [↑](#footnote-ref-51)
52. CEG, Risk free rate and MRP in the CAPM, March 2012, pp. 16, 45. [↑](#footnote-ref-52)
53. 'A change in expected inflation will cause the same change in the nominal interest rate.' R. Brealey, S. Myers, G. Partington, and D. Robinson, Principles of Corporate Finance, McGraw-Hill Australia: First Australian Edition, 2007, p. 691. [↑](#footnote-ref-53)
54. CEG, Risk free rate and MRP in the CAPM, March 2012, p. 45. [↑](#footnote-ref-54)
55. RBA, Letter regarding the CGS market, July 2012, p. 1. [↑](#footnote-ref-55)
56. Discussed further in section 4.3.2. [↑](#footnote-ref-56)
57. Australian Competition Tribunal, Application by DBNGP(WA) Transmission Pty Ltd (No 3) [2012] ACompT 14, 26 July 2012, paragraph 149. [↑](#footnote-ref-57)
58. AER, Final Decision: WACC Review, May 2009, pp. 148–149. [↑](#footnote-ref-58)
59. Lally, Risk free rate and present value, August 2012, p. 16. [↑](#footnote-ref-59)
60. K. Davis, Determining debt costs in access pricing, a report to IPART, February 2011, p. 1. [↑](#footnote-ref-60)
61. A. Damodaran, What is the riskfree rate? A search for the Basic Building Block, December 2008, pp. 6–7. [↑](#footnote-ref-61)
62. AER, Final Decision: WACC Review, May 2009, pp. 156–166. [↑](#footnote-ref-62)
63. AER, Final Decision: WACC Review, May 2009, p. 168. [↑](#footnote-ref-63)
64. 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). [↑](#footnote-ref-64)
65. Australian Competition Tribunal, Application by DBNGP(WA) Transmission Pty Ltd (No 3) [2012] ACompT 14, 26 July 2012, paragraph 131. [↑](#footnote-ref-65)
66. Australian Competition Tribunal, Application by DBNGP(WA) Transmission Pty Ltd (No 3) [2012] ACompT 14, 26 July 2012, paragraph 132. [↑](#footnote-ref-66)
67. CEG, Risk free rate and MRP in the CAPM, March 2012, p. v. Source document is Australian Competition Tribunal, Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009) [2009] ACompT 8, 12 November 2009. [↑](#footnote-ref-67)
68. Australian Competition Tribunal, Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9, 12 May 2011. [↑](#footnote-ref-68)
69. Australian Competition Tribunal, Application by Envestra Ltd (No 2) [2012] ACompT 3, 11 January 2012. Also, in the Victorian electricity distribution determination, the AER accepted Jemena Electricity Network's proposed averaging period, despite it being inconsistent with the SRI methodology. This was on the basis of the Tribunal's decision in the EnergyAustralia matter. The AER stated at the time that it was still examining the full implications of the Tribunal's decision and its relationship to the requirements of the SRI as well as to the broader NER framework. AER, Final decision: Victorian electricity distribution network service providers: Distribution determination 2011–15, October 2010, pp. 477–478 (AER, Final decision: Victorian distribution determination, October 2010). [↑](#footnote-ref-69)
70. Australian Competition Tribunal, Application by Telstra Corporation Limited ABN 33 051 775 556 [2010] ACompT 1, 10 May 2010. [↑](#footnote-ref-70)
71. NER, transitional chapter 6, clause 6.5.2(b) [↑](#footnote-ref-71)
72. Some support for the conclusion that they did can be found at paragraph 73(d)(1) where the Tribunal stated that a principle assisting it in the determination of the issue was '...whether the period proposed is likely to result in an unbiased risk free rate, given that the equity beta and the market risk premium are deemed to be 1.0 [sic] and 6.0 per cent respectively'. Australian Competition Tribunal, Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009) [2009] ACompT 8, 12 November 2009. [↑](#footnote-ref-72)
73. Federal Court of Australia, ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639, 8 June 2011, paragraph 148. [↑](#footnote-ref-73)
74. Australian Competition Tribunal, Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009) [2009] ACompT 8, 12 November 2009, paragraph 94. [↑](#footnote-ref-74)
75. Federal Court of Australia, ActewAGL Distribution v The Australian energy Regulator [2011] FCA 639, 8 June 2011, paragraph 145. [↑](#footnote-ref-75)
76. NGR, r. 40(3). [↑](#footnote-ref-76)
77. The AER referenced the following three reports in support of this statement: M. Lally, Determining the risk free rate for regulated companies, August 2002; K. Davis, Report on the risk free interest rate and equity and debt beta determination in the WACC, 28 August 2003; M. Lally, The cost of capital for regulated utilities—Report prepared for the QCA, 26 February 2004 (Lally, Cost of capital for regulated utilities, February 2004). [↑](#footnote-ref-77)
78. Australian Competition Tribunal, Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009) [2009] ACompT 8, 12 November 2009. [↑](#footnote-ref-78)
79. The term of the risk free rate was deemed to be 10 years in the transitional chapter 6 clause 6.5.2 that applied in the EnergyAustralia matter. [↑](#footnote-ref-79)
80. Federal Court of Australia, ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639, 8 June 2011, paragraph 113. [↑](#footnote-ref-80)
81. Federal Court of Australia, ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639, 8 June 2011, paragraphs 22 and 28. [↑](#footnote-ref-81)
82. For example, if the Tribunal's interpretation is correct, it seems that the AER misinterpreted clause 6.5.2(a). If so, it seems likely that the Federal Court would have made a similar finding. However, it did not. The AER acknowledges that the Federal Court did not address this issue in detail. [↑](#footnote-ref-82)
83. Australian Competition Tribunal, Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009) [2009] ACompT 8, 12 November 2009, paragraph 94. [↑](#footnote-ref-83)
84. Federal Court of Australia, ActewAGL Distribution v The Australian Energy Regulator [2011] FCA 639, 8 June 2011, paragraph 145. [↑](#footnote-ref-84)
85. Lally advised this is because the 'expectations hypothesis' is not a satisfactory characterisation of the term structure of interest rates. Lally went on to explain that even if the expectations hypothesis held, the use of forward interest rates to assess two different averaging periods is still a flawed approach. M. Lally, Expert report of Martin Thomas Lally, 13 February 2011, p. 15 (Lally, Expert report, February 2011). [↑](#footnote-ref-85)
86. Lally, Expert report, February 2011, p. 15. [↑](#footnote-ref-86)
87. Australian Competition Tribunal, Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009) [2009] ACompT 8, 12 November 2009, paragraph 145. [↑](#footnote-ref-87)
88. Australian Competition Tribunal, Application by Telstra Corporation Limited ABN 33 051 775 556 [2010] ACompT 1, 10 May 2010, paragraph 364. [↑](#footnote-ref-88)
89. Australian Competition Tribunal, Application by Telstra Corporation Limited ABN 33 051 775 556 [2010] ACompT 1, 10 May 2010, paragraphs 415–417. [↑](#footnote-ref-89)
90. Australian Competition Tribunal, Application by Telstra Corporation Limited ABN 33 051 775 556 [2010] ACompT 1, 10 May 2010, paragraph 418. [↑](#footnote-ref-90)
91. In a recent determination process Aurora Energy Pty Ltd submitted that the Tribunal's comments at paragraph 422 supported a departure from a short tem average approach. The AER does not take the same interpretation of those comments. Further discussion can be found in the Aurora final determination. AER, Final distribution determination: Aurora Energy Pty Ltd 2012–13 to 2016–17, Appendices, April 2012, pp. 11–13 (section A.1.4). [↑](#footnote-ref-91)
92. E. Elton, M. Gruber, S. Brown and W. Goetzmann, Modern Portfolio Theory and Investment Analysis, Wiley: Eighth edition, 2010, pp. 516–521. [↑](#footnote-ref-92)
93. G. Peirson, R. Brown, S. Easton and P. Howard, Business Finance, McGraw-Hill: Eighth edition, 2003, p. 103. [↑](#footnote-ref-93)
94. T. Brailsford, R. Heaney, and C. Bilson, Investments: concepts and applications, Nelson Australia Pty Ltd: Third edition, 2007, p. 155 (Brailsford et al, Investments: concepts and applications, 2007). [↑](#footnote-ref-94)
95. T. Brailsford, R. Heaney, and C. Bilson, Investments: concepts and applications, Nelson Australia Pty Ltd: Third edition, 2007, p. 156. [↑](#footnote-ref-95)
96. These concerns have been raised by Lally when considering the use of forward interest rates to predict future interest rates. Lally, Expert report, February 2011, p. 15–17. [↑](#footnote-ref-96)
97. J. Handley, *An estimate of the historical equity risk premium for the period 1883 to 2011*, April 2012, p. 6. Estimates are based on an assumed value of imputation credits of 0.35. [↑](#footnote-ref-97)
98. For example, if an index starts at 100, falls to 80 and then increases again to 100, the arithmetic average return is 2.5 per cent (the average of the initial 20 per cent fall and subsequent 25 per cent rise) and the geometric average return is zero (because the value of the index at the end of the second period is the same as at the beginning of the first period). [↑](#footnote-ref-98)
99. See: AER, Final decision: Envestra Ltd access arrangement proposal for the SA gas network 2011–2016, June 2011 p. 191 (AER, Final decision: Envestra access arrangement SA, June 2011); AER, Final decision: Envestra Ltd access arrangement proposal for the Qld gas network 2011–2016, June 2011, p. 179 (AER, Final decision: Envestra access arrangement Qld, June 2011); AER, Final distribution determination, Aurora Energy Pty Ltd 2012–13 to 2016–17, April 2012, p. 145 (AER, Final decision: Aurora distribution determination, April 2012); AER, Final decision: APTPPL access arrangement, August 2012, p. 69. [↑](#footnote-ref-99)
100. See Australian Competition Tribunal, Application by Envestra Ltd (No 2) [2012] ACompT 3, 11 January 2012 and Australian Competition Tribunal, Application by Envestra Ltd (No 2) [2012] ACompT 4, 11 January 2012. [↑](#footnote-ref-100)
101. Corrs Chambers Westgarth, *Appendix B*—*market risk premium, the Australian Energy Regulator’s submissions*, 11 November 2011, pp. 17–18. [↑](#footnote-ref-101)
102. Australian Competition Tribunal, *Application by Envestra Ltd (No 2) [2012] ACompT* *3*, 11 January 2012, paragraph 157. [↑](#footnote-ref-102)
103. SFG, Market risk premium, Report for APT Petroleum Pipelines Ltd, 11 October 2011, p. 16 (SFG, MRP for APTPPL, October 2011). [↑](#footnote-ref-103)
104. 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). [↑](#footnote-ref-104)
105. SFG, MRP for APTPPL, October 2011, p.1 8. [↑](#footnote-ref-105)
106. Australian Competition Tribunal, Application by Envestra Ltd (No 2) [2012] ACompT 3, 11 January 2012, paragraph 157. [↑](#footnote-ref-106)
107. McKenzie, and Partington, Supplementary report on the MRP, February 2012, pp. 5–7. [↑](#footnote-ref-107)
108. NERA, Prevailing conditions and the market risk premium: A report for APA Group, Envestra, Multinet and SP AusNet, March 2012, pp. 49–50 (NERA, Prevailing conditions and the MRP, March 2012). [↑](#footnote-ref-108)
109. M. Lally, The c*ost of equity and* the *market risk premium,* 25 July 2012, pp. 3–15 (Lally, Cost of equity and the MRP, July 2012). [↑](#footnote-ref-109)
110. The AER’s consideration was discussed in detail in AER, Draft decision, APT Petroleum Pipeline Pty Limited access arrangement proposal for the Roma to Brisbane Pipeline 12 April 2012 – 30 June 2017, April 2012, pp. 295–296. [↑](#footnote-ref-110)
111. McKenzie, and Partington, *Supplementary report on the* MRP, February 2012, pp. 7–9. [↑](#footnote-ref-111)
112. Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT* *3*, 11 January 2012, paragraphs 165–166. [↑](#footnote-ref-112)
113. NERA Economic Consulting, The market risk premium: A report for CitiPower, Jemena, Powercor, SP AusNet and United Energy, February 2012 (NERA, MRP for the Vic electricity DNSPs, February 2012), p. 31. [↑](#footnote-ref-113)
114. McKenzie and Partington, *Supplementary report on the* MRP, February 2012, p. 17. [↑](#footnote-ref-114)
115. M. McKenzie, and G. Partington, Report to the AER: Review of regime switching framework and critique of survey evidence, 7 September 2012, p. 27 (McKenzie and Partington, MRP: regime switching framework and survey evidence, September 2012, p.27) [↑](#footnote-ref-115)
116. McKenzie and Partington, *Supplementary report on the* MRP, February 2012, pp. 17–18. [↑](#footnote-ref-116)
117. McKenzie and Partington, *Supplementary report on the* MRP, February 2012, pp. 17–18. [↑](#footnote-ref-117)
118. Truong, Partington and Peat (2008) and Asher (2011) were published in academic journals. Fernandez surveys are repeated over time. KPMG (2005), Capital Research (2006) and Bishop (2009) are neither of these. [↑](#footnote-ref-118)
119. McKenzie and Partington, MRP: *regime switching framework and survey evidence,* September 2012, p. 28. [↑](#footnote-ref-119)
120. McKenzie and Partington, *Supplementary report on the MRP, February 2012*, pp. 17–18. [↑](#footnote-ref-120)
121. McKenzie and Partington, *Supplementary report on the MRP, February 2012*, pp. 18–19. [↑](#footnote-ref-121)
122. McKenzie and Partington, *Supplementary report on the MRP,* February 2012, p. 20. [↑](#footnote-ref-122)
123. Corporate finance texts have noted '[t]he simple constant-growth DCF [discounted cash flows] formula is an extremely useful rule of thumb' but '[n]aive trust in the formula has led many financial analysts to silly conclusions'. R. Brealey, S. Myers and F. Allen, *Principles of Corporate Finance,* McGraw-Hill Boston: 9th International Edition, 2008, p. 95. [↑](#footnote-ref-123)
124. M. McKenzie and G. Partington, Report to Corrs Chambers Westgarth: Equity market risk premium, 21 December 2011, p. 25 (McKenzie and Partington, Equity market risk premium, December 2011). [↑](#footnote-ref-124)
125. Lally, Cost of equity and the MRP, July 2012, pp. 11–18. [↑](#footnote-ref-125)
126. AER, Final decision: WACC review, May 2009, p. 220. [↑](#footnote-ref-126)
127. AER, Final decision: WACC review, May 2009, pp. 218–219. [↑](#footnote-ref-127)
128. CEG, Risk free rate and MRP in the CAPM, March 2012, p. 38. [↑](#footnote-ref-128)
129. The AER understands that the US might have better quality data for DGM analysis. [↑](#footnote-ref-129)
130. BHP Billiton, Submission to the AER: APA GasNet access arrangement proposal,29 June 2012, pp. 13–14; McKenzie and Partington, Equity market risk premium, December 2011, pp. 23–27; Lally, Cost of equity and the MRP, July 2012, pp. 15–18. [↑](#footnote-ref-130)
131. 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). [↑](#footnote-ref-131)
132. Capital Research, MRP estimate for the Aurora determination, February 2012, table 2, p.21. [↑](#footnote-ref-132)
133. 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). [↑](#footnote-ref-133)
134. NERA, *Prevailing conditions and the market risk premium*: A report for APA Group, Envestra, Multinet and SP AusNet*,* March 2012, pp. 49–50 (NERA, Prevailing conditions and the MRP, March 2012). [↑](#footnote-ref-134)
135. Lally, *Cost of equity and the* MRP*,* July 2012, pp. 15–18. [↑](#footnote-ref-135)
136. Lally, *Cost of equity and the* MRP*,* July 2012, pp. 18–20. [↑](#footnote-ref-136)
137. Lally, *Cost of equity and the* MRP*,* July 2012, p. 20. [↑](#footnote-ref-137)
138. Capital Research, *Australian market risk premium*, January 2005, pp. 31–32. [↑](#footnote-ref-138)
139. Lally, *Cost of equity and* MRP*,* July 2012, p. 22. [↑](#footnote-ref-139)
140. CEG, R*isk free rate and MRP in the CAPM,* March 2012, p. 49. [↑](#footnote-ref-140)
141. Lally, *Cost of equity and the* MRP*,* July 2012, pp. 11–23. [↑](#footnote-ref-141)
142. Capital Research, MRP estimate for the Vic NSPs, March 2012, p. 33 [↑](#footnote-ref-142)
143. Capital Research, MRP estimate for the Aurora determination, February 2012, pp. 19–23. [↑](#footnote-ref-143)
144. McKenzie and Partington, Equity market risk premium, December 2011, p. 26. [↑](#footnote-ref-144)
145. NERA, *Prevailing conditions and the* MRP*,* March 2012, pp. 24–31. [↑](#footnote-ref-145)
146. For example, NERA estimated the probability of the market remaining in the high volatility state was 0.935 per cent and the probability of it remaining in the low volatility state was 0.951 per cent. However, NERA estimated probability of the high volatility state for 2012–2016 based on the probability of it remaining in the low volatility state (0.951). [↑](#footnote-ref-146)
147. McKenzie and Partington, MRP: Regime switching framework and survey evidence*,* September 2012, pp. 21–22. [↑](#footnote-ref-147)
148. McKenzie and Partington, *Equity market risk premium*, December 2011, pp. 36–37. [↑](#footnote-ref-148)
149. McKenzie and Partington, Supplementary report on the MRP, February 2012, p. 5.

     McKenzie and Partington, MRP: Regime switching framework and survey evidence, September 2012, pp. 24–25. [↑](#footnote-ref-149)
150. Lally, Cost of equity and the MRP, July 2012, p. 3. [↑](#footnote-ref-150)
151. Lally, *Cost of equity and the* MRP*,* July 2012, p. 34. [↑](#footnote-ref-151)
152. Further, the appropriate measure of implied volatility is difficult to determine, with different measures (based on different underlying options) producing conflicting figures. [↑](#footnote-ref-152)
153. See discussions in AER, *Draft decision*: *Envestra Ltd*: *Access arrangement proposal for the SA gas network* 2011–2016, 17 February 2011, pp. 282–283 (AER, Draft decision: Envestra access arrangement SA, February 2011). [↑](#footnote-ref-153)
154. McKenzie and Partington, *Equity market risk premium*, December 2011, pp. 30–31. [↑](#footnote-ref-154)
155. VAA, Market risk premium: *Comments on the AER draft distribution determination for Victorian electricity distribution network service providers,* July 2010, p. 19 (VAA, MRP for Vic electricity DNSPs, July 2010). [↑](#footnote-ref-155)
156. The Australian Competition Tribunal also recognised this view, in the DBNGP decision. See: Australian Competition Tribunal, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14,* 26 July 2012, paragraphs 153–154. [↑](#footnote-ref-156)
157. NERA, Prevailing conditions and the MRP, March 2012, p. 42. [↑](#footnote-ref-157)
158. NERA, Prevailing conditions and the MRP, March 2012, pp. 24–31. [↑](#footnote-ref-158)
159. SFG, Review of NERA regime-switching framework: Report for APA Group, Envestra, Multinet Gas and SP AusNet, 29 March 2012, p. 8 (SFG, Review of NERA regime-switching framework, March 2012). [↑](#footnote-ref-159)
160. McKenzie and Partington, MRP: Regime switching framework and survey evidence, September 2012, pp. 5–25. [↑](#footnote-ref-160)
161. R. Tsay, Wiley series in probability and statistics: Analysis of financial time series, Wiley: Third edition, 2010, p. 187. [↑](#footnote-ref-161)
162. McKenzie and Partington, MRP: Regime switching framework and survey evidence, September 2012, p. 20. [↑](#footnote-ref-162)
163. SFG, M*arket 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). [↑](#footnote-ref-163)
164. SFG, Issues affecting the estimation of MRP: Report for Envestra, 21 March 2011. [↑](#footnote-ref-164)
165. SFG, MRP for APTPPL, October 2011. [↑](#footnote-ref-165)
166. SFG, Conditional and unconditional MRP for the Vic DNSPs, February 2012. [↑](#footnote-ref-166)
167. SFG, Review of NERA regime-switching framework, March 2012; and SFG, Market risk premium: Response to selected issues arising out of the AER final decision for Envestra (South Australia): Report for APA Group, Envestra, Multinet and SP AusNet, 29 March 2012 (SFG, Response on MRP for the Vic DNSPs, March 2012). [↑](#footnote-ref-167)
168. The Black-Scholes option pricing model is most often used, but other methods are possible. [↑](#footnote-ref-168)
169. To clarify, options are sold with different maturities beyond this range, but the implied volatility calculations are found only at these short term horizons. [↑](#footnote-ref-169)
170. See AER, Final decision: WACC review, May 2009, pp. 231–234; AER, Draft decision: Envestra access arrangement SA, February 2011, pp. 282–283; and AER, Final decision: Envestra access arrangement SA, June 2011, pp. 196–197. [↑](#footnote-ref-170)
171. See the discussion below on the VAA implied volatility glide path approach; also see AER, Draft decision: Envestra access arrangement SA, February 2011, pp. 282–283; and AER, Final decision: Envestra access arrangement SA, June 2011, pp. 196–197. [↑](#footnote-ref-171)
172. See the discussion of Chernov (2007) and Santa-Clara and Yan (2010) in AER, Draft decision: Envestra access arrangement SA, February 2011, pp. 282–283; and AER, Final decision: Envestra access arrangement SA, June 2011, pp. 196–197. [↑](#footnote-ref-172)
173. McKenzie, and Partington, Supplementary report on the MRP, February 2012. Also see the discussion of Doran (2005) in AER, Draft decision: Envestra access arrangement SA, February 2011, pp. 282–283; and AER, Final decision: Envestra access arrangement SA, June 2011, pp. 196–197. [↑](#footnote-ref-173)
174. McKenzie and Partington, *Supplementary report on the* MRP, February 2012, pp. 26–27 [↑](#footnote-ref-174)
175. Since the SFG assessment of implied volatility is relative to the 'baseline' long run average, the choice of baseline period is particularly important to the final result. The AER has previously noted that SFG inappropriately chose a shorter (post 2000) baseline period in its analysis, rather than the longest available data series; see AER, Final decision: APTPPL access arrangement, August 2012, pp. 222, 225–226. [↑](#footnote-ref-175)
176. However, it appeared that SFG did not always update its reports to include the most recent data, even allowing for a short practical delay encompassing analysis and publication. See AER, Final decision: APTPPLaccess arrangement, August 2012, pp. 218–226. [↑](#footnote-ref-176)
177. Briefly, the proposed relationship is that the current value of implied volatility relative to its long term average is indicative of the current value of the market risk premium relative to its long term average. [↑](#footnote-ref-177)
178. SFG, MRP for APTPPL, October 2011, p. 11. [↑](#footnote-ref-178)
179. McKenzie and Partington, *Supplementary report on the* MRP, February 2012, pp. 21–23. [↑](#footnote-ref-179)
180. More specifically, the DGM includes consideration of changes in dividends beyond the immediate dividend forecast horizon. [↑](#footnote-ref-180)
181. SFG, MRP for APTPPL, October 2011, p. 9. [↑](#footnote-ref-181)
182. Specifically, SFG stated that the current dividend yield was 1.02 standard deviations above the long run average. The AER does not consider this calculation to be correct, and discusses this later in the decision. SFG, Conditional and unconditional MRP for the Vic DNSPs, February 2012, p. 29. [↑](#footnote-ref-182)
183. Fama and French (1988, 1989) and Keim and Stambaugh (1986); see also Cochrane (2011) cited by McKenzie and Partington. [↑](#footnote-ref-183)
184. For example, papers by Stambaugh (1999); Fisher and Statman (2000); Goyal and Welch (2003); Armitage (2011), Dimson, Marsh and Staunton (2011); Jun, Gallagher and Partington (2011); and Min (2011). Papers cited in McKenzie and Partington, Equity market risk premium, December 2011, p. 4; and McKenzie and Partington, Supplementary report on the MRP, February 2012, pp. 13–14, 23–25. [↑](#footnote-ref-184)
185. McKenzie and Partington, *Supplementary report on the* MRP, February 2012, p. 23. [↑](#footnote-ref-185)
186. 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. [↑](#footnote-ref-186)
187. McKenzie and Partington, *Supplementary report on the* MRP, February 2012, pp. 12–13. [↑](#footnote-ref-187)
188. SFG, Conditional and unconditional MRP for the Vic DNSPs, February 2012, p. 12. [↑](#footnote-ref-188)
189. That is, the data series used by SFG and provided by them to the AER commences at this point. [↑](#footnote-ref-189)
190. To prevent misinterpretation, the AER does not consider that this figure is reliable. [↑](#footnote-ref-190)
191. The AER has previously referred to this technique as 'Officer and Bishop's implied volatility glide path', recognising that the authors of the VAA reports mentioned in this section are Professor Bob Officer and Dr Steven Bishop. [↑](#footnote-ref-191)
192. 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. [↑](#footnote-ref-192)
193. VAA, Market risk premium: Further comments: Prepared for Energy Networks Association, Australian Pipeline Industry Association and Grid Australia, January 2009. [↑](#footnote-ref-193)
194. 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. [↑](#footnote-ref-194)
195. 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. [↑](#footnote-ref-195)
196. VAA, Comments on the Market Risk Premium in Draft Decision by AER for Envestra February 2011, March 2011 (VAA, MRP for Envestra, March 2011). [↑](#footnote-ref-196)
197. VAA, MRP for Envestra, March 2011, p. 4 (footnote 7). Further, VAA appears to end its baseline period in 2009 even when using implied volatility data up to the end of 2010. See Bishop, Fitzsimmons, and Officer (2011), pp. 9, 14 (endnote 5). [↑](#footnote-ref-197)
198. The AER sets out earlier in this decision its analysis of the historical excess return series. [↑](#footnote-ref-198)
199. A geometric average of the five years is used. [↑](#footnote-ref-199)
200. Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 4*, 11 January 2012, paragraph 161. [↑](#footnote-ref-200)
201. Multinet, Access arrangement information, 30 March 2012, Appendix H-1, pp. 5–6. [↑](#footnote-ref-201)
202. SFG, Response on MRP for the Vic DNSPs, March 2012, pp. 18–19. [↑](#footnote-ref-202)
203. APA GasNet, *Access arrangement submission,* 31 March 2012, p. 145. [↑](#footnote-ref-203)
204. AER, *Final decision: WACC review,* May 2009, p. 238. [↑](#footnote-ref-204)
205. See Fernandez (2009), Fernandez and Del Campo (2010), Fernandez et al. (2011), Asher (2011). [↑](#footnote-ref-205)
206. For clarity, the AER notes the differing opinions on the implications of implied volatility measurements for the long run MRP. This statement does not depend on such an assessment. Rather, the return of the implied volatility index to the pre-GFC average indicates this indicator of financial markets conditions did not undergo a structural break. [↑](#footnote-ref-206)
207. Burns and Mitchell, *Measuring business cycles*, National Bureau of Economic Research, 1946. [↑](#footnote-ref-207)
208. McKenzie and Partington, Supplementary report on the MRP, February 2012, pp. 28–30. [↑](#footnote-ref-208)
209. Energy Users Coalition of Victoria, Submission to the AER: APA GasNet access arrangement proposal*,* 18 June 2012, p. 46 [↑](#footnote-ref-209)
210. NGR, r. 87(1). [↑](#footnote-ref-210)
211. NGL, s. 24. [↑](#footnote-ref-211)
212. 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. [↑](#footnote-ref-212)
213. 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). [↑](#footnote-ref-213)
214. 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. [↑](#footnote-ref-214)
215. 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>. [↑](#footnote-ref-215)
216. 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 ASX announcement on sale of Allgas, December 2011). [↑](#footnote-ref-216)
217. 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>. [↑](#footnote-ref-217)
218. AER, Draft decision: Envestra access arrangement SA, February 2011, p. 63. [↑](#footnote-ref-218)
219. 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> [↑](#footnote-ref-219)
220. APA Group, ASX announcement on sale of Allgas, December 2011. [↑](#footnote-ref-220)
221. APA Group, ASX announcement on sale of Allgas, December 2011 . [↑](#footnote-ref-221)
222. Allgas is a holding company that also owns the unregulated Moura pipeline and the Gatton-Gympie easement. [↑](#footnote-ref-222)
223. 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. [↑](#footnote-ref-223)
224. Grant Samuel, Expert report: Babcock and Brown Infrastructure, October 2009, p. 78. [↑](#footnote-ref-224)
225. Grant Samuel, Expert report: Babcock and Brown Infrastructure, October 2009, p. 77. [↑](#footnote-ref-225)
226. Changes have been made to the value of gamma, the value of the MRP and the estimation approach for the DRP. [↑](#footnote-ref-226)
227. 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. [↑](#footnote-ref-227)
228. The AER has reported trading multiples from reports published in August 2012—noting that the brokers do not always provide these figures (one report from June 2012 was included). Where possible, trading multiples for the previous year have also been presented to provide context, but only for those broker reports where a recent (August 2012) update was available. [↑](#footnote-ref-228)
229. JP Morgan, Envestra Limited: FY12 Result - dividend growth held back by regulatory concerns, 24 August 2012, p. 6; JP Morgan, DUET Group: FY12 Result Preview, 10 August 2012, p. 5; JP Morgan, Spark Infrastructure Group: 1H12 result earnings strength driven by regulatory tariff increases, 27 August 2012, p. 7; and JP Morgan, SP AusNet: AER decision positive, but risk remains, 29 August 2012, p. 9. [↑](#footnote-ref-229)
230. Macquarie, DUET Group, Curtain call, 1 August 2012, p. 3; Macquarie, Spark Infrastructure Group, ETSA sparkles through reliability, 27 August 2012, p. 1; Macquarie, SP AusNet, Cash generation set to improve, 28 June 2012, pp. 1, 8. [↑](#footnote-ref-230)
231. Credit Suisse, Regulated Utilities Monthly, Sector review, 7 August 2012, p. 10. [↑](#footnote-ref-231)
232. Bank of America Merrill Lynch, Envestra Limited, Earnings review, Flat divi in FY13, 23 August 2012, p. 5; Bank of America Merrill Lynch, Spark Infrastructure Group, Earnings review, Solid underlying cash flows, 27 August 2012, p. 5. [↑](#footnote-ref-232)
233. Spark Infrastructure, *2012 Fact Book*, 27 February 2012, p. 9. [↑](#footnote-ref-233)
234. 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. [↑](#footnote-ref-234)
235. Macquarie, DUET Group: Limited RAB growth, At fair value, 8 November 2011, p. 2. [↑](#footnote-ref-235)
236. Australian Energy Market Commission, *Directions Paper*, 2 March 2012, p. 108. [↑](#footnote-ref-236)
237. Changes have been made to the value of gamma, the value of the MRP and the estimation approach for the DRP. [↑](#footnote-ref-237)
238. Australian Competition Tribunal, Application by Envestra Ltd (No 2) [2012] ACompT 3, 11 January 2012, paragraph 166. [↑](#footnote-ref-238)
239. Australian Competition Tribunal, Application by Envestra Ltd (No 2) [2012] ACompT 3, 11 January 2012, paragraph 167. [↑](#footnote-ref-239)
240. 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. [↑](#footnote-ref-240)
241. 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, C*ost of equity and the MRP*, July 2012, p. 14. [↑](#footnote-ref-241)
242. The table presents broker reports from August 2012. [↑](#footnote-ref-242)
243. AER, Final Decision: APTPPL access arrangement, August 2012; AER, Final Decision: Aurora *distribution* d*etermination*, April 2012; AER, Final Decision: *Powerlink Transmission determination 2012–13 to 2016–17*, April 2012; AER Final Decision: *Victorian* d*istribution 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. [↑](#footnote-ref-243)
244. ACCC, Final report: *Inquiry to make final access determinations for the declared fixed line services*, July 2011, p. 59; ESC, Final decision: *Metro* p*roposed* a*ccess* a*rrangement*, August 2011, p. 87; ACCC, Final decision: *Airservices Australia price notification*, September 2011, p. 7; ERA, Final decision: Access arrangement information for the Dampier to Bunbury Natural Gas Pipeline, December 2011, p. 159; Queensland Competition Authority, Draft Report: *SunWater Irrigation Price Review: 2012–17*, Volume 1, November 2011, p. 392; Independent Pricing and Regulatory Tribunal (IPART), Final Report: *Review of water prices for Sydney Desalination Plant Pty Limited*, December 2011, p. 80; Essential Service Commission of South Australia (ESCOSA), Final Advice: *Advice on a Regulatory Rate of Return for SA Water*, February 2012, p. 50; IPART, Water – Final report: *Review of prices for Sydney Water Corporation’s water, sewerage, drainage and other services*: From 1 July 2012 to 30 June 2016, June 2012, 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. [↑](#footnote-ref-244)
245. AER, *Final decision:* APTPPL *access arrangement*, August 2012, p. 102; AER, Draft decision: Envestra Ltd: Access arrangement proposal for the Qld gas network 2011–2016, February 2011, p. 243; AER, Final decision: Envestra access arrangement Qld, June 2011, pp. 148–149. [↑](#footnote-ref-245)
246. However, the AER does not consider that the expected cost of equity should be greater than the promised cost of debt. This critical distinction is explained below. [↑](#footnote-ref-246)
247. The basic method is a probability-weighted value calculation. If (for example) there was a 1 per cent chance of default, the calculation would assign 99 per cent weight to the promised yield (when all interest and capital is paid) and 1 per cent to the (much lower) yield arising if the default occurred and interest and capital were not repaid (or paid only in part). [↑](#footnote-ref-247)
248. For instance, consider the situation where the expected return on equity is 4 per cent; the promised return on debt is 5 per cent; but there is a non-zero default probability such that the expected return on debt is 3 per cent. There is no problem with the promised return on debt being above the expected return on equity (5 > 4), as long as the expected return on debt is below (4 > 3). [↑](#footnote-ref-248)
249. See Lally, Cost of capital for regulated utilities, February 2004, p. 75 (footnote 74); Lally, Comments on submissions relating to the QCA’s proposed WACC for the SEQ water utilities, 31 March 2011, pp. 2, 17: Lally, Cost of equity and the MRP, July 2012, p. 9. [↑](#footnote-ref-249)
250. That is, if the cost of debt graphed above (of 7.01 per cent) reflects a promised cost of debt, the expected cost of debt would be even lower. [↑](#footnote-ref-250)
251. This advice is discussed in appendix B.1.1. Source document is RBA, Letter regarding the CGS market, July 2012. [↑](#footnote-ref-251)
252. RBA, Letter regarding the CGS market, July 2012, p. 1–2. [↑](#footnote-ref-252)
253. NGR, r. 74(2)(a). [↑](#footnote-ref-253)
254. NGR, r. 74(2)(b). [↑](#footnote-ref-254)
255. NGR, r. 74(2)(b). [↑](#footnote-ref-255)
256. Deloitte Access Economics, Forecast growth in labour costs in Victoria: Report prepared for the AER, 28 May 2012. [↑](#footnote-ref-256)
257. APA GasNet, Access Arrangement Submission, March 2012, p. 177. [↑](#footnote-ref-257)
258. APA GasNet, Access Arrangement Submission, March 2012, p. 93. [↑](#footnote-ref-258)
259. NGR, r. 74. [↑](#footnote-ref-259)
260. NGR, r. 74(2). [↑](#footnote-ref-260)
261. NGR, r. 74(2)(b). [↑](#footnote-ref-261)
262. ABS, Email from Kathryn Parlor to Fleur Gibbons, 8 July 2010. [↑](#footnote-ref-262)
263. The Australian and New Zealand Standard Industrial Classification (ANZSIC) provides a framework for organising data about businesses - by enabling grouping of business units carrying out similar productive activities. [↑](#footnote-ref-263)
264. BIS Shrapnel, Real cost escalation forecasts to 2017 - Australia and Victoria, March 2012, p. A-4. [↑](#footnote-ref-264)
265. BIS Shrapnel, Real cost escalation forecasts to 2017 - Victoria and New South Wales, November 2011, p. A-5. [↑](#footnote-ref-265)
266. NGR, r. 74(2)(b). [↑](#footnote-ref-266)
267. See AER, Final decision: Powerlink Transmission determination 2012-13 to 2016-17, April 2012, p. 60. [↑](#footnote-ref-267)
268. NGR, r. 74(2). [↑](#footnote-ref-268)
269. NGR, r. 74(2)(b). [↑](#footnote-ref-269)
270. Productivity Commission, Productivity in electricity, gas and water: measurement and interpretation, March 2012. [↑](#footnote-ref-270)
271. Professor Jeff Borland, Labour cost escalation report for Envestra Limited, 2011, p. 2. [↑](#footnote-ref-271)
272. Deloitte Access Economics, Response to Professor Borland: comments prepared for the AER, 15 April 2011, p. 3. [↑](#footnote-ref-272)
273. Deloitte Access Economics, Response to Professor Borland: comments prepared for the AER, 15 April 2011, p. 3. [↑](#footnote-ref-273)
274. ABS, Quality-adjusted labour inputs, Research paper, Catalogue number 1351.0.55.010, November 2005. [↑](#footnote-ref-274)
275. See AER, Draft Decision: Powerlink Transmission determination 2012–13 to 2016–17, November 2011, p. 57. [↑](#footnote-ref-275)
276. AER, Draft Decision: Powerlink Transmission determination 2012–13 to 2016–17, November 2011, p. 56. [↑](#footnote-ref-276)
277. Productivity Commission, Productivity in electricity, gas and water: measurement and interpretation, March 2012, p. 122. [↑](#footnote-ref-277)
278. Productivity Commission, Productivity in electricity, gas and water: measurement and interpretation, March 2012, p. 126. [↑](#footnote-ref-278)
279. Productivity Commission, Productivity in electricity, gas and water: measurement and interpretation, March 2012, pp. 128-129. [↑](#footnote-ref-279)
280. Productivity Commission, Productivity in electricity, gas and water: measurement and interpretation, March 2012, pp. 129-130. [↑](#footnote-ref-280)
281. AER, Draft decision - Access arrangement proposal for the Roma to Brisbane Pipeline 2012–13 to 2016–2017, April 2012, p. 200. [↑](#footnote-ref-281)
282. BIS Shrapnel, Real cost escalation forecasts to 2017 - Australia and Victoria, March 2012, p. 48. [↑](#footnote-ref-282)
283. Professor Jeff Borland, Labour cost escalation: Choosing between AWOTE and LPI - Report for Envestra Limited, March 2012, p. 6. [↑](#footnote-ref-283)
284. Deloitte Access Economics, Response to issues raised in the Victorian Gas Access Review, 29 May 2012, p. 7. [↑](#footnote-ref-284)
285. Professor Jeff Borland, Labour cost escalation: Choosing between AWOTE and LPI - Report for Envestra Limited, March 2012, p. 6. [↑](#footnote-ref-285)
286. NGR, r. 74(2)(b). [↑](#footnote-ref-286)
287. To the extent that some quality changes in the work performed are unquantifiable, the price change would incorporate some of the quality change effect. However, the magnitude of this effect is generally negligible. [↑](#footnote-ref-287)
288. ABS, Labour Price Index: concepts, sources and methods, Catalogue number 6351.0.55.001, 2004, p. 12. [↑](#footnote-ref-288)
289. Deloitte Access Economics, Response to Professor Borland: comments prepared for the AER, 15 April 2011, p. 3. [↑](#footnote-ref-289)
290. BIS Shrapnel, Real cost escalation forecasts to 2017 - Victoria and New South Wales, November 2011, p. 25. [↑](#footnote-ref-290)
291. Deloitte Access Economics, Response to issues raised in the Victorian Gas Access Review, 29 May 2012, p. 2. [↑](#footnote-ref-291)
292. Deloitte Access Economics, Response to issues raised in the Victorian Gas Access Review, 29 May 2012, p. 2. [↑](#footnote-ref-292)
293. ABS, Labour Price Index: concepts, sources and methods, Catalogue number 6351.0.55.001, 2004, p. 43. [↑](#footnote-ref-293)
294. Deloitte Access Economics, Responses to issues raised in various submissions to the Victorian Gas Access Review, 29 May 2012, p. 25. [↑](#footnote-ref-294)
295. NGR, r. 74(2)(b). [↑](#footnote-ref-295)
296. NGR, r. 74(2)(b). [↑](#footnote-ref-296)
297. Robert T. Clemen, 'Combining forecasts: A review and annotated bibliography', International Journal of Forecasting, volume 5, issue 4, 1989, pp, 559-583. [↑](#footnote-ref-297)