ceg COMPETITION ECONOMISTS GROUP

Update to March 2012 Report

ON CONSISTENCY OF THE RISK FREE RATE AND MRP IN THE CAPM

November 2012

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1 Introduction

1. My name is Tom Hird. I have a Ph.D. in Economics and 20 years of experience as a professional Economist. My curriculum vitae is provided separately.

2. This report provides an update to my March 2012 report: *Internal consistency of risk free rate and MRP in the CAPM*. I have considered the AER decisions made since March 2012, including the Final Decision for the Roma to Brisbane Pipeline (RBP), the Draft Decisions for the Victorian Gas Distribution Businesses and the Draft Decision for APA GasNet. Based on my analysis, the AER's estimates of the cost of equity do not meet the objective on Rule 87(1).

1.1 Terms of reference

3. The Victorian gas businesses[1] have asked me to provide a response to the AER's draft decisions they have received on the cost of equity.

> *The terms and conditions upon which each of the Gas Businesses provides access to their respective networks are subject to five yearly reviews by the AER.*
>
> *The AER undertakes that review by considering the terms and conditions proposed by each of the Gas Businesses against criteria set out in the National Gas Law and National Gas Rules.*
>
> *Rule 76 of the National Gas Rules provides that the Gas Businesses' total revenue for each regulatory year is to be determined using the building block approach, in which one of the building blocks is a return on the projected capital base for the year.*
>
> *Rule 87(1) provides 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. Rule 87(2) provides that a well accepted approach incorporating the cost of equity and debt (such as the Weighted Average Cost of Capital (**WACC**)) is to be used along with a well accepted financial model (such as the Capital Asset Pricing Model (**CAPM**)) in determining the rate of return on capital.*
>
> *The Gas Businesses are seeking expert assistance in respect of their proposed estimates of the cost of equity to be used in the calculation of the WACC (through the CAPM) and the approach of the AER in recent draft decisions for each of the Gas Businesses.*

[1] Envestra, Multinet, APA and SPAusNet.

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In this context the Gas Businesses wish to engage you to prepare an expert report which:

(a) Updates your analysis in CEG's report : Internal consistency of risk free rate and MRP in the CAPM: March 2012 to:

(i) reflect the latest available market data and in light of the recent AER decisions; and

(ii) compare the volatility of outcomes derived from estimating a risk free rate using the CGS yields over a 10-40 day averaging period, using various different examples of such averaging periods over the past couple of years, versus the outcome of estimating the risk free rate using a long term averagemeasured over an appropriate period.

(iii) Update your opinions on the methodologies for estimating the cost of equity.

(b) In a new report , respond to the AER's Draft Decisions for each of the Gas Businesses, including:

(i) Whether the AER's estimate of the cost of equity using an estimate for the MRP of 6% combined with a spot risk free rate (applying short term CGS yields) in your opinion reflects prevailing conditions in the market for funds and if not, why not.

(ii) The AER's statement that its methodology for estimating the cost of equity is to estimate a 10 year forward looking risk free rate and a 10 year forward looking MRP[1] and whether, in your opinion, the AER's methodology does achieve this.

(iii) The AER's response to the CEG March 2012 report set out in sections B1.2, B1.3 and the DGM estimates in B2.3 and B2.4 of the Appendices to the relevant Draft Decisions.

(iv) The AER's decision on the extent of the inverse relationship between the MRP and risk free rate (sections 4.3.2, 4.3.4 of Attachment 4 to the relevant Draft Decisions) (to the extent not covered in your update report).

(v) Your response to the AER's reliance on the RBA letter to the ACCC of 16 July 2012 that "CGS yields are the most appropriate risk free rate in Australia in prevailing market conditions."2

(vi) The AER's statements relating to addressing problems with one parameter by reference to another, and in particular, the

statements of Professor Lally in respect of CEG's proposed method of using a long term average risk free rate.3

(vii) The report by Lally "Risk free rate and present value" August 2012 which argues that the use of a long term average risk free rate is inconsistent with the present value principle.

(viii) Any other relevant matters you which to comment on arising from the AER's Draft Decisions and expert reports on the cost of equity, in particular the reports of Lally (July 2012) and McKenzie and Partington (April 2012 and Lally (August 2012).

[1] See page 58, 65, 80 of the RBP Final Decision

[2] Ibid page 66.

[3] See page 80 and report Lally: *Cost of equity and the MRP*, July 2012.

4. This report addresses part (a) of the above terms of reference. The AER's draft decisions are substantively the same so, for practical reasons, I have referenced the SPAusNet draft decision although the same AER analysis can be found in all decisions.

1.2 Report structure

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

- section 2 provides a summary of volatility in CGS yields over time, and the impact of this volatility on the cost of equity as estimated by the AER, including the recent Roma to Brisbane Pipeline Final Decision;
- section 3 provides an 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. I believe that this conclusion is supported by the RBA advice to the AER;
- section 4 provides an analysis of why this has been the case;
- section 5 examines regulatory practice from the US, UK and Australia that is relevant to the issues involved;
- section 6 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 7 provides a summary of my conclusions.

6. 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.

7. I have been assisted in the preparation of this report by Johanna Hansson from CEG's Sydney office. However, the opinions set out in this report are my own.

Thomas Nicholas Hird

9 November 2012

2 Movements in the risk free rate and AER methodology

8. 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. It updates analysis undertaken for the purposes of my March 2012 report, and also reflects on any implications this update has on the conclusions made in the March 2012 report.

2.1 CGS yields are at historical low

9. In my March 2012 report, I illustrated that the yields on 10 year nominal CGS have been very volatile over the last decade. I presented a time series for yields on 10 year CGS (Figure 1 on p. 4) which showed 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.

10. In the context of this figure, I noted that, during both of these financial crises, there has been a dramatic fall in 10 year CGS yields in Australia and that the decline had left these yields at their lowest levels in the last decade and, indeed, over the past 50 years.

11. After the March 2012 report, yields on 10 year CGS have declined even further to below 3% in mid-2012. This is illustrated in Figure 2 below. The yields have bounced back slightly since their lowest levels in mid-2012, but are at the time of writing still below 3.5%. This is still notably below the yields in late-2011 and early-2012 examined by me in my March 2012 report – illustrating that the volatility observed at that time has not subsided but rather has been accentuated.

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

12. As noted in my March 2012 report (paragraphs 33 – 36), the AER's methodology can reasonably be described as estimating the cost of equity by adding an invariant market risk premium multiplied by a relatively stable beta to the fluctuating, and often wildly fluctuating, spot risk free rate.

13. The mechanical explanation for this phenomenon is relatively simple to understand. It reflects the AER's methodology which applies the Capital Asset Pricing Model

(CAPM) in a manner that attempts to obtain the best estimate of the risk free rate, beta and market risk premium independently of one another.

14. The risk free rate is set equal to the prevailing risk free rate (which is very volatile), whereas the market risk premium is based primarily on the AER's estimate of the historical average premium[2] earned by Australian equity investors (which is, by construction, very stable).

15. The risk free rate and the market risk premium fit together in the CAPM as per the following equation:

$$Cost\ of\ Equity = Risk\ Free\ Rate + \beta \times Market\ Risk\ Premium$$

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

17. At the time of my March 2012 report, the AER had recently released a Draft Decision for Aurora (released in November 2011). In the Aurora Draft Decision, the AER assumed that equity investors investing in a 60% geared electricity distribution businesses require a 9.08% nominal (6.4% real) return on equity. At the time, this was the lowest cost of equity allowance set by the AER, or the ACCC before it, for an energy transport business. In fact, prior to the global financial crisis of late 2008 the allowed cost of equity was universally above 11%, and averaged around 12%.

18. Since the March 2012 report, the AER has released a Final Decision for Aurora (30 April 2012), a Final Decision for the Roma to Brisbane Pipeline (10 August 2012), draft decisions for APA GasNet and SP AusNet (11 September 2012) and draft decisions for Multinet Gas and Envestra (Victoria and Albury) (24 September 2012).

19. In the Aurora Final Decision, the AER assumes that equity investors investing in a 60% geared electricity distribution business require an 8.69% nominal return on equity. The corresponding assumption for the Roma to Brisbane Pipeline is 7.75%, and 7.78% for all of APA GasNet, Envestra (Victoria and Albury), Multinet Gas and SP AusNet.

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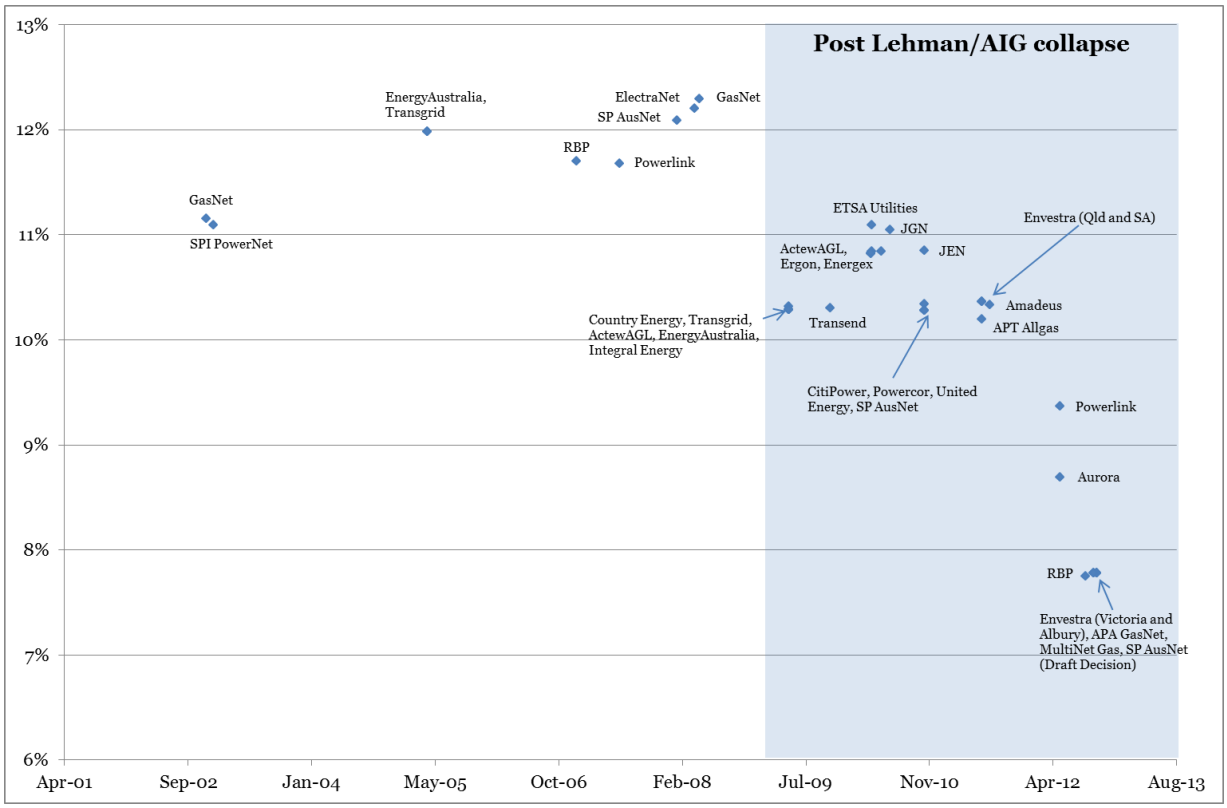
[2] See for example AER (2009) *Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters,* p. 177:

> *In assessing the MRP, the AER had regard to historical estimates, cash flow measures using variants of the dividend growth model (DGM), and surveys of market practioners. Consistent with past regulatory practice, rather than placing sole weight on any particular measure of the MRP, the AER had regard to each measure, tempered by an understanding of the strengths and weaknesses of each measure. This led to the* ***AER placing primary weight on historical estimates****, but also having regard to cash flow measures and surveys [emphasis added]*

20. The nominal return on equity assumed in these recent final and draft decisions are now the lowest cost of equity allowances set by the AER, or the ACCC before it, for an energy transport business.

21. Figure 1 below is an updated version of Figure 2 (p. 5) of my March 2012 report. In the March 2012 version of this figure, the Aurora marker sat at about 9%, notably lower than any decision before it. In this version, the cost of equity allowed in the AER's final decisions for Aurora and RBP both sit below 9% - RBP even sits below 8%. Also the draft decisions for APA GasNet, Envestra, Multinet Gas and SP AusNet sit below 8%.

Figure 1: 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

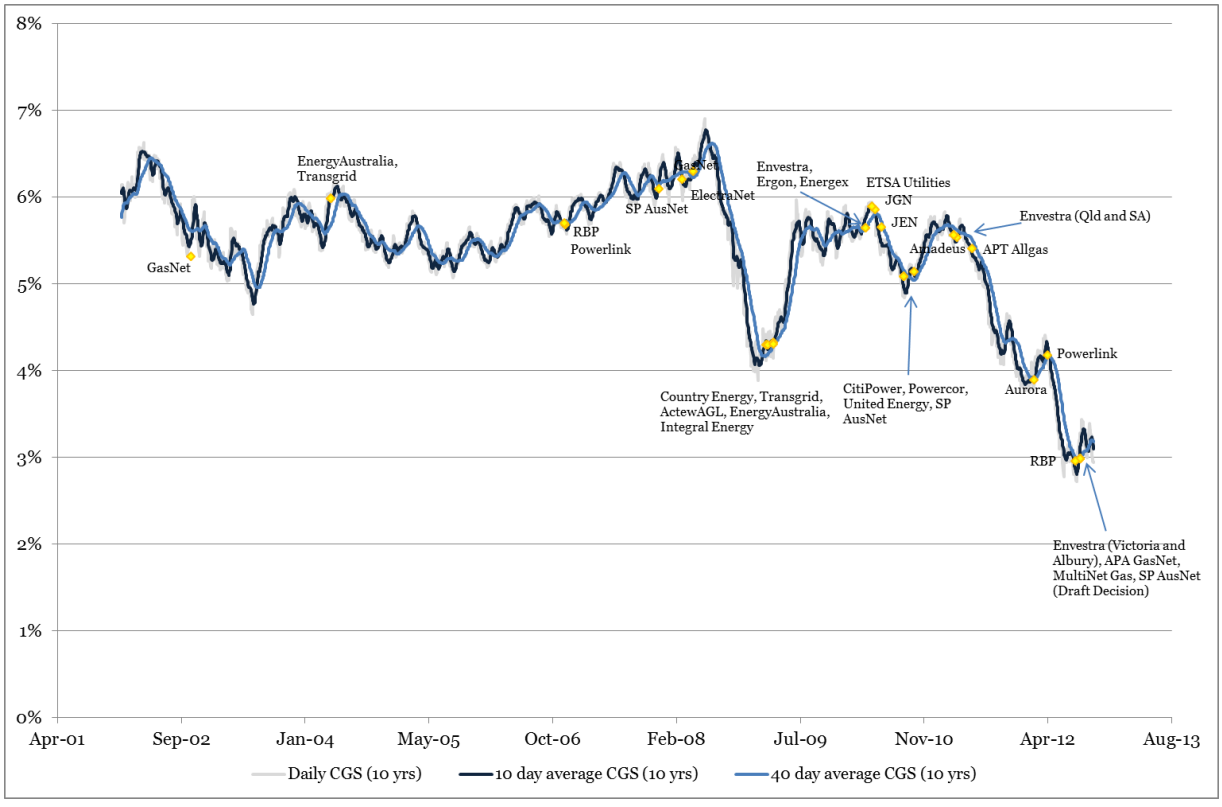
22. The updated version of the figure above reinforces and accentuates the conclusion from my March 2012 report that the AER's methodology causes the cost of equity to fluctuate in the same degree as the CGS, the effect of which is that the AER estimates are currently at historically low levels.

2.3 AER methodology creates commercial uncertainty

23. The recent Aurora and RBP final decisions, as well as the recent draft decisions for the Victorian Gas Businesses, are the most striking examples of an important side effect of the AER methodology. Under this methodology, the return on equity, and the associated investment incentives for a business, depends critically on the precise date of their proposed short term "averaging period". An averaging period that is just a few weeks later or earlier can result in an allowance for the cost of equity that is more than 100 basis points different – and this difference is locked in for 5 years even if the CGS yield does not stay at the level observed in that averaging period.

24. Figure 2 below illustrates the movement in the risk free rate over time - and its impact on the allowed cost of equity in various regulatory decisions. This figure shows that the risk free rate, and therefore the compensation for making equity investment allowed by the AER is highly unstable.

Figure 2: Risk free rate 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

25. The effect of this is that the regulatory regime creates a 'roulette-wheel' for equity investors – with the timing of their averaging period equivalent to the fall of the ball on the roulette-wheel.

26. By way of example, consider the impact of falling CGS rates on the allowed cost of equity for APT Allgas, Aurora and Powerlink, and RBP. Aurora received 151 basis points (per annum for five years) less compensation than Powerlink simply because Aurora's averaging period started seven months after APT Allgas' averaging period ended. Powerlink received 28 basis points more than Aurora because its averaging period started one month after Powerlink's finished. RBP received 122 basis points less than Powerlink (and 245 basis points less than APT Allgas) simply because its averaging period started four months after Powerlink's ended (14 months after APT Allgas's averaging period ended).

27. These are very significant differences as a proportion of the real cost of equity allowed. By way of illustration, RBP's real (inflation adjusted) allowance for the cost of equity was just 5.07% per annum.[3] The 245 basis points difference between the RBP risk free rate and the APT Allgas risk free rate accounts for very nearly half of the actual real return allowed RBP. Put another way, APT Allgas's real allowance for the cost of equity (7.46%) was 47% higher than RBP's solely due to the higher CGS yields in APT Allgas's averaging period.

28. This fall in AER allowed compensation for investment by equity financiers occurred despite economic indicators suggesting that attracting such investment was becoming more - not less - difficult. I described these indicators in my March 2012 report and I update them in the following sections. Of course, the Aurora and RBP final decisions were not released at that time, nor were the Victorian gas distribution draft decisions.

29. In my view, this volatility in allowed returns creates commercial uncertainty for businesses. For the reasons expressed in each of my reports during these proceedings, I do not believe that businesses' actual cost of equity moves in line with movements in the risk free rate. Consequently, there is no 'natural hedge' to the businesses for the volatility in the compensation provided to them. As a result this volatility creates commercial uncertainty for businesses. Even if a business is earning an adequate return on new investments in its current regulatory period it cannot be sure whether this will be the case in the next regulatory period or whether, like RBP, its averaging period will fall in a period of market turmoil and extremely low CGS yields.

30. This uncertainty is despite the fact that the AER methodology provides certainty and stability in the market risk premium that will be used. Indeed, it is the stability in the AER's estimate of the market risk premium that creates the instability in the allowed cost of equity as a result of volatility in risk free rates. As discussed in section 5 below there is strong regulatory precedent for focussing more on stability in the cost of equity than the market risk premium.

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3 This is calculated as the nominal cost of equity of 7.75% deflated by the RBP decision estimated inflation rate of 2.55% using the Fisher equation.

31. Consistent with the views expressed in my March report, if one is to adopt an invariant estimate of the risk premium required by equity investors then it is my opinion that a long term average estimate of the risk free rate should be combined with this. The end result would be a more stable level of compensation for equity investors and the amelioration of the current roulette-wheel approach to compensating equity investors.

3 Movement in the risk free rate and the required return on other assets

32. In my March 2012 report I provided a factual assessment of whether risk premiums in general had stayed constant as CGS had fallen. The purpose of this assessment was to show that if CGS yields were falling primarily as a consequence of factors that do not push down the overall cost of equity, then the AER's approach downwardly biases the cost of equity estimate. If that can be shown to be the case then a better approach would be one where some or all of the fall in CGS yields was offset by a higher allowance for the market risk premium.

33. In my March 2012 report I showed that required returns on risky assets in general have remained relatively stable as CGS yields have fallen. To reach this conclusion I assessed evidence of recent risk premiums for:

    - low risk assets including Australian state government debt 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 (i.e. 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.

34. The evidence in March 2012 from all these sources pointed at higher risk premiums at times of lower CGS yields, such as those experienced in early 2009 and at the current time. This is supported by the RBA. Below I update the March 2012 analysis, and discuss any implications for the conclusions made in March 2012.

3.1 Risk premiums on low risk assets

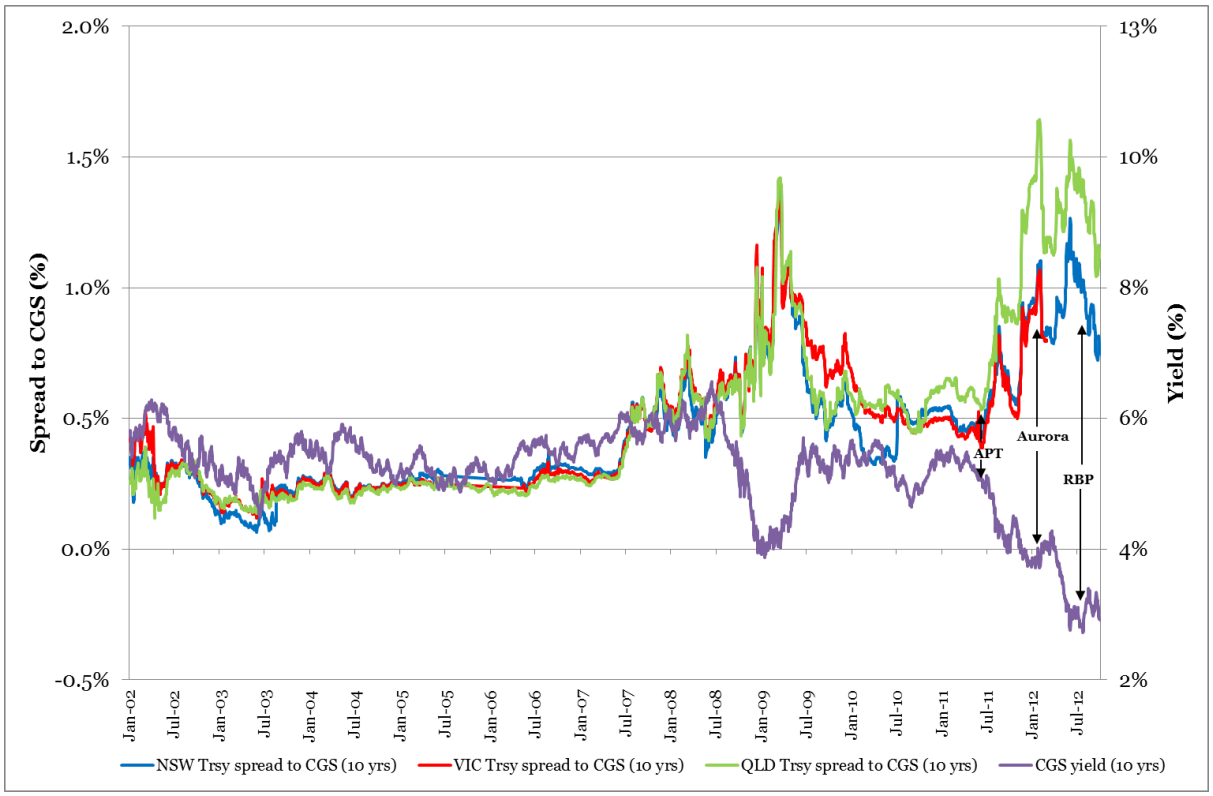
35. In my March 2012 report, I assessed the spreads between CGS yields and the yields on other very low risk assets (Figure 3 on page 11). The figure showed that the required rate of return on state government debt (rated AAA for NSW and Victoria and AA+ for Queensland) had increased materially relative to the required return on CGS since mid-2011. As a result, the difference in these returns (the "spread") had

increased materially. Moreover, this spread had returned to levels not seen since the midst of the 2008/09 financial crisis.

36. Figure 3 below is an updated version of Figure 3 from my March 2012 report. It shows that the required return on state government debt continued to increase relative to the required return on CGS since early 2012, but dropped off slightly in mid-2012. However, the difference in these returns is still very high compared to both before and after the 2008/09 financial crisis. Figure 3 also marks recent regulatory decision averaging periods.

37. I noted in March 2012 that this figure provides compelling evidence to the effect that required returns on low risk assets have not fallen in line with required returns on CGS. This conclusion is consistent with the updated analysis undertaken in this section.

Figure 3: Update of Figure 10 (Risk premiums on State Government debt relative to CGS)



Source: Bloomberg, RBA, CEG analysis

38. It can be seen that the risk premiums on AAA rated NSW and Victorian debt (left axis) more than doubled[4] between the APT Allgas and Aurora averaging periods.[5]

4 From 45.9 basis points on 31 May 2011 to 109.6 basis points on 2 February 2012.

This occurred at the same time that CGS rates fell by over 151 basis points (right axis). For the reasons spelt out in my March 2012 report, and consistent with the advice in letters to the AER from the RBA and the Treasury/AOFM,[6] these events were not independent. The same factors driving up risk premiums between these averaging periods were also manifesting in a flight to safety forcing down CGS yields.

39. Notably, between the APT Allgas and RBP decisions the risk premium on the very safe and liquid NSW Government debt also more than doubled.[7] In this context of increasing risk premiums on even the safest non-CGS assets, there is, in my view, no plausible basis for concluding that risk premiums on riskier equity assets remained constant. Put in terms of the cost of equity, it is not reasonable to assume that:

    - equity investors in RBP's operations in Queensland over its regulatory period (which happens to substantially overlap with APT Allgas's regulatory period) required a 245 basis point lower (the full extent of the fall in 10 year CGS yields) level of compensation than equity investors funding APT Allgas's operations in Queensland over the regulatory period; while
    - debt investors in very safe NSW State Government debt demanded a much smaller reduction in required return (with spreads between 10 year NSW Government debt and 10 year CGS rising by 62 basis points).[8]

3.2 Risk premiums on high risk bonds

40. In my March 2012 report I noted that it is common practice to use spreads between low risk assets and BBB rated bonds as a proxy for the level of investor aversion. In Figure 5 on page 13 I produced a figure which demonstrated a history for the spread between Standard & Poor's AAA and BBB rates bonds with one year to maturity. It showed that 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%. I noted that since 2008, the average spread has been over three times higher at 1.6%.

41. Figure 4 shows an updated version of Figure 5 from the March 2012 report. The average spread since 2008 (up to end of September 2012) is still 1.6%.

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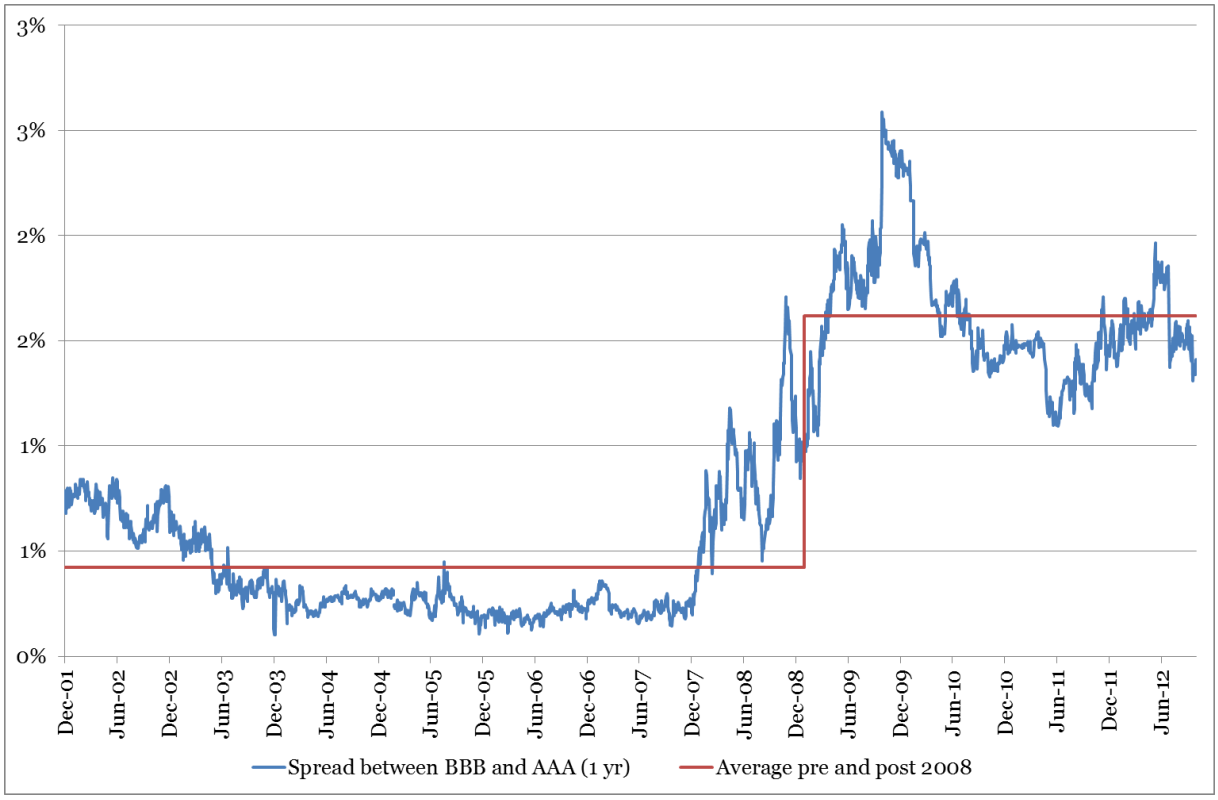
5 As explained in March report, a doubling in risk premiums on AAA rated liquid state government debt is suggestive of a very large increase in risk premium on less liquid and more risky equity (much more in absolute terms than the absolute increase in risk premiums on AAA debt).

6 See section 3.2 of my companion report *Response to AER Vic gas draft decisions, November 2012*

7 From 45.9 basis points on 31 May 2011 to 107.5 basis points on 25 June 2012.

8 The fall in CGS yields less rise in spreads to CGS for NSW Government debt from the end of the APT Allgas averaging period to the beginning of the RBP averaging period.

Figure 4: Spreads between AAA and BBB benchmark bonds at 1 year to maturity



Source: Bloomberg, CEG analysis

42. In my March 2012 report I also presented a table which showed the AAA to BBB spreads at 1 year to maturity (Table 1 page 14). The conclusion that the spread was about 3 times higher at the present time than the pre-2008 levels still holds – the average spread in November 2011 was 1.53% and the average spread in September 2012 was 1.46%. An updated version of the table is presented below.

Table 1: AAA to BBB spreads at 1 year to maturity

Sampling period	Spread (%)
Average pre-2009	0.42%
Average post-2008	1.62%
Ratio pre-2009 : post-2008	**3.8**
Average September 2012	1.46%
Ratio August 2012: pre-2009	**3.5**

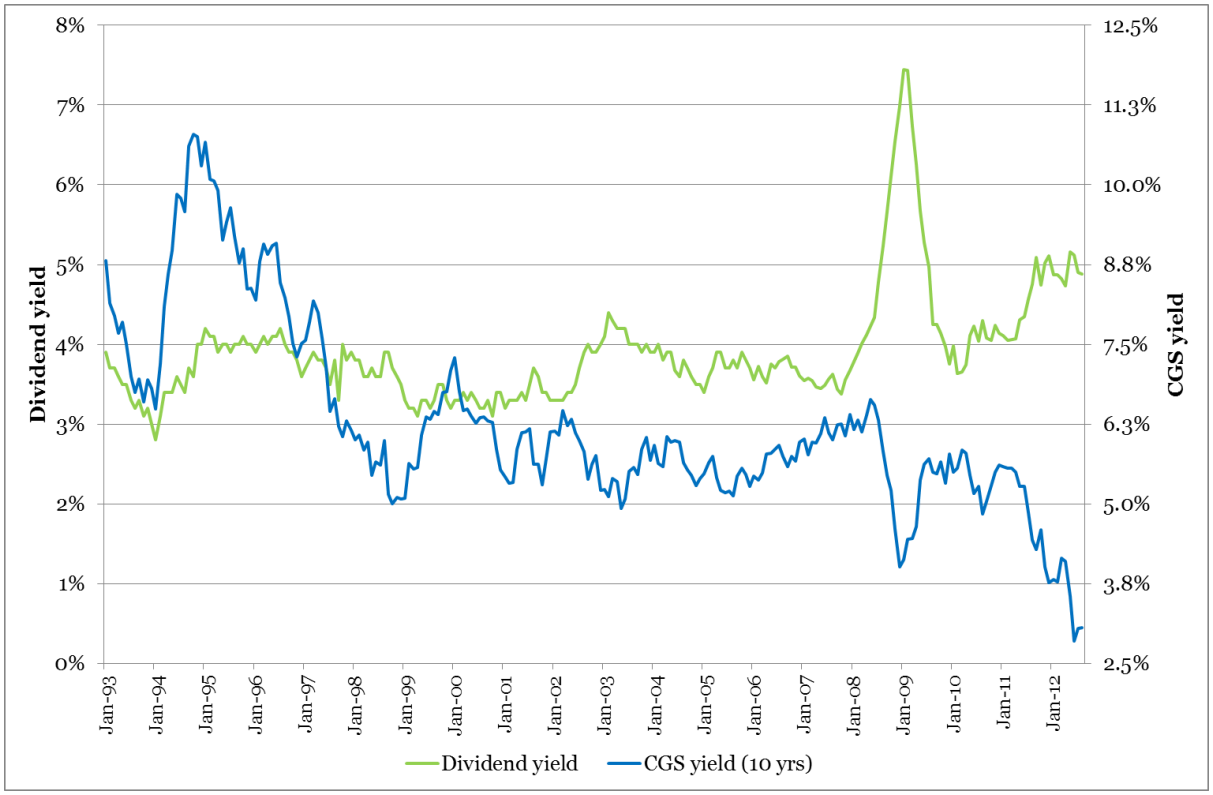
Source: Bloomberg, CEG analysis

3.3 Risk premiums on equities

43. I noted in my March 2012 report that it is common practice to use equity dividend yields as a proxy for prevailing levels of risk aversion. I presented a figure (Figure 7 on page 16) which showed the dividend yield on the ASX and the contemporaneous yield on 10 year CGS since 1993. I chose 1993 as the starting point as this coincides with the formal adoption of inflation targeting by the RBA (at the range 2-3%). The figure showed that since the 1990s, there has been a clear negative relationship between dividend yields and CGS yields– most noticeable in the 2008/09 financial crisis and more recently since mid-2011.

44. Figure 5 below is an updated version on this figure. The updated version supports my conclusion from March 2012 and even reinforces it, given that the spread is even more pronounced in mid-2012.

Figure 5: Dividend yield on ASX versus 10 year CGS yields



Source: RBA, CEG analysis
Note: 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

45. In my March 2012 report I also noted that the dividend yield on listed equities can be used to arrive at a direct estimate of the prevailing cost of equity by way of a dividend growth model (DGM). In my previous report I relied on a method used by AMP

Capital Investors to estimate the prevailing cost of equity, which has also previously been relied upon by the AER in support of its position that the then MRP of 6.0% was generous.

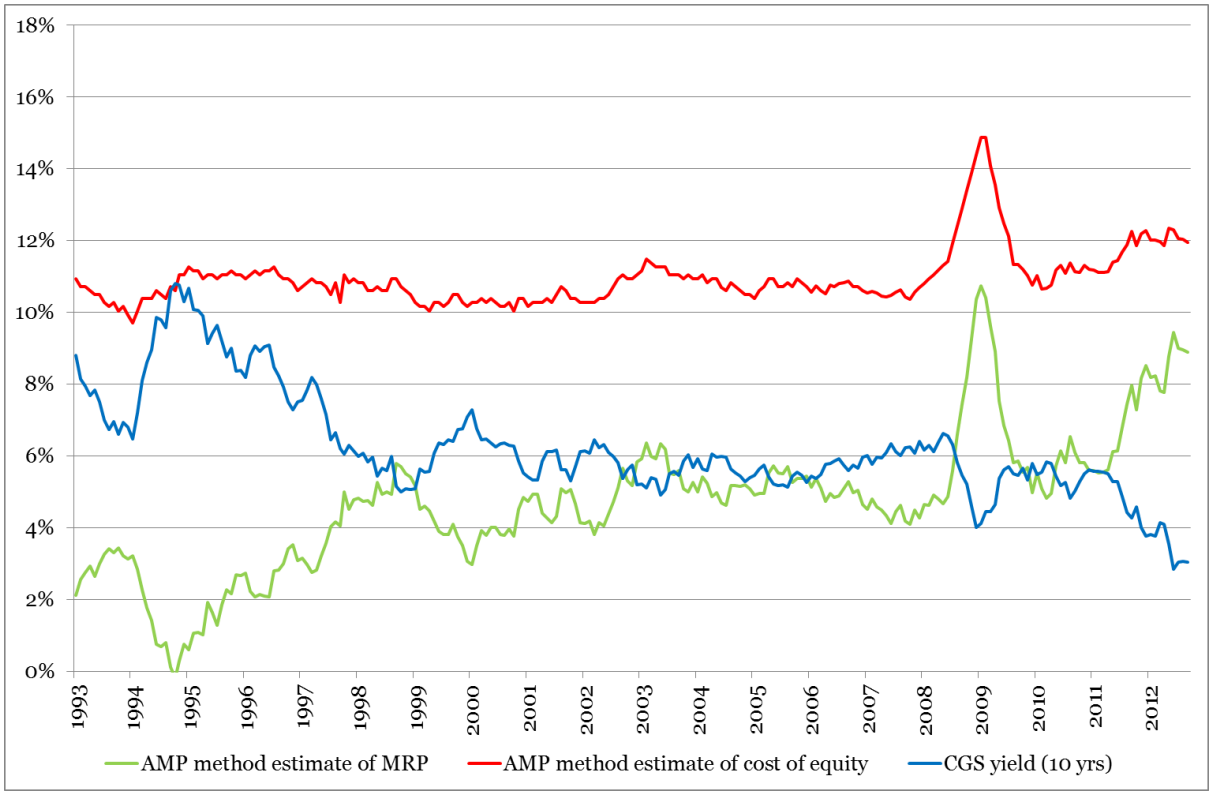
46. The AMP methodology involves approximating a cost of equity by adding the long term average nominal growth in GDP (as a proxy for long term average nominal growth in dividends) to the prevailing dividend yield for the market as a whole. This gives a 'cash' cost of equity. To convert this into a cost of equity including the value of imputation credits the cost of equity needs to scaled up by the relevant factor.

47. In Figure 8 on page 18 in my March 2012 report, I 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[9]. The figure illustrated the resulting estimate of the prevailing cost of equity, together with the 10 year CGS and MRP (measured relative to the 10 year CGS yields). It was clear from the figure that the most recent fall in CGS yields has been associated with a more than offsetting rise in MRP, reflected in the rising cost of equity since mid-2011. Notably, the market cost of equity, being the sum of the CGS and the MRP, was much more stable over time than either of its components.

48. An updated version of this figure is presented below, using the same assumptions. The conclusion from my March 2012 report that the recent falls in CGS have been associated with a more than offsetting rise in MRP - resulting in a rising cost of equity - still holds until the present time.

9 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)

Figure 6: AMP method estimate of return of equity and MRP relative to 10 year CGS rates



Source: RBA, CEG analysis

49. I note that the estimated MRP in October 1994 using this methodology fell to negative 0.2%. The reason the estimated MRP becomes negative on this date is due to the simplifying assumption that I have used in assuming that inflation expectations were in the middle of the RBA target band (2.5%) at all times in history. The implication of this assumption is that investors' expected nominal growth in dividends is always equal to the historical average real GDP growth rate (4.0%) plus 2.5% inflation.

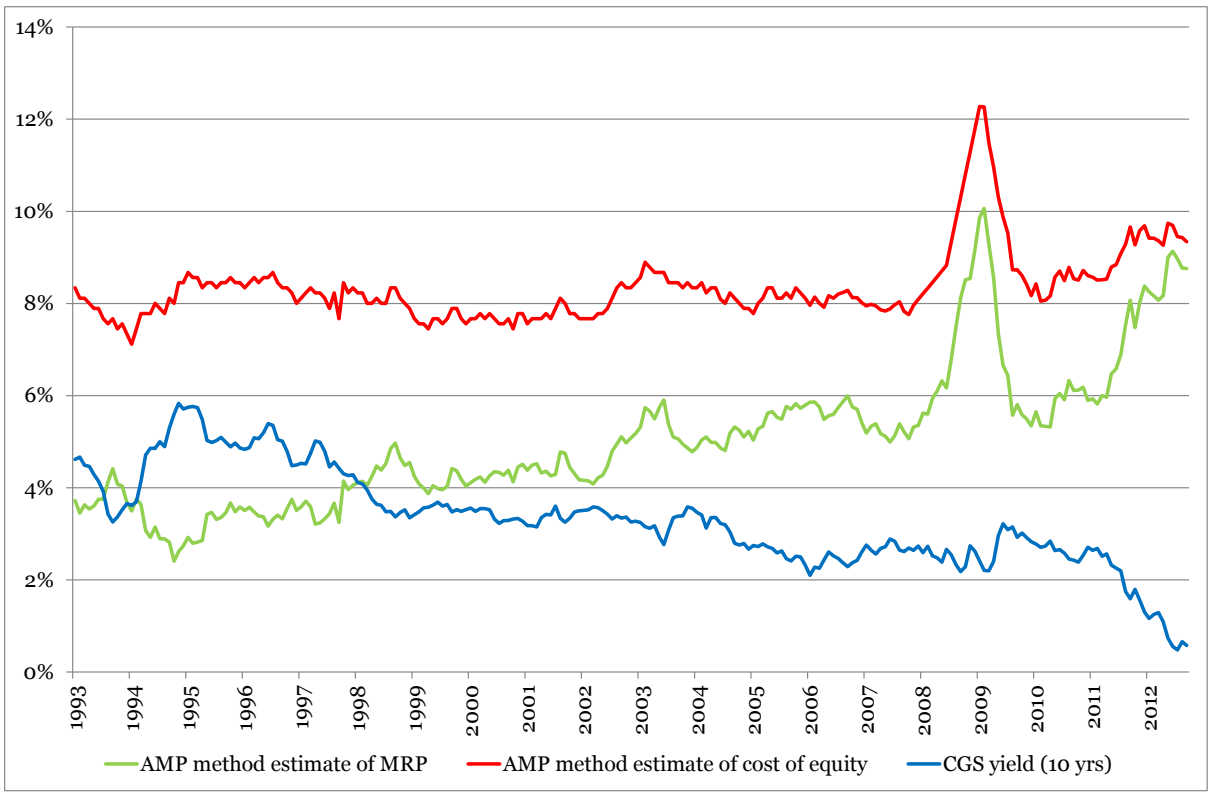
50. If, as was almost certainly the case in October 2009,[10] inflation expectations were above 2.5% then my assumption of constant 2.5% inflation expectations in history will underestimate the expected nominal return on equity. However, the contemporaneous nominal return on CGS will not be underestimated because this has been directly observed inclusive of actual inflation expectations at that time. The result is that the MRP is underestimated.

[10] Break-even 10 year inflation rates (the difference between 10 year nominal and CPI indexed CGS) in October 1994 averaged 4.5%. This means that assuming 2.5% inflation understates the true expected growth in nominal dividends and therefore the cost of equity. Breakeven inflation rates fell dramatically from this point and were below 3% from mid-1996 onwards except for a brief period in 1999/00 and again in early 2008.

51. Of course, this is not symptomatic of any problem with application of the AMP DGM model in current market circumstances were the best estimate of current inflation expectations has been used – as is the case with my estimates of the prevailing DGM in September 2012 in this report (and December 2011 in my March 2012 report).

52. Nonetheless, I can address this issue in history by performing the DGM analysis in real terms. Specifically, by using indexed CGS yields instead of nominal CGS yields as my proxy for the risk free rate and by applying a dividend growth assumption based on my estimate of real historical average GDP growth (4.0%) without grossing this up by an estimate of historical inflation expectations. When I do this I derive the following chart.

Figure 7: AMP method estimate of the real return of equity and MRP relative to 10 year real (indexed) CGS rates



Source: RBA, CEG analysis

53. This figure tells basically the same story in real terms – but with less dramatic variations in the risk free rate than when the risk free rate is expressed in nominal terms. The real market cost of equity is relatively stable through time. In the 1990's the average real risk free rate is high and the average MRP is low (and is lowest when the real risk free rate is highest). As the real risk free rate falls in the 2000's the MRP rises (and varies inversely with short as well as long term movements in the real risk free rate).

54. Notably, the inflation indexed CGS yield during the GFC does not exhibit the same volatility as the nominal CGS yield –reflecting the fact that indexed CGS are less liquid than nominal CGS and therefore less valued in a crisis period. This demonstrates that the difference between the real and nominal charts is not just related to inflation expectations. It will also reflect differential variations in the liquidity premium applied to nominal and indexed CGS. [11]

55. Most relevantly for current market circumstances, the dramatic fall in CGS yields post 2010 (and more dramatic rise in MRP) is still evident when the analysis is performed in real terms. In fact, it is in a sense clearer because we can see that real CGS yields have fallen to almost zero – making almost the entire return on the market explained by a premium relative to the near zero real CGS yields.

3.4 Risk premiums on utility equities

56. In my March 2012 report, I undertook a DGM analysis based on dividend and share price data from Bloomberg for six Australian utilities businesses: APA Group, DUET Group, Envestra, Hastings Diversified Utilities Fund, SP Ausnet and Spark Infrastructure.

57. The DGM analysis was 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 that same time the average 10 year CGS yields was 4.13%.

58. For the purposes of this report, I have updated the DGM analysis. The analysis is based on analyst dividend forecasts from 11 September 2012 and the average price of equities is an average over the period 13 August to 11 September 2012. Over the same period the average 10 year CGS yield was 3.2%.

59. Beyond the time at which Bloomberg dividend forecasts are available, it is necessary to make an assumption about the future path of dividend growth/decline. I show here a range of possible assumptions, including that which would be necessary to support the AER's estimated 4.8% equity risk premium (6%×0.8). The assumptions range from 0% real growth (2.5% nominal growth) to 6.6% nominal growth (long run nominal GDP growth rate).

60. I have included as a sensitivity analysis the long term growth assumption that delivers an average cost of equity equal to 8.0%. This is the cost of equity derived by combining the average CGS yield over the estimation period (3.2%) 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

[11] And possibly also differences in the risk premium attached to being exposed to inflation movements for nominal bond holders.

dividends in the future has to be negative at -0.12% in nominal terms. 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 (assuming long term inflation of 2.5% pa, i.e., in the middle of the RBA's target range).

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

Table 2: DGM cost of equity analysis

Dividend growth rate	-0.12%	2.50%	4.50%	6.60%
APA Group	8.0%	10.3%	12.2%	14.1%
DUET Group	8.6%	10.9%	12.8%	14.7%
Envestra	7.8%	10.2%	12.0%	13.9%
HDF	6.0%	8.5%	10.3%	12.3%
SP Ausnet	8.6%	11.0%	12.8%	14.7%
Spark Infrastructure	7.8%	10.2%	12.0%	14.0%
Weighted average cost of equity	8.0%	10.4%	12.2%	14.1%

Source: Bloomberg, CEG analysis

62. The corresponding results from the March 2012 report DGM analysis were 10.86% assuming a growth rate of 2.50% and 14.59% using a growth rate of 6.60%. The growth rate resulting in a cost of equity of 8.9% (4.8%+4.1%) at that time was 0.30% (as opposed to -0.12% in Table 2).

63. Whilst the DGM estimates of the cost of equity have declined, they have only declined marginally and certainly have not fallen in the same manner that CGS rates have.

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

64. In this section I attempt to explain the empirical evidence presented in the previous section. That is, I attempt to explain why the required returns on riskier assets are not falling in line with CGS yields.

65. In my March 2012 report, I canvassed the views of experts such as the RBA. As described in that report, 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. This, in turn, has pushed down the yield on this asset but not all other assets.

66. I noted that a powerful demonstration of this was provided by examining the movement in risk premiums on state Government debt and the movements in CGS yields in the same chart (Figure 10 on page 24).

67. I chose the scales on the two axes deliberately to place the CGS time series approximately coincident with the state government debt time series in 2002.[12] This was 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 since mid-2011.

68. The figure clearly showed that the 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). As CGS yields recovered in 2009, risk premiums fell. This same pattern was observed in 2011 and early 2012.

69. Figure 3 above is an update of that figure. The same pattern that was discerned in my March 2012 report is observable in this updated version of the figure – there is a strong negative relationship between CGS yields and risk premiums that persists into 2012.

70. I noted in March 2012 that the same conclusion can be drawn by reference to the negative relationship between equity risk premiums for Australian publicly listed equities (estimated using the AMP method) and the yield on CGS (Figure 11 on page 26).

[12] 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.

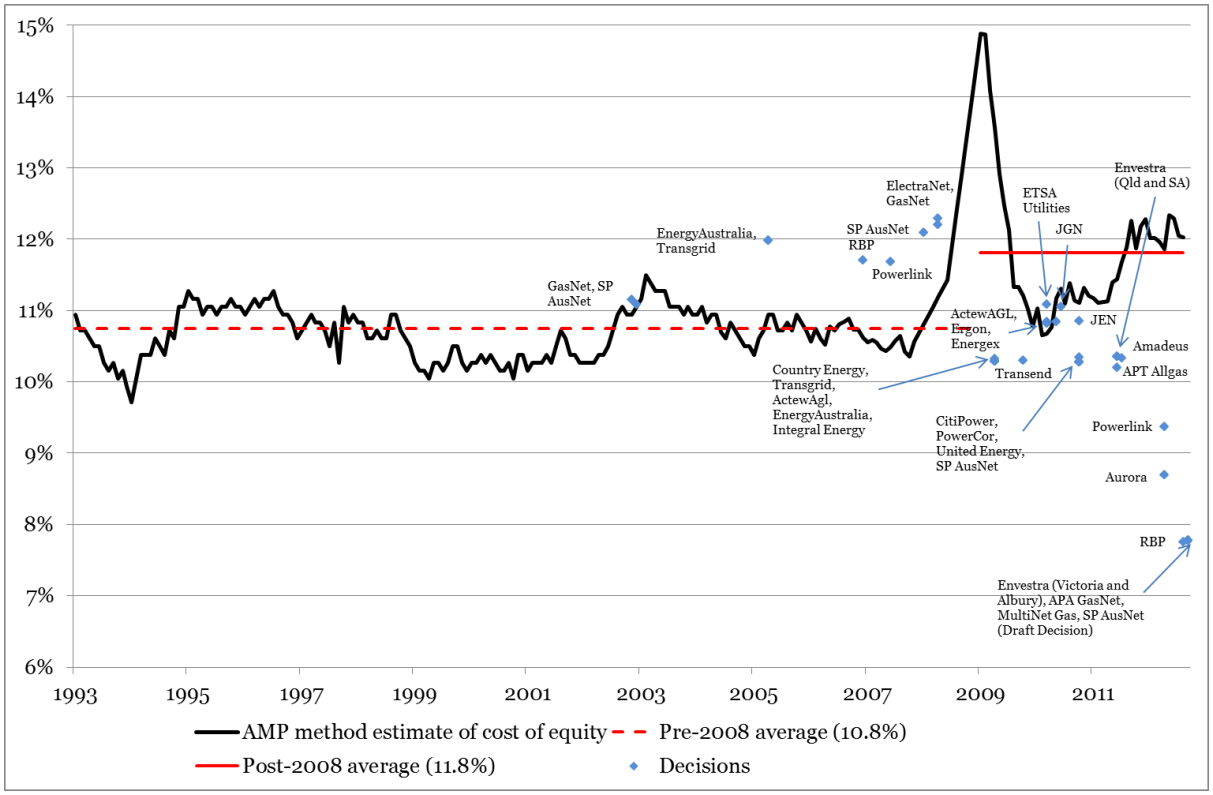
71. Figure 6 above is an updated version of this figure. This figure, like the one in my March 2012 report, shows that the risk premium is lowest when CGS yields are highest and vice versa. This can be discerned both at extreme and less extreme levels of CGS yield. The negative relationship persists into 2012.

72. I noted in my March 2012 report that, given this negative relationship between the risk free rate and the risk premium on listed equities, it is unsurprising that their sum – the required return on equity – is much more stable than its components. I illustrated this in Figure 12 on page 27, which showed that the total cost of equity has been remarkably stable between 10-11% since 1993. The exceptions to this were early 2009 and, to a lesser extent, in late 2011 when CGS yields were driven to unprecedentedly low levels by historical standards.

73. The figure also showed that, using the AMP method, the average cost of equity for the market post-2008 was somewhat higher than the average pre-2008. This was despite the average CGS yields being materially lower post-2008 (this is illustrated in Figure 6, Figure 7 and Figure 8 of this report).

74. Figure 8 below updates Figure 12 from my March 2012 report. It shows that the high cost of equity from late 2011 has persisted to the present time. Superimposed on Figure 8 are the regulatory decisions from Figure 1 in this report, illustrating that decisions up until recently were hovering around the AMP method estimate of the cost of equity for the market (black line). However, in the most recent decisions, particularly the RBP Final Decision and the Victorian gas businesses draft decisions, the AER has allowed cost of equity values far below the AMP estimate of the cost of equity for the market.

Figure 8: Total cost of equity (AMP method)



Source: RBA, regulatory decisions, CEG analysis

5 Regulatory precedent for dealing with volatility in risk free rates

75. This section outlines how the majority 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 a low allowed cost of equity. There is also material precedent for this in Australia from bodies other than the AER.

5.1 Australian Competition Tribunal

76. In my March 2012 report, I commented on the Australian Competition Tribunal decision in 2009 where it was found that use of the prevailing spot risk free rate in the AER's CAPM formula (with a fixed MRP) resulted in too low a cost of equity. As noted above, this was a time of very low CGS yields as a consequence of the global financial crisis.

77. In particular I observed that, in its Final Decision for the NSW electricity distribution businesses and the NSW and Tasmanian electricity transmission operations, the AER estimated a cost of equity using an MRP of 6% and a nominal (real) risk free rate of 4.3% (1.8%). This was the lowest yield on nominal CGS since the 1950s. This decision was appealed to the Tribunal, with the contentious issue amounting to whether the historically low risk free rates during the crisis should be passed through in equally low cost of equity allowances.

78. In my March 2012 report, I compared the risk free rate allowed by the AER in its Aurora Draft Decision with the AER's risk free rate subject to merits review by the Australian Competition Tribunal. In this context I noted that the AER had set the same MRP but a materially lower risk free rate than the AER set in the EnergyAustralia decision (which the Tribunal overturned) (1.8% vs. 1.6%).

79. Of course, since the March 2012 report, the AER has made its final decision regarding RBP. In this decision, the AER set a real risk free rate of 0.4% (the real risk free rate in the most recent draft decisions for the Victorian distribution businesses is 0.5%). 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.

80. As was the case with the Aurora Draft Decision, the AER's RBP Final Decision fails to raise the MRP to even 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 Aurora MRP (a reduction which was subsequently maintained for RBP) 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.)

81. The table below compares the CAPM parameters used in the RBP Final Decision to the parameters rejected by the Tribunal as being in error in EnergyAustralia.

Table 3: Cost of equity estimates

Parameter	Tribunal correction to AER error	AER decision (pre-Tribunal correction)	AER decision for RBP
Real risk free rate	3.3%	1.8%	0.4%
Beta	1.0	1.0	0.8
MRP	6.0%	6.0%	6.0%
Real cost of equity	9.3%	7.8%	5.2%

Source: Regulatory decisions

82. The table above 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 sets a real risk free rate that is 1.4% less than the level which the Tribunal found in EnergyAustralia was inappropriate. The Tribunal directed the AER to use an earlier averaging period, as proposed by EnergyAustralia, which had higher spot CGS yields than during the AER's proposed averaging period.

83. 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 was 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% with no ability to depart from that fixed value.

5.2 IPART Sydney Water decision

84. Since my March report IPART has issued its final decision on Sydney Water's regulated prices. This decision largely accepts the logic that I have set out in this and my other reports. The logic is well illustrated in the below quotes:

> *We note that there may be an inconsistency between using short-term data for the market-based parameters and using long-term data for the MRP and the equity beta. In particular, there may be an inversely proportional relationship between the MRP and the risk free rate. 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).* [13]

And

> *The risk free rate has been affected by market volatility and prolonged weak market conditions. The change in these factors has potentially created a disparity between the risk free rate (for which we use short-term average data) and the market risk premium (for which we use long-term average data). In the current market circumstances, there is some evidence to support the view that expectations for the market risk premium have risen as bond yields have fallen. However, it is difficult to measure these short-term variations in expectations for the market risk premium.*
>
> *To guide our decision making on the point estimate for the WACC we estimated the long-term averages of the risk free rate, debt margin, inflation adjustment and the market risk premium. We found that using these long-term averages, the WACC would have a midpoint of 5.6%. This midpoint is 100 basis points higher than the midpoint of the range we estimated for the WACC.*
>
> *In light of this, we consider it appropriate to use the upper bound of our WACC range, 5.6%, in setting prices for Sydney Water for the next 4 years. We consider that this WACC addresses the higher level of market uncertainty at this time, and stakeholders' concerns in relation to the way that market parameters are estimated.*[14]

85. This upper bound is 80bp higher than IPART's midpoint as is described in section 3.7 of my companion report, the WACC estimate chosen by IPART is almost exactly the same as would be calculated simply adopting IPART's historical average risk free rate (5.4%) and leaving all other parameters at their midpoint estimates (including the spot cost of debt).

5.3 UK regulators

86. As discussed in my March 2012 report, UK regulators do not, as a rule, use a prevailing estimate of the government bond rate as the risk free rate when applying the CAPM. I refer to my March 2012 report for more specific examples in this regard.

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13 IPART, Review of prices for Sydney Water Corporation's water, sewerage, stormwater drainage and other services , Final Report, June 2012, p.210

14 Ibid, pp. 198-199

5.4 US regulators

87. I noted in my March 2012 report that 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.

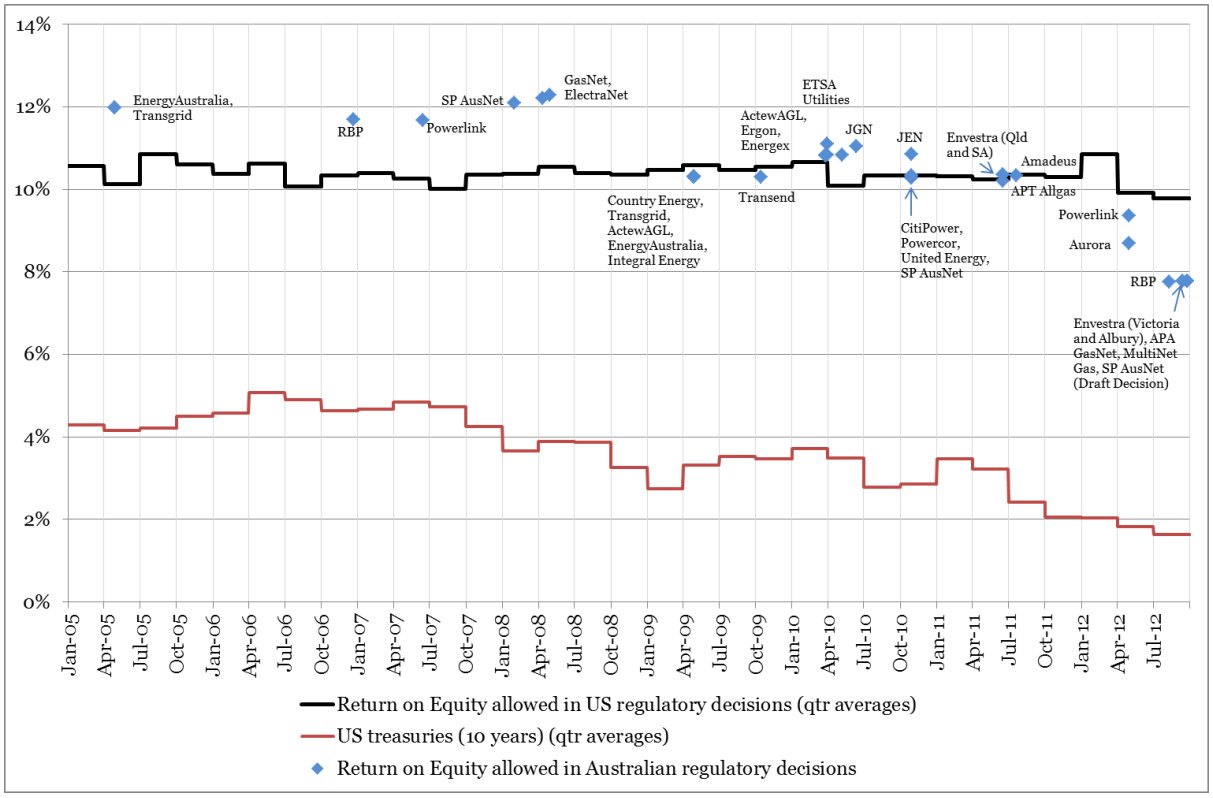
88. In my March report I presented a figure which illustrated the above by examining US decisions for regulated electricity transport businesses over the last 6 years – covering the periods before and after the global financial crisis. The figure showed that over this period the US government 10 year bond rates were volatile and were, at the time, around 300bp lower than (less than half) their pre-crisis peak (2.05% versus 5.07%). However, the allowed return did not move in line 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.

89. Figure 9 is an updated version of this figure. Adding the first three quarters of 2012 brings the five year average from 10.38% to 10.37%, suggesting that the average allowed return of equity remains very stable.

90. Superimposed over Figure 9 are the regulatory decisions from Figure 1 (decisions since 2005). It is clear that the AERs most recent decisions, in particular the draft decision relating to the Victorian distribution businesses and the final decision relating to RBP, are almost 3% below the return on equity allowed by US regulators on average. In examining this chart one should focus on the trend in the compensation for investment in each jurisdiction rather than the absolute level. The average compensation provided to equity investors in the US should be lower than for equivalent Australian decisions because US businesses are, on average, more lightly geared (less than 50%) than the AER's assumed 60% gearing level. The fact that, despite this difference in assumed gearing, recent Australian trends have led to much lower allowance in Australia is symptomatic of the problems I have identified with the AER methodology.

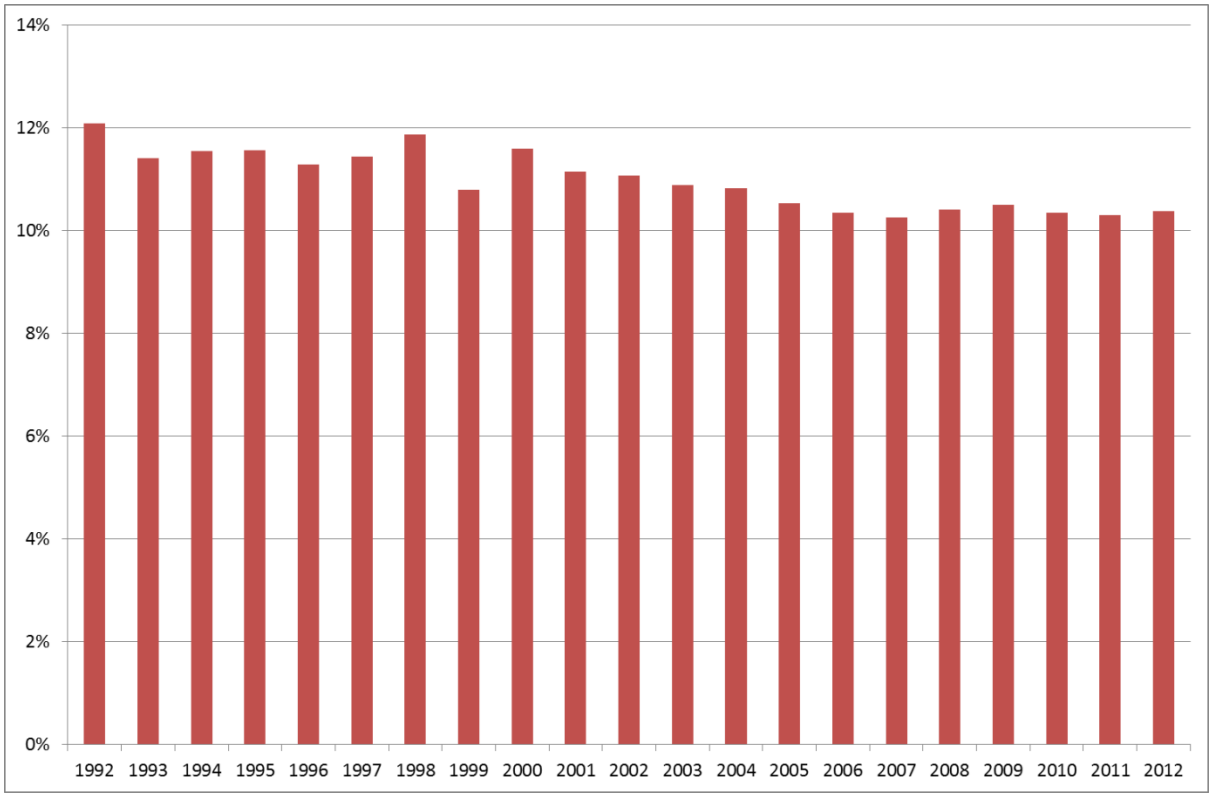
91. The same pattern of stability in the return on equity is true over an even longer time horizon as illustrated in Figure 10 (this is an update of Figure 14 from the March 2012 report). This figure the return on equity allowances for regulated US energy firms over the last 20 years, averaged across all regulatory decisions (average 10.94%).

Figure 9: US regulatory decisions over time broken into risk free rate and risk premium



Source: SNL Financial, Federal Reserve, CEG analysis

Figure 10: US regulatory return on equity decisions over 20 years – average per year



Source: SNL Financial, CEG analysis

92. I noted in the March 2012 report that 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 assessed in March 2012, I estimated the average ROE as 10.38% (11.01% over the last 20 years). The average equity premium was 6.57% and average 10 year US Treasury rate was 3.80%. This was based on DGM analysis performed by regulators. However, this was for an average gearing of 47.98%. Adjusting this to 60% gearing gives an average cost of equity of 12.36%.

93. For the US regulatory decisions Q1 2005 and Q3 2012 (inclusive), I estimate the average ROE as 10.37% (10.94% over the last 20 years). The average equity premium is 6.75% and average 10 year US Treasury rate is 3.61%. This is for an average gearing of 48.27%. Adjusting this to 60% gearing gives an average cost of equity of 12.35%, which is very marginally higher than that observed in the March 2012 report. [15]

[15] 12.35%=3.61%+(1-0.4827)/(1-0.6)*6.75%

6 Summary of update to cost of equity estimates

94. This section is effectively an update of the corresponding section in my March 2012 report, which also considered the consistency of each approach with the National Gas Rules and National Gas Law. The details of each methodology and its consistency with the Rules and Law and not reiterated here.

95. The four broad brush approaches to estimating the cost of equity include:

    - Methodology (i): Direct estimate for the firms of comparable risk to the reference services, using for example DGM analysis.
    - Methodology (ii): Direct estimate for the market portfolio with a separate process for estimating the adjustment for differences in risk between the market and the reference services.
    - Methodology (iii): Proxy the prevailing conditions in the market for funds by combining a historical average MRP with an internally consistent estimate of the (historical average) risk free rate;
    - Methodology (iv): Attempt to estimate a 'normal' level of equity risk premium associated with the reference services and add this to the prevailing spot estimate of the risk free rate (ie, the AER methodology).

96. The outcome of applying each of these methodologies is presented in Table 4 below, and can be compared to the outcome presented in the March 2012 report.

Table 4: Summary of results from each methodology

	Basis of estimate	Time period	Div. yield	DPS growth	Market return	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 from 11 September 2012. Price and CGS averaged over 8 August to 11 September 2012	multiple	2.50-6.60%	n/a	Jointly estimated			**10.4 – 14.1%**
(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	September 2012	5.34%*	6.6%	11.94%**	3.05%	8.89%	0.80	**10.16%**
(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 3.28%, resulting in a real cost of equity of 8.1%, or 10.66% assuming inflation of 2.5%	Average historical CGS between 1 July 1993 and 28 September 2012	n/a	n/a	11.86%	3.28% real 5.86% nominal	6.0%	0.80	**10.66%**
(iv)	**AER methodology** Prevailing CGS with a risk free rate in August 2012 of 3.06%, MRP of 6.00% and a beta of 0.80	Average September 2012	n/a	n/a	9.05%	3.05%	6.00%	0.80	**7.85%**

Source: Various, CEG analysis
** Dividend yield scaled up using a factor of 1.1125*
*** For completeness, I note that if the Lally adjustments to my DGM estimate are implemented then this figure is 11.24%. These adjustments are discussed in section 3.3.1 of my companion report "Response to AER Vic gas draft decisions".*

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7 Conclusion

97. Consistent with my March 2012 report, there is persistent and 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 historic lows. In these circumstances, it would be an error to estimate the cost of equity using prevailing CGS yields in combination with an historical average estimate of the market risk premium.

98. 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:

    - 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.
    - 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 (ie, a beta different to 1.0).
    - An historical average estimate of the risk free rate that is internally consistent with the historical average estimate of the market risk premium.

99. In my view, these approaches result in an estimate of the cost of equity that is at least 10.16%. This is more than 2% higher 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 (which results in a 7.85% estimate).