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Memorandum

To:	ActewAGL Distribution
From:	Dr Tom Hird
Date:	24 May 2014
Subject:	**Factors relevant to estimating a trailing average cost of debt**

1 Purpose

1. This memo addresses: the appropriate benchmark credit rating; the selection of historical third party fair value estimate for that credit rating; and the issue of whether extrapolation of that estimate to 10 years is required.

2 Credit rating

2. The AER guidelines sets a BBB+ benchmark credit rating based on the median credit rating for a sample of regulated utilities over the period 2002 to 2012.[1] The AER does not provide the basis for its calculation, however, I have replicated it and arrive at the same conclusion (namely that the median credit rating is BBB+ over the entire period). However, there has been a sustained drop in median credit ratings for the AER sample from A- in 2002 to BBB since 2009. This is illustrated in the below table (see Appendix A for more detail).

Table 1: Median credit rating for AER sample by year

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
A-	BBB+	BBB+	BBB+	BBB+	BBB+	A-	BBB	BBB	BBB	BBB	BBB

Source: Bloomberg, CEG analysis

3. I note that the median credit rating over the period from 2004 (i.e., 10 years prior to 2013) is BBB not BBB+. Therefore, if a single credit rating is to be applied it should be BBB.

4. In order to provide an illustration of the impact of choosing different benchmark credit ratings at different times in the past over the last 10 years I have estimated a

[1] See page 156 of the Explanatory Statement

time series of the cost of debt for each credit rating using different weightings to the RBA BBB and A fair value estimates.

5. In order to do this I have assumed a linear relationship between yields and credit ratings – such that a benchmark BBB rated bond has a yield that is above the benchmark A rated bond by three times as much as an A- bond and 1.5 times as much as the BBB+ rated bond. This allows A- and BBB+ credit ratings to be derived from the A and BBB published yield estimates as follows in Table 2.

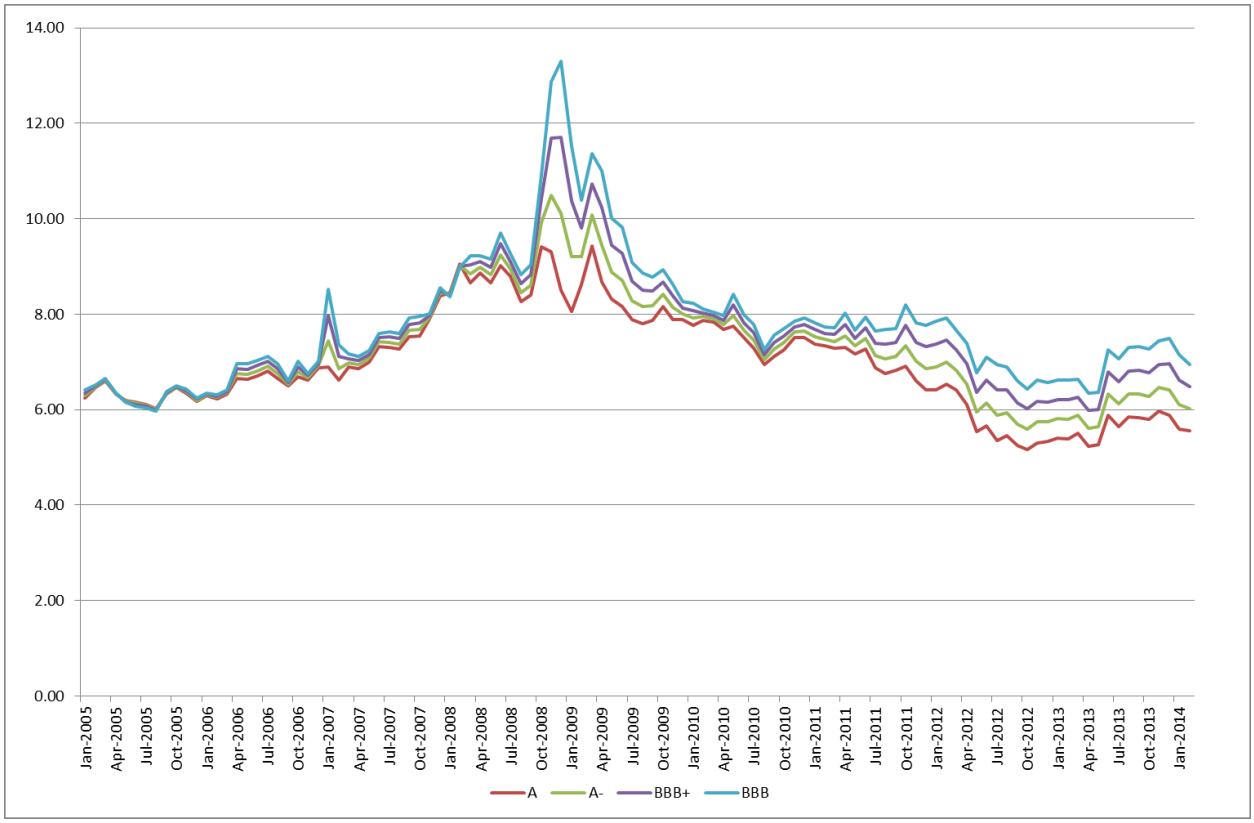
Table 2: Median credit rating for AER sample by year

Target credit rating	Weight to A curve	Weight to BBB curve
A	1.00	0.00
A-	0.67	0.33
BBB+	0.33	0.67
BBB	0.00	1.00

Source: Bloomberg, CEG analysis

6. When the weighting scheme in Table 2 is applied the time series in Figure 1 is derived.

Figure 1: Time series of RBA cost of debt by credit rating



Source: RBA, CEG analysis

7. It can be seen that varying the benchmark credit rating in the years 2008 and earlier will not have a material impact on estimated average yield. It is only really in 2009 and 2011 onwards that there is a significant departure between the different credit ratings. Cross comparison to Table 1 shows that over this entire period the benchmark median credit rating is BBB. Consequently, adopting a single benchmark credit rating of BBB throughout the period will give a similar estimate to adopting a BBB+ benchmark prior to 2009 and a BBB benchmark from 2009 onwards. This is illustrated in Table 3 below.

Table 3: Impact of credit rating on 10 year trailing average cost of debt at December 2013

Credit rating assumptions	Cost of debt
BBB throughout the entire period	8.06%
BBB+ up to 2008, BBB thereafter	7.98%

Source: RBA, Bloomberg, CEG analysis. 2004 data is based on Bloomberg BFV curve.

3 Choice of third party estimate

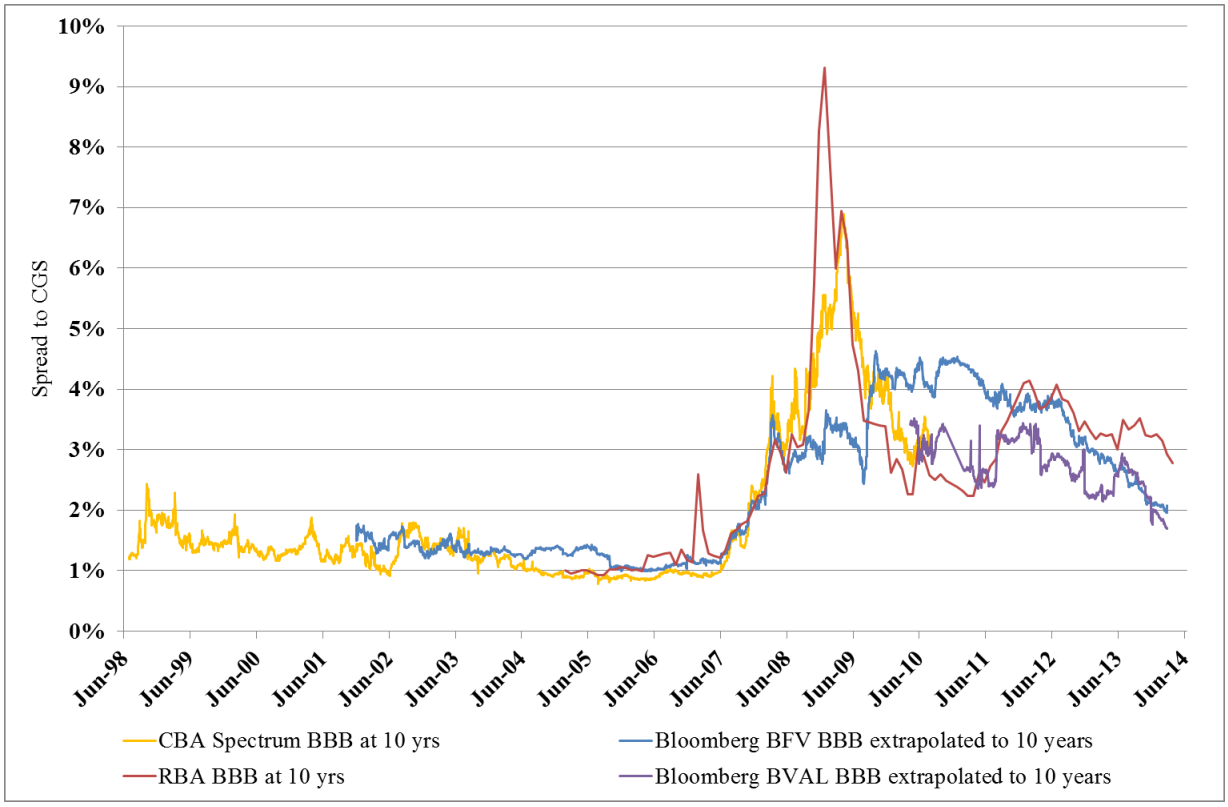
8. There are currently two sources of potential third party fair value estimates of the cost of debt for BBB rated corporates that also go back historically in the order of 10 years. These are yield curves published by Bloomberg and the RBA. Bloomberg publishes BBB fair value curve yield estimates going back more than 10 years but not always at the 10 year maturity. The RBA publishes a yield for a 'target maturity' of 10 years going back 9 years from December 2013. Bloomberg has recently introduced an alternative methodology for estimating BBB yields (its BVAL yield curves) but these have only been backdated to mid-2010.

9. Historically there also exists the potential to have regard to fair value curves published by CBASpectrum. The CBASpectrum curve is not currently available being discontinued in mid-2010. However, CBASpectrum estimates are a useful reference point against which to compare the behaviour of the other curves.

10. Figure 2 below shows a time series for each of these curves.[2]

[2] The Bloomberg BBB fair value estimate shown in the chart is, where necessary, extrapolated to 10 years as follows: until 22 June 2010, the BBB curve is extrapolated to 10 years based on the slope of the fair value curve closest to BBB in rating (ie, A, AA and AAA in order of preference); between 23 June 2010 and 31 October 2013, the BBB curve is extrapolated from 7 years to 10 years assuming an increase in DRP calculated as the average increase in DRP between 7 and 10 years for the Bloomberg AAA fair value curve over the 20 days to 22 June 2010; and since 1 November 2013, the BBB curve is extrapolated from 7 years to 10 years assuming no increase in DRP.

Figure 2: RBA, CBASpectrum and Bloomberg



Source: RBA, Bloomberg, CBASpectrum and CEG analysis

11. It is possible to make some observations about the performance of each of these curves by asking whether it has behaved:

    - as one would expect over the last decade; and
    - in a manner consistent with the other estimates of the cost of BBB debt.

12. Over the last decade we have had two periods of what can reasonably be referred to a 'financial crisis' the first relates to the period of late 2008 and early 2009 the intensity of which was at its peak following the bankruptcy of Lehman Brothers in September 2008 and the subsequent nadir of global stock markets in March 2009. The second distinct period of financial crisis relates to the period of heightened perceived risk of European sovereign government default and potential exit from the Euro currency area. This period dates from late 2011 to late 2012 and had its epicentre in June/July of 2012 – a period described by the RBA Governor Glen Stevens as follows:

    > *But, as we said at the last hearing, sorting out the problems in the euro area is likely to be a long, slow process, with occasional setbacks and periodic bouts of heightened anxiety. We saw one such bout of anxiety in the middle of this year, when financial markets displayed increasing nervousness about*

the finances of the Spanish banking system and the Spanish sovereign. The general increase in risk aversion saw yields on bonds issued by some European sovereigns spike higher, while those for Germany, the UK and the US declined to record lows. This 'flight to safety' also saw market yields on Australian government debt decline to the lowest levels since Federation.[3]

13. The RBA BBB curve has responded to each of these crises in the manner expected – increasing substantially. In doing so it has followed more or less the pattern of the CBASpectrum fair value estimate where both were published concurrently (although the RBA series peaked in December 2008 earlier and higher than the CBASpectrum series).

14. The RBA curve also behaved in a manner consistent with that of the Bloomberg and CBASpectrum curves prior to late 2008.[4] Subsequent to the financial crisis of 2008/09 the RBA and CBASpectrum estimates fall as expected. The CBASpectrum curve was discontinued in mid-2010, but the RBA curve does respond to the European sovereign debt crisis in the expected manner – rising materially in late 2011 and the first half of 2012 before falling again.

15. By contrast, the spread implied by the Bloomberg fair value (BFV) curve, having failed to rise in the 2008/09 crisis, finally does rise when that crisis is past its worst and when the other curves are falling. The BFV spread reaches levels of around 4.5% in late 2010 and then falls modestly during the lead up to the European debt crisis but fails to rise at all in response to that crisis.

16. The Bloomberg BVAL curve was only introduced in 2013 and has since been extended backwards in time by Bloomberg to mid-2010. As such, it does not include the 2008/09 crisis. The BVAL curve is the most erratic of the three curves published over the same time period – with large single day changes in estimated yields. For example, from 1 August 2011 to 3 August 2011 the extrapolated[5] BVAL spread rose from 2.47% to 3.18%.

17. The extrapolated BVAL curve reached a peak of 3.44% in December 2011 and then fell materially to an average of 2.98% in June/July 2012. This is the same period RBA Governor Glen Stevens refers to in the above quote and the period I examine in more detail in the Appendix B to this memo – demonstrating heightened risk

3 Reserve Bank of Australia (RBA) Governor (Glenn Stevens) statement to the House of Representatives Standing Committee on Economics (24thof August 2012).

4 In January 2007 the RBA spread to CGS rose dramatically (to around 2.5%) then fell dramatically the following month and this was not consistent with the Bloomberg or the CBASpectrum curve. It appears likely that this was the result of the temporary existence of a high yielding 8+ year maturity bond in the RBA dataset in that month. The 7 and 10 year spreads show the same magnitude jump but not the 5 year or 3 year spread. The number of bonds in the 8-12 maturity range jumps from 1 to 3 in January 2007 and then drops to 2 in February 2007. There is only 1 bond in the 6 to 8 year maturity in January 2007.

5 I have extrapolated the BVAL curve from 7 to 10 years in the same manner as the BFV curve.

premiums in that month by reference to a number of other indicators. The behaviour of the BVAL curve is inconsistent with expectations of how the risk premium on BBB debt would have behaved over 2012. Specifically, I would have expected any measured BBB risk premium to rise from December 2011 to June/July 2012 – not fall.[6]

18. The RBA makes similar observations:

> *The Bloomberg Australian dollar fair value curve appears to be overly smooth between early 2009 and late 2010. These measures did not increase as much as could be expected in early 2009, given that the global financial crisis was at its most severe at that time, and as was observed in other measures of Australian and foreign corporate bond spreads. Moreover, the Bloomberg spread measures remained elevated for an extended period of time between early 2009 and 2010, while credit spreads globally declined sharply following the introduction of extraordinary policy measures; this was especially true of BBB-rated bond spreads.*[7]

19. The RBA also compares its BBB estimates with the Bloomberg US BBB BFV curve and find that the US Bloomberg curve is more similar to the Australian RBA curve than to the Australian Bloomberg curve.

20. On the above basis I consider that the RBA fair value curve is the best third party source that can be relied on to estimate a cost of 10 year BBB debt over the 10 years to December 2013.

21. Finally, it is worth noting that even though the RBA and BFV estimates differ materially through much of 2008 to 2013 these differences tend to cancel each other out – with the RBA estimates being higher in some periods and the Bloomberg estimates higher in other periods. The net difference over the period January 2005 to December 2013 is only 8 basis points (0.08%). (I note that the same comparison is not available for the BVAL curve because of its limited history.)

6 It is unclear to what extent Bloomberg regards its backdating of this curve should be relied on (i.e., whether backdated yields are as reliable as yields published on dates after the first date the BVAL curve was regularly published).

7 RBA, New Measures Of Australian Corporate Credit Spreads, p.24

3.1 Methodology

22. The RBA methodology is well documented and transparent, and the results are publicly available online.[8] The RBA publishes yield estimates for BBB and A rated debt at maturities of 3, 5, 7 and 10 years at the end of each month.

23. The RBA's methodology estimates a yield at a particular maturity based on a weighted average of yields on a sample of bonds. The yield of each bond is weighted by the product of:

    - the face value of the bond, such that larger bond issues receive greater weight in the assessment of the benchmark spread or yield; and
    - the relative closeness of the bond to the target maturity. This second weighting is achieved by estimating a 'Gaussian kernel', or essentially a normal probability density function, centred on the target maturity. The weight given to each bond is a positive function of the height of the density function at that bond's maturity.

24. In order to be included in the RBA's sample of bonds used to estimate yields on BBB debt, bonds need to:[9]

    - be rated BBB-, BBB or BBB+ (a "broad" BBB credit rating) by Standard & Poor's, or if unrated have an issuer credit rating with Standard & Poor's in that band;
    - be a fixed rate bond;
    - be issued in Australia by an Australian company in either Australian dollars, United States dollars or in Euros (with foreign currency bonds converted into equivalent Australian dollar yields);
    - have raised more than $A100 million or its equivalent in foreign currency terms at the time of issue;
    - have a residual term to maturity of at least one year; and
    - not have any duplicate bond issues in the sample.

25. By contrast, the Bloomberg AUD BBB corporate curve relies solely on bonds issued in Australian dollars. Bloomberg's estimates are proprietary and, consequently, its sample selection criteria and methodology is not transparent. Bloomberg states that its fair value curves are constructed using a proprietary optimisation model.

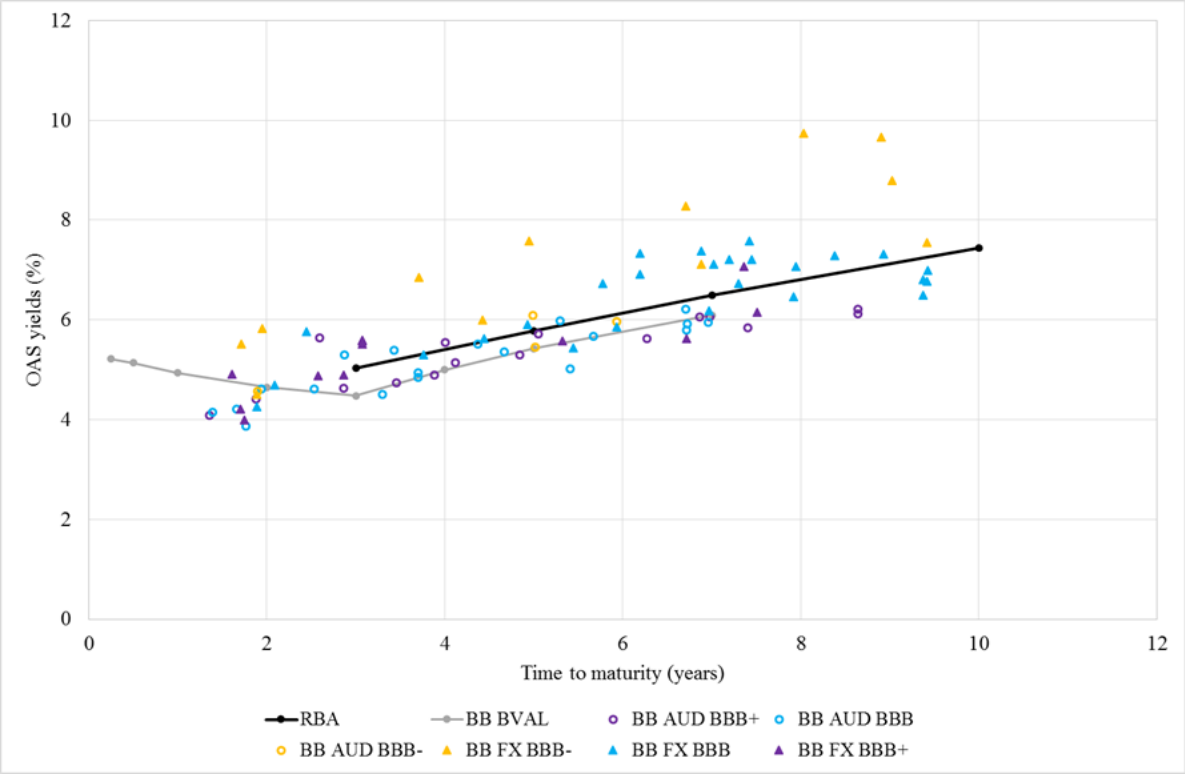
8 See New Measures of Australian Corporate Credit Spreads, RBA Bulletin, December 2013, available at http://www.rba.gov.au/publications/bulletin/2013/dec/pdf/bu-1213-3.pdf for a description of the RBA's methodology and http://www.rba.gov.au/statistics/tables/xls/f03hist.xls for its results.

9 RBA, *New Measures of Australian Corporate Credit Spreads*, December 2013.

Bloomberg publishes its yield estimates at 3 months, 6 months, 1 to 5 years and 7 years on a continuous basis.

26. Figure 3 shows the bonds which meet the RBA selection criteria over the 20 day period from 22 October to 18 November 2013, together with the RBA curve and the Bloomberg BVAL curve. It is clear from this figure that the Bloomberg BVAL curve tends to pass below most of the long dated observations during the relevant 20 day averaging period.

Figure 3: RBA and Bloomberg methodology



Source: Bloomberg, RBA, CEG analysis. RBA values are interpolated.

4 Extrapolating to 10 years

27. The RBA BBB 10 year spread to swap is estimated by taking a weighted average of the spreads on its full sample of BBB bonds. However, the weights used are highest for bonds close to 10 years and lower for bonds with maturities further away from 10 years. The weighting methodology employed by the RBA is a 'Gaussian kernel' where the weights applied to each bond essentially fall in line with a 'normal' probability density function centred on 10 years.

28. However, the weighted average maturity of the resulting estimate will not be equal to 10 years unless there are as many bonds in the RBA sample above 10 years as

there are below 10 years. In practice, this is generally not the case because the passage of time means all bonds, even if issued with a maturity of more than 10 years, eventually have a maturity that is less than 10 years but the opposite is not true (bonds issued with maturity of less than 10 years never have a remaining maturity of more than 10 years).

29. Presumably in order to allow researchers to take account of this fact, the RBA publishes both the 'target tenor' and the 'effective tenor' of each of its estimates. The 'target tenor' is the maturity at which the Gaussian kernel is centred and the 'effective tenor' is the resulting weighted average maturity of the bonds in the sample using the weights derived from the Gaussian kernel.

30. The average effective maturity of the 10 year 'target tenor' estimates from 2005 to 2013 is 8.7 years for the BBB estimates (and 8.9 years for A estimates). This means that, on average, the 10 year 'target tenor' estimate published by the RBA reflects the yield on bonds with an average maturity of slightly under 10 years.

31. I have adjusted for this by re-expressing the RBA curve based on effective tenor (rather than target tenor) and then extrapolating out to 10 years using the slope of the reported curve. This has a relatively minor impact on the trailing average (raising it around 18 – 21 bp).

32. The extrapolation process is relatively simple and can be mechanically implemented. The process used is illustrated below

- Let the published yield for a target tenor of 10/7 years be A%/B%;
- Let the associated effective tenors be "a" and "b" years.
- The implied slope of the yield curve is (A%-B%)/(a yrs-b yrs).
- Consequently, the extrapolated cost of debt to an effective tenor of 10 years = A%+(A%-B%)/(a yrs-b yrs)*(10yrs- a yrs).

33. For example, if A=9% and B=8% and a=9 years and b=6 years then the extrapolated cost of debt to 10 years effective tenor would be 9.33%=9+(9-1)/(9-6)*(10-9).

Table 4: Extrapolated vs not extrapolated 10 year trailing average to December 2013.

Credit rating assumptions	Cost of debt (not extrapolated)	Cost of debt (extrapolated)
BBB throughout the entire period	7.85%	8.06%
BBB+ up to 2008, BBB thereafter	7.80%	7.98%

Source: RBA, Bloomberg, CEG analysis. 2004 is based on Bloomberg data

34. The average slope of extrapolation is 13.3 bppa for the BBB curve throughout the period, and 11.9 bppa if the BBB+ benchmark is used up to 2008. This is broadly consistent with regulatory precedent. In its most recent final decision, for SP AusNet, the AER extrapolated the Bloomberg fair value curve from 7 year to 10 years with an increase in spreads to CGS of 34.6 basis points. This is 11.5 basis points per annum –close to the average RBA extrapolation described above.

35. The RBA fair value curve is calculated as the weighted average of a relatively small number of bonds, particularly at long maturities. This means that variance in the composition of these bonds over time is likely to cause variation in the slope of the RBA's fair value curve over time (and hence extrapolation using the method I have used). However, there is no basis to expect that the slope of the RBA fair value curve is deterministically biased upward or downward – such that averaged over 10 years these are likely to be relatively stable and accurate.

Appendix A: Benchmark credit rating

36. The AER has conducted analysis on a sample of regulated utilities (gas and electricity) over the period 2002 to 2013[10].

- APT Pipelines Ltd
- ATCO Gas Australian LP
- DBNGP Trust
- DUET Group
- ElectraNet Pty Ltd
- Energy Partnership (Gas) Pty Ltd
- Envestra Ltd
- ETSA Utilities
- Powercor Australia LLC
- SP AusNet Group
- SPI (Australia) Assets Pty Ltd
- The CitiPower Trust
- United Energy Distribution Pty Ltd

37. The AER does not provide the basis for its calculation, but concludes that the median credit rating over the periods 2002 – 2012 and 2002 - 2013 is BBB+, whereas the median credit rating in June 2013 is BBB. The AER's results are summarised in Table 5 below. The AER concludes that adopting BBB+ as a benchmark credit rating is consistent with recent determinations and the 2009 WACC review.

Table 5: Median credit rating of AER's sample

Measure	Energy Networks
Median credit rating (2002 – 2012)	BBB+
Median credit rating (2002 – 2013)	BBB+, negative watch
Median credit rating (June 2013)	BBB

Source: AER (Dec 2013 p. 156)

[11] Moody's Investors Service, Moody's maintains review for possible downgrade of SP AusNet and SPIAA's ratings, 01 Aug 2013. Available at: https://www.moodys.com/research/Moodys-maintains-review-for-possible-downgrade-of-SP-AusNet-and--PR_279138

38. I have replicated the AER's analysis by collecting historical S&P credit ratings for the stated benchmark sample from 2002-2013 in order to calculate a median credit rating in each year. Specifically, I have used the S&P long-term local issuer credit rating. The credit rating for each company in each year is summarised in the following table.

Table 6: Credit ratings 2002 – 2013

Credit ratings	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
APT Pipelines	N/A	N/A	N/A	N/A	N/A	N/A	N/A	BBB	BBB	BBB	BBB	BBB
ATCO Gas Australian LP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	BBB	BBB	BBB
DBNGP Trust	N/A	N/A	BBB	BBB	BBB	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-
DUET Group	N/A	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
ElectraNet Pty Ltd	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+	BBB	BBB	BBB	BBB	BBB
Energy Partnership (Gas)	N/A	BBB	BBB	BBB	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
Envestra Ltd	BBB	BBB	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB
ETSA Utilities	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-
Powercor Utilities	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-
SP AusNet Group	A	A	A	A	A	A	A-	A-	A-	A-	A-	BBB+
SPI (Australia) Assets	N/A	N/A	N/A	N/A	N/A	N/A	A-	A-	A-	A-	A-	BBB
The CitiPower Trust	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-	A-
United Energy Dist.	A-	BBB	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Bloomberg

39. I have used a conversion table to assign each credit rating a value, starting with 1 for BBB- and ending with 12 for AAA+. The values corresponding to the credit ratings in Table 6 are shown in Table 7. In the bottom row of the table I calculate the median credit rating across the sample.

Table 7: Credit rating values 2002 – 2013

Credit ratings	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
APT Pipelines	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	2	2	2	2
ATCO Gas Australian LP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	2	2
DBNGP Trust	N/A	N/A	2	2	2	2	2	1	1	1	1	1
DUET Group	N/A	1	1	1	1	1	1	1	1	1	1	1
ElectraNet Pty Ltd	3	3	3	3	3	3	3	2	2	2	2	2
Energy Partnership (Gas)	N/A	2	2	2	2	2	1	1	1	1	1	1
Envestra Ltd	2	2	2	2	1	1	1	1	1	1	1	2
ETSA Utilities	4	4	4	4	4	4	4	4	4	4	4	4
Powercor Utilities	4	4	4	4	4	4	4	4	4	4	4	4
SP AusNet Group	5	5	5	5	5	5	4	4	4	4	4	3
SPI (Australia) Assets	N/A	N/A	N/A	N/A	N/A	N/A	4	4	4	4	4	2
The CitiPower Trust	4	4	4	4	4	4	4	4	4	4	4	4
United Energy Dist.	4	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MEDIAN	**4**	**3**	**3**	**3**	**3**	**3**	**3.5**	**2**	**2**	**2**	**2**	**2**

Source: Bloomberg

40. I note that the median across all credit rating observations from 2004 (i.e., 10 years prior to 2013) is BBB, not "BBB+, negative watch" as per the AER's estimate in Table 5.

41. The AER's estimate appears to be based on taking the median of each year's median which is 2.5 (or exactly half way between BBB and BBB+). It is not clear why this value should be described as "BBB+, negative watch" rather than "BBB, positive watch". However, to the extent this measure (a median of annual median observations) is 'on a knife edge' the fact that the median of all observations is clearly BBB suggests BBB is a preferred estimate.

42. I also note that the two most highly rated issuers SPI (Australia) Assets (SPIAA) and SP AusNet Group both had significant credit rating support as a result of ownership by the Singapore Government. When this was diluted in 2013 credit rating agencies put SP AusNet and SPI on negative watch citing this dilution.

> *The likely downgrade of SP AusNet's rating to A3 would reflect our view that the high likelihood of parental support from SP -- and which has been incorporated in the rating through a 2-notch uplift -- would no longer hold following the divestment to a minority interest.*[11]

[11] Moody's Investors Service, Moody's maintains review for possible downgrade of SP AusNet and SPIAA's ratings, 01 Aug 2013. Available at: https://www.moodys.com/research/Moodys-maintains-review-for-possible-downgrade-of-SP-AusNet-and--PR_279138

43. Removing SP AusNet and SPIAA from the sample (or reducing their credit ratings by two notches) results in the median of annual median observations also falling closer to BBB than BBB+. Moreover, I note that Citipower, Powercor and ETSA are all part of the same corporate group and arguably should consistute only one observation in the above table. These are the 3 most highly rated entities in the table and condensing these 3 observations into a single observation would further reduce the median credit rating.

44. As such, if a single credit rating is to be applied over the entire 10 years this analysis suggests that a credit rating of BBB for energy (electricity and gas) network businesses is appropriate. Alternatively, if credit annual median credit ratings from the below table could be used.

Table 8: Median credit rating 2002 – 2013 for AER sample

Year	Value credit rating	Median credit rating	Median credit rating – SPN and SPIAA adj.*
2002	4	A-	A-
2003	3	BBB+	BBB+
2004	3	BBB+	BBB+
2005	3	BBB+	BBB+
2006	3	BBB+	BBB+
2007	3	BBB+	BBB+
2008	4	BBB+/A-	BBB
2009	2	BBB	BBB
2010	2	BBB	BBB
2011	2	BBB	BBB
2012	2	BBB	BBB
2013	2	BBB	BBB

*Source: CEG analysis. *Two notch downward adjustment to SP AusNet and SPIAA prior to 2013 to account for implicit support from Singapore Government.*

45. Moreover, I note that Citipower, Powercor and ETSA are all part of the same corporate group and arguably should consistute only one observation in the above table. These are the 3 most highly rated entities in the table and condensing these 3 observations into a single observation would further reduce the median credit rating. Indeed, it would be BBB in all years but 2002.

Appendix B: Case study of internal inconsistency

46. Market conditions influencing spot Australian government bond (Commonwealth government securities or CGS) yields at any given time will also be influencing spot expected return on the market (E[Rm]) and, therefore, the spot E[MRP] estimate (which is simply the difference between (E[Rm]) and CGS yields if CGS yields are used as the proxy for the zero beta rate in the CAPM). Moreover, there will be times when market conditions are such that very low spot CGS yields are associated with a normal (or even a heightened) spot expected return on the market E[MRP] – such that the spot E[MRP] estimate is heightened relative to average conditions.

47. In this appendix I address a specific set of market circumstances that provides a near perfect illustration of the problems with the AER's current methodology for setting the cost of equity. On the 24th of August 2012 the RBA Governor (Glenn Stevens) made a statement to the House of Representatives Standing Committee on Economics that included the following statement:

> *But, as we said at the last hearing, sorting out the problems in the euro area is likely to be a long, slow process, with occasional setbacks and* ***periodic bouts of heightened anxiety****. We saw* ***one such bout of anxiety*** *in the middle of this year, when financial markets displayed increasing nervousness about the finances of the Spanish banking system and the Spanish sovereign. The* ***general increase in risk aversion*** *saw yields on bonds issued by some European sovereigns spike higher, while those for Germany, the UK and the US* ***declined to record lows****. This* ***'flight to safety'*** *also saw market yields on Australian government debt decline to the* ***lowest levels since Federation****.* [Emphasis added]

48. As it happens, the Roma to Brisbane Pipeline (RBP), regulated by the AER, had its averaging period during the period described by RBA Governor Glenn Stevens as a 'flight to quality'. The RBP averaging period started on the 25 June 2012 and ended on 20 July 2012. The RBP decision's averaging period occurred over the particular time interval to which Governor Stevens was referring in his remarks:

> *This 'flight to safety' also saw market yields on Australian government debt decline to the lowest levels since Federation.*

49. Notwithstanding that the fall in CGS yields was a direct corollary of "*heightened anxiety*", an "*increase in risk aversion*", and a "*flight to safety*", the AER passed the full amount of this fall in CGS into an assumed lower cost of equity for RBP.

50. This is not the first time that I have written a report drawing the AER's attention to the averaging period and have attempted to explain why it is an exemplar of the

problems I have identified. In a report for the Victorian gas businesses[12] I made precisely the above observations.

51. I also drew the AER's attention to other contemporaneous market evidence suggesting that risk premiums during the RBP averaging period were unusually high.

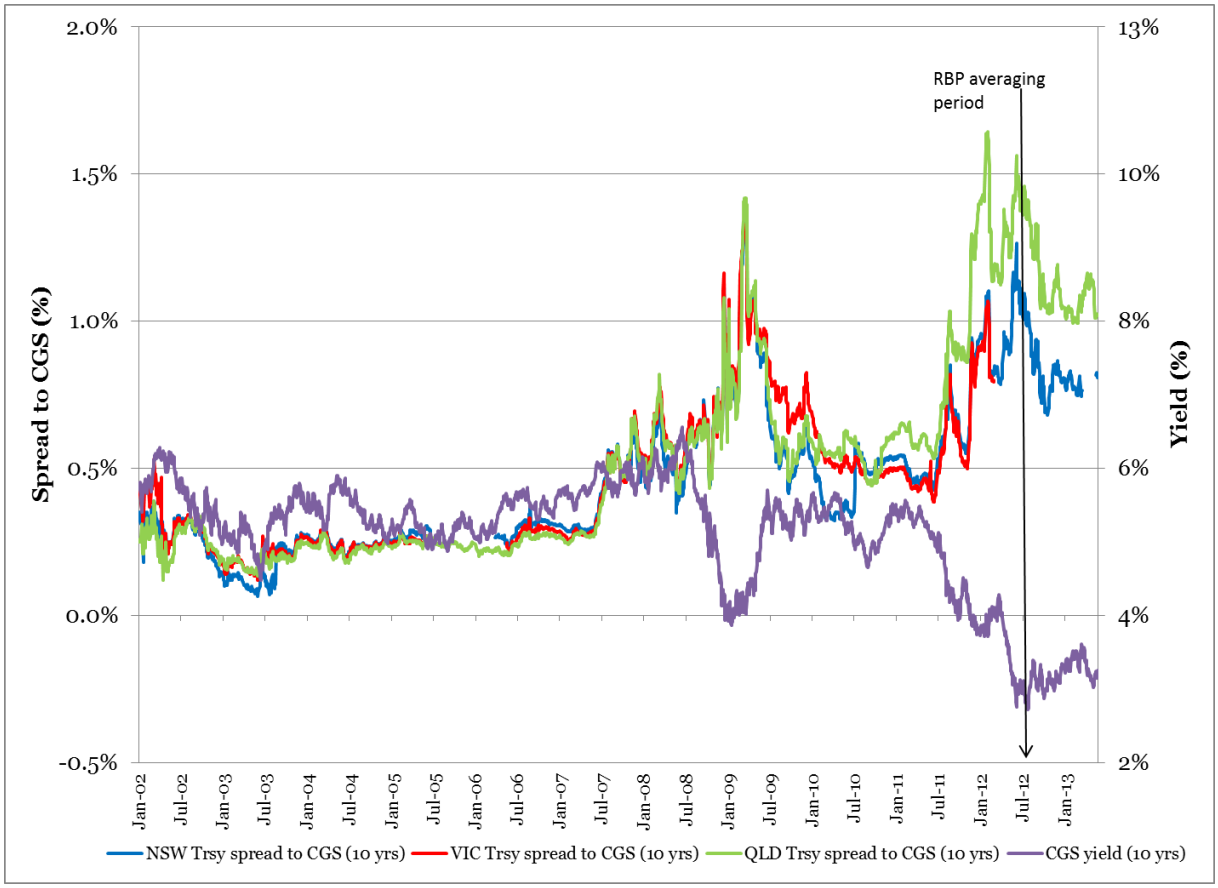
Required returns on low risk assets and the RBP averaging period

52. The following three figures illustrate spreads between CGS yields and the yields on other very low risk assets. These figures show that required returns on these very safe assets *did not* fall one-for-one with CGS yields during the RBP averaging period. This finding is in contrast to the AER's assumption that required returns on equity in regulated business *did* fall one-for-one with falls in CGS yields.

53. Figure 4 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 was at levels not seen since the midst of the 2008/09 financial crisis during the RBP averaging period. This figure provides ample evidence to the effect that required returns on low risk assets have not fallen in line with required returns on CGS.

[12] Response to AER Vic gas draft decisions, Internal Consistency of MRP and Risk-Free Rate, prepared by Competition Economists Group, November 2012.

Figure 4: Spread between 10 year state government debt and 10 year CGS



Source: Bloomberg, CEG analysis.

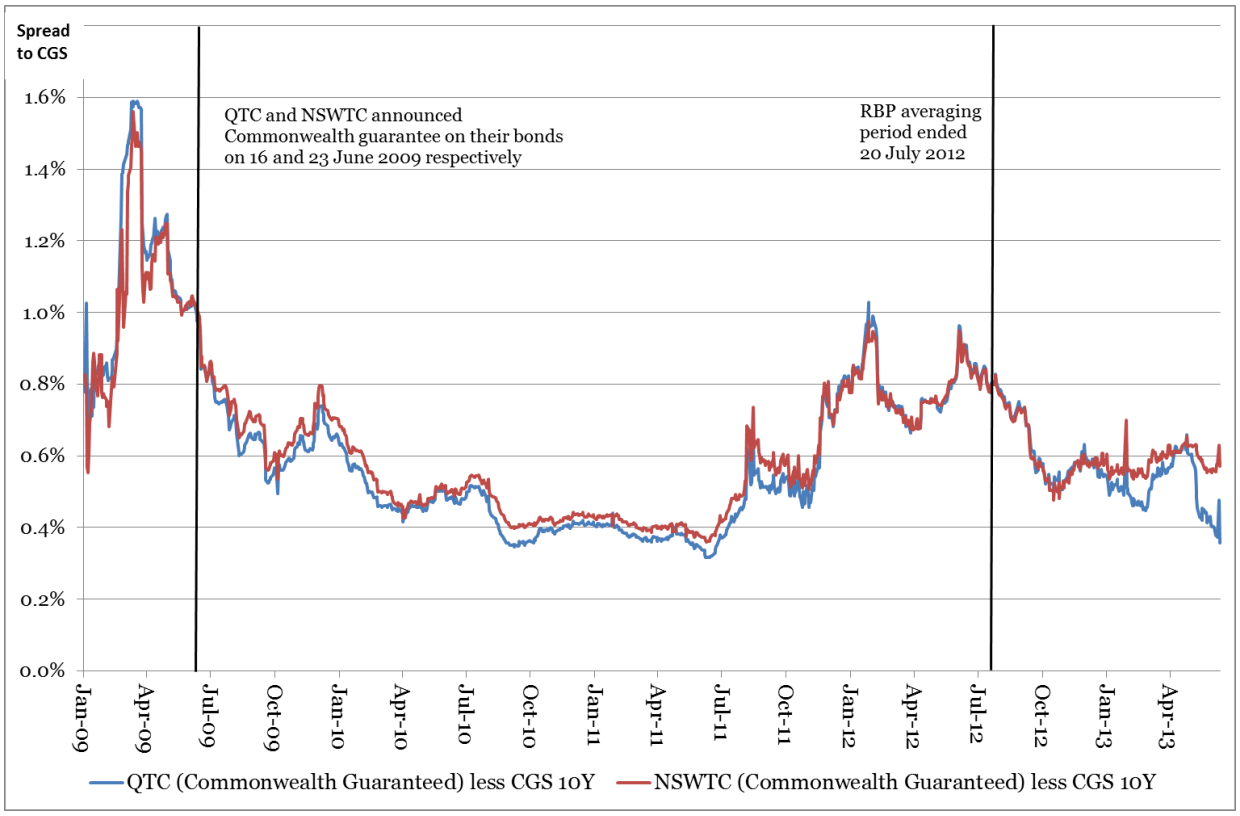
54. This is strong evidence that the forces driving down required yields on CGS are not driving down required yields on all other asset classes to the same extent. Put simply, if heightened demand for safe/liquid assets is causing risk premiums relative to CGS for the next most safe/liquid assets to rise by 70 bp (and in so doing trebling in magnitude), then risk premiums relative to CGS for the much riskier and much less liquid equity market must be rising by many multiples of this.

55. As a further illustration of this, I note that there are a number of state government bonds that are directly guaranteed by the Commonwealth Government.[13] Thus, they have an identical default risk to CGS. Despite this, even these bonds have traded at a heightened spread to CGS – presumably because they are perceived as less liquid than CGS or because international investors (who now account for nearly 80% of all CGS holdings, and for whom the share of overall holdings has increased steadily

[13] These bonds include a Queensland Government bond maturing in 2021, and a NSW Government bond maturing 01/05/2023. These are the longest dated Commonwealth Guaranteed state government debt on issue.

from around 30% in 2000)[14] have mandates that prevent them from owning debt other than that of a sovereign government. These spreads to CGS were at very high levels in the RBP averaging period. In other words, even the yields on Commonwealth Government guaranteed state government bonds did not fall one-for-one with CGS during the market circumstances surrounding the RBP averaging period. It is therefore preposterous to argue that the best estimate is that required returns on the equity market ($E[R_m]$) did so.

Figure 5: QTC and T-Corp Commonwealth guaranteed bonds

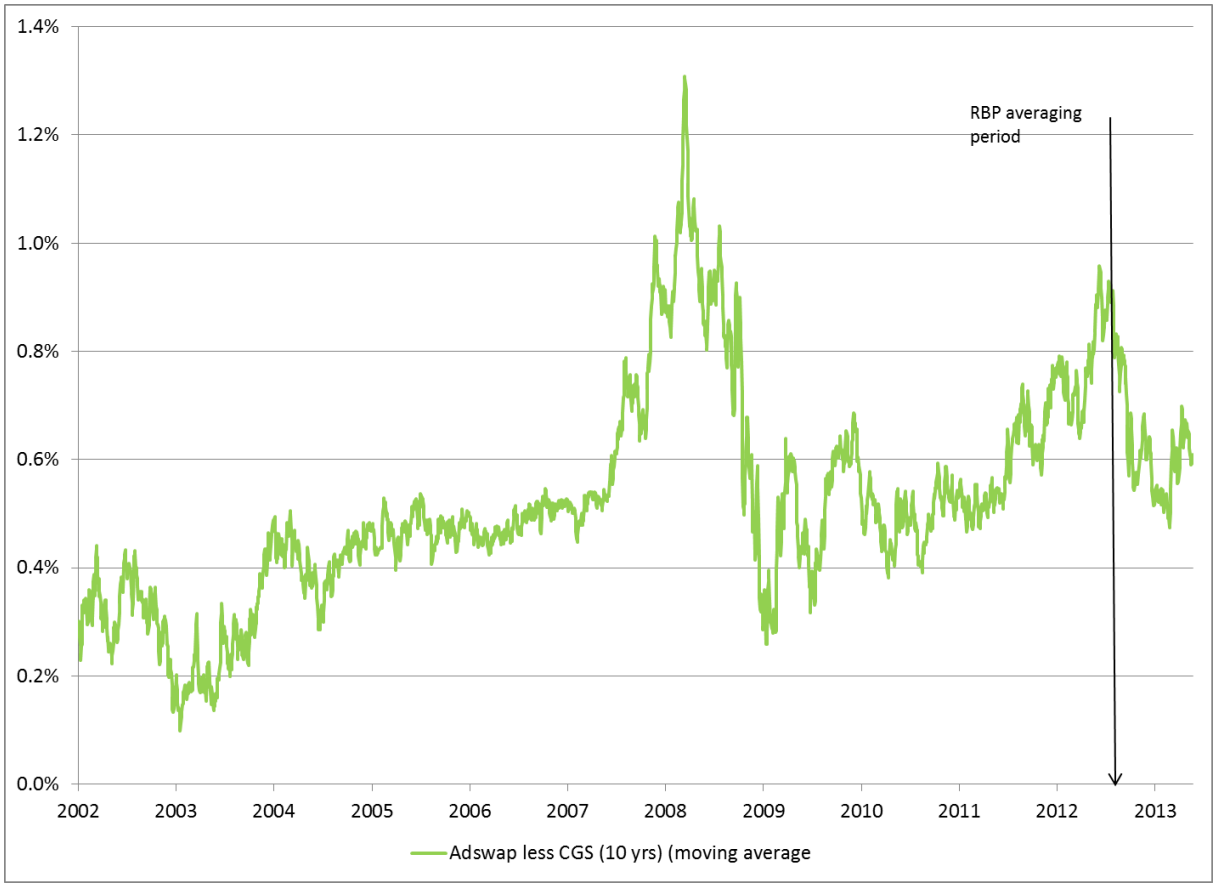


Source: Bloomberg, CEG analysis. QTC bond matures on 06/14/2021, NSWTC bond matures on 05/01/2023.

56. Another very low risk financial asset is an interest rate swap. Before 2008, these traded at a spread of around 40 bp or so – see Figure 6 below. The spread spiked in 2008/09 and then returned to levels above, but much closer to, pre GFC levels. Then, over 2011 and the first half of 2012, spreads to CGS rose to a new post 2008/09 spike – with its peak just before the RBP averaging period. This demonstrates, once more, that required returns on swap contracts did not fall one-for-one with the falls in CGS yields in the lead up to the RBP averaging period.

[14] See graph 4.3 from the RBA November 2012 Statement on Monetary Policy.

Figure 6: Spread between 10 year swaps and CGS



Source: Bloomberg and CEG analysis

Required returns on higher risk assets and the RBP averaging period

57. The dividend yield on listed equities can also be used to arrive at a direct estimate of the prevailing cost of equity using a simple dividend growth model. In what follows I use the method used by AMP Capital Investors. Prior to the GFC, this methodology was relied on by the AER in support of a position that the then MRP of 6.0% was generous:[15]

> *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*

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

could be added for imputation credits resulting in a 'grossed-up' Australian MRP of around 4.5 to 5.0 per cent.

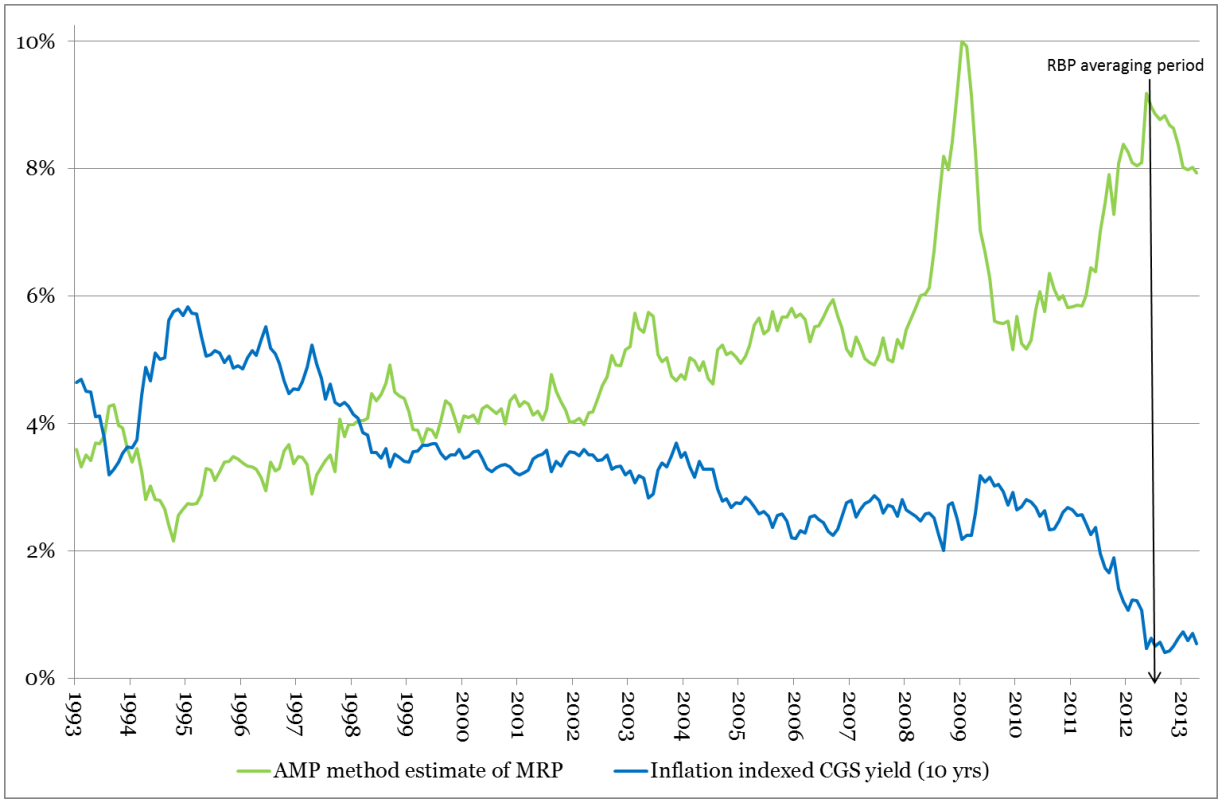
58. The AMP methodology involves approximating a cost of equity by adding the long term average real growth in GDP (as a proxy for long term average nominal growth in dividends) to the prevailing dividend yield for the market as a whole. This gives a 'cash' cost of equity. To convert this into a cost of equity including the value of imputation credits, the cost of equity needs to be scaled up by the relevant factor. In Figure 7 below I have used 3.9% per annum as the long run growth path for real GDP[16] and a scaling factor of 1.1125 to capture the value of imputation credits.[17] These assumptions are important for the level but not for the variation in the cost of equity estimate. I compare the cost of equity estimated in this manner with the real yield on CPI indexed CGS. When I do this I derive Figure 7.

16 The Australian Bureau of Statistics (ABS) publishes economic growth figures on its website starting in 1959. Here I 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. The average annual rate of growth in real gross domestic income between the December quarter 1959 and June quarter 2012 was 3.9%.

By way of comparison, equivalent real growth in the US since 1929, 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%. (The longest published series by the Bureau of Economic Analysis at the US Department of Commerce http://www.bea.gov/national/index.htm#gdp.)

17 This is based on the assumption of a corporate tax rate of 30%; and, that the value of imputation credits distributed (theta) is 35% of their face value, consistent with Australian Competition Tribunal precedent; and that 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 7: AMP method estimate of the E[MRP] relative to 10 year indexed CGS yields



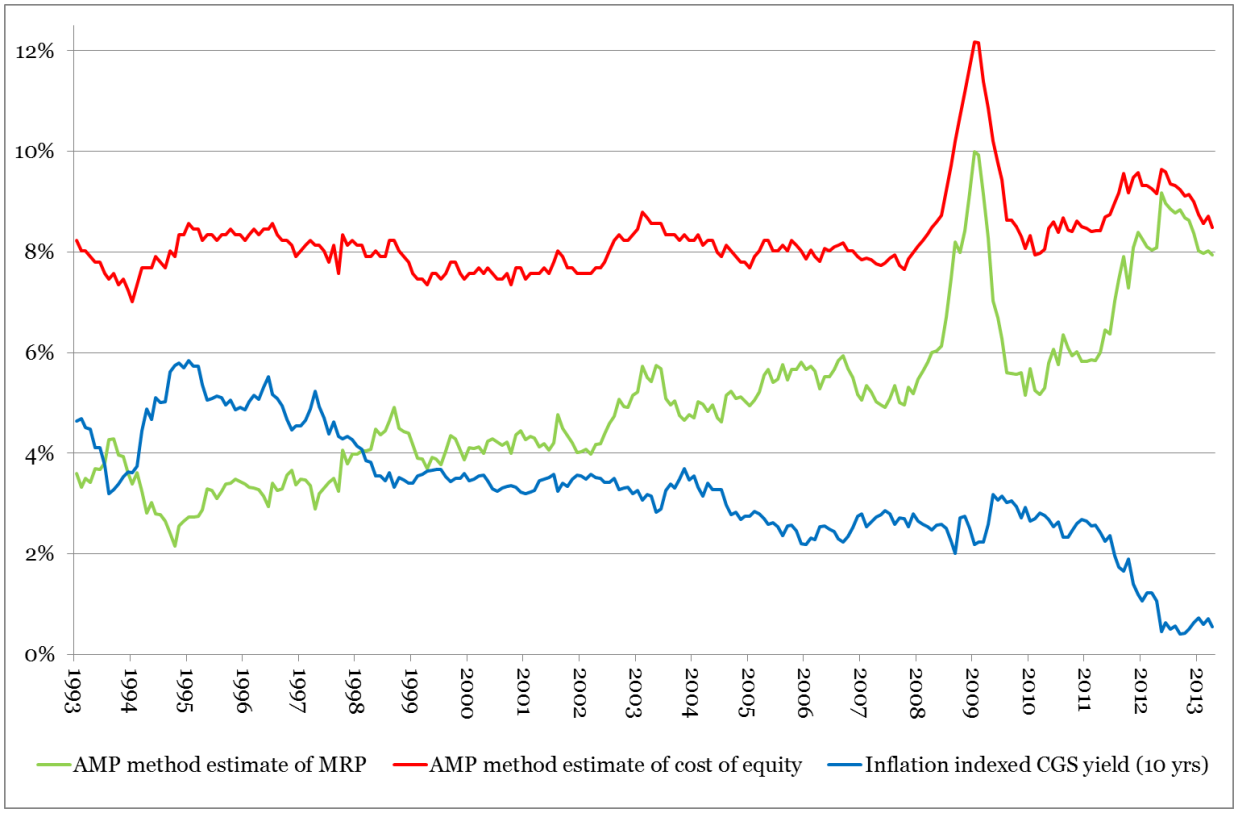
Source: RBA, CEG analysis

59. Notably, the fall in CGS yields in the lead up to the RBP averaging period has been associated with a more than offsetting rise in E[MRP] measured relative to CGS yields – such that the estimate of E[Rm] 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.[18]

60. The estimate of E[Rm], being the sum of the CGS and MRP time series is much more stable than either of these two time series – as shown below in Figure 8.

[18] Capital Research, *Forward Estimate of the Market Risk Premium: Update*, A report prepared for the Victorian gas transmission and distribution businesses: APA Group, Envestra, Multinet Gas and SP AusNet, March 2012; Figure 11, Implied MRP from Constant Dividend Growth model, net theta = 0.2625.

Figure 8: AMP method estimate of real E[Rm] and E[MRP] relative to 10 year indexed CGS yields



Source: RBA and CEG analysis.

AER statements on RBP period in the Victorian gas draft decision

61. In the following extended quote from the AER Victorian gas draft decision it is not obvious that the AER realised that the period in question covered the RBP averaging period. In this quote, the AER concedes that the spot CGS yield might be depressed by factors that do not depress required equity returns (such that E[MRP] measured relative to the spot CGS yield is heightened). However, the AER fails to acknowledge the implications for its choice of E[MRP] in the RBP averaging period.[19]

> *A definition of a flight to quality may include:*

[19] AER, *Access Arrangement draft decision SPI Networks (Gas) Pty Ltd 2013–17: Part 3*, September 2012, p. 7.

> Flight to quality episodes involve a combination of extreme risk- or uncertainty-aversion, weaknesses in the balance sheets of key financial intermediaries, and strategic or speculative behavior, that increases credit spreads on all but the safest and most liquid assets.[20]

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

> We saw one such bout of anxiety in the middle of this year when financial markets displayed increasing nervousness about the finances of the Spanish banking system and the Spanish sovereign.
>
> The general increase in risk aversion saw yields on bonds issued by some European sovereigns spike higher; while those for Germany, the US and the UK declined to record lows. This flight to safety also saw market yields on Australian government debt decline to the lowest levels since Federation. Meanwhile many European economies saw a further contraction of economic activity and share markets decline sharply.[21]

A flight to quality would not provide justification to depart from a prevailing estimate of the risk free rate. Demand for highly liquid assets is likely to increase in a flight to quality period.[22] This would, all else the same, push the yield on risk free assets down. These actions reflect changes in investor expectations and perceptions of the relative value of a risk free asset and would not undermine the risk free nature of that asset.[23]

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

> I therefore remain of the view that CGS yields are the most appropriate measure of a risk-free rate in Australia.[24]

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20 Caballero, R. and Kurlat, P., *MIT Department of Economics Working Paper No. 08-21, Flight to Quality and Bailouts: Policy Remarks and a Literature Review*, 9 October 2008, p. 1.

21 Glenn Stevens, *Opening Statement to the House of Representatives - 24 August 2012 - Hansard script*, p. 2.

22 Caballero, R. and Kurlat, P., *MIT Department of Economics Working Paper No. 08-21: Flight to Quality and Bailouts: Policy Remarks and a Literature Review*, 9 October 2008, p. 2.

23 Discussed further in section 4.3.2.

24 Reserve Bank of Australia, *Letter to the ACCC: The Commonwealth Government Securities Market*, 16 July 2012, p. 1 (RBA, *Letter regarding the CGS market*, July 2012).

> *This suggests that the RBA does not consider a flight to quality period makes CGS an inappropriate proxy for the risk free rate*. [The italicised text above represents AER drafting while the indented small text represents quotes from third parties which the AER reproduced.]

62. The AER's response involves an implicit assumption that the RBA's letter advising CGS as the most appropriate proxy for the 'risk free rate' was intended to advise that the CGS is the best proxy for $E[R_{\beta=0}]$ (the return on a zero risk (zero beta) asset) in the CAPM (i.e., to advise that it was not appropriate to adopt the 'Black CAPM'). It is not obvious to me that this is the case.

63. In any event, even if it were, the AER's conclusion in the last paragraph of this quote is beside the point. The point of concern is not whether CGS yields are the best estimate of the risk free rate. The question is how must the E[Rm] and, therefore, the E[MRP] be estimated relative to the CGS yield.

64. Moreover, the AER's focus on the need to establish a 'sustained flight to quality since the onset of the GFC' is misguided. There may, or may not, be a sustained flight to quality but the point, amply demonstrated in the above discussion, is that even if a very brief flight to quality occurs during a business's averaging period, then CGS yields will be pushed down even though the cost of equity not be similarly pushed down.

65. Failing to address the impact of a flight to quality on the E[MRP] in the RBP averaging period 'cordons off' discussion of the E[MRP] from E[Rm] and the required return on a zero beta asset. In effect, these are estimated over different time periods and gives rise to outcomes that diverge substantially over time and are far from commensurate with prevailing costs of equity for firms with the same degree of risk.