Estimating the regulatory debt risk premium for Victorian gas businesses

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1. Introduction

1. My name is Tom Hird. I have a Ph.D. in economics and 20 years experience as a professional economist. My curriculum vitae is provided separately. The Victorian gas businesses[1] have asked me to provide an opinion on the benchmark cost of debt and associated debt risk premium (DRP) to be applied in the regulation of the pipeline Victorian natural gas distribution and transmission businesses. My terms of reference are set out below.

Background

The legislative requirements for calculation of the DRP are contained in the National Gas Law and the National Gas Rules.

The National Gas Law requires that:

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

- *A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates.*

The National Gas Rules require that the rate of return on capital is:

- *To be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services; and*

- *In determining a rate of return on capital:*

  - *It will be assumed that the service provider meets benchmark levels of efficiency and uses a financing structure that meets benchmark standards as to gearing and other financial parameters for a going concern and reflects in other respects best practice; and*

  - *A well-accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well-accepted financial model, such as the Capital Asset Pricing Model, is to be used.*

For the calculation of the DRP this has been interpreted in previous regulatory decisions as meaning:

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[1] Envestra, Multinet and SPAusNet. APA.

- *It must be determined using the 'observed annualised Australian benchmark corporate bond rate for corporate bonds' or some proxy thereof;*

- *the bonds must have a BBB+ credit rating;*

- *the bonds must have a maturity period of 10 years; and*

- *It is the margin over the annualised nominal risk free rate and by implication is measured over the same period as the nominal risk free rate.*

Questions

The businesses are seeking your opinion on whether the Bloomberg fair value yield curves (extrapolated to 10 years using the methodology proposed by PWC in the report entitled "Estimating the benchmark debt risk premium") can be relied upon to reasonably meet the legislative requirements.

If the Bloomberg BBB rating fair value curve, (BFV), is not suitable, then please propose an alternative methodology for calculating the DRP that best meets the legislative requirements.

In either case, you should perform your analysis in respect of the 20 business days from 21st November to 16th December 2011.

In providing the advice, you should take into consideration the outcomes of recent AER decisions and relevant judgments handed down by the Australian Competition Tribunal.

2. The analysis in this report is based on market data over the period between 21 November 2011 and 16 December 2011.

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

   - Section 2 considers the benefits of relying on the estimates of a well recognised independent expert, such as Bloomberg, when setting the DRP;
   - Section 3 examines the fit of the Bloomberg BBB fair value curve to the yields on bonds issued by BBB to A- rated Australian companies in Australia and in Australian dollars. This is the data set that has been the primary focus of recent regulatory precedent where the debt risk premium has been assessed.
   - Section 4 considers the best estimate of the DRP in the context of including information on bonds issued by Australian companies in foreign currencies;
   - Section 5 provides a robust econometric methodology capable of using all of the available information to determine the best estimate of the DRP;
   - Section 6 examines other cross-checks on the reasonableness of the extrapolated Bloomberg fair value curve;

- Section 7 provides an assessment of the AER's rationale, as expressed in its Aurora and Powerlink draft decisions, for deviating from the use of the Bloomberg fair value curve; and
- Section 8 concludes.

4. 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.

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

Thomas Nicholas Hird

29 March 2011

2. Reliance upon an independent expert opinion

6. I consider that there are significant advantages in relying on an independent expert opinion, such as that of Bloomberg, when setting the DRP. This does not imply that the Bloomberg BBB fair value curve should be uncritically accepted. Rather, if it can be shown that the Bloomberg fair value curve provides a robust fit to the data, I consider that it would be poor regulatory practice to impose an alternative estimate that is formulated in a casual manner without an in depth understanding of all of the available information.

7. Second guessing the expertise of Bloomberg in gathering and interpreting information relevant to determine a fair value curve is a fraught exercise. To the extent the AER is less expert in this area than Bloomberg, it is reasonable that, in the absence of compelling evidence that the measurement of the DRP based on the Bloomberg curve would be unreasonable, a presumption should exist in favour of adopting Bloomberg's estimate.

8. In this regard it is relevant to note that interpretation of bond data is not straight forward. Bond yields might be affected by a number of factors, including:

   - the expected loss given the default of the issuer;
   - the size of the bond issue;
   - the growth options of the particular issuer;
   - the capital expansion plans of the issuer;
   - the liquidity of trading in the issuer's bonds; and
   - particular features of the bond (such as maturity, call features, credit rating, recognition of issuer's corporate brand, implied government backing etc).

9. It must also be kept in mind that the observations that the AER (and myself) work from are not actual bond yields but are estimates of bond yields if the bonds were to trade. Some estimates will be better than others depending on factors such as when the most recent trade took place in that bond (or other of the issuers' bonds) and the extent to which comparable bonds have recently traded. Moreover, some bond yield estimates may be more reliable than others. For example, a UBS yield estimate might be more reliable for a particular bond than an ABNAmro yield estimate because UBS trades in those bonds more frequently (or *vice versa*).

10. Properly synthesising debt market information is a difficult and complex task. To the extent that the AER is less expert in this task than Bloomberg then, other things equal, this provides a basis for preferring Bloomberg's estimate over those of the AER.

11. In summary, the Bloomberg fair value curve is built for and commercially provided to debt market participants who pay to use it for commercial purposes. In deriving its fair value curves Bloomberg has a great deal of information available to it – including, but not limited to, estimates of market prices of many hundreds of bonds across a range of

credit ratings and maturities (including but, again, not limited to the BBB to A- bonds charted in this report).

12. By comparison, the AER decisions in Envestra and APT Allgas gave equal weight to the Bloomberg fair value curve and a single bond issued by APA. This methodology was rejected by the Australian Competition Tribunal (the Tribunal) who substituted a DRP based on the extrapolated Bloomberg BBB fair value curve. In its recent Aurora and Powerlink draft decisions, the AER proposed to amend this methodology to include eight other bonds (such that the AER sample is now nine bonds) and to give no weight to the Bloomberg fair value curve.[2]

13. However, the consideration of nine bonds rather than one only partially addresses the risk that the sample will be unrepresentative and/or that the sample includes outliers that are that should not be included.

14. In fact, this is precisely what has occurred in the construction of the AER sample. The average DRP of the bonds in the AER's sample does not result in an estimate that is representative of the wider information available from the population of bonds.

15. This is at least partly because in constructing the sample the AER has shown a lack of expertise and understanding of the bond yield data that it has extracted from the Bloomberg database. This is discussed more fully in section 7 below but is best illustrated by examining the A- rated Coca Cola Amatil bond that the AER includes in its sample.

16. This bond has a reported DRP of around 1% which is by far the lowest of any long term bond rated AA+ or below (let alone those rated A-). However, closer inspection of the reason this bond has such a low yield demonstrates that its reported yield is set within Bloomberg by being (incorrectly) benchmarked against AAA and AA+ rated comparables (being Australian State Government debt and debt backed by the German government).

17. This may simply reflect a data entry error in maintaining the Bloomberg database. However, the important point to note is that Bloomberg when putting its A rated fair value curve together does not use the Coca Cola Amatil bond. By contrast, the AER gives this bond an 11% weight (ie, one out of nine) in its estimate of the benchmark DRP.

[2] See Aurora and Powerlink draft decisions.

3. Assessing the Bloomberg fair value curve against bonds issued in Australia

18. I explain in the previous section that there are persuasive reasons why it is desirable to rely upon, where possible, a fair value estimate made by an independent expert assessor of cost of debt information like Bloomberg. Nonetheless, in some circumstances different experts can hold divergent views, as was evident when Bloomberg and CBASpectrum provided very different estimates for fair values. I consider that it is reasonable to apply a 'sanity check' to the extrapolated Bloomberg BBB fair value estimate by comparing it to the yields of bonds with similar characteristics.

19. My terms of reference instruct me to test the accuracy of the Bloomberg BBB fair value curve as extrapolated to 10 years by PwC. PwC estimate the spread to CGS yields increases by 7.6bp per year as the Bloomberg fair value curve is extended from 7 to 10 years. This estimate is based on an examination of the increase in spreads on matched pairs of bonds (from the same issuer) that have maturities comparable to 7 and 10 years.[3]

3.1. Description of relevant bond data

20. I have identified the population of fixed and floating corporate bonds issued by Australian companies in Australian dollars where those bonds are rated between BBB and A- by Standard & Poor's. Using Bloomberg I have identified the population of fixed and floating corporate bonds issued by Australian companies in Australian dollars rated between BBB to A- on issue during the period from 21 November 2011 to 16 December 2011. This population consists of 145 bonds with terms to maturity that range from a month to over 20 years.

21. I have sourced data for these 145 bonds from Bloomberg and UBS. Bloomberg relies on several price series, including Bloomberg composite prices (BCMP), Bloomberg generic prices (BGN) and Bloomberg's evaluated price (BVAL). As described by Bloomberg, a BCMP yield is any sourced by Bloomberg from a set of quality contributors. A BGN yield is Bloomberg's assessment, using bond-specific information only, of a market consensus price for the bond.[4] Bloomberg will not estimate a BGN price if it is not comfortable that there is a market consensus on price. A BVAL price is Bloomberg's assessment, using bond-specific and/or general market information, of the price a bond might trade at.[5]

3 PwC, Estimating the benchmark debt risk premium, March 2012.

4 Bloomberg description of Bloomberg Generic Price (BGN) available in the Help Search function (search: Bloomberg Generic Price) under sub-heading Frequently Asked Questions

5 Bloomberg description of BVAL Final Price available in the Help Page for BVAL.

22. In respect of the Bloomberg data, I have relied on BGN yields where these are available, followed in order of preference by BVAL and BCMP. I believe that this is a fair reflection of Bloomberg's assessment of the reliability of these sources. However, I note that this choice of preference is not material to any of the conclusions in this report.

23. The yields obtained from UBS and Bloomberg have been annualised on the basis that fixed rate bonds pay coupons semi-annually and that floating rate bonds pay coupons quarterly. Spreads have been calculated as the difference between annualised yields and annualised CGS yields interpolated to the same maturity as the bond.

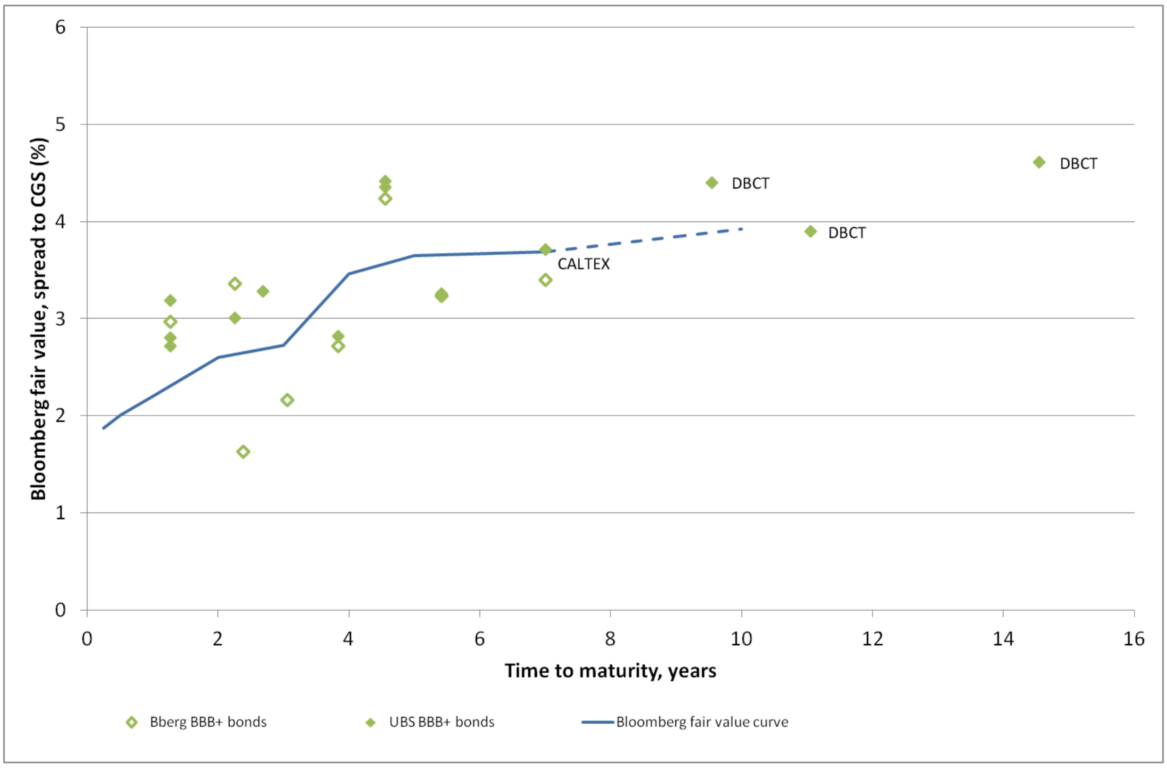
24. In the following sections I have relied on the maturity date reported by Bloomberg. This is of relevance in the context of callable bonds, since Bloomberg reports the final maturity date for callable bonds, whereas UBS rate sheets sometimes list the next call date under the maturity column rather than the final maturity of the bond. I explain in section 3.3.3 and in more detail at Appendix A the basis upon I consider that it is reasonable to interpret UBS yields as being expressed to maturity rather than to first call.

3.2. Analysis of relevant bond data

25. As a starting point, Figure 1 below sets out all bonds that meet the criteria described above and are rated BBB+ only. Bonds rated BBB+ are the logical starting point because the AER's benchmark bond from which the DRP relates to is a BBB+ rated Australian corporate bond with a maturity of 10 years.

26. In Figure 1 below and in all further charts in this report, the extrapolation of the Bloomberg BBB fair value curve is indicated by a dashed line for maturities beyond 7 years.

Figure 1: Bonds with maturity greater than one year rated BBB+



Source: Bloomberg, UBS, RBA and CEG analysis
Note: Data sourced as an average over 21 November 2011 to 16 December 2011

27. The quantitative evidence presented in Figure 1 suggests that the extrapolated Bloomberg BBB fair value provides a reasonable estimate for bonds rated BBB+. At the lower maturities the line passes through the middle of a 'cloud' of bonds, whereas at the higher maturities the Caltex bond and the three DBCT bonds all lie on or close to the curve.

28. It may be relevant to note that DBCT is an Australian infrastructure issuer rated BBB+. To the extent that one takes the view that infrastructure issuer's bonds are more relevant to an assessment of the BBB+ benchmark (as the AER has previously done to justify giving weight to the APA bond, but rejected by the Tribunal in its Envestra decision[6]) then these long dated bonds may be given more weight than other bonds (especially the floating rate bond maturing in almost exactly 10 years). We note that this does not appear to the approach adopted by the Tribunal, which has indicated that it does not necessarily place greater weight upon infrastructure issues.

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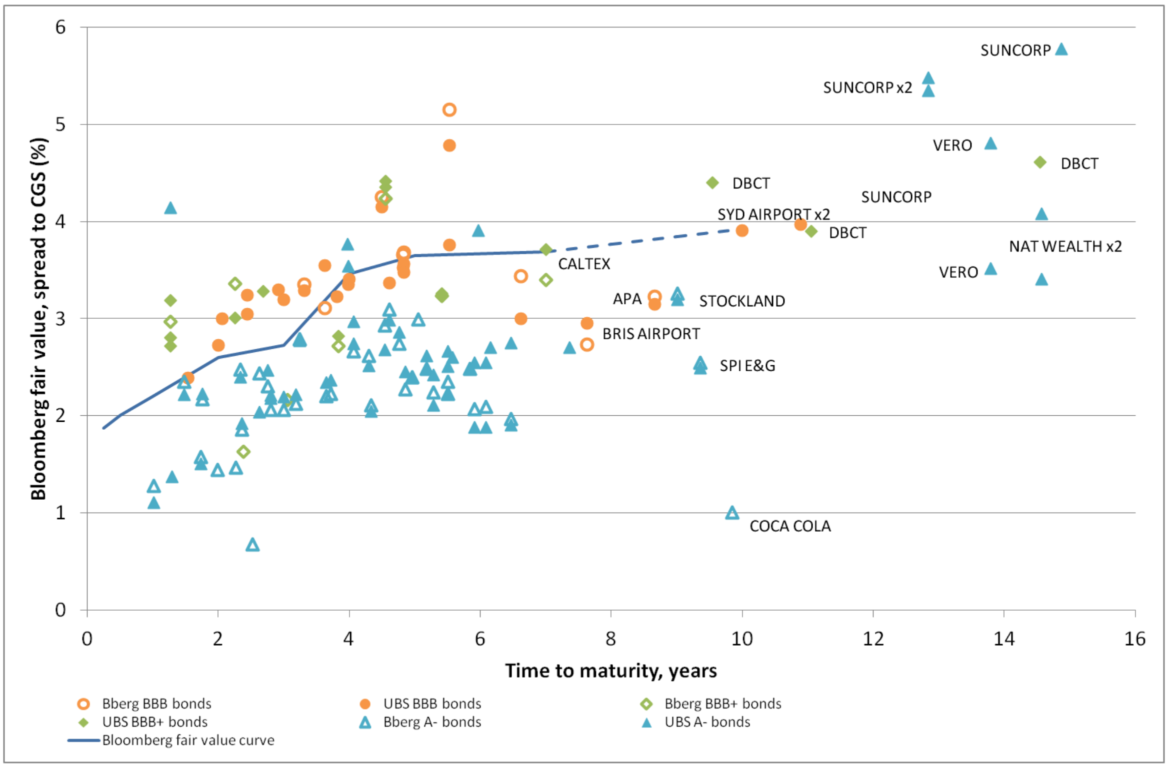
29. Figure 1 above indicates that the extrapolated Bloomberg BBB fair value curve is a good fit to the available data for BBB+ bonds. However, this remains a small sample of bonds. Following the process originally proposed by CEG and accepted by the Tribunal and now the AER, Figure 2 expands the selection of bonds to include fixed and floating corporate bonds issued in Australia in Australian dollars rated BBB to A-, with maturity greater than one year. This larger dataset provides a further cross-check on the reasonableness of the extrapolated Bloomberg BBB fair value curve, as well as providing a cross-check upon the BBB+ data used in Figure 1 above for that purpose.

Figure 2: Bonds with maturity greater than one year rated BBB to A-



Source: Bloomberg, UBS, RBA and CEG analysis
Note: Data sourced as an average over 21 November 2011 to 16 December 2011

30. Including bonds rated BBB and A- expands the number of bonds materially. However, it does not provide a basis for altering the conclusion that the Bloomberg fair value curve is a good fit to the available data.

31. The great majority of the A- bonds added have DRP's less than the Bloomberg BBB fair value curve (consistent with what one would expect). However, there are some A- bonds that are above the BBB fair value. Notably, three of the long-dated A- bonds that are the furthest below the curve are in the AER sample (Coca Cola, SPI E&G and Stockland).

32. Similarly, the majority of BBB bonds lie above the curve and most that are below the curve are only fractionally so – with the notable exceptions of the APA bond and the Brisbane Airport bond both of which are in the AER sample and are well below both the BBB fair value curve and most other BBB rated bonds with maturity of more than 4 years.

33. I do not consider that this wider population of bonds provides any basis upon which to conclude that the extrapolated Bloomberg BBB fair value curve is unreasonable. However, it does provide a basis for concluding that the AER sample of bonds is not representative of the wider population of bonds.

34. In this regard I note that two bonds in particular in the AER sample are clearly not representative and should be given little or no weight. These are the Coca Cola Amatil bond and the SPI E&G bond.

35. The SPI E&G issuer is part owned by the Singapore Government. The AER's experts, Oakvale Capital, stated in relation to a shorter dated SP E&G bond in an earlier period that:

> *During the averaging period the bond was attracting one of the lowest yields, in contrast to other A- bonds observed (as per the CEG report). The key feature supporting the bond was the parental support of the issuer's owners and the link to the Government.*[7]

36. The Coca Cola Amatil bond yield is clearly anomalous and CEG research, described in more detail in section 7.4.2 below, explains that this yield is actually being determined in Bloomberg based on comparisons with AAA and AA+ rated State Government and supranational debt.

3.3. Analysis of callable bonds

37. Call options allow the issuer of a bond the right to repay the principal of the bond earlier than the final maturity date. There are different types of call options, including those that allow discrete dates at which these options may be exercised and others that permit a call to be made at any point beyond a certain date.

38. The potential exercise of these options may mean that a lender may demand a higher interest rate on these bonds to compensate for the fact that they may be made worse off if the bond is called. For example, the issuer may be likely to call the bond if interest rates have fallen and, as a result, the interest rate on the bond is higher than prevailing rates in the market. However, calling the bond in those circumstances makes the lender worse off – because the lender ceases to earn above market interest rates on the bond.

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[7] Oakvale Capital, *The impact of callable bonds*, February 2011, p. 24

39. However, if a bond is 'make whole callable' this means that the issuer must pay the borrower a penalty if the bond is called. The penalty is calculated such that the borrower is compensated (or 'made whole') for lost interest as a result of the bond being called. For this type of bond a lender would not expect a higher interest rate due to the callable nature of the bond because the intention is that they would be compensated for losses as a result on the bond being called.

40. The AER appears to accept this contention in its Aurora and Powerlink draft decisions.[8] This reflects the advice of Oakvale Capital, which stated that call options on make whole callable bonds should not raise yields relative to the same bond with no call options (and may even depress yields as investors see some value from the potential that the bond may be called).[9]

41. It is also relevant to note that for many bonds issued before the global financial crisis with relatively low coupons/spreads, the ability of the issuer to now or in the future lower financing costs by exercising a call option is negligible.

3.3.1. Should callable bonds be excluded

42. I consider that the DRP should be assessed relative to the population of callable and non-callable bonds for the simple reason that businesses, including regulated businesses, prudently issue both callable and non-callable bonds. Moreover, the cost of equity has been estimated by the AER based on the observed equity betas for regulated businesses. To the extent issuing callable bonds lowers the cost of equity then removing the impact of the call option from the cost of debt involves an element of double counting (as it has already been captured in a lower cost of equity).

43. The AER has in the past not accepted this view and in its Aurora and Powerlink draft decisions it has excluded callable bonds from its assessment of the DRP.

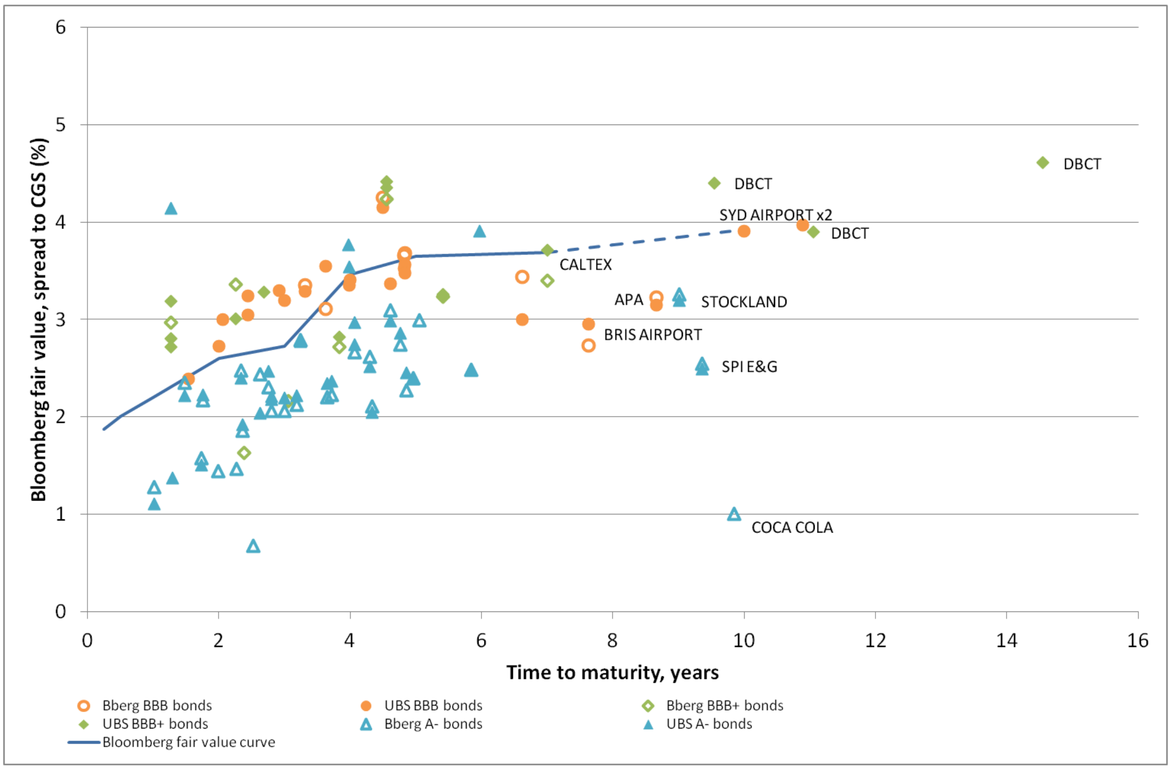
3.3.2. Impact of excluding callable bonds

44. Out of the total population of bonds in Figure 2, 28 bonds are callable but not make whole callable (for ease of exposition below, I call the class of bonds remaining after excluding callable bonds "non-callable" notwithstanding that they include make whole callable bonds). Figure 3 below is the same as Figure 2 above excluding all such bonds.

8 See for example: AER, *Draft decision: Powerlink transmission determination*, November 2011, footnote 573.

9 Oakvale Capital, *Report on the cost of debt during the averaging period: The impact of callable bonds*, February 2011., p. 7.

Figure 3: Bonds with maturity greater than one year rated BBB to A- (excluding callable but not make whole callable bonds)



Source: Bloomberg, UBS, RBA and CEG analysis
Note: Data sourced as an average over 21 November 2011 to 16 December 2011

45. This chart shows that the majority of non-callable bonds with more than 6 years to maturity have yields that are below the Bloomberg fair value curve. These are the bonds that the AER relies on in its sample of nine bonds (all of the named bonds in the above chart are in the AER sample except the Caltex bond which is less than 7 years maturity and the DBT bond which is more than 13 years maturity).

46. Examined in isolation and assuming that one accepted that the excluded callable bonds had no relevant information, the fact that the majority of non-callable bonds with 7 to 13 years maturity lie below the extrapolated Bloomberg BBB fair value curve might cause one to question the accuracy of that curve.

47. However, there are two reasons why, even if I restricted myself to this very narrow range of information, I reject this conclusion. First, for reasons set out above and in more detail below in section 7.4, I consider that the Coca Cola and SPI E&G bonds are either false observations (Coca Cola) or depressed by the implicit backing of the AAA rated Singapore Government. These bonds have the lowest yields and, once removed, there are more bonds on or above the extrapolated fair value curve than below it (four against three).

48. Second, looking at the whole population of non-callable bonds it is clear that the sample between 7 and 13 years is small and inconsistent with the wider population. For example, the BBB bonds in this sample have a lower average DRP than the BBB bonds with between 4 and 7 years to maturity. In fact, these shorter dated BBB bonds average 5.03 years to maturity and an average DRP of 3.79%. This compares to 9.30 years maturity and 3.48% DRP for BBB bonds in the AER's sample. Notably, the DRP calculated from the UBS yield for the Brisbane Airport bond is less than all but one of the other BBB bonds despite the Brisbane Airport bond having much higher maturity than these comparators.

49. In order to reconcile these facts one would have to assume that DRP fell as maturity rose. This is not consistent with what one would normally expect for investment grade bonds, what the AER has historically assumed in past regulatory decisions, nor is it consistent with the matched bond analysis of PwC which finds increases in DRP for the same issuer the longer the maturity.

50. This inconsistency between the long dated sample and the short dated sample illustrates why it is an error to simply reject the accuracy of a curve that is *drawn through all of the data* on the basis of a comparison of that curve with a *subset of the data* as the AER effectively does.

51. In this case the data for bonds maturing at less than 7 years provides information on where the benchmark yield is at those maturities. If one draws a curve through this data *and* long dated bonds then it may be the case that such a curve is higher than a curve drawn through only long dated bonds. However, this does not mean the curve is wrong. It simply means that the sample of long dated bonds are, once adjusted for maturity, not representative of the population as a whole. (I discuss in section 5 below how one can use mathematical modelling of bond yields to attempt to give proper weight to both short and long dated bonds.)

52. In any event, I do not believe that it is appropriate to restrict myself to this sample of bonds. One reason is that callable bond yields can be adjusted to remove any premium due to their callable nature (rather than simply excluding them outright). I perform this adjustment in the sub-section immediately below.

3.3.3. Adjusting rather than excluding callable bonds

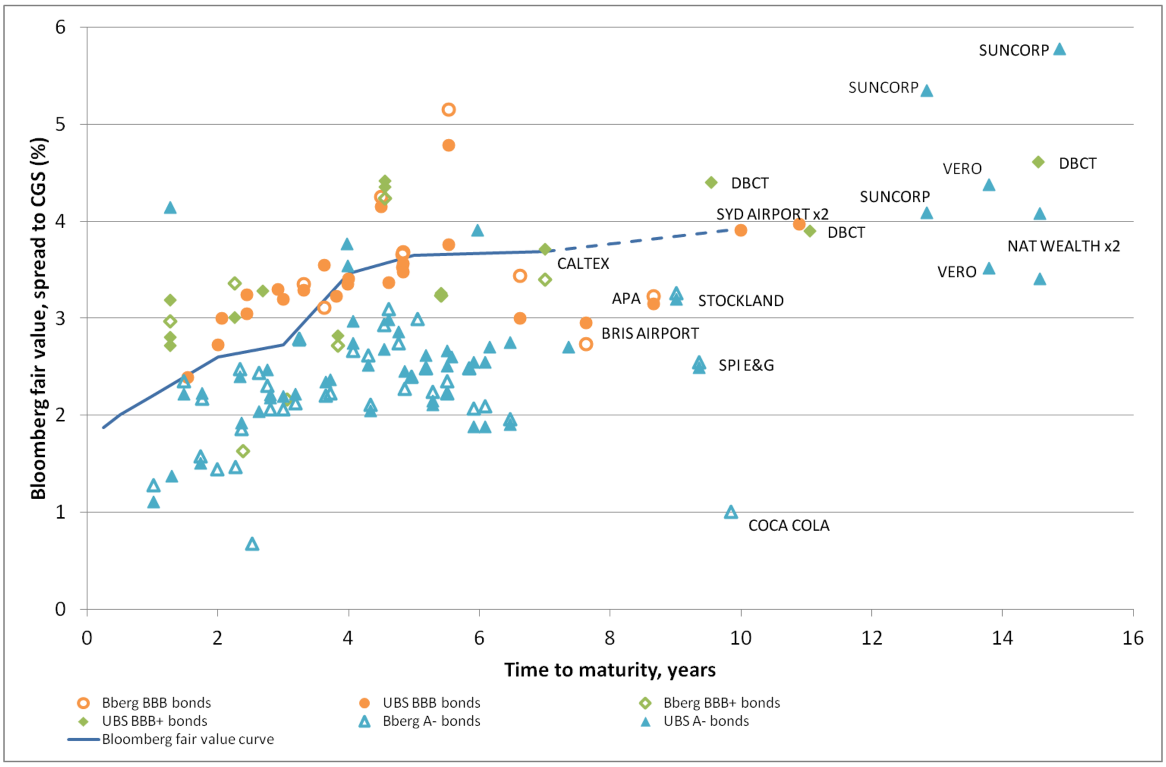
53. In the context of the appeal of JGN's access arrangement decision, the AER commissioned a report from Oakvale Capital about how to value bonds with non-standard features.[10] Oakvale suggested a methodology for adjusting the yield on callable bonds to remove any impact of callability.[11] This methodology involves identifying option premiums embedded in the callable structure via a pricing model

10 Oakvale Capital, *Report on the cost of debt during the averaging period: The impact of callable bonds*, February 2011.

11 Ibid, pp.13-16.

provided by Bloomberg. Adjusting the UBS spreads in Figure 2 using the Oakvale adjustment gives the following figure.

Figure 4: Bonds with maturity greater than one year rated BBB to A- (Oakvale adjustment applied to callable bonds)



Source: Bloomberg, UBS, RBA and CEG analysis. Maturity dates for callable bonds are final maturity date for the bond (i.e., not call date).
Note: Data sourced as an average over 21 November 2011 to 16 December 2011

54. Making the Oakvale adjustments does not materially change the pattern of bonds from that described in Figure 2.

55. The AER has also argued that UBS reports yield to call data rather than yield to maturity data for some callable bonds.[12] If correct, then this would mean that some of the callable bond yields would require a further adjustment in order to convert them from yield to call to yield to maturity.

56. I have tested whether the AER is correct by making the adjustment that the AER suggests is required to the DBCT bond that matures on 12 December 2022 but which had a call date listed in UBS as 12 December 2011. I have taken the trading margin

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[12] See page 217 of the Powerlink draft decision (second dot point).

from UBS's rate sheets for that bond on 2 December 2011 (300bp to swap) and treated it 'as if' UBS intended it to be a trading margin to call date (rather than to maturity date). Assuming this to be the case, I calculate the fixed equivalent yield to maturity on the bond would be 5.26%. This is equivalent to a DRP of 1.17% (details of this calculation are set out in Appendix A).

57. In my opinion, this is not a credible estimate of the yield to maturity/DRP on this bond. My reason for this conclusion is that there are two other DBCT bonds with similar maturities that, according to the AER logic, require no adjustment (because UBS correctly identifies the maturity date of these bonds as their final maturity date). All three DBCT bonds are labelled in the figures above with the bond requiring adjustment according to the AER's logic being the middle bond with a maturity of 11 years.

58. The two bonds not requiring adjustment have similar yields/DRPs to the pre-adjustment yield/DRP of the 12 December 2022 bond. However, they have dramatically higher yield/DRPs than the post adjusted yield on the 12 December 2022 bond. In fact, the adjusted DBCT bond has a yield/DRP that is more consistent with the yield on AA+ rated State Government debt than on a BBB+ bond. It is the incongruous nature of the adjusted DBCT bond yield/DRP relative to the other DBCT bond yields/DRPs that lead me to the conclusion that the AER is incorrect to claim that all UBS trading margin information relates to the call date rather than the maturity date.

4. Having regard to foreign bond data

59. As I set out at section 3 above, I consider that the information from Australian domestic bonds is sufficient to conclude that the extrapolated Bloomberg BBB fair value curve provides a reasonable estimate for at 10-year BBB+ benchmark. However, additional cross-checks of this conclusion can be made by comparing the extrapolated Bloomberg BBB fair value curve to yield information from bonds issued by Australian companies in foreign currencies. Given the sparseness of Australian dollar denominated long dated bonds in the A- to BBB credit rating it is important to consider the information that is available from other sources. This is especially the case if the AER's proposed exclusion of callable and subordinated bonds is employed.

60. It has been observed by both the AER and Tribunal that there appear to be few bonds close to the benchmark maturity of 10 years.

> *There is another point worth noting about the AER's methodology. It arises out of the difficulty in identifying a sufficient number of long term bonds to determine yield. The reason a 10 year bond was originally chosen was because, in the past, many firms favoured long term debt, albeit that it came at a higher cost, because it reduced refinancing or roll-over risks. The high rate was then hedged via interest rate swaps. That may no longer be the position. If not, the AER may need to be reconsider its approach in light of more current strategies of firms in the relevant regulated industry. Further, there seems to be little point in attempting to estimate the yield on a bond which is not commonly issued.*[13]

61. These comments were made in the context of the analysis of Australian dollar bonds issued in Australia. The implicit conclusion drawn in these comments appears to be that a maturity of 10 years might not be appropriate because it does not reflect the borrowing behaviour of regulated infrastructure businesses.

62. However, a significant body of evidence exists that indicates that regulated electricity and gas network businesses actually do issue long dated debt, with average time to maturity of greater than 10 years.[14] The seeming inconsistency of this with the above quote from the Tribunal can be reconciled by observing that a significant proportion of long-dated debt issued by these firms is not issued in Australian dollars but rather in foreign currencies.[15] That is, the assumption that regulated firms issue 10 year debt is not wrong. Rather, it is just that much of these firm's long term debt is issued in foreign currencies.

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13 Australian Competition Tribunal, Application by ActewAGL Distribution [2010] ACompT 4 (17 September 2010), para 72.

14 See section 2.1 of, CEG, Critique of AER Rule Change Proposal, A report for ETSA, Powercor and Citipower, December 2011.

15 See for instance, EUAARCC Rule Change Proposal, 17 October 2011, p. 14

63. I also note that the Tribunal's reference to hedging interest rate risk on domestic debt issues has a parallel in the hedging of currency risk on foreign denominated debt issues by businesses – a process that I discuss below.

64. It is notable that analysis to date on observed bond yields has not generally encompassed Australian bonds issued in foreign currencies. A possible explanation for this is that until quite recently, debate in this area mainly focused on which of Bloomberg or CBASpectrum (or most recently just Bloomberg) fair yields were the best fit to the observed data. Because these sources did not rely upon foreign currency bonds it seemed natural not to do so in analysing them.

4.1. Can yields on foreign currency bonds be expressed on an Australian dollar basis?

65. One barrier to the inclusion of foreign currency bonds in the determination of an Australian benchmark bond rate is that yields expressed in foreign currencies cannot be readily compared to Australian dollar yields. Future coupon payments and the return of principle must be assessed at their expected value in Australian dollar terms in order to determine the converted yield.

66. In practice, businesses that issue bonds in foreign currencies often immediately convert these bonds to Australian dollar equivalents using an instrument known as a "cross currency swap". For a bond issued in United States dollars, a business would enter into a swap agreement (or series of swap agreements) where it would receive an amount in US dollars that would cover its coupon and principle liabilities on the US dollar bond. In return, it would promise to pay its counterparty an amount denominated in Australian dollars.

67. By entering into a cross currency swap, the foreign currency bond is converted to an Australian dollar bond without currency risk to the issuer (beyond that inherent in the default of the counterparty to the swap). The converted yield reflects the market cost in Australian dollars of issuing the bond in US dollars. This is a common practice for Australian companies, including Australian regulated businesses. For example, CEG has been informed by ETSA that it raises US dollar debt which it then swaps back into Australian dollars in this manner.[16]

4.2. How does CEG convert foreign currency bond yields to Australian dollar terms?

68. The principles governing the pricing of cross-currency swaps are clear. The conversion is based on observable market instruments indicating investors' expectations about future currency movements.

[16] See, CEG, *Critique of AER Rule change proposal, a report for ETSA Utilities, Powercor and Citipower*, December 2011.

69. Bloomberg's "XCCY" function estimates cross-currency swap rates between any pair of currencies for given characteristics, such as maturity, coupon payments and payment frequency.

70. Given the number of foreign currency bonds issued in Australia (over 1000, with 20 days of data for each over the averaging period) it is not practicable to use this function to convert each bond on each day of the averaging period. Instead, tables of cross currency swap rates associated with a range of maturity-yield pairs were produced for each currency and interpolation over these points used to convert foreign currency yields into Australian dollar terms. The technique is explained in greater detail at Appendix B below.

4.3. Is inclusion of Australian bonds issued in foreign currencies consistent with the Rules?

71. Rule 87(1) of the NGR requires 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. The obvious question is whether a strategy that involves an Australian company issuing foreign currency bonds and swapping them back into Australian dollars using market swap rates constitutes a source of funding that is within 'the market for funds' as per 87(1).

72. In my opinion, the answer is that the cost of funding using such a strategy should be considered either part of the market for funds, or relevant to the cost in the market for funds, to the extent that:

- Australian businesses, including regulated businesses, engage in such funding strategies for a substantial portion of their debt; and/or
- The existence of such a strategy for both borrowers and lenders constrains the yields that can exist on bonds issued in Australian dollars.

73. Australian businesses do engage in foreign currency bond issues which are swapped back into Australian dollars. The evidence provided by ETSA and referred to above is an example. More generally, the fact that we identify many bonds issued by Australian companies in foreign currencies supports the conclusion that this is an important source of funding for Australian companies.

74. However, even if very few Australian companies issued foreign currency bonds, the potential for an Australian company to do so would place a cap on the interest rate that it was prepared to pay on a bond issued in Australia. Similarly, the potential for a lender to buy a bond denominated in a foreign currency and swap it back into Australian dollars places a floor under the yield that they will accept for lending to a similarly risky entity in Australia.

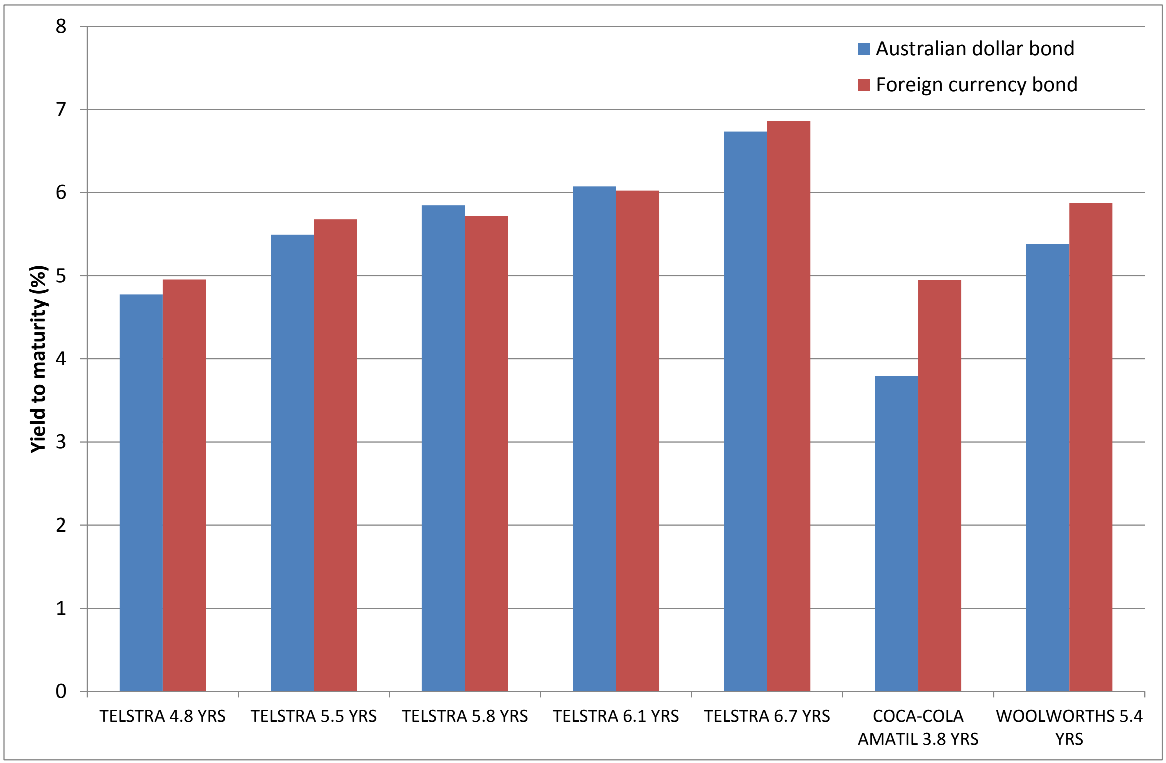
75. For these reasons, it is my view that the yields on foreign currency bonds issued by Australian companies are at least relevant to an assessment of the conditions in the market for funds from which Australian companies raise debt. As such, the cost of

funding using such a strategy can, at the minimum, be used as a cross-check on the analysis of Section 3 where we restrict ourselves to bonds issued in Australian dollars.

4.4. Are swapped foreign currency yields consistent with domestic yields

76. I have compared the swapped yield on the foreign currency bonds relied upon in this report (ie, those issued by Australian firms rated BBB- to A) with the yields on Australian dollar bonds issued by the same firm, with the same rating and with a term to maturity that is within half a year of the foreign currency bond. This comparison captures six bonds which are shown in Figure 5 below.

Figure 5: Comparison of yields on swapped foreign currency bonds and AUD bonds by the same issuer and with similar maturity



Source: Bloomberg, CEG analysis

77. This chart demonstrates that the yields are broadly comparable on bonds by the same issuer. Sometimes the swapped yield is higher than the AUD yield and sometimes it is lower but the differences are not significant. The only exception relates to the Coca-Cola Amatil bond where where the Australian dollar yield looks low compared to the swapped foreign currency yield. This not a surprise given the analysis in section 7.4.2 which demonstrates that there is a downward bias in Bloomberg's estimate of the Australian dollar yield for this bond.

78. I consider that Figure 5 provides strong evidence to suggest that the yields on swapped foreign currency bonds issued by Australian firms are likely to be a

reasonable estimate for how similar bonds would trade (or be assessed) if issued in Australian dollars.

4.5. Data analysis and conclusions

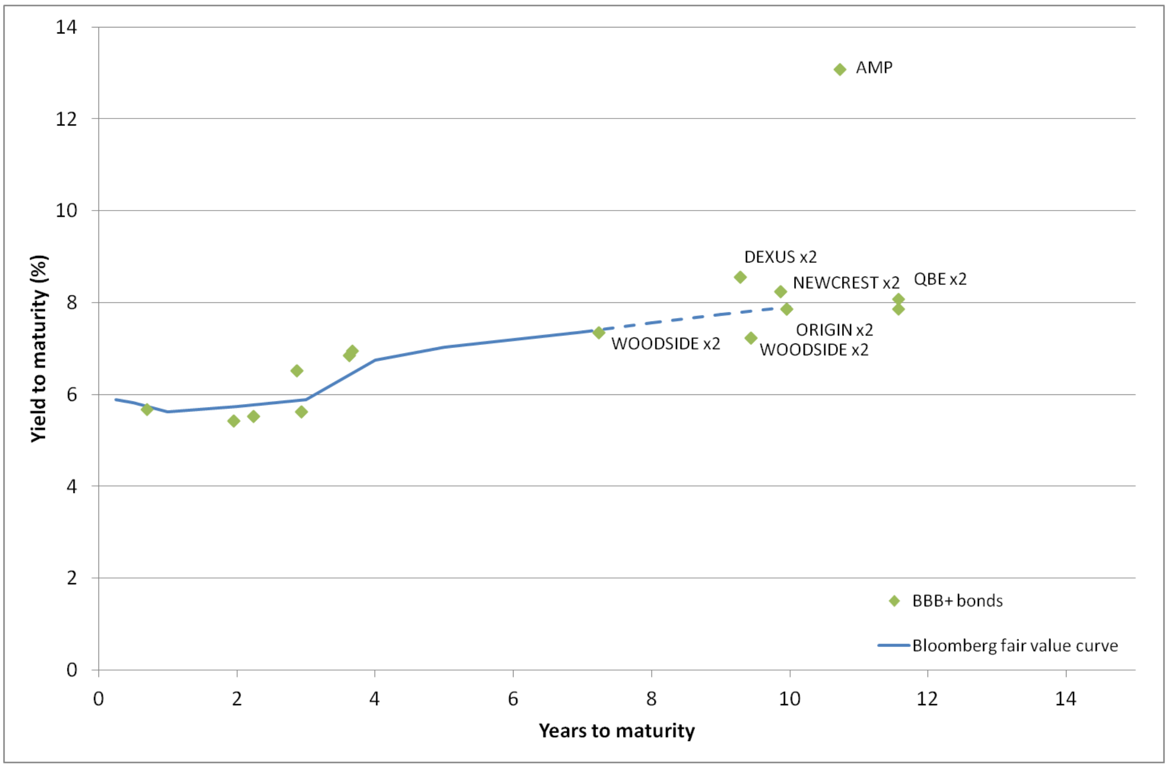
79. The following charts show the yields on bonds issued by Australian companies in a foreign currency once these are swapped into Australian dollars. These yield observations are compared with the extrapolated Australian BBB Bloomberg fair value curve. All of the data on foreign currency yields is sourced from Bloomberg as are the cross currency swap rates used to convert these into Australian dollars.[17]

80. I have chosen to exclude all callable bonds that are not make-whole callable from this analysis. This is not because I believe that callable bonds should be excluded from the analysis. Rather, I do so because the treatment of callable bonds is a point of contention between the AER and myself and I wish to make distinct the impact of including foreign currency bonds from the impact of including callable bonds. Moreover, as will become clear in the following analysis, there are sufficient non-callable foreign currency bonds such that one can draw clear conclusions from the additional information. It is, therefore, not necessary to rely on callable bonds, and any contested adjustments thereto, in order to reach a conclusion on the reasonableness of the extrapolated Bloomberg BBB fair value curve.

81. In particular, there are a sufficient number of long dated BBB+ and similarly rated foreign currency bonds issued by Australian companies to allow a robust check on whether the extrapolated Australian Bloomberg BBB fair value curve is consistent with this data.

[17] Foreign currency yields have been sourced from Bloomberg's BVAL pricing source.

Figure 6: Yields on BBB+ bonds issued by Australian companies in a foreign currency swapped into Australian dollars

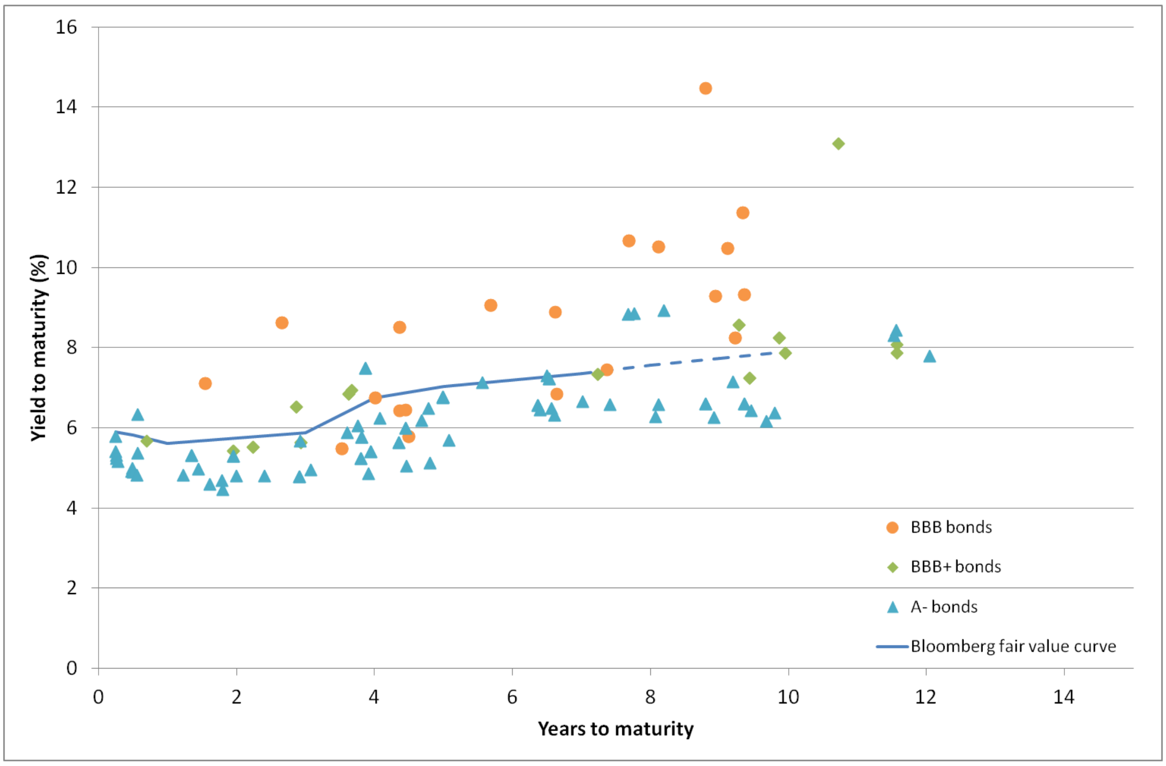


Source: Bloomberg and CEG analysis
Note: Data sourced as an average over 21 November 2011 to 16 December 2011 using cross-currency swap information as at 2 December 2011.

82. As can be seen in the above figure, the yields on BBB+ foreign currency bonds issued by Australian companies and swapped back into Australian dollars provides a very good fit to the extrapolated Bloomberg fair value curve, with the possible exception of the AMP bond.

83. Following the same logic as was applied in the context of the analysis of Australian currency bonds issued by Australian companies, I now extend the relevant sample to include A- to BBB rated bonds.

Figure 7: Yields on A- to BBB bonds issued by Australian companies in a foreign currency swapped into Australian dollars



Source: Bloomberg and CEG analysis
Note: Data sourced as an average over 21 November 2011 to 16 December 2011 using cross-currency swap information as at 2 December 2011.

84. In this case the foreign currency bonds show a clearer pattern than the Australian currency bonds, with:

- BBB+ bond yields (swapped into Australian dollar terms) sitting mostly on or very close to the extrapolated Australian Bloomberg BBB fair value curve (the curve);
- BBB bonds sitting mostly above, but sometimes below, the curve; and'
- A- bonds sitting mostly below, but sometimes above, the curve.

85. This foreign currency bond data provides support for my earlier conclusion, based on Australian currency bonds, that there is no basis for concluding that the extrapolated Australian Bloomberg BBB fair value curve does not provide a good fit for the available data.

5. Making explicit use of all bond data – constructing alternative fair value curves

87. Since the Tribunal's decision in ActewAGL[18] it has been common practice to assess a benchmark estimate for a 10-year BBB+ DRP by reference to reported yields across credit ratings between BBB and A-. The AER now also has reference to this range of credit ratings in assessing the DRP.[19]

88. Although the AER explains the inclusion of BBB and A- rated bonds in its sample with reference to their 'similarity' to the benchmark bond, this is not identical to the reasoning by the Tribunal when it considered the evidence from these bonds:[20]

> *In the Tribunal's view, if it were reasonable not to include A- and BBB bonds in the population (because they are not representative of BBB+ bonds), it was unreasonable for the AER not to consider whether useful information could be obtained from taking these bonds into account without including them in the population. That A- yields sat above BBB+ yields should have indicated to the AER that by use of its methodology it may not have selected the fair value curve most likely to provide the best estimate of the benchmark bond yield.*

89. In the quote above, the Tribunal is specific that the AER should have had regard to the yields on A- and BBB bonds, not because they were 'representative of' (or similar to) BBB+ bonds, but because they provided information that was potentially relevant to the assessment of the best estimate of the benchmark yield.

90. Similarly, the AER in its Aurora and Powerlink draft decisions includes in its bond sample only bonds with maturities of between 7 and 13 years. By doing so, the AER makes no use of the information that is embodied in bonds with shorter maturities, or the Bloomberg fair value curves.[21] In fact, the AER draft decisions for Powerlink and Aurora do not show charts of the type that I have shown previously – where all bond yield data, including at short maturities, is included in the chart.

91. For the reasons explained in the next section, this failure to properly use information on shorter dated bonds to assess the reasonableness of its long dated bond sample leads the AER into error. I have taken this information into account in the previous

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18 *Application by ActewAGL Distribution* [2010] ACompT 4 (17 September 2010)

19 See for example, AER, *Draft distribution determination: Aurora Energy Pty Ltd*, November 2011, p. 249

20 *Application by ActewAGL Distribution* [2010] ACompT 4 (17 September 2010), para. 63

21 It is the case that the AER includes a 'sensitivity' where it includes all maturities between 5 and 15 years. However, it makes no use of yields on bonds with fewer than 5 years maturity (which, for the reasons described in the following section leads it into error) and even the 5 to 15 year 'sensitivity' is very crude. The AER simply takes an average of all bond yields in this range and makes no adjustment for the fact that, with the exception of one 15 year DBCT bond, the weight of the sample is very much biased to bonds with lower maturities than 10 years – as can be seen from Figure 2 noting that the AER exclusion of callable bonds and subordinated bonds would exclude all the A- bonds with maturities greater than 10 years in that figure.

sections in a qualitative manner. Specifically, by placing all the yield data points, including at short maturity, on a graph and visually assessing whether the Bloomberg fair value curve is a good fit to that data. This approach ensures I do not incorrectly conclude that the 'true' fair value curve passes through a small sample of long dated bond yields when this conclusion would mean that such a curve must pass well below a larger sample of short dated bond yields.

92. I consider that this visual assessment is an appropriate basis on which to proceed for the purpose of testing whether there is a reason to depart from the Bloomberg fair value curve (which I consider is the appropriate default option for the reasons set out in section 2).

93. An alternative approach is the approach I adopt in this section, which is to use modelling techniques to estimate an alternative fair value curve based on data greater range of credit ratings. This approach is reasonable as an additional cross-check on the reasonableness of the Bloomberg fair value. It is also an appropriate approach if one decided that an alternative to the Bloomberg fair value curve was required.

94. Both of the approaches adopted by me are consistent with the Tribunal's reasoning. The Tribunal's reasoning would justify reliance upon bonds of any credit rating or maturity, where these provide information that is relevant to assessing the benchmark yield. However, trying to use information from, say, two year A bonds to inform the yield on a 10-year BBB+ benchmark bond entails a greater degree of complexity than simply comparing yields to the benchmark.

95. In essence the AER's current practice in forming a sample of only BBB, BBB+ and A-rated bonds with maturities of 7 to 13 years to estimate the benchmark amounts to an implicit assessment that any adjustments required to compare yields across these credit ratings and maturities will be small. The exclusion of other credit ratings/maturities from the AER analysis implicitly reflects an assumption that required adjustments for these differences are both large and uncertain (possibly why the AER has not also considered BBB- and A bonds, for example).

96. However, it is not necessary to assume negligible adjustments between adjacent credit ratings or maturities and set aside the large amount of information available at other credit ratings and maturities when these factors are capable of being assessed qualitatively (as I have done in previous sections) or estimated empirically. In this section, I use the functional form for bond yields introduced by Nelson and Siegel[22] as a framework for processing the bond yield evidence from a much wider sample of bonds than relied upon by the AER.

97. I estimate Nelson-Siegel yield curves on three alternative datasets of bonds, relying upon progressively larger datasets. In all cases I find results similar to the

[22] Nelson, C.R., and Siegel, A.F." Parsimonious Modeling of Yield Curves", *The Journal of Business*, Vol. 60, No. 4. (Oct., 1987), pp. 473-489.

extrapolated Bloomberg BBB fair value estimate and considerably higher than the results of the AER's methodology as proposed for Aurora and Powerlink. I consider that the application of this methodology provides compelling evidence that the preponderance of bond yield data is supportive of a 10 year BBB+ Australian corporate bond DRP consistent with the extrapolated Bloomberg fair value curve figure of 3.92% per annum.

5.1. Yield curve functional form

98. I have applied a yield curve functional form based on the method introduced by Nelson and Siegel. Nelson and Siegel first used their technique to approximate yield curves for US Treasury bills. This functional form is widely used in the empirical finance literature on yield curves. For example, Christensen et al. state:

> *Our new AF model structure is based on the workhorse yield-curve representation introduced by Nelson and Siegel (1987). The Nelson-Siegel model is a flexible curve that provides a remarkably good fit to the cross section of yields in many countries, and it is very popular among financial market practitioners and central banks (e.g., Svensson, 1995, Bank for International Settlements, 2005, and Gurkaynak, Sack, and Wright, 2006).*[23] [24]

99. The Nelson Siegel model provides a flexible functional form that allows for a variety of shapes one would expect a yield curve might take but which also limits the amount of computing power required to estimate the relevant parameters.

5.1.1. Nelson-Siegel method

100. The functional form used is as set out below:

$$Yield(t, rank) = \beta_{1,rank} + (\beta_2 + \beta_3)\frac{1 - e^{-t/\beta_0}}{t/\beta_0} - \beta_3 e^{-t/\beta_0}$$

101. Conceptually, parameter $\beta_{1,rank}$ can be interpreted as a long-term component (which never decays), β_2 as a short-term component (its loading starts nearly at 1, and then decays over term to maturity), β_3 as a medium-term component (its loading starts at zero, then peaks at some point, and then decays to zero again), and β_0 as a parameter characterising the speed of decay of the short-term and medium-term effects. Therefore, as the term to maturity increases, the estimated yield goes to

23 Christensen, Diebold and Rudebusch ,"The affine arbitrage-free class of Nelson–Siegel term structure models", Journal of Econometrics, Volume 164, Issue 1, 1 September 2011, Pages 4–20

24 See, also Robert R. Bliss. "Testing Term Structure Estimation Methods". *Federal Reserve Bank of Atlanta*, Working Paper 96-12a, November 1996; Elton, Edwin J. Martin J. Gruber, Deepak Agrawal,and Christopher Mann. "Explaining the Rate Spread on Corporate Bonds". *The Journal Of Finance*, Vol. LVI, No. 1 (February 2001).

$\beta_{1,rank}$ rather than to infinity as it would if I had adopted a linear or quadratic specification. The above parameters *rank* and t refer to the bond's credit rating and its term to maturity, respectively.

102. This functional form gives the curve the flexibility to take on many different shapes (from monotonically increasing to hump shaped) which allows the curve to be fitted to the data rather than enforcing a shape that may not be consistent with the underlying data.

103. I use this specification in order to estimate the yield curve for bonds that all have the same credit rating. However, by allowing β_1 to vary across credit ratings. By doing so, I am effectively assuming that the shape of the curve is the same for all credit ratings but the level of the curve is different.

104. I consider that this is a reasonable assumption – especially for credit ratings that are similar to each other. That is, I consider that it is reasonable to assume that the underlying shape of the A- and BBB fair value curves is very similar to that of the BBB+ curve. By fitting a different value for β_1 for each credit rating, I am able to use data from A- to BBB in order to inform the shape of the yield curve.

105. I assume that $\beta_{1,A} \leq \beta_{1,A-} \leq \cdots \leq \beta_{1,BBB-}$. With this adaptation, I estimate β_0, β_{1rank}, β_2, β_3 to minimise the sum of squared errors between the fair yield curves and the reported yield data.

106. It is worth noting that the regression above is non-linear due to the inclusion of the speed-of-decay parameter β_0, and many statistics used to evaluate goodness of fit of a linear regression are not suitable for this model.

5.1.2. Yield to maturity versus zero-coupon yield curve

107. I first perform my analysis using yield to maturity (YTM) and term to maturity of each bond as the input data. This results in fitted YTM curves consistent with the Bloomberg fair value curve and consistent with the standard way in which bond data has been analysed in regulatory proceedings to date.

108. I then perform analysis using bond prices, terms to maturity, and coupons as the input data. This allows me to estimate a zero-coupon yield curve (a.k.a. the "spot rates curve" or "spot curve"). A point on a zero coupon yield curve, say at 10 years, represents the discount rate that should be applied to a payment that will be made in 10 years – with no payments between now and then. By contrast, the 10 year point on an YTM curve is the discount rate that, if applied to the final return of principle and all coupons paid before then, will give the present value of the bond's future payments equal to its assessed price.

109. The zero coupon yield at 10 years maturity is not directly comparable to the 10 year yield to maturity from the extrapolated fair value curve – with the latter being an average discount rate applied to coupons and principle while the former is the discount

rate applied to 10 year principle only. However, a comparable yield to maturity value can be calculated from the zero coupon curve by solving for the fixed coupon rate that would be necessary for a ten year bond to trade at par. I perform and report the results of these calculations below.

110. The YTM curve is technically simpler to estimate since all it requires is yield and maturity date information on the bond population to which the model is applied. By contrast, the spot curve is more computationally intensive but has the potential advantage that the estimated discount rates do not depend on the distribution of bonds' coupon rates in the sample.

111. There are seldom any direct observations of zero-coupon yields (they would only be observed for zero-coupon bonds). Hence, it is necessary to start with an assumed spot curve and then use it to compute the present value of all the future payments on each bond in my sample. This gives an estimated or "fitted price" for each bond in the sample. This "fitted price" of the bond then can be compared to its actual price to evaluate the quality of fit. A computer program is then used to repeat this process for different values of spot curve's parameters until the best fit to the data is made.

112. This more complex version of the Nelson-Siegel model gives rise to the following set of equations. Let:

$$r(t, rank) = \beta_{1,rank} + (\beta_2 + \beta_3)\frac{1-e^{-t/\beta_0}}{t/\beta_0} - \beta_3 e^{-t/\beta_0},\ rank = A, A-, \dots, BBB-$$

be the discount rate curve, where *t* refers to the time to the bond's next payment, which is to be discounted at rate $r(t, rank)$ and *rank* stands for bond's credit rating (as before, I allow the long-run values of the discount rates to vary, depending on the perceived bond's riskiness, as characterised by its credit rating).[25] Then, parameters $\beta_0, \beta_{1,rank}, \beta_2, \beta_3$ are chosen to minimise the weighted sum of squared pricing errors

$$\min \sum_{i=1}^{N} \left[w_i\left(P^A{}_i - \hat{P}_i\right)\right]^2$$

where $w_i = \frac{\frac{1}{d_i}}{\sum_{k=1}^{N}\frac{1}{d_k}}$, d_i is Macaulay duration of bond i, N is the total number of bonds in the sample, $P^A{}_i$ is the actual 'dirty' price of bond i, and $\hat{P}_i$ is the fitted price of bond i, defined below:

[25] Again, I assume that the long-term value of the discount rate for low-risk bonds is not higher than for high-risk bonds, that is, $\beta_{1,A} \le \beta_{1,A-} \le \cdots \le \beta_{1,BBB-}$.

$$\hat{P}_i = \sum_t C_{it} e^{-r(t,rank)*t},$$

where C_{it} is a cash flow on bond i promised to be paid t years from now.

113. The method described above provides the estimates of discount rates for bonds of different maturity and credit ratings. However, the BBB+ 10-year discount rate will not fully reflect the cost of debt associated with issuing a 10-year coupon paying bond. To the extent that what we are interested in the coupon rate on a bond issued at par then one needs to calculate this coupon rate from the estimated zero-coupon rates. I do this to arrive at "par-yield" curves – ie, coupon rates that would price a bond at par, given discounting based on the zero-coupon yield curve.

5.1.3. Bond yield data

114. In setting up the dataset for this analysis I have been careful to exclude all bonds issued by:

- sovereign governments and their agencies;
- state or provincial governments;
- local or municipal authorities;
- supranational bodies that are supported by governments; and
- bonds explicitly guaranteed by sovereign governments.

115. I have also excluded all bonds that are callable, but not make whole callable, from the analysis. This is not because these bonds do not contain information relevant to the benchmark yield but is a simplification I have made:

- to avoid a point of contention between the AER and myself on this issue; and
- due to the extra manual calculations that would be needed to estimate the yield adjustments required to each of these bonds to remove the value of the call options.

116. All yields have been sourced from UBS or Bloomberg, or an average of the two if both are available. I have not attempted to identify and exclude potential outliers from this sample. This means that I have not excluded from this analysis the low-yielding Coca Cola Amatil or SPI E&G bonds whose inclusion in the AER's much smaller sample of bonds I object to.

5.2. Estimation of a YTM fair value curve

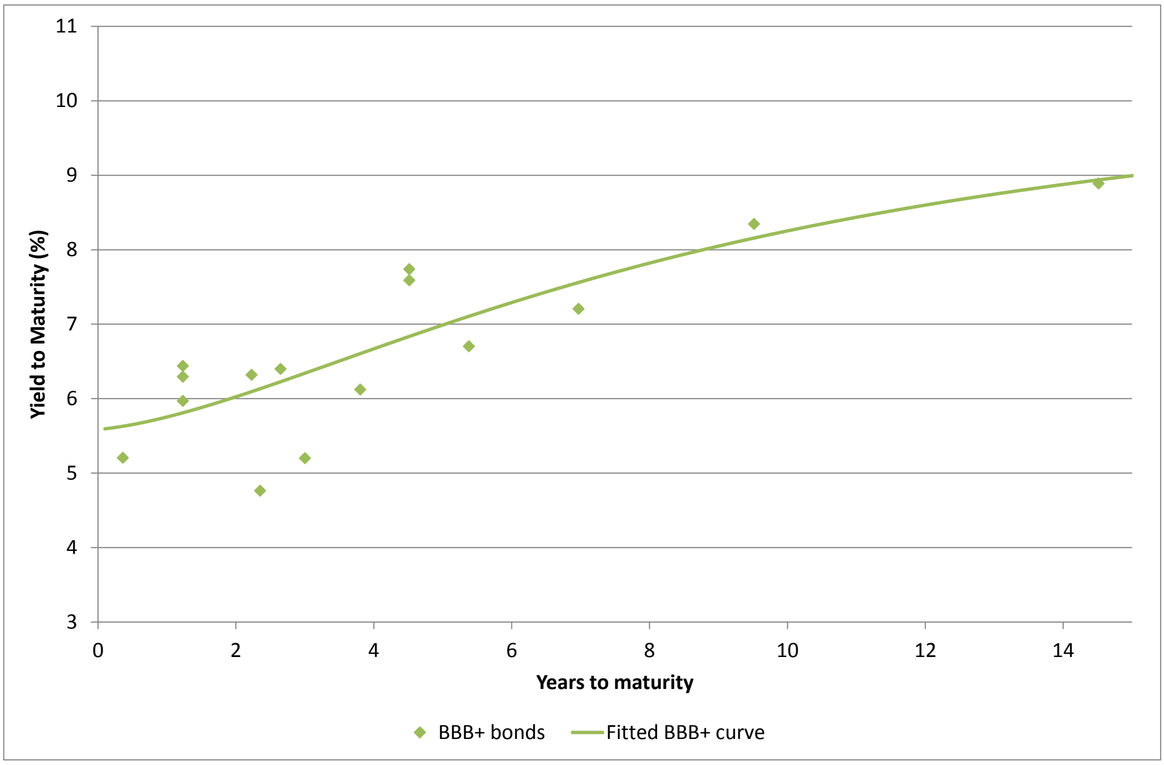
117. I have estimated the Nelson-Siegel equations across three bond populations of bonds issued by Australian companies. Initially I apply the technique to BBB to A- Australian dollar bonds, effectively the same population of bonds identified at section 3 above. I

then expand this sample further by having regard to BBB to A- bonds issued by Australian issuers in foreign currencies. Finally, I apply the technique across bonds issued by Australian corporate issuers with credit ratings with Standard and Poor's between BBB- and A.

5.2.1. Australian issued Australian dollar bonds rated BBB+ only

118. I estimate the YTM yield curves across 15 bonds issued by Australian firms in Australian dollars, rated BBB+ only by Standard and Poor's. The curve estimates across this dataset is shown in Figure 8 below.

Figure 8: Australian issued Australian dollar bonds rated BBB+ only



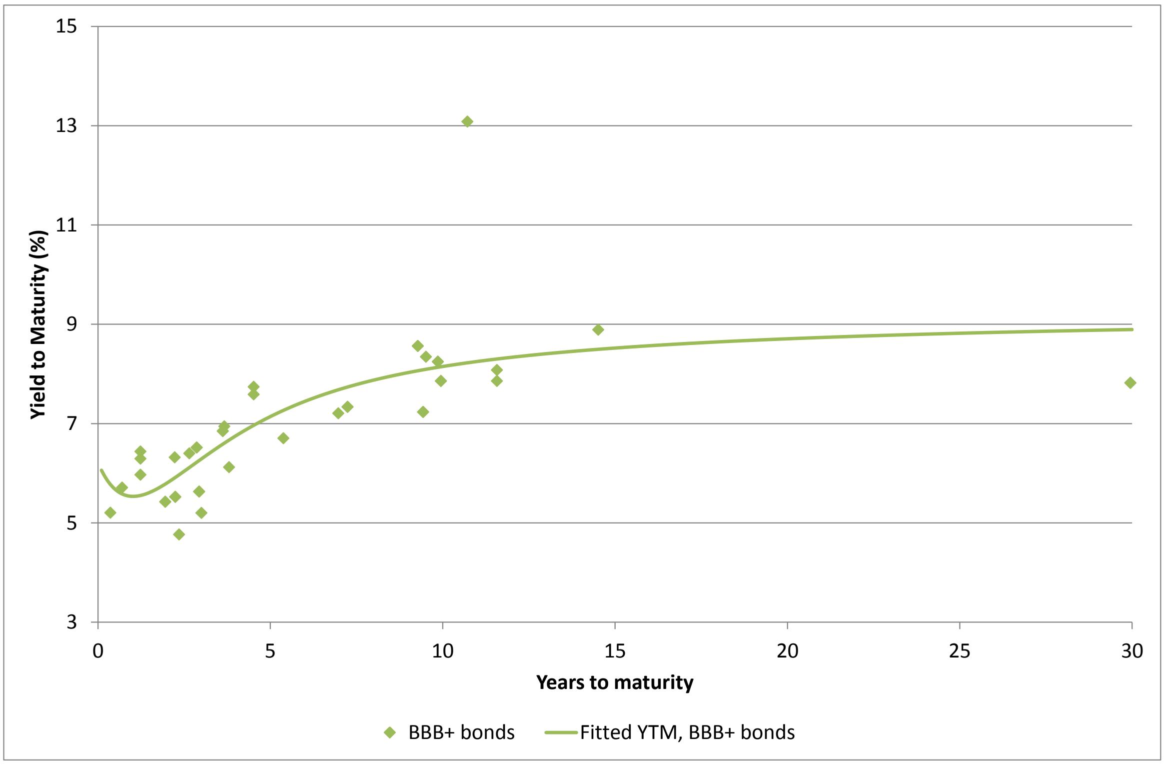
Source: Bloomberg, UBS, RBA and CEG analysis
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

119. At 10 years, the BBB+ yield is estimated to be 8.25%, equivalent to a DRP of 4.24%. This compares with the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.2.2. Australian issued bonds rated BBB+ only

120. Further including foreign currency bonds issued by Australian companies (swapped back to Australian dollars) increases the dataset of bonds to 42. The curve estimated across this larger dataset is shown in Figure 9 below.

Figure 9: Australian issued bonds rated BBB+ only



Source: Bloomberg, UBS, RBA and CEG analysis
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

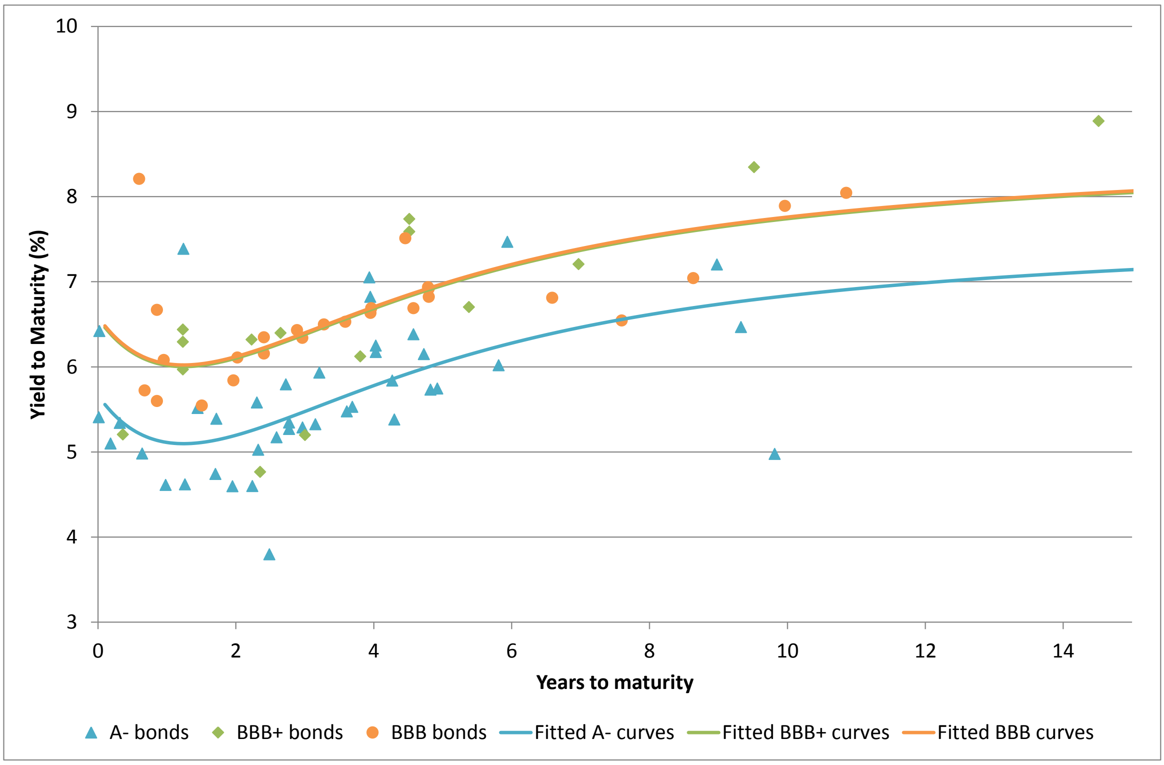
121. At 10 years, the BBB+ yield is estimated to be 8.15%, equivalent to a DRP of 4.14%. This compares with the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.2.3. Australian issued Australian dollar bonds rated BBB to A-

122. I estimate the YTM yield curves across 80 bonds issued by Australian firms in Australian dollars, rated BBB to A- by Standard and Poor's. I generate fair value curves for each of the BBB, BBB+ and A- credit ratings from this dataset.

123. The BBB+ curve estimated on this dataset is coincident with the BBB curve. This is a reflection of the dataset used which, as demonstrated in Figure 10 below, does not show a material difference in average yields for BBB and BBB+ bonds. By contrast, the A- fair value curve does have a materially lower yield.

Figure 10: Australian issued Australian dollar bonds rated BBB to A-



Source: Bloomberg, UBS, RBA and CEG analysis
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

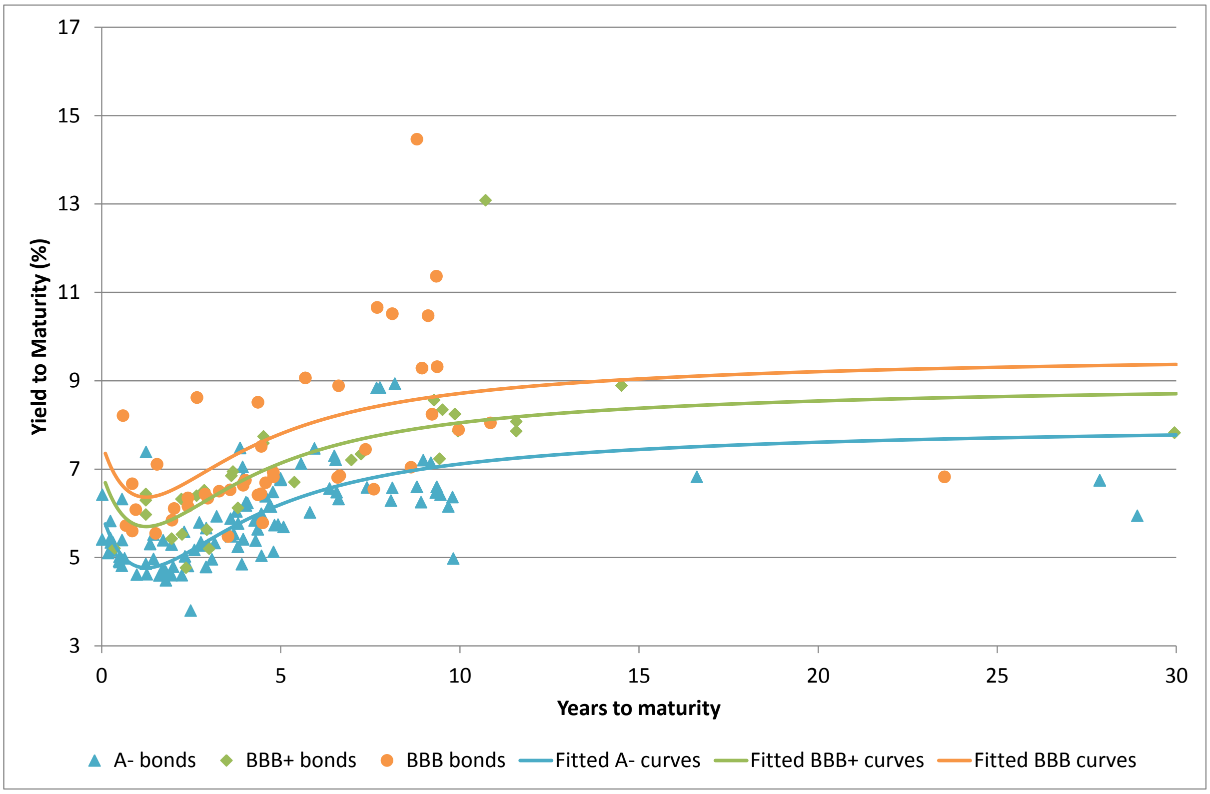
124. At 10 years, the BBB+ yield is estimated to be 7.74%, equivalent to a DRP of 3.75%. This compares with the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.2.4. Australian issued bonds rated BBB to A-

125. Further including foreign currency bonds issued by Australian companies (swapped back to Australian dollars) increases the dataset of bonds by 143 bonds (giving 223 observations in total) is available if yields on foreign currency bonds rated BBB to A- issued by Australian firms are also used.[26] Curves estimated on the augmented dataset are shown in Figure 11 below.

[26] Where these yields are swapped into Australian dollar terms using the process described at section 4.

Figure 11: Australian issued bonds rated BBB to A-



Source: Bloomberg, UBS, RBA and CEG analysis
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

126. I note that once these foreign currency bonds (swapped back into Australian dollar terms) are included in the sample the estimated BBB fair value curve is clearly above the estimated BBB+ fair value curve.

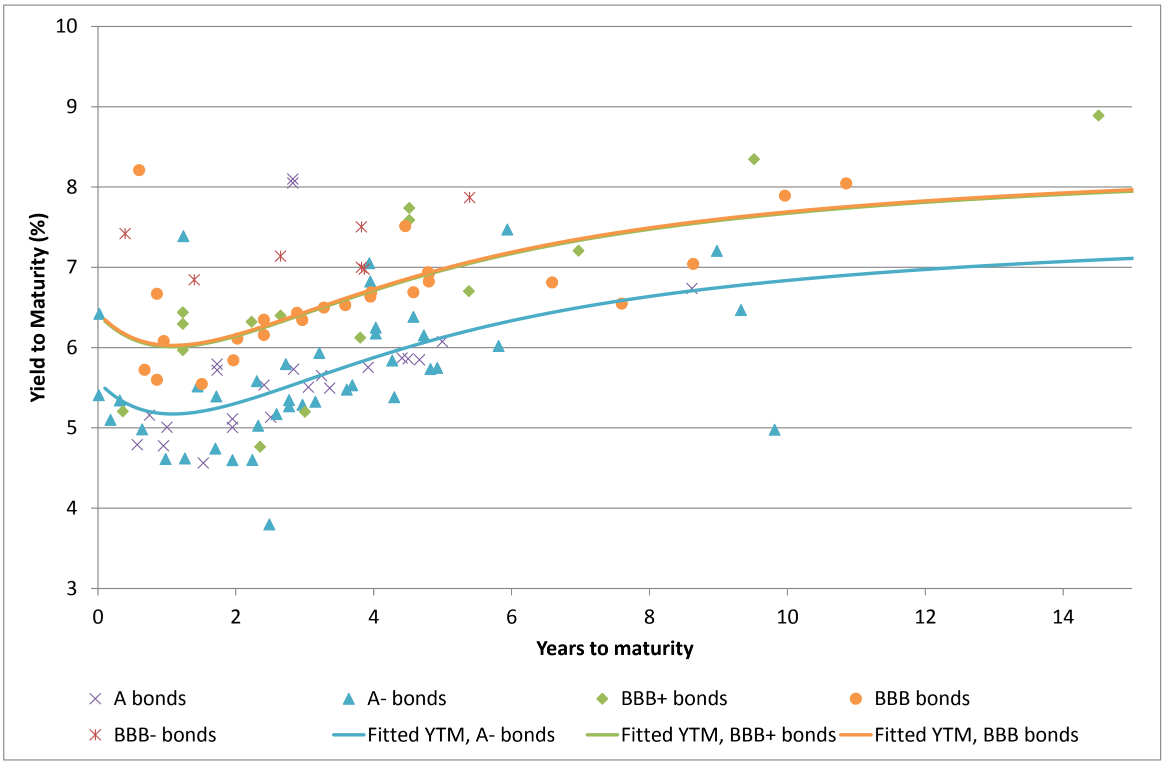
127. At 10 years, the BBB+ yield is estimated to be 8.05%, equivalent to a DRP of 4.06%. This compares with the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.2.5. Australian issued Australian dollar bonds rated BBB- to A

128. The generality of the technique described in this section is such that it can be applied to utilise yield information obtained from a wider range of credit ratings. It is important to note that the information obtained from other credit ratings would not be expected to have an effect on the level of the BBB+ curve *per se*, but could provide information that would affect its shape and therefore the yield estimate at 10 years.

129. Consideration of a wider dataset of Australian dollar bonds rated between BBB- and A gives a population of 110 bonds. Curves estimated on this dataset are shown in below.

Figure 12: Australian issued Australian dollar bonds rated BBB- to A



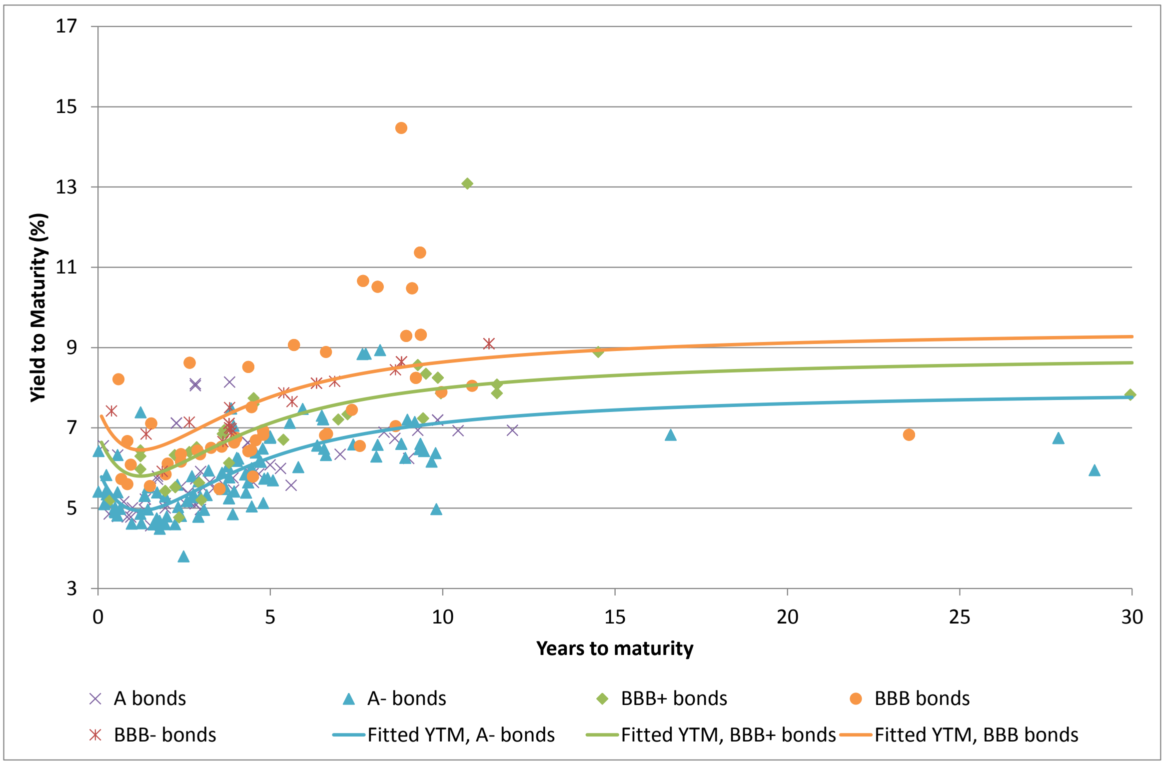
Source: Bloomberg, UBS, RBA and CEG analysis
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

130. At 10 years, the BBB+ yield is estimated to be 7.67%, equivalent to a DRP of 3.68%. This compares with the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.2.6. Australian issued bonds rated BBB- to A

131. Extending the dataset further to include all Australian issued bonds (including foreign currency bonds swapped back to Australian dollars) rated between BBB- and A gives a population of 297 bonds. Curves estimated on the augmented dataset are shown in Figure 13 below.

Figure 13: Australian issued bonds rated BBB- to A



Source: Bloomberg, UBS, RBA and CEG analysis
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

132. At 10 years, the BBB+ yield is estimated to be 7.99%, equivalent to a DRP of 4.00%. This compares to the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.3. Application of zero coupon Nelson-Siegel yield curves to estimate par yield curves

133. I describe in section 5.1.2 the process of how I estimate zero-coupon yield curves using the Nelson-Siegel approach and estimate from these par yield curves. I have conducted this analysis for the samples of Australian issued Australian dollar bonds considered in section 5.2 above. It would be computationally complex to use bonds issued in foreign currency in the construction of this curve as each coupon would need to be swapped back into Australian dollars individually (rather than each bond). The par yield curves are derived so as to have a single (ie, annualised) coupon for easier interpretation.

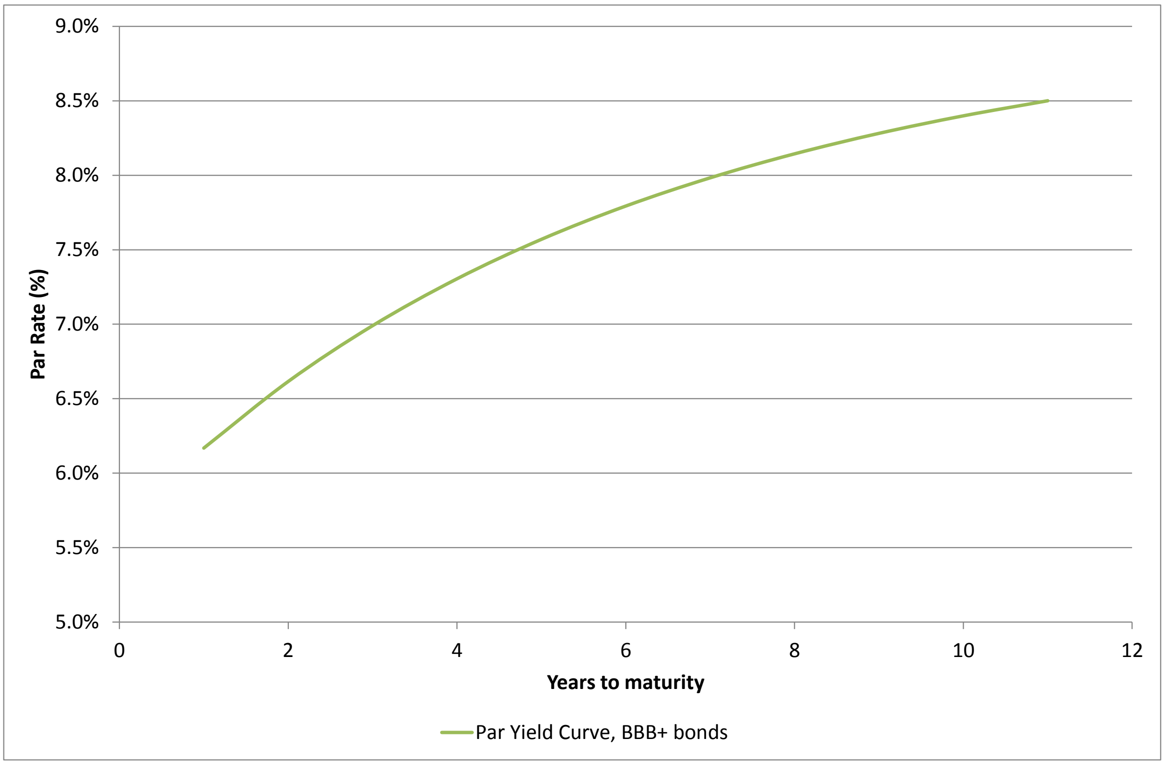
134. In each of the diagrams below the par yield curves are shown in isolation without the backdrop of observations. This is not because the curves do not use information from the bond yield observations (in fact, they use more information than the yield to

maturity curves derived above) but rather because it is incorrect to directly compare par yield curves with yields to maturity at various different coupon rates.

5.3.1. Australian issued Australian dollar bonds rated BBB+ only

135. The BBB+ par yield curve estimated across the dataset of Australian issued Australian dollar bonds rated BBB+ only is shown at Figure 14 below.

Figure 14: Par yield curve for Australian issued Australian dollar bonds rated BBB+ only



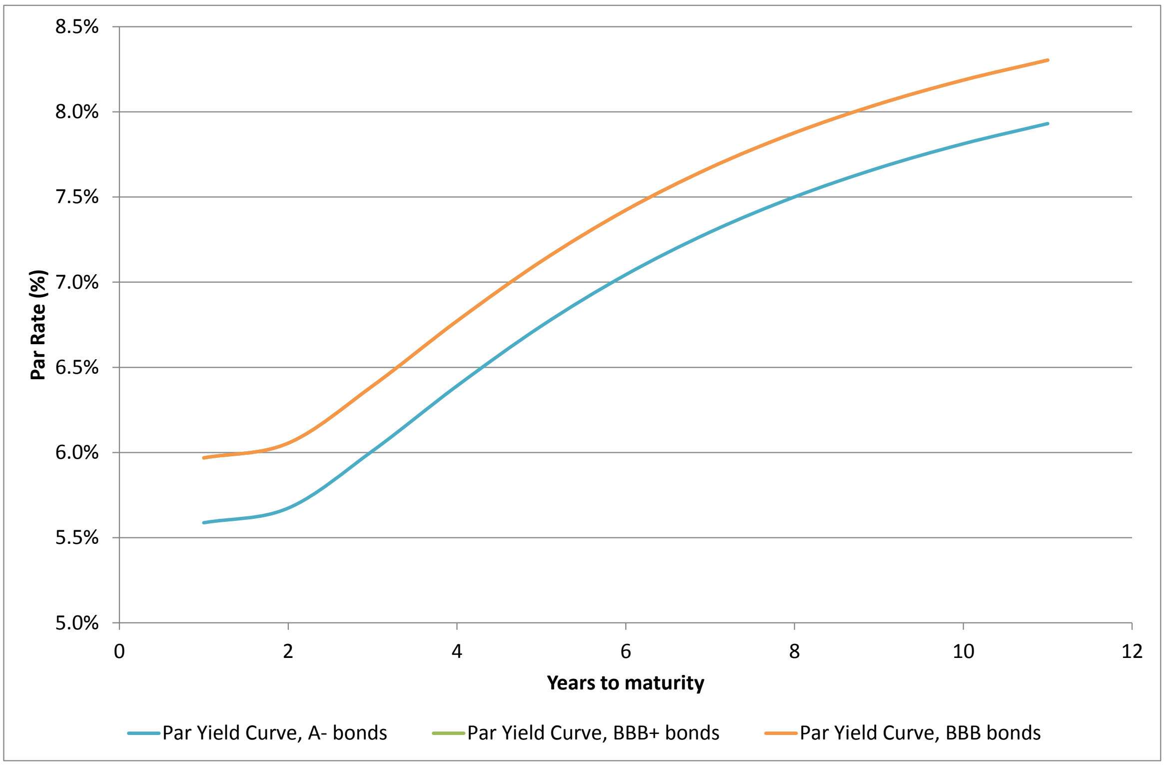
Source: Bloomberg, UBS, RBA and CEG analysis
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

136. The annual coupon estimated on a 10-year BBB+ bond trading at par is estimated to be 8.40%, equivalent to a DRP of 4.41%. This compares to the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.3.2. Australian issued Australian dollar bonds rated BBB to A- only

137. The par yield curves estimated across the dataset of Australian issued Australian dollar bonds rated BBB to A- only is shown at Figure 15 below.

Figure 15: Par yield curve for Australian issued Australian dollar bonds rated BBB to A-



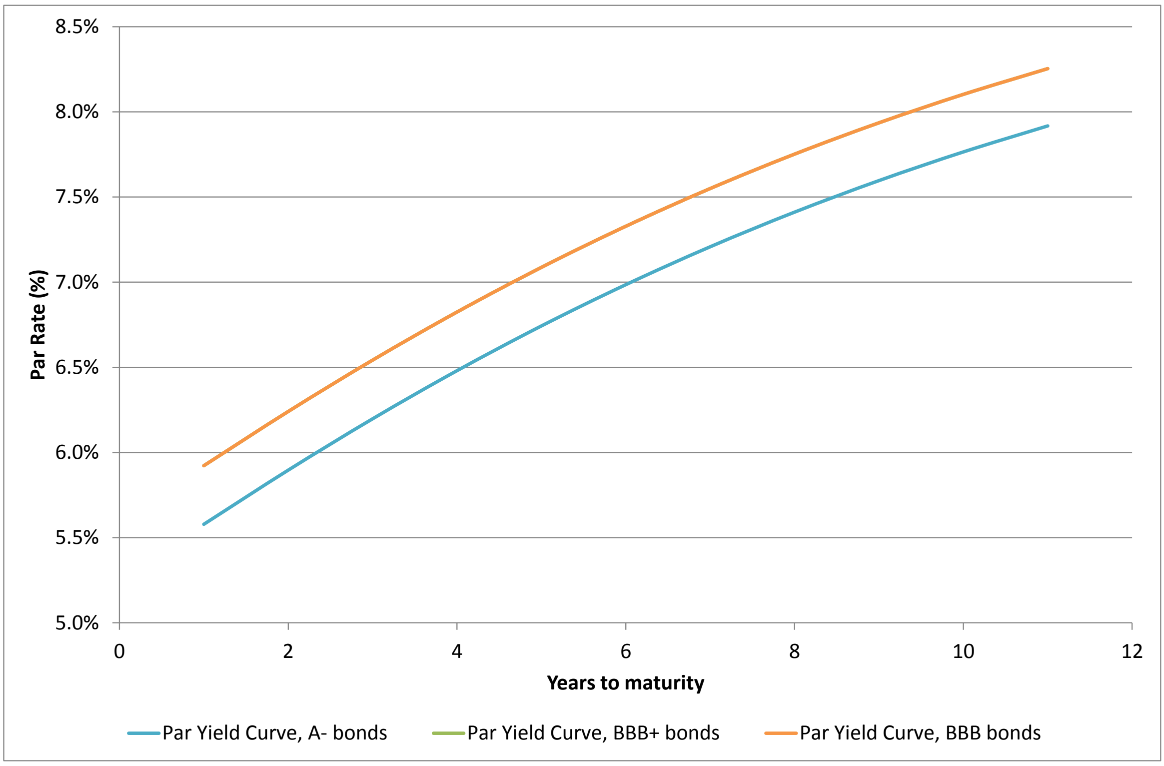
Source: Bloomberg, UBS, RBA and CEG analysis
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

138. In this chart, as with the equivalent yield to maturity chart at Figure 10, the curves estimated for BBB+ and BBB are coincident. The annual coupon estimated on a 10-year BBB+ bond trading at par is estimated to be 8.19%, equivalent to a DRP of 4.20%. This compares to the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.3.3. Australian issued Australian dollar bonds rated BBB- to A only

139. The par yield curves estimated across the dataset of Australian issued Australian dollar bonds rated BBB- to A only is shown at Figure 16 below.

Figure 16: Par yield curve for Australian issued Australian dollar bonds rated BBB- to A



Source: Bloomberg, UBS, RBA and CEG analysis
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

140. The annual coupon estimated on a 10-year BBB+ bond trading at par is estimated to be 8.10%, equivalent to a DRP of 4.11%. This compares to the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

6. Other cross checks on the Bloomberg fair value curves

141. This section examines other potential cross-checks on the extrapolated Bloomberg fair value curve.

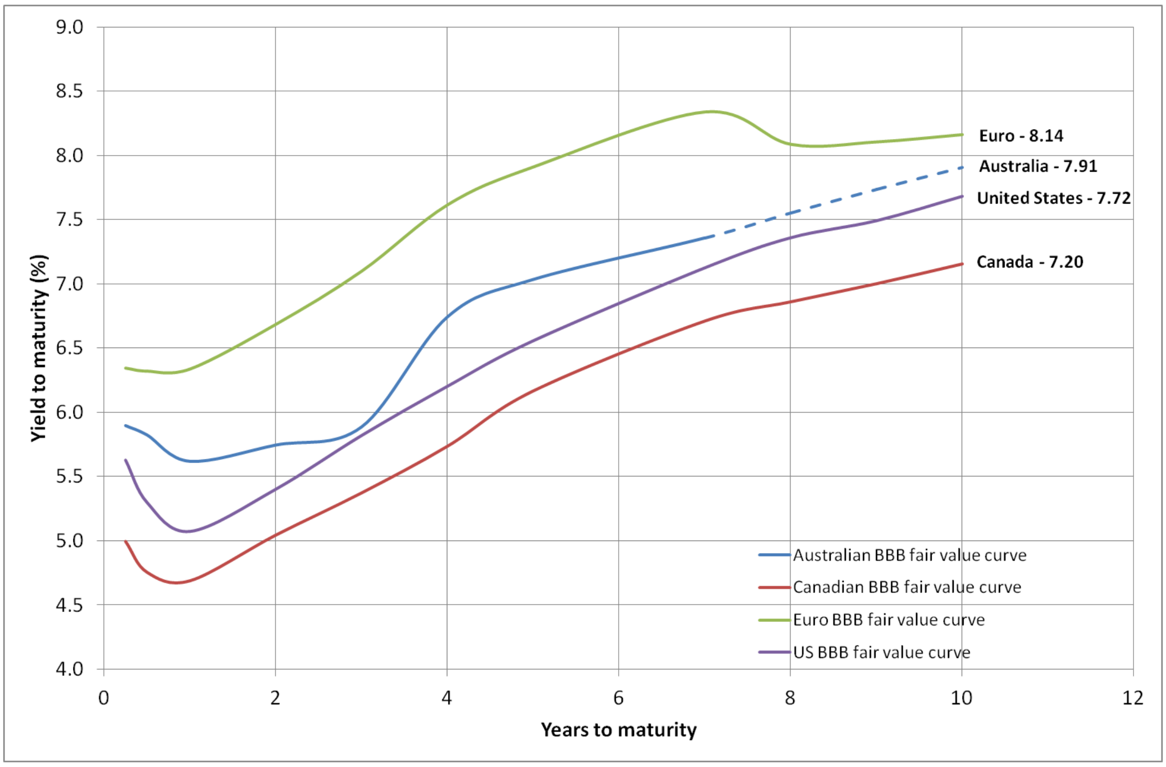
6.1. Comparison to foreign fair value curves

142. At section 4 above I discuss the availability of evidence from Australian bonds issued in foreign currencies. I consider that this provides an additional source of evidence against which to test potential candidates for extrapolation.

143. In addition to individual bond yields, I have also sourced Bloomberg fair value curves from foreign jurisdictions. These curves can potentially be used as a cross-check on the reasonableness of the Bloomberg fair value curve in Australia. However, these curves represent an estimate for the cost of debt of foreign firms which may be affected by factors not relevant to Australian firms. Consequently, these comparisons are best considered providing only a high level source of information – one that might provide a basis for further investigation of other facts rather than a basis for any strong conclusion on its own.

144. Figure 17 below shows Bloomberg BBB composite fair value curves in Australia, the Eurozone, the US and Canada. The non-Australian fair value curves have been converted into Australian dollar yields using cross currency swap rates available from Bloomberg (see Appendix B for more detail on this conversion process). The Australian curve is extrapolated beyond 7 years using PwC's estimates.

Figure 17: BBB fair value curves – Australia and other jurisdictions



Source: Bloomberg and CEG analysis
Note: Fair value curve yields calculated as an average over 21 November 2011 to 16 December 2011

145. I note that the Australian fair value curve sits close to the US fair value curve and below the Euro fair value curve. This comparison provides no reason to believe that the Australian fair value curve 'out of kilter' with foreign fair value curves.

6.2. Comparison to fitted curves

146. In section 5 I estimate a number of curves fitted to a number of alternative samples of bonds. Each of these gives rise to its own estimate of the DRP at 10 years. Table 1 below summarises these and compares them with the 7.91% yield associated with the extrapolated Bloomberg fair value curve at 10 years.

Table 1: CEG curve fitting vs Bloomberg fair value estimate

Bond sample	Yield at 10 years (%)	Extrapolated Bloomberg fair value at 10 years
Yield to maturity analysis		
BBB+ Australian only	8.25%	7.91
BBB+ Australian and foreign	8.14%	7.91
BBB to A- Australian only	7.74%	7.91
BBB to A- Australian and foreign	8.05%	7.91
BBB- to A Australian only	7.67%	7.91
BBB- to A Australian and foreign	7.99%	7.91
Par yield analysis		
BBB+ Australian only	8.40%	7.91
BBB- to A Australian only	8.19%	7.91
BBB- to A Australian only	8.10%	7.91

Source: CEG analysis based on Bloomberg, UBS and RBA data

147. In all but two cases the estimated DRP from CEG's curve fitting is higher than the extrapolated Bloomberg fair value estimate. However, there is a very tight bound in the estimates derived from all of the regressions – with the minimum estimate being 7.74% and the maximum estimate being 8.40%. This comparison provides no reason to believe that the extrapolated Bloomberg fair value estimate 'out of kilter' with the underlying data.

7. Assessment of AER methodology in Aurora and Powerlink

148. In November 2011, the AER released draft decisions in its regulatory reviews of both Aurora and Powerlink. In these decisions, the AER estimated a DRP of 3.14% and 3.19% respectively.[27]

149. The AER's lower DRP estimates for Aurora and Powerlink are the result of a new methodology that it introduced subsequent to its final decisions for APT Allgas and Envestra. The most important change in its methodology is its proposal to move away from any reliance upon Bloomberg's fair value curve and to estimate the DRP based on a simple average of the reported yields for a selection of nine long-dated bonds to estimate the DRP.

150. In my opinion, the reasoning relied upon by the AER in those decisions to reject the use of the Bloomberg fair value curve is flawed. As I set out in more detail at section 2 of this report, I consider that reliance upon independent expert opinion in processing a vast array of information on bond prices is preferable to the AER's proposed methodology in Aurora and Powerlink. Furthermore, the specific evidence cited by the AER in support of its assessment of Bloomberg's 'inappropriate' fair value estimate does not establish the that the Bloomberg estimate is unreasonable.

151. In my opinion, a reasonable assessment of the totality of evidence available to the AER over 21 November 2011 to 16 December 2011, such as that conducted in this report at sections 3, 4, 5 and 6 above, clearly indicates that the extrapolated Bloomberg BBB fair value curve provides a reasonable estimate of DRP.

152. In some contexts it may be open to the AER to devise its own methodology to determine a DRP in preference to the use of extrapolated Bloomberg BBB fair yields. Ultimately however, the reasonableness of that methodology must be assessed in the same way that the reasonableness of Bloomberg's fair yields must be assessed. In my opinion, the AER did not conduct adequate cross-checks within its Aurora and Powerlink decisions that could have established the reasonableness or otherwise of its proposed DRP estimates.

153. I consider that if it assesses its estimates against the wide range of information that I put forward in sections 3 and 4 above, or against the type of analysis that I conduct in sections 5 and 6, the AER cannot reasonably apply the methodology it proposed for Aurora and Powerlink for the Victorian gas distribution businesses.

[27] See AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, p. 241; and AER, *Powerlink: Transmission Determination*, November 2011, p. 224. The same methodology was used in both decisions, but the averaging period for Aurora was 20 days to 14 October 2011, whereas the averaging period for Powerlink was 40 days to 14 October 2011.

7.1. Reconciling the results of the AER's new methodology with Tribunal precedent

154. Prior to its Aurora and Powerlink draft decisions in which it estimated DRPs of 3.14% and 3.19%, the AER's DRP estimates reflected its methodology of placing equal weight on the Bloomberg BBB fair value curve (extrapolated to 10 years) and the yield on a bond issued by APA Group. Most recently, the AER allowed DRPs in its June 2011 final decisions for the gas distribution pipelines of APT Allgas and Envestra South Australia of 3.64% and 3.81% respectively.[28]

155. Subsequently, both these decisions were overturned on appeal to the Tribunal, which rejected placing substantive weight upon the APA bond and substituted instead sole reliance upon the Bloomberg fair value estimates. These changes resulted in DRP estimates for APT Allgas and Envestra of 4.37% and 4.67% respectively.[29] It is worth noting that the Tribunal commented that there was strong evidence in these cases in support of the extrapolated Bloomberg BBB fair value curve:[30]

> *Envestra provided to the AER strong evidence in support of the EBV, in particular by its response to the May 23 letter. The view of Dr Hird of CEG was that that material did not demonstrate any basis for the substitution of an alternative estimate for the EBV. As noted, the AER itself accepted the relevance of the EBV. Whilst the Tribunal accepts that the AER properly considered the reliability of the EBV, it has reached the view on the available material that there is no reason shown from the available material why the use of the EBV should not be adopted in this particular matter.*

156. In my opinion the outcome of the Tribunal decisions in respect of the DRP for APT Allgas and Envestra raise concerns about whether the AER's methodology as proposed for Aurora and Powerlink meets the requirements of the NGR and NGL and in particular the NGO (which is similar in structure to the NEO). In its Aurora draft decision, the AER asserts that Aurora's proposed DRP of 4.54%, relying upon the extrapolated Bloomberg BBB fair value curve, is:[31]

> *excessive and does not satisfy the requirements of the NER and NEL. In particular, the AER considers Aurora has, in estimating the DRP, had insufficient regard to:*
>
> - *achieving an outcome that is consistent with the NEO, in promoting efficient investment in, and*

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[28] See AER, *Final decision: APT Allgas: Access arrangement proposal for the Qld gas network*, June 2011, p. 41; and AER, *Final decision: Envestra Ltd: Access arrangement proposal for the SA gas network*, June 2011, p. 59.

[29] See *Application by APT Allgas Energy Limited* (No 2) [2012] ACompT 5 (11 January 2012), para. 121; and *Application by Envestra Limited* (No 2) [2012] ACompT 4 (11 January 2012), para. 171.

[30] *Application by Envestra Limited* (No 2) [2012] ACompT 3 (11 January 2012), para. 123

[31] See AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, p. 240

- *efficient operation and use of, electricity services for the long-term interests of consumers of electricity*

- *the regulatory and commercial risks involved in providing the network service, and the economic costs and risks of the potential for under and over investment.*

157. Conversely, the AER considers that its own estimate of 3.14% for Aurora:[32]

> *satisfies the requirements of the NER. The AER considers its DRP estimate will contribute to a rate of return that promotes efficient investment in Aurora's network, and reflects the regulatory and commercial risks of providing its network services.*

158. It must be recalled in comparing the DRPs above that they are each estimated across different intervals of time. For completeness I set these out below, in chronological order of averaging period used:

  - Envestra's proposed DRP of 4.67% based on Bloomberg was estimated over 25 February 2011 to 17 March 2011. This DRP was accepted by the Tribunal.
  - Aurora's proposed DRP of 4.54% based on Bloomberg was estimated over 28 February 2011 to 25 March 2011. This DRP was rejected by the AER.
  - APT Allgas' proposed DRP of 4.37% based on Bloomberg was estimated over 2 May 2011 to 31 May 2011. This DRP was accepted by the Tribunal.
  - the AER's proposed DRP for Aurora of 3.14% based on a selection of nine bonds was estimated over 16 September 2011 to 14 October 2011, and for Powerlink 3.19% estimated over 19 August 2011 to 14 October 2011.

159. The AER's assertion that its preferred DRP estimates in the Aurora and Powerlink reviews satisfy the NEO is, at least superficially, difficult to reconcile with the latest Tribunal decisions in relation to APT Allgas and Envestra. There is a very large difference between DRP estimates that the Tribunal accepted in those cases and the DRP estimates that the AER has arrived at for Aurora and Powerlink. The difference in time between the various averaging periods is not sufficient to explain this.

160. Consequently, the AER's Aurora decision must rest on a belief that the AER has identified new and better information to justify its decision – information that was not before the Tribunal in the Envestra and Allgas decisions.

[32] Ibid, p. 241

7.2. Reasons supplied by the AER for rejecting Bloomberg not compelling

161. In rejecting the use of the extrapolated Bloomberg BBB fair value curve to estimate DRP, the AER put forward the general proposition that:[33]

- where market data is available, it is possible to estimate the DRP using this data
- where market data is not available, FVCs are a viable second-best alternative.

162. I agree that where market data is available, it is 'possible' to estimate the DRP using this data. But this is precisely what Bloomberg does. The AER does not address adequately why it is 'preferable' to supplant its own use of market data for that of Bloomberg. In order to make that assessment, it is necessary to consider what data is being used to estimate DRP and how that data is used. The AER claims that:[34]

> *…the sample size in the current circumstances comprising 9 bonds is sufficiently robust, particularly when compared with the deficiencies of Bloomberg's 5 and 7 year BBB rated FVCs.*

163. In my opinion, the AER has not made a reasonable assessment in weighing up the claimed deficiencies of Bloomberg's fair value curves against the obvious problems with its own methodology. The AER has raised at least eight separate criticisms of the use of the Bloomberg fair value curve. I do not consider that any of these provide a reasonable basis upon which to conclude that Bloomberg's fair value estimates should not be relied upon once validated against the full range of available data. Due to the large number of assertions made by the AER, I address these in detail in Appendix C to this report.

164. Ultimately I consider that any benchmark estimate, whether provided by Bloomberg or the AER, should be assessed against the full weight of available evidence. It appears likely that an estimate that has had regard to a wide range of relevant information will perform better than one that relies upon a highly restricted sample, holding other factors constant.

165. Having made this assessment myself at sections 3 to 5 of this report, and in comparing the extrapolated Bloomberg BBB fair value curve to a wide range of yield evidence, I am satisfied that it is a reasonable representation of the available data and there is no reason to depart from it. By contrast, I conclude that, in taking a simple average across a sample of just nine bonds, the AER has relied upon a dataset that is too narrow and a methodology that is not sophisticated enough for the purpose that it is being used.

[33] Ibid, p. 222

[34] Ibid, p. 222

7.3. The bond sample relied upon by the AER was inadequate

166. In my opinion, a methodology that seeks to rely upon the yields of just nine bonds, setting all other bond yield information aside, is not likely to be robust. In its Aurora and Powerlink draft decisions, the AER estimated the DRP based on a simple average over nine bonds. These bonds were selected based on:[35]

- Australian domestic issuance, fixed and floating;
- a term to maturity of between 7 to 13 years;
- a rating of BBB to A- by Standard & Poor's; and
- excluding callable or subordinated bonds.

167. In my experience, it is consistent with the AER's past and current approach to assessing DRP that it begins its analysis by determining the data that it wishes to exclude without due consideration of whether the information contained within the excluded data may be useful. For example, I note that in the past, the AER applied four very narrow criteria that excluded all but six bonds from its analysis of the DRP. Those criteria were that bonds had to be fixed rate bonds issued by Australian companies in Australia, rated BBB+ and with more than two years to maturity.[36]

168. Ultimately, none of these four narrow criteria were necessary as part of a methodology informing the yield on a benchmark 10-year BBB+ rated corporate bond. Each exclusion set aside information that could potentially be relevant to this assessment. Subsequent to successful appeals of the AER methodology, the AER has relaxed these criteria somewhat (eg, allowing for the consideration of information on floating rate bonds and bonds rated close to BBB+).

169. In section 3 I consider the yield of callable bonds adjusted for the value of the call option using the method recommended by the AER's consultant, Oakvale Capital. I consider that the greater riskiness of subordinated debt is adequately accounted for by the higher credit rating accorded to this debt by Standard & Poor's. The AER has not supplied any reasoned evidence as to why it would be reasonable to exclude such bonds from consideration.

170. In sections 3 to 5 I consider the yield information on bonds for all maturities. I consider that this is necessary to give appropriate context to the value estimated at a maturity of 10 years. Furthermore, it is possible and appropriate to use the yield data from shorter-dated bonds to inform the yield at longer maturities where there are fewer bonds at these maturities. Not only does the AER exclude shorter dated bonds from its sample, it provides no graphical representation of the yields on these bonds –

[35] Ibid, p. 216

[36] See for example AER, *Draft decision: Access arrangement for the ACT, Queanbeyan and Palerang gas distribution network*, November 2009, p. 22

making it impossible to assess the consistency of its sample with the information it has rejected.

171. I agree that for the purpose of estimating a benchmark corporate bond rate, the analytical focus should be on bonds issued by Australian companies. This is not the same as excluding bonds issued by Australian companies that are traded overseas or in foreign currencies, which is what the AER proposes to do. I examine this data in sections 4 and 5 and conclude that this information is useful in assessing bond yields at longer maturities.

172. When assessing the benchmark rate for BBB+ corporate debt, the most directly relevant data will come directly from bonds with BBB+ or similar credit ratings. However, this does not mean that some information cannot be obtained from other credit ratings. In section 5 above I show how this information can be used to inform the shape and level of the yield curve passing through BBB+ yield data.

173. In my opinion, setting aside all this potentially relevant information is unreasonable, and increases the likelihood that the DRP estimate produced by the AER's methodology relying upon this restricted dataset will also be unreasonable. The analysis presented in sections 3 to 5 of this report indicate that this is precisely the result of the AER's methodology in Aurora and Powerlink draft decisions.

174. I note for completeness that the AER conducted a number of 'sensitivity tests' where it adopted alternative assumptions to those described above. Specifically, the AER considered having regard to:[37]

- BBB+ bonds only, although it did not pursue this approach;
- maturities at 9-11 years and 5-15 years; and
- considered fixed rate bonds only.

175. These sensitivity tests do not represent a material improvement on the AER's methodology. Indeed, in three out of four cases, the sensitivities actually amount to the AER considering a smaller set of data rather than a wider set. In the case where a larger dataset is considered there is no attempt by the AER to take into account and adjust for the wide differences in maturities of the bonds in the sample.

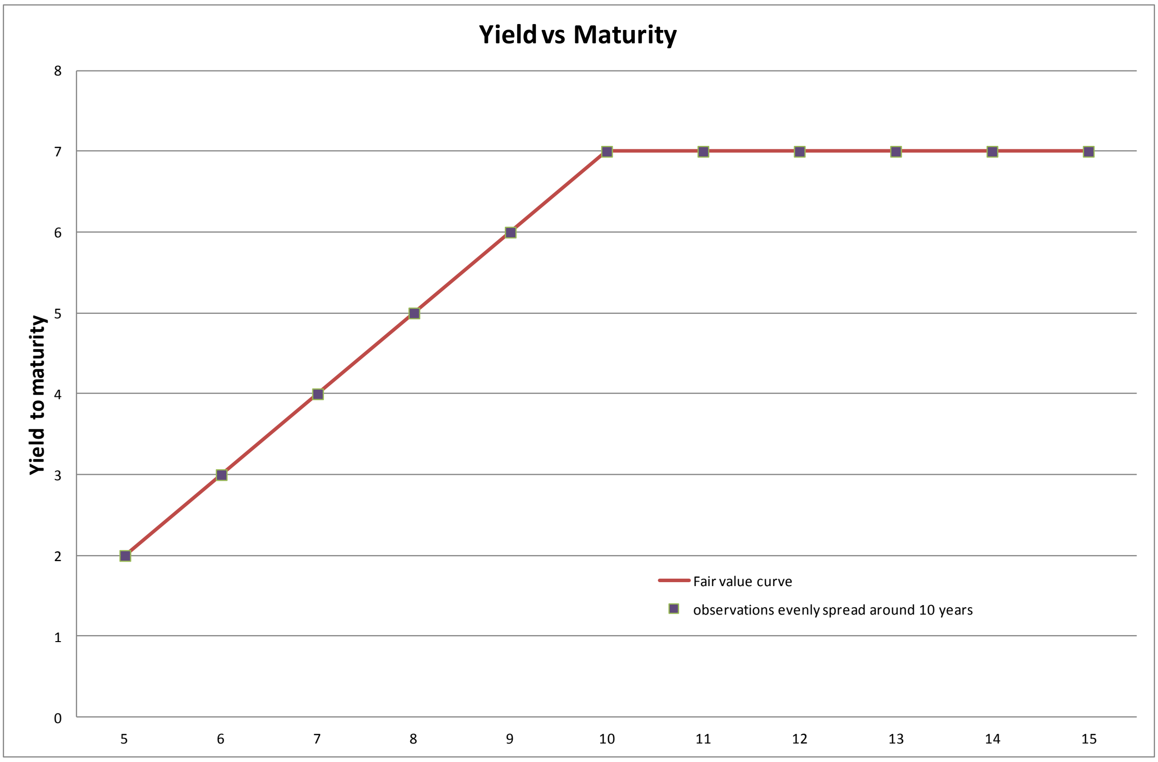
176. I note that the AER reports the average maturity of this 5 to 15 year sample at 9.2 years in the Powerlink draft decision. This may appear close to 10 years. However, the average maturity of a sample is only a good indicator of the influence of the distribution of sampled maturities on the sample mean yield if yield is linear in maturity.

37 AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, pp. 249-252

177. Imagine that the yield curve starts steep at 5 years and flattens out as maturity increases (ie, is concave) – which is what the Bloomberg fair value curve does. In this case, even if the within sample maturity is evenly distributed above and below 10 years (such that the mean maturity in the sample is 10 years) then the mean yield in the sample will be lower than the true 10 year yield.

178. The figure below demonstrates this with an example. There are 11 observations with five having maturity above 10 years and five having maturity below tend years and one with maturity of exactly 10 years. All of these are on the fair value curve so they are all representative of the benchmark cost of debt at their maturity.

Figure 18: Hypothetical scenario with a concave fair value curve



179. The average maturity of the sample is 10 years. Yet the average yield of the sample is not the 10 year benchmark of 7.00%. Rather it is 5.64%. This bias in the sample mean as the predictor of the true 10 year rate exists due to the concavity in the fair value curve. It exists despite:

- the mean maturity in the sample being 10 years;
- there being no bias in the sample (in the sense that all bonds are reflective of the benchmark at that maturity); and
- there being an equal distribution above and below 10 years.

180. The bias would be worse if:

- the mean maturity in the sample was less than 10 years;
- there were more bonds below 10 years than above (eg, the mean maturity in the sample was dragged up by a single 15 year bond);
- the sample included some bonds that are clearly biased estimators of the benchmark yield.

181. The first two of the above dot points are, as a matter of fact, true of the AER's 5 to 15 years maturity sample. I also consider that the inclusion of the Coca Cola Amatil and SPI E&G bonds makes the last dot point true (see below).

7.4. The bond sample relied upon by the AER was incorrectly applied

182. The full list of nine bonds relied upon by the AER is replicated in Table 2 below, both for Aurora's averaging period and for the Victorian gas distribution business' nominated averaging period. The DRP was calculated upon each of these bonds using either UBS or Bloomberg yield data, or taking the average between the two if both were available.

Table 2: Bonds relied upon by the AER

Issuer	Rating	20 days to 14 Oct 2011		20 days to 16 Dec 2011	
		Term to maturity	Average DRP	Term to maturity	Average DRP
APA Group	BBB	8.8	3.03	8.7	3.19
Brisbane Airport	BBB	7.7	2.64	7.6	2.84
Sydney Airport	BBB	10.1	3.77	10.0	3.91
Sydney Airport	BBB	11.0	3.86	10.9	3.97
Dalrymple Bay Coal Terminal	BBB+	9.7	4.26	9.5	4.40
Dalrymple Bay Coal Terminal	BBB+	11.2	3.69*	11.1	3.90
Coca Cola Amatil	A-	10.0	1.42	9.9	1.00
SPI Electricity and Gas	A-	9.5	2.63	9.4	2.52
Stockland Trust	A-	9.1	2.97	9.0	3.23
Average		**9.7**	**3.14**	**9.6**	**3.22**

Source: Aurora draft decision, p. 241, Bloomberg, UBS, RBA, CEG analysis
** The AER appears to have calculated the CGS at the wrong maturity for the DBCT bond, causing it to overestimate the DRP associated with that bond.*

183. I consider that it is preferable to take into account a much wider range of information than the AER proposed to by having regard to only the bonds listed in Table 2 above. However, even if the AER's methodology were adopted without adjustment, I make the following observations provided in the three subsections below.

7.4.1. Inclusion of callable bonds

184. The AER's list of nine bonds includes two bonds issued by DBCT both of which are 'make whole' callable. Without these bonds the AER estimate would be even lower (2.90% in the Aurora averaging period). The AER has made an exception for make-whole callable bonds when establishing its criteria. This exception can be justified on the grounds that 'make whole' callable bonds require less adjustment than other callable bonds in order to convert them into equivalent zero option value fixed rate yields. This is the justification provided at footnote 573 of the Powerlink draft decision.

185. The second ground for this exception is more pragmatic. The AER methodology leaves it hostage to the vagaries of the final sample that its exclusions result in. These vagaries may result in a biased sample that, when considered in the context of the population of bonds, results in an unreasonably high/low estimate. However, because the AER's methodology gives little or no weight to the wider population there is no formal way in which the AER methodology can correct for any such sample bias.

186. Excluding all callable bonds would have resulted in an even lower, and in my opinion, even more unreasonable estimate of the DRP. Making an exception for the inclusion of make whole callable bonds can be justified purely on the pragmatic grounds that it gives a less unreasonable estimate relative to the wider set of information. Of course, the AER cannot rely on such a pragmatic explanation for its sample selection because its methodology includes no mechanism for assessing the reasonableness of its estimate relative to the wider population of bond yield data.

7.4.2. Erroneous inclusion of Coca Cola Amatil

187. The bond issued by Coca Cola Amatil Australia included in the AER's list of nine bonds at Table 2 above has a DRP of 1.42%. This is improbably low for an A- bond with a maturity of 10 years given the wider population of bonds. This should have caused the AER to exercise caution and investigate this bond further before relying upon it to estimate the DRP for Aurora and Powerlink.

188. The yield information relied upon by the AER for the Coca Cola Amatil Australia bond is available only from Bloomberg, and specifically the AER has relied upon the BVAL yield. Further information available from the BVAL pricing source indicates that Bloomberg has estimated the yield on this bond, not by direct observations in terms of bids, asks or executed transactions, but by reference to observed comparables. In my experience this is not unusual for bond yields sourced from Bloomberg and likely other data providers as well.

189. However, the comparables selected by Bloomberg for the Coca Cola Amatil bond deserve closer inspection. They include: the Queensland Treasury Corporation, the New South Wales Treasury Corporation, the Treasury Corporation of Victoria, Eurofima and KFW. That is, the yield for the Coca Cola Amatil has been determined by reference to comparables that include:

- Australian state treasuries, rated AA+ and AAA; or
- European organisations that are either sponsored or wholly owned by AAA rated European governments (both Eurofima and KFW are AAA rated and are funded by European governments including Germany in the case of Eurofima and exclusively Germany in the case of KFW).

190. A further comparable is another Coca Cola Amatil bond issued by Coca Cola Amatil New Zealand. However, similar inspection of this bond indicates that its yield is also estimated by reference to the same comparables.

Figure 19: Bloomberg BVAL screenshots for Coca Cola Amatil bond

Source: Bloomberg

191. In light of the information provided by Bloomberg and reproduced in Figure 19 above, it would be wholly inappropriate to continue to rely upon the DRP estimated for the Coca Cola Amatil bond to determine the benchmark DRP on 10-year BBB+ corporate bonds either now or in the future.

192. I note for completeness that I have seen objections raised to the inclusion of the Coca Cola Amatil bond on different grounds to those discussed above. In a report for Powerlink, PwC makes the claim that it should be excluded on the grounds that it is described by Bloomberg as a "Euro MTN". PwC interpret this to mean that the bond was issued in Europe and:[38]

> *Accordingly, the inclusion of this bond does not meet the requirements of the National Electricity Rules to use the 'observed annualised Australian benchmark corporate bond rate'.*

193. The Coca Cola Amatil bond was issued by an Australian domiciled company in Australian dollars. Bloomberg indicates that the "Euro MTN" description applies to bonds issued in "non-domestic currency". In this context, the term "non-domestic currency" means a currency other than the domestic currency in the jurisdiction that the bond was issued. It does not mean a currency that is different to the currency in the jurisdiction in which the issuer is domiciled. For example, an Australian firm issuing a bond denominated in HK dollars in Australia would be described as a "Euro MTN" issue. The fact that the Coca Cola Amatil bond was issued in Australian dollars means that the bond must certainly have been issued in an overseas jurisdiction - although not necessarily Europe.

194. A case could be mounted that inclusion of this bond would violate the AER's own criterion that it relies upon bonds with "Australian domestic issuance". However, irrespective of whether that is the case, I consider that this would be inadequate grounds upon which to exclude Coca Cola Amatil or any other bond.

195. In my opinion, any information which can provide information relevant to assessing the "Australian benchmark corporate bond rate" should be considered. This includes the issuance by Australian companies into overseas markets, whether in Australian dollars or in foreign currency. The yields on bond issues into foreign markets provide relevant information about the yields that could be expected on domestic bond issues. In the context that we observe various firms simultaneously issuing into both markets, it is a reasonable assumption to make that the expected yields would be similar or the same in both cases.

196. I note that exclusion of information on the type of narrow grounds that PwC rely upon in respect of the Coca Cola Amatil bond has been attempted in the past by the AER in

[38] PwC, *Debt Risk Premium and Equity Raising Costs*, January 2012, p. 7

relation to floating rate bonds, by attempting to define the benchmark bond as fixed rate.[39] The Tribunal rejected this style of argument:[40]

> *First, the AER said that floating rate bonds were not a perfect substitute for fixed rate bonds. The AER may be correct to say that the two are not perfect substitutes, but this is not determinative. The issue here is whether taking floating rate bonds into account could aid in determining the yield on 10-year BBB+ bonds. As a matter of theory, the yield on a floating rate bond will be an unbiased proxy for the yield on a fixed rate bond because of the law of arbitrage. Briefly summarised, the law of arbitrage says that if an investor has a choice between a fixed rate bond and a floating rate bond that are identical other than their yield, he/she could buy the floating rate bond and enter into a swap arrangement, which would give him/her a fixed income stream. Consequently, investors would choose to buy the bond with the higher yield until the yields equilibrate. This theory is supported by empirical evidence. For example, Figure 2 of CEG's report shows the yield on 10 companies' simultaneously issued floating rate and fixed rate bonds with the same maturity and same rating*

197. In my opinion, it is incorrect to exclude the information obtained from any bond on the grounds that it is a "Euro MTN", a characteristic that is in fact shared by a very large number of bonds. However, I consider that the Bloomberg yield information for the Coca Cola Amatil bond is commensurate with a Standard & Poor's rating of AAA or AA+, rather than A-, and should therefore not be included in the AER's consideration of DRP.

7.4.3. Erroneous inclusion of SPI Electricity and Gas

198. SPI Electricity and Gas is a subsidiary of SP AusNet, which is majority owned by Singapore Power, itself wholly owned by Temasek Holdings, an investment holding company owned by the Singapore government. That is, SPI E&G is ultimately majority owned by the Singapore government through its ownership of Singapore Power.

199. I note that aside from the Coca Cola Amatil bond, the SPI E&G bond has the lowest DRP in Table 2 above. Caution must be applied in assessing whether the yields on SPI E&G's bonds are commensurate with its rating of A-. The Singapore government is rated AAA with Standard & Poor's.

200. The AER's consultant, Oakvale Capital, stated in regard to bonds issued by SPI E&G:[41]

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39 See for example ActewAGL, *Final decision: ACT, Queanbeyan and Palerang gas distribution network*, March 2010, p. 42. This was the AER's practice in electricity decisions prior to this as well.

40 Application by ActewAGL Distribution [2010] ACompT 4 (17 September 2010), para. 53

41 Oakvale Capital, *The impact of callable bonds*, February 2011, p. 24

During the averaging period the bond was attracting one of the lowest yields, in contrast to other A- bonds observed (as per the CEG report). The key feature supporting the bond was the parental support of the issuer's owners and the link to the Government of Singapore.

201. On this basis, I consider that the yield on SPI E&G's debt should not be considered representative of an Australian benchmark corporate bond rate. The potential for error is particularly compounded when the yield on this bond is one of only a handful that are considered in calculating that rate, as under the AER's methodology. In my view, this bond should not be included in the AER's consideration of DRP.

7.4.4. Remaining bonds considered by the AER

202. Removing the Coca Cola Amatil and SPI E&G bonds previously mentioned from the AER's dataset leaves the six bonds set out in Table 3 below. The average DRP for these seven bonds over the Victorian distribution business' averaging period is 3.63%, 0.41% higher than I calculate over the AER's sample of nine bonds.

Table 3: Bonds relied upon by the AER (amended by CEG)

Issuer	Rating	20 days to 14 Oct 2011		20 days to 16 Dec 2011	
		Term to maturity	Average DRP	Term to maturity	Average DRP
APA Group	BBB	8.8	3.03	8.7	3.19
Brisbane Airport	BBB	7.7	2.64	7.6	2.84
Sydney Airport	BBB	10.1	3.77	10.0	3.91
Sydney Airport	BBB	11.0	3.86	10.9	3.97
Dalrymple Bay Coal Terminal	BBB+	9.7	4.26	9.5	4.40
Dalrymple Bay Coal Terminal	BBB+	11.2	3.69*	11.1	3.90
Stockland Trust	A-	9.1	2.97	9.0	3.23
Average		**9.66**	**3.46**	**9.54**	**3.63**

Source: Aurora draft decision, p. 241, Bloomberg, UBS, RBA, CEG analysis

203. Of the seven bonds listed at Table 3 above, four report DRPs over the Victorian business' averaging period that are higher than the extrapolated Bloomberg BBB fair value curve over the period between 21 November 2011 and 16 December 2011. The mean DRP of the sample is 3.63%, which is only 0.23% below the extrapolated Bloomberg BBB fair value curve assessed at 10 years.

204. In summary, I consider that while the AER's proposed methodology is likely to be inadequate for the purpose it is put to, when applied correctly it provides support for the extrapolated Bloomberg BBB fair value curve estimate, or at least provides no reason to suppose that the Bloomberg BBB fair value estimate is an unreasonable measure of DRP.

7.5. Cross-checks used by the AER were inadequate

205. In addition to adopting a methodology that used information from only a small sample of bonds to estimate the benchmark DRP, the AER's draft decisions for Aurora and Powerlink only employ limited cross-checks to test the robustness of its DRP estimates.

206. As described at section 7.3 above, the AER conducted what it described as 'sensitivity testing', which generally consisted of narrowing its sample of bonds still further. However, the AER did seek to compare its DRP estimates against analyst reports of the debt financing outlooks of various regulated network service providers. The evidence it put forward included that:[42]

- Macquarie Equities Research expected that APA Group would refinance $900m of bank debt at a spread of 240 basis points;
- Macquarie Equities Research expected that Spark Infrastructure Group would be able to raise debt at spreads at around 150 basis points; and
- Bank of America Merrill Lynch noted that DUET Group had refinanced $3 billion of debt at approximately 300 basis points since April 2011.

207. In my opinion, none of these observations supplies useful information supporting the AER's draft decision (in the case of Aurora) of a DRP of 3.14%, and none would support a similar result in respect of the Victorian distribution businesses. The AER appears to have overlooked in its interpretation of this evidence that:

- in referring to basis points spreads, the analysts are almost certainly referring to "spread to swap", which is a market convention, and not "spread to CGS" as their statements are interpreted by the AER; and
- the statements of expected spreads do not contain information about the expected maturity of the debt raising. The AER has no basis upon which to assume that the expected spreads are representative of 10 year debt.

208. Without further information, I do not consider that the analyst reports as summarised by the AER lend support to its proposed DRP estimate. To the extent that the expected spreads were for maturities considerably shorter than 10 years (which is very likely) then this information could indeed contradict the AER's assessment of DRP and lend support to Bloomberg's fair value estimates.

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[42] AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, p. 242

8. Recommended benchmark cost of debt and DRP

209. I conclude that the extrapolated Bloomberg BBB fair value curve is a good fit to the available data. This gives rise to an estimate of the 10-year DRP of 3.92% over the averaging period from 21 November 2011 to 16 December 2011. This is associated with a benchmark cost of debt of 7.91%.

210. In my view this is the best estimate of the required DRP consistent with prevailing conditions in the market for funds over this averaging period. I consider that when combined with annualised yield on 10-year CGS estimated over the same averaging period, use of this estimate results in a cost of debt that is in line with the Australian benchmark corporate bond rate for corporate bonds which have a BBB+ credit rating and a maturity of 10 years.

Appendix A. Conversion calculations from YTC to YTM

A.1. Background

211. UBS quotes floating rate bonds by reference to “trading margins”. A trading margin is the same as a DRP but instead of being measured relative to the CGS rate the trading margin is measured relative to the swap rate. Quoting risk premiums for floating rate bonds relative to the swap rate is standard market practice. UBS quotes trading margins for floating rate bonds rather than DRPs. All of the bonds discussed below are floating rate bonds and so the discussion is primarily in terms of trading margins. The equivalent fixed rate yield on a bond is calculated as the trading margin plus the swap rate to the relevant maturity. However, in a given maturity range, the DRP is a roughly constant level above the trading margin reflecting a roughly constant difference between the swap rate and the CGS rate.

A.2. AER views

212. The AER appears to believe that where a UBS rate sheet lists a bond’s next call date under the ‘maturity’ column then the yield/trading margin for that bond should be interpreted as a yield/trading margin to call rather than a yield/trading margin to maturity.

213. If that is correct, the yield to maturity will be lower than the yield to call for any bond that is trading at less than its face value (ie, where the trading margin on the bond is more than the coupon margin the bond is paying).

214. This is because the capital gain payable on the bond if held to maturity (the difference between the trading value and the face value), while the same as the capital gain received if the bond is called, is received later (ie, at maturity rather than at the first call date). Put simply, if the capital gain occurs at maturity rather than call date then the bond is less attractive (has a lower yield to maturity) than if the capital gain is realised at the (earlier) call date.

215. If the AER is correct then CEG is wrong to include the yields on these bonds at their actual maturity.

A.3. AER views can be tested by examining DBCT bonds relative to each other

216. It is possible to test this speculation by comparing the yields on different DBCT bonds. If the AER is correct, two of the three labelled DBCT bonds in the charts in this report do not require adjustment because they are quoted ‘to maturity’. However, one does require adjustment because it is quoted ‘to call’ and therefore, under the AER’s contention, should be adjusted. However, as outlined below, if the adjustment is made, the DBCT bond is given a DRP that is not credible relative to the DRPs for the other two DBCT bonds - where it is agreed by the AER that no adjustment is necessary. Specifically, the adjustment would result in a DRP of around 1.2%

(calculation described below) which is inconsistent with the DRPs of the other two DBCT bonds which are in excess of 4.0%.

217. This demonstrates that UBS's trading margin is, at least for this bond, best interpreted as applying 'to maturity' rather than 'to call'.

218. However, this technique of pair-wise comparison cannot be applied to other bonds in question (eg, Suncorp and Vero) because, unlike the DBCT bonds, there is no single bond from these companies where UBS lists the true final maturity date. All of these bonds would, if the AER was correct, require adjustment and, therefore, there is no 'control' against which the adjusted yields can be compared for reasonableness.

219. Moreover, these bonds all have call dates that are much later than the DBCT bond – which means that the required adjustment would be much smaller. For these reasons, one cannot so readily demonstrate that the AER's hypothesis is not credible with respect to these bonds. However, it remains the case that the AER's hypothesis is speculation rather than fact and that this speculation is clearly wrong in relation to at least one of the callable bonds, namely the DBCT bond maturing on 12 December 2022.

A.4. Details of DBCT adjustment calculations

220. The DBCT bonds provide the best basis on which to test the AER's hypothesis because:

- There are two DBCT bonds where UBS lists the final maturity of the bond in its rate sheets. Therefore, it is uncontested that the trading margin information for these bonds is associated with the final maturity of the bond.
- There is one DBCT bond where UBS lists the first call date in its rate sheets:
  a. The first call date for this bond was on 12 December 2011 but the final maturity is 11 years later;

  b. The trading margin on this bond is well above the coupon margin on the bond (300bp vs 29bp on the 2nd December 2011).

221. The coupon rate on the DBCT bond to be adjusted is only 29bp above the swap rate (that is the bond will pay coupons equal to the swap rate plus 0.29% of the face value of the bond).

222. Consequently, in order to earn a return of 300bp above the swap rate, the remaining return of approximately 271bp (300bp-29bp) must come in the form of a capital gain at the time the bond is redeemed (its maturity date or its call date). This capital gain reflects the difference between the bond's trading price and its face value.

223. If the AER is correct that UBS's yields are expressed to the first call date then UBS must be estimating that an approximate 271bp annual capital gain is to be delivered on

the bond's first call date, only 10 days after 2 December 2011 (being the date from which the UBS trading margin of 300bp was taken). However, because the call date is only 10 days away, it is equivalent to an absolute capital gain of around 7.4bp (271*(10/365)).

224. If this were indeed the case then this same 7.4bp capital gain, realised at maturity (11 years time) gives just 0.7bp capital gain per annum (7.4bp/11 years)

225. When this annual capital gain is added to the 29bp coupon return the total margin above the swap rate to maturity is only around 30bp. A 30bp trading margin is associated with a DRP of around 1.0% (given a margin between swap and CGS rates of around 73bp on 2 December 2012).

226. The nature of the calculations set out above are approximate because they are limited to simple addition and division of the relevant UBS rate sheet values. This makes the calculations, and the underlying financial logic, simple to understand. However, a precise estimate, discounting all relevant cashflows to determine the internal rate of return, would not differ materially from these values. We have performed these calculations and estimate an adjusted DRP for the DBCT bond of 1.17% on 2 December 2012.

A.5. Use of Bloomberg YASN function to make the adjustment

227. In the Powerlink draft decision the AER gas stated that:

> *The AER is aware of a method that applies the Bloomberg YASN function to make the adjustments discussed above. However, the AER has had technical issues with the application of the function, and is undertaking further analysis to address these issues. Accordingly, the AER considers the method for adjusting callable bonds is not, in the current circumstances, sufficiently reliable to include these bonds in the sample. (Page 217).*

228. However, we are able to use this function to make the necessary adjustments. We have used this function in Bloomberg to estimate the yield to maturity of the DBCT bond maturing on 12 December 2022 if one interprets the UBS trading margin as being a yield to call.[43] The result is a yield to maturity of 5.10% (which is very close to our own estimate of 5.17%).

[43] This is achieved by substituting a price for the bond into the YASN function that is equal to the price in the UBS rate sheets on the 2nd of December 2012. I note that the price in the UBS rate sheets appears to be a mechanical calculation that solves for the price that is consistent with the trading margin and the maturity date that is listed in the spreadsheet. In the case of this bond, the maturity date is the call date and, therefore, the price is the price that would exist if the trading margin were expressed on a trading margin to call basis. (I note that, for the reasons described above, the only reasonable interpretation of this data is that the UBS trading margin is expressed on a yield to maturity basis but that the rate sheet mechanically derives an (incorrect) price for the bond by treating that trading margin as being expressed on a 'to call' basis.)

Figure 20: Screenshot of Bloomberg YASN function

Source: Bloomberg

Appendix B. Method to calculate Australian dollar equivalent yields on foreign currency bonds

229. Bloomberg's XCCY function estimates cross-currency swap rates between any pair of currencies for given characteristics, such as maturity, coupon payments and payment frequency.

230. Given the number of foreign currency bonds issued in Australia (over 1000, with 20 days of data for each) it is not practicable to use this function to convert each bond on each day, given that each historical conversion is a manual process. To resolve this practical difficulty, I establish a mapping between foreign currency bond yields and Australian dollar bond yields for each currency using a cross-section of conversions obtained from Bloomberg at different maturity-yield pairs averaged over three days in the averaging period. Given the maturity and yield of the foreign currency bond to be swapped, I use interpolation across these points to identify the equivalent Australian dollar yield at that maturity.

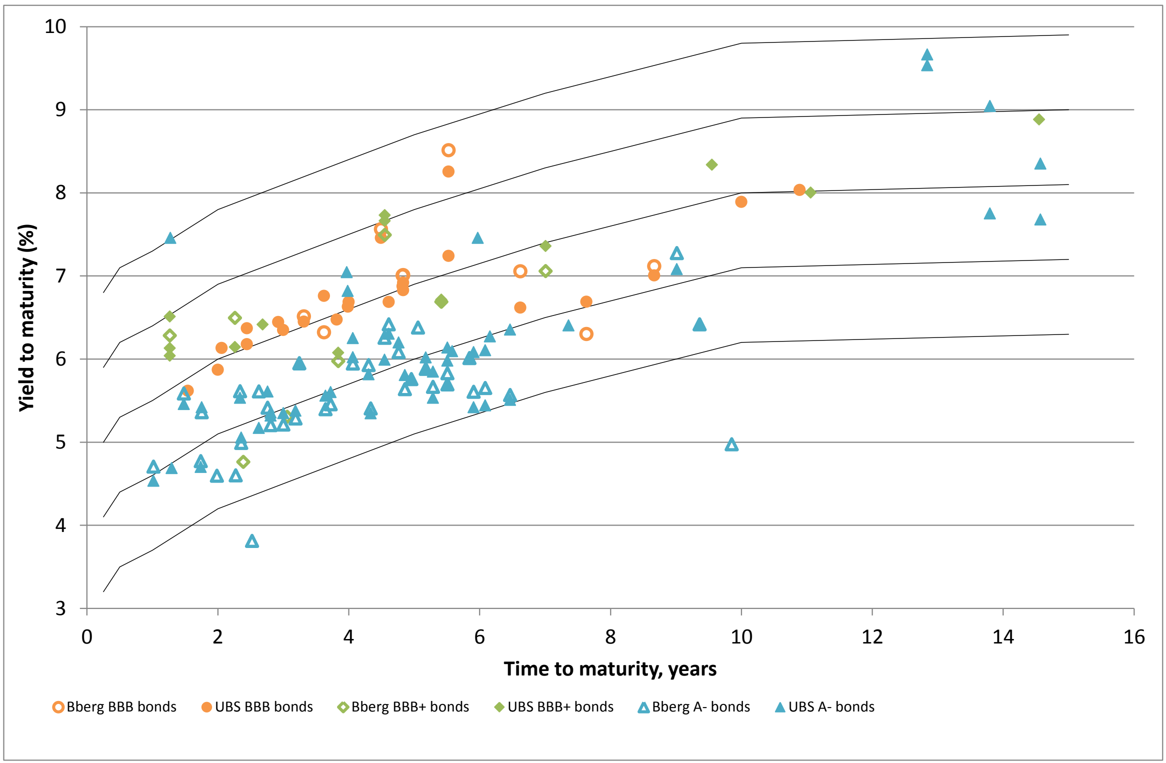
231. It is convenient to establish this mapping on a common set of Australian dollar maturity-yield pairs. The following table of Australian dollar yields was swapped into equivalent foreign currency terms for the nine most common currencies averaged across three dates in the averaging period, being 21 November 2011, 2 December 2011 and 16 December 2011. These currencies were CAD, CHF, EUR, GBP, HKD, JPY, NZD, SGD and USD. It is important to note that the yields in Table 4 below have been chosen based on typical yields observed at each maturity in Australian dollar terms in order to establish a range that will encompass the majority of bond yields. However, the selection of these yields only forms a 'mesh' of points at which cross-currency conversions are made and then used to inform conversions at other points. The results of the methodology do not turn on the selection of these particular points.

Table 4: Australian dollar yield-maturity pairs used for cross-currency swap calculations

Maturity					
0.25	3.20	4.10	5.00	5.90	6.80
0.5	3.50	4.40	5.30	6.20	7.10
1	3.70	4.60	5.50	6.40	7.30
2	4.20	5.10	6.00	6.90	7.80
3	4.50	5.40	6.30	7.20	8.10
4	4.80	5.70	6.60	7.50	8.40
5	5.10	6.00	6.90	7.80	8.70
7	5.60	6.50	7.40	8.30	9.20
8	5.80	6.70	7.60	8.50	9.40
10	6.20	7.10	8.00	8.90	9.80
15	6.30	7.20	8.10	9.00	9.90

232. To understand why I consider that the yield-maturity pairs used in Table 4 above are likely to produce reasonable estimates of Australian dollar yields, Figure 21 below shows these charted against the yields on the population of domestic bonds rated BBB to A- (as shown earlier at Figure 2 above).

Figure 21: Cross-currency yield-maturity pair matrix against BBB to A- domestic bond yields



Source: Bloomberg, UBS, RBA and CEG analysis
Note: Data sourced as an average over 21 November 2011 to 16 December 2011

233. I note that the precision of the approximation obtained could always be improved by collection of more maturity-yield pairs. However, I judge in the circumstances that the pairs in Table 4 above are sufficient to provide a reasonable approximation.

234. The swapped United States table was derived from Bloomberg as an average over 21 November 2011, 2 December 2011 and 16 December 2011, as illustrated in Table 5 below. Each element in Table 5 is mapped from the equivalent element in Table 4. Table 5 is provided for illustrative purposes but it should be noted that similar tables are produced for each of the nine currencies that I obtain bond yield information from.

Table 5: United States dollar calculated yield-maturity pairs used for cross-currency swap calculations

Maturity					
0.25	-0.844	0.048	0.939	1.831	2.723
0.5	-0.116	0.762	1.640	2.517	3.395
1	0.535	1.411	2.288	3.164	4.041
2	1.092	1.957	2.823	3.688	4.554
3	1.346	2.199	3.052	3.905	4.757
4	1.680	2.520	3.360	4.200	5.041
5	1.995	2.824	3.653	4.481	5.310
7	2.661	3.469	4.276	5.084	5.892
8	2.908	3.706	4.505	5.303	6.102
10	3.391	4.173	4.955	5.737	6.525
15	3.808	4.558	5.308	6.058	6.808

Source: Bloomberg

235. In order to swap bonds from foreign currency yields into Australian dollar yields, the tables are used to interpolate five foreign currency yields and five equivalent Australian dollar yields at the maturity of the bond. Then the foreign currency yield is used to interpolate across the five Australian dollar yields to give the resulting estimate in Australian dollar yield terms.

236. For example, the following table of foreign currency and Australian dollar yields can be constructed for a United States dollar bond with maturity of 9 years:

Table 6: Example of swap calculation

Maturity	Yield 1	Yield 2	Yield 3	Yield 4	Yield 5
AUD	6.000	6.900	7.800	8.700	9.600
USD	3.150	3.940	4.730	5.520	6.314

237. If the bond in question has a yield in United States dollars of 5.00%, then by interpolating between the second and third columns in the table above it is possible to show that the approximately equivalent Australian dollar yield is 8.11%. Yields for other foreign currency bonds are converted into Australian dollar yields in the same way.[44]

[44] All cross-currency swaps from Bloomberg have been calculated in semi-annual terms, so annualisation is applied after the swap is performed.

Appendix C. Reasons relied upon by the AER to reject Bloomberg

238. The AER has asserted at least eight separate reasons in support of its proposal to rely upon its own methodology for assessing DRP in preference to the extrapolated Bloomberg fair value curve.[45]

C.1. The Bloomberg fair value curve is not transparent

239. The AER notes that:[46]

> *…the Bloomberg FVC is derived from estimates made by a market data provider, which are then reconciled with observed yield data drawn mostly from short dated bonds. The proprietary techniques used to produce the yield estimates cannot be assessed by third parties. This limits the ability of interested parties to gauge the efficiency of the underlying estimates, or to what extent they reflect the available market observed data.*

240. Despite this apparent lack of transparency, the AER was able to identify the data relied upon by Bloomberg and the approximate methodology relied on by Bloomberg to fit its curve. This is information that the AER later relies upon to criticise Bloomberg's estimates.

241. I agree that, all else being equal, transparency is preferable This does not mean that all outputs from proprietary models should be rejected simply because they are not transparent. If this were the case, the AER could not rely upon the labour cost forecasts that it receives from Access Economics, for example, because these are generated from a proprietary macroeconomic model of the Australian economy, about which much less is documented than is the case for Bloomberg's fair value curves.

242. o one must be careful in uncritically accepting the outputs of a methodology that is not transparent. Certainly the AER should be careful to ensure that the extrapolated Bloomberg fair value estimates are reasonable before relying on them. This assessment should rely upon all relevant information that is available, which is what I have done in sections 3 to 5. However, it would be unreasonable to simply not have regard to Bloomberg's expertise and to lose the information that this provides simply because the AER does not understand perfectly how it comes to these estimates.

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45 See AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, pp. 225-232

46 Ibid, pp. 225-226

C.2. Bloomberg fair values are not intended to be a predictive source of pricing

243. The AER asserts, based on a letter it has received from Bloomberg, that Bloomberg's fair value curve:[47]

> *is not intended to be a predictive source of pricing information. The AER considers it should be interpreted as a supplementary source of data where prices cannot be obtained for relevant bond comparators*

244. It is unclear to me as to why the AER considers that statement is relevant to the use of Bloomberg's fair value estimates, or how it comes to its conclusion in the second sentence based on the information in the first.

245. Firstly, it is obvious that Bloomberg's fair value curves are not 'predictive' in the sense that they are not intended to mimic or exactly price the characteristics of any single bond. They are formed based on calculations across a range of bonds with similar credit ratings and, as such, act as a benchmark representative of bonds with those credit ratings. This makes the fair value curves ideal for use in the context of regulation where a 'benchmark' is required.

246. Secondly, it should be noted that although Bloomberg's methodology is not transparent, it is well understood as a methodology that seeks to use reported bond yields to derive a fair yield curve. As such, it is no different in principle from (although clearly much more sophisticated than) the AER's proposed methodology in Aurora and Powerlink to take a simple average across nine bonds that it considers most relevant to the benchmark. If the AER's statement is a valid criticism of Bloomberg's fair value curve, then it is also a valid criticism of any methodology (including its own) that seeks to use reported yield information to estimate a benchmark yield.

C.3. Bloomberg fair values do not take into account yields derived from floating rate notes

247. The AER notes that Bloomberg's fair value curve:[48]

> *excludes floating rate bonds from the sample used to generate the FVC, which prevents representation of the full range of available information*

248. To the extent that Bloomberg's methodology neither directly nor indirectly takes into account yields on floating rate notes then I agree that this is a reason for including these bonds when testing the accuracy of the Bloomberg curve.

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[47] Ibid, p. 243

[48] Ibid, p. 243

249. Caution should be applied in considering any methodology that does not have regard to the full range of information available. That is why in this report and in previous reports I have exhaustively compared Bloomberg's fair value estimates to the full range of available yield information.

250. This is also an important reason why caution should be applied in considering the AER's most recent proposal, based on taking a simple average over nine bonds. Notwithstanding its concern that the Bloomberg fair value curve does not take account of floating rate bonds, the AER's proposed methodology is defined by the data that it seeks to exclude based on maturity, credit rating, option status, whether they are subordinated and where the bonds are traded. The 'excluded' bonds in the AER methodology exclude most bonds (both fixed and floating).

C.4. Bloomberg BBB fair value curve does not take into account many long dated bonds

251. The AER notes that:[49]

> *Where there are few or no long dated bonds in the sample, the AER considers the scope for the FVC estimate to differ from a 'true' price at the benchmark term is likely to increase*

252. I agree as a matter of principle that any methodology that seeks to use information to come up with an estimate may be less precise and/or robust where that information is scarce.

253. It then goes on to state:[50]

> *The bonds used to derive the Bloomberg BBB rated FVC consisted largely of bonds with less than 5 years term-to-maturity, which may have explained the disparities between the observed yields for long dated bonds and the Bloomberg FVC estimates.*

254. Where the AER talks about 'disparities' between observed yields for long dated bonds and the Bloomberg fair value curve estimates, it appears to be using its own nine bond sample as a reference point. This could be a valid criticism of Bloomberg's results if this sample of bonds represented the totality of information about the yields on long dated bonds that was available to the AER, and it was established that Bloomberg did not properly utilise this information.

255. However, it is apparent that the AER's sample of nine bonds includes bonds that are not directly comparable to the benchmark bond (as explained at section 7.4.2 and

[49] Ibid, p. 243

[50] Ibid, p. 244

7.4.3) and furthermore does not utilise all the information about yields on long-dated bonds by:

- excluding the information provided by bonds with maturities of greater than 13 years;
- excluding the information provided by bonds with call options;
- excluding the information provided by bonds issued overseas or in foreign currencies; and
- excluding the information about the relationship between yields on short-dated and long-dated bonds indicated by bonds of other credit ratings.

256. I do not consider that in forming this sample the AER has established an appropriate benchmark upon which to critique Bloomberg's long dated fair value estimates. Ultimately, other information as assessed at sections 3 to 5 suggests that Bloomberg's fair value estimates more accurately represent the available evidence on long-term bond yields.

257. Furthermore, any assertion that Bloomberg does not take into account much of the information that the AER would seek to rely upon is insupportable. The AER's second statement above suggests that it believes that Bloomberg only takes into account the yields on bonds that are reported as forming its fair value curve. My understanding, based on discussions with Bloomberg help desk, is that Bloomberg considers **all** fixed rate bond yields in the relevant rating range. This includes many of the bonds that the AER considers highly relevant, such as APA Group. However, its assessment process means that that some bonds will not be used in the construction of the curve.

C.5. Recent issuance of long dated bonds indicate poor fit of Bloomberg BBB fair value curve

258. The AER refers to discussion in its final decision on the Amadeus gas pipeline where it reviewed recent issues, including Brisbane Airport, Sydney Airport bonds,[51] Stockland and SPI E&G. These yields, the AER claims:[52]

> *further suggested the extrapolated Bloomberg BBB rated FVC was not a reliable estimator of long dated corporate bond yields. In contrast, the observed yields for bond issuances were consistent with those for the APA Group bond.*

259. I agree that it is useful to compare bond yields to the Bloomberg fair value curve to assess its reasonableness. However, as demonstrated in sections 3 to 5 the five bonds noted by the AER are not the only source of information available to assess the Bloomberg fair value curve. Furthermore, since the AER's final decision in respect of

[51] Noting that these are not 'new' issues, but bonds for which yield information has only recently become available from UBS.

[52] See AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, pp. 243-244

the Amadeus gas pipeline the reported yields of many bonds, and of the Bloomberg fair value curve, have changed significantly and the AER's critique should be reassessed based on the most recent information, as I do in sections 3 to 5.

260. Further, I note in section 7.4.2 and 7.4.3 that the SPI E&G and Coca Cola , Amatil bonds are not relevant comparisons.

C.6. Bloomberg BBB fair values have not reflected improvements in debt market conditions since the GFC

261. AER argues that, because Bloomberg BBB fair value spreads have not decreased substantially since the GFC, this is indicative of a flaw in the current level of Bloomberg's fair value estimates.[53] This is a continuation of an argument that the AER has made in a number of forums, including recent regulatory decisions.[54]

262. However, this argument is ultimately predicated upon the notion that Bloomberg's fair value estimates properly reflected debt market yields during the worst of the GFC. That is, even if one accepted that debt market conditions had eased over this period, the fact that the Bloomberg fair value estimates had not changed much could be due to (amongst other explanations):

- Bloomberg's fair value estimates being too low then, and being correct now; or
- Bloomberg's fair value estimates being correct then, and being too high now.

263. None of the evidence relied upon by the AER establishes that the second point above must be the case. This was accepted by the Tribunal in its recent decisions in respect of APT Allgas and Envestra:[55]

> *At this point, it is sufficient for the Tribunal to express the view that the performance of the Bloomberg curve during and after the GFC alone would not necessarily have warranted its rejection. The unusual circumstances and market conditions, in particular the restriction of the debt market, that prevailed during the GFC are unlikely to persist for extended periods and might not therefore be viewed as indicative of the likely market conditions that would prevail during the majority of the ten year reference period. At most, the so-called "counterintuitive" performance would warrant further investigation of the reliability of the Bloomberg curve.*

264. I believe that the most useful evidence that the AER puts forward is the iTraxx CDSI (page 246 of the Aurora draft decision), reproduced in Figure 22 below.

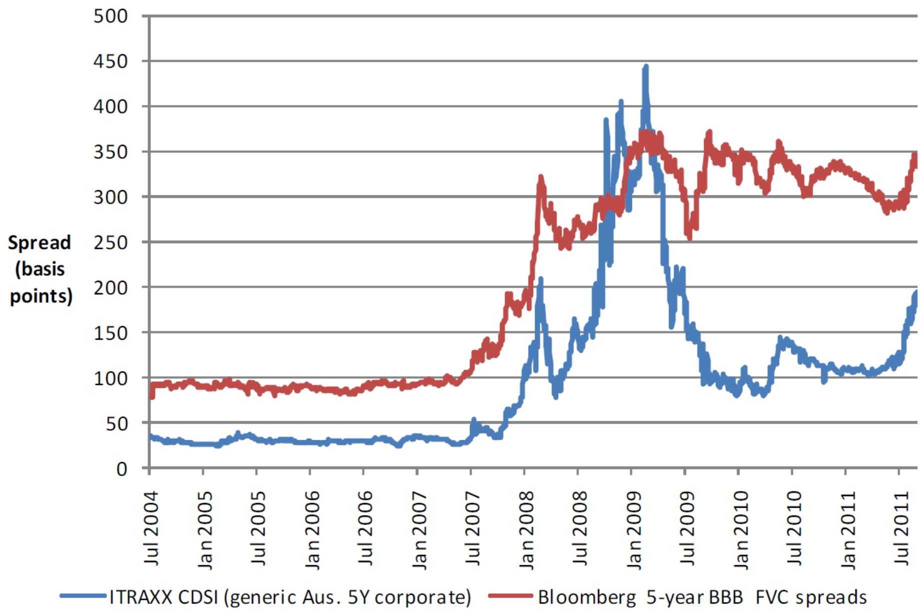
53 Ibid, pp. 244-246

54 See for example AER, *Final decision: Access arrangement for the SA gas network*, June 2011, pp. 204-26

55 Application by Envestra Limited (No 2) [2012] ACompT 4 (11 January 2012), para. 81.

Figure 22: Figure 9.6 from the AER's Aurora report

Figure 9.6 Perceptions of default risk—iTraxx CDSI compared to the Bloomberg 5 year BBB rated FVC



Source: Bloomberg, RBA, AER analysis.

Source: AER

265. Before discussing this figure, it is important to note that one should not expect the DRP based on the Bloomberg fair value curve to be at the same level as the iTraxx index. This is because writing a CDS contract does not involve the same transfer of risk as buying the bond that the CDS is written against (eg, if the purchasers of a bond are exposed to interest rate risk and a CDS insured bond only provides adequate insurance if the CDS issuer also does not default). Moreover, the Itraxx index is not solely based on BBB to BBB+ bond issues.

266. One can expect the iTraxx and BBB fair value curve to move in the same direction for a given economic shock. It may also, depending on the nature of the shock, be reasonable to assume that the two series would settle at levels relative to their pre-shock level that are broadly consistent. That is, if a shock doubles the iTraxx series it may be reasonable to assume that it also doubles the BBB fair value series.

267. With this in mind the above figure shows that during the GFC the Bloomberg fair value estimates did not 'spike' in the same manner as iTraxx (or for that matter CBASpectrum). It is interesting to note that during this period, the AER's methodology

at that time selected Bloomberg's fair value curve as preferable to CBASpectrum's on the basis of evidence provided by a handful of bonds.[56]

268. Subsequent to the crisis, the iTraxx CDSI declined substantially, whilst Bloomberg's fair value estimates were variable but approximately constant and considerably higher than iTraxx. However, this is entirely consistent with the pre-crisis period in which the iTraxx index was also much lower than Bloomberg's fair value estimates. Indeed, the relativities between the two series appear approximately the same pre and post crisis. In each period Bloomberg's fair value curve is around three times the value of the iTraxx series. It is only during the 2008/09 crisis that this relativity is disturbed – with the iTrax series briefly spiking above the Bloomberg series. This suggests that the behaviour of the Bloomberg fair value curve was anomalous in that period and not in the post crisis period.

269. In conclusion, the evidence put forward by the AER appears consistent with an interpretation that the Bloomberg fair value estimates reacted insufficiently to the GFC. Although the AER has provided some evidence that conditions for debt raising have eased since the worst of the GFC, this provides no basis to disregard current Bloomberg fair value estimates.

C.7. Fair value estimates may be unreliable at 10 years

270. The AER notes that, in general, the reliability of fair value estimates may be questionable at long maturities:

> *Both Bloomberg and CBASpectrum had ceased publication of their 10 year FVCs, which might indicate a lack of confidence in the reliability of the FVC estimates for long-term debt.*

271. I note that the AER's statement applies equally to its own estimate of DRP, since this is simply another fair value estimate, albeit less sophisticated and relying on less data than Bloomberg's or CBASpectrum's estimates. Hence I do not regard this comment as supporting a preference for the AER's methodology over that of Bloomberg's.

272. I agree that fair value estimates at long maturities are likely to be less precise than at shorter maturities where there is more data. My opinion, as set out elsewhere in this report, is that these estimates can be cross-checked by reliance on:

- a methodology that uses the information from shorter-dated bonds to inform long-dated yields; and/or
- additional yield data sourced from bonds issued by Australian companies into overseas markets.

[56] See AER, *Final decision: New South Wales distribution determination*, 28 April 2009, pp. 227-229

273. That is, the reliability of the fair value estimate can be established (or otherwise) by reference to a wider range of information. In conducting these tests at sections 3 to 5, I find that this information supports the estimates produced by the extrapolated Bloomberg BBB fair value curve.

C.8. Extrapolation methodology for Bloomberg is unreliable

274. In its Aurora draft decision, the AER expresses doubt about the method for extrapolation of the Bloomberg BBB fair value curve used by Aurora, specifically the use of Bloomberg's AAA fair value estimated dating from June 2010.[57] Although the method applied by Aurora was originally proposed by me in 2010,[58] I did not envisage that it would remain appropriate to apply without review for an extended period into the future.

275. I do not consider, and I do not read the AER as suggesting in its Aurora draft decision, that the need to extrapolate the Bloomberg BBB fair value curve from seven years to ten years to meet required 10-year benchmark is a valid reason for not having regard to the information contained within the Bloomberg BBB fair value curve.

[57] AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, pp.246-249

[58] CEG, *Use of the APT bond yield in establishing the NER cost of debt*, October 2010, pp. 49-56