Internal consistency of risk free rate and MRP in the CAPM

Prepared for Envestra, SP AusNet, Multinet and APA

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Executive summary

Volatility in CGS and AER idiosyncratic application of the CAPM

1. 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.

2. This volatility is particularly important in the context of the AER's methodology for setting the cost of equity for regulated businesses using the CAPM formula. The CAPM formula states:

$$Cost\ of\ equity = Prevailing\ RFR + (Prevailaing\ beta\ x\ Prevailing\ MRP)$$

3. The AER's methodology adopts the prevailing yield on 10 year CGS as a proxy for the risk free rate (RFR). However, the AER's methodology involves an idiosyncratic application of the CAPM whereby the AER assumes that, while the RFR is volatile, the other two parameters in the CAPM, being beta and market risk premium (MRP) are stable over time. In particular, the AER has estimated the MRP by reference to the long run historical average excess return on equities relative to CGS over long periods of history (e.g. a period of up to over 100 years). The effect of this is that movements in CGS yields are passed through 'one-for-one' into movements in the AER's estimate of the cost of equity.

4. This approach is problematic if, during the relevant regulatory period, the MRP will significantly depart from the long term average. Where the MRP is significantly higher during a regulatory period than its long-term average, the problems associated with the approach are exacerbated where there is a negative relationship between risk premiums and risk free rates. In these circumstances the AER's methodology will result in a more unstable (and a depressed) estimate of the cost of equity than is the case in reality.

Negative relationship between CGS yields and risk premiums

5. The evidence is clear that risk premiums are not constant through time. Rather, risk premiums tend to move in the opposite direction to the yield on CGS (noting that the AER uses CGS yields as the proxy for the risk free rate in the CAPM). This evidence was sufficiently clear for Smithers and Co, a firm of asset allocation specialists from whom the UK economic regulators sought advice, which recommended that the best estimate was that any rise/fall in the risk free rate would be fully offset by a countervailing rise/fall in investor's required return for risk.

   Given our preferred strategy of fixing on an estimate of the equity return, ***any higher (or lower) desired figure for the safe rate would be precisely offset by a lower***

(or higher) equity premium, thus leaving the central estimate of the cost of equity capital unaffected.[1] (Emphasis added)

6. The negative relationship between the risk free rate and the market risk premium is factored into regulatory regimes in the UK and the US.

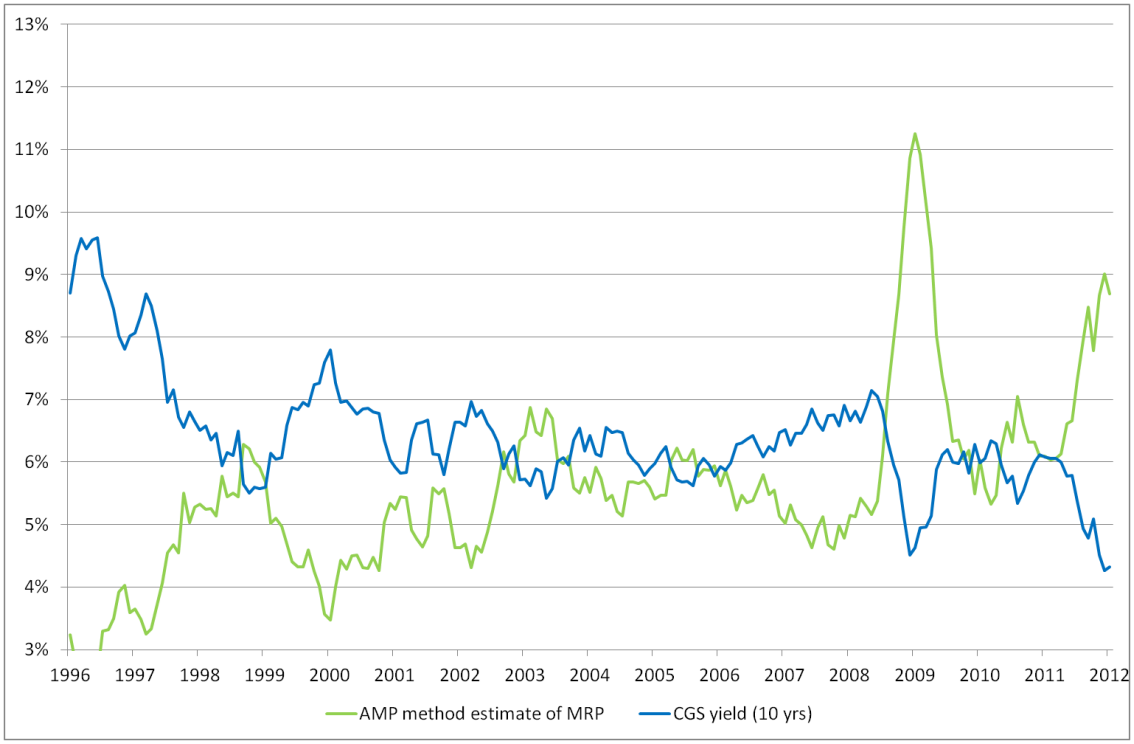
7. In Australia this negative relationship is well illustrated by Figure 11 of this report, which is reproduced below. The figure shows a time series for the equity risk premium for Australian publicly listed equities estimated using the AMP method as described in the body of this report (and as previously relied upon by the AER to support its estimate of the MRP) against the 10 year yield on Commonwealth Government Securities (CGS).

8. The figure shows that there is a clear negative relationship between the equity risk premium and the yield on 10 year CGS: The equity risk premium is lowest when CGS yields are highest and highest when CGS yields are lowest (in early 2009 and once more at the time of writing in early 2012).

9. Moreover, this negative relationship can be clearly discerned even when CGS yields are at less extreme levels. For example, between 1998 and 2005, peaks in the MRP are generally coincident with troughs in CGS yields (in late 1998, 2003 and 2005), whilst peaks in CGS yields occur with troughs in the MRP series (in 2000, in 2002 and again in 2004).

[1] Smithers and Co, A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K., A report commissioned by the U.K. economic regulators and the Office of Fair Trading. (2003), p. 49

Risk premiums on listed equities (AMP method) vs. 10 year yield on CGS

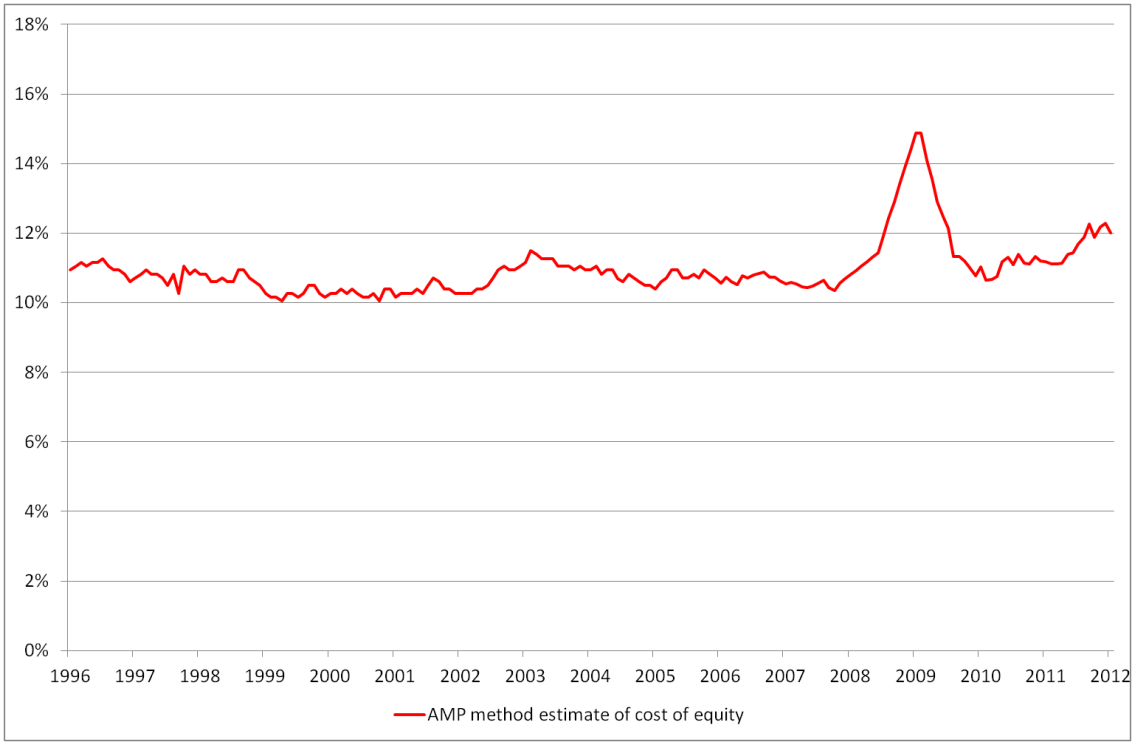


Source: RBA, CEG analysis

10. The negative relationship between risk premiums and yields on CGS illustrated in the figure above is intuitively easy to understand. In periods of high investor risk aversion there is a flight from risky assets to safe assets. This tends to push up the price and push down the yields on safe assets. For this reason, falling risk free rates tend to be associated with rising investor risk premiums (and vice versa).

11. Given this negative relationship between the risk free rate and the risk premiums on listed equities, it is unsurprising that the sum of them, being the required return on the listed equity market, is, consistent with the advice of Smithers and Co, much more stable than its constituent parts. This relative stability of the required return on equity is illustrated in Figure 12 in the body of the report, and reproduced below.

Total cost of equity (AMP method)



Source: RBA, CEG analysis

12. I note that this relative stability is in contrast to the volatility in estimates of the cost of equity using the AER method – exemplified by its recent Aurora draft decision where the AER dramatically reduced its estimate of the cost of equity despite the AMP method determining an increase in the market cost of equity.

13. Prior to its Aurora draft decision, the last time the AER implemented its idiosyncratic application of the CAPM during a period of historically low yields on CGS was in early 2009 – when MRP estimates using the AMP method were at historically high levels, as is illustrated in the two figures above. The issue of the measurement of the risk free rate (including the time period over which it should be measured) was the subject of a merits review brought by the NSW electricity distributors, and the NSW and Tasmanian electricity transmission operators..

14. In those proceedings I advised the electricity distributors and transmission operators, drawing upon analysis which is similar to that presented in this report (while the time periods are different the key facts are remarkably similar). The Tribunal agreed that using historically low interest rates to set the cost of equity without increasing the

market risk premium was likely to underestimate the cost of equity. The Tribunal stated:[2]

> *The Applicants submitted that these facts demonstrated that basing a risk free rate on the AER's specified averaging periods would not achieve the objective of an unbiased rate of return consistent with market conditions at the date of the final decision. They appealed to expert opinion that the market risk premium was far higher than its deemed value while the risk free rate was abnormally low, so that the return required by investors was much higher than the AER's specified averaging period would generate.*
>
> …
>
> *The Tribunal considers that an averaging period during which interest rates were at historically low levels is unlikely to produce a rate of return appropriate for the regulatory period.*

15. It is relevant to note that the real risk free rate set in the AER's recent Aurora draft decision is even lower than the real risk free rate that was overturned in the decision discussed above (1.6% versus 1.8%).

RBA views on heightened risk premiums and scarcity premiums for CGS

16. Reserve Bank of Australia commentary from a range of publications supports the contention that risk premiums are currently elevated, and that the fall in CGS rates is a symptom of higher risk premiums (rather than a symptom of falling required returns on risk assets).

17. Moreover, the RBA has argued that in recent history the yields on CGS have been depressed due to a shortage of supply:

> *One complication in doing this calculation in Australia is that* ***because government paper has been in short supply for many years, it has tended to trade with a scarcity premium. This widens the observable spread between the yield on government paper and the yield on other assets in a way that is not present in most other jurisdictions****.*[3] (Emphasis added)

18. This scarcity premium increases the price of CGS and, as a result, depresses their yields. That is, investors accept a lower yield in order to have access to the scarce pool of CGS.

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[2] *Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009)* [2009] ACompT 8 (12 November 2009), paras. 112-114

[3] Guy Debelle, RBA Assistant Governor (Financial Markets), Speech to the APRA Basel III Implementation Workshop 2011 Sydney - 23 November 2011.

19. Material increases in demand for CGS from foreigners and the banking system can also be expected to raise this baseline 'scarcity premium' for the foreseeable future. As noted by the RBA, foreign holdings of CGS have risen to 75% of the market in recent months reflecting, in part, the shrinking pool of AAA rated sovereign debt due to downgrades of US debt in August 2011 and, most recently, French debt in January 2012. Similarly, the RBA has pointed to Basel III liquidity requirements as raising the demand for CGS (indeed, the pre-existing scarcity of CGS in Australia is an issue explicitly acknowledged in the development of Basel III).

AER methodology not consistent with NGR 87(1)

20. Based on the evidence summarised above, I conclude that the AER's methodology is not valid in current market conditions. Specifically, the assumption, implicit in the AER methodology, that the cost of equity has moved one-for-one with CGS yields and is currently at historically low levels is invalid. Moreover, it is likely to be invalid in the medium term due to supply and demand dynamics in the market for CGS.

Alternatives to the AER methodology

21. I propose three alternatives to the AER's methodology that implement the CAPM. I consider that each of these methodologies would comply with Rule 87(1) of the NGR if applied in the current market circumstances. I do not consider that the same is true for the AER's methodology. My three alternatives are:

    i. Directly estimating the prevailing cost of equity for regulated utilities using the dividend growth model (involving a simultaneous estimate of all parameters of the CAPM).

    ii. Directly estimating the prevailing MRP relative to the prevailing CGS yield being used as the risk free rate. This eliminates potential for error from the AER's methodology - in which there is no attempt to estimate the MRP relative to the prevailing risk free rate. In this methodology the AER's proposed value of 0.8 for beta is adopted.

    iii. Estimating a 'normal' cost of equity for regulated businesses by estimating each of the CAPM parameters using suitable historical time periods. This provides a proxy for the prevailing cost of equity if the prevailing cost of equity is relatively stable over time (an assumption supported by the evidence in this report). It also provides a minimum estimate of the cost of equity if one believes that current market conditions are such that the cost of equity is more likely above its long term average than below (a view that is supported by the evidence in this report). A departure from this historical norm could be justified if there was some threshold level of evidence to the effect that currently prevailing market conditions were sufficiently different from the normal market conditions. Whether this threshold was satisfied could be assessed by, for example, application of methodologies i) and ii) above.

22. In the table below (from section 6 of my report) I summarise the results of application of these methodologies.

Table 4: Summary of results from each methodology and comparison to AER methodology

	Basis of estimate	Time period	Div. yield	DPS growth	RFR	MRP	Beta	Nominal cost of equity
(i)	**DGM for regulated businesses** DGM model applied to utility stocks in Australia. Range based on long run real dividend growth of between zero and in line with GDP.	Dividend forecasts average 24 Feb and 9 March. Price and CGS averaged over period 24 Feb to 9 March 2012	multiple	2.50 – 6.60%	Jointly estimated			**10.87 – 14.59%**
(ii)	**DGM for the market** Application of the AMP methodology to estimate prevailing MRP and then application of beta of 0.80 along with prevailing RFR	End-December 2011	5.68%*	6.60%	3.77%	8.52%	0.80	**10.58%**
(iii)	**Historical average RFR plus historical average MRP * beta** Historical CGS with MRP of 6% and beta of 0.8.** Assumes an indexed historical CGS of 3.40%, resulting in a real cost of equity of 8.2%, or 10.8% assuming inflation of 2.5%	Historical CGS based on time series since July 1993	n/a	n/a	3.40% real 5.99% nominal	6.0%	0.80	**10.78%**
(iv)	**AER methodology** Prevailing CGS with a risk free rate on 31 December 2011 of 3.77%, MRP of 6.00% and a beta of 0.80	End-December 2011	n/a	n/a	3.77%	6.00%	0.80	**8.57%**

Source: Various, CEG analysis
** Dividend yield scaled up using a factor of 1.1125, **I adopt these values for beta and MRP in order to be consistent with recent AER practice. This does not mean I endorse these values as the best estimate of historical MRP and equity beta.*

Conclusion

23. I consider that the overwhelming empirical and contextual evidence suggests that the observed low yields on Commonwealth Government Securities (CGS) are as a result of a general flight to safety by investors exacerbating a pre-existing scarcity premium. The current low yields do not signal that investors perceive the economic environment as being less risky. Indeed, the opposite is the case and the fall in CGS yields is symptomatic of greater perceived risks by investors in many classes of assets. The current historically low CGS yields are not a sound basis for concluding that required returns on risky assets are also at historically low levels.

24. However, application of the AER's methodology leads to changes in CGS yields being passed, one-for-one, into a lower cost of equity, whilst the MRP and equity beta are estimated on a historical basis. Applied at the end of December 2011, the AER's methodology would estimate a cost of equity of 8.6%, whereas forward-looking measures of the cost of equity that I survey in this report range from 10.6% to 14.6%.

1. Introduction

25. My name is Tom Hird. I have a Ph.D. in Economics and 20 years experience as a professional economist. My curriculum vitae is provided separately. The Victorian gas businesses[4] have asked me to provide an opinion on whether it is reasonable to estimate the cost of equity for regulated businesses by assuming, as the AER has recently, that the cost of equity has declined "one-for-one" with the recent significant declines in yield on Commonwealth Government Securities (CGS). In particular, I am asked whether such an assumption is consistent with Rule 87(1) of the NGR. The scope of this engagement as set out in the terms of reference as per below:[5]

Background

Rule 87 of the National Gas Rules sets out provisions relating to the rate of return (or weighted average cost of capital) as follows:

> *"(1) The rate of return on capital is to be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.*
>
> *(2) In* determining *a rate of return on capital:*
>
> *(a) it will be assumed that the service provider:*
>
> *(i) meets benchmark levels of efficiency; and*
>
> *(j) uses a financing structure that meets benchmark standards as to gearing and other financial parameters for a going concern and reflects in other respects best practice; and*
>
> *(b) a well-accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well-accepted financial model, such as the Capital Asset Pricing Model, is to be used."*

The revenue and pricing principles in section 24(2) and (5) of the National Gas Law state:

> *"24(2) A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in providing reference services; and*

[4] APA, Envestra, Multinet and SPAusNet.

[5] The full terms of reference are attached to this report at Appendix B.

24(5) A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates."

In estimating the cost of equity using the CAPM, it has become standard practice in regulatory decisions to combine:

- *An estimate of the market risk premium based on annual historic data over various periods from 1883 to the present day, occasionally adjusted to some extent; and*
- *A current-day estimate of the risk-free rate typically based on the observed yields on Commonwealth Government bonds over the 20 trading days immediately prior to the decision.*

Questions

The Victorian gas distribution and transmission businesses (APA Group, Envestra, Multinet and SP AusNet) have sought your opinion on an approach to measuring the cost of equity that is consistent with Rule 87. The purpose of these questions is to obtain an expert opinion which will assist the businesses in formulating their approach for estimating the cost of equity and the weighted average cost of capital, (WACC), in their forthcoming access arrangement proposals.

1. *In your opinion does the standard regulatory approach to CAPM noted above presently produce an estimate of the cost of equity that meets the requirements of Rule 87? Please provide evidence to support your opinion.*
2. *How should the cost of equity be estimated in today's market conditions in accordance with rule 87?*
3. *Please provide your estimates of the cost of equity and of the market risk premium in accordance with your suggested method(s).*

26. The remainder of this report is set out as follows:

- section 2 provides a factual summary of volatility in CGS yields over time, and the impact of this volatility on the cost of equity as estimated by the AER;
- section 3 provides a general discussion of whether there is any reason to assume that the cost of equity will move in line with movements in the risk free rate;
- section 4 provides a factual assessment of whether risk premiums in general have stayed constant as CGS yields have fallen since mid-2011. I conclude that risk premiums have risen materially over this period (measured relative to CGS yields) such that the required return on risk assets in general has not fallen one-for-one with the fall in CGS rates;
- section 5 provides an analysis of why this has been the case;

- section 6 examines regulatory practice from the US, UK and Australia that is relevant to the issues involved;
- section 7 provides my views on how the cost of equity can be estimated in the current circumstances in a manner that is consistent with Rule 87(1) of the NGR; and
- section 8 provides a summary of my conclusions.

27. I have read, understood and complied with the Federal Court Guidelines on Expert Witnesses. I have made all inquiries that I believe are desirable and appropriate to answer the questions put to me. No matters of significance that I regard as relevant have to my knowledge been withheld.

28. I have been assisted in the preparation of this report by Daniel Young and Johanna Hansson from CEG's Sydney office and Yuliya Moore who works with me in Melbourne. However, the opinions set out in this report are my own.

Thomas Nicholas Hird

29 March 2011

2. Movements in the risk free rate and AER methodology

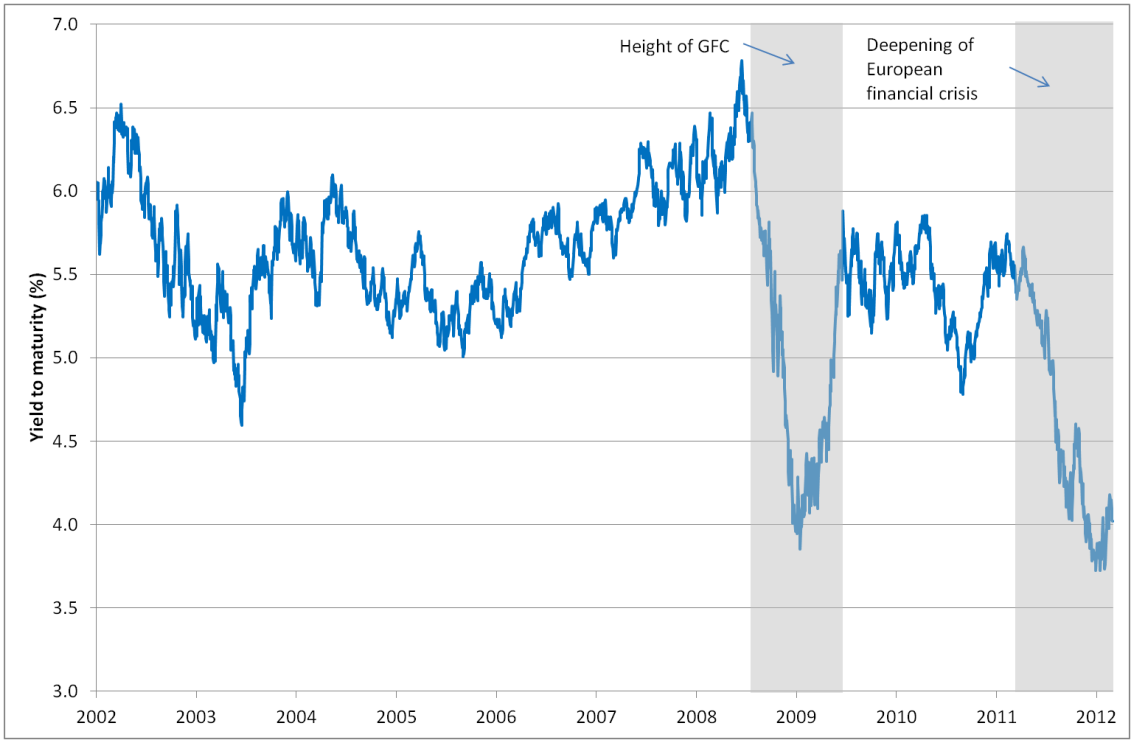
29. This section provides a factual summary of volatility in CGS yields over time, and the impact of this volatility on the cost of equity as estimated by the AER.

2.1. CGS yields are at historical low

30. Figure 1 below illustrates that the yields on 10 year CGS have been very volatile over the last decade. The figure shows that the largest swings in the risk-free rate were associated with the onset of financial market crises. The first large swing occurred in the aftermath of the collapse of Lehman Brothers and the near collapse of other financial institutions in late 2008. The second large swing occurred in the subsequent recessions in the US and Europe, which then gave rise to a deepening sovereign debt, banking and currency crisis in the Eurozone.

31. During both of these financial crises there has been a dramatic fall in 10 year CGS yields in Australia. The decline has left these yields at their lowest levels in the last decade and, indeed, over the past 50 years.

Figure 1: Time series for yields on 10 year CGS

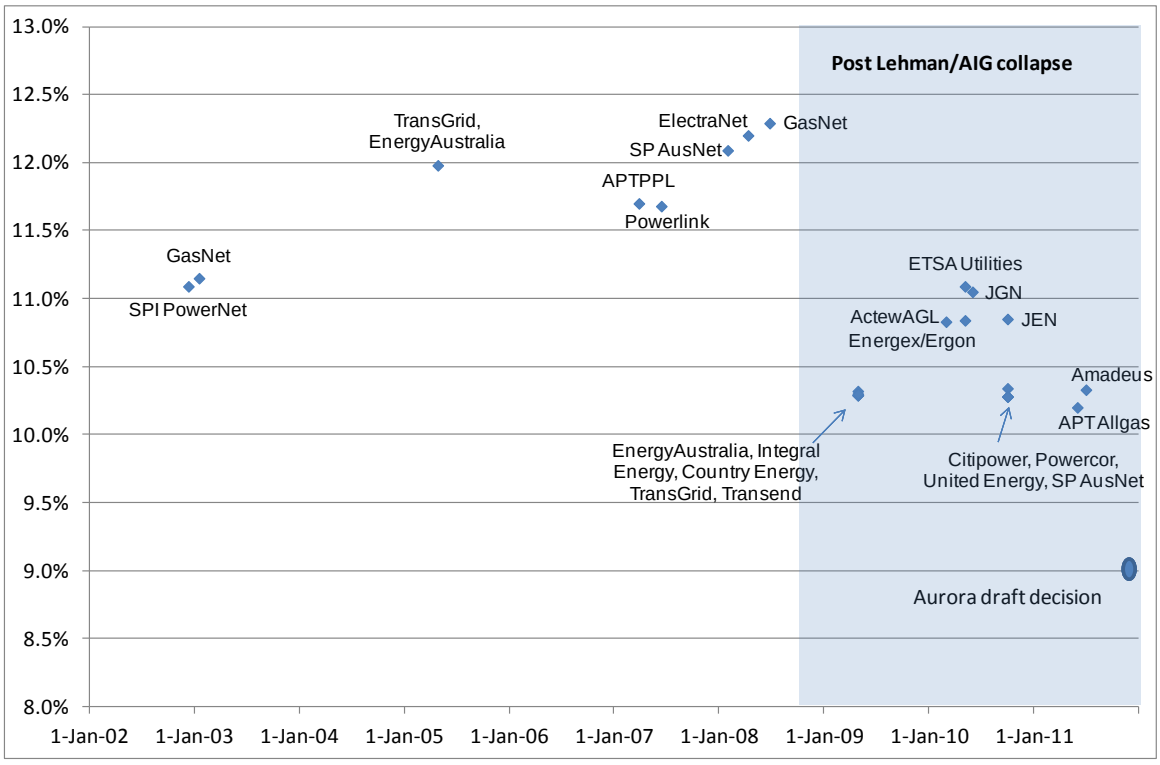


Source: RBA, CEG analysis

2.2. AER methodology will cause the cost of equity to be at a historically low level

32. The AER's Aurora draft decision assumes that equity investors investing in a 60% geared electricity distribution business require a 9.08% nominal (6.4% real) return on equity. This is by far the lowest cost of equity allowance set by the AER, or the ACCC before it, for an energy transport business. By comparison, the allowed cost of equity decisions prior to the global financial crisis of late 2008 were universally above 11%, and averaged around 12%.

Figure 2: AER cost of equity decisions for regulated energy businesses



Source: Regulator's decisions, CEG analysis. Note that 2009 decision for EnergyAustralia et. al. is before amendment by the ACT.

33. Figure 2 above demonstrates an important phenomenon: The allowed cost of equity set by the AER has been lower after the global financial crisis than before it – with the Aurora draft decision being the most extreme example of this trend.

34. The mechanical explanation for this phenomenon is relatively simple to understand. It reflects the AER's methodology which applies the Capital Asset Pricing Model in a manner that:

- sets the risk free rate equal to the prevailing risk free rate (which is very volatile); and

- sets the market risk premium primarily based on the AER's estimate of the historical average risk premium earned by Australian equity investors (which is, by its construction, very stable).

35. These two variables fit together in the CAPM as per the following equation:

$$Cost\ of\ Equity = Risk\ Free\ Rate + (\beta * Market\ Risk\ Premium)$$

36. This equation makes clear that if the risk free rate fluctuates significantly, and if the market risk premium estimate is stable then, for any given beta estimate, the cost of equity estimate will move in synchronicity with the risk free rate.

3. Movements in the risk free rate and the cost of equity

37. This section provides a general discussion of whether there is any reason to assume that the cost of equity will move in line with movements in the risk free rate.

3.1. Risk premiums are not constant

38. The CAPM formula describes an investor's required return on any asset – be that asset debt, equity or any other asset. The asset's beta (β) is a measure of the risk of that asset relative to the riskiness of the market portfolio. The MRP describes investors' required compensation for the risk associated with holding the market portfolio. The CAPM formula is set out below:

$$Cost\ of\ Equity = Risk\ Free\ Rate + (\beta * Market\ Risk\ Premium)$$

39. There is nothing in the theoretical derivation of the CAPM formula that implies that either the beta or the MRP are constant over time. The AER's consultant, Professor Davis, made precisely this point in a recent report for the AER:[6]

> *More generally, empirical testing of the model requires application over many time periods, and* ***there is nothing in the model which implies that the parameters of the model will be the same in different time periods.*** *This has led to the distinction between the conditional and unconditional CAPM, in which it is recognized that the CAPM equation could vary period by period, perhaps in some systematic relationship to other observable factors. … The conditional CAPM leads to an unconditional CAPM relationship in which expected asset returns depend on both a market risk factor and an additional factor reflecting the effect of the temporal variation in the conditional CAPM relationship. (See, for example, Jagannathan and Wang, 1996)* (Emphasis added)

And

> *it is my opinion that … there is general agreement that the CAPM needs to be viewed in a conditional form – but that the precise determinants and size of that conditionality (and hence variations over time in beta, MRP etc) are not well agreed.*

40. The Jaganathan and Wang paper referred to by Professor Davis shares his view that the MRP varies over time:[7]

[6] Davis, Cost of Equity Issues: A Report for the AER, January 2011, p. 4, 21

[7] Ravi Jagannathan and Zhenyu Wang, *The Conditional CAPM and the Cross-Section of Expected Returns* The Journal of Finance, Vol. 51, No. 1. (Mar., 1996), pp. 3-53.

In fact, we know from earlier studies that the expected risk premium on the market as well as conditional betas are not constant (Keim and Stambaugh (1986), Breen, Glosten, and Jagannathan (1989)), and vary over the business cycle (Fama and French (1989), Chen (1991), and Ferson and Harvey (1991)).

41. Fama and French (1989)[8] cited by Jaganathan and Wang conclude:

Our tests indicate that expected excess returns (returns net of the one-month Treasury bill rate) on corporate bonds and stocks move together. Dividend yields, commonly used to forecast stock returns, also forecast bond returns. Predictable variation in stock returns is, in turn, tracked by variables commonly used to measure default and term (or maturity) premiums in bond returns. The default-premium variable (the default spread) is the difference between the yield on a market portfolio of corporate bonds and the yield on Aaa bonds. The term- or maturity-premium variable (the term spread) is the difference between the Aaa yield and the one-month bill rate.

3.2. MRP will often move in the opposite direct into the risk free rate

42. Moreover, there is a general consensus that the market risk premium tends to move in the opposite direction to the risk free rate – especially for material changes in the level of the risk free rate. For example, Lettau and Ludvigson[9] find that the risk premiums tend to move in the opposite direction to the de-trended government bond rate.

43. Amongst other findings, they found a strongly statistically significant negative relationship between the de-trended US bill rates and the change in the log excess return (the variable they introduce akin to the MRP). Such a negative relationship held true without controlling for other potential variables that might affect risk premiums (i.e. a simple correlation suggested that the risk premiums rose 2.1% for every 1% reduction in the de-trended risk free rate). When Lettau and Ludvigson included controls for other variables they still found that when the de-trended risk free rate fell the risk premiums tended to rise by the same amount as the fall in the de-trended risk free rate.

44. Reflecting this negative relationship, Smithers and Co, advisers to the UK economic regulators, have recommended that the cost of equity not be varied based on variations in the risk free rate:

Given our preferred strategy of fixing on an estimate of the equity return, ***any higher (or lower) desired figure for the safe rate would be precisely offset by a lower***

[8] Fama and French, 1989, Business Conditions And Expected Returns On Stocks And Bonds, Journal of Financial Economics

[9] Lettau, Martin and Sydney Ludvigson, 2001, "Consumption, Aggregate Wealth and Expected Stock Returns," Journal of Finance 56 (3), pp. 815—849.

(or higher) equity premium, thus leaving the central estimate of the cost of equity capital unaffected."[10] (Emphasis added)

45. In the following sections I discuss in more detail the evidence and expert opinion that clearly demonstrates that the current market circumstances are such that there is a negative relationship between risk free rates and the market risk premium. That is, current historically low risk free rates are associated with historically high risk premiums measured relative to those risk free rates.

[10] Smithers and Co (2003), *A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.*, A report commissioned by the U.K. economic regulators and the Office of Fair Trading, p. 49

4. Movements in the risk free rate and the required return on other assets

46. If low CGS yields are simply a reflection of investors accepting a lower return on all assets (risky and riskless) then the AER's methodology is reasonable. That is, it is reasonable to assume that the cost of equity falls one-for-one with the CGS yields with the equity risk premium remaining constant.

47. However, if CGS yields are falling primarily as a consequence of factors that do not push down the overall cost of equity, then the AER approach is not valid. An approach that does not lower the cost of equity by the same amount as it lowers CGS yields is appropriate.

48. This issue is one that can be resolved by examination of empirical data. If the AER is correct then the yields on all assets should fall in line with CGS yields. If the AER is not correct, then the spread (risk premium) between CGS and other assets should have risen. The evidence summarised in this section clearly demonstrates that the spread (risk premium) between CGS and other assets has risen, that is, the AER's approach is not valid.

49. This section provides a factual assessment of whether risk premium in general have stayed constant as CGS yields have fallen. An assessment of the reasons why this might have happened, including the views of other experts such as the RBA, is provided separately in section 5below.

50. In this section I review the evidence of recent risk premiums for:

- low risk assets including:
  - Australian state government debt; and
  - AAA fair values as estimated by Bloomberg.
- high risk bonds, using Bloomberg data to examine the change in spreads between BBB and AAA rated bonds with one year to maturity;
- high risk bonds using Bloomberg data to examine the change in spread to CGS for AA, A and BBB rated corporate bonds with maturity between 1 and 5 years;
- the equity market, using information about dividend yields to approximate the forward-looking MRP (ie, the spread between expected equity market returns and CGS returns); and
- utilities stocks, using the dividend growth model to estimate forward-looking equity risk premiums on the six predominantly regulated listed Australian utilities.

51. The evidence from all these sources points at trends towards higher risk premiums at times of lower CGS yields, such as those experienced in early 2009 and at the current time.

4.1. Risk premiums on low risk assets

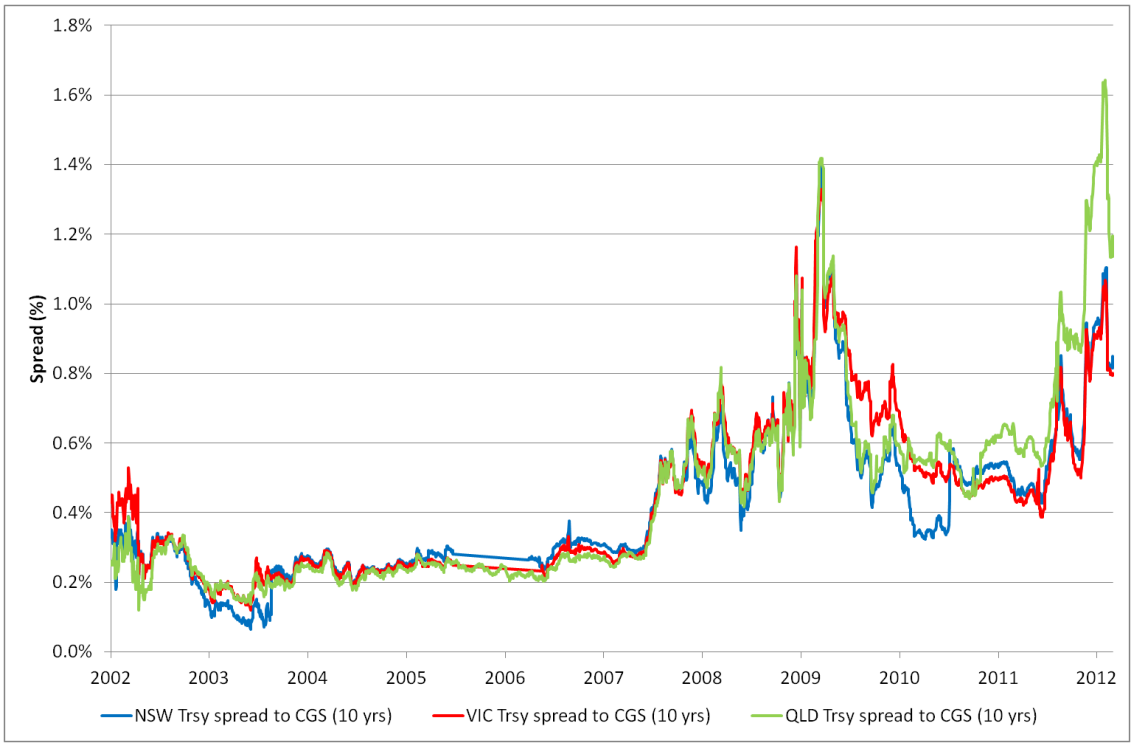
52. The following two figures illustrate spreads between CGS yields and the yields on other very low risk assets.

53. Figure 3 shows that the required return on state government debt (rated AAA for NSW and Victoria and rated AA+ for Queensland) has increased materially relative to the required return on CGS since mid 2011. As a result, the difference in these returns (the "spread") has increased materially. Moreover, this spread has returned to levels not seen since the midst of the 2008/09 financial crisis.

54. Instead of using semi-government yields, Figure 4 plots the difference between the yields on Bloomberg's 4 year fair value for AAA rated bonds and 4 year CGS (four years is chosen because this is the longest maturity for which Bloomberg publishes a AAA fair value). This indicates a similar pattern of risk premiums over time as Figure 3.

55. These figures provide compelling evidence to the effect that required returns on low risk assets have not fallen in line with required returns on CGS. (This is evidence of a heightened safety/liquidity/scarcity premium for CGS as discussed in section 5 below.)

Figure 3: Spread between 10 year state government debt and 10 year CGS



Source: Bloomberg, CEG analysis

Figure 4: Spread between AAA corporate bonds and CGS at 4 years (the longest maturity for the Bloomberg AAA curve)

Source: Bloomberg, CEG analysis

4.2. Risk premiums on high risk bonds

56. It is common practice to use spreads between low risk assets and BBB rated bonds as a proxy for the level of investor risk aversion. Jagannathan and Wang (1996)[11] use the difference between the yield to maturity on short term BBB rated bonds and short term AAA rated bonds as a proxy for the level of risk aversion. They describe this approach as being used extensively in finance:

> *Based on these findings, I choose the yield spread between BAA and AAA rated bonds, denoted by* R_{t-1}^{Prem} *as a proxy for the market risk premium. The variable* R_{t-1}^{Prem} *… has been used extensively in finance.*

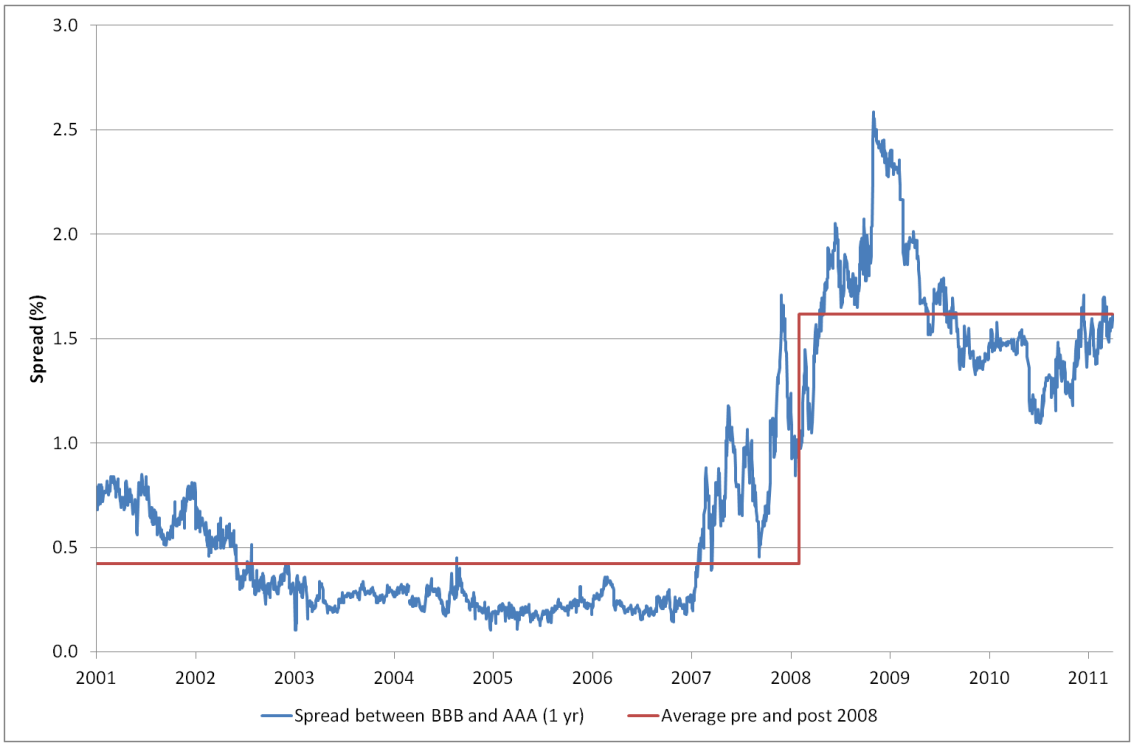
57. The quote above refers to Moody's credit ratings. The equivalent Standard and Poor's credit ratings are AAA and BBB. When I examine the same measure in Australia using the longest history of fair value estimates available from Bloomberg we observe the following history for the spread between Standard and Poor's AAA and BBB rated

[11] Ravi Jagannathan and Zhenyu Wang, *The Conditional CAPM and the Cross-Section of Expected Returns* The Journal of Finance, Vol. 51, No. 1. (Mar., 1996), pp. 3-53.

bonds with one year to maturity. In Figure 5 below, the spreads between AAA and BBB rated bonds are shown up to 29 February 2012.

58. It can be seen in Figure 5 below that the level of the spread between BBB and AAA rated bonds with one year maturity prior to 2008 was almost always less than 0.5% and averaged 0.42%. Since 2008, the average spread has been over three times higher at 1.6%. While it is true that these spreads peaked in April 2009 at 2.6%, they have not fallen back to pre-crisis levels and are currently very close to their average levels since 2008. Moreover, the level of this spread increased in the second half of 2011 as CGS yields fell.

Figure 5: Spreads between AAA and BBB benchmark bond yields at 1 year maturity



Source: Bloomberg, CEG analysis

59. Bloomberg estimates that in November 2011 AAA to BBB spreads were still more than three times the pre-2008 average yields.[12] This is consistent with ERPs being similarly elevated above their pre GFC levels. This is summarised in Table 1 below.

[12] AAA/BBB spreads for December 2011 are estimated at 1.6%.

Table 1: AAA to BBB spreads at 1 year maturity

Sampling period	Spread
Average pre 2009	0.42%
Average post 2008	1.62%
Ratio pre and post 2008	**3.8**
November 2011	1.5%
Ratio November 2011 to pre 2008 Average	**3.6**

Source: Bloomberg, CEG analysis

4.2.1. RBA estimates of risk premiums relative to CGS

60. The RBA has produced a chart showing movements in risk premiums measured relative to CGS yields[13] on corporate bond of various credit ratings and on near riskless swap transactions (Figure 6 below).[14]

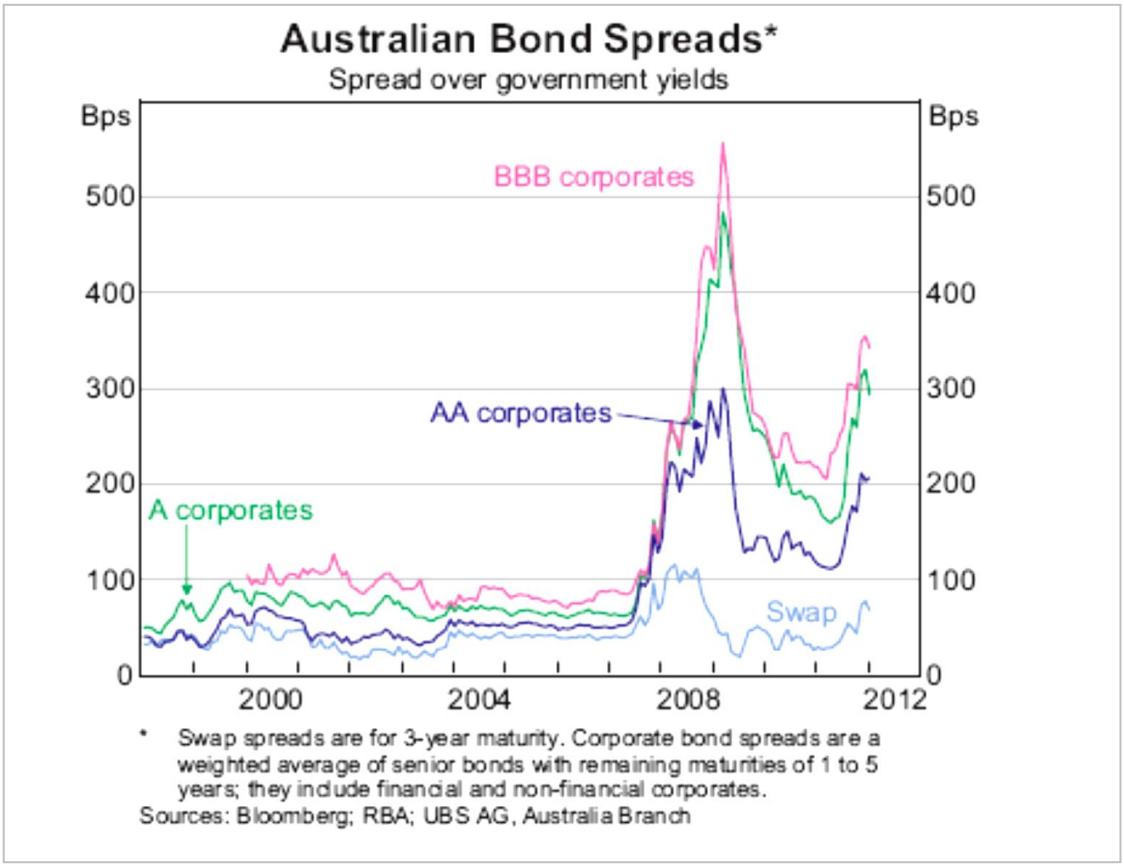
61. The chart shows that all spreads on lower rated bonds increased in the second half of 2011 as CGS yields fell. Notably, the increase in spreads on AA corporate bonds was higher than the increase in spreads on AAA rated debt considered in the previous section and the increase in spreads on near risk free swaps shown in Figure 6 from the RBA above.

62. This is what one would expect in a period of rising risk aversion, namely, widening spreads and spreads widening most on higher risk assets. Similarly, the increase in spreads on A and BBB rated bonds was higher than the increase in spreads on AA rated bonds.

[13] That is, the difference in yields on corporate bonds and CGS.

[14] Swap transactions do not involve any exchange of principle. If a counterparty defaults the only values potentially at 'risk' are then prevailing differences between short term interest rates and the agreed fixed rate in the contract.

Figure 6: Estimates of spreads on AA, A and BBB corporate bonds



Source: RBA February 2011 Statement on Monetary Policy. The RBA has separately identified the same increases in spreads to CGS for the subset of bonds issued by banks only – see Graph 2.19 in the RBA September 2011 Financial Stability Review

4.3. Risk premiums on equities

63. Standard finance theory predicts that a heightened debt risk premium for a firm will also be associated with a heightened equity risk premium for the firm. Moreover, any increase in the DRP would tend to be associated with a similar proportionate (but larger absolute) increase in the equity risk premium[15]. With debt risk premiums in the order of at least 3%[16] for a 60% geared business, this suggests an at least 200bp increase in the DRP relative to pre GFC levels. Standard finance theory predicts a more than 200bp increase in the MRP would be associated with this increase in the DRP.

[15] Bruce D. Grundy, The *Calculation of the Cost of Capital,* A Report for Envestra, 30 September, 2010

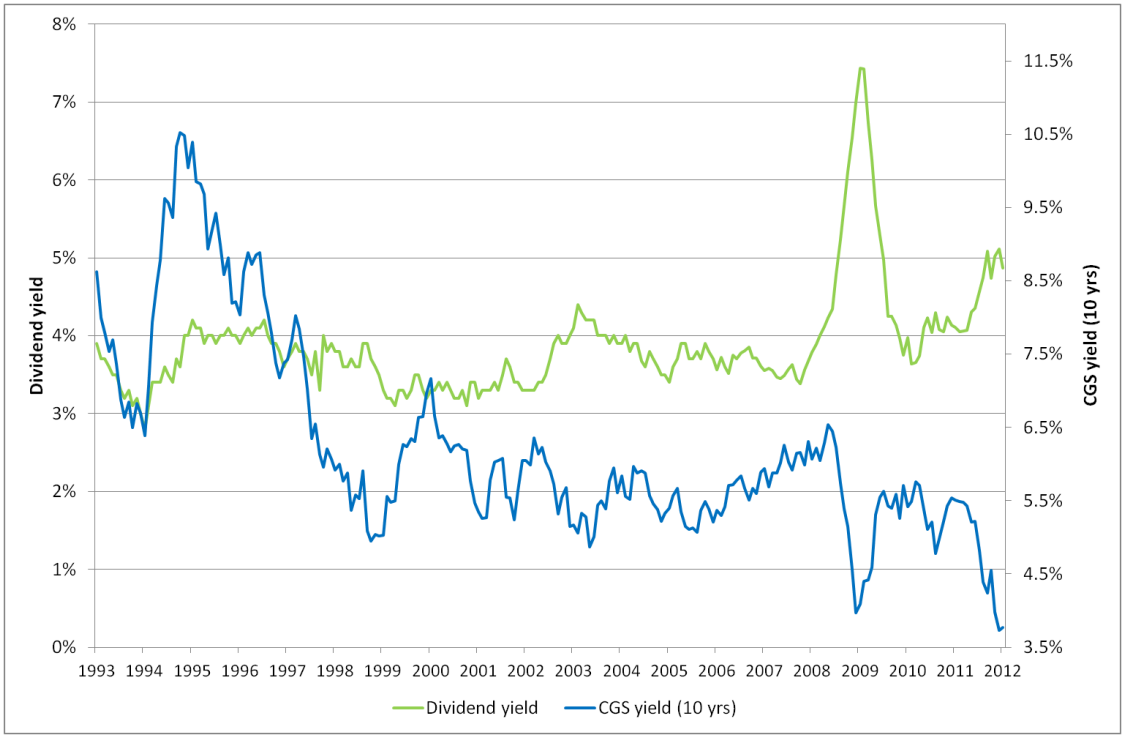
[16] Based on the AER methodology as applied in its Aurora draft determination.

64. It is also common practice to use equity dividend yields as a proxy for prevailing levels of risk aversion (as noted in Fama and French (1989) quoted previously). Figure 7 below shows the dividend yield on the ASX and the contemporaneous yield on 10 year CGS.

65. Figure 7 shows the average dividend yield on Australian listed equities since 1993 and the corresponding yield on 10 year CGS as reported by the RBA. 1993 is chosen as the first year of this series because this coincides with the formal adoption of inflation targeting by the RBA (where the RBA dates the beginning of inflation targeting as 'mid 1993) and the beginning of a period where inflation and inflation expectations have been anchored around the RBA target range of 2-3%.[17]

66. Figure 7 clearly shows that since the late 1990's there has been a clear negative relationship between dividend yields and CGS yields – most noticeable in the 2008/09 financial crisis and most recently since mid 2011.

Figure 7: Dividend yield on the ASX vs. 10 year CGS yields



Source: RBA, CEG analysis. Figures used in this chart are month end figures published by the RBA in the RBA Monthly Bulletins (1993-2012) and correspond to the dividend yield information

67. The dividend yield on listed equities can also be used to arrive at a direct estimate of the prevailing cost of equity using the dividend growth model. In what follows I use the

[17] See http://www.rba.gov.au/publications/bulletin/1999/may/pdf/bu-0599-2.pdf

method used by AMP Capital Investors.[18] This methodology has previously been relied on by the AER in support of a position that the then MRP of 6.0% was generous.[19]

> *A more recent estimate is from AMP Capital Investors (2006), who base the growth rate on the expected long-run GDP growth rate, similar to Davis (1998). AMP Capital Investors (2006) estimate the forward looking Australian MRP for the next 5-10 years to be 'around 3.5 per cent' (specifically 3.8 per cent), 1.9 per cent for the US and 2.4 per cent for the 'world'. AMP Capital Investors (2006) considers an extra 1 to 1.5 per cent could be added for imputation credits resulting in a 'grossed-up' Australian MRP of around 4.5 to 5.0 per cent.*

68. The AMP methodology involves approximating a cost of equity by adding the long term average nominal growth in GDP (as a proxy for long term average nominal growth in dividends) to the prevailing dividend yield for the market as a whole. This gives a 'cash' cost of equity. To convert this into a cost of equity including the value of imputation credits the cost of equity needs to scaled up by the relevant factor. In the figure below I have used 6.6% per annum as the long run growth path for nominal GDP (based on average real growth in GDP from 1959 until 2011 plus inflation of 2.5%) and a scaling factor of 1.1125 to capture the value of imputation credits.[20]

69. When I use this method consistently through time (using the time series for dividend yields shown in Figure 7), I derive the following time series for the prevailing cost of equity, 10 year CGS yields and MRP (measured relative to 10 year CGS yields).

70. Notably, the most recent fall in CGS yields has been associated with a more than offsetting rise in MRP – such that the cost of equity has risen materially since mid-2011. I note that the path of these parameters over time is similar to those recently estimated and presented by Capital Research.[21]

71. This shows a clear negative relationship between the prevailing market risk premium and the prevailing risk free rate. Notably, market cost of equity, being the sum of the CGS and MRP time series is much more stable than either of these two time series. I discuss this fact in more detail in section 5.1.2 below.

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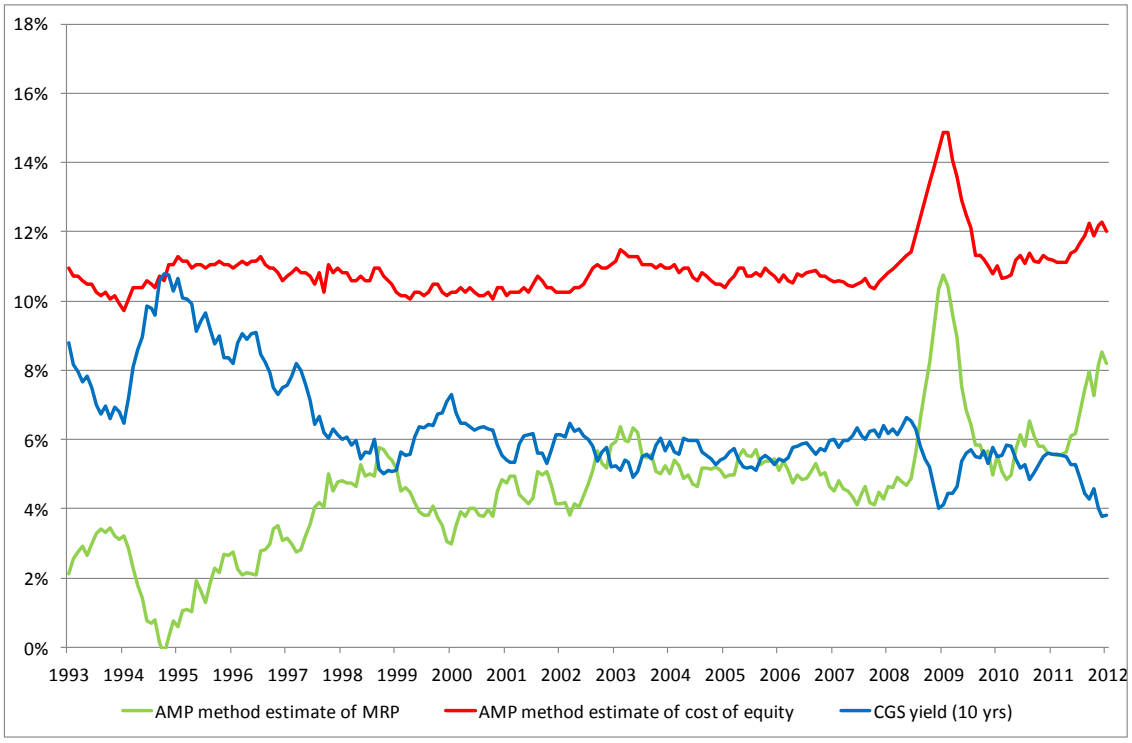
[18] AMP Capital Investors (2006), *The equity risk premium – is it enough?* Oliver's insights, Ed.13, 4.

[19] AER, *Electricity transmission and distribution network service providers Review of the weighted average cost of capital (WACC) parameters,* December 2008, p. 173

[20] This is based on the assumption of a corporate tax rate of 30%, that the value of imputation credits distributed (theta) is 35% of their face value, consistent with Australian Competition Tribunal precedent, and the proportion of dividends that are franked is 75% (consistent with Brailsford, T., J. Handley and K. Maheswaran, Re-examination of the historical equity risk premium in Australia, Accounting and Finance 48, 2008, page 85). The value of 1.1125 is calculated as 1+.30*.35*.75/(1-.3)

[21] Capital Research, *Forward Estimate of the Market Risk Premium: Update*, February 2012, Figure 8.

Figure 8: AMP method estimate of RoE and MRP relative to 10 year CGS yields



Source: RBA and CEG analysis

4.4. Risk premiums on utility equities

72. The AER assumes a historical average equity risk premium for utilities of 4.8% (derived from a historical average MRP of 6% and a beta of 0.80). The AER assumes that this historical average is stable through time and independent of movements in the risk free rate. Consequently, the AER's estimate of the cost of equity has fallen one-for-one with CGS yields since mid 2011.

73. The reasonableness of these assumptions can be assessed by examining market evidence on the prevailing required equity risk premium by Australian regulated utilities. I have undertaken such an analysis based on a DGM using dividend and share price data from six Australian utilities businesses, being APA Group, DUET Group, Envestra, Hastings Diversified Utilities Fund, SPAusNet and Spark Infrastructure, obtained from Bloomberg. The DGM analysis is based on analyst dividend forecasts sourced from Bloomberg on 24 February 2012 and 9 March 2012 and the average price of equities for these firms over the period 9 February 2012 to 9 March 2012. Over the same period the average 10 year CGS yield was 4.13%

74. The basis of DGM analysis is to examine the forecast future distributions of businesses and to derive the discount rate (or cost of equity) that makes these consistent with the market valuation of the equity of those businesses as manifested in the current share price. In order to be conservative I have assumed that investors place a zero value on any franking credits distributed (this assumption reduces the

value of future dividends to investors and reduces the discount rate required to equate the flow of dividends with prevailing share prices).

75. I have sourced analysts' forecasts of dividends for the first two years from Bloomberg, with these averaging to an annual growth rate of 4.6%. %. However, beyond this date analyst dividend forecasts are not available and it is necessary to make an assumption about the future path of dividend growth/decline beyond this horizon. Because this assumption is necessarily subjective, I have shown a range of assumptions, including those that would be necessary to support the AER's estimated 4.8% percent equity risk premium. The range that I have used is zero real growth in dividends (2.5% nominal growth) up to growth in line with long run nominal GDP (6.6%).[22]

76. I have included as a sensitivity analysis the long term growth assumption that delivers an average cost of equity equal to 8.9%. This is the cost of equity derived by combining the average CGS yield over the estimation period (4.1%) with the AER's historical average equity risk premium of 4.8%. The results show that, in order to arrive at an average equity risk premium of 4.8%, the assumed growth rate for dividends in the future has to be around 0.3%. Implicit in this result is a long term inflation forecast of 2.5% (in the middle of the RBA's target range). Consequently, in order for a 4.8% equity risk premium to be supported, the assumed long run growth in dividends for these businesses must be materially negative in real terms (negative 2.2%).

77. The results of the DGM analysis at varying growth rates are summarised in Table 2 below.

Table 2: DGM cost of equity analysis - with dividend growth rates assumptions

Dividend growth rate	0.30%	2.50%	4.50%	6.60%
APA AU Equity	8.4%	10.3%	12.2%	14.1%
DUE AU Equity	10.7%	12.7%	14.4%	16.3%
ENV AU Equity	9.1%	11.1%	12.9%	14.8%
HDF AU Equity	6.5%	8.6%	10.4%	12.4%
SPN AU Equity	9.1%	11.1%	12.9%	14.8%
SKI AU Equity	8.7%	10.7%	12.5%	14.4%
Weighted average by market capitalisation	8.87%	10.86%	12.67%	14.59%
ERP (beta*MRP) if risk free rate = 4.13%	4.74%	6.73%	8.54%	10.46%

Source: Bloomberg, RBA, CEG analysis

[22] A detailed basis for the assumptions underlying this DGM analysis is set out at Appendix A to this report.

5. Why required returns on riskier assets are not falling in line with CGS yields

78. The previous section provided an empirical description of the fact that required returns on other assets have not been falling with the most recent fall in CGS yields – such that risk premiums (spreads) have been rising. Section 5.1 below section explains why this has been happening including by reference to the views of other experts such as the RBA. Section 5.2 of this report also canvasses the RBA's views on the extent to which a 'scarcity premium' or 'liquidity premium' is currently depressing the yield for CGS and the likely implications for future levels of CGS yields.

5.1. Flight from risky to safe assets

79. The CAPM, or, more precisely, the Sharpe-Lintner version of the CAPM, predicts that the expected yield on any asset will be determined by the following formula:

$$Required\ Return\ on\ an\ Asset = Risk\ Free\ Rate + (beta\ for\ that\ asset * MRP)$$

$$Risk\ premium\ on\ asset_i = \beta_i * MRP$$

80. This formula describes an investor's required return on any asset – be that asset debt, equity or any other asset. The asset's beta (β_i) is a measure of the risk of that asset relative to the riskiness of the market portfolio. The MRP describes investors' required compensation for the risk associated with holding the market portfolio.

81. Investors' required compensation for the risk associated with any individual asset can increase for one or both of two reasons:

- the asset's beta can increase (i.e. the asset's risk relative to all other risky assets can increase); or
- the market risk premium can increase.

82. It is AER's practice to implement the CAPM formula above assuming that the risk free rate is best proxied by the prevailing yield on 10 year CGS. Given this practice, internal consistency requires that the MRP be measured relative to the prevailing yield on CGS.

83. However, the factual analysis of the previous section demonstrates that the dramatic fall in 10 year CGS yields in late 2011 was not associated with similarly dramatic reductions in required yields on other assets – be those assets relatively low risk debt or the relatively high risk listed equity market.

84. The only internally consistent explanation for this evidence is that there has been an across the board increase in the risk premiums (measured relative to 10 year CGS yields) that investors require. This need not be because investors are demanding a

higher return on risky assets than they were prior to the fall in 10 year CGS rates. It simply means that investors have not demanded a commensurately lower return on risky assets as the yields on 10 year CGS fell.

85. A common interpretation for the increase in spreads between CGS and other higher risk/less liquid assets (including by the RBA) is that there has been a flight to the safety and liquidity of AAA rated government debt – which has pushed down the yield on this asset but not all other assets.

5.1.1. Risk premiums on state government debt

86. The most recent fall in the yields on Australian Government CGS has been explained in the following terms by the RBA February 2012 Statement on Monetary Policy:[23]

> *Strong demand, particularly from offshore investors, for relatively safe assets in the uncertain global climate has been apparent in the demand for Australian Government bonds over the past couple of months. (As at the end of September, non-residents were estimated to be holding around 75 per cent of Commonwealth Government securities (CGS) on issue.) The yield on 10-year CGS fell to 3.67 per cent in mid January, its lowest level in 50 years….*
>
> *The strong investor preference for CGS and a deterioration in liquidity in the state government securities market, primarily as a result of heightened risk aversion related to events in Europe, led to a widening of the spread between yields on these securities (Graph 4.4). At their peak, 5-year spreads had widened by around 70 basis points from where they were at the end of October for South Australia and Queensland, and by around 50 basis points for New South Wales and Victoria. In recent weeks, spreads have narrowed and issuance has picked up considerably. Yields on longer-term state government debt have increased since the previous Statement as the increase in spreads has more than offset the fall in yields on CGS, but they remain low by historical standards.*

87. In the context of this report, the most relevant elements of the RBA's conclusions are that:

i. Demand for CGS has increased *as a result of an uncertain global climate*, particularly from offshore investors, and pushed down the yields on CGS to its *lowest level in 50 years*;

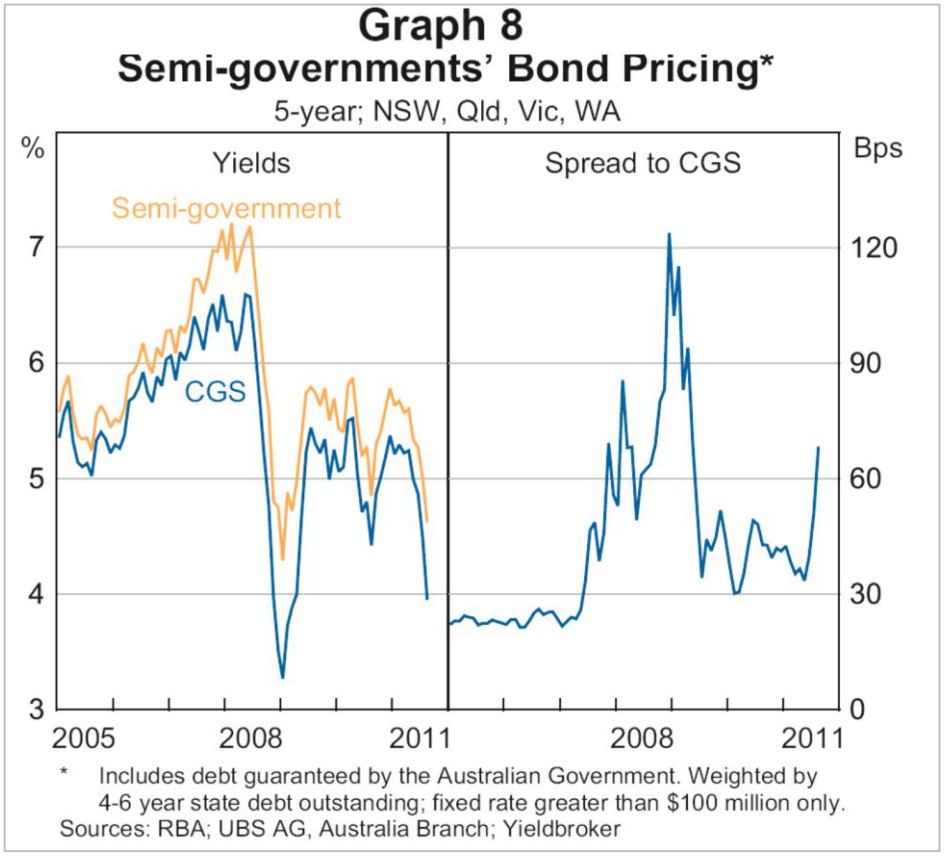
ii. This lower CGS yield *has not* been associated with a commensurately lower required yield on the riskier state government debt. This reflects *heightened risk aversion related to events in Europe* with the effect that risk premiums required on state government debt *rose:* and

[23] Reserve Bank of Australia, *Statement on Monetary Policy*, February 2012, p. 49

iii. Indeed, the increase in risk premiums for state government debt since the previous RBA December Statement on Monetary Policy has more than offset the fall on CGS yields such that yields on state government has *risen* despite the *fall* in CGS yields.

88. Lancaster and Dowling (2011)[24] have made similar observations to those expressed in the RBA Statement on Monetary Policy and quoted above. Published in late 2011, but before CGS yields had reached their recent lows, Lancaster and Dowling compare the yields on semi-government debt to those on CGS. Their graph 8 is reproduced in Figure 9 below.

Figure 9: Semi-governments bond pricing



Source: Lancaster and Dowling (2011)

89. Lancaster and Dowling go on to state:[25]

> *Explicit backing by their respective state governments has meant investors generally perceive credit risk for state treasury corporations to be low. This has*

[24] Lancaster and Dowling, *The Australian Semi-government Bond Market*, RBA bulletin, September Quarter 2011

[25] Ibid,

typically resulted in semi-government bonds trading at tight spreads to CGS (Graph 8). Nevertheless, during periods of market distress, semi-government bond spreads generally widen, as investors seek to hold more of the safest and most liquid securities – namely CGS. During the period of market dislocation following mid 2007, the spread between the yields of semi-government securities and CGS widened to over 120 basis points, up from around 25 basis points before the crisis. Although currently well below their peaks in late 2008, recent market uncertainty has caused spreads to rise in recent months. 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.

90. In the context of this report, the most relevant elements of the above quote from Lancaster and Dowling (2011) are that:

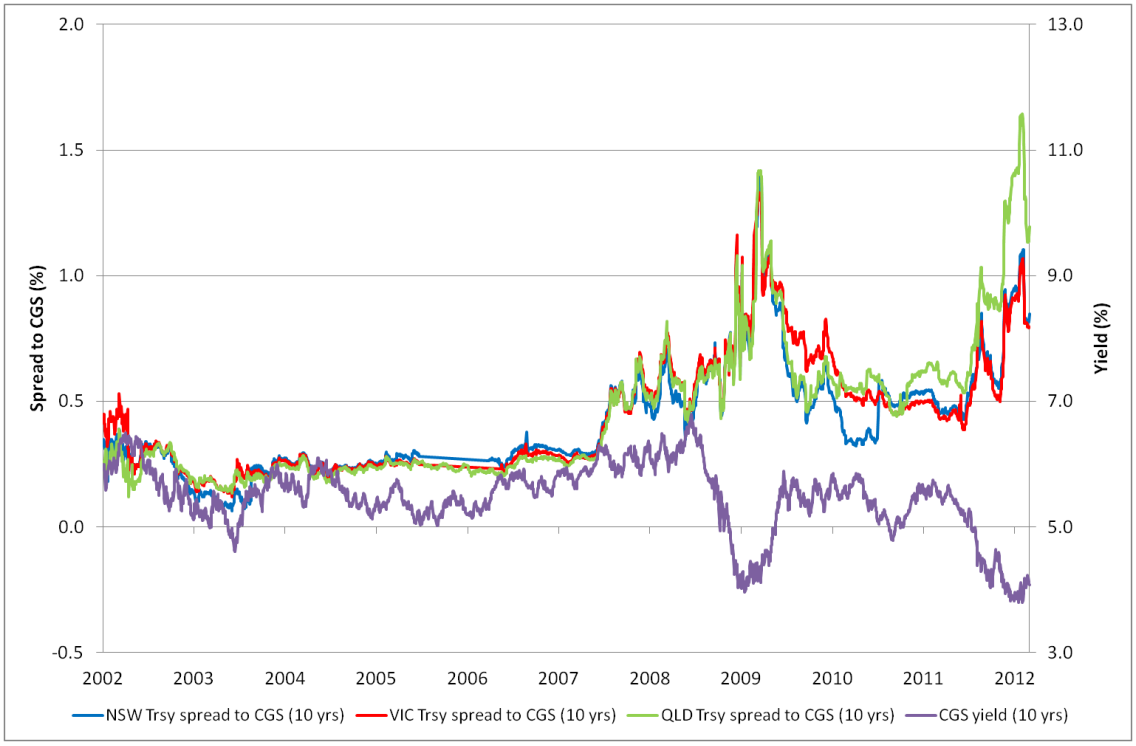
    i. During periods of *heightened risk aversion,* CGS yields tend to be pushed down due to a flight to *the safest and most liquid securities.* However, the required returns on other assets, even similarly safe state government debt, do not fall by as much; and

    ii. Lancaster and Dowling view the current period as an example of this phenomenon (i.e. heightened risk aversion pushing down CGS yields).

91. This is strong evidence that what was causing the fall in CGS yields was not a general reduction in the return investors required on all assets. Rather, it was a fall in CGS yields driven by a general flight from risk.

92. A powerful demonstration of this evidence is provided by examining the movements in risk premiums on state government debt and the movements in CGS yields on the same graph. Figure 10 below shows the yield difference between state government debt and 10 year CGS on the left hand axis. Because this is measured as a *difference in yields* the scale used for this time series is different to the scale used for the CGS yields – which is shown on the right hand axis.

Figure 10: 10 year risk premiums on state government debt against 10 year yields on CGS



Source: Bloomberg, CEG analysis

93. The scales on the two axes are deliberately chosen to place the CGS time series approximately coincident with the state government debt time series in 2002.[26] This is done in order to allow the reader to see more easily the negative relationship between CGS yields and risk premiums in the financial crisis of 2008/09 and then again in the second half of 2011.

94. This figure shows that the very dramatic fall in 10 year CGS yields in late 2008 and early 2009 was associated with an equally dramatic increase in risk premiums (which more than doubled relative to their 2007 levels and quadrupled relative to their pre 2008 levels). Then, as CGS yields recovered in 2009, risk premiums fell. The same pattern is observed in the second half of 2011 with CGS yields falling precipitously and risk premiums simultaneously doubling for NSW and Victorian government debt both rated AAA (and more than doubling for Queensland government debt rated AA+).

95. The risk premiums on state government debt relative to 10 year CGS are, at the time of writing, in the vicinity of 30bp higher than when CGS yields began falling in mid 2011. This is a very substantial increase for a relatively low risk asset. Using the

[26] The reader should note that this does not mean that the CGS yields were the same as the risk premium at that time – as CGS yields are shown on the right hand axis which starts at a higher level than the left had axis.

CAPM formula above, it is simple to demonstrate that this implies a much greater increase in the average risk premium for risky assets (i.e. the MRP).

96. To see this, consider Victorian government debt. This had a risk premium of 80bp at the time of writing (28 February 2012) which is 29bp higher than the average risk premium of 51bp over calendar year 2010. If one believes that the MRP in 2010 was around 6.0% then this implies a debt beta for Victorian government debt of around 0.09 (=0.51/6). If one assumes that the same beta applies today when risk premiums are around 80bp then this implies an MRP in the vicinity of 9.0% (0.80/0.09).[27]

5.1.2. Risk premiums on listed equities

97. Figure 11 below shows the equity risk premium for Australian publicly listed equities as estimated using the AMP method as described. This figure is simply the CGS and MRP time series from Figure 8 above.

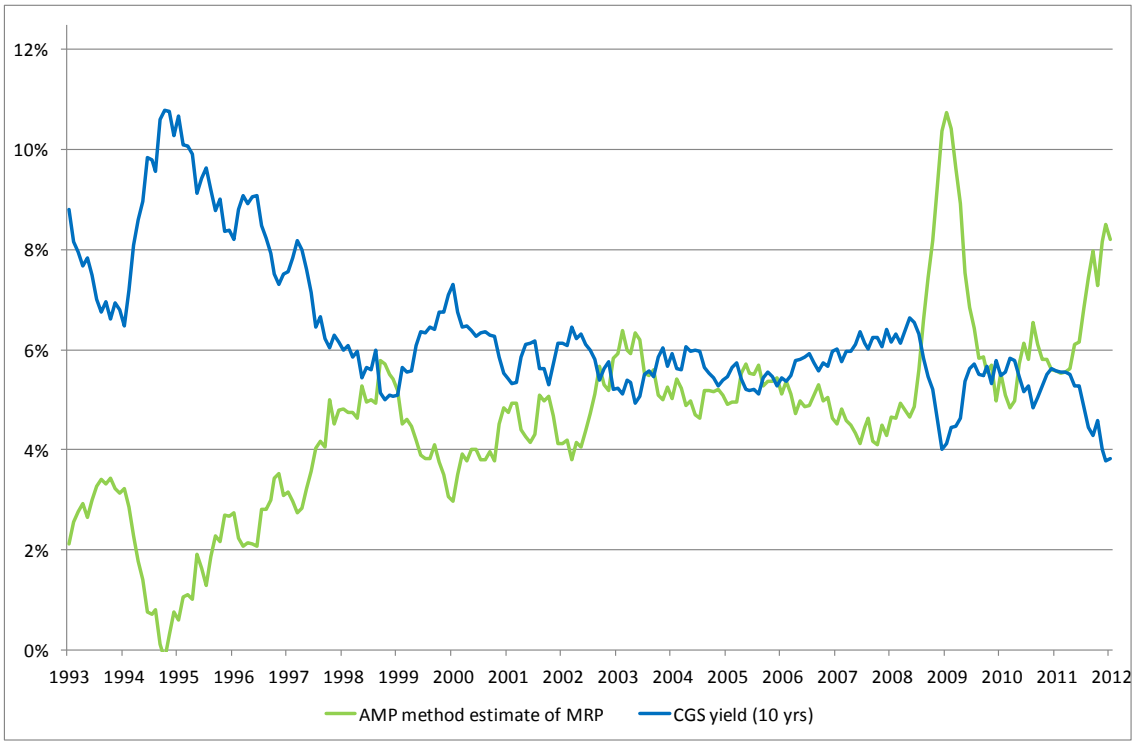
[27] Of course, this does not imply that the absolute required return on risky assets is 300 basis points (3.0%) higher now than it was in 2010. Rather, it simply implies that the required return on risky assets has simply increased *relative to* a falling CGS yield (noting that CGS yields on 28 February were 140 basis points (1.4%) lower than their average over 2010). Thus, based on the logic and assumptions set out above, the CAPM return on the market portfolio would only be 160 basis points higher on 28 February (calculated as 300 bp less 140 bp) compared to the average over calendar year 2010. Of course, if one incorrectly assumed that risk premiums were constant through time then one would conclude that absolute required returns had fallen for all assets when, in reality, required returns on the average asset had risen.

As an aside, I note that any reader accustomed to thinking of the MRP as a stable value derived from long run average historical returns may find it jarring to read about an estimate of the MRP on a given day. However, if the MRP is to be applied in the CAPM formula alongside a CGS yield taken from a given day (or small number of consecutive days) then this is unavoidable – the CAPM requires that the MRP be measured relative to the CGS yield on the same day or set of days that the CGS yield has been estimated on. Formally, the market risk premium is equal to the required return on the market less the risk free rate:

$$MRP = RoE_{Market} - RFR$$

In order for the estimate of the MRP to have any meaning (or, at least, the meaning it has in the CAPM), RoE_{Market} and RFR must be estimated consistently (ie, in the same market conditions).

Figure 11: Risk premiums on listed equities (AMP method) vs 10 year yields on CGS



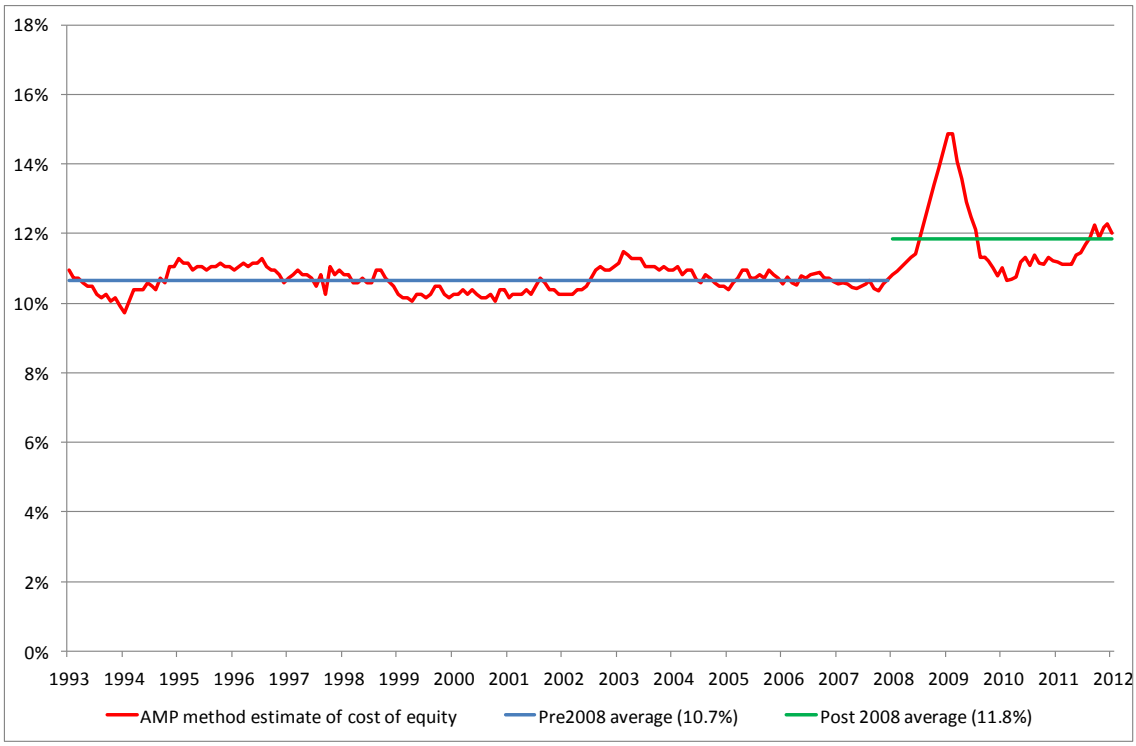
Source: RBA, CEG analysis

98. Figure 10 illustrates, just as Figure 10 did, a clear negative relationship between the yield on CGS and the level of the risk premium. The risk premium is lowest when CGS yields are highest and highest when CGS yields are lowest (in early 2009 and once more at the time of writing in early 2012).

99. Moreover, this negative relationship can be clearly discerned even when CGS yields are at less extreme levels. For example, between 1998 and 2005, peaks in the MRP are generally coincident with troughs in CGS yields (in late 1998, 2003 and 2005), whilst peaks in CGS yields occur with troughs in the MRP series (in 2000, in 2002 and again in 2004).

100. Given this negative relationship between the risk free rate and the risk premium on listed equities, it is unsurprising that the sum of them, being the required return on the listed equity market, is much more stable than its constituent parts.

Figure 12: Total cost of equity (AMP method)



Source: RBA, CEG analysis

101. Examination of Figure 12 suggests that the total cost of equity has been remarkably stable between 10% and 11% since 1993. The clear exceptions to this are the period in early 2009 and, to a lesser extent, in early 2012 when CGS yields were driven to unprecedentedly low levels by historical standards.

102. This chart also shows that, using the AMP method, the average cost of equity for the market post 2008 is somewhat higher than the average pre 2008. This is despite the average CGS yields being materially lower post 2008 (see Figure 1 above).

103. This negative relationship between government bond yields and risk aversion/premiums is not unique to Australia. The RBA has noted precisely the same dynamic at play in other bond markets. When describing investment market turbulence in August 2011, a period in the midst of the CGS yield decline, the RBA noted:[28]

> *S&P subsequently downgraded the credit ratings of a number of US agencies, banks and clearinghouses whose status is dependent on that of the sovereign. This contributed to the increased market turbulence in August. Japan's sovereign credit rating was also downgraded in August; Moody's reduced the*

[28] RBA, *Financial Stability Review,* September 2011, p. 8

rating one notch to the equivalent of AA-, bringing it into line with S&P's rating, which had been downgraded earlier in the year. ***Despite rating changes, long-term government bond yields in the United States and Japan have fallen since the start of August as risk aversion has grown.*** (Emphasis added)

104. In the same document the RBA reiterates the fact that the falling CGS yields in the second half of 2011 were contemporaneous with heightened risk aversion:[29]

> ***Risk aversion and volatility in global financial markets have increased sharply since the start of August (****Graph 1.1) …. Across many countries, prices of shares and other risk assets have declined sharply since early August. Bank and insurer share prices have been particularly affected, falling by more than 15 per cent in most countries, to be around their lowest levels since early 2009 (Graph 1.2)…*
>
> ***This current episode of risk aversion and volatility follows a number of periods of heightened market turbulence over the past couple of years****. These periodic events indicate that financial market participants remain sensitive to bad news following the experience of 2008–09. While the latest bout of market uncertainty is not on the scale of 2008–09, it is unclear at this stage whether it will be another temporary episode or whether it is foreshadowing a more serious market dislocation.* (Emphasis added)

105. It is important to understand that it would be an error to argue, based on the last sentence of this quote, that the regulatory MRP should not be increased to reflect heightened uncertainty/risk aversion because this may only be temporary. Even if we know that the heightened risk aversion is temporary (which we do not), if we are using prevailing CGS as our estimate of the risk free rate, we must still reflect even temporarily higher MRP levels in our cost of equity estimate. To do otherwise would be to pass through a temporarily lower CGS yield that is the 'other side of the coin' of temporarily higher risk aversion.

5.2. Specific supply and demand conditions in the CGS market

106. Figure 10 and Figure 11 above clearly illustrate the negative relationship between risk premiums and the risk free rate that is driven by the flight to safety of CGS in periods of heightened risk aversion. However, there is good reason to believe that there are current aspects of the supply and demand dynamics for Australian CGS that will tend to depress CGS yields, and raise risk premiums, even in periods of 'normal' market conditions. Specifically, the experience of recent years is likely the supply of CGS is small relative to the size of the Australian economy and:

- international events have seen a significant increase in demand for CGS by foreign investors; and

[29] Ibid, pp. 5-6

- regulatory changes associated with Basel III banking regulation will require banks to significantly increase their holdings of low risk liquid assets (primarily CGS).

107. The shortage of CGS is well understood to have resulted in a scarcity premium for CGS in recent years - and hence a depressed yield. RBA Assistant Governor Guy Debelle has observed when considering how to interpret differences between the yield on CGS and required returns on other assets:[30]

> *One complication in doing this calculation in Australia is that* ***because government paper has been in short supply for many years, it has tended to trade with a scarcity premium. This widens the observable spread between the yield on government paper and the yield on other assets in a way that is not present in most other jurisdictions****.* (Emphasis added.)

108. This scarcity premium has undoubtedly turned upwards for the foreseeable future as a result of the two dot points described above. In relation to the first point, Australian CGS are now amongst very few developed country government bonds that have a AAA credit rating from S&P. The downgrade of US and French Government debt in 2011 (preceded by downgrades to most other Eurozone Government debt) left Australia one of only a very small club of AAA rated sovereigns.[31] This has been associated with a significant increase in demand for CGS by foreign institutions looking for AAA rated sovereign debt.

109. The head of the Australian Office of Financial Management (AOFMO) has been quoted in the press explaining the fall in CGS yields as not just a flight from equities but also as a spill-over from the reduction in the availability of AAA rated government debt in the rest of the developed world. RBA Assistant Governor, Guy Debelle, was quoted in the same article commenting on increased demand for CGS from foreigners:[32]

> *"It's the product of a whole lot of influences," he said. "Australia is a AAA-rated sovereign, and that's a shrinking club. Investors might be taking money out of equity markets and putting it into the safety of bonds paying fixed interest.*
>
> *"There have been changes in currency level and hedging costs. It's not surprising that demand for Australian government securities should have risen in the current circumstances."*

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[30] Guy Debelle, RBA Assistant Governor (Financial Markets), Speech to the APRA Basel III Implementation Workshop 2011 Sydney - 23 November 2011.

[31] The others being Canada, Denmark, Finland, Germany, Luxemburg, Netherlands, Norway, Singapore, Sweden, Switzerland and the UK.

[32] The Age, *Australia reaps bond windfall*, Tim Colebatch, *February 16, 2012* available at: http://www.theage.com.au/opinion/political-news/australia-reaps-bond-windfall-20120215-1t6q2.html#ixzz1oQQsnHCl

Reserve Bank assistant governor Guy Debelle said this week the demand for Australian bonds was coming largely from the sovereign wealth funds of foreign governments.

Mr Debelle said the Reserve estimated that 75 per cent of Australian bonds were owned offshore. He said foreign demand for Australian bonds could be partly responsible for the recent strength of the Australian dollar.

110. The heightened demand for CGS from foreign investors appears to have pushed domestic investors into state government debt. While Australian investors only hold around 25% of CGS, they hold around 60% of the market value of state government debt (up from 53% in June 2007). [33]

111. This heightened demand from foreigners comes at the same time that changes to banking regulations are raising the demand for CGS and state government debt from Australian banks. Specifically, under Basel III regulations banks will be required to hold an increased proportion of their balance sheet in high quality liquid assets. The purpose of this regulation is to ensure that banks individually, and the banking system as a whole, can avoid the need to engage in 'fire sales' of illiquid assets in the event of a runs on the banking system (and thereby avoiding a systemic reduction in the value of all such assets held in the banking system).

112. In describing the implementation of Basel III, APRA's Charles Littrel has stated:[34]

First, we intend to ensure that each bank reasonably optimises its use of Commonwealth Government Securities and semi-government securities, which are the most liquid assets in our market. But at the same time, holdings of this stock cannot allow the liquidity in these markets to be soaked up.

113. The problem for Australia is that there simply are too few CGS and state government debt instruments on issue that will allow the Basel III induced demand for these assets to be satisfied (at least without destroying the liquidity of these assets). RBA Assistant Governor Guy Debelle has explained the magnitude of this effect in the following way.[35]

The Basel liquidity standard requires that banks have access to enough high-quality liquid assets to withstand a 30-day stress scenario, and specifies the characteristics required to be considered an eligible liquid asset.

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[33] Lancaster and Dowling, The Australian Semi-government Bond Market, RBA bulletin, September Quarter 2011, page 53.

[34] APRA's Basel III Implementation rationale and impacts, Charles Littrell, Exec. GM, Policy, Research and Statistics, APRA, APRA Finisia Workshop, Sydney, 23 November 2011.

[35] Guy Debelle, RBA Assistant Governor (Financial Markets), Speech to the APRA Basel III Implementation Workshop 2011 Sydney - 23 November 2011.

> *The issue in Australia is that there is a marked shortage of high quality liquid assets that are outside the banking sector (that is, not liabilities of the banks). As a result of prudent fiscal policy over a large run of years at both the Commonwealth and state level, the stock of Commonwealth and state government debt is low.* ***At the moment, the gross stock of Commonwealth debt on issue amounts to around 15 per cent of GDP, state government debt (semis) is around 12 per cent of GDP.[1] These amounts fall well short of the liquidity needs of the banking system.*** *To give you some sense of the magnitudes, the banking system in Australia is around 185 per cent of nominal GDP. If we assume that banks' liquidity needs under the liquidity coverage ratio (LCR) may be in the order of 20 per cent of their balance sheet, then they need to hold liquid assets of nearly 40 per cent of GDP.*
>
> ***[1]The net stock of Commonwealth government debt on issue is considerably lower at 6 per cent*** *of GDP, reflecting the assets held by the Commonwealth government, including through the Future Fund.*

114. Lancaster and Dowling in the RBA Bulletin make the same observations about the impact of Basel III on demand for CGS and state government debt:[36]

> *The demand for semi-government securities is likely to increase over coming years as the introduction of Basel III reforms requires banks to hold higher levels of liquid assets,* ***which include semi-government securities, as well as Commonwealth Government securities (CGS),*** *balances held at the Reserve Bank of Australia and cash.* (Emphasis added.)

115. Of course, a well anticipated future increase in demand for CGS will already be factored into a higher current market price (and lower yield) of long term CGS.

116. As a consequence of this recognised shortage of supply, the Basel Committee has explicitly stated that the RBA can attempt to fill the gap by providing a "Committed Liquidity Facility" as a substitute for banks holding CGS and state government debt. In order to access this facility banks would need to agree to pay a 15bp access fee even if they never used the facility (and a further 25bp of penalty interest rates in addition to the access fee if they did use the facility). This gives the bank the right to borrow (access liquidity) from the RBA using less liquid assets as collateral (under a margin scheme that prevents the RBA taking on any credit risk).

117. The only reason a bank would pay these fees for the right to borrow at a penalty interest rate would be if the scarcity/liquidity premium on CGS was high enough to justify this.

118. In justifying these fees Assistant Governor Debelle, in late November 2011 when CGS yields were at similar levels to those at the time of writing this report, made reference to the heightened liquidity premium that existed at that time.[37]

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[36] Lancaster and Dowling, *The Australian Semi-government Bond Market*, RBA bulletin, September Quarter 2011.

> ***While at times like the present, liquidity can have considerable value**, the Reserve Bank will not be varying the size of the fee through the cycle. Consequently, the facility is to be priced at a level that takes into account the value of liquidity in more normal conditions, as well as in stressed circumstances.*
>
> *…*
>
> *However, part of the point of the new liquidity regulations is to recognise that the market has underpriced liquidity in the past. Consequently, it is appropriate to levy a fee which is greater than implied by a long run of historical data. **The net outcome is thus a weighted average of a relatively low liquidity premium in normal times and a much higher liquidity premium in stressed times.***

119. 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.

120. Finally, it is worth noting that the other likely source of increased demand for CGS that can be expected to prevail into the future is a heightened awareness from investors generally about the risks of investing in equities and real estate. The RBA September 2011 Financial Stability Report makes the following observations:[38]

> *Continued net inflows, particularly into superannuation and deposits, offset negative valuation effects associated with falls in share prices. Given the volatility in equity markets in recent years and higher returns being offered on deposits, households have become more conservative in their investment preferences, directing a larger share of their discretionary savings to deposits while **reducing direct equity investments**. **This is also consistent with surveys showing an increase over the past few years in the proportion of households nominating bank deposits as the wisest place for their savings and fewer nominating equities and real estate.***

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[37] Guy Debelle, RBA Assistant Governor (Financial Markets), Speech to the APRA Basel III Implementation Workshop 2011 Sydney - 23 November 2011.

[38] RBA, *Financial Stability Review*, September 2011, p. 48

6. Regulatory precedent for dealing with volatility in risk free rates

121. The weight of regulatory precedent outside Australia is for the cost of equity to be set in a manner that ensures that unusually low risk free rates are not fully passed on in low allowed cost of equity. There is also material precedent for this in Australia from bodies other than the AER.

6.1. Australian Competition Tribunal

122. In 2009, the Australian Competition Tribunal found that the AER's approach to estimating the cost of equity for was in error because use of the prevailing risk free rate in the AER's CAPM formula resulted in too low a cost of equity. As already noted above, in late 2008 and early 2009, CGS yields plunged during the global financial crisis of that period. This reflected a flight to safety and liquidity by investors as they shunned alternative riskier assets.

123. The NSW electricity distribution businesses and the NSW and Tasmanian electricity transmission operators where advised by both myself and Professor Bruce Grundy that, if the MRP was held constant at historical levels, then measuring the risk free rate at historical lows in the CAPM would result in an erroneous estimate of the cost of equity. The AER contested this view and proceeded to estimate the cost of equity using an MRP of 6% and a nominal (real) risk free rate of 4.3% (1.8%) (the lowest yield on nominal 10 year CGS since the 1950s).

124. This decision was appealed to the Tribunal. The issue of contention was whether the historically low risk free rates during the crisis should be passed through in equally low cost of equity allowances.

125. In the context of those proceedings, I provided expert evidence very much along the lines described above.[39] The Tribunal agreed that using such rates to set the cost of equity without increasing the market risk premium was likely to underestimate the cost of equity. The Tribunal stated:[40]

> *The Applicants submitted that these facts demonstrated that basing a risk free rate on the AER's specified averaging periods would not achieve the objective of an unbiased rate of return consistent with market conditions at the date of the final decision. They appealed to expert opinion that the market risk premium was far higher than its deemed value while the risk free rate was abnormally low, so that the return required by investors was much higher than the AER's specified averaging period would generate.*

[39] CEG, *Rate of return and the averaging period under the National Electricity Rules and Law*, January 2009.

[40] *Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009)* [2009] ACompT 8 (12 November 2009), paras. 112-114.

…

The Tribunal considers that an averaging period during which interest rates were at historically low levels is unlikely to produce a rate of return appropriate for the regulatory period.

126. It is relevant to note that the real risk free rate set in the AER's recent Aurora draft decision is even lower than the real risk free rate that was that was the subject of variation as a consequence of the merits review brought by the NSW distribution businesses and the NSW and Tasmanian transmission operators (1.6% versus 1.8%). I focus on the real risk free rate because it is the real risk free rate and not the nominal risk free rate that determines the nominal level of revenues that the PTRM cost model actually delivers to regulated businesses.

127. In these circumstances, the AER's Aurora draft decision (November 2011) not only fails to raise the MRP to at least partially offset the impact on the cost of equity of lower risk free rates resulting from a flight from risky assets. In fact, the AER decided to use its discretion to *reduce* the MRP from 6.5% as set out in the SORI to 6.0% - thereby compounding the impact of the falling CGS rates on the allowed cost of equity.

128. The table below compares the CAPM parameters used in the Aurora draft decision to the parameters rejected by the Tribunal as being in error in EnergyAustralia. It also shows the results of applying the same methodology at the time of writing (using average CGS yields in February 2012)

Table 3: Cost of equity estimates

Parameter	Tribunal correction to AER error	AER decision (pre Tribunal correction)	AER in Aurora Energy (draft)
Real risk free rate	3.3%	1.8%	1.6%
Beta	1.0	1.0	0.8
MRP	6.0%	6.0%	6.0%
Real cost of equity	9.3%	7.8%	6.4%

129. This table demonstrates that the AER has set the same MRP but a materially lower risk free rate than the AER set in the EnergyAustralia decision (which the Tribunal overturned). The effect of this is that the AER draft decision for Aurora sets a real risk free rate at 0.2% less than the level that the Tribunal found in EnergyAustralia was:[41]

[…] unlikely to produce a rate of return appropriate for the regulatory period.

[41] *Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009)* [2009] ACompT 8 (12 November 2009), para. 114.

130. The context of that proceeding was such that the Australian Competition Tribunal had open to it to direct the AER to use an earlier averaging period, as proposed by EnergyAustralia, that did not reflect the prevailing conditions in the CGS market during the AER averaging period. This is what the Tribunal directed should occur.

131. It is relevant to note that, as I understand the legal constraints, the Australian Competition Tribunal did not have open to it the option of varying the market risk premium parameter that was to apply. This is because as a consequence of transitional provisions in the Rules for the regulatory determination processes to apply to the NSW electricity distributors, the market risk premium was fixed at 6 per cent with no ability to depart from that fixed value. For the transmission network operators, the value was similarly fixed at 6 per cent with no ability to depart from that fixed value.

6.2. UK regulators

132. UK regulators have considered the problems associated with using a volatile estimate of the prevailing risk free rate alongside a stable estimate of the market risk premium. As a group, they commissioned Smithers and Co to address this and other issues. The advice from Smithers and Co was that movements in the MRP would tend to move to offset any change in the risk free rate: [42]

> *Given our preferred strategy of fixing on an estimate of the equity return, any higher (or lower) desired figure for the safe rate would be precisely offset by a lower (or higher) equity premium, thus leaving the central estimate of the cost of equity capital unaffected.*

133. UK regulators have largely accepted this advice and they do not, as a rule, use a prevailing estimate of the risk free rate when applying the CAPM. For example, in an annexure report entitled "Decision on strategy for the next transmission and gas distribution price controls - RIIO-T1 and GD1 Financial issues" Ofgem adopted the following approach, in March 2011:[43]

> *3.69. Market measures of the real risk-free rate, such as the yield on ILGs, have risen slightly since the data cut-off point for EE's December report. However, they remain near historical lows, partly due to the Bank of England's official interest rate being held at 0.5 per cent and the impact of Quantitative Easing. We, therefore, do not consider it appropriate to rely on spot rates or short-term averages to set the risk-free rate.*
>
> *3.70. Our revised range for the risk-free rate is, therefore, 1.7-2.0 per cent. The lower bound matches the 10-year average yield on 10-year ILGs, while the upper bound corresponds to regulatory precedent in the UK.*

[42] Smithers and Co, *A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K., A report commissioned by the U.K. economic regulators and the Office of Fair Trading,* 2003, p. 49.

[43] Available at: http://www.ofgem.gov.uk/Networks/Trans/PriceControls/RIIO-T1/ConRes/Documents1/T1decisionfinance.pdf

134. The market level of the ILG's (Index Linked Gilts) reported in the EE report (and referred to above) were around 0.4%. Consequently, Ofgem's decision involved an increase of between 1.3% and 1.6% relative to these values.

135. In 2006 Ofgem similarly set the risk free rate above market rates. On the basis of Smithers and Co's advice referred to above, Ofgem, in its 26 June 2006 Initial Proposals, stated:

> *In DPCR4, as described above, we observed that the CAPM model gave a wide range of estimates for the cost of equity, reflecting a significant variation between long term average values for the cost of equity and observed market data at a given point in time. We concluded that we could not rely on observed market data due to exceptional factors pushing down interest rates and the instability of the equity beta. (p. 30)*

136. Ofcom stated:[44]

> *Taking account of both current and recent historical evidence, Ofcom's view is that it is appropriate to use a value of 4.6% for the nominal risk free rate. This is somewhat higher than the current rate of about 4.2% to 4.3% (which are lower than historic averages), but consistent with a longer term averages and a real risk free rate of 2.0% and a rate of inflation of 2.5%.*

137. Similarly, Ofwat, the UK water regulator, concluded:[45]

> *The proposed range is consistent with regulatory precedent. Recent regulatory determinations have placed little weight on low gilt rates [Government bond rates]. The Competition Commission, eg BAA plc (2002), has also noted that current yields should be used with caution when estimating the risk free rate because of market volatility. The Smithers & Co study (February 2003) undertaken on behalf of the regulators concludes that a reasonable assumption for the [real] risk-free rate is 2.5%.*

6.3. US regulators

138. Energy regulators, along with most other monopoly regulators in the US, do not tend to reflect variations in the risk free rates, proxied by 10 year Treasury bond rates, in the allowed cost of equity for a regulated business. This reflects the fact that the US regulators attempt to estimate the cost of equity using a wholly forward looking methodology. As a result, any fall in Government bond yields due to a rise in risk aversion will tend to be automatically offset by higher allowed risk premiums.

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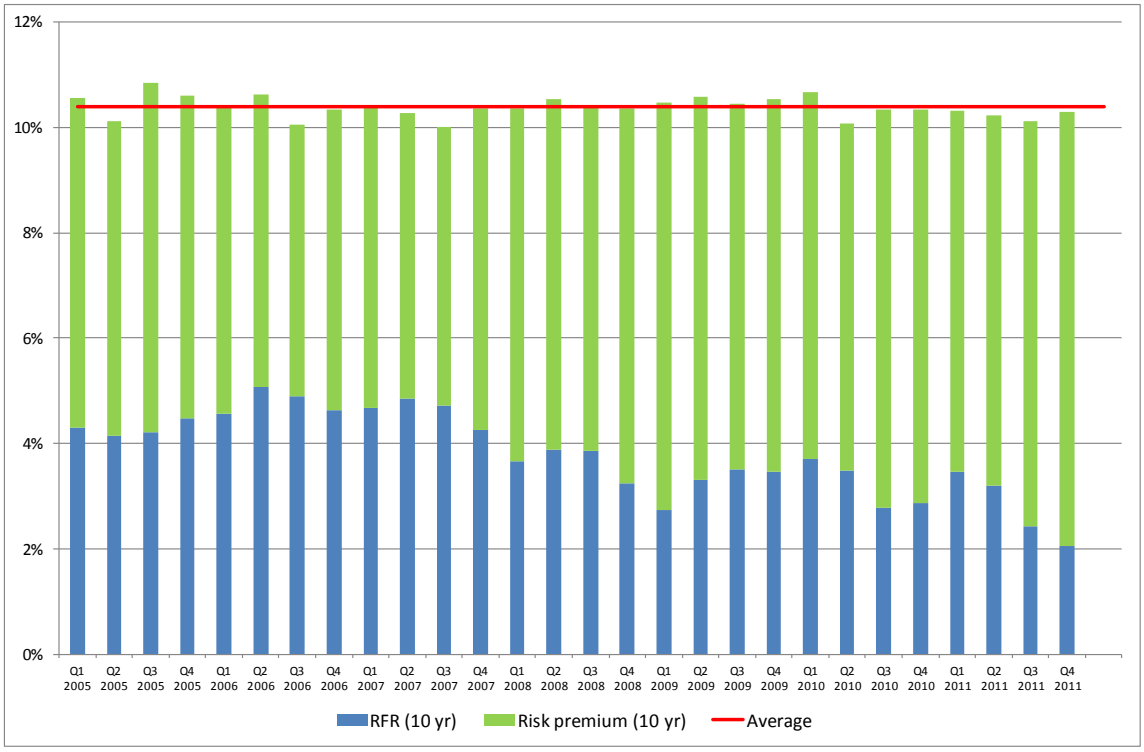
[44] Office of Communications, Ofcom's approach to risk in the assessment of the cost of capital, 23 June 2005, p. 15

[45] Ofwat, Future water and sewerage charges 2005-10: Final determinations, Appendix 5, Cost of Capital

139. The following figure illustrates this by examining US decisions for regulated gas and electricity transport businesses over the last 6 years –covering the periods pre and post global financial crisis. Over this period US government 10 year bond rates were volatile and are currently around 300bp lower than (less than half) their pre-crisis peak (2.05% versus 5.07%).. However, the allowed return did not move in synchronicity with movements in risk free rates – with the average return on equity allowed by US regulators relatively stable at 10.38% in the face of movements in risk free rates.

Figure 13: US regulatory decisions over time – broken into risk free rate and risk premium

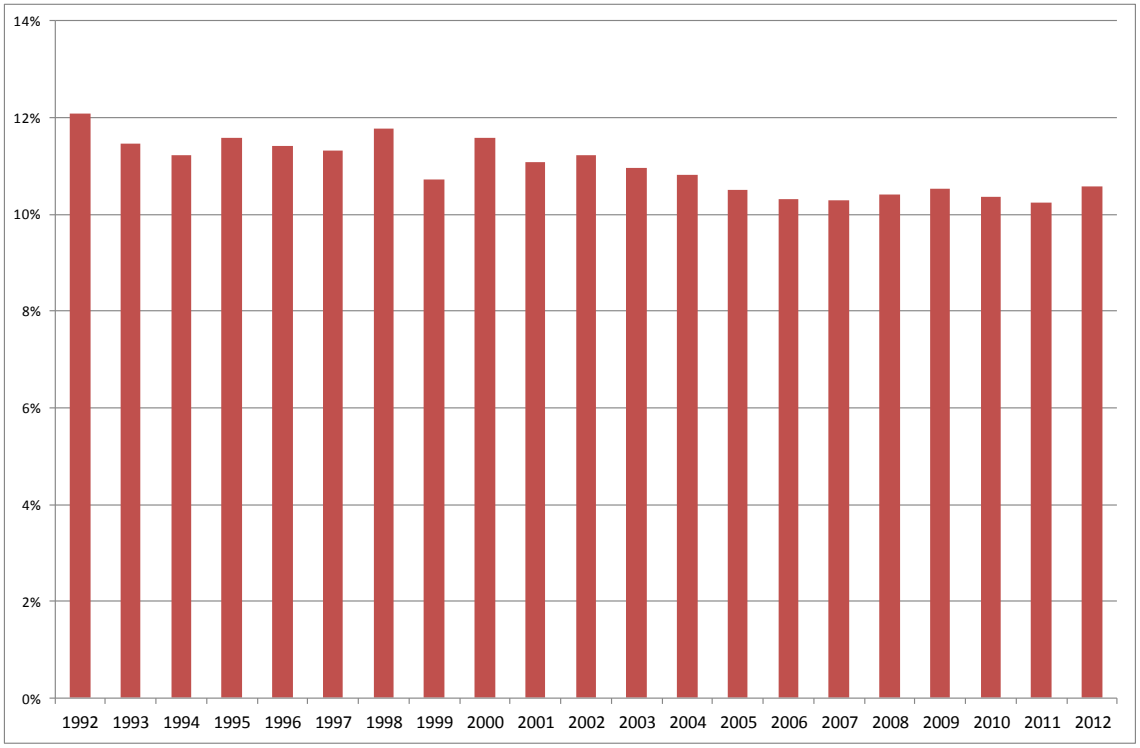


Source: SNL Financial Business Intelligence Services, Bloomberg, CEG analysis

** Note that the average gearing of the firms in this sample is below 50%. Consequently, the allowed return on equity for these businesses cannot be directly compared with the AER allowed return on equity for a 60% geared company without making the necessary upward adjustment.*

140. The same pattern of stability in the return on equity is true over an even longer time horizon as shown in the Figure below which shows, for the last twenty years, return on equity allowances for regulated US energy firms averaged across all regulatory decisions (average 11.01%).

Figure 14: US regulatory return on equity decisions over 20 years – average per year



Source: SNL Financial Business Intelligence Services, CEG analysis

141. An additional potential source of information on normal required returns for regulated businesses comes from US regulatory precedent involving the application of the DGM model. For the US regulatory decisions from 2005 to 2011 described previously, I have estimated the average ROE is 10.38% (11.01% over the last 20 years). The average equity premium is 6.57% and average 10 year US Treasury rate is 3.80%. Note that this is based on DGM analysis performed by regulators. However, this is for an average gearing of 47.98%. Adjusting this to 60% gearing gives an **average cost of equity of 12.36%.**[46]

6.4. Australian regulatory practice

142. There is also recent and older Australian regulatory precedent for not setting the risk free rate based on observations that are affected by abnormal conditions in the Government bond market.

143. In a recent decision in relation to the Sydney Desalination Plant, IPART has stated:

[46] 12.36% = 3.805% + (1-0.4798)/(1-0.600)*6.575%

For this review, we consider that the value of the risk free rate is currently well below long term averages and that there is a high level of market uncertainty. We consider the risks in setting a 5-year determination in the current conditions are more significant than under normal market conditions.

We acknowledge the argument that there may be greater stability in the sum of the market risk premium and the risk free rate (i.e., the expected market return) than in the individual components. In the current market circumstances, there is some evidence, as SDP noted, to support the view that expectations for the market risk premium have risen as bond yields have fallen.

144. Consistent with this analysis, IPART set a WACC towards the top of its range. Its stated reason for doing so was as set out below[47]:

We determined the values for the parameters of the WACC based on market conditions over the 20 days to 28 October 2011. The risk free rate and debt margin have been affected by market volatility and the prolonged weak market following the credit crisis of 2008. The change in these factors has potentially created a disparity between these parameters (for which we use short term average data) and the market risk premium (for which we use long term average data).

However, the effects of this disparity are mitigated by our decision to use a point estimate of 6.7%, which is 80 basis points higher than the midpoint of our estimated WACC range. In doing so, we had strong regard to the calculated WACC using longer term averages for market parameters.

145. In addition, the Essential Services Commission of Victoria (ESCV) determined that government bond markets were abnormally affected by the maturity of a large proportion of the relevant CGS market which it believed led to shortage of supply of these bonds and a downward bias in yields (noting that yields are inversely related to the price of a bond).[48] Consequently, the ESCV chose to adopt an averaging period from before this event. The ESCV stated:

[…] the Commission's preferred response is to identify a measurement period that is not influenced by the downward bias, and to sample interest rates from that period. Data after August cannot be relied upon at this time as it is unclear for how long the downward bias may persist. On this basis, the Commission considers that it is appropriate to use the latest market evidence available prior to the biasing event. The Commission has therefore applied a measurement period for the calculation of the risk-free rate as the last 20 trading days of July

[47] Ibid., section 9.1, page 80.

[48] The yield is the percentage return on a bond. Given that the stream of future payments is predetermined, the higher the price paid for the bond the lower the percentage return on the bond, i.e. the lower the yield.

2005. This amended measurement period excludes any potential downward bias in the month of August, as identified by Westpac and CBA.[49]

146. In the 2002 Powerlink decision[50], the ACCC made an adjustment to its averaging period in order to exclude the impact of the events of September 11. Similar to the current financial crisis, the events of September 11 caused a 'flight to safety' – with the effect that government bond prices were pushed up (pushing yields down) and equity prices fell dramatically. That is, the risk free rate fell at the same time that the perceived riskiness of equities (cost of equity) increased.

147. Importantly, the ACCC (then the regulator) determined that it would be inappropriate to capture a lower risk free rate due to a crisis when that same crisis was likely causing the prevailing MRP to rise (and to increase by more than the decline in the risk free rate). The ACCC stated: [51]

> *The Commission recognises that the events of 11 September have impacted on the risk free rate, however it believes that it is still too early to fully quantify this impact. Given this uncertainty, the Commission will adopt a forty-day moving average ending on 11 September rather than a forty-day moving average ending on the date of this decision.*
>
> ***The Commission acknowledges that as a result of 11 September there may be an increase to the level of risk experienced by the market. If such an increase in risk exists, it is unclear to what extent CAPM parameters will be effected. However, any movement in the MRP can only be accurately determined by accessing changes in the market over an extended period of time****.*
>
> *Therefore, the Commission will continue to examine the impact of the 11 September events over time and it will take into account any evidence identified for future regulatory decision."*

148. In this decision the ACCC explicitly recognised the same problem that we are faced with today in dealing with an averaging period and an economic crisis (although the events of September 11 had a much shorter and shallower impact on financial markets than the current events). The ACCC responded by excising risk free rate data that was affected by the crisis rather than by increasing the MRP.

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49 ESCV, October 2006, Final Decision Electricity Distribution Price Review 2006-10 as amended in accordance with a decision of the Appeal Panel dated 17 February 2006, Volume 1 Statement of Purpose and Reasons, p. 343

50 ACCC, *Powerlink Revenue Cap Decision*, November 2002.

51 Ibid, p. 13

7. How should the cost of equity be estimated

149. This section considers four broad brush approaches/methodologies for arriving at an estimate of the cost of equity and assesses the consistency of these with the National Gas Rules and National Gas Law. In particular:

- Rule 87(1) which states that the rate of return on capital is to be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services; and
- The revenue and pricing principles in section 24(2) and (5) which state:
  - A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in providing reference services; and
  - A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates.

150. The four approaches considered are:

i. Direct estimate of the cost of equity for firms of comparable risk to the reference services ($RoE_{reference\ services}$) using, for example, DGM analysis.
   - This methodology attempts to estimate the future path of dividends that investors' expect for a particular firm (or set of firms that have the same risks as are involved in providing reference services). Having done this, one then calculates the discount rate that equates this dividend path with current market prices. This effectively involves estimating the risk free rate, beta and MRP jointly (i.e. the process delivers an estimate of the cost of equity for the reference services directly).

ii. Direct estimate of the cost of equity for the market portfolio (RoE_{Market}) with a separate process for estimating the adjustment for differences in risk between the market and the reference services.
   - For example, one might attempt to estimate the prevailing market risk premium using DGM analysis applied at the level of the market. Then one might separately estimate the beta of the reference services using historical data for comparable businesses. Having done this, the estimate of the cost of capital can be found using the CAPM formula.

$$RoE_{reference\ services} = Prevailing\ R_f + \beta \times (Prevailing\ RoE_{Market} - Prevailing\ R_f)$$

iii. Proxy the prevailing conditions in the market for funds by establishing the best estimate of the 'normal' cost of equity associated with the reference services. Based on the evidence in this report the cost of equity is more stable than its constituent CAPM parameters. Consequently, the normal cost of equity can be expected to be a good proxy for the prevailing cost of equity in most market

conditions. One can test this presumption against other evidence and, if necessary, make an adjustment if that evidence is sufficiently compelling that the prevailing cost of equity is heightened/depressed relative to its 'normal' level. The evidence in this report suggests that if any such adjustment were to be made it would be positive.

iv. Attempt to estimate a 'normal' level of the equity risk premium associated with the reference services (i.e. a 'normal' level for $(RoE_{reference\ services} - R_f)$) and add this to a prevailing estimate of the risk free rate (R_f).

- This is essentially the AER methodology. The AER estimates $(RoE_{reference\ services} - R_f)$ as the product of an equity beta estimate (derived from historical market data) and a market risk premium figure (also derived from historical market data). The AER then adds this to the prevailing estimate of the risk free rate.

151. In my view, each of the first three methodologies is capable of arriving at an estimate of the cost of equity for reference services that is consistent with the Rules across a wide range of market circumstances. In fact, the differences between these approaches are really ones of degree and/or emphasis. All of the first three methodologies share the objective of deriving a forward looking (prevailing) estimate of the cost of equity. Methodologies i) and ii) rely solely on prevailing market data to arrive at an estimate of the cost of equity. Methodology iii) relies on historical average data and the presumption, supported by the evidence presented in this report, that the cost of equity is relatively stable overtime (more stable than the constituent CAPM parameters that tend to move in offsetting directions).

152. In my view, the fourth methodology cannot be relied on to provide a robust estimate of the prevailing cost of equity. This is because it fixes the risk premium on equity based on historical evidence but does not similarly fix a consistent estimate of the risk free rate. Given that risk premiums and risk free rates commonly tend to move in the opposite direction this methodology will tend to underestimate the cost of equity when risk free rates are low and overestimate the cost of equity when risk free rates are high.

7.1. Methodology i)

153. The first methodology is entirely forward looking. Assuming that the CAPM describes how investors determine prevailing conditions in the market for funds, this methodology estimates all components of the CAPM formula jointly. Such an estimate reflects the forward looking assessment of both market risk (MRP) and relative risk of the reference services (beta). This approach also implicitly captures the actual risk free rate that investors use when applying the CAPM (rather than needing to adopt a potentially biased proxy such as CGS).

154. Of course, the first methodology does not provide estimates of the individual CAPM parameters. However, this is a 'feature' and not a 'bug' of this approach because these individual parameters are of little interest if we have already directly estimated

the cost of equity directly (ie, the cost of equity that would result from application of the CAPM if we could accurately estimate each parameter separately).[52] .

155. The downside of the first methodology is that it is only possible if there is listed equity with comparable risk to the reference services and there is some methodology for arriving at an estimate of the future dividends that investors expect that equity to pay. In the US, regulators rely in part on a relatively deep pool of analyst forecasts for this purpose. Arguably, the level of analyst coverage for individual regulated businesses, and certainly the pool of regulated businesses, is not as deep in Australia as in the US.

156. Of course, having regard to comparables in other countries, such as the US regulated businesses and US regulatory determinations, is one way to address any perceived lack of depth in Australian data.

157. A further potential objection to this approach is that the estimates of the cost of equity are sensitive to the level of stock prices at the time that the estimate is made. The volatility in equity prices (relative to long run dividend forecasts) means that the DGM estimate of the cost of equity will also be volatile.

158. Once more, this can reasonably be argued to be a 'feature' rather than a 'bug' to the extent that the volatility in equity prices is driven by volatility in prevailing conditions in equity markets (ie, volatility in equity investor's required return on equity). However, at least part of the volatility in equity prices is likely to be driven by illiquidity in the market for a particular equity. Consequently, part of the volatility in DGM estimates may simply reflect movements driven by lopsided buy or sell side activity. However, this can potentially be addressed by using a longer average of equity prices (e.g. measured over a month or several months).

7.1.1. Application

159. I have used the dividend growth model to forecast a cost of equity for Australian regulated utilities of **between 10.87% and 14.59%.** This is based on analyst dividend forecasts sourced from Bloomberg on 24 February 2012 and 9 March 2012 and the average price of equities for these firms over the period 24 February 2012 to 9 March 2012. The range for the cost of equity is based on a range for long term dividend growth from zero growth in real terms (2.5% nominal) to growth in line with long term average GDP growth (6.6% nominal).

7.2. Methodology ii)

160. As with the first methodology, the second methodology relies on a DGM estimate of prevailing returns but instead of being only for comparable firms the DGM is applied to the market as a whole. However, one still needs to separately analyse comparable

[52] Note that if the CAPM actually describes how investors arrive at required returns then a well implemented DGM analysis will estimate the CAPM cost of capital in the market place. If the CAPM does not describe how investors assess risk then this will not be the case. Of course, that is a another 'feature' of the DGM rather than a 'bug'.

firms in order to arrive at an estimate of the risk of the reference service relative to the market (beta).

161. The second methodology may not be entirely forward looking if it takes an estimate of relative risk (beta) from historical data. Doing so assumes that investors believe that the equity in question will behave in the same way, and in the same relationship to the market, as it did in the historical beta estimation period. This is only reasonable if investors believe that future shocks to the economy/equity markets will largely be the same (in type, frequency and magnitude) as the shocks experienced over the historical beta estimation period. This may or may not be a reasonable assumption.

162. However, under this methodology, the estimate of relative risk is applied to a forward looking MRP estimate. By doing so the estimate will capture prevailing conditions in the market for funds in general. Provided the *prevailing* relative risk of the reference services (e.g. beta) is consistent with the *historically* estimated value then this will result in an estimate that is commensurate with prevailing conditions in the market for funds for providers of the reference services.

163. Similar issues are associated with the application of the DGM whether it be applied to the market or a subset of comparable firms. However, to the extent the market as a whole is less likely to have prices affected by liquidity issues this may render the results from the market estimate less volatile due to this factor.

7.2.1. Application

164. I estimate a prevailing market cost of equity at 12.28% and MRP at 8.52%. This is based on the AMP method using end December 2011 dividend yields from the RBA, long run dividend growth of 6.6% nominal and an assumption that each dollar of dividend delivered to investors comes with 11.125 cents value of franking credits.[53] Assuming a beta of 0.8 and risk free rate of 3.77% as at 31 December 2012 this gives a **cost of equity for the reference services of 10.58%.**

165. By way of contrast, Bloomberg, using analysts forecasts of near term dividend growth and its own model of transition and steady state growth, estimates the prevailing market cost of equity at 14.1% and MRP of 10.5% as at end-December 2011.

7.3. Methodology iii)

166. Compared to the first and second methodologies the third methodology relies on historical average data. 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. The evidence examined in this report demonstrates that movements in risk premiums and CGS yields tend to 'cancel' each other out with the cost of equity

[53] Based on theta of 0.35 and 75% of dividends being franked.

relatively stable and much more stable than the constituent CAPM parameters (e.g., see section Risk premiums on equities4.3).

167. Indeed, to the extent that estimation of purely forward looking estimates suffer 'noise' (eg, due to the illiquidity issues discussed above) then the best estimate of the prevailing cost of equity may be the best estimate of the historical average cost of equity. This was precisely the advice of Smithers and Co to UK regulators as set out at paragraphs 44 and 132 above.

168. As with any methodology, it would be appropriate to cross-check the results from its application to the results from other methodologies. However, methodology iii) could reasonably provide an "anchor" estimate of the prevailing cost of equity that could be departed from if some evidentiary threshold for departure was satisfied. This evidentiary threshold may be met with information from the application of either the first or the second methodologies.

169. An estimate of the historical average cost of equity under methodology iii) could reasonably be arrived at by having regard to a historical average of CAPM real parameters (e.g. a historical average real risk free rate, market risk premium and beta estimate.

7.3.1. Application

*7.3.1.1. Historical average risk free rate plus historical average MRP*beta*

170. In my view there are two possible sources of an estimate of the historical average risk free rate that can be used in conjunction with a historical average MRP estimate (such as the AER's 6% estimate). My preference is to adopt the historical average yield on inflation indexed CGS.[54] This yield is, by definition, the required return on these CGS bonds after inflation (which is separately compensated based on actual inflation over the life of the bond). Based on a time series from July 1993 the average yield on indexed CGS was 3.40%.[55] I note that this is a conservative estimate because, from late 2008, the AER ceased using indexed CGS as the risk free rate proxy because of evidence that scarcity premium was depressing the required yield on these CGS bonds.

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[54] The alternative is to attempt to estimate the expected return on nominal CGS by deducting expected inflation from nominal CGS yields. This is clearly more difficult because it is not possible to directly observe what investors expected inflation to be over the 10 year life of a 10 year CGS. Nonetheless, one possible assumption is that investors have perfect foresight, i.e., that investors expected what actually occurred. With this assumption it is possible to derive an expected real return on historical average nominal CGS.

From mid 1993 onwards the RBA began inflation targeting. Over this period inflation has averaged 2.73% and 10 year nominal CGS have averaged 6.32%. Deducting 2.73% from the nominal CGS yield of 6.32% using the Fisher equation gives a real yield of 3.49% - which is only slightly above the average indexed CGS yield of 3.40% reported above.

[55] There is additional data going back to July 1992 for indexed CGS. If this data is included then the average real CGS rate rises slightly to 3.45%. I use the post June 1993 data in order to have a consistent time period for comparison with the nominal CGS yields experienced under the RBA's inflation targeting regime which, as explained earlier in this report, began in mid 1993.

171. Combining my best estimate of the historical average real required return on 10 year CGS with a beta of 0.8 and an MRP of 6.0% gives a real cost of equity of 8.20%. If expected inflation going forward is 2.50% then a 5.99% nominal CGS yield is required to deliver the same 3.40% real yield. Using this nominal CGS yield with a beta of 0.8 and an MRP of 6.0% gives a **nominal cost of equity of 10.78%.**

172. The 6.0% MRP estimate used above is the estimate most commonly used by Australian regulators over the period in relation to which the yields on CGS have been averaged. If the use of a 6.0% MRP over this period was, on average, correct then it is consistent and appropriate that an average CGS yields over this period be added to it.

173. While the genesis of the 6.0% MRP estimate may be based on the average of a longer time series of historical *ex post* returns on equity relative to CGS, I do not consider that this makes it problematic to use a shorter time series for historical average *ex ante* real return on CGS.

174. There are two reasons why I hold this view:

- Firstly, we are interested in estimating the *ex ante* real risk free rate (i.e. the expected return for investors after accounting for inflation). This can be estimated with much greater accuracy from the early 1990s onwards due to the introduction of inflation indexed bonds which allow us to directly estimate the real CGS yield actually required by investors over that period; and
- Secondly, and by contrast, historical average estimates of MRP must be based on very long time periods because the volatility in the observed *ex post* excess return on equities is so large that a long period is required in order to have any confidence in the average reflecting *ex ante* investor expectations (ie, the excess return investors needed to expect in order to invest). This is not the case with indexed CGS where the promised real yield is the real yield actually delivered. Nor is it the case with nominal CGS in a low and stable inflation environment such as has existed in the post 1993 period of inflation targeting by the RBA.

7.3.1.2. Cross checks on the historical average cost of equity estimate

175. An additional potential source of information on normal required returns for regulated businesses comes from US regulatory precedent involving the application of the DGM model. For the US regulatory decisions from 2005 to 2011 described previously, I have estimated the average ROE is 10.38% (11.01% over the last 20 years). The average equity premium is 6.57% and average 10 year US Treasury rate is 3.80%. Note that this is based on DGM analysis performed by regulators. However, this is for an average gearing of 47.98%. Adjusting this to 60% gearing gives an **average cost of equity of 12.36%.**[56]

[56] 12.36% = 3.805% + (1-0.4798)/(1-0.600)*6.575%

176. This 12.36% estimate is higher than the 10.78% estimate derived immediately above. If one accepts that US regulators application of the DGM is unbiased and that US regulated businesses have similar underlying risk to Australian regulated businesses then this provides a basis for concluding that the 10.78% is more likely to be too low than too high.

177. The estimates of the cost of equity derived under methodologies i) and ii) are 10.58% and 10.87% to 14.59% respectively. Once more, this suggests that the 10.78% estimate is more likely to be too low than too high. Depending on the threshold applied, one might, or might not, determine that the results of these cross checks justified a departure from the estimate derived under methodology iii).

7.4. Methodology iv)

178. The fourth methodology is the AER's methodology. This methodology fully reflects the prevailing risk free rate in the cost of equity but not the prevailing risk premiums relative to that risk free rate. In the currently prevailing market conditions this gives a materially downwardly biased estimate of the cost of equity because, for the reasons discussed in previous sections, it is clear that historically low CGS yields are currently associated with historically high risk premiums.

7.4.1. Application

179. This methodology arrives at a **nominal cost of equity estimate of 8.57%** using end December 2011 CGS yields of 3.77%. This is materially lower than the estimate arrived at using all of the other methodologies.

7.5. Summary of results from different methodologies

180. Table 4 below summarises the results of the different methodologies.

Table 4: Summary of results from each methodology

	Basis of estimate	Time period	Div. yield	DPS growth	RFR	MRP	Beta	Nominal cost of equity
(i)	**DGM for regulated businesses** DGM model applied to utility stocks in Australia. Range based on long run real dividend growth of between zero and in line with GDP.	Dividend forecasts average 24 Feb and 9 March. Price and CGS averaged over period 24 Feb to 9 March 2012	multiple	2.50 – 6.60%	Jointly estimated			**10.87 – 14.59%**
(ii)	**DGM for the market** Application of the AMP methodology to estimate prevailing MRP and then application of beta of 0.80 along with prevailing rfr	End-December 2011	5.68%*	6.60%	3.77%	8.52%	0.80	**10.58%**
(iii)	**Historical average RFR plus historical average MRP * beta** Historical CGS with MRP of 6% and beta of 0.8.** Assumes an indexed historical CGS of 3.40%, resulting in a real cost of equity of 8.2%, or 10.8% assuming inflation of 2.5%	Historical CGS based on time series since July 1993	n/a	n/a	3.40% real 5.99% nominal	6.0%	0.80	**10.78%**
(iv)	**AER methodology** Prevailing CGS with a risk free rate on 31 December 2011 of 3.77%, MRP of 6.00% and a beta of 0.80	End-December 2011	n/a	n/a	3.77%	6.00%	0.80	**8.57%**

Source: Various, CEG analysis
** Dividend yield scaled up using a factor of 1.1125, **I adopt these values for beta and MRP in order to be consistent with recent AER practice. This does not mean I endorse these values as the best estimate of historical MRP and equity beta.*

8. Conclusion

181. There is unambiguous evidence that risk premiums in the market for funds have risen to offset the recent fall in CGS yields. The effect of this is that the prevailing cost of equity is at least as high as under normal market conditions – notwithstanding that the CGS yields are at 50 year lows. In these circumstances, it would be an error to estimate the cost of equity using prevailing CGS yields in combination with a historical average estimate of the market risk premium.

182. Alternative methodologies consistent with Rule 87(1) of the NGR and section 24(2) and (5) of the NGL involve estimating the cost of equity using:

    i. A DGM estimate of the cost of equity for firms which experience risks that are comparable to those confronted by firms which provide the reference services.

    ii. DGM estimates of the cost of equity for the market portfolio (RoE_{Market}) and a separate process for estimating the adjustment for differences in risk between the market and the reference services (a beta different to 1.0).

    iii. Estimate a 'normal' level for the cost of equity for the reference services and make an adjustment to that based on evidence/proxies that suggest heightened/depressed prevailing conditions in the market for funds relative to 'normal' conditions.

183. Any of these approaches will, in my view, result in an estimate of the cost of equity that is at least 10.58%. This is around 2% more than is estimated using prevailing CGS yields in conjunction with the AER's most recently used estimates of the MRP (6%) and equity beta (0.8) estimates.

Appendix A. Assumptions used in DGM modelling

184. In order to estimate the average risk premium required by investors across Australian utilities equities I have sourced from Bloomberg median analyst forecasts for six regulated utilities businesses.

185. The forecast cash amount and value of the dividends of the six regulated utilities firms are available only for three financial year periods, including the current, next and subsequent financial year. There are no direct forecasts of dividends per share that we are aware of which extend beyond that period. To enable an estimate of the required rate of return, we have extended the path of dividends into perpetuity based on an assumed long run rate of growth from the final Bloomberg forecast.

186. The Bloomberg forecasts cannot usually be directly compared to capitalisation of firms in order to estimate an implied rate of return because these are forecasts of cash dividends, and as such do not include the value of imputation credits to investors. Usually, I would include the value of imputation credits consistent with a value for theta of 0.35 and a proportion for franked dividends of 75%.[57] This means that on average each dollar of dividends had attached to it imputation credits valued by investors at 11.125 cents ($0.35 * 0.75 * 0.3/(1-0.3)$.

187. Accordingly, I would apply an uplift factor to the Bloomberg cash dividend forecasts to reflect the value of imputation credits to investors. However, I have applied no such uplift factor to the six regulated utility firms because the majority of these firms do not currently pay any imputation credits with their distributions. This means that the resulting cost of equity for the utilities firms is a conservative estimate.

188. There is general consensus that long run real dividend growth is best proxied by long run real economic growth. This is the assumption that is made by AMP,[58] Davis,[59] Lally[60] and Damodaran[61]. I consider this approach is appropriate and have developed an estimate for real long run growth of 3.9%.

189. The average annual rate of real growth in gross domestic income between the December quarter 1959[62] and September quarter 2010 was 3.99%. Combined with an

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[57] Sourced from Brailsford, T., J. Handley and K. Maheswaran, Re-examination of the historical equity risk premium in Australia, Accounting and Finance 48, 2008, page 85.

[58] AMP Capital Investors (2006), *The equity risk premium – is it enough?* Oliver's insights, Ed.13, 4. This methodology uses the long term average nominal growth in GDP as a proxy for long term average nominal growth in dividends).

[59] Davis, The weighted average cost of capital for the gas industry, Report prepared for the ACCC and ORG, 18 March 1998, p.15-16.

[60] Lally, The cost of capital under dividend imputation, Prepared for the ACCC, 2002, pp.29-34.

[61] Damodaran, op cit, p. 53.

[62] The Australian Bureau of Statistics (ABS) publishes economic growth figures on its website starting in 1959. Here we use growth in real domestic income of 3.9% (A2304314X of ABS Catalogue 5206.0) rather than nominal growth, since future expectations of inflation are not consistent with the high levels of inflation that were experienced at various times over this period.

average long run inflation forecast of 2.5%, based on the middle of the RBA's target band for inflation, this is equivalent to nominal economic growth of 6.59%. This is also consistent with the 6.9% average expected rate of growth in dividend per share in the US from 1946 to 2008.[63] By way of comparison, equivalent real growth in the US since 1929,[64] starting immediately prior to the great depression, was 3.3%. If the data series begins instead at 1933 the real average growth rate is 4.0%.

190. The use of long run historical economic growth should be distinguished from using the long run historical MRP to predict the currently prevailing MRP. In the latter approach one is using *long run historical* MRP and assuming it is the best estimate of the *prevailing* MRP. This is not akin to how I am using long run historical economic growth. In this approach I am using a *long run historical* economic growth to inform my view about the best estimate of a *long run future* economic growth beyond immediate term forecasts - which I then use, along with current data on equity prices, short-term dividend forecasts and CGS yields as the input into our estimate of the prevailing MRP. Importantly, I am using long run historical estimates as a proxy for long run future estimates – I am not using them to proxy short run (prevailing) conditions.

[63] The appropriate data for Australia is not easily accessible – noting that it is desirable to track dividend *per share* growth not dividend growth *per se*. This means we require an estimate of the dividends an investor would receive if they never reinvested dividends nor participated in share buy backs. Also, it is desirable to be able to calculate dividend per share growth on a portfolio that is constantly being reweighted to match the market portfolio over time. Data is available to perform these calculations from the US. The average mean continuously compounding growth rate for dividends, measured on this basis, on the New York Stock Exchange was 6.10% over this period. The standard deviation of the annual continuously compounded growth rate was 11%. Assuming the dividend growth rates are lognormally distributed the expected annual dividend growth rate is $e^{\mu+0.5\sigma^2}$ where μ is the expected annual continuously compounded growth rate and σ^2 is the variance of the annual continuously compounded growth rate.

[64] The longest published series by the Bureau of Economic Analysis at the US Department of Commerce http://www.bea.gov/national/index.htm#gdp.

Tom Hird is a founding Director of CEG's Australian operations. In the four years since its inception CEG has been recognised by Global Competition Review (GCR) as one of the top 20 worldwide economics consultancies with focus on competition law. Tom has a Ph.D. in Economics from Monash University. Tom is also an Honorary Fellow of the Faculty of Economics at Monash University and is named by GCR in its list of top individual competition economists.

Tom's clients include private businesses and government agencies. Tom has advised clients on matters pertaining to: cost modeling, valuation and cost of capital.

In terms of geographical coverage, Tom's clients have included businesses and government agencies in Australia, Japan, the UK, France, Belgium, the Netherlands, New Zealand, Macau, Singapore and the Philippines. Selected assignments include:

Recent

Advice to Everything Everywhere in relation to the cost of capital for UK mobile operators – including appeal of regulators decision.

Expert evidence to the Australian Competition Tribunal on the cost of debt for Jemena Electricity Networks.

Advice to Integral Energy on optimal capital structure.

Expert evidence to the Australian Competition Tribunal on the cost of debt for Jemena Gas Networks.

Advice to ActewAGL on estimation of the cost of debt

Advising NSW, ACT and Tasmanian electricity transmission and distribution businesses on the cost of capital generally and how to estimate it in the light of the global financial crisis.

Advice in relation to the appeal by the above businesses of the AER determination - quoted in Australian Competition Tribunal decisions.

Expert testimony to the Federal Court of Australia on alleged errors made by the Australian Competition and Consumer Commission (ACCC) in estimating the cost of capital for Telstra.

Advice to T-Mobile (Deutsche Telekom) on the cost of capital for mobile operators operating in Western Europe.

Advising Optus and TERRiA on the cost of capital to be used in developing their tender to build the next generation fibre to the node (FTTN) broadband network in Australia.

Advising Vivendi on the correct cost of capital to use in a discounted cash flow analysis in a damages case being brought by Deutsche Telekom.

Advising the Energy Networks Association on cost of capital issues in the context of the Australian Energy Regulator (AER) five year review of the cost of capital in the NER.

2007

Advising the Victorian gas distributors in relation to their response the ESCV's draft decision on the cost of capital (four reports).

Advising the Energy Networks Association on the appropriate estimation technique for the risk free rate used in CAPM modeling (two reports).

Earlier

Advising the Australian Energy Regulator on the cost capital issues in relation to the RBP pipeline access arrangement.

Advising the ENA on the relative merits of CBASpectrum and Bloomberg's methodology for estimating the debt margin for long dated low rated corporate bonds.

Advising the Australian Competition and Consumer Commission, Australia on the correct discount rate to use when valuing future expenditure streams on gas pipelines.

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Detailed Project Experience

Market Design and Competition Analysis

2011 **ACCC, Australia**
Advice on merger in media and entertainment industry
Advice on merger in media and entertainment industry

2011 **ACCC, Australia**
Advice on a concentration in ownership in the television industry
Advice on merger in media and entertainment industry

2010 **Gilbert + Tobin, Australia**
BHPB proposed joint venture with Rio Tinto
Providing expert statements and empirical analysis on the likely impact of the proposed Pilbarra joint venture between BHP and Rio Tinto. The legal and economic teams involved were awarded 'Deal of the year – Asia Pacific" by Global Competition Review.

2009 **Webb Henderson, Australia**
Setting reserve prices for auction of digital radio spectrum
Provided advice, which was adopted, in relation to the appropriate reserve price for the November 2009 auction of digital radio spectrum across Australia.

2009 **AMP, Australia**
Analysis of competition in the market for superannuation services
Providing advice to AMP for submission to the Cooper Review into the governance, efficiency, structure and operations of Australia's superannuation system. This included as survey of the competitive structure of the industry and an assessment of how, if at all, competition was less effective at serving customer needs in this market than other unregulated markets.

2009 **JWS, Australia**
Analysis of a 'competitive margin' in contract resetting
Providing expert statements on the appropriate estimate of a risk adjusted margin in the context of services provided by United Water to SA Water where the contract specified that the margin must be reset consistent with what would be found in a competitive market.

2009 **Gilbert + Tobin, Australia**
BHPB proposed joint venture with Rio Tinto
Providing expert statements and empirical analysis on the likely impact of the merger on the prices of iron ore and coking coal. Expert statements to be provided to ACCC, European Commission and US regulators. Also providing commentary and advice on the formulation of reports by NERA (in Japan and the US) and Frontier (in Europe).

2009 **Chapman Tripp, New Zealand**
Advice on the proper design of a multiproduct imputation test
Providing advice on the conceptual design and practical implementation of an imputation test for a client of Chapman Tripp with multiple retail and wholesale products where a position of dominance in the provision of some, but not all, wholesale products.

2009 **AGCOM, Italy**
Design of imputation test
Providing expert advice to AGCOM (the Italian Communications Authority) on the design of an imputation test to be applied in relation to Telecom Italia's retail and wholesale prices.

2009 **Gilbert + Tobin, Australia**
Analysis of proposed transaction in relation to small industrial packaging
Providing expert statements and empirical analysis on the substitutability between different types of small industrial packaging.

2009 **Chapman Tripp, New Zealand**
Expert testimony in Vodafone appeal of Commerce Commission decision
Providing expert testimony on the correct economic interpretation of a competitive price level (and price path) in relation to services provided by Telecom New Zealand.

2009 **Minter Ellison, Australia**
Interpretation of 'promotion of economically efficient use of infrastructure'
Advice on the proper interpretation of 'promotion of economically efficient use of infrastructure' in the context of Telstra's claim that it should be exempted from supplying regulated wholesale services to Optus in areas where Optus, it was argued, could commercially extend its competing HFC cable.

2009 **Van Bael & Bellis, EU**
Proposed transaction between GSK and Astra Zeneca
Provided market modelling of the effect of a concentration between Glaxo Smith Kline and Astra Zeneca in relation to certain common pharmaceutical product lines.

2008 **Gilbert + Tobin, Australia**
BHPB proposed merger with Rio Tinto
Providing expert statements and empirical analysis on the likely impact of the merger on the prices of iron ore and coking coal. Outputs included submissions made to the European Commission, the ACCC and the KFTC (Korean competition regulator) and responses to detailed questions from the European Commission.

2008 **Scottish Power, UK**
Purchase of British Energy Nuclear Power Plants
Providing electricity market modelling, to inform a competition law assessment, of the impact on competition if Scottish Power were to purchase various combinations of British Energy's nuclear power plants.

2008 **Gilbert + Tobin, Australia**
Industrial Packaging
Providing an expert report to Gilbert + Tobin on the competitive implications of a merger involving large industrial packaging.

2008 **Vivendi, European Union**
Damages in Mobile Telephony Market
Providing expert critique of a proposed damages claim being brought by Deutsche Telecom against Vivendi in relation to alleged unlawful activity in a Polish mobile telephony joint venture.

2008 **MGF Webb, Australia**
Mobile Termination
Advising on a range of competition matters relating to mobile termination including an assessment of the potential basis for company specific exemptions from regulation of mobile termination.

2007 **"G9" Group of Telecommunications Carriers**
Regulatory Undertaking to Build and Operate a FTTN Network in Australia
Advising the G9 on competition analysis associated with the construction and operation of a FTTN network. Developing an regulatory Undertaking under the Australian Trade Practices Act describing the proposed operation of the FTTN. Providing an expert report on the economic benefits associated with the proposed undertaking.

2007 **Gilbert + Tobin, Australia**
Merger Analysis – New Steel Drum Manufacture
Providing expert opinion to Gilbert + Tobin on the competitive implications of a merger involving new steel drum manufacture.

2006 **Melbourne Water Industry, Australia**
Market Design – Bulk Water Sector
Developing reform proposals to facilitate the introduction of tradeable bulk water rights to the Melbourne system – including the specification of operational market rules.

2006 **Australian Competition and Consumer Commission, Australia**
Merger Analysis – Electricity Industry
Advising the Australian Competition and Consumer Commission (ACCC) on the competitive implications of a proposed merger in the electricity sector.

2006 **Minter Ellison, Australia**
Section 46 of the TPA - Telecommunications
Providing expert opinion in relation to an action under Section 46 of the Trade Practices Act.

2005 **Philips Fox, Australia**
Merger Analysis - Telecommunications Industry
Advising the merging firms on the competitive implications of that merger.

2005 **AirServices Australia (ASA), Australia**
Review of Pricing Conduct
Providing expert opinion to ASA on pricing for its services at Australian Airports. Including an examination of allegations that pricing contravened National Competition Agreements.

2001-05 **TransGrid, Australia**
Market for transmission
Analysis of the design of the National Electricity Market (NEM) and its implications for efficient investment in generation and transmission assets. This work has involved providing private advice to TrnasGrid as well as public policy documents such as drafting TransGrid's submission to the US energy regulator (FERC) on market design.

2005 **Confidential, Australia**
Competition Assessment of Pricing Strategy
Advising a large corporate on the economic implications of the Trade Practices Act for its pricing conduct.

2005 **Australian Competition and Consumer Commission, Australia**
Competition Assessment of Electricity Generation Merger
Advised the ACCC on the competition concerns (and potential remedies) associated with a specific proposed merger of electricity generation interests.

2004 **Australian Competition and Consumer Commission, Australia**
Competition Impact of Exclusive Rights to Content
Provided a public report to the ACCC on the competition concerns (and potential remedies) associated with the use of exclusive rights to content by incumbent telecommunications infrastructure owners.

2004 **Australian Competition and Consumer Commission, Australia**
Empirical Evidence of Predatory Pricing in Telecommunications
Provided the ACCC with an expert report that developed an imputation test framework and empirical model to test allegations of predatory pricing of broadband services.

2003-04 **Singtel Optus, Australia**
Expert Report on Market Definition and Existence of Market Power in Mobile Termination
Provided Optus with an expert report on the appropriate market definition to use in analysing competition between mobile network operators in providing terminating access.

2003-04 **Singtel Optus, Australia**
Expert Economic Advice on Competition Complaint

Providing Optus advice on a confidential competition complaint relating to the exercise of market power by one of Optus' competitors.

2001-03 **Qantas**
Advice on Competition Law and Predation Allegations
Provided input into NERA's advice in relation to allegations of anticompetitive behaviour under section 46 of the Trade Practice Act.

2002 **National Competition Council (NCC), Australia**
Exploitation of Market Power by a Gas Pipeline
Provided a report to the NCC in which we developed a number of tests for whether current transmission prices were evidence of the exploitation of market power by a gas transmission pipeline. Also provided a separate report that applied these tests. This analysis was used to inform the NCCs decision on whether to recommend the pipeline in question be subject to regulation under the Australian Gas Code.

2002 **Screenrights, Australia**
Advice on methodologies used to estimate the value of retransmitting copyright content contained in local free-to-air broadcast.

Cost of Capital Issues

2011 **Gas pipeline owners, Australia**
Cost of Capital
Advising Jemena Gas Networks on estimation of the cost of debt in an appeal of the Australian Energy Regulator's (AER) decision. Expert testimony requested by the Australian Competition Tribunal.

2010 **Victorian Electricity Distribution, Australia**
Cost of Capital
All Victorian distribution businesses response to an AER consultation paper on estimating the cost of debt.

2010 **Integral Energy, Australia**
Capital structure
Advice to Integral Energy on managing its capital structure.

2010 **ActewAGL, Australia**
Cost of Capital
Advising ActewAGL on estimation of the cost of debt and subsequent appeal of the Australian Energy Regulator's decision. CEG evidence favourably quoted in Tribunal decision.

2010 **Gas pipeline owners, Australia**
Cost of Capital
Advising on the appropriate cost of capital under the National Gas Code.

2010 **Gas pipeline owners, Australia**
Cost of Capital
Advising the ActewAGL on an appeal of the AER's decision in relation to the cost of debt under the National Gas Code.

2010 **DHA, Australia**
Cost of Capital
Advising the DHA on the cost of capital it should use in assessing the NPV of potential projects.

2010 **T-Mobile, France**
Cost of Capital
Advising the T-Mobile on the appropriate cost of capital for mobile telecommunications services in France.

2010 **Gas pipeline owners, Australia**
Cost of Capital
Advising on the cost of capital for gas distribution business and AER's Final Determination.

2010 **Citipower and Powercor, Australia**
Cost of Capital
Advising on the cost of capital for electricity distribution business.

2009 **ETSA, Australia**
Cost of Capital
Advising ETSA on the cost of capital for its South Australian electricity distribution business.

2009 **NSW, Tasmanian and ACT electricity businesses, Australia**
Cost of Capital
Advising NSW, ACT and Tasmanian electricity transmission and distribution businesses on the cost of capital generally and how to estimate it in the light of the global financial crisis.

2009 **Gilbert and Tobin, Australia**
Cost of Capital
Advice in relation to the appeal by the above businesses of the AER determination. With expert advice quoted approvingly in the ACT judgment in favour of the applicants.

2009 **Philips Fox, Australia**
Cost of Capital
Expert report submitted to the AER on the issue of how to estimate the cost of 10 year BBB+ debt (as required under the NER) given divergence between fair value estimates from the Bloomberg and CBASpectrum data services. The context was a decision in relation to Advanced Metering Infrastructure.

2009 **Gas pipeline businesses, Australia**
Cost of Capital
Advice on a range of factors relating to the cost of capital including debt and equity. .

2009 **Herbert Geer and Rundle, Australia**
Cost of Capital
Expert testimony to the Federal Court of Australia on alleged errors made by the Australian Competition and Consumer Commission (ACCC) in estimating the cost of capital for Telstra (the incumbent telecommunications provider). Testimony quoted approvingly in the judgment.

2009 **T-Mobile, European Union**
Cost of Capital
Advice to T-Mobile (Deutsche Telekom) on the cost of capital for mobile operators operating in Western Europe.

2009 **Joint Industry Associations, Australia**
Cost of Capital
Advising the Energy Networks Association on cost of capital issues in the context of the Australian Energy Regulator (AER) five year review of the cost of capital in the NER. Multiple reports covering issues such as: dividend growth estimates of the market risk premium, appropriate selection of the risk free rate, appropriate term for the measurement of equity and debt costs, impact of the financial crisis on the cost of capital, empirical testing of the accuracy of the capital asset pricing model (CAPM), conceptual discussion of the theoretical purity of the implementation of the CAPM in AER analysis.

2009 **Telecom New Zealand, Australia**
Cost of Capital
Advising Telecom New Zealand on cost of capital issues associated with the cost of providing the New Zealand universal service obligation (TSO).

2009 **Queensland Rail, Australia**
Cost of Capital
Advising Queensland Rail on its cost of capital submission to the QCA.

2009 **Gilbert + Tobin, Australia**
Cost of Capital
Advising Gilbert+Tobin/Japanese Steel mills on competitive impact of proposed transactions between BHPB and Rio Tinto. Including analysis of the impact of the global financial crisis on this analysis. Reports provided to both Australian and European regulators.

2009 **Gilbert and Tobin, Australia**
Cost of Capital
Advice on estimation of the cost of capital in the context of the AER's regulatory review of revenues for ETSA, Ergon and Energex.

2008 **Optus/TERRiA, Australia**
Cost of Capital

Advising Optus and TERRiA on the cost of capital to be used in developing their tender to build the next generation fibre to the node (FTTN) broadband network in Australia.

2008 **Vivendi, Poland**
Cost of Capital
Advising Vivendi on the correct cost of capital to use in a discounted cash flow analysis in a damages case being brought by Deutsche Telekom.

2008 **The Energy Networks Association, Australia**
Cost of Capital
Advising the Energy Networks Association on cost of capital issues in the context of the Australian Energy Regulator (AER) five year review of the cost of capital in the NER.

2008 **Telecom New Zealand, Australia**
Cost of Capital
Advising Telecom New Zealand on the appropriate estimation of the cost of capital associated with capital assets used to provide its universal service obligations.

2008 **Queensland Rail, Australia**
Cost of Capital
Advising QR on the appropriate estimation of the cost of capital associated with capital assets used to provide rail transport services

2008 **Transend, Australia**
Cost of Capital
Advising Transend on the appropriate estimation of the cost of capital associated with capital assets used to provide electricity transmission services.

2008 **Energy Australia, TransGrid, Country Energy and Integral Energy, Australia**
Cost of Capital
Advising on the appropriate estimation of the cost of capital associated with capital assets used to provide electricity transmission and distribution services.

2008 **ActewAGL, Australia**
Cost of Capital
An expert report describing the appropriate method for deriving a real risk free rate in the CAPM.

2007 **Electranet, Australia**
Cost of Capital
An expert report describing the appropriate method for deriving a real risk free rate in the CAPM.

2007 **Gas pipeline owners, Australia**
Cost of Capital
Three expert reports in response to the Victorian Essential Services Commission's cost of capital decision for Victorian gas distributors. Issues covered included: estimation of the appropriate equity beta, the appropriate form of the CAPM to be used, the use of non-CAPM asset pricing models, the estimation of the risk free rate from Government bond data.

2007 **Energy Networks Association, Australia**
Cost of Capital
Two expert reports with Professor Grundy identifying and quantifying the existence of a bias in the use of Australian Government bond yields as a proxy for the CAPM risk free rate.

2006 **ACTEW Corporation, Australia**
Cost of Capital
Advising on the cost of capital for ACTEW's water and waste water operations.

2006 **AER, Australia**

Cost of Capital
Advising on the cost capital issues in relation to the RBP pipeline access arrangement.

2006 **Integral Energy, Australia**
Cost of Capital
Advising on the cost of capital for Integral's retail operations.

2006 **Telecom New Zealand, New Zealand**
Cost of Capital
Advising on the cost capital issues in relation to TSO.

2005 **Energy Networks Association, Australia**
Debt Margin
Advising on the relative merits of CBASpectrum and Bloomberg's methodology for estimating the appropriate debt margin for long dated low rated corporate bonds.

2005 **The Victorian ESC, Australia**
Cost of Capital
Advice on the cost of capital for electricity distribution network assets.

2005 **Prime Infrastructure, Australia**
Weighted Average Cost of Capital
Provided a report for Prime Infrastructure critiquing the QCA's draft cost of capital decision for Queensland electricity distribution.

2004 **The Australian Competition and Consumer Commission, Australia**
Cost of Capital
Provided a report advising on the correct discount rate to use when valuing future expenditure streams on gas pipelines.

2004 **ETSA Utilities, Australia**
Weighted Average Cost of Capital
Provided a report for ETSA examining the use of historical proxy betas.

2004 **ActewAGL, Australia**
Weighted Average Cost of Capital
Provided a report for ActewAGL estimating its weighted average cost of capital for regulated activities (gas distribution).

2004 **TransGrid , Australia**
Debt Margin
Provided a report critiquing CBASpectrum's methodology for estimating the appropriate debt margin for long dated low rated corporate bonds.

2004 **Prime Infrastructure, Australia**
Weighted Average Cost of Capital
Provided a report for Prime Infrastructure the weighted average cost of capital for its regulated activities (coal shipping terminal).

2004 **ActewAGL, Australia**
Debt Margin
Provided a report for ActewAGL advising on the appropriate calculation of debt margins for BBB+ ten year bonds.

2003 **Electricity Transmission Service Providers, Australia**
Expert Report on the Use of Historical Proxy Betas
Critique of the ACCC's statistical interpretation of historical proxy beta in its review of the Statement of Principles for the Regulation of Transmission Revenues.

2003 **Orion, New Zealand**

Cost of Capital
Critique of Associate Professor Lally's advice on the Cost of Capital for New Zealand Electricity Distribution.

2003 **TransGrid, Australia**
Expert Report on TransGrid's WACC
Advising TransGrid on the appropriate weighted average cost of capital (WACC) for its regulated assets

2003 **EnergyAustralia, NSW, Australia**
Advice on Financial Capital Maintenance
Advising EnergyAustralia on issues relating to its appropriate WACC and the modelling of cash flows to ensure the expected present value of future net revenues was equal to the value of the regulated asset base.

2002 **Rail Access Corporation, Australia**
Hurdle Rates of Return
Advising rail access corporation on the appropriate hurdle rates of return that should be applied when assessing competing investments.

2002 **Integral Energy, Australia**
Return on Capital
Advising Integral Energy on what risk adjusted regulatory return on capital is necessary to provide sufficient incentive to invest in new infrastructure assets.

2001 **TransGrid, Australia**
Advice on ACCC's Powerlink WACC decision
A report critically appraising the ACCC's decision regarding Powerlink's weighted average cost of capital (WACC).

2001 **Optus, Australia**
Affidavit on Telstra's PSTN WACC
Providing expert testimony to the Australian Competition Tribunal on Telstra' use of the CAPM model to determine an appropriate rate of return on PSTN assets.

2001 **Australian Competition and Consumer Commission, Australia**
International Comparison of WACC Parameters
Preparation of a report on international and domestic WACC parameters and the potential impact of variations in declared WACCs on incentives to invest in various regulatory jurisdictions.

General Regulatory Analysis

2011 **SingTel Optus, Australia**
Cost modelling
Advice on the Australian regulator's fixed line cost model including fixed interconnection cost structures.

2010 **Telecom New Zealand, New Zealand**
Cost modelling
Advice on cost modelling of mobile termination in Samoa.

2010 **Digicel, Vanuatu**
Cost modelling
Econometric benchmarking of mobile termination costs.

2010 **Digicel, Tahiti**
Cost modelling
Developing a cost model for Digicel in relation to the cost of providing mobile termination in Samoa.

2010 **SingTel Optus, Australia**
Cost modelling
Construction of a cost model to estimate unbundled local loop costs.

2009 **ETSA, Australia**
Cost modelling
Advice to ETSA on modelling of its cost of service.

2009 **Digicel, Samoa**
Cost modelling
Developing a cost model for Digicel in relation to the cost of providing mobile termination in Samoa.

2009 **ActewAGL, Australia**
Cost modelling
Advice to ActewAGL on modelling of its cost of service including in relation to forecasts for costs faced by its gas distribution business over the forthcoming regulatory period.

2009 **Country Energy, Australia**
Cost modelling
Advice to Country Energy on modelling of its cost of service including in relation to forecasts for costs faced by its gas distribution business over the forthcoming regulatory period.

2009 **Vodafone, Fiji**
Cost modelling
Developing a cost model for Vodafone in relation to the cost of providing mobile termination in Fiji.

2009 **Jemena, Australia**
Cost modelling
Advice to Jemena on modelling of its cost of service including in relation to forecasts for costs faced by its gas distribution business over the forthcoming regulatory period.

2009 **Integral, Australia**
Cost modelling
Advice to Integral on whether their pricing structure was consistent with the requirements of the National Electricity Rules in relation to, inter alia, consistency with reflecting long run marginal cost and each tariff being set at a level between standalone and avoidable cost.

2008 **Telecom New Zealand, New Zealand**

USO Reform
Advise Telecom NZ on all aspects of universal service obligation reform, including: the appropriate level of obligations; the use of contestable models of provision, alternative funding models, costing of the obligations.

2008 **Envestra, Australia**
Related party transaction
Expert statement assessing the reasonableness of an alleged related party transaction entered into by Envestra to outsource its operating and maintenance activities to Origin Energy.

2008 **Energy Australia, TransGrid, Country Energy and Integral Energy, Australia**
Cost modelling
Advice to these businesses on modelling of its cost of service including in relation to forecasts of costs over the forthcoming regulatory period.

2008 **Digicel, PNG**
Cost modelling
Developing a cost model for Digicel in relation to the cost of providing mobile termination in Fiji.

2008 **Transend, Australia**
Cost modelling
Advice to Transend on modelling of its cost of service including in relation to forecasts for costs over the forthcoming regulatory period.

2008 **Electranet, Australia**
Cost modelling
Advice to Electranet on modelling of its cost of service including in relation to forecasts for costs over the forthcoming regulatory period.

2007 **T-Mobile, UK**
Mobile termination cost modelling
Advise T-Mobile on BT's appeal of the UK Commerce Commission's determination on teh cost of mobile termination (specifically in relation to the treatment of 3G spectrum).

2008 **SingTel Optus, Australia**
Mobile cost modelling
Advise SingTel Optus on the (TSLRIC) cost of mobile termination in Australia. This involves detailed telecommunication cost modelling and conceptual analysis. CEG's cost model is to be used to underpin SingTel Optus' price undertaking to the Australian Competition and Consumer Commission.

2007 **GSME, Europe**
USO reform
Developing and drafting of submission to the European Commission by the GSME on all aspects of universal service obligation reform, including: the appropriate level of obligations; the use of contestable models of provision, alternative funding models, costing of the obligations.

2007 **SingTel Optus, Australia**
FTTN
Advise SingTel Optus on all regulatory and competition issues associated with the construction of a FTTN network. Issues include – costing, form of price controls, capital raising and the cost of capital, drafting of undertakings, expert reports submitted to the regulator (Australian Competition and Consumer Commission).

2007 **Communications Alliance, Australia**
USO reform
Developing and drafting of submission to Government by the Communications Alliance (an industry body covering incumbent and new entrant fixed and mobile carriers) on all aspects of

universal service obligation reform, including: the appropriate level of obligations; the use of contestable models of provision, alternative funding models, costing of the obligations.

2006-07 **GDSE, Macau, SAR PRC**
Efficient Electricity Tariff Reform
Advise the Macau regulator (GDSE) on efficient tariff reform for the vertically integrated generation and network provider. This involved estimating the LRMC on maximum demand and translating this into efficient tariff designs given relevant constraints (eg, metering constraints).

2005-06 **Integral Energy, Australia**
Efficient Electricity Tariff Reform
Advise Integral Energy on its LRMC of meeting growing network demand and on how this could be reflected in efficient tariff design (including design of critical peak pricing).

2005 **Telecom New Zealand, New Zealand**
Modelling of New Entrant Costs for TSO
Provide expert reports on the correct methodology for calculating the cost of providing the TSO (universal service obligation) using new entrant costs.

2005 **Telecom New Zealand, New Zealand**
Operating Cost Benchmarks
Advised Telecom on appropriate operating cost benchmarks for telecommunications services

2005 **TransGrid, Australia**
Capital Expenditure Indexation
Advised TransGrid on the development of a price index to reflect movements in the unit costs of inputs into its capital expenditure program.

2005 **TransGrid, Australia**
Forecast of Capital Expenditure
Advised TransGrid on appropriate adjustments to forecast capital expenditure to take account of material increases in demand for investment in future Australian electricity infrastructure.

2005 **TransGrid, Australia**
ACCC's Capital Expenditure Regime
Advised TransGrid on the ACCC's proposed regulatory regime to apply to capital expenditure.

2005 **Actew, Australia**
Financing of New Infrastructure
Advised Actew on options for financing new infrastructure.

2004 **Telecom New Zealand, New Zealand**
Avoided Retail Cost Study
Developing an avoided cost study associated with Telecom's fixed line retail activities.

2004 **TransGrid, Australia**
Fair Sharing of Efficiency Gains
Provided a report to TransGrid advising on whether the ACCC's draft decision was consistent with the National Electricity Code's requirement that there be a 'fair sharing' of efficiency gains.

2004 **Australian Competition and Consumer Commission, Australia**
Asset Valuation Report
Provided an expert report to the ACCC on the calculation of depreciated optimised replacement cost (DORC) in the context of the EAPL's appeal of the ACCC's valuation of its Moomba to Sydney pipeline.

2004 **ESCOSA, Australia**

Incentive Regulation
Provided ESCOSA with a report on the appropriate mechanism to provide ETSA Utilities with an incentive to achieve cost reductions in operating and capital expenditure.

2004 **Perisher Blue Ltd, Australia**
Review of Municipal Services
Assisted PBL with its submission to IPART on the review of municipal services (roads, waste, water and sewerage) at the Perisher Blue Resort.

2004 **TransGrid, Australia**
ACCC Regulatory Review
Assisted TransGrid in drafting its Application to the ACCC for regulated revenues and in its response to the ACCC's draft decision.

2003 **Telecom New Zealand, New Zealand**
Expert Report on Efficient Recovery of CSO Costs
Provided Telecom with a report stepping through all the information necessary to administer SO costs in a manner consistent with "Ramsey efficient" pricing. The purpose of this was to inform the NZ Commerce Commission of the practical difficulties associated with pursuing such an outcome.

2003 **EnergyAustralia, NSW, Australia**
Advice on Financial Capital Maintenance
Advising EnergyAustralia on issues relating to its appropriate WACC and the modelling of cash flows to ensure the expected present value of future net revenues was equal to the value of the regulated asset base.

2003 **Optus, Australia**
Critique of Telstra's Access Undertaking for PSTN Services
Advising Optus in relation to the reasonableness of Telstra's cost modelling assumptions underlying its access undertaking for PSTN services.

2003 **Optus, Australia**
Indicative Pricing Principles
Advising Optus in relation to appropriate pricing principles the ACCC should adopt when establishing indicative prices for access to PSTN services.

2003 **Optus, Australia**
Estimation and Recovery of Telstra's Access Deficit
Provided a report to the ACCC on behalf of Optus addressing the appropriate measurement of any 'access deficit' that may exist between the cost to Telstra of its access network and the revenues associated with that network. Also examined the most appropriate recovery methodology for any access deficit.

2003 **Rail Infrastructure Corporation, NSW, Australia**
Expert Report on Hurdle Rates of Return
Advising RIC on the appropriate WACC each division should use as a hurdle rate of return when assessing competing capital projects.

2003 **Telecom New Zealand, New Zealand**
Expert at Commerce Commission Hearing
Provided expert testimony to the NZ Commerce Commission on the appropriate calculation of a wholesale discount for regulated services.

2002 **Telecom New Zealand, New Zealand**
'Intelligent' Wholesale Benchmarking Report
Carried out a benchmarking survey and provided a report to the New Zealand Commerce Commission on behalf of Telecom New Zealand. This report adjusted wholesale prices in the United States for differences in cost drivers (in terms of the cost of capital and labour) compared to New Zealand.

2003 **TransGrid, NSW Australia**
Submission to the ACCC's Review of the Regulatory Test
Advised TransGrid in response to the ACCC's Discussion Paper on the review of the regulatory test. Tom prepared a report which commented both on the ACCC's proposal to amend the regulatory test to improve clarity and to ensure consistency with the provisions in the National Electricity Code, and also on the ACCC's proposed options for incorporating 'competition benefits' in the regulatory test.

2003 **Clayton Utz, TransGrid, NSW, Australia**
Murraylink's Application for Regulated Status
Tom advised TransGrid and Clayton Utz in responding to Murraylink's Application to the ACCC for regulated status, and, in particular, Murraylink's use of the regulatory test to derive a regulatory asset value.

Tom also advised TransGrid in responding to the ACCC's Preliminary View on Murraylink's Application, and helped draft a further report commenting on aspects of the ACCC's approach.

2001-03 **TransGrid, NSW, Australia**
Application of the regulatory test to network augmentation in the Western Area
Advised TransGrid on the application of the regulatory for intra-regional network augmentation planned for the Western Area of NSW. The application highlighted issues in applying the regulatory test in a situation where an agreed reliability standard is not currently met.

2002 **Telecom New Zealand, New Zealand**
Interconnection Pricing
Advised Telecom New Zealand on the potential forms of price control the New Zealand Commerce Commission could adopt in regulating PSTN interconnection prices.

2002 **Telecom New Zealand, New Zealand**
'Intelligent' Interconnection Benchmarking Report
Carried out a benchmarking survey and provided a report to the New Zealand Commerce Commission on behalf of Telecom New Zealand. This report adjusted interconnection prices in Europe, Australia and the United States for differences in cost drivers (in terms of switching and transmission economies of scale, transmission link lengths and the cost of capital and labour) compared to New Zealand.

2002 **SPI PowerNet, Australia**
Design of Efficiency Carryover Mechanism
Advised SPI PowerNet on the appropriate design of an efficiency carryover mechanism intended to share efficiency gains between a regulated business and its customers.

2002 **SPI PowerNet, Australia**
ReOptimisation of Transmission Assets
Advised SPI PowerNet on the appropriate approach to calculating the value of assets previously optimised out of its regulatory asset base and now being "un-optimised" due to greater utilisation levels of those assets.

2002 **SPI PowerNet, Australia**
Adviser on Revenue Reset Application
Advised SPI PowerNet on a range of high level issues in relation to their regulated revenue reset application, including appropriate drafting and consistency of argument throughout the document. Presented aspects of SPI PowerNet's application to the ACCC and in an ACCC sponsored regulatory public forum.

2002 **Telecom New Zealand, New Zealand**
Review of Interconnection Benchmarking Report
Advised Telecom New Zealand on issues arising out of an Interconnection Benchmarking report commissioned by the Commerce Commission of New Zealand for the purpose of

setting interim interconnection charges. This role included the submission of a report to the Commerce Commission and presentation of the findings of that report at a Commerce Commission hearing.

2002 **Australian Pipeline Trust, Australia**
Expert Advice on CPI Indexation
Advised APT in relation to a dispute with customers on the appropriate CPI indexation adjustment of prices for the impact of the GST required under the Trade Practices Act.

2002 **EnergyAustralia, Australia**
Pricing Strategy Under a Price Cap
Advised EnergyAustralia on the commercial implications for pricing strategies under a weighted average price cap.

2001 **IPART, Australia**
Minimum Standards in Regulation of Gas and Electricity Distribution
Advised the NSW regulator on the appropriate role of minimum standards in regulatory regimes and how this could be practically implemented in NSW.

2001-03 **Rail Infrastructure Corporation, New South Wales**
Preparation of access undertaking
Advised on all economic aspects arising in the preparation of an access undertaking for the New South Wales rail network. Issues arising include: pricing principles under a `negotiate and arbitrate' framework, asset valuation, efficient costs, capacity allocation and trading, and cost of capital.

2001 **Australian Competition and Consumer Commission, Australia**
Determination of Local Call Resale Prices
The ACCC's expert regarding the determination of local call resale prices from Telstra's fixed line network. This involved the application, and manipulation, of the Australian incumbent's (Telstra's) regulatory accounting framework to determine appropriate wholesale prices.

2001 **All NSW electricity distribution businesses, Australia**
Form of Price Control
Advice on the economic efficiency implications of various forms of price control that can be applied under the National Electricity Code.

2001 **Wesfarmers, Australia**
Expert Advice on Reasonable Cost Recovery
Advising Wesfarmers in relation to a dispute with customers on reasonable recovery of costs of coal production.

2001 **Integral Energy, Australia**
Pricing Strategy Paper
Advising on appropriate pricing strategy for Integral's electricity distribution business, including advice on an appropriate regulatory engagement strategy.

2001 **TransGrid, SPI PowerNet and GPU GasNet, Australia**
CPI Indexation Adjustment
Advice on the appropriate CPI indexation adjustment for the impact of the GST required under the Trade Practices Act.

2001 **All NSW gas and electricity distribution businesses, Australia**
CPI Indexation Adjustment
Advice on the appropriate CPI indexation adjustment for the impact of the GST required under the Trade Practices Act.

2000 **One.Tel, Australia**
ULL Pricing

Advising OneTel in their arbitration with Telstra on pricing for access to the unbundled local loop.

2000 **Electricity Supply Association of Australia and Australian Gas Association,**
Adjusting the Regulatory Regime for the Impact of Tax Reform
Advised the peak energy bodies on the implications of tax reform on their members under the Trade Practices Act.

2000 **Victorian Department of Treasury and Finance, Australia**
State Business Tax Reform
Advised the Department of Treasury and Finance on State business tax reform including in relation to the relative economic costs associated with payroll, stamp duty and other transaction taxes.

1999 **Independent Pricing and Regulatory Tribunal of NSW**
Various energy regulation issues
Advice on a range of issues in regulation of the NSW energy sector.

1990-99 **Commonwealth Treasury, Australia**
Various economic policy issues
Provided input in the formulation of a number of economic policies. These included: the year 2000 reforms of the Australian indirect and corporate tax regimes; reform of the social security system and labour market regulation; economic forecasting and monetary policy monitoring; reform to the regulation of the Australian financial system.

General Policy Analysis

2007 **Brotherhood of St Laurence, Australia (*pro bono*)**
Analysing disadvantage by electorate
An analysis of the social disadvantage by Australian federal electorate. The objective was to promote a program ("HIPPY") aimed at tackling disadvantage. The then opposition Labor party (now Government) announced it would fund the program the same afternoon as our report released.

2007 **Menzies Institute, Australia**
Hidden Costs of Stamp Duty
An analysis of the hidden economic costs of state government stamp duty on residential property transactions – including in terms of labour force mobility.

2003 **Betfair, UK**
The Impact of Internet Betting Exchanges on the Racing Industry
This project involved estimating bounds for the price elasticity of demand for wagering in Australia and using these to determine the likely impact of licensing internet betting exchanges to compete with existing TAB wagering operations. This project also involved modelling the impact on wagering tax rates required to achieve revenue neutrality under various prices elasticity scenarios.

2002 **Marsh, Australia**
The Impact of Taxation on Levels of Property Insurance
This project involved estimating the number of uninsured households destroyed in the recent NSW bushfires that would otherwise have been insured if the only tax insurance premiums were subject to was GST. The methodology used was based on evidence from studies of the price responsiveness of demand for property insurance in the US and Australian evidence on the proportion of people without home or contents insurance.

Educational Services

2006 **RMIT University, Australia**
Economics Unit for MBA
Developed the course materials for the economics unit in RMIT's MBA course.

Speeches and presentations

2010 **Energy Networks Association, Melbourne**
Setting the cost of debt for Australian energy businesses

2007 **Energy Networks Association, Melbourne**
Setting the cost of capital for Australian energy businesses

2005 **International Telecommunications Society regional Conference, Perth**
Stepping over the Competitive Line

2005 **ACCC Regulatory Conference, Gold Coast**
Exclusive Rights to Content and Competition in Telecommunications

2004 **Office of the Water Regulator, Perth**
Cost Benchmarking – Practical Pitfalls

2004 **Macquarie Bank, Terrigal**
Internal presentation on regulatory risk across jurisdictions and industries

2003 **ACCC Regulatory Conference, Gold Coast**
Anticompetitive Pricing in Telecommunications

2003 **ACCC Conference on SPI PowerNet Regulatory Decision**
Operation of the efficiency carryover

2002 **International Telecommunications Society regional Conference, Perth**
TSLRIC Regulation and Leverage of Market Power

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29th March 2012

Our Reference: MN.PG.10.02

By email: Tom.Hird@ceg-ap.com

Dr Tom Hird
Competition Economists Group (CEG Asia-Pacific)
Suite 201
111 Harrington Street
SYDNEY NSW 2000
Australia

Dear Dr Hird,

Expert report in relation to the market risk premium and the cost of equity

Background

Rule 87 of the National Gas Rules sets out provisions relating to the rate of return (or weighted average cost of capital) as follows:

> "(1) The rate of return on capital is to be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.
>
> (2) In determining a rate of return on capital:
>
> (a) it will be assumed that the service provider:
>
> (i) meets benchmark levels of efficiency; and
>
> (j) uses a financing structure that meets benchmark standards as to gearing and other financial parameters for a going concern and reflects in other respects best practice; and
>
> (b) a well-accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well-accepted financial model, such as the Capital Asset Pricing Model, is to be used."

The revenue and pricing principles in section 24(2) and (5) of the National Gas Law state:

> "24(2) A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in providing reference services; and

24(5) A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates."

In estimating the cost of equity using the CAPM, it has become standard practice in regulatory decisions to combine:

- An estimate of the market risk premium based on annual historic data over various periods from 1883 to the present day, occasionally adjusted to some extent; and
- A current-day estimate of the risk-free rate typically based on the observed yields on Commonwealth Government bonds over the 20 trading days immediately prior to the decision.

Questions

The Victorian gas distribution and transmission businesses (APA Group, Envestra, Multinet and SP AusNet) have sought your opinion on an approach to measuring the cost of equity that is consistent with Rule 87. The purpose of these questions is to obtain an expert opinion which will assist the businesses in formulating their approach for estimating the cost of equity and the weighted average cost of capital, (WACC), in their forthcoming access arrangement proposals.

1. In your opinion does the standard regulatory approach to CAPM noted above presently produce an estimate of the cost of equity that meets the requirements of Rule 87? Please provide evidence to support your opinion.
2. How should the cost of equity be estimated in today's market conditions in accordance with rule 87?
3. Please provide your estimates of the cost of equity and of the market risk premium in accordance with your suggested method(s).

Expert report

The businesses emphasise that the report prepared by you will be provided to the AER in support of the businesses' revised access arrangements. Accordingly the report may become a public report.

The report may also be relied upon in any subsequent appeal proceedings. For that reason, the businesses have attached a copy of the Federal Court's "Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia".

Please read and familiarise yourself with the Code of Conduct and comply with it at all times in the course of your engagement.

The report must contain the following:

1. The terms of reference.
2. The qualifications of the person(s) preparing the report.
3. Identify any pre-existing relationship that the person(s) have with the businesses.
4. Clearly and fully set out all the relevant facts.

5. Explain the person's (persons') process of reasoning.
6. Set out each of the expert's opinions separately from the factual findings or assumptions.
7. Reference any documents relied on by the person(s).
8. Include specified wording at the end of the report stating that "[the person(s)] has made all the inquiries that [the person(s)] believes are desirable and appropriate and that no matters of significance that [the person(s)] regards as relevant have, to [the person's (persons')] knowledge, been withheld"; and
9. State that the person(s) have been provided with a copy of the Federal Court's "Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia" (Attachment 1) and that the Report has been prepared in accordance with those Guidelines.

Contact

Jeremy Rothfield will be the day-to-day contact for you.

Yours sincerely,

Jeremy Rothfield
Network Regulation and Compliance Manager