Estimating the cost of 10 year BBB+ debt during the period 17 November to 5 December 2008

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Table of Contents

Table of Figures

Table of Tables

1. Terms of reference

1. DLA Phillips Fox has asked me to advise on the compliance of various proxies for the 'observed annualised Australian benchmark corporate bond rate for corporate bonds'. This is an input into the estimation of the Debt Risk Premium (which is derived by subtracting the yield on Commonwealth Government Securities from the 'observed annualised Australian benchmark corporate bond rate for corporate bonds'). The relevant sections of my terms of reference are set out below.

1. Compliance of Bloomberg and other DRP measures with the legislative requirements

The requirements under the AMI OIC for the calculation of the DRP are that:

- it must be determined using the 'observed annualised Australian benchmark corporate bond rate for corporate bonds';
- the bonds must have a BBB+ credit rating;
- the bonds must have a maturity period of 10 years; and
- measurement is to occur between 17 November and 5 December 2008 (**the measurement period**),

(**the legislative requirements**)

In the draft determination, the AER determines that the DRP should be 3.09%. This determination is based on fair yield curves published by Bloomberg during the measurement period. The AER's reasons are set out on pages 118-124 of the draft determination.

Can you please advise on:

- whether the Bloomberg fair yield curves that the AER relies on in the draft determination comply with the legislative requirements, and the extent to which they comply with the legislative requirements; and
- what other sources could reasonably be used to measure the DRP, and to what extent do those other sources comply with the legislative requirements.

2. Reliability of Bloomberg and other DRP measures

Can you please advise on:

- whether the Bloomberg fair yield curves that the AER relies on in the draft determination are a reliable and accurate estimate of a DRP that complies with the legislative requirements; and

- whether there are other sources that could be used to measure the DRP and that are a more reliable and accurate estimate of a DRP that complies with the legislative requirements.

2. Criteria for estimating the cost of Debt

2.1. Interpretation of the 'benchmark rate'

2. In order to answer my terms of reference it is necessary to proceed on the basis of an interpretation of the meaning attached to the '*observed annualised Australian benchmark corporate bond rate for corporate bonds for bonds with a BBB+ credit rating and a maturity of 10 years'*.

3. I interpret this to mean that it is the yield that would be paid on a typical BBB+ rated bond with a maturity of 10 years and that this typical yield must be assessed based on actual observations of yields in the corporate bond market. Specifically, observations from the bond market should have primacy over any preconceived conceptual notions of what the yield on a 10 year BBB+ bond should be absent those market observations.

4. I do not consider that the term *benchmark corporate bond rate* (in general or applied to BBB+ 10 year debt) has a standard or common usage in finance theory or practice. However, I do note that, in the context of economic regulation, the term 'benchmark' does have a common meaning. Given that the cost of debt is an input into the economic regulation of the AMI assets it may be relevant to consider the general meaning that is attached to the use of the term 'benchmark' in this wider context.

5. In order to give regulated businesses an incentive to operate efficiently, it is necessary to set revenues in a manner that is independent of, or at least not entirely dependent on, the actual conduct of the regulated firm. This gives rise to what is commonly described as 'benchmarks' against which the firm has an incentive to lower its own costs. If a regulated firm is able to perform at a lower cost than the 'benchmark' set by the regulator then the firm earns a financial reward being a profit in excess of the normal ('benchmark') level of profits. By contrast, if the firm operates at a higher cost than the benchmark then the firm incurs a financial penalty and has profits that are lower than the normal ('benchmark') level of profits. The same is true of service standard benchmarks – where firms are rewarded for operating at higher quality of service than the relevant benchmark and penalised for operating at lower quality of service.

6. This specific use of the term 'benchmark' in economic regulation is consistent with the interpretation of the benchmark cost of debt to mean 'typical' cost of debt. If incentive regulation were to always set expenditure/performance benchmarks at a level that is better than the typical firm can expect to achieve then typical firms (ie, most firms) will be unable to recover their true costs and will earn less than normal economic profits. This would be contrary to the stated objectives of economic regulation.

7. The current context involves setting the cost of capital based on a hypothetical 'benchmark' financing strategy that involves a firm adopting debt gearing of 60%

(which is a high level of gearing relative to most companies) and issuing 10 year debt. These 'benchmark' financing assumptions gives rise to:

- an assumed 'benchmark' equity beta of 1.0 (which is used in conjunction with an MRP of 6.0%); and
- an assumed 'benchmark' BBB+ credit rating from Standard and Poor's.

8. These benchmark assumptions, and observations of yields on Commonwealth Government and corporate bonds, give rise to an overall cost of capital. This is a benchmark cost of capital. If firms are able to lower their cost of capital below this then they receive a financial benefit and, if not, they receive a financial penalty. There are range of ways in which a firm might attempt to lower their cost of capital below the regulatory benchmark:

   - adopt a less aggressive level of gearing and thereby benefit from a higher credit rating and lower equity beta (but suffer as a result of having a greater proportion of their financing in the form of higher cost equity);
   - engage in other strategies that may lower debt or equity costs – such as hedging various risks, issuing hybrid debt/equity instruments, financial transparency with investors, prudent debt refinancing timelines etc.

9. In this context, one could interpret the use of 'benchmark' in the words 'observed annualised Australian benchmark corporate bond rate for corporate bonds for bonds with a BBB+ credit rating and a maturity of 10 years' to simply mean that the relevant *regulatory* benchmark was the cost of issuing 10 year BBB+ rated debt corporate debt. One could further infer that if such an assessment resulted in a range in which 10 year BBB+ debt would be issued then a 'typical' or 'central' point in that range should be adopted such that the typical issuer of BBB+ debt could be expected to achieve that interest rate on their debt.

10. In this context, a firm who is able to organise their financing strategy to lower their equity beta and/or to raise then credit rating (or to trade off a higher equity beta for a raise equity beta and lower the other in a manner that lowers the overall cost of capital) has an incentive to do so.

2.2. General criteria

11. In my view, in order to be accurate and reliable, any methodology for estimating the cost of debt should as far as possible:

    i. result in an unbiased estimate of the cost of issuing debt and a small standard error (ie, when the method does misestimate the benchmark rate it should only do so by a small amount);

ii. incorporate all relevant information and not rely on irrelevant information;

iii. produce results that are consistent with accepted expert opinion (including academic finance theory and empirical research);

iv. produce results that are timely and responsive to changes in market conditions; and

13. In order to assess these qualities it is also desirable that the methodology:

v. be transparent including transparency about how and to what end discretion has been employed.

2.3. Relevant economic issues

14. In this report I assess how one would estimate the accuracy of an estimate of the interest rate that would typically be incurred by a firm issuing a bond that has:

- no put/call/conversion options attached to it;
- a maturity of 10 years where the issuer makes fixed payments to the bond holder over the ten years and those payments are denominated in Australian dollars; and
- a credit rating of BBB+ from Standard and Poor's.

15. For these types of bonds, there are other features that may affect its yield. These include:

- whether the coupon payment is high or low. The higher the coupon payment the shorter the "duration" being the average timing of payments associated with the bond. For a "bullet" bond with a single payment at the time of maturity and no intervening coupons then the duration of the bond is equal to its maturity. For all other bonds the duration is shorter than its maturity. If the yield curve is upward sloping then, other things equal, for two bonds with identical maturity the bond with the shorter duration will have a lower yield to maturity – reflecting the fact that shorter duration bonds pay more of their value in earlier periods (over which the required yield to that point in time is lower when the yield curve is upward sloping);
- whether there is likely to be a liquid[1] secondary market for the bond. The more liquid the secondary market for a bond the more attractive will be the bond at the

[1] A liquid secondary market is one where a buyer or seller could, over a short period, accumulate/liquidate a large value of the relevant asset without raising/depressing its price.

time of issuance (lower the yield to maturity) because investors will know that the cost of selling the bond, should they need to do so in the future, will be lower; and

- whether the probability of default for a bond is higher or lower than the average for bonds with a BBB+ rating.

16. I will assess different estimates of the cost of debt against a 'benchmark rate' where that benchmark rate is 'typical' of bonds with differing duration, liquidity and default risk but which nonetheless have a BBB+ rating.

17. Finally, it is relevant to note that the cost of debt to a firm is the interest rate incurred by the firm at the time of issue. There are sound economic reasons for believing that the interest rate at which bonds trade at in the secondary market will be lower than the interest rate at which those bonds are issued initially (other things constant). This reflects the fact that the initial sale of the bonds represents the sale of 100% of the relevant bonds over a short period (often over a single day in a book build process). By contrast, secondary trades of the bond are almost always for much smaller parcels of the bond (a few percent of the total amount outstanding). Unless the corporate bond market is perfectly liquid then an initial sale of a large volume of bonds will always, other things equal, result in a lower bond price (higher yield) than subsequent secondary sales.[2]

18. Of course, determining the actual level of this premium is very difficult because it is very rare for an investor to participate in an initial bond sale and then immediately turn around and sell that bond in the secondary market. By the time secondary market sales are recorded it is not possible to know definitively whether the price change reflects a new issue premium or other factors that have affected the cost of debt since the initial issue was made.

2.4. Consideration of current market conditions

19. Following the onset of the global financial crisis, the market for corporate bonds has changed materially. The impacts of these changes are summarised in the below quotes from various sources:

20. Before the crisis was fully developed the International Monetary Fund (IMF) stated in April 2008:

[2] Of course, this does not mean that the first secondary trades after an initial issue will always occur at a lower yield to maturity. Changes in market conditions between the time of initial issue and the time of subsequent secondary trade may cause the observed yield on some secondary trades to be higher than the yield at time of issue.

"The financial market crisis that erupted in August 2007 has developed into the largest financial shock since the Great Depression, inflicting heavy damage on markets and institutions at the core of the financial system,"[3]

21. Since then, the crisis has progressed further and reached a new level in September 2008.[4] The IMF in its October 2008 World Economic Outlook clearly identified the events of September 2008 as signalling a 'new phase' for the crisis:

"The financial crisis that first erupted with the U.S. subprime mortgage collapse in August 2007 has deepened further in the past six months and entered a tumultuous new phase in September. The impact has been felt across the global financial system, including in emerging markets to an increasing extent. Intensifying solvency concerns have led to emergency resolutions of major U.S. and European financial institutions and have badly shaken confidence."

22. Similarly, the Organisation for Economic Cooperation and Development (OECD) states in the context of its November 2008 Economic Outlook No. 84:

"This Economic Outlook represents a substantial downward revision from just a few months ago: many of the downside risks previously identified have materialised. The financial turmoil that erupted in the United States around mid-2007 has broadened to include non-bank financial institutions and rapidly spread to the rest of the world. Following the collapse of Lehman Brothers in mid-September, a generalised loss of confidence between financial institutions triggered reactions akin to a 'blackout' in global financial markets."[5]

23. An important consequence of this is that there has been a significant flight of capital to the safety and liquidity of nominal Government bonds. This has been described by the US Federal Reserve as an "extreme rush to liquidity".

"We have discontinued the liquidity-adjusted TIPS expected inflation estimates for the time being. The adjustment was designed for more normal liquidity premiums.

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3 IMF, World Economic Outlook, April 2008 page xv.

4 On the 7th of September the two largest buyers and securitisers of US mortgages ('Fannie Mae' and 'Freddie Mac') were placed in conservatorship. On Sunday 14th September the bankruptcy of investment bank Lehman Brothers and the sale of Merrill Lynch to Bank of America (with US government guarantees attached) were both announced. On Tuesday the 16th of September it was announced that the US Government would effectively take over 80% of the equity in one of the world's largest insurers (AIG) which had suffered a liquidity crises and was unable to find lenders to save it from insolvency. The US Government provided an $85 billion credit facility in exchange for taking over 80% of the equity in AIG.

5 OECD, Economic Outlook No. 84, Editorial, Managing the global financial crisis and the economic downturn and summary of projections, Klaus Schmidt-Hebbel, OECD Chief Economist, page 3.

***We believe that the extreme rush to liquidity is affecting the accuracy of the estimates.*"[6]**

24. Australian credit markets have been similarly affected. Deloitte in a November 2008 report for the AER has stated:

> *The market for non-financial institutions corporate bonds, similar to the assumed BBB+ grade used in the WACC model, effectively vanished from capital markets in the first half of 2008 against a total for $6.5 billion for the whole of 2007*[7]
>
> *The small volume of corporate bond issues that has taken place in 2008 has been in the main restricted to large financial institutions, and credit spreads have increased significantly*
>
> *In the past, 5 and 10 year bonds were widely issued, but in the current market, the little volume that is being issued is primarily 3 year bank debt, with very little liquidity in 5 year facilities.*
>
> *In the current market it would be difficult (if not impossible) to attempt to refinance billions of dollars of debt in a 5-40 day [sic]*
>
> *From published research and discussions with market makers, the expectations are for the domestic corporate bond market to remain illiquid, possibly into 2010 and beyond. Given the historic events in credit markets, market makers were reticent to make any predictions… Their expectations are for the corporate bond market to have a very slow recovery, particularly for BBB+ issuances.*[8]
>
> *As per discussions with Market Makers there is currently no liquidity in the domestic corporate bond market, and international banks and fund managers are withdrawing funds from the market, restricting the size of the pool of money available to invest.*
>
> *The recent financial crisis demonstrates that in times of severe market conditions, liquidity in the primary and secondary markets can decline or even disappear. The lack of liquidity in the primary debt market implies business entities cannot raise finance via debt issuance without paying higher borrowing costs… On the other hand, the lack of liquidity in the secondary market implies capital providers in the primary market (investors) cannot convert debt securities to cash quickly at reasonable prices and hence would demand a higher rate of*

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6 http://www.clevelandfed.org/Research/data/TIPS/lpremium.cfm.

7 Page 5.

8 Page 9.

return from investments in the debt market. In both cases, the lack of liquidity will result in the addition of a liquidity premium to the investors' required rate of return and hence will increase the costs of accessing debt.[9]

25. Similarly, the Reserve Bank of Australia's (RBA) November Statement on Monetary Policy states:

> *"World financial markets have come under severe stress in the period since the last Statement [in August 2008]. Strains in credit markets escalated in early September, and the period since then has been marked by further large declines in equity prices and exceptional volatility across a range of markets…*
>
> *The renewed turmoil was sparked by the failure or near-failure of a number of financial institutions in the United States and Europe…*
>
> *These events saw an intensification of the credit tightening that was already beginning to take hold in a number of countries. While this had previously been mainly apparent in increased funding costs, which were typically passed on to borrowers in the form of higher lending rates, the renewed turmoil saw this develop into a serious tightening in credit availability. As confidence in the financial sector deteriorated, banks became more uncertain about their ability to sustain their funding, and this in turn made it more difficult for them to lend to sound borrowers in the non-financial sector.*[10]
>
> *Corporate bond issuance has remained low in recent months (Graph 74). Thirteen small bonds were issued in the September quarter, totalling around $1¾ billion. This is significantly lower than the average quarterly issuance of around $5½ billion before the credit turmoil. Two small corporate bonds were issued in October. As has been the case with most corporate issues in 2008, all of the recent deals were issued offshore.*[11]

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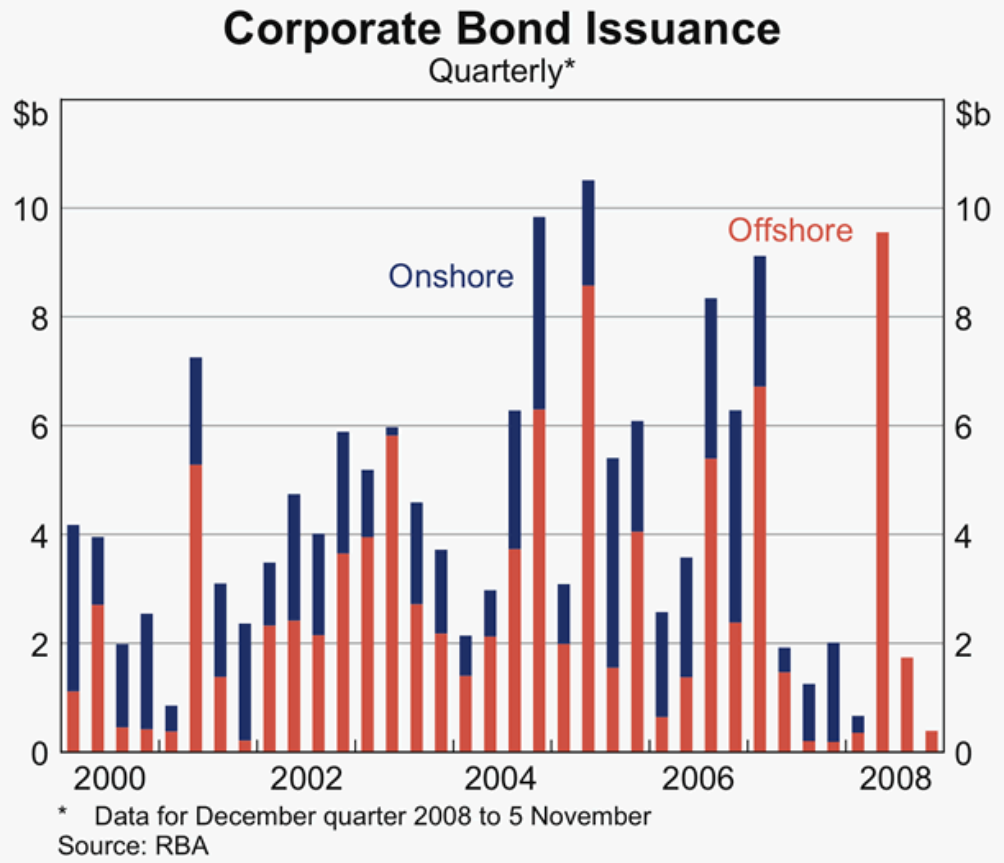
9 Page 18.

10 RBA, *Statement on Monetary Policy*, 10 November 2008, page 1.

11 Ibid, Page 56.

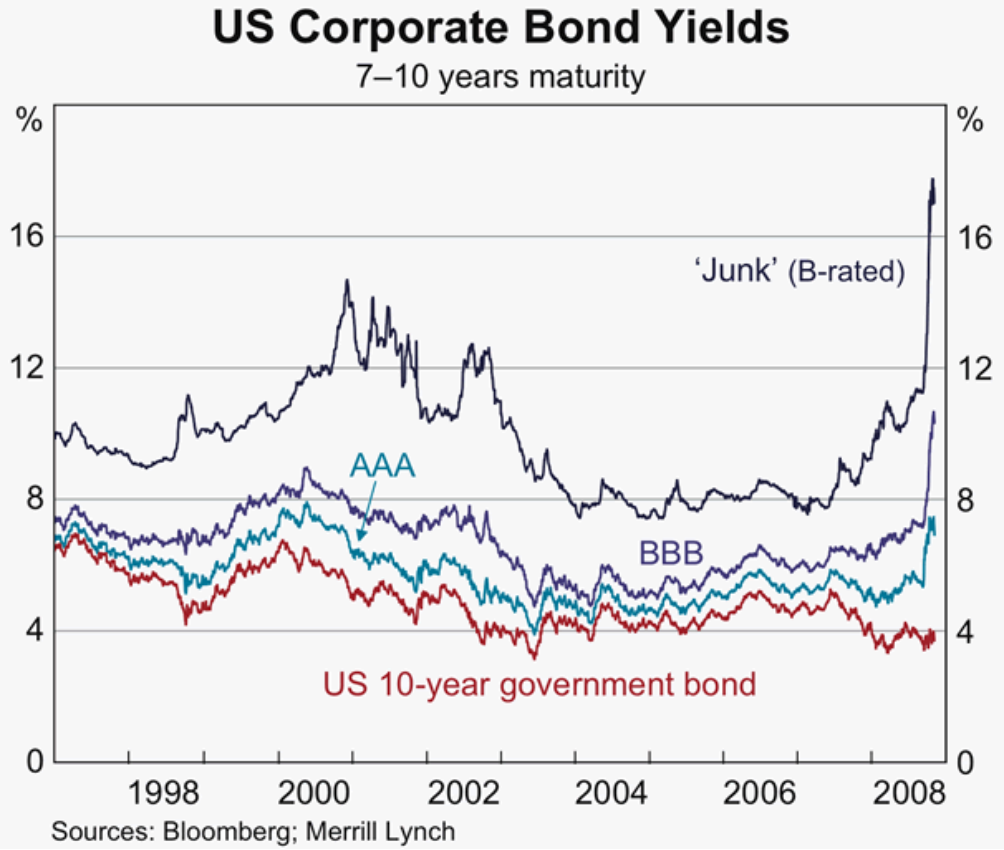
Graph 74



The deterioration of credit market conditions and the failure of several large financial institutions saw corporate debt yields [in the US] *increase significantly through September and October as default risk concerns escalated. Spreads on corporate debt surpassed their mid-March highs and 2000 peaks…*[12]

[12] Ibid, Page 13.

Graph 13



Corporate bond issuance in the United States was very weak in the September quarter and well below the already subdued level of issuance seen earlier in 2008; issuance was around three times less than in the June quarter for both financials and non-financials, reflecting the current very difficult conditions for longer term funding.[13]

Market contacts indicate that the secondary market has become more illiquid during the recent heightened turbulence, with few trades taking place. [14]

26. The RBA's February 2009 statement noted:

While the global financial system remains under considerable strain, there have been some signs of an improvement in financial conditions recently. The extreme volatility that affected all markets in October and November following

[13] Ibid, page 14.

[14] Ibid, page 57.

the Lehman's collapse has abated in the past two months. There have also been some signs of improvement in the functioning of credit markets in response to the substantial assistance measures taken by authorities in a number of the major economies. These measures have included injections of capital into financial institutions, the provision of government guarantees and various actions taken by central banks to improve market liquidity. While spreads in money markets remain high, yields have fallen to historically low levels in many countries. Debt issuance at longer terms has picked up, dominated by bonds issued by banks using government guarantees…[15] *However, global issuance of unguaranteed debt remains weak."*[16]

27. In a speech on 31 March 2009,[17] the RBA Assistant Governor (Financial Markets) commented on the effects of the global financial crisis on Australian financial markets as follows:

"Funding markets shut completely following the collapse of Lehman Brothers [in September 2008]. All global financial markets were dislocated by this event, but not surprisingly term debt markets were about the most affected…

In the wake of the dislocation induced by Lehman's, many countries, including Australia, moved to guarantee bank debt issuance. Soon after the introduction of the guarantee, Australian banks were able to once again access term debt markets… There has, however, been little investor appetite for unguaranteed debt, despite other indications of an improvement in credit market conditions."

28. In summary, during the AMI period the conditions in the secondary market for corporate bonds, which is the market covered by Bloomberg and CBASpectrum (being the other publisher of BBB+ fair value estimates), were such that:

- there were few, if any, actual transactions in the secondary bond market;
- there were no long dated BBB+ fixed coupon bonds and there have been very limited issue of new bonds (especially at the BBB+ credit rating); and
- there was very low liquidity (in the sense that it is difficult to buy and sell without affecting prices) and there is a high premium associated with liquidity.

29. I discuss these conditions in turn below and identify the issues that they raise for estimating an average benchmark yield on 10-year, BBB+ corporate debt. I use the term "the benchmark rate" as a short hand for this concept.

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15 RBA, *Statement on Monetary Policy,* 6 February 2009, page 1.

16 Ibid, page 22.

17 Speech titled *Some Effects of the Global Financial Crisis on Australian Financial Markets,* delivered by Guy Debelle, RBA Assistant Governor (Financial Markets) to Finance Professionals Forum, Sydney, 31 March 2009.

2.4.1. Few trades in corporate bonds

30. Consistent with the above views few, if any, actual transactions in the secondary bond market occurred during the AMI averaging period. In any case, given that such bonds are not generally traded in a centralised exchange but are bought and sold 'over the counter' it can be difficult to observe the prices on the trades that actually take place.

31. Even in normal market conditions yields attributed to a bond will generally not represent the results of actual trading on that day. Indeed Bloomberg has stated in 2007, before the full onset of the financial crisis, that up to 90% of the prices in its bonds database were indicative, not executable.[18] The prices reported by financial institutions, to a large extent, simply reflect the informed opinion of industry players about a fair price for a particular bond.

32. It comes as no particular surprise then, that the yields reported for the same bond on the same day often vary considerably. For example, on 5 December 2008 various sources were quoting the yields shown in Table 1 below.

Table 1: Comparison of estimated yields on 5 December 2008

Issuer	Maturity	UBS	CBA	NAB Markets	ABN Amro
GPT	22/08/2013	13.140	16.608	13.538	10.939
Santos	23/09/2015	7.356	6.704	9.211	6.580

Source: Bloomberg, CBASpectrum, UBS.

33. Clearly, there would be significant arbitrage profits to be had if all of these yields reflected yields at which these institutions were willing to trade. For example, it would be very profitable to buy the Santos bond from NAB (quoting the highest yield which implies the lowest price for the bond) and sell it to ABN Amro (quoting the lowest yield). On the GPT bond it would be most profitable to buy from ABN Amro and sell to UBS.

34. Two observations can be made about this. First, the quotes in the above table simply cannot be prices at which the banks are willing to trade (or even prices at which they have traded on that day). Rather, they simply represent yields at which these institutions believe a trade would take place if it did take place on that day. Second, the wide divergence between the yield estimates for the same bond suggests that there has not been any recent known trades (ie, prior to the end of the AMI averaging period on 5 December 2008) of the bonds to anchor price expectations.

[18] Bloomberg, *Bloomberg Fair Value Market Curves*, International Bond Market Conference, Taipei, 2007.

2.4.2. Using all of the available information

35. It is not necessarily the case that two bonds with the same time to maturity and same credit rating will attract the same price and, in fact, one may often observe very different prices for such bonds (eg, if the market for those bonds have different levels of liquidity). Even if there were a bond that just happened to have exactly 10 years to maturity and be rated at BBB+, this does not mean that we can, or should, rely completely upon the estimated yield reported for this bond to serve as the benchmark rate.

36. Furthermore, using a single observation as the required 'benchmark' means that all the information embodied in all other bond prices is thrown away, under the implied assumption that this is not useful in explaining the yield on 10-year BBB+ rated bonds. As a general rule it is wasteful and inefficient to exclude data that may potentially assist to improve an estimate of a benchmark yield for 10-year BBB+ corporate debt.

37. In particular, if we have limited observations of yields on BBB+ rated bonds then it will be prudent to infer the benchmark rate for BBB+ bonds from the yields on higher and lower rated bonds. This is because we know that, by definition, the benchmark rate for an A rated bond of a particular maturity is lower than the benchmark rate for a BBB+ rated bond of the same maturity. Thus, if we can accurately estimate the benchmark rate for the A rated bond this puts a floor on the benchmark rate for a BBB+ rated bond. Similarly, an accurate estimate of the benchmark rate for a BBB- bond puts a ceiling on the benchmark rate for a BBB+ bond.

38. Using information on bond yields from other credit ratings in this fashion it is possible to arrive at a range for the benchmark BBB+ rated bond even if we have no observations of yields on BBB+ bonds. Equally, if the sample of available yield estimates for BBB+ rated bonds is not large (in a statistical sense), it is appropriate to supplement information on BBB+ rated yields with information from yields on bonds of other ratings when arriving at a benchmark BBB+ rate.

39. For example, imagine there were only one BBB+ rated bond that happened to have a 10 year maturity and that bond had an estimated yield that of 7.0%. However, imagine that we also had 100 observations of A- rated bonds with around 10 years to maturity and that all of these A- rated bonds had yields of between 8.0% and 9.0%.

40. Based solely on the single observation for a BBB+ rated bond we would assume that the best estimate of the benchmark 10 year BBB+ rate was 7.0% - as this is our only observation. However, based on the information embodied in the 1,000 observations of A rated bond yields we can accurately (with statistical precision) infer that the best estimate for the benchmark yield on an A rated bond is somewhere in the range of 8.0% to 9.0%. Having done so we know that the benchmark BBB+ rate must be above this level. Thus, notwithstanding the single observation of a BBB+ yield at 7.0% we would still set the benchmark rate for the BBB+ bond at more than 8.0% - reflecting the information available in the form of yields on A rated bonds.

41. This does not mean that the single BBB+ observation is treated as an 'outlier' and ignored (given zero weight). Rather, it simply means that the observation is identified as atypical and given a weight that is proportionate to its relative value in all of the information that is available to us - which is a weight of around 1 in 1,001.

42. Any reasonable estimation technique would give the 7.0% observation some weight and this would tend to have the effect of lowering the both the BBB+ benchmark rate and the benchmark rate for A rated bonds (for precisely the same logic as outlined above) relative to a scenario where that observation did not exist. However, equally, any reasonable estimation technique would equally give the 7.0% observation only a very small weight (reflecting the fact that it is only one in 1,001 available and relevant observations).

43. As I will describe below, the methodology employed by CBASpectrum to arrive at fair value bond yields for BBB+ rated bonds (and for all credit ratings) does make use of the available information on all bonds including those of other credit ratings. It does this using relatively sophisticated statistical techniques (jointly estimating all fair value curves simultaneously). By contrast, Bloomberg's methodology appears to make less use of bond yields in other credit ratings to inform the BBB fair value curve. That said, there are clear examples where Bloomberg does impose restrictions on its BBB fair value curve to make sure that it does not cross its A fair value curve – but it would appear that these are more in the way of ad hoc adjustments rather than any consistent aspect of its methodology.

44. The AER's methodology for estimating a 10-year yield on BBB+ corporate bonds using Bloomberg's fair value estimate provides an example of how this principle can be used in practice. Since Bloomberg no longer reports yields for BBB debt of 10-year maturity, rather than simply accepting the yield on 8-year BBB debt as the best estimate for this value the AER sought to improve on this estimate by using information about the relative yields on 8-year and 10-year A rated debt, as estimated by Bloomberg. In theory, this adjustment makes efficient use of the information that is available to achieve a better estimate for the yields on 10-year BBB+ rated corporate bonds.[19]

2.4.3. Low liquidity and high liquidity premium

45. In a financial crisis there is heightened uncertainty about the returns on both corporate debt and equity. As discussed below, this tends to create what is known as a 'flight from risk' or a 'flight to safety'. As a consequence, investors reduce their demand for illiquid products and increase their demand for liquid instruments, such as government bonds, increasing demand for these products. This is partly because of the uncertainty about when major investors are going to need quick access to cash to

[19] In practice, as I show in section 3, the Bloomberg estimates that the AER relies upon in calculating this revised estimate are not themselves founded upon actual data and hence each of the estimates that the AER relies upon are problematic.

settle other obligations and partly because the heightened uncertainty about the value of corporate assets tends to make these markets less liquid. Moreover, the collapse of investment banks (and investment banking generally) has meant there are fewer players with less deep pockets willing to 'make the market' for a particular bond or stock by buying/selling it when they believe it is being mispriced.

46. All things being equal, this means that in general investors are likely to seek to sell out of corporate bonds, thus reducing the prices and increasing the yields. However, for the reasons described above, bonds that retain some liquidity will be less affected by this trend and will retain higher prices and lower yields than the majority of bonds, which have been left illiquid. That is, in the context of the current financial crisis, the premium for liquidity is considerably higher than it has been historically, and this effect will cause more liquid bonds to have materially lower yields than illiquid bonds.

47. Because there is little trading in corporate bonds at the moment, it is also the case that many bonds are traded infrequently. Methodologies that estimate a benchmark cost of debt that have reference to only the most liquid bond yields will be biased, to the extent that these bonds are not representative of their class and, as described above, may have lower yields than the typical bond.

48. In a market where there are many bonds that are traded liquidly (and a minority that are not) this bias is not likely to be material. That is, as long as there is a relatively large pool of liquid bonds, particularly of the type that closely approximate the benchmark we require, this can give some confidence that the average yield over these bonds is a good approximation for the benchmark, relative to other methodologies that might use more information.

49. However, consistent with the description of market conditions in sections 2.3 and 2.4.1, the typical corporate bond during the AMI averaging period, is best described as illiquid. To the extent that the concept of the *benchmark rate* is one that reflects the typical characteristics of a 10 year BBB+ bond then a consistent fair value estimate, in the then (and current) market conditions, would not be one that restricted itself to the most liquidly traded bonds.

2.5. Specific criteria when selecting data sources

50. Consistent with the five general criteria listed above I incorporate into these criteria more detailed criteria reflecting the above observations. The methodology should, as far as is practical:

    i. reflect an unbiased estimate of the representative yield at the time of issue for 'typical' corporate bonds with a maturity of 10 years and a BBB+ long-term credit rating;

    ii. utilise a methodology that is not unnecessarily reliant on a single or small number of observations and/or individual views but efficiently uses the totality

of information available, particularly where the available BBB+ information is sparse;

iii. gives rise to estimates that are consistent with expert opinion (including standard predictions of finance theory and past empirical relationships);

iv. give rise to estimates that are consistent with current market conditions and those estimates should change as market conditions change; and

v. be transparent including in relation to how discretion is applied. If that discretion results in yield estimates that are inconsistent with other potential proxies for the benchmark rate this inconsistency should be able to be explained in terms of why the alternative proxies are worse estimates for the benchmark rate.

51. There is also possibly a sixth criterion that would be desirable. This criterion does not flow from consideration of finance issues but more from consideration of process issues. Specifically, given that parties to regulatory proceedings may have vested interests in the outcome of the estimated benchmark corporate bond rate then ideally:

vi. the source of the estimate would be as independent as possible from interested parties to the regulatory proceedings.

3. Accuracy of AER/Bloomberg in the lead up to AMI averaging period

52. During the period six months through to October 2008, market commentary, such as from the RBA, observed that the spreads to CGS were increasing dramatically as the yields on government debt decreased. In this section I compare Bloomberg's fair value estimates to the observations of the RBA over this period in order to shed light on how effective Bloomberg's fair value estimates were in capturing the effects of the changed credit market conditions.

3.1. Response to the global financial crisis

53. A relevant test of the appropriateness of the fair value estimates produced by Bloomberg is to compare the effect that the global financial crisis has had on these estimates.

54. In my view the only reasonable expectation is that, following the escalation of the financial crisis in September 2008, risk premiums on corporate debt, and especially relatively low rated BBB+ corporate debt, should have increased markedly. This reflects the fact that risk premiums naturally increase for all risky assets during times of crisis. It also reflects the fact that BBB+ rated debt is a rating that, according to Standard and Poor's:

> *BBB: An obligation rated 'BBB' exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitment on the obligation.*[20]

55. It is appropriate to assume that investor's perceptions of economic conditions became 'more adverse' between September 2008[21] and the AMI averaging period. During that period the Australian equity market (a barometer of perceptions about economic conditions) fell by 29%.

56. As already described above, the IMF stated the financial crisis "*entered a tumultuous new phase in September".* The OECD stated in October 2008 "*This Economic Outlook represents a substantial downward revision from just a few months ago: many of the*

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20 *Understanding Standard & Poor's Rating Definitions* , June 2009, available at http://www2.standardandpoors.com/spf/pdf/fixedincome/Understanding_Rating_Definitions.pdf

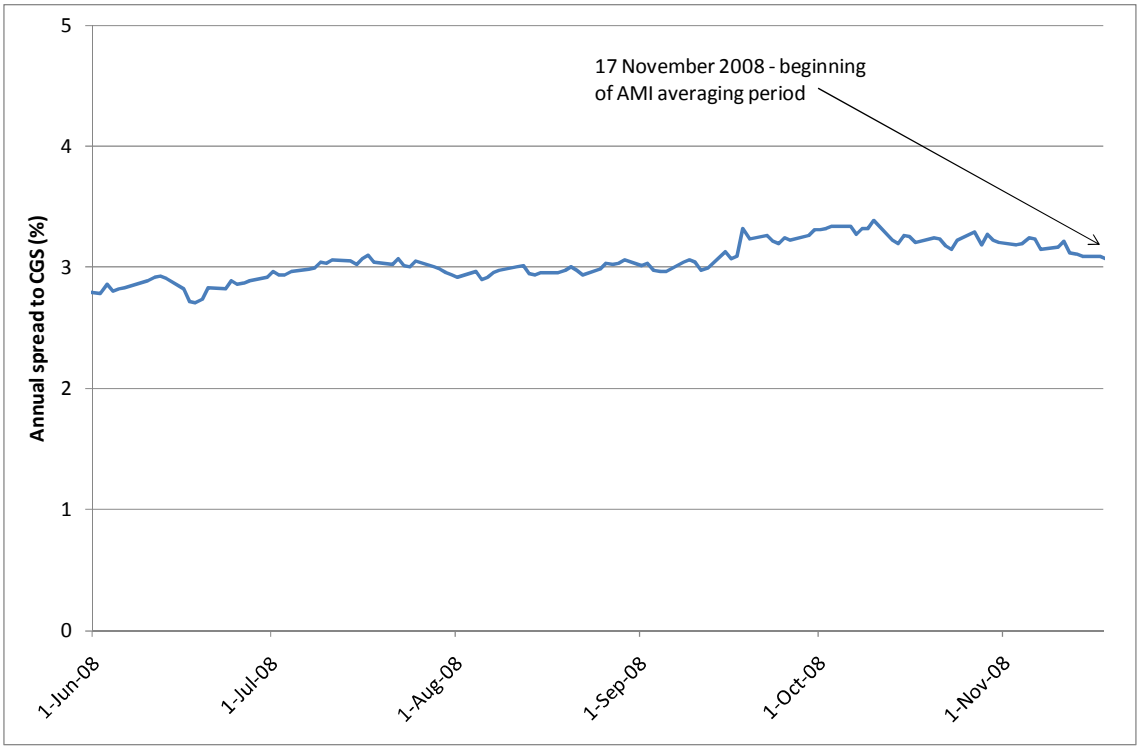
21 On the 7th of September the two largest buyers and securitisers of US mortgages ('Fannie Mae' and 'Freddie Mac') were placed in conservatorship. On Sunday 14th September the bankruptcy of investment bank Lehman Brothers and the sale of Merrill Lynch to Bank of America (with US government guarantees attached) were both announced. On Tuesday the 16th of September it was announced that the US Government would effectively take over 80% of the equity in one of the world's largest insurers (AIG) which had suffered a liquidity crises and was unable to find lenders to save it from insolvency. The US Government provided an $85 billion credit facility in exchange for taking over 80% of the equity in AIG.

*downside risks previously identifi*ed have materialised. … *Following the collapse of Lehman Brothers in mid-September, … triggered reactions akin to a 'blackout' in global financial markets."* The RBA stated in February 2009 that "*The extreme volatility that affected all markets in October and November following the Lehman's collapse has abated in the past two months".* In March 2009 the RBA Assistant Governor (Financial Markets) commented that: "*Funding markets shut completely following the collapse of Lehman Brothers [in September 2008]. All global financial markets were dislocated by this event, but not surprisingly term debt markets were about the most affected…"*

57. One must presume that risk premiums associated with BBB+ debt (ie, debt that is, according to Standard and Poor's, more likely to be affected by "*adverse economic conditions or changing circumstances")* would increase in October and November relative to previous levels.

58. Figure 1 below shows a recent history of debt risk premia over CGS estimated by Bloomberg for 10-year BBB+ bonds, using the AER's methodology.

Figure 1: Bloomberg (AER) estimated spreads to CGS on 10-year BBB+ corporate bonds



Source: Bloomberg, RBA

59. This figure shows that debt premia as estimated by Bloomberg did not rise materially over the period September to November. There appears to be no significant reaction to the events of September and October 2008. This pattern does not appear to accord with what one would reasonably expect to be the case given the perceived financial and economic conditions and the definition of BBB credit ratings.

3.2. Consistency with Reserve Bank estimates

60. I discuss above how the AER/Bloomberg 10-year fair value debt risk premia appear to be inconsistent with the perceptions of market commentators, including the RBA, over September, October and November 2008. In addition to its public statements, the RBA publishes daily estimates of bonds yields for maturities of between 1 to 5 years.

61. These estimates are reproduced in Table 2 below.

Table 2: RBA estimates of average corporate spreads to CGS on bonds with 1-5 years (midpoint 3 years) maturity

	Spreads to CGS		
Month	**BBB**	**A**	**AA**
July 2008	2.88	2.76	2.19
August 2008	3.22	2.80	2.14
September 2008	3.78	3.37	2.57
October 2008	4.43	3.53	2.27
November 2008	4.59	3.72	2.46
December 2008	4.61	4.26	2.85
January 2009	4.54	4.19	2.75
February 2009	5.17	4.16	2.53
March 2009	5.91	4.99	3.08
April 2009	5.54	4.76	2.89
May 2009	4.93	4.33	2.29
June 2009	4.20	4.09	1.78

Note: sourced from RBA and converted from semi-annual to annual basis

62. It is notable that the RBA reported that, consistent with expectations, risk premiums increased significantly from pre September 2008 up to the AMI averaging period (in November and December 2008). BBB spreads to CGS increased by 1.4%. This is clearly not reflected in the Bloomberg 10 year BBB+ spread to CGS as per Figure 1 above.

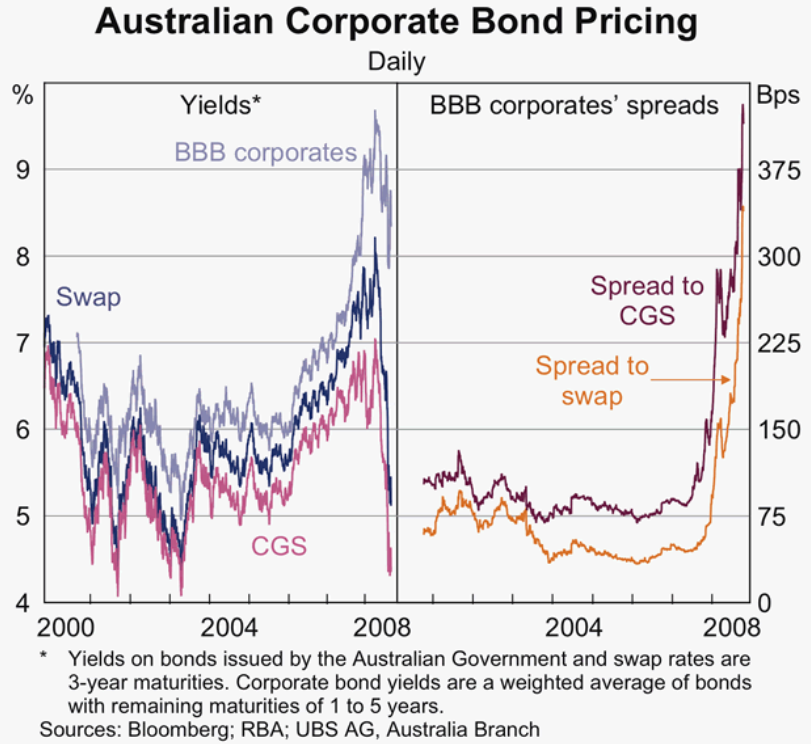
63. However, the RBA figures are for bonds of maturities between 1 and 5 years and are not therefore directly comparable to the Bloomberg data in Figure 1 above. However, the RBA shows these yields and spreads graphically in its February Statement on

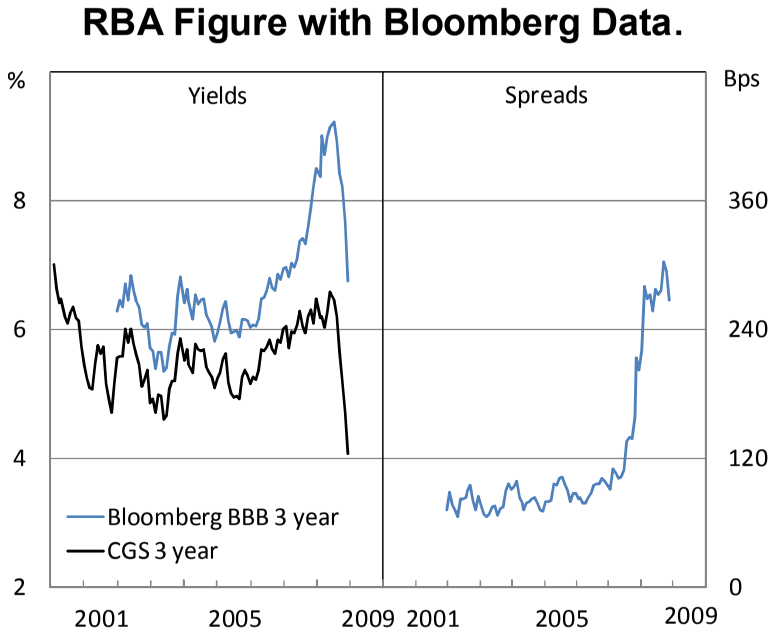
Monetary Policy.[22] I reproduce this chart in Figure 2 below and compare it to an equivalent chart produced using Bloomberg data for 3 year maturities.

64. There are two figures both of which have two panels in them. The left hand figure is reproduced from the RBA November Statement of Monetary Policy. In the right hand figure we have generated the same graph except we use Bloomberg fair value for 3 year BBB rated bonds. The discrepancy between the figures is most noticeable if one looks only at the right hand panel in each of the two figures. The right hand panel describes the spread to CGS for BBB bonds of the relevant maturity. The right hand panel in the RBA figure shows the spread to CGS for BBB bonds rising continually up to November 2008. However, the right hand panel of the figure generated using Bloomberg data shows the spread to CGS 'flatlining' at a much lower level over the second half of 2008.

[22] RBA, *Statement on Monetary Policy*, February 2009, p. 55

Figure 2: Comparison of Bloomberg corporate bonds spreads with RBA estimates





65. That Bloomberg spreads to CGS effectively stop increasing in any meaningful way in mid 2008 and do not increase post September is counter to the intuition and the widely held expert opinions that the risk premiums on corporate debt increased following the worsening of the financial crisis in September 2008. It is also inconsistent with the widening in spreads in the US market – which is the only market Australian corporations were issuing (non Government guaranteed) debt at the time – see section 5.2 below and also graph 13 on page 14 of the November Statement on Monetary.

66. The Bloomberg data indicate a levelling off of spreads from about June 2008, at around or just less than 300 basis points. However, the RBA's estimates indicate that, after a brief downturn, spreads continue to increase to over 400 basis points.

67. In my opinion the Bloomberg fair value yields did not adequately capture the effect of the global financial crisis on debt markets over the period through to the beginning of the AMI averaging period on 17 November 2008, either in terms of:

- what would have been expected as a result of the crisis, as per the statements of experts (including the RBA) as described above; and

- the data for BBB bond yields published by the RBA.

4. Accuracy of AER/Bloomberg during AMI averaging period

68. In this section I test the accuracy of the AER/Bloomberg BBB+ benchmark rate proxy against the observations of actual bond yield estimates during the AMI averaging period by financial institutions involved in the Australian corporate bond market.

4.1. Data used

69. I have obtained yield estimates during the AMI averaging period for over 600 bonds issued in Australian dollars but not issued by Commonwealth or State Governments. The yield estimates are sourced from Bloomberg, AFMA, UBS rate sheets, CBASpectrum and Reuters. From Bloomberg I have individual yield estimates from Westpac, ANZ, NAB markets, ABN Amro. Not all of these yield sources provide a yield estimate for every bond. The three most comprehensive sources in terms of bonds covered are UBS, AFMA and CBASpectrum. I have used the Standard and Poor's credit ratings assigned to each bond as reported by UBS where this is available and by AFMA where it is not. In some cases I have altered the credit rating assigned to these bonds by UBS/AFMA to reflect known discrepancies with actual ratings during the AMI period (eg, GPT is rated BBB while UBS has it rated at BBB+). The full set of data used is provided in separately in spreadsheet form.

70. Unless otherwise specified the data I provide is averaged for a specific issuer. This means that I give equal weight to each issuer rather than to each bond. For example, Sallie Mae has six BBB+ bonds (both fixed and floating) while Adelaide Bank has one. Were I to treat each bond as an independent observation I would give Sallie Mae six times the weight as Adelaide bank.

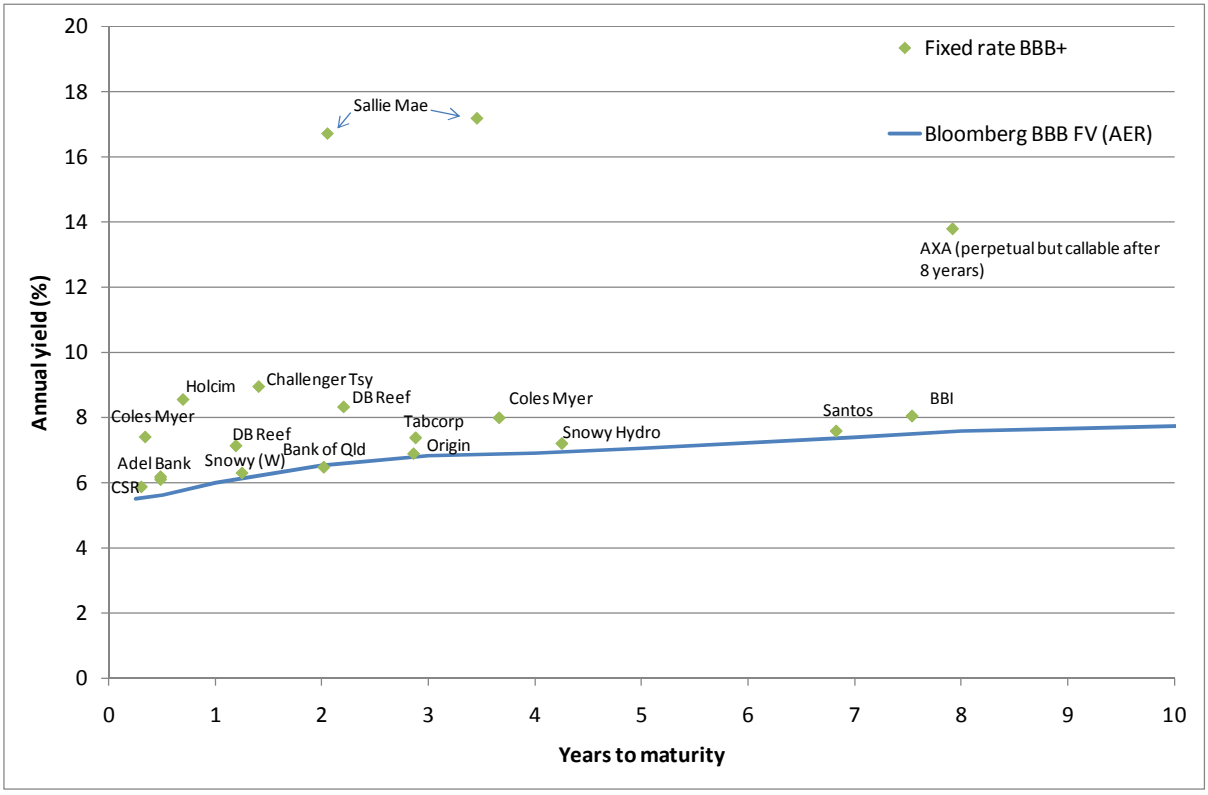
71. In the following graphs I report a single bond yield/maturity for Sallie Mae equal to the average for all six bonds. When I graph only those bonds with more than four years to maturity I include all issuers who have at least one bond in that maturity range (even if the average of all of their bonds is not in that maturity range). If an issuer has more than one bond in that maturity range I report the average of only those bonds in that maturity range.

4.2. Analysis of the yield data over AMI averaging period

72. In this section I provide an analysis of the average yield data for issuers over the AMI averaging period (17 November to 5 December 2008) and compare this to the AER/Bloomberg fair value BBB+ yield on that day.

73. The below figure provides a scatter graph that shows the average estimated yield (from all institutions who estimate a yield for that bond) for all fixed coupon BBB+ bonds against the AER/Bloomberg proxy for the benchmark rate for BBB+ bonds. The vertical axis of the figure is yield to maturity (reported on an annualised basis) and the horizontal axis is years to maturity. (This chart includes multiple bonds from single issuers.)

Figure 3: Average yield estimates for BBB+ fixed coupon bonds during AMI averaging period



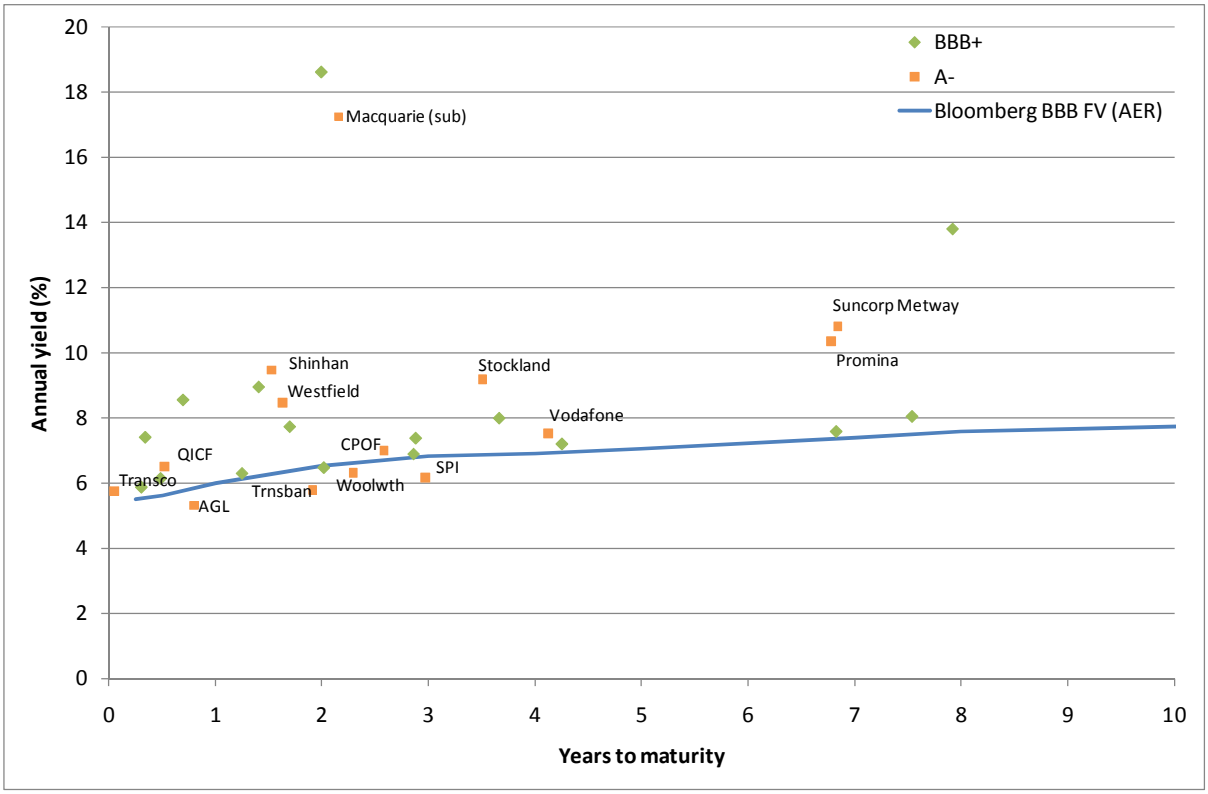
*The AXA bond is a perpetual bond that is callable after eight years. If it is not called it converts from a fixed coupon bond to a floating rate note at high margin to swap. This means it is most like a fixed coupon bond with a maturity of 10 years (and this is how it is treated in bank rate sheets). However, the option for AXA not to pay the principle in 8 years time means that it is likely to have a higher interest rate than if AXA did not have that option.

74. As is clearly evident from the above graph the AER/Bloomberg fair value curve passes below the lower envelope of all of the BBB+ bonds for which there are yield estimates. It passes only marginally above only one observation (Bank of Queensland) and passes below all of the other 16 observations of unique issuers (mostly materially below these).

75. Purely based on this fact one would conclude that the AER/Bloomberg fair value underestimates the typical yield on BBB+ rated debt. However, it is possible that this could be justified by having regard to information on bond yields from other ratings. Observations for BBB+ yields from 16 issuers is not a large sample (in statistical terms) and it is possible that a fair value curve that passes below 18 of these observations may be justified by a large number of low yields on slightly higher credit ratings (such as A- bonds).

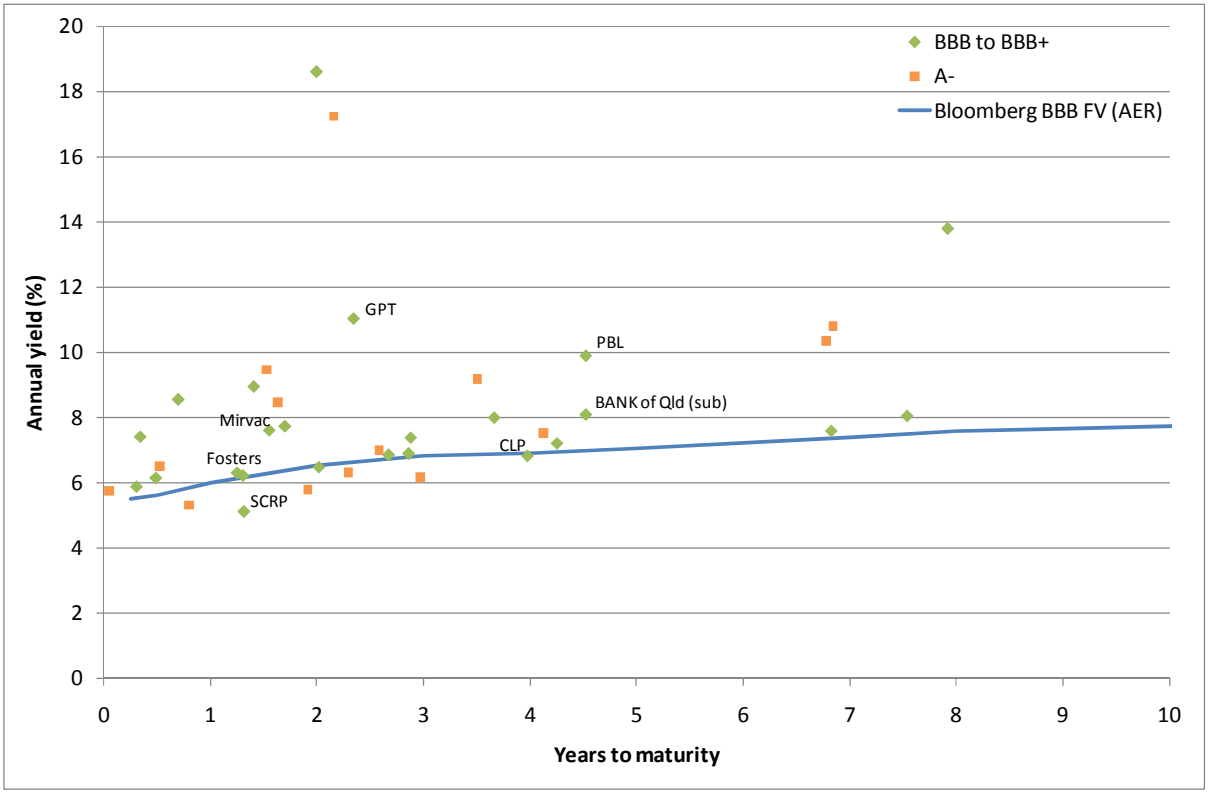
76. I have also examined the yields on A- bonds but, rather than supporting the adoption of BBB+ fair value curve below the majority of BBB+ yields the opposite is true. Not only is the AER/Bloomberg fair value curve below the majority of BBB+ bond yield estimates it is also below the majority of A- bond yields. This is true at all maturities but is especially true at longer maturities (above 3.5 years) where the AER/Bloomberg fair value curve is below all nine of the available observations. The below graph only plots one data point for each issuer (ie, each data point is a unique issuer) and only labels the A- bonds (the BBB+ bonds being labelled in the previous figure).

Figure 4: Average yield estimates for BBB+ and A- rated fixed coupon bonds during AMI averaging period



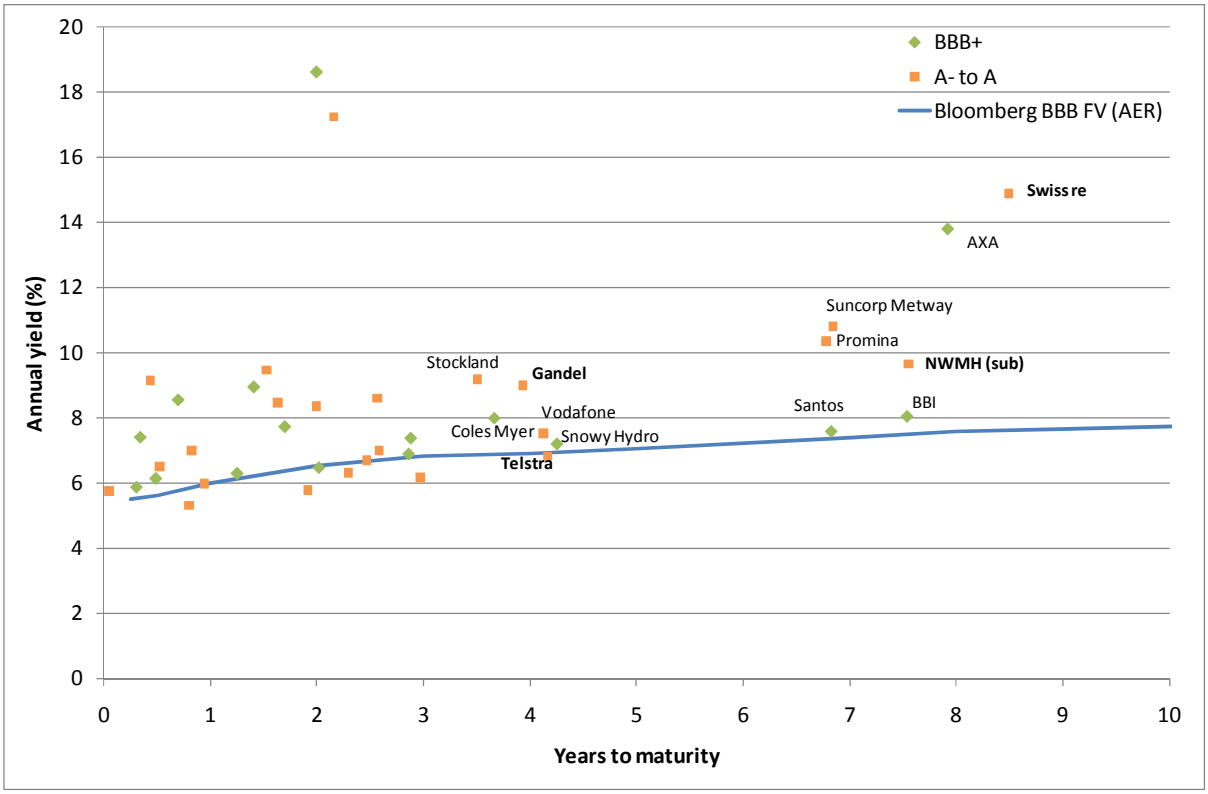
77. Of course, the average credit rating of observations in the above figure is above BBB+. I have also examined all observations in the credit rating range BBB to A- (where the median credit rating is BBB+). The below graph only plots one data point for each issuer (ie, each data point is a unique issuer) and only labels the BBB issuers (the BBB+ and A- issuers being labelled earlier figures).

Figure 5: Average yield estimates for BBB to A- rated fixed coupon bonds during AMI averaging period



78. I have also extended the analysis to include A rated bonds but excluding BBB bonds – in order that every observation correspond to a BBB+ or higher credit rating. These are shown in the below figure where I have labelled all bonds with more than 3.5 years to maturity and the new A rated bonds are labelled in bold. As can be seen, the AER Bloomberg BBB+ fair value curve continues to underestimate all estimated yields for BBB+, A- and A rated fixed coupon bonds with more than four years to maturity.

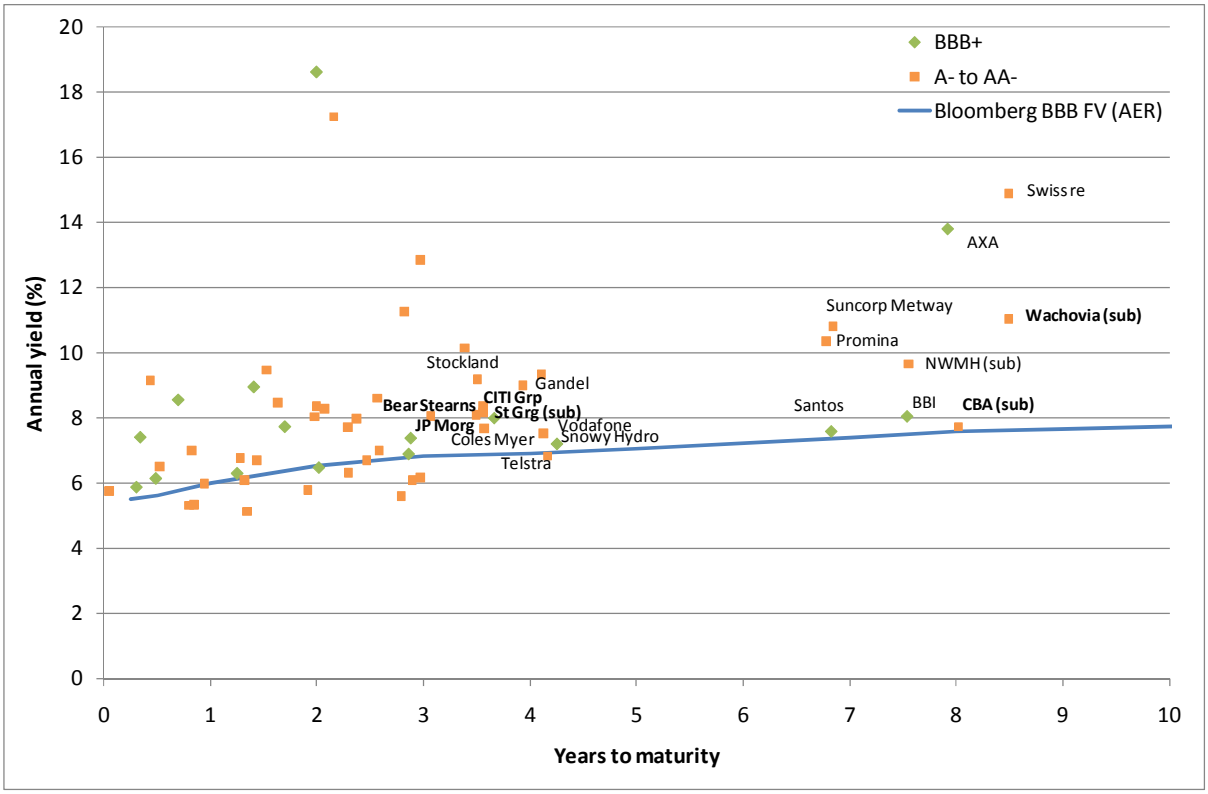
Figure 6: Average yield estimates for BBB+ to A rated fixed coupon bonds during AMI averaging period



79. As can be seen, above 3.5 years to maturity every observation (from BBB+ to A rated) is above the Bloomberg BBB+ fair value curve – with the single exception of Telstra.

80. Even when the analysis is extended to include all fixed coupon corporate bonds with credit ratings between BBB+ and AA- the same conclusion is found. This can be seen in the below figure which demonstrates that the AER/Bloomberg fair value curve underestimates the yield on the vast majority of BBB+ to AA- bonds and underestimates all but one of the yields on bonds with more than 3.5 years to maturity.

Figure 7: Average yield estimates for BBB+ to AA- rated fixed coupon bonds during AMI averaging period



81. It is interesting to note that the Santos 6.8 year maturity BBB+ bond (through which the AER/Bloomberg fair value curve passes just below) has an unusually low yield for its maturity and credit rating. As discussed in section 7.2, this may be explained by the fact that at the time Santos was effectively debt free.

82. A number of high level observations suggest themselves:

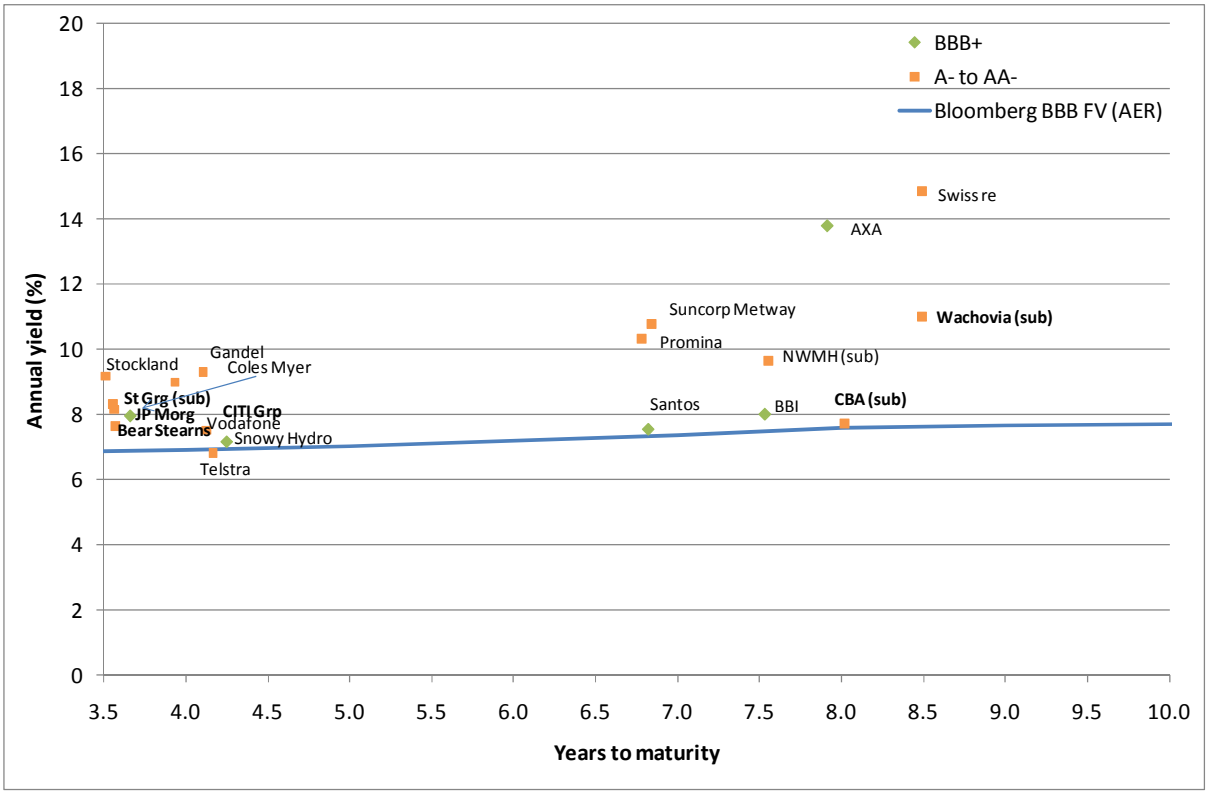
i. The Bloomberg fair value curve for BBB rated bonds falls below most estimates for yields on corporate BBB+ bonds and below most estimates of yields on corporate A- to AA- bonds.

ii. The effect described in i. above particularly pronounced for longer dated bonds (bonds with more than 3.5 years to maturity). In fact, there are 19 unique issuers for bonds with a maturity of between 3.5 and 10 years and the AER/Bloomberg fair value curve lies below all of these but for the Telstra observation;

iii. There is a wide dispersion in yield estimates within each credit rating category – with some BBB+ rated bonds having lower yields than some higher rated bonds.

83. The following figure represents the same data but focuses only on bonds with between 3.5 and 16 years to maturity.

Figure 8 Average yield estimates for BBB+ to AA- rated fixed coupon bonds during AMI averaging period – bonds with maturity between 3.5 and 10 years



84. When interpreting this data in the context of the AER/Bloomberg BBB+ fair value curve it is relevant to note that the mean (median) of the bonds that are more than 3.5 years to maturity is 9.2% (8.3%). This is 2.1% (1.4%) above the Bloomberg fair value curve for BBB rated bonds at 5.6 (4.2) years maturity (where 5.6 (4.2) years is the mean (median) time to maturity in the sample). It should also be kept in mind that only five of the 19 observations are for issuers with a BBB+ credit rating and the other 14 issuers all have a higher credit rating (with the average rating being between A and A+).

85. Similarly, for the entire sample the mean (median) yield is 8.6% (7.7%) and this is 1.8% (1.5%) above the AER/Bloomberg BBB+ fair value curve at 3 (2.5) years to maturity (where 3 (2.5) years is the mean (median) time to maturity in the sample).

Similarly, only 16 out of 63 unique issuers in this sample are BBB+ with the remaining issuers having a yield of between A- and AA- (with the average rating being between A and A+).

4.3. Implications for the reliability of the AER proxy for the benchmark BBB+ rate

86. During the AMI averaging period, the AER/Bloomberg BBB+ fair value curve clearly does not accurately predict/reflect the yield estimates for corporate bonds of BBB+ rating or higher for which yield estimates are available from a large number of sources. This is true at all maturities but is especially true for longer maturities (eg, greater than 3.5 years).

87. If the AER/Bloomberg BBB+ fair value curve was accurate it would predict higher yields than actually attributed bonds rated higher than BBB+. However, the reality is that the vast majority of A- to AA- bonds have higher estimated yields than the AER/Bloomberg BBB+ fair value curve.

88. In the case of BBB+ to AA- corporate bonds with a time to maturity of more than 3.5 years, all but one of the 19 issuers of these bonds attract a higher yield than the AER/Bloomberg BBB+ fair value curve. The differences are not trivial, with the average mean difference being 2.1%.

89. The fact that the AER/Bloomberg BBB+ fair value curve is lower than all but one of the issuers with longer dated bonds means that the AER/Bloomberg fair value curve is a downward biased estimator of yield estimates not only on long dated BBB+ rated bonds but also of bonds rated A- to AA-.

90. In my opinion any interpretation of the *benchmark corporate bond rate* must require that the chosen benchmark rate be consistent with the best estimate of market determined yields for individual BBB+ rated bonds. Further, the BBB+ benchmark rate should be, on average, higher than the market determined yields for higher rated bonds (such as A- to AA- bonds).

91. Absent evidence that the yield estimates sourced from a range of financial institutions are unreliable/unrepresentative of market determined yields then the evidence presented above clearly demonstrates that the AER/Bloomberg BBB+ fair value curve is not a suitable proxy for the *Australian benchmark corporate bond rate for BBB+ rated bonds* and that this is especially true at the longer maturities (ie, in the vicinity of 10 years).

92. There are only two possible reasons why one would not draw this conclusion based on the yield estimates described in this section. Specifically,:

i. if the yield estimates for bonds are generally higher than what the true market determined yield would be; and/or

ii. if the yields are accurately estimated but some of the bonds included in the sample have characteristics that means that these bonds should be given less weight in any such test (ie, should be treated as 'outliers').

93. On the first issue I have sourced yield estimates from a wide range of sources (contributors to Bloomberg, AFMA, UBS, CBASpectrum and Reuters) and do not consider there is any basis for believing that these sources overestimated market yields in that period.

94. In fact, if anything the quoted yields are likely to be underestimates of the cost of issuing debt in that period because the yield estimates quoted are for relatively small parcels of bonds of around $2m to $10m traded on the secondary market. In order to find a buyer for a larger bond issuance (in the order of hundreds of millions of dollars) then the selling price would need to be lower (yield higher). I discuss this in section 4.4 of my June 2009 report for ETSA, Ergon and Energex which is also before the AER.[23] The Victorian businesses also noted this point in their submission on the AMI cost of debt in which they quoted a statement from a Bloomberg representative that:

> *Bearing in mind that the curves are representative of secondary market prices and trading sizes, new issues have nearly always been issued at a premium to this curve. In settled market conditions, the premium required to 'get away' a new issue might have been quite small. My experience has been that the premium has increased during this period of market turbulence as buyers have demanded a greater risk premium.* [24]

95. I consider that the secondary market yields estimated by UBS (and others) are likely to be materially lower than the yields that would have had to be paid by similar companies to issue new debt during the AMI averaging period (which was particularly affected by the impact of the global financial crisis).

96. I now turn to whether the bond yields included in the UBS rate sheet are somehow skewed by the inclusion of "outliers" in the analysis and whether this could explain why the AER proxy for the benchmark corporate bond rate underestimates the average of these bond yields.

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[23] CEG, *Estimating the Cost of 10 year BBB+ debt*, June 2009.

[24] *Debt Risk Premium for use in the Initial AMI WACC Period*, A paper jointly prepared by the Victorian Electricity Distribution Businesses, 1 June 2009, page 17.

97. Consideration of this issue is straight forward. Of the 20 unique issuers of fixed rate bonds with ratings between BBB+ and AA- all but one have a higher yield than the AER/Bloomberg fair value curve predicts for *BBB+* bonds. The exceptional issuer is Telstra which is A rated and has only a fractionally lower yield than the AER/Bloomberg BBB+ fair value. The only basis for concluding that this effect was explained by "outliers" would be to assume that all, or almost all, corporate bond issuers are outliers. This is despite the fact that most of these bonds have a rating higher than BBB+ and, consequently, the AER/Bloomberg BBB+ fair value curve should be overestimating the yields on these bonds.

98. I am unaware of any definition of an outlier that would involve treating most, let alone all, of the available data as outliers.

99. I also note that this conclusion is not sensitive to the choice of maturity range for the analysis. Examination of Figure 7 demonstrates that extending the maturity range to include bonds with less/more than 3.5 years to maturity would still support the conclusion that the vast majority of BBB+ to AA- estimated bond yields are above the AER/Bloomberg BBB+ fair value curve – despite the average credit rating of these bonds being higher than BBB+.

4.4. Including floating rate notes in the analysis

100. In addition to issuing fixed coupon bonds corporations also commonly issue bonds with variable interest rates – commonly terms floating rate notes or floating rate bonds. Floating rate notes pay a fixed coupon plus a variable coupon over the life of the bond. The variable coupon is almost always reset every three months based on the prevailing 3 month interest rate in the swap market (the 3 month bank bill swap rate). On any given trading day a floating rate note can be converted into a fixed coupon bond. This is done by the issuer of the bond entering into a swap contract where they promise to pay a fixed amount to a third party in exchange for the third party promising to pay them the floating payments on the bond over the remainder of the bonds life. This is discussed more in the following section.

101. The swap market is sufficiently liquid for us to observe what the equivalent fixed coupon yield is on a floating rate bond today. Indeed, this is precisely how floating rate bonds are priced and quoted in the market. That is, the yield on floating rate bonds is quoted as the bank bill swap rate to the end of the maturities life plus a "trading margin" where the sum of these two values is the equivalent fixed yield on a floating rate note.

102. It is therefore relevant to examine whether including floating rate notes in the above analysis would alter the conclusions in anyway. Adding floating rate notes only adds 5 new unique issuers with maturities of greater than 3.5 years. These issuers have bonds with a mean time to maturity of 6.4 years and a yield of 10.4% (ie, 3.1% above

the Bloomberg fair value curve at 6.4 years). Details for these bonds are set out in the below table.

Table 3: Cost of debt based on 425bp margin above the swap rate

Issuer	Rating	Maturity	Yield
MSDW	AA-	3.6	12.6
ABNAMROSUB	A+	4.5	9.5
SUNINS SUB	A-	6.5	10.4
HSBC SUB	A	7.5	11.5
RELIANCE	A	10.2	7.9
Average	A+	6.4	10.4

4.5. Tested against RBA reported average bond yields

103. The AER/Bloomberg fair value curve estimated spreads to CGS for 10 year BBB+ rated bonds of 3.09%. By contrast the RBA was reporting spreads to CGS for 3 years BBB debt of 4.46% in November and 4.49% in December (not annualised). This alternative source of yield estimates also suggests that the AER/Bloomberg fair value curve underestimates the actual yields estimated in debt markets.

5. Accuracy of Bloomberg methodology post the AMI averaging period – tested against known trades

104. As noted by expert commentators, such as the RBA, there has been a lack of liquidity in the domestic corporate bond sector both in the primary and secondary markets. For example, in its November 2008 Statement of Monetary Policy, the RBA stated in respect of the primary market:

> *Corporate bond issuance has remained low in recent months (Graph 74). Thirteen small bonds were issued in the September quarter, totalling around $1¾ billion. This is significantly lower than the average quarterly issuance of around $5½ billion before the credit turmoil. Two small corporate bonds were issued in October. As has been the case with most corporate issues in 2008, all of the recent deals were issued offshore.* [25]

105. In respect of the secondary market the RBA stated:

> *Market contacts indicate that the secondary market has become more illiquid during the recent heightened turbulence, with few trades taking place.* [26]

106. The lack of known trades, and in particular bond issues, during the AMI averaging period means that, if one is solely restricted to contemporaneous observations, one must rely on yield estimates for various bonds. However, since the end of the AMI averaging period we have been able to observe actual trades and these confirm the findings in earlier sections that the AER Bloomberg BBB+ fair value curve underestimates actual yields in the bond market.

107. There are two specific sources for estimates of trades in bonds proximate to the AMI averaging period. These are:

- the issue in Australia of BBB+ (A-) debt by Tabcorp (and AMP) in March 2008;
- the issue of debt overseas by BBB+ (or higher rated) corporations.

108. The Tabcorp and AMP domestic issues are the exceptions that the RBA refers to in its May 2009 Statement of Monetary Policy where it states:

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25 Ibid, Page 56.

26 Ibid, page 57.

> *In recent months, there has been evidence of an increase in investor appetite for corporate debt, with the first such bonds issued since October 2008. Australian corporates have issued a record $16.7 billion of bonds since the last Statement, almost all of which was issued offshore (Graph 62). The bulk of issuance was accounted for by BHP Billiton and Rio Tinto, which issued bonds denominated in US dollars and euros.* (Page 55)

109. All of these observations involve interest rates on the actually traded debt exceeding the interest rate predicted by the contemporaneous AER/Bloomberg fair value curve.

5.1. The Tabcorp and AMP issues in Australia

5.1.1. Interest costs on the Tabcorp BBB+ debt issue

110. Tabcorp announced the issue of a 5 year BBB+ rated bond on 24 March 2009.[27] The Tabcorp bond issue is a 5 year issue and was rated at BBB+ by Standard and Poors immediately prior to its issue.[28] It will pay a floating interest rate which is reset every three months to be equal to the then prevailing 3 month bank rate plus a margin of 400bp to 450bp.[29] On 1 April 2009 Tabcorp announced the results of a bookbuild process that set the margin in the middle of this range at 425bp.[30] Tabcorp will also pay a 'bonus' interest payment of 0.25% for the first year to some retail investors.[31] The issue size is expected to be around $200m.[32]

111. The Tabcorp offer is a floating rate offer referenced to the 3 month BBSW rate. This means that in order to estimate the equivalent fixed yield to maturity for the Tabcorp issue one must add the five year swap rate.[33]

112. The actual process that Tabcorp would follow (and may well have followed) to achieve this fixed rate would be to hedge its floating rate liability associated with the bond by entering into a contract with a third party to pay that third party a fixed yield over 5

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[27] See page 6 of the Prospectus for the issue of Tabcorp bonds at http://www.asx.com.au/asxpdf/20090324/pdf/31gqwq62d8gqvs.pdf.

[28] See ASX announcement at http://www.asx.com.au/asxpdf/20090325/pdf/31grrc2xd1nf59.pdf.

[29] See section 1.15 of the Prospectus for the issue of Tabcorp bonds.

[30] See http://www.asx.com.au/asxpdf/20090401/pdf/31gvxc5xsd8t2c.pdf.

[31] See page 6 of the Prospectus for the issue of Tabcorp bonds.

[32] See ASX announcement http://www.asx.com.au/asxpdf/20090330/pdf/31gtthwsynzsry.pdf.

[33] The fact that a company can either issue fixed rate or floating rate and use the interest rates swap to convert either to its desired rate set format, means that borrowers can fund via the cheapest possible form - this implies Tabcorp used the floating rate note as this was at a lower yield than the fixed rate equivalent. In other words, had Tabcorp borrowed fixed rate it would have done so at a higher floating rate margin.

years in exchange for the third party paying Tabcorp a floating liability based on the 3 month bank bill rate. This is termed a 'fixed for floating swap'. In effect, Tabcorp would promise to pay a fixed coupon to the third party over the five year period and the third party would promise to pay Tabcorp the bank bill rate over those five years.

113. By entering into this transaction Tabcorp would be able to use the bank bill payments from its swap agreement to pay the bank bill related costs on its floating rate bond. This would leave Tabcorp with a net liability equal the fixed component of its swap agreement plus the fixed margin above the bank bill rate on its floating rate bond. That is, the net position would be identical to having issued a fixed coupon bond.

114. Such transactions are commonplace in financial markets and it is quite possible that this is precisely what Tabcorp did. Of course, Tabcorp does not have to enter into a 5 year swap. It can leave itself exposed to variations in the bank bill rate over the five years. However, the market price of bearing this risk itself is given by the 5 year swap rate.

115. There are two sensible dates on which to measure the swap rate for this purpose. The first is 24 March 2009 (the day of the announcement of the offer) which is the day Tabcorp committed to issue the debt at a specified margin (between 400bp and 450bp) above the swap rate. The 5 year swap rate was 4.34% on that day. The second is 1 April 2009 being the date that the margin was established in the middle of this range. The swap rate was 4.36% on that day.

116. Using the 1st of April date as an example, if we add 4.25% (being the fixed coupon margin) to the swap rate on 1st April (4.36%) then we get an equivalent fixed coupon yield to maturity of 8.61%. However, this is sum of four quarterly payments that would have to be made by Tabcorp over the remaining life of the bond. I understand that the cost modelling in the AMI process requires an "annualised" cost of debt calculation (ie, "as if" the interest payments were made at the end of a the year). One quarter of 8.61% paid quarterly is equivalent to a single annual payment of 8.89% $(=(1+0.0816/4)^4-1)$.

117. The table below summarises theses calculations and compares it to the AER/Bloomberg 5 year BBB+ fair value estimate on 24 March 2008 and 1 April 2008.

Table 4: Cost of debt based on 425bp margin above the swap rate

Date	24 March 2009	1 April 2009
Swap rate (quarterly)	4.34%	4.36%
Tabcorp fixed coupon margin (quarterly)	4.25%	4.25%
Tabcorp 5 year issue quarterly	8.59%	8.61%
Tabcorp 5 year issue annualised	**8.87%**	**8.89%**
AER/Bloomberg 5 year BBB+ fair value estimated	**7.68%**	**7.69%**

**Source: Bloomberg and CEG analysis.*

118. This table states that Tabcorp issued at a 5 year equivalent fixed annualised yield in excess of 8.87% (I say in excess because Tabcorp will also have to pay bonus interest on some proportion of its offer). The immediate next observation from this table is that Tabcorp is issuing at a yield that is substantially above (1.2% above) the AER/Bloomberg BBB+ fair value estimate.

5.1.2. Interest costs on the AMP A- debt issue

119. AMP issued approximately $300 million of A- floating rate bonds in early March 2008 – with the fixed coupon on these being set at 4.75% on 11 March 2009.[34]

120. The AMP issue will have a potential maturity of ten years.[35] Similar to the Tabcorp issue, the AMP debt will pay a floating interest rate which is reset every three months to be equal to the then prevailing 3 month bank bill rate (3 month BBSW) plus a margin set initially between 425bp to 475bp.[36] After five years the margin on any outstanding debt will be 150% of this initial margin (ie, 7.125% being 1.5*4.75%), however, AMP will have the right to extinguish the bond prior to this higher interest rate being paid.

121. This ability to 'call' the bond and the very high rates after five years if the bond is not 'called' effectively makes its term a 5 year bond. That is, the only circumstances in which AMP would not call the bond would be if interest rates on its debt had risen to more than 7.125% above the swap rate (in which case it would make sense for AMP to prefer to continue to pay that interest rate rather than refinance. This means that attempting to calculate a 10 year cost of debt based on the 4.75% and 7.125% coupon

[34] Standard & Poors has given a provisional rating of A- for the issue. See page 43 of the Prospectus for the issue of AMP bonds at http://www.asx.com.au/asxpdf/20090303/pdf/31gdmr9wwvqrzx.pdf. The 4.75% fixed coupon rate is http://www.asx.com.au/asxpdf/20090311/pdf/31gjdfqxfsjk9m.pdf

[35] After 5 years the issuer has the right, with regulatory approval, to redeem some or all of the notes issued, giving it characteristics of a 5 year issue.

[36] The initial margin will be set on the issue date.

margins would overestimate the likely cost of debt for AMP (as AMP is not committed to paying the 7.125% coupon margin). However, AMP is committed to paying the 4.75% coupon margin over the first five years so it is possible to estimate a 5 year cost of debt to AMP accurately.

122. The following table steps through the same calculations for AMP as for Tabcorp – the only difference being the calculations are undertaken for 11 March rather than 24 March and 1 April.

Table 5: Cost of debt based on 475bp margin above the swap rate

	11 March 2009
Swap rate (quarterly)	4.07%
AMP fixed coupon margin (quarterly)	4.75%
AMP 5 year issue quarterly	8.82%
AMP 5 year issue annualised	9.12%
AER/Bloomberg 5 year BBB+ fair value estimated	7.47%

*Source: Bloomberg and CEG analysis.

123. In the case of the AMP issue the AER/Bloomberg BBB+ fair value curve underestimated the yield on this bond by more than 1.65%. This is despite the AMP issue being rated A- (ie, a higher rating that BBB+).

5.1.3. Adjustment required for transaction costs

124. In the AMI decision the AER has allowed 12.5bppa in transactions costs associated with issuing debt. This is based on the assumption that the debt is issued entirely into the wholesale market. However, this is significantly less than the actual transaction costs incurred by both Tabcorp and AMP both of which had retail components to their issue and where retail issues tend to involve higher transaction costs.

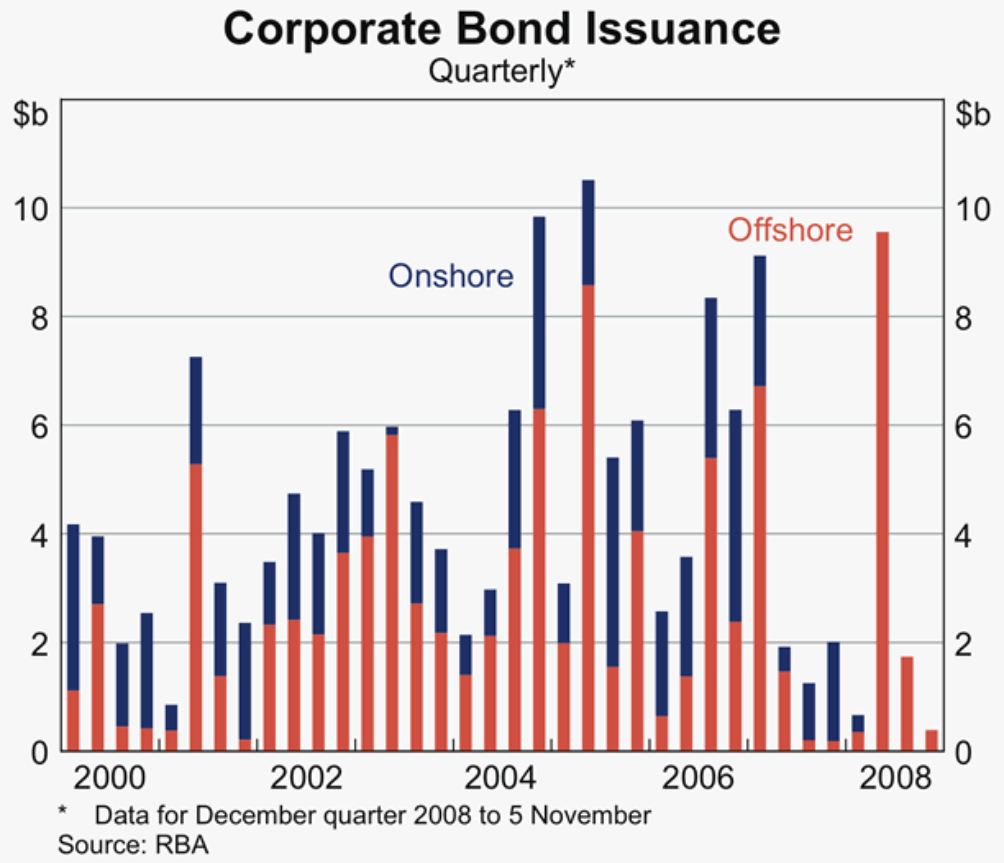
125. Tabcorp and AMP would only rationally have incurred the higher transaction costs associated with a retail issue if they believed that doing so would reduce their interest costs by more than it would increase their transaction costs. Thus, the Tabcorp and AMP issues constitute a lower bound estimate of the interest rate that would have been paid in the wholesale market at that time.

126. A conservative estimate of the extent to which the wholesale market interest rate would be higher is simply to take the difference between the AER's allowance for transaction costs (12.5bppa) and the actual transaction costs incurred by Tabcorp and AMP. I estimate this to be more than 0.5% pa (or 50bppa) – see appendix A for calculations.

5.2. Tested against actual trades in the US markets

127. Given the absence of any known trades during the AMI averaging period an alternative approach would be to look to known trades that occurred during the AMI averaging g period but in the US or European markets. Australian corporations were issuing exclusively into this market in the latter half of 2008 - as demonstrated by the following figure from the RBA November 2008 Statement of Monetary policy.

Graph 74



128. In the February 2009 Statement of Monetary policy the RBA states (referring to domestic bond issues)

> *There has been no corporate bond issuance since October 2008. Secondary market spreads on corporate bonds have increased by around 5 basis points since the last Statement, reaching a high of 450 basis points above CGS (Graph 79). However, due to the fall in CGS yields, corporate bond yields are currently around*

> *7.2 per cent – 150 basis points lower* than at the end of October 2008 and at levels last seen in August 2007. (Page 55.)

129. In this context I consider the AER was in error to express the following conclusion in the AMI draft decision:

> *The AER does not consider it appropriate to compare the Bloomberg Australian fair yields against the yields of international bonds. Market conditions will vary between the Australian bond market and the US bond market and it is expected that deviations between the two will occur, even after the bonds are swapped to Australian dollars.* (Page 121.)

130. Such a conclusion may be justified if we observed that Australian corporations were all choosing to issue debt in the Australian market. However, such a conclusion cannot hold if this is not the case – and in fact the opposite is true during the AMI period.

131. Given that we observe that corporations are preferring to issue debt overseas then we must conclude that the perceived cost of doing so is lower than the perceived cost of issuing debt domestically. Given that we know the perceived cost of issuing debt overseas is lower than the perceived cost of issuing debt domestically then we can use the estiamtes of the cost of issuing debt overseas as a lower bond estimate of the cost of issuing debt domestically. To simply exclude such evidence on the basis that it tells us nothing about domestic market conditions is illogical and inconsistent with what we observe about the actual behaviour of Australian corporations.

132. I am informed by Citipower that the following bond issues by major Australian companies took place in the US debt markets in the period immediately after the AMI period (with the first observation on 30 Dec 2008). I have not indepently verified these observations but nonetheless rely on them as faithful reproductions of the facts.

Table 6: Debt premia (not annualised) paid by Australian companies issuing debt in the US

	Spread over US Treasury at Issue	Launch/ Announcement Date	Rating	Spread to CGS after hedging exchange rate risk
5 year issues				
QBE Insurance	770	30-Dec-08	A3/A-	802
Woodside	625	24-Feb-09	Baa1/A-	615
Brambles	550	15-Mar-09	NAIC-2	556
BHP Billiton	400	18-Mar-09	A1/A+	400
Rio Tinto	752	14-Apr-09	Baa1/BBB	794
Caltex Australia	615	14-Apr-09	BBB+	839
Westfield	549	27-May-09	A-/A2/A-	564
7 year issues				
Brambles	550	15-Mar-09	NAIC-2	586
Caltex Australia	615	14-Apr-09	BBB+	666
APA Pipelines	575	14-May-09		620
10 year issues				
BHP Billiton	400	18-Mar-09	A1/A+	476
Woodside	613	24-Feb-09	A-	663
Brambles	550	15-Mar-09	NAIC-2	629
Rio Tinto	658	14-Apr-09	Baa1/BBB	780
APA Pipelines	575	14-May-09		728
Average	**586**			**647**

*Source: Citipower

133. The second column describes the debt premia measured relative to the US government bonds ("Treasuries"). The column on the far right provides the debt premium measured relative to CGS after hedging the debt back into Australian dollars.

134. Based on the economic concept of uncovered interest parity, risk free interest rates denominated in one currency should offer the same expected return as risk free interest rates in another country after adjusting for expected movements in exchange rates between the two currencies. If this was not the case then there woud be arbitrage profits to be made by borrowing in one country and lending in another. On this basis, it is reasonable to ignore any differences in risk free rates between Australia and the US and focus solely on the credit spread in the US as the variable that companies would be considering when deciding whether to issue debt in the US or Australia. That is, the observed debt margin in the US will be very close to the debt margin that busiensses expect to pay relative to CGS assuming that they don't hedge foreign currency exposure.

135. Alternatively, one can also go through the exercise of examining what it would cost to hedge interest costs incurred in the US back into Australian dollars. Citipower has

done this and, unsurprisingly, this results in only a small incresae in the average debt margin. I say this is unsurprising because the possibility of such arbitrage profits drive the development of foreign currency hedging markets so uncovered interest rate parity should provide a close approximation to covered (ie, hedged) interest rate parity.

136. In what follows I focus on the more conservative spread to Treasuries measure of the debt premium in the abvoe table. This column demonstrates that, starting in December 2008, Australian corporations were isssuing debt into the US debt market at risk premia (even before annualisation) well in excess of the 3.09% determined in the AER draft decision. The lowest debt premium achieved by any of these issuers was by BHP Billiton which has a credit rating of A+ and with extremely low debt levels. The following commentary from the business pages of the Sydney Morning Herald on 5th February 2009 is relevant:

> *BHP Billiton boss, Marius Kloppers, delivered a half-year result yesterday that by anyone's standards would be considered disappointing. It contained more than the usual smattering of hot spots and under normal circumstances would have sent the share price into a tailspin.*
>
> *But Kloppers didn't appear particularly concerned and the share price response was fairly benign. He, unlike some other captains in the commodity industry, sleeps well at night.*
>
> *The simple explanation for this is that BHP Billiton has next to no debt - a gearing ratio of less than 10 per cent. Until a year ago this would be viewed with derision: a lazy balance sheet working at far less than its capacity.*
>
> *But in the new world there is no such thing as too little debt. What was once lazy is now safe and brimming with potential to pounce on cheap distressed assets that must be discarded by competitors with debt problems.*[37]

137. Similarly, other analysts commentary such as "BHP's ultra-low gearing must be the envy of blue chips around the world". [38]

138. In summary, around the AMI averaging period Australian companies were universally choosing to issue into foreign debt markets and the lowest debt premium observed for

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[37] The Age, *February 5, 2009,* Low debt burden ensures Kloppers sleeps well at night http://business.smh.com.au/business/low-debt-burden-ensures-kloppers-sleeps-well-at-night-20090204-7xwg.html

[38] Fat Prophets analyst Gavin Wendt as reported in the Courier Mail, August 13 2009. *BHP Billiton registers first profit fall since merger* http://www.news.com.au/couriermail/story/0,20797,25921570-3122,00.html

those issuers is 4.0% for BHP Billiton (which is A+ rated and has ultra low gearing at a time when '*there is no such thing as too little debt*'). In this context, I do not consider that it is reasonable to determine a benchmark debt premium for an Australian company with an assumed BBB+ credit rating and 60% gearing is less than 4.0%.

139. In my view, the evidence of Australian companies issuing debt into the US market proximate to the AMI averaging period supports a conservative estimate of the debt risk premium for a 60% geared BBB+ rated firm of 5.86% (the mean of post AMI period unhedged debt premia for Australian companies issuing debt into the US where those Australian companies had an average).

140. I note that Citipower has also examined the issues of debt into foreign markets during the AMI averaging period (but not by Australian businesses) with those interest costs hedged back into Australian dollars. I am told that the mean (median) premium on BBB+ debt during that period was 5.98% (6.21%) when hedged back into Australian dollars. Interestingly, I am told that four of these issues are for three US BBB+ rated energy utilities and they had a mean (median) risk premia of 6.56% and 6.83%. This confirms my view that a 5.86% estimated risk premium for the AMI averaging period based on observations from Australian companies issuing in the US post the AMI period is conservaitve.

5.3. Conclusion

141. The best available evidence of actual trades in BBB+ (and other) rated bonds proximate to the AMI averaging period confirms the analysis undertaken in prior periods (ie, the lead up to and during the AMI averaging period). Namely, the AER/Bloomberg BBB+ fair value curve significantly underestimates the market observed yields on BBB+ bonds (and even on higher rated bonds).

142. The Tabcorp bond is the best observation available of a traded BBB+ bond with a medium term maturity that is proximate to the AMI averaging period. Importantly, it is also an observation of the cost of debt *to an issuer* and therefore is desirable as a source of information on the benchmark rate (see criterion i at paragraph 50). The yield at issue on the Tabcorp bond issue can reasonably be viewed as an underestimate of the benchmark rate because the issue was a retail issue and, as such, incurred higher direct transaction costs in reaching retail customers with the pay-off for incurring these costs being lower interest costs paid by Tabcorp.

143. This observation provides a clear basis for believing that Bloomberg fair value estimates underestimate the benchmark rate.

144. Of course, the Tabcorp issue is only one observation for one bond. However, the AER/Bloomberg methodology is also effectively based on a single bond (as described

below, Santos drives the value of the Bloomberg BBB 8 year fair value). There is also no evidence that the Bloomberg Santos price reflects an actual trade of the bond as opposed to an estimate of its yield. In addition, the Bloomberg estimate for Santos is based on an estimate of the yield associated with a hypothetical trade in the secondary market and not the interest costs to the issuer (as is the case for the Tabcorp observation).

145. On this basis, to the extent that one was required to set the benchmark on the basis of a single observation it would be preferable for that observation to be based on the actual traded price for the Tabcorp new issue than on a Bloomberg estimate of the hypothetical secondary market traded price for Santos.

6. Alternative proxies for the benchmark 10 year BBB+ rate in the AMI averaging period

146. Based on the empirical evidence outlined above it is my opinion that the AER/Bloomberg BBB+ fair value curve is not a reliable estimator of benchmark BBB+ yields based on observations from the corporate bond market. This conclusion holds at every maturity level but is especially strong at longer maturities approaching 10 years.

147. I have also been asked to provide my opinion on alternative proxies for the 10 year BBB+ benchmark rate during the AMI averaging period. I describe and assess alternative proxies in the following sub-sections.

148. In my view there are really four options available to arrive at an estimate of the benchmark rate for 10 year BBB+ rated debt during the AMI averaging period. These options are:

- to use published fair value estimates from CBASpectrum and Bloomberg to arrive at an estimate (possibly by taking some sort of average of the two);
- to derive a bespoke estimate of the fair value of BBB+ bonds from Australian corporate bond yield estimates observed within the AMI averaging period;
- to take observations of actual trades in Australia from outside the AMI averaging period and use these as a basis for setting the benchmark rate within the AMI averaging period; or
- to take observations of actual trades from outside Australia (but within or proximate to the AMI averaging period) and use these as a basis for setting the Australian benchmark rate within the averaging period.

6.1. CBASpectrum fair value as an alternative to Bloomberg

149. I am only aware of two providers of fair value estimates for yields on Australian corporate debt – Bloomberg and CBASpectrum. Previously in this report I have restricted my discussion, consistent with my terms of reference, to the Bloomberg estimates. I now focus on the CBASpectrum estimates.

150. During the AMI averaging period CBASpectrum published a 10 year BBB+ fair value yield of 9.55% (annualised) giving rise to a DRP estimate of 4.92% (ie, a spread to 10 year CGS of 4.92%). This compares with the AER/Bloomberg 10 year fair value yield of 7.73% (DRP of 3.09%).

151. In contrast to the AER/Bloomberg fair value estimates, I find that the CBASpectrum estimates:

- behaved in the manner expected of a fair value estimate following the worsening of the global financial crisis. Specifically, rather than credit spreads staying relatively constant through September, October and November 2009 (as reported by Bloomberg), CBASpectrum estimated increasing credit spreads in the period leading up to the AMI averaging period – consistent with theory and published BBB yield estimates by the RBA;

- better fit the data for yield estimates during the AMI averaging period; and

- better described the yields observed on actual trades of BBB+ (and other rated) debt post the AMI averaging period.

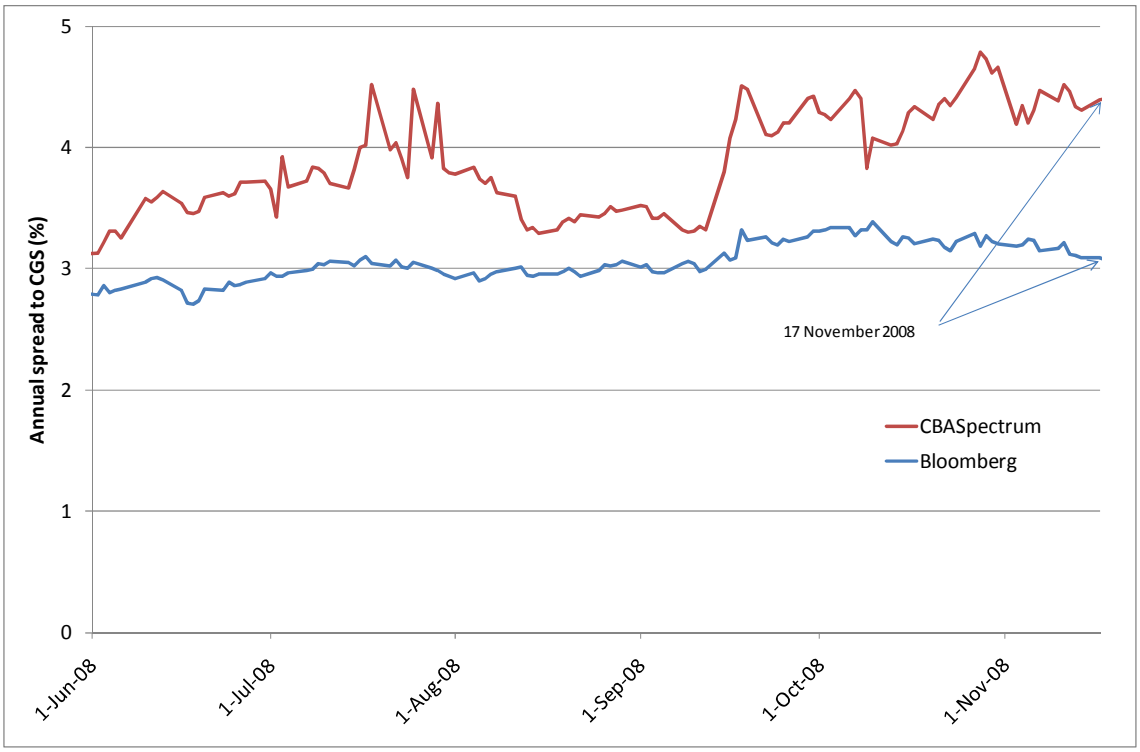
152. For these reasons I find the CBASpectrum BBB+ fair value estimate to be a more reliable proxy for the benchmark BBB+ rate during the AMI averaging period. I step through the evidence underlining each of the dot points in the following subsections.

6.1.1. Performance in the lead up to the AMI averaging period

153. As already described in section 3.1 above, it is my opinion that the only reasonable expectation is that, following the escalation of the financial crisis in September 2008, risk premiums on corporate debt, and especially relatively low rated BBB+ corporate debt, should have increased markedly.

154. Figure 9 below shows a recent history of debt risk premia over CGS estimated by CBASpectrum and Bloomberg for 10-year BBB+ bonds, using the AER's methodology.

Figure 9: CBASpectrum vs Bloomberg (AER) estimated spreads to CGS on 10-year BBB+ corporate bonds



Source: Bloomberg, RBA

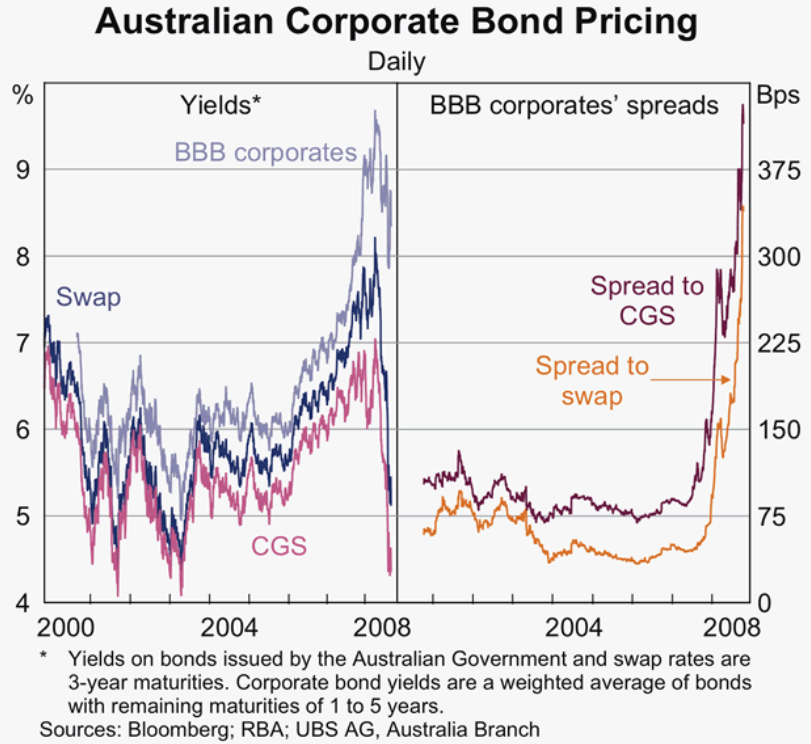
155. Unlike the debt premia estimates of Bloomberg, it can be seen that the debt premia estimates for CBASpectrum rose following the collapse of Lehman Brothers in September and the consequent escalation of the global financial crisis.

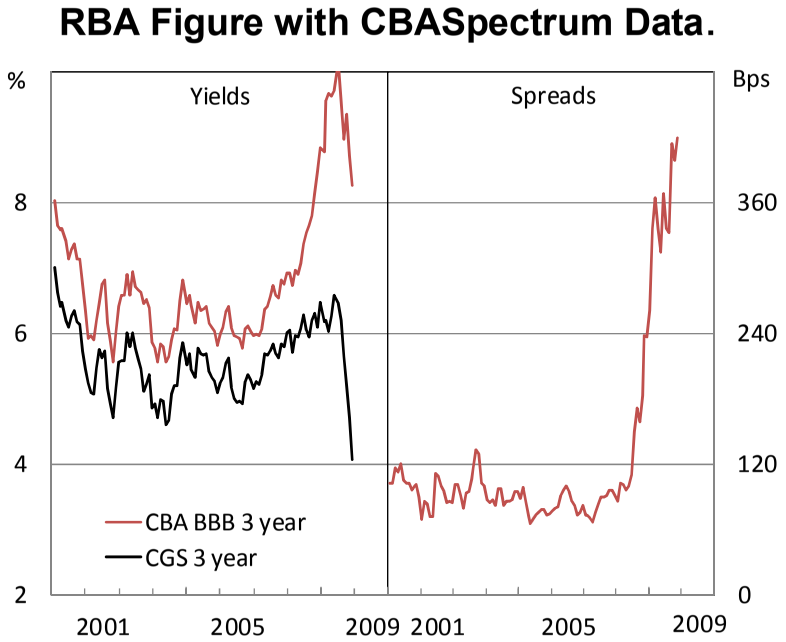
156. By the beginning of the AMI averaging period the CBASpectrum BBB+ estimated spreads to CGS were, at 4.39%, 1.30% higher than those estimated by Bloomberg.

157. The CBASpectrum estimated spread to CGS for 10 year BBB+ bonds on 17 November 2008 is also consistent with, although lower than, the RBA reported spread for BBB bonds with 1 to 5 years to maturity of 4.59% in November 2008 (as reported in Table 2 above).

158. As I did in section 3.2 for Bloomberg I now compare the RBA graph for moves in BBB spreads to CGS with the same graph derived using CBASpectrum fair value estimates for 3 year debt. A cursory examination of Figure 2 and Figure 10 will show that CBASpectrum BBB+ estimated yields and spreads behaved consistently with those published by the RBA while those published by Bloomberg did not.

Figure 10: Comparison of CBASpectrum corporate bonds spreads with RBA estimates



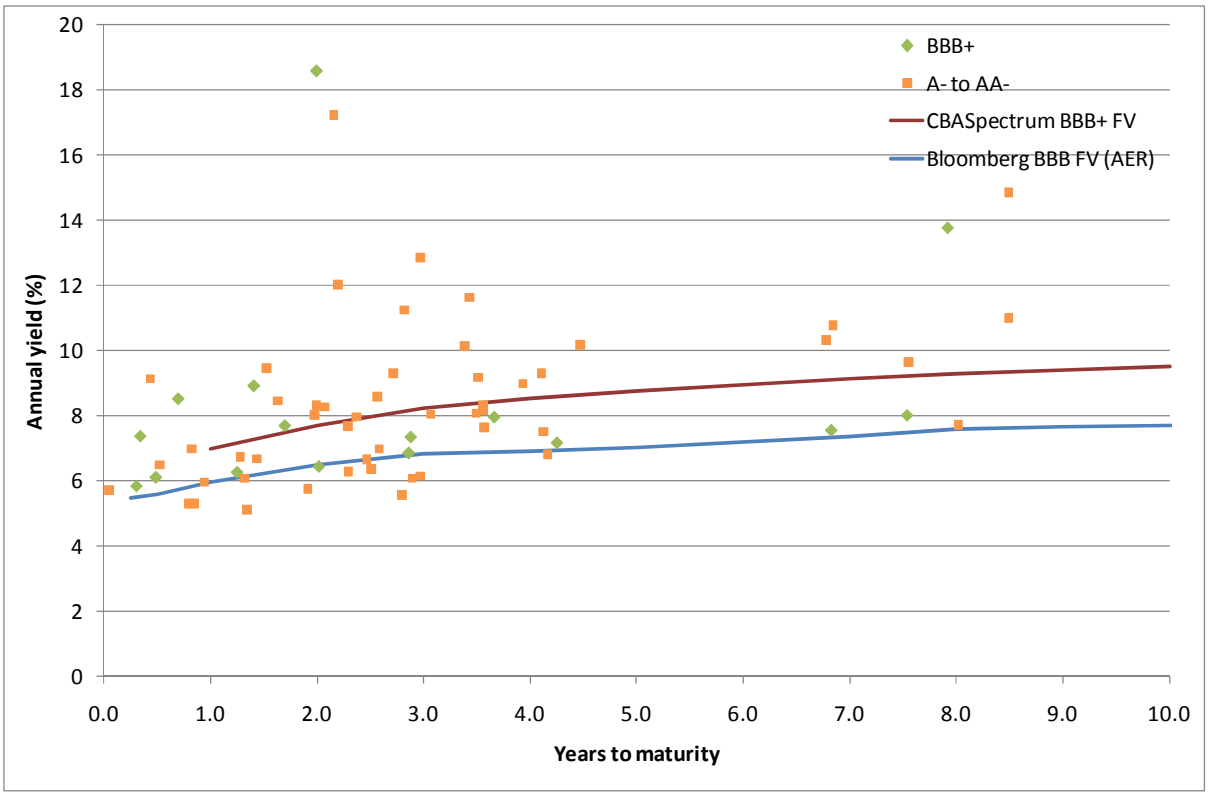


159. Specifically, note that the spread to CGS estimated by CBASpectrum continues to rise throughout the period as does the spread to CGS estimated by the RBA (recall that the Bloomberg spread to CGS ceases stops and 'flatlines' over the latter half of 2008).

6.1.2. Performance in explaining observed yields during the AMI averaging period

160. During the AMI averaging period the CBASpectrum BBB+ fair value curve provided a better fit to all of the estimated BBB+ to AA- yields. As should be the case, the CBASpectrum BBB+ fair value curve passes above a large number of the observations for A_ to AA+ issuers (including above 3.5 years to maturity). This can be seen in the below figure (which updates Figure 7 above by including the CBASpectrum fair value curve).

Figure 11: Average yield estimates for BBB+ to AA- rated fixed coupon bonds during AMI averaging period



6.1.3. Performance in explaining actual trades post the AMI averaging period

161. Table 7 and Table 8 below are the same as Table 4 and Table 5 except they now include the CBASpectrum estimate of the BBB+ fair value at the time of the Tabcorp/AMP debt issues and also include the relevant spread to 5 year CGS on that date.

Table 7: Tabcorp BBB+ issue vs Bloomberg/CBASpectrum

	24 March 2009	1 April 2009
Yields		
Tabcorp 5 year issue annualised	8.87%	8.89%
AER/Bloomberg 5 year BBB+ fair value estimated	7.68%	7.69%
CBASpectrum 5 year BBB+ fair value estimated	9.89%	10.19%
Spread to CGS		
5 year CGS yield	3.84%	3.90%
Tabcorp spread to CGS (5 years)	5.03%	4.99%
CBASpectrum BBB+ spread to CGS (5 years)	6.05	6.29%
AER/ Bloomberg BBB+ spread to CGS (5 years)	3.84%	3.79%

*Source: Bloomberg, CBASpectrum, RBA and CEG analysis.

Table 8: AMP Comparison A- issue vs Bloomberg/CBASpectrum

	11 March 2009
Yields	
AMP 5 year issue annualised	9.12%
AER/Bloomberg 5 year BBB+ fair value estimated	7.47%
CBASpectrum 5 year BBB+ fair value estimated	9.51%
Spreads to CGS	
5 year CGS	3.65%
AMP spread to CGS (5 years)	5.47%
CBASpectrum BBB+ spread to CGS (5 years)	5.86%
AER/Bloomberg BBB+ spread to CGS (5 years)	3.82%

*Source: Bloomberg, CBASpectrum and CEG analysis.

162. Notably, the spread to 5 year CGS on both of the Tabcorp and AMP bonds was in excess of 4.99% in March 2008. This is materially more than the predicted spread to CGS for a BBB bond based on the Bloomberg BBB fair value curve (of around 3.8%). Notably it is also substantially more than the 3.09% 10 year DRP allowed in the AMI draft decision. CBASpectrum estimated a BBB+ spread to CGS for these bonds that

163. Bloomberg underestimated these actual observations and CBASpectrum overestimated them (but by less than Bloomberg). On this basis alone some average of CBASpectrum and Bloomberg may present itself as reasonable. However, in my opinion this evidence supports a dominant weight being given to the adoption of CBASpectrum rather than Bloomberg fair value estimates because:

- CBASpectrum BBB+ was a better predictor of these observations on average than Bloomberg;
- The average credit rating for these observations is above BBB+ (given the AMP issue was rated A-); and
- The yield on Tabcorp and AMP issues is a downward biased estimate of the yield on a wholesale issue of such debt. As described in section 5.1.3 and Appendix A I conservatively estimate this downward bias at 0.5%.

164. It is also the case that CBASpectrum BBB+ fair value estimates are more consistent with other relevant information on the cost of debt during the AMI averaging period – such as the average observed yield estimates for corporate bonds during the AMI averaging period and the cost of issuing debt by Australian companies into the US dollar denominated debt market. I discuss these alternative proxies for the benchmark cost of debt below.

6.2. Adjusting actual trades back to the AMI averaging period

165. If one adjusts yields on actual trades post the AMI averaging period for changes in credit spreads back to the AMI averaging period then one can also arrive at an estimate of what the yield on those trades would have been had they occurred during the AMI averaging period. One could then use some form of estimate of the shape of the yield curve duirng the AMI averaging period to convert the observed yield for the individual bond into a yield on an otherwise equivalent 10 year maturity debt.

166. This is the approach that the Victorian businesses used to arrive at an estimate of the yield on the Tabcorp bond had it been issued during the AMI averaging period and had it had a maturity of 10 years (9.48%). This estimate is consistent with the CBASpectrum estimate (9.55%) but below an average yield estimates for all long dated BBB+ to AA- bonds. It also results in a spread to CGS of 4.84% - which is slightly higher than that estimated by the RBA for BBB bonds with 1 to 5 years to maturity (4.59% in November 2008 and 4.61% in December 2009)

167. In my view converting observed trades from outside the AMI period into equivalent yields inside the AMI period is a reliable approach to determining the benchmark rate in the AMI period given the paucity of traded data during the AMI averaging period. I

also note that the Victorian DB's estimate falls within a reasonable range given other available data.

168. I further note that the average spread to 5 year CGS for the Tabcorp and AMP issues was 5.16%. Even if one ignored the fact that one of these bonds was newly rated at more than BBB+ and both had shorter duration than 10 years, one would still need to believe that risk premiums were more than 2% lower in the AMI averaging period in order for these observations to be consistent with the 3.09% DRP in the AMI Draft Decision.

6.3. Taking an average of observed yields during the AMI averaging period

169. An alternative to using a fair value estimate published by Bloomberg and/or CBASpectrum is to take a simple average of the observations of risk premia estimates for issuers during the AMI averaging period. The table below provides three different measures of central tendency across the full sample of fixed coupon bonds (and fixed and floating rate bonds) I have collected.

Table 9: Average spread to CGS across all maturities

	BBB+	BBB to A-	BBB+ to AA-	BBB+ to AAA
Average premia on fixed bonds issued by an issuer				
Observations	15	39	68	130
Mean (%)	5.08	5.46	5.54	4.12
Median (%)	3.70	3.70	4.42	3.33
Trimmed mean(%)	4.23	4.54	4.57	3.34
Average premia on fixed and floating bonds issued by an issuer				
Observations	20	54	93	177
Mean(%)	5.42	6.71	5.77	4.29
Median(%)	3.91	4.27	4.38	3.30
Trimmed mean(%)	4.35	4.83	4.43	3.50

*Source: Bloomberg, UBS, AFMA, CBASpectrum, Reuters, and CEG analysis.

170. Restricting the analysis to BBB+ issuers alone gives rise to a mean spread to CGS for of 5.08% for fixed coupon issues (15 observations) and 5.42% for both fixed and floating issuers (20 observations). The median yield is 3.70% for fixed coupon bonds and 3.91% for fixed and floating issuers. The trimmed mean is the mean of only the interquartile observations (ie, the mean of observations excluding the highest and lowest yielding 25%). The trimmed mean is 4.23% (fixed only) and 4.35% (fixed and floating). The table also reports the same results when the credit rating criteria is changed.

171. The table below provides the same analysis but where the maturity profile of the bonds under consideration are restricted to be between 4 to 16 years (more in line with the requirement to estimate the interest cost on a 10 year bond). I primarily focus on the results of this table as most relevant. I note that there is substantial agreement between the two tables except for in relation to the BBB+ only samples. As I discuss below, this is explainable by virtue of the very small sample size for long dated BBB+ issuers.

Table 10: Average spread to CGS across maturities from 4 to 16 years

	BBB+	BBB to A-	BBB+ to AA-	BBB+ to AAA
Average premia on fixed bonds issued by an issuer				
Observations	4	11	21	51
Mean (%)	4.92	5.65	5.77	3.87
Median (%)	3.50	6.00	5.90	3.35
Trimmed mean(%)	4.21	5.09	5.34	3.67
Average premia on fixed and floating bonds issued by an issuer				
Observations	5	16	28	68
Mean (%)	4.80	5.17	5.67	4.00
Median (%)	3.50	5.00	5.63	3.50
Trimmed mean (%)	4.39	5.02	5.17	3.85

*Source: Bloomberg, UBS, AFMA, CBASpectrum, Reuters, and CEG analysis.

172. A number of observations can be made about these tables. Firstly the mean observation in all ratings categories presented is at 4.0% or above. That is, even when I examine the debt premia for 177 unique issuers rated from BBB+ all the way to AAA the mean observation is 4.29% (Table 9 above).

173. Secondly, when I restrict the sample to only BBB+ issuers with more than 4 years to maturity I effectively limit the number of issuers to only 5 (4 if I exclude floating rate bonds). This is an unreliably low sample size and I do not recommend its use. This is especially given that this sample has a lower average (however measured) than both:

- all issuers with a BBB+ to AA- rating; and
- all issuers of BBB+ bonds (ie, including shorter maturity BBB+ bonds);

174. Thirdly, including both BBB and A- bonds in the sample (ie, keeping the average credit rating at around BBB+) causes the average debt premium on longer dated bonds to rise universally above 5% (ie, irrespective of definition of average and also irrespective of whether floating rate notes are included). The sample sizes achieved are larger making the estimates more reliable.

175. Fourthly, including issuers rated up to AA- and excluding issuers rated less than BBB+ gives rise to a larger sample size (21 for fixed coupon bonds and 28 for both fixed and floating) and an average credit rating that is above BBB+. This gives rise to estimates of the average debt risk premia of between 5.17% and 5.90%.

176. Fifthly, it is only when I include AAA rated bonds in the sample that the average debt risk premia fall to 4.00% and less. However, even in this scenario the lowest estimate of the average debt risk premium is 3.35%. This is still above the 3.09 DRP estimated in the AMI draft decision even though the average issuer in this group has a rating above AA. This further supports the view that a DRP based on the Bloomberg BBB+ fair value curve is unreliable.

177. In my view, these observations support an estimate of the benchmark BBB+ DRP of at least 5.0% and up to 6.0% (defined by the range of measures of central tendency reported in the samples for BBB to A- issuers and BBB+ to AA- issuers in Table 10). The midpoint of this range is 5.5%.

178. I also note that the RBA publishes average spread to CGS for BBB rated bonds (albeit at 1 to 5 years maturity). As per Table 2 above these average 4.60% in November and December 2008.

6.3.1. Treatment of 'outliers'

179. I note that each of the measures described in the above tables involves a different measure of central tendency ("average") for the sample. None of these measures exclude observations but they do have the effect of giving different weight to the observations.

180. The mean gives every observation in the sample equal weight in a weighted average. The median adopts only one observation from the middle of the sample – but all observations play a role in determining which observation that is (ie, where the middle is). The trimmed mean gives all observations in the interquartile range equal weight – but with all other observations playing a role in determining what observations actually fall into the interquartile range (eg, adding an extra low observation into the bottom quartile will, even though that observation does not fall in the interquartile range, lower the trimmed mean by effectively pushing out the previously highest observation from the interquartile range and replacing it with a new observation that previously sat just below the interquartile range).

181. It is also possible to engage in an exercise that excludes some observations completely from the calculation on the basis that they are 'outliers'. This should be done if one has ascertained that the excluded observation is the result of measurement error (eg, a data entry error caused an extraneous "0" to be added) or it

can be definitively determined that the observation is not drawn from the population under consideration (eg, when sampling the length of worms one has accurately but inadvertently measured the length of a small snake rather than a worm).

182. Unless we have reason for believing that high and low yield estimates from individual banks are incorrect then we must accept these as accurate (or at least as accurate as the other observations). That is, we must accept that there is a real dispersion in the range of yields that exist in the market and this needs to be reflected in my analysis.

183. The second reason for excluding "outliers" is that the thing being measured is not the thing that we are interested in. In this context, one would have to conclude that some special characteristics of the bond in question make it irrelevant (ie, of zero informational content) to the task of estimating a benchmark BBB+ rate at 10 years. For example, I discussed in section 7.2 below how the Santos bond is unusual for a BBB+ bond in that Santos was effectively debt free during the AMI averaging period. One might be tempted to exclude Santos from the sample of relevant bonds on this basis.

184. However, I consider that this would be a mistake. While there are some characteristics of the Santos bond that make it unusual this will invariably be true for all bonds given the idiosyncratic nature of the financial position of different companies and the risks inherent in their sphere of operation. It is precisely these idiosyncratic risks that rating agencies such as Standard and Poor's attempt to encapsulate in the credit ratings they assign to these bonds. In my view, all observations are of value and no observations should be 'thrown out'. A low (high) observed yield for one bond relative to others does provide a basis for concluding the benchmark yield is lower (higher) than if that observation did not exist. Exactly how much lower (higher) may be a matter of debate but, in my view, any reasonable method must give the observation some weight.

185. An attempt to exclude from consideration a bond with a particular credit rating on the basis of special characteristics about that bond amounts to a *de facto* second guessing of the rating agency decisions. The fact that the AMI Order in Council directs one to have regard to the credit rating of a bond, rather than to an assessment of what that credit rating *should be* based on new research, would appear to support my view that such a second guessing exercise not be undertaken.

186. Nonetheless, I do report below the results of an estimation process which identifies potential outliers and then, without further inspection, I exclude these observations. I do this primarily for illustrative purposes to demonstrate the extreme example of what would be the case if one applied techniques commonly used for identifying outliers (ie, commonly used to identify unusual observations for further inspection) and then found that all such outliers should be completely excluded.

187. I have applied three tests to identify outliers for this purpose. They operate as follows:

- Chauvenet's test[39] defines a criterion based upon how far an observation diverges from the mean of the sample. The observation is determined to be an outlier if it lies outside a normally distributed confidence interval about the mean with a significance level of 1/(2n), where n is the number of observations in the sample;

- the "classic" outlier detection test[40] excludes those observations that lie further than two standard deviations from the mean. This is approximately equivalent, under the assumption that observations are drawn from a normal distribution, to excluding those observations where the null hypothesis that they are drawn from the same population can be rejected at the 5% level of significance using a two-tailed test;

- the "box plot" test[41] excludes observations that:

  - exceed the 75th percentile by 1.5 multiples of the interquartile range; and

  - lie below the 25th percentile by 1.5 multiples of the interquartile range.

188. I summarise in the table below the results of applying these tests to the yield data.

[39] Chauvenet, W. (1863) *A Manual of Spherical and Practical Astronomy:* Lippincott, Philadelphia.

[40] See, for example, Rand R. Wilcox, Basic Statistics: Understanding Conventional Methods and Modern Insights Wilcox Oxford University Press page 23

[41] Ibid, page 24

Table 11: Average spread to CGS excluding outliers

	BBB+	BBB to A-	BBB+ to AA-	BBB+ to AAA
All fixed and floating bonds				
Mean completely excluding outliers using "Chauvenet's test"	4.19	5.90	5.11	3.58
Mean completely excluding outliers using "Classic test"	4.19	5.90	4.62	3.43
Mean completely excluding outliers using "Boxplot test"	4.19	4.33	4.20	3.43
All fixed and floating bonds with maturity between 4 and 16 years				
Mean completely excluding outliers using "Chauvenet's test"	3.82	4.85	5.27	3.88
Mean completely excluding outliers using "Classic test"	4.80	4.85	5.27	3.63
Mean completely excluding outliers using "Boxplot test"	3.82	5.17	5.27	3.88

*Source: Bloomberg, UBS, AFMA, CBASpectrum, Reuters, and CEG analysis.

189. These results of this process do not alter my conclusion that the yield estimated during the AMI period support a range for the BBB+ benchmark DRP of between 5.0% and 6.0%. I note that, even when observations determined to be 'outliers' by these tests are given zero weight, the mean of the remaining samples are more often than not above 5.0% for the samples of BBB to A- and BBB+ to AA- issuers.

6.4. Using actual trades observed overseas during/proximate to the AMI averaging period

190. Given the absence of any known trades during the AMI averaging period an alternative approach would be to look to known trades that occurred during the AMI averaging period but in the US or European markets. I have already addressed the relevance of issues of debt by Australian (and foreign) companies in overseas debt markets proximate to the AMI averaging period (see section 5.2).

191. Based on the analysis set out therein consider that this supports an estimate of 5.86% (the mean of post AMI period unhedged debt premia for Australian companies issuing debt into the US where those Australian companies had an average).

6.5. Summary

192. Based on the analysis in this section I conclude that the following proxies for a benchmark BBB+ rate are more reliable than the AER/Bloomberg fair value derived estimate of 3.09%.

Table 12: Debt premia based on alternative proxies for the benchmark rate for BBB+ 10 year bonds during the AMI averaging period

Proxy	Implied DRP
Average of RBA estimated spreads to CGS for 3 year BBB bonds (November and December)	4.60%
CBASpectrum 10 year BBB+	4.92%
Tabcorp/AMP actual trade observed debt premia*	5.16%
Average of estimated yields during AMI period	5.50%
Actual trades in the US and other markets (including during the AMI period).	5.86%

*No adjustment made to AMI period.

7. Comparison of AER/Bloomberg and CBA Spectrum methodologies

193. Bloomberg and CBASpectrum are, to the best of my knowledge, the only data services that produce 'fair value' estimates for debt with a specific credit ratings and maturities for Australian corporate bonds. A 'fair value' estimate is an estimate of some form of 'average' or 'representative' yield for a bond of a specific credit rating and yield to maturity. In this sense an accurate or unbiased 'fair value' estimate can be equated with the concept of a 'benchmark yield' for a particular credit rating.

194. In previous sections I have examined the accuracy of the AER/Bloomberg and CBASpectrum BBB+ fair value estimates against various sources of independent evidence. As a result of this I have determined the CBASpectrum BBB+ fair value is a superior estimate of a benchmark yield for BBB+ rated bonds.

195. In this section I examine differences in the methodologies utilised by Bloomberg and CBASpectrum that might explain the different fair value estimates and explain why, in the market conditions prevailing during the AMI period, the CBASpectrum methodology gives rise to a superior estimate in my view.

196. The important conclusions from this section are that:

i. both Bloomberg and CBASpectrum exercise significant discretion in developing their fair value estimates. However, the nature and exercise of that discretion is not transparent and it is only possible to infer the methodology used and the rationale for this;

ii. nonetheless a clear inference can be drawn that Bloomberg relies solely on fitting its BBB fair value curve at long maturities to the single yield estimate for the Santos bond – this is the case before, during and after the AMI averaging period;

iii. there is good reason to believe that the characteristics of the Santos bond during the AMI averaging period meant this approach biased downward the Bloomberg BBB fair value curve at long maturities;

iv. Both Bloomberg and CBASpectrum fit fair value curves beyond the maturity that they appear to have yield estimates at that credit rating. The CBASpectrum methodology for doing so is to use yield estimates from other credit ratings and to impose a functional form on the shape of the fair value curve (or the credit spreads generated by that curve). I do not know the methodology used by Bloomberg;

v. In my view the methodology used by CBASpectrum is, in concept, an appropriate way with dealing with the paucity of data available at long maturities. I cannot express an opinion on the actual estimation techniques used by CBASpectrum to give effect to this concept as I do not have a full knowledge of them. I was previously critical of one aspect of the technique used by CBASpectrum in 2005 the effect of which was to bias down the CBASpectrum estimates at long maturities.[42] I understand that CBASpectrum has revised its techniques taking into account that specific criticism. I cannot express an opinion, at a conceptual or implementation level, of the Bloomberg methodology as I do not know what this is.

vi. A repeat of the 2005 methodology used by myself and Prof. Bruce Grundy to compare the accuracy of the Bloomberg and CBASpectrum fair value curves for long maturities would find that CBASpectrum was now significantly more accurate than Bloomberg.

197. An overall conclusion of the rest of this section is that methodology employed by both Bloomberg and CBASpectrum relies heavily on the discretion and judgement of each service. The proprietary nature of the models and lack of any published information explaining the basis for the exercise of discretion means that it is simply impossible to claim a full understanding of the methodology employed by either service. Of course, at any given time, it is possible to form an opinion about the accuracy of that discretion and judgment in the context of the NER requirements. However, precisely because it involves an exercise of judgement and discretion, it is not possible to compare this aspect of each service's methodology outside the context of a specific output from each service on a particular day.

7.1. Discretion is an important input into both Bloomberg and CBASpectrum fair value estimates

198. Bloomberg appears to mostly fit its fair value curve through a subset of the yield estimates provided to it for that credit rating category. However, Bloomberg uses discretion in:

- assigning a yield to a particular bond (it is not simply an average of yield estimates provided to it);
- deciding whether the yield assigned to the bond will actually be used in the curve fitting process; and

42 Hird and Grundy, NERA, *Critique of available estimates of the credit spread of corporate bonds*, May 2005.

- whether yields from bonds with other credit ratings will be used to determine the fair value curve (eg, yields on A rated bonds used to determine the yields on BBB rated bonds);

- what the curve fitting process will be (it is not simply a repeated application of a particular statistical technique that, say, minimises the sum of squared differences).

199. Much of this is obvious from an analysis of the fair value curves published by Bloomberg and the individual bond data published by Bloomberg. I undertake such an analysis in Appendix B. However, it is also clear from actual statements made by Bloomberg.

> *"Bloomberg Generic Price (BGN) is Bloomberg's market consensus price for corporate and government bond.* [sic] *Bloomberg Generic Prices are calculated by using prices contributed to Bloomberg and any other information that we consider relevant. Bloomberg does not make a market in any of the securities that we price. The actual methodology we use is proprietary and depends on the type of pricing and the markets involved. The goal of the pricing is to produce "consensus" pricing. To the extent that we are not comfortable that a bond can be assigned a consensus price at any time, we will mark it "not priced". We constantly and vigorously review the performance of the system and alter it as we determine necessary to achieve our goal."* [43]

200. Moreover, it appears from the following statements, provided to me by Citipower as a faithful representation of communication Citipower had with Bloomberg, that Bloomberg devolves the exercise of considerable discretion to individual analysts at the time the fair value curve is published.

> *"The absence of a BGN cannot always be taken to mean that the bond in question was not taken into consideration in curve creation."*
>
> *"The Bloomberg analyst has discretion to use approved alternate pricing to flesh out a curve when it is needed. Bloomberg could also use, depending on the reliability of the pricing source, a CBBT or a BCMP price to flesh out a curve."*
>
> *"Curves are fit as sets. If there are bonds on the curves in other ratings then Bloomberg may determine that they will keep a curve out longer than they have bonds, and monitor the shape and movement by that of the curves in other ratings."*

[43] Sourced from Bloomberg terminal on 26 May 2009.

"Analysts do have the discretion to refer to other curves in a 'set' (which might be other Australian dollar credit curves) to 'flesh out' a curve."

201. It is unclear what approval process that analyst must go through when using the discretion described above, what the analyst's physical location is (eg, Australia or the US) or whether the analyst has any specialist knowledge of the Australian corporate bond market.

202. CBASpectrum also uses discretion in its methodology for estimating fair value curves. CBASpectrum states:[44]

CBASpectrum is a cutting-edge relative-pricing tool developed for the Australian debt market. This paper aims to help clients understand the methods used to generate CBASpectrum's fair-value curves.

The original CBASpectrum model was developed by Ron Bewley, a former Professor of Econometrics at the University of New South Wales, and now the Head of Quantitative Research at the CBA. The Australian corporate bond market has grown significantly since the first CBASpectrum was released.

To accommodate a wider product range, and more variety of issuers, we have taken the opportunity to improve CBASpectrum. Under Ron's guidance, Simon Sando (a Senior Quantitative Analyst at CBA) enhanced the original credit spread model, and constructed new fair-value curves to broaden the application of CBASpectrum across the Australian debt market.

***Because the models used in CBASpectrum are proprietary in nature, this paper provides a flavour (rather than detailed discussion) for the techniques used to estimate fair-value curves**. …*

*Any basic model of the term structure of credit spreads begins with the premise that credit spreads depend on the time-to-maturity and the credit rating. Unlike commercial data providers, our fair-value indices are not simply interpolated estimates from a given rating category**. Instead, CBASpectrum's curves are derived from a system of credit rating equations. This methodology allows for more efficient estimates, especially given relatively sparse data on lower-rated corporate bonds.***

Building on these foundations, the new CBASpectrum corporate credit model offers a number of significant innovations. ***First, a more flexible functional form is used***

[44] Commonwealth Bank Credit Research, *What makes the new CBASpectrum tick?* 6 September 2006.

to model credit spreads (where credit spreads are defined as the spread-to-CGS). *This flexibility allows CBASpectrum to cope with a greater variety of credit spread term structures.*

Second, weaker assumptions are used to prevent credit rating curves from intersecting. *The benefit of weaker assumptions is that the new model allows for richer inter-rating dynamics. Third, industry-specific factors are modelled for four sectors - Financials (Banks), Financials (Property Trusts), Foreign Government-owned, and all other corporate sectors. Finally, S&P long-run default probabilities are used to supplement market pricing data when estimating default risk premia.*

203. The above description provides an in principle discussion of the methodology used by CBASpectrum. However, it nonetheless remains unclear:

- what bond yield data is used in to populate the estimation model and what the source of this data is;
- whether this data is manipulated in any way by CBASpectrum;
- what functional forms are actually used in the estimation process and what the estimation process is (eg, what does it minimise); and
- the extent to which any ad hoc adjustments are made to the outputs of the estimation model.

7.2. The AER methodology relies almost totally on the Bloomberg yield estimate for the Santos bond

204. The AER's proposed methodology is to estimate the yield to maturity for a 10 year BBB+ bond equal to:

AER 10 year BBB+ yield	=	Bloomberg 8 year BBB fair value	+	Bloomberg 10 year A fair value	-	Bloomberg 8 year A fair value

205. Consequently, the accuracy of the AER methodology depends entirely on:

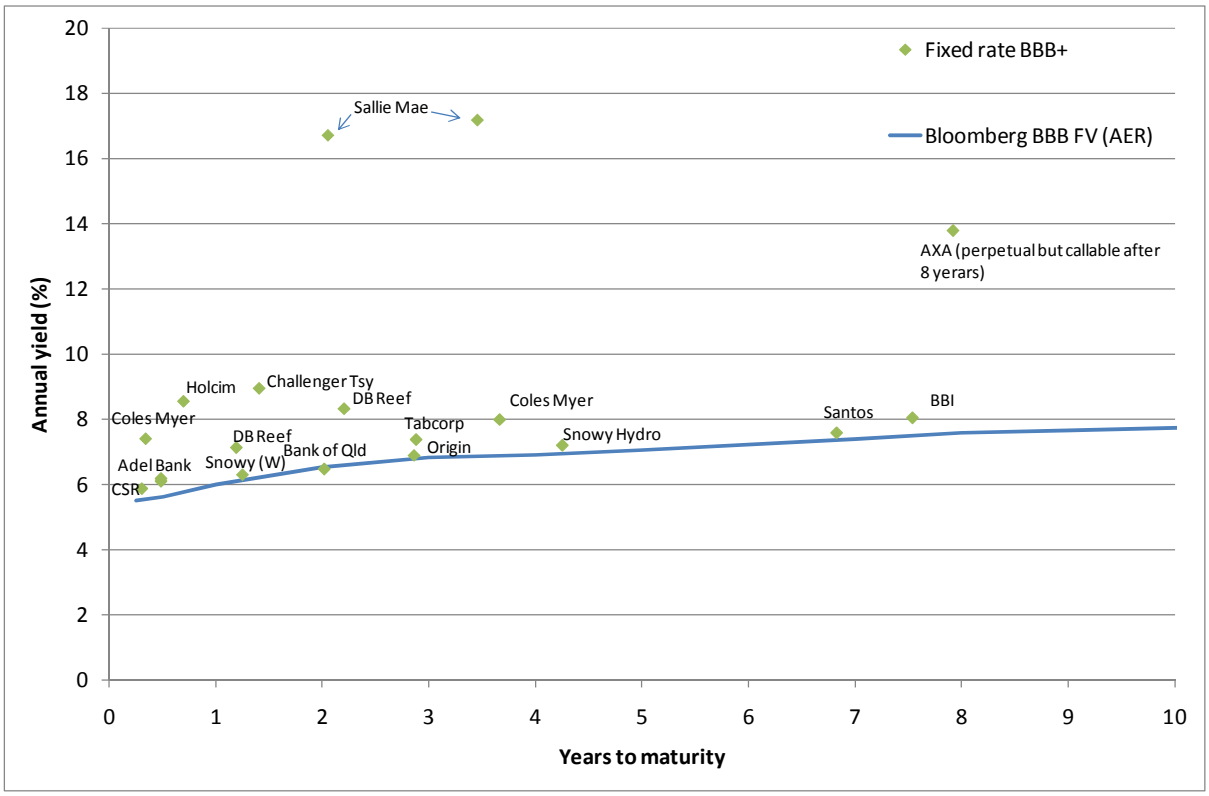
- The accuracy of the Bloomberg 8 year BBB fair value estimate as a proxy for the 8 year BBB+ benchmark yield envisioned under the NER;

- The accuracy of the Bloomberg A fair value curve between 8 and 10 years as a proxy for the shape of the BBB+ yield curve (for debt instruments envisioned under the NER).

206. However, given the nature of Bloomberg's methodology this more or less the same as adopting the yield on the Santos bond. This is because Bloomberg anchors its BBB fair value curve around the Santos observation (around 7 years to maturity during the AMI averaging period) and tends to draw a "flat" curve beyond 7 years (for both its BBB and A fair value curves). This means that the AER BBB+ fair value curve is essentially both flat and anchored to the Santos bond in the long maturity region.

207. That this is true can be seen by examining Figure 3 (reproduced below).

Figure 3 (Reproduced): Average yield estimates for BBB+ fixed coupon bonds during AMI averaging period



208. Bloomberg does not publish a BGN (consensus yield) for the Santos bond on any of the days during the AMI averaging period. However, over the AMI period the Bloomberg BBB fair value curve at the same maturity of the Santos bond has an

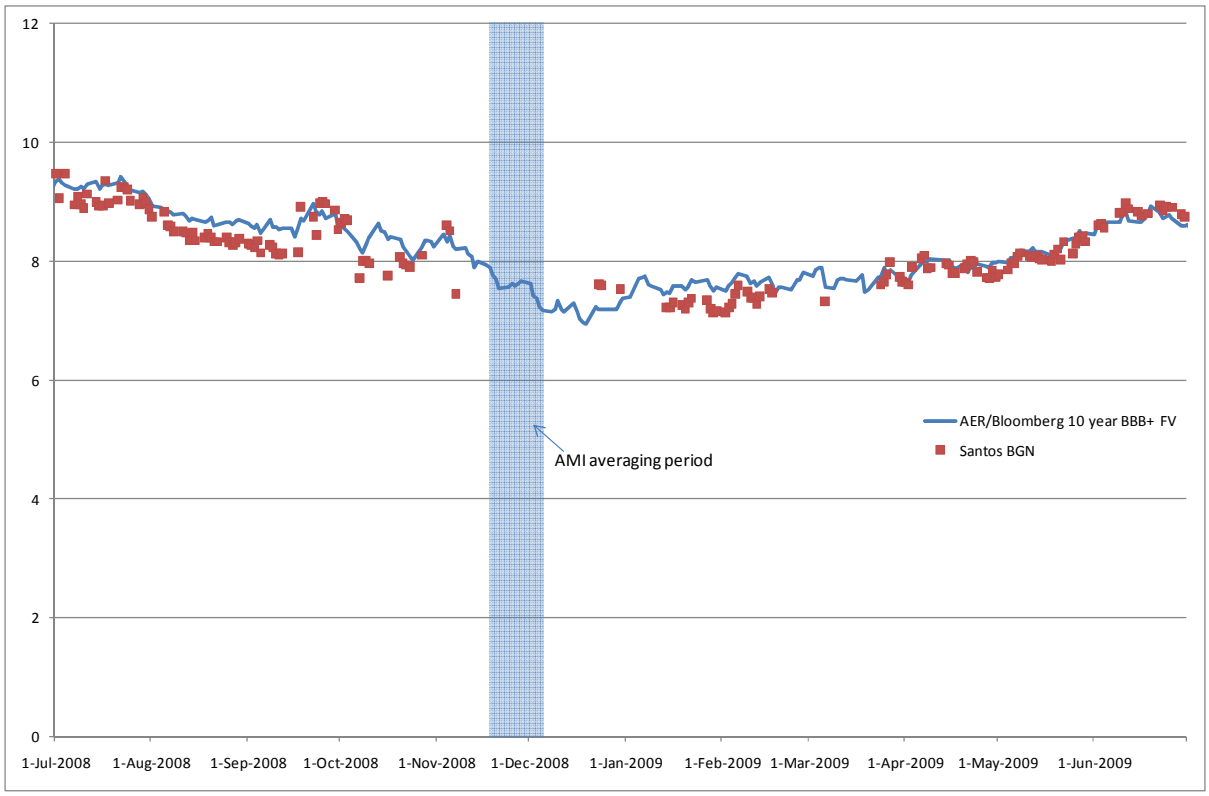
annualised value of 7.21%. This value is above two of the contributors to Bloomberg with pricing (ABNAmro and AFMA) and below two (Westpac and NAB Markets).

209. The mean of the contributor pricing for Santos over the AMI period is 7.72% which is 38bp more than the AER/Bloomberg fair value at the same maturity and is only 1bp less than the AER/Bloomberg estimate of the 10 year benchmark rate.

210. This is not a finding that is peculiar to the AMI averaging period. Over the 12 months from 1 July 2008 to 30 June 2009 the mean difference between the AER/Bloomberg 10 year BBB+ fair value estimate and the Santos BGN was only 14bp. Moreover, on only 6 of these days was it more than 35bp different to this mean.

211. This can be demonstrated by examining the below graph which plots a scatter diagram of the Santos BGN against the AER/Bloomberg BBB+ fair value curve.

Figure 12: Correlation between Santos BGN and Bloomberg/AER 10 year BBB+ fair value estimate



212. Clearly there is a strong dependency between the yield that Bloomberg assigns the Santos bond and the estimate of the 10 year BBB+ benchmark rate that is derived following the AER method. As already noted, Bloomberg did not assign a BGN to the Santos bond during the AMI averaging period but nonetheless the average yield estimated for Santos by the four contributors to Bloomberg (AFMA, NAB, Westpac and ABN Amro) was only 1bp different to the AER estimate of the 10 year BBB+ benchmark rate.

213. Of course, if the yield on the Santos bond were the best proxy for the benchmark BBB+ rate this would not be problematic. However, I consider that the opposite is true during the AMI averaging period, namely, that the Santos bond yield is strongly biased downwards proxy for the benchmark BBB+ rate.

214. Firstly, as demonstrated in Figure 8 above, the Santos bond has an estimated yield that is below most BBB bonds it also has a yield that is below most of the bonds with a rating of A- to AA-. This is despite the fact that it has a relatively long maturity date and one would expect, with an upward sloping yield curve, that such a bond to have a relatively low yield.

215. The explanation for this peculiarly low yield would appear to be at least partly explained by the fact that at the time Santos was effectively debt free. On 31 December 2008 Santos reported current assets (cash and cash equivalents plus other liquid assets) of $2.48bn which exceeded interest bearing loans and borrowing of $2.45bn.[45] Santos' cash and cash equivalents plus the value of swap contracts alone were reported at $1.95bn leaving net debt (interest bearing loans less $1.95bn) at only $0.51bn. On 31 December 2008 Santos equity market capitalisation was around 8.5bn.[46] This gives Santos a debt to market equity ratio of around 6% and a debt to total assets (equity plus debt) of around 5%. This very low level of debt, combined with a long maturity profile for the debt it had, would appear to have insulated Santos' from the events in credit markets at the time – a fact explicitly acknowledged by Santos.

> *We have been managing our debt conservatively, making sure we have no significant peaks in repayments and ensuring a long average term to maturity of nearly seven years. Less than 15% of gross debt matures in the next two years and greater than 25% matures beyond 10 years. The result is that we are in a strong position and are not facing a significant refinancing task in the difficult markets that are evident in the near term.*[47]

45 http://www.santos.com/library/Santos_Financial_Report_2008.pdf

46 Shares on issue of 584,812,875 multiplied by a closing price of $14.87. Convertible preference shares excluded.

47 Santos 2008 annual report, page 8.

216. This is reflected in a positive short term outlook from Standard and Poor's published on 17 December 2008 where S&P state:

> *The 'A-2' short-term rating on Santos is supported by the company's strong liquidity, underpinned by the cash proceeds from the Gladstone LNG sale (the initial payment of about US$2 billion was received in August 2008) and the stable nature of the company's contracted-gas cash flow. At Nov. 30, 2008, the company had cash and its equivalent of A$1,664 million, and A$80 million debt maturing in the next 12 months.*

217. It is reasonable to conclude that the very low levels of debt owed by Santos meant that it was not typical of a BBB+ rated firm – and certainly was not typical of the hypothetical benchmark 60% geared regulated utility. This is not a reason for excluding the yield on the Santos bond from calculations of a BBB+ benchmark rate. The Santos bond was BBB+ rated at the time and other factors would have entered into this long term credit rating (including expected increases in Santos' future capital expenditure and volatility in energy prices to which it is exposed).

218. However, the weight that should be given to the Santos bond yield must be proportional to the amount of the available information that the bond yield embodies. Given we have 26 yield observations for BBB+ to AA- bonds with more than 4 years to maturity then an approximate weight given to this observation might be about 4% (1/26) – as discussed in section 2.4.2. (This assumes we have no other evidence such as actual trades from outside the AMI period etc). By contrast, it appears that the AER/Bloomberg methodology is to give this observation 100% weight in determining the shape and level of the BBB+ fair value curve beyond 4 years maturity – as discussed in section 7. In this regard I also note that the Santos bond issue is only a very small size ($100m).

219. Notably, at a time when the Santos bond had a relatively low yield the ESCV rejected a proposal from Envestra to base its BBB+ fair value estimate on the Santos bond yield. The ESCV gave the same reason as I give here:

> *While Santos has the longest term to maturity of any bond in the sample, the fact that it is only one estimated value with no effective comparison (i.e. no equivalent bond of similar maturity to compare with), and as the methodology applied by Envestra to derive the ten year maturity adjustment is unknown, there are no grounds for weighting the Santos estimate to the extent advocated. Furthermore, the Santos corporate bond may be a special case in terms of its*

low yield with respect to its tenor, due to Santos facing greater cash flow volatility when compared to other BBB+ rated bonds.[48]

220. This is also consistent with the views expressed by the AER on page 120 of the AMI draft determination where it expressed the view that:

Furthermore, the AER considers that the benchmark corporate bond rate should be based on the observed yields of all bonds suitable for inclusion rather than a single bond.

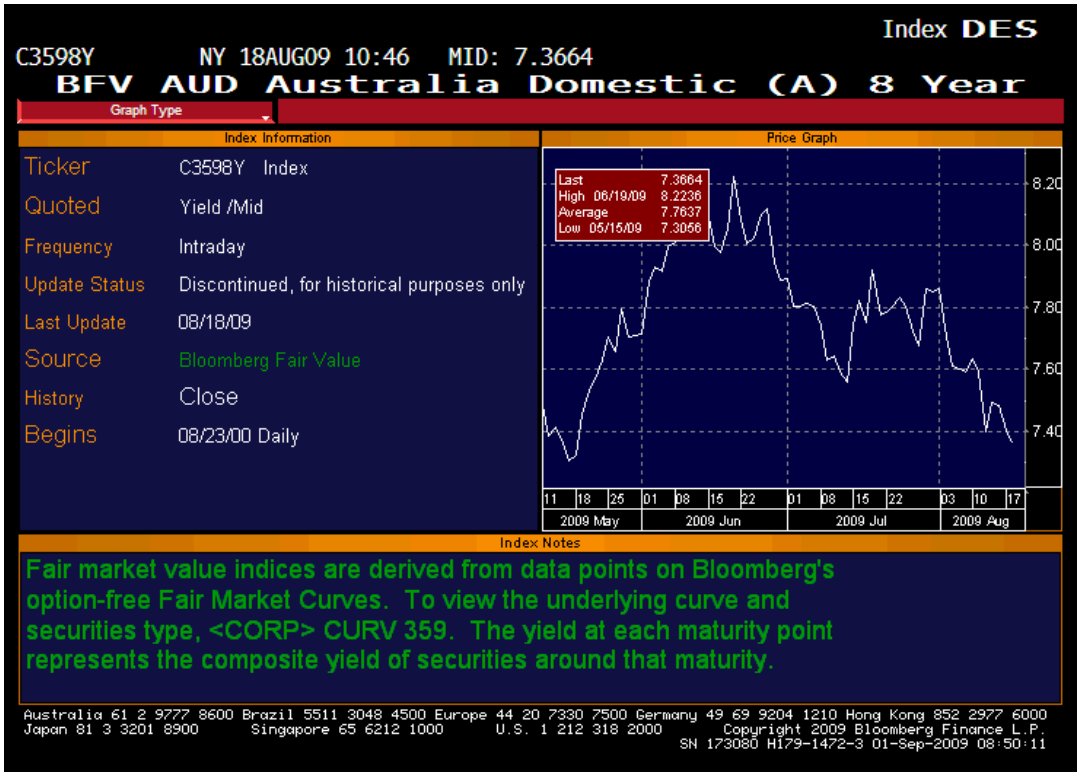
7.3. Lack of data, the Bloomberg method and the Santos bond

221. It appears to me that the Bloomberg method is such that it tries to fit its curve through specific data points. However, as the ESCV noted, there are *no equivalent bond of similar maturity to compare* the Santos bond with. I surmise that, in the absence of any other BBB bonds of a similar maturity, Bloomberg simply fits its BBB curve through its estimate of the Santos yield.

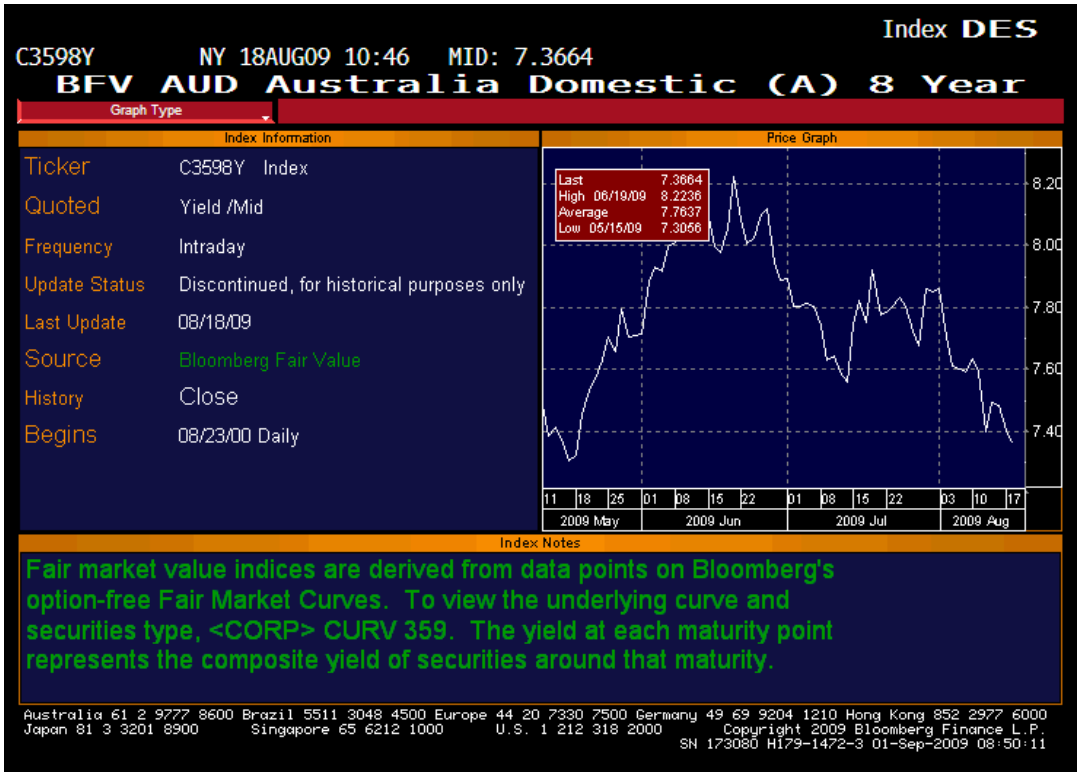
222. Notably, during the AMI Bloomberg was period publishing an 8 year BBB fair value estimate despite the longest dated BBB bond it was using to fit its curve being less than 7 years to maturity. Since the 18 August 2008 Bloomberg has stopped publishing an 8 year BBB fair value.

223. It is also the case that Bloomberg was publishing estimates of fair value for 8 to 10 year A rated bonds during the AMI averaging period. These were relied on by the AER to arrive at a 10 year BBB fair value. However, the longest dated A rated bond that Bloomberg was using to fit it's a rated curve was shorter maturity than the Santos bond. Bloomberg has since the 18 August 2008 ceased to publish the 8 and 10 year A rated fair value curve. The following screen shots from the Bloomberg terminal attest to this:

[48] Page 487 of the 2008 ESCV 2008-2012 Gas Access Arrangement Review, Final Decision.


Index DES
C3598Y NY 18AUG09 10:46 MID: 7.3664
BFV AUD Australia Domestic (A) 8 Year
Graph Type
Index Information
Ticker C3598Y Index
Quoted Yield /Mid
Frequency Intraday
Update Status Discontinued, for historical purposes only
Last Update 08/18/09
Source Bloomberg Fair Value
History Close
Begins 08/23/00 Daily
Price Graph
Last 7.3664
High 06/19/09 8.2236
Average 7.7637
Low 05/15/09 7.3056
8.20
8.00
7.80
7.60
7.40
11 18 25 01 08 15 22 01 08 15 22 03 10 17
2009 May 2009 Jun 2009 Jul 2009 Aug
Index Notes
Fair market value indices are derived from data points on Bloomberg's option-free Fair Market Curves. To view the underlying curve and securities type, <CORP> CURV 359. The yield at each maturity point represents the composite yield of securities around that maturity.
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000
Copyright 2009 Bloomberg Finance L.P.
SN 173080 H179-1472-3 01-Sep-2009 08:50:11

224. I note that the decision to shorten the maturity of the A fair value curve by 3 years (from 10 to 7 years) cannot be explained by the maturity of bonds in the Bloomberg database reducing due to the passage of time since the AMI averaging period. Presumably whatever deficiencies Bloomberg now sees in the data required to estimate the A (and BBB) fair value curves at 8 years and beyond were also there at the time of the AMI averaging period.



7.4. CBASpectrum methodology and the Santos bond

225. I have had access to the detailed credit rating equations used by CBASpectrum in the past. Professor Bruce Grundy and I have described those equations in our 2005 paper for NERA referenced earlier in relation to the Bloomberg methodology.[49] In that paper we were critical of certain aspects of those equations which we regarded as resulting in a downward bias to long term and low rated fair value estimates. Since then, CBASpectrum has amended its methodology (as already described).

226. Notwithstanding the changes to CBASpectrum's equations it is clear from my inspection of the fair value curves currently reported by CBASpectrum that it continues to impose a broadly similar functional form on the data as was the case in 2005. I note that the source of the bias identified in the NERA report was not the functional form but rather the optimisation process for fitting that functional form to the data.

227. Nonetheless, as noted in the NERA 2005 report, in a data rich environment a potential weakness of the CBASpectrum methodology may be that the pre-conceived functional

[49] NERA, *Critique of available estimates of the credit spread of corporate bonds*, May 2005, page15.

form is not sufficiently flexible to represent the actual shape of the yield curve suggested by the data. On the other hand, this can be an advantage if these restrictions preserve characteristics of the fair value curve that are consistent with finance theory in the face of a paucity of available data.

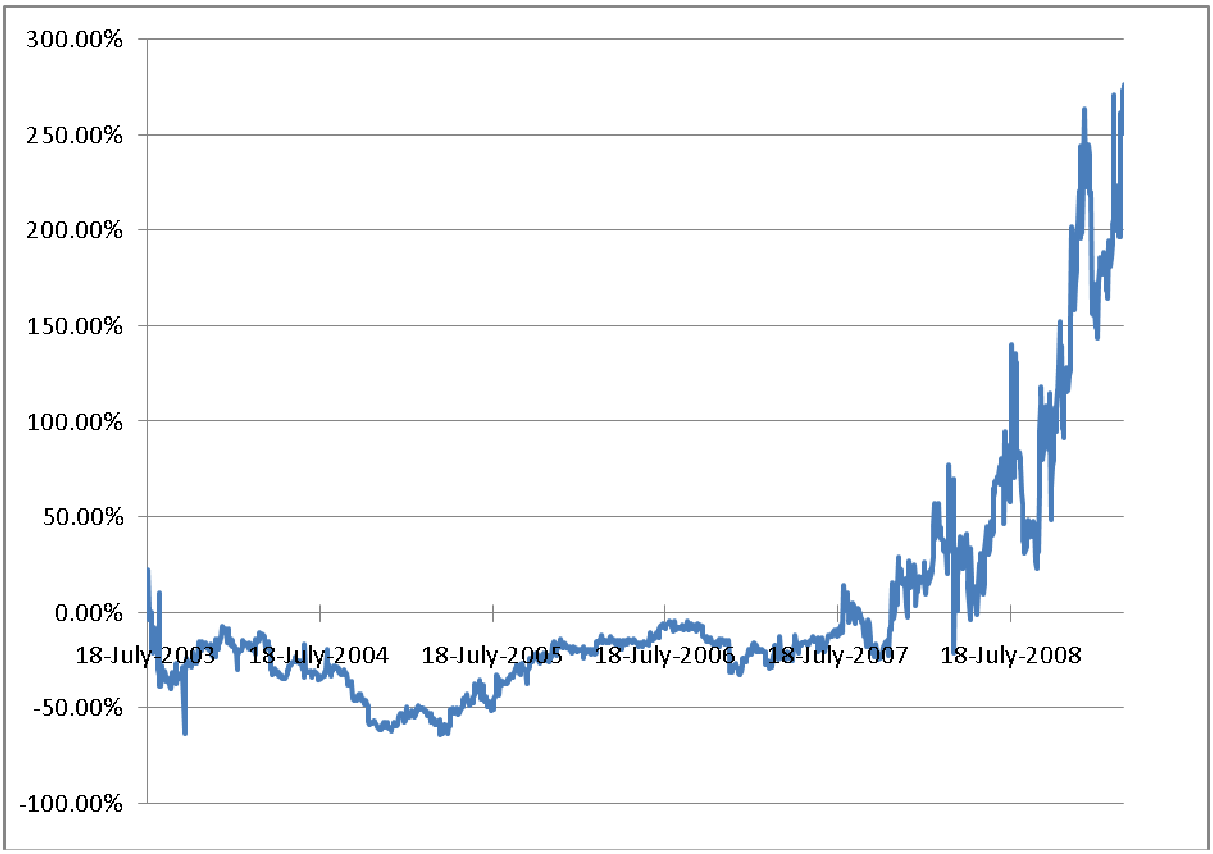
228. It is worth noting that the CBASpectrum's methodology simultaneously solves for the set of fair value curves that best fit all of the data used in its regressions – not just the BBB+ data. This means that the BBB+ curve will be informed by data for BBB+ bonds as well as data for bonds of other credit ratings. This is an attractive property of the methodology in the circumstances where there is a relative paucity of data (as was the case in the AMI averaging period). For example, imagine a scenario where there were only one BBB+ bond and 10 A rated bonds. With only one BBB+ observation it is impossible to draw a curve for that credit rating having regard only to that observation. However, the 10 observations for the A rated bonds can be used to infer a shape for both the A and BBB+ rated curve which does allow a curve to be drawn for the BBB+ rating.

229. When adopting this methodology CBASpectrum determines that the Santos bond is not typical of a BBB+ bond (ie, draws the BBB+ fair value curve above the Santos bond). This is consistent with the discussion above which similarly concluded that there was evidence to suggest that the Santos bond did not have a yield that is typical of a BBB+ bond with its maturity.

7.5. Conclusion

230. It is important to note at the outset that in 'normal' market conditions the differences between CBASpectrum fair value estimates and AER fair value estimates (based on Bloomberg fair value estimates) have been relatively small. It is only since the advent of the global financial crisis and, in particular, the collapse of Lehman Brothers in September 2008 that the differences have become large.

Figure 13: Absolute difference between CBASpectrum BBB+ yield and AER/Bloomberg BBB yield for 10 year maturity



231. Consistent with the above graph I note that the level of disagreement between the two methods is clearly somehow related to the advent of the global financial crisis.

232. Both CBASpectrum and Bloomberg:

- rely on proprietary methods and information; and
- engage in non-transparent exercises of discretion and judgement when developing their fair value curves.

233. Bloomberg's methodology appears set the Bloomberg fair value curve for each credit rating based solely on bonds with that credit rating (albeit with Bloomberg excluding a large number of these bonds from its analysis for reasons that are not transparent). By contrast, CBASpectrum uses data from all credit ratings and an assumed relationship between each of its fair value curves to simultaneously determine the shape and level of all of its fair value curves. This is an advantage of CBASpectrum's

fair value estimate in the current market circumstances with limited bond pricing due to illiquidity and few new issues into the Australian corporate bond market in recent years.

234. The AER's methodology is likely to give rise to a biased estimate because it relies very heavily on the estimated Santos bond yield and that yield does not appear to be typical of BBB+ bonds. Neither CBASpectrum nor Bloomberg services contain data relating to bonds with 10 years to maturity and a BBB+ credit rating. The AER/Bloomberg methodology attempts to bridge this impasse by assuming that a bond with a 10-year maturity will require approximately the same yield as the longest dated BBB+ bond used by Bloomberg (Santos). CBASpectrum moderates the shape and level of its BBB+ yield curve by reference to bond yields at other credit levels. Both of these approaches rely on the exercise of discretion in the face of a lack of data.

235. In this respect, Bloomberg's methodology, and by extension, the AER's methodology, currently relies almost exclusively on the observed yield of the Santos bond. In my view there is evidence that this bond is unrepresentative of long dated BBB+ bonds in general and, consequently, the AER's methodology will give rise to a biased estimate of a NER benchmark rate.

236. There are other reasons to consider that the AER's methodology for deriving a 10 year BBB estimate (from Bloomberg 8 year BBB, 10 year A and 8 year A fair value estimates) may be inferior to CBASpectrum's methodology in the AMI averaging period market conditions. This is because:

- Bloomberg's methodology works best where there are multiple bonds with similar maturity profiles within a given credit rating. This is not currently the case for BBB bonds in Australia with Bloomberg having only one pricing observation beyond 4 years (the Santos bond). By contrast, CBASpectrum's methodology uses information from all credit rating categories to simultaneously determine all credit rating fair value curves. This has the potential advantage of not relying solely on pricing for the limited set of BBB rated bonds to determine BBB rated fair value curves. (In periods with richer data sets it has the potential disadvantage of imposing a structure on term premia for a given credit rating that is inconsistent with the term structure implied by the bonds in that credit rating.)
- Bloomberg's exclusion of relatively low yielding BBB and A rated bonds from its curve construction may represent a desire by Bloomberg for its fair value curves to reflect the fair value for liquid corporate bonds - as opposed to fair value for the typical bond which in the current corporate bond market is not a liquid bond.
    - The above dot points is a reason why CBASpectrum methodology may be preferred to AER/Bloomberg in meeting criterion i listed at paragraph [50] above (given that illiquidity is currently typical on bonds in the Australian corporate bond market).

237. Based on the analysis of this section it is my view that CBASpectrum estimates of BBB+ 10 year fair value are to be preferred to the AER's estimates of BBB+ 10 year fair value (based on Bloomberg BBB and A fair value curves).

8. Conclusions

238. Based on the facts and analysis reported earlier in this report I consider that all of the available evidence suggests that the AER/Bloomberg BBB+ fair value curve is unreliable and downward biased as a proxy for determining a benchmark rate. On this basis I do not consider that sole reliance on this method can comply with the legislative requirements.

239. I conclude that the there are more reliable alternative proxies as set out in section 6. Adopting one, or a combination of these proxies, will result in a benchmark rate at least 1.5% higher than derived using the AER/Bloomberg BBB+ fair value curve.

Appendix A. Transaction costs in Tabcorp/AMP issue

240. Section 7.6 of the Tabcorp prospectus details the fees and expenses associated with the debt issue. These fees and expenses include:

- up to 1.5% of the total issue value in Arranger fees;
- up to 0.75% of the total issue value in fees to the 3 other Joint Lead Managers who are not Arrangers;
- fees of 2.0% on the total value of bonds allocated in the Broker Firm Offer;
- Out of pocket expenses. These include the expenses incurred by Joint Lead Managers (eg, legal expenses, transaction taxes, the cost of operating and staffing a 1300 information line Monday to Friday between 8.30am and 5.30pm).
- Fees paid to and expenses incurred by the Trustee (who holds the bonds on trust for the borrowers) (see section 7.5 of the prospectus).

241. Assuming that the maximum fees are paid to the Arrangers and other Joint Lead Managers then these alone would represent 2.25% of the amount raised. A payment of 2.25% of the total amount raised amortised at 8%[50] over the five years of the bonds life amounts to a 56bp per annum cost.

242. However, the estimate of 2.25% (56bp per annum) must be increased to reflect fees for placements through Broker Firm Offers and out of pocket expenses (such as legal expenses etc). If one assumes that only 25% of the debt is issued through Broker Firm Offers then this fee will still amount to 0.5% of the total value of the issues. This raises the total direct cost of the issue to 2.75%.

243. One must also add to this an estimate of other direct costs. The AER NSW distribution draft decision estimates this to be around $200,000 in total (including legal and roadshow costs, credit rating fees and other minor costs) which represents around 0.1% of a total issue value $200m. Reviewing the documentation for the Tabcorp issue and noting the use of a staffed information phone line it appears likely to us that the other out of pocket expenses are likely to be well in excess of that allowed in the draft decision. Nonetheless, adding 0.1% to 2.75% gives a total upfront cost of 2.85%.

[50] I conservatively assume a cost of capital of only 8%.

244. A 2.85% upfront cost means that for every $100 raised there is only $97.15 raised in net. A 2.85% upfront cost therefore translates to 2.93% of the net proceeds. Amortising 2.93% over 5 years at an 8% discount rate gives an annual debt raising cost of 0.73% pa. This is 0.65% lower than the AER's estimate of around 0.08% direct costs for a wholesale issue (based on wholesale issue into the US market).[51] If we add 0.65% to the Tabcorp issue yield we find that it is much closer to the CBASpectrum fair value estimate than the Bloomberg fair value estimate.

245. Section 7.4.1 of the AMP prospectus details the fees and expenses associated with the debt issue. These fees and expenses include an upfront fee of up to 2.35% of the total issue to Arrangers and Joint Lead Managers plus expenses incurred by the Joint Lead Managers and fees and expenses of the Trustee. Amortising 2.35% over five years at a discount rate of 8% is 59bp per annum. To this must be added other direct costs of issuing the debt.

246. On this basis I believe that a reasonable point estimate is that transaction costs incurred by AMP and Tabcorp were around 50bppa lower than allowed by the AER. Tabcorp and AMP would only rationally have incurred these lower costs if there was an advantage in terms of lower interest costs. Thus, the interest costs of these retail issues is an underestimate of the wholesale interest costs perceived by AMP and Tabcorp by likely more than 50bppa (ie, 0.5% pa).

[51] See page 187 of the AER 28 April 2009 Final Decision for NSW electricity distributors.

Appendix B. Discretion exercised in Bloomberg fair value estimation

B.1. Discretion used in estimating 'consensus' bond yields

247. Each day Bloomberg publishes a fair value corporate bond curve for each of the credit ratings AAA, AA, A and BBB. It also publishes the bonds and their estimated yields it had regard to when estimating that fair value curve. Bloomberg does not fully disclose how it determines which bonds are included and which bonds are excluded from the construction of the fair value curve. Rather, Bloomberg simply states in relation to the BBB fair value curve:[52]

> *"The curve is populated with Australian dollar denominated fixed-rate bonds issued by Australian companies. The bonds have ratings of BBB+, BBB, BBB- from S&P, Moody's Fitch and/or DBRS. The yield curve is built daily with bonds that have either Bloomberg Generic (BGN) prices, supplemental proprietary contributor prices or both. The bonds are subject to option-adjusted spread (OAS) analysis and the curve is adjusted to generate a best fit."*

248. It is not transparent what is meant by *supplemental proprietary contributor prices*. It would appear that Bloomberg's methodology allows for the possibility that it would use a specific pricing estimate (supplemental proprietary contributor prices) in preference to other pricing estimates or would rely solely on that specific pricing estimate when no other pricing estimates are available. However the source and nature of those estimates are not disclosed.

249. Similarly, the nature of the process for determining whether a bond has Bloomberg Generic Pricing (and what that Bloomberg Generic Price is) is determined using judgement and discretion exercised by Bloomberg. With respect to these prices Bloomberg states:[53]

> *"Bloomberg Generic Price (BGN) is Bloomberg's market consensus price for corporate and government bond.* [sic] *Bloomberg Generic Prices are calculated by using prices contributed to Bloomberg and any other information that we consider relevant. Bloomberg does not make a market in any of the securities that we price. The actual methodology we use is proprietary and depends on the type of pricing and the markets involved. The goal of the pricing is to produce "consensus" pricing. To the extent that we are not comfortable that a*

[52] This statement is made on the Bloomberg screen when it describes its bond prices.

[53] Sourced from Bloomberg terminal on 26 May 2009.

bond can be assigned a consensus price at any time, we will mark it "not priced". We constantly and vigorously review the performance of the system and alter it as we determine necessary to achieve our goal."

250. In summary, Bloomberg states that it uses discretion in arriving at what it considers are "consensus" bond yields and in determining whether a "consensus" bond yield exists.

B.2. Discretion used in excluding outliers

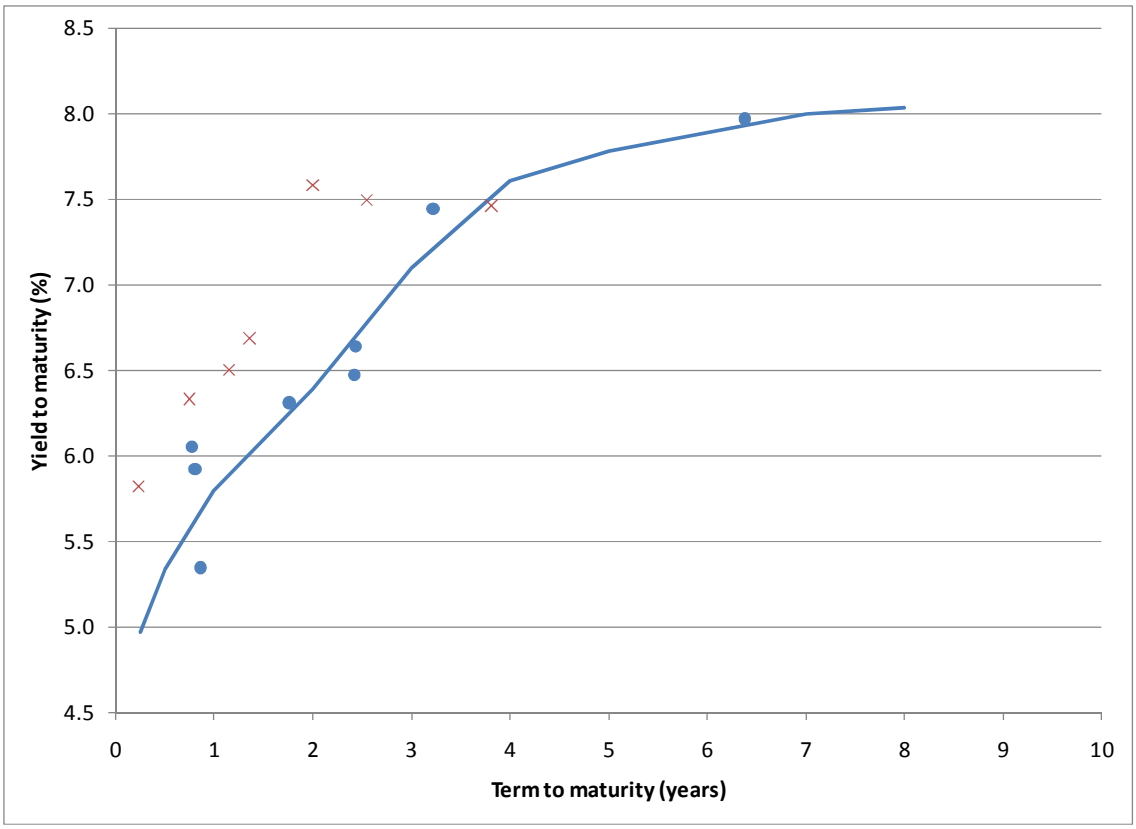
251. For prices that have Bloomberg Generic Pricing (BGN prices published by Bloomberg which Bloomberg regards as reflecting 'consensus pricing') Bloomberg appears to exercise further discretion in excluding 'outliers' from this sample when building its fair value curves. [54] I am unaware of the criteria Bloomberg applies when determining that a bond constitutes an outlier.

252. I illustrate the exercise of this discretion below. I do not have access to the bonds Bloomberg states it used to fit its curve during the AMI averaging period so I illustrate this point using data from a later period. Figure 14 below shows the Bloomberg fair value curve for BBB on 6 May 2009. Each dot in that figure represents the yield to maturity and the term to maturity of a particular bond for which there was BGN pricing on Bloomberg on that day.[55] However, only the blue dots represent the bonds that Bloomberg used to determine the fair value curve. The orange crosses represent bonds that were excluded by Bloomberg from the generation of that curve.

[54] See page 9 of a presentation by Michael Lee to the International Bond Market Conference 2007, Taipei. Available at http://taipeibond.gretai.org.tw/cv/Bloomberg%20Mr.%20Lee(panel%203-1).ppt.

[55] I have not shown two bonds that Bloomberg excludes from its BBB fair value estimation process on this graph. These two bonds each have yields of 18.6% (GPT) and 21.3% (Fairfax) and to show them would require a scale of the graph that would prevent closer examination of the area of interest around Bloomberg's BBB fair value curve.

Figure 14: Bloomberg BBB fair value curve and included/excluded bonds on 6th May 2009

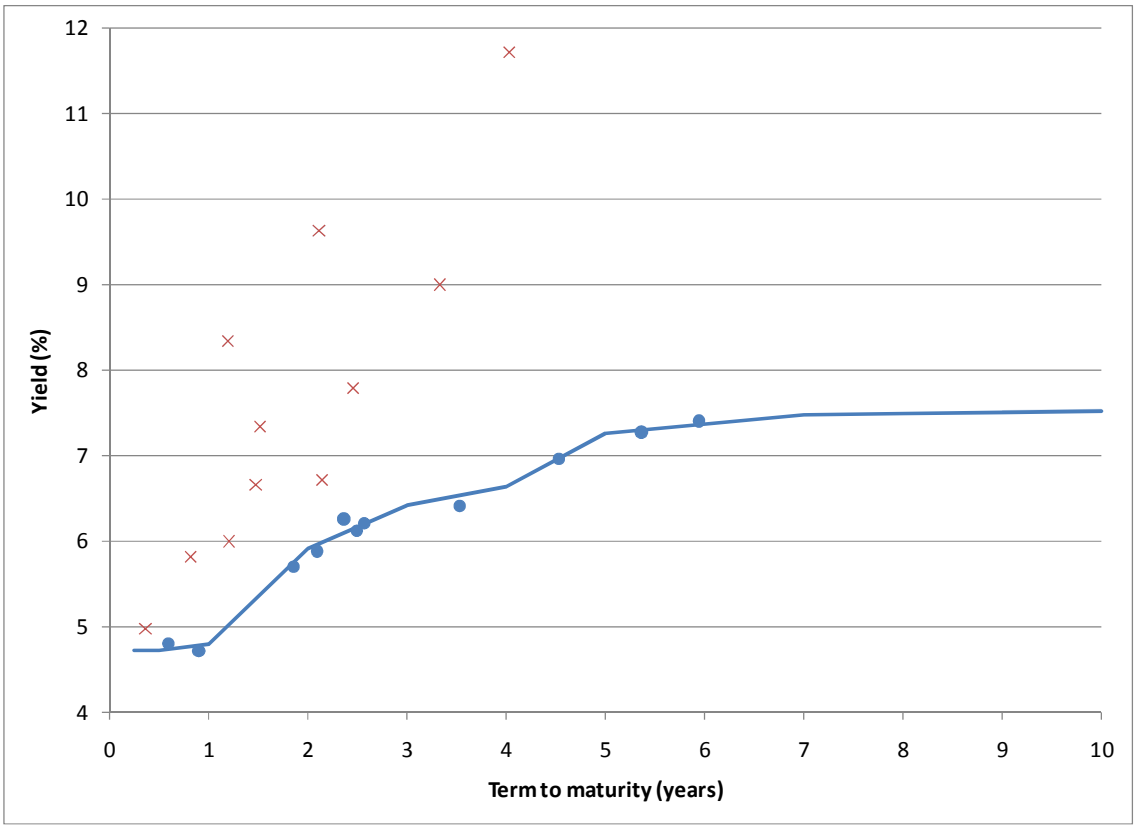


Source: Bloomberg

253. The above graph illustrates that seven bonds with pricing in the vicinity of the Bloomberg fair value curve have been excluded by Bloomberg. Of these, six have pricing that is above the Bloomberg fair value curve and one has pricing that is slightly below. It appears clear that the impact of including these bonds would have been to result in a lower fair value curve. Given that Bloomberg does not explain the reason for excluding these bonds it is not possible to assess the reasonableness of this exclusion (either in general or specifically in the context of whether the Bloomberg estimates are an appropriate input into the determination of the cost of debt under the NER).

254. Given the AER also uses the Bloomberg A fair value curve to determine its estimate of the cost of debt under the NER I provide a similarly formatted graph for Bloomberg's A fair value curve.

Figure 15: Bloomberg A fair value curve and included/excluded bonds on 6 May 2009



Source: Bloomberg

255. In this case all of the excluded bonds had lower yields. Had some or all of these bonds been included then it is reasonable to assume that the fair value curve for A would have been both lower and steeper than the actual fair value curve estimated by Bloomberg.

256. It is also relevant to note that Bloomberg's methodology may be such that it excludes illiquid bonds from its methodology. Specifically, a presentation by Bloomberg staff states:

"The availability of BGN price for a bond is an indication of good liquidity for that bond"[56]

257. In the circumstances of the AMI averaging period, where the RBA stated that the corporate bond market was illiquid, I consider that this would make the Bloomberg fair value curve a biased estimate of the 'average' or 'typical' cost of debt for BBB bonds. Bloomberg appears to only use bonds with Bloomberg Generic Pricing (BGN) to determine its fair value curve. However, the above quote implies that its BBB fair value curve is, in reality, a fair value curve for *liquid* BBB bonds. In ordinary circumstances where there is a relatively small liquidity premium then this may be less problematic. But in the current circumstance of a large number of illiquid corporate bonds, by focussing only on the most liquid bonds the Bloomberg methodology would give rise to a biased estimate of the true average cost of debt for bonds of any given credit rating.

B.3. Discretion used in fitting curves

258. Once Bloomberg has settled on a set of bonds used to generate its fair value curves Bloomberg uses further discretion to generate a 'best fit' to that data. The methodology employed by Bloomberg has been described in a 2005 NERA report which the AER has referenced as informing its understanding of the Bloomberg methodology in the context of its NSW electricity distribution decisions[57]. The NERA report (authored by myself and Professor Grundy of Melbourne University) describes the Bloomberg methodology as follows:

"For each credit rating, Bloomberg nominates a number of predetermined maturity points on the yield curve (3 and 6 months, 1, 2, 3 4, 5, 7, 8, 9, 10, 15, and 20 years – or fewer if there are limited long dated observations). Bloomberg then estimates the yields to maturity on the set of bonds that would both sell at par and have maturity dates exactly equal to the predetermined maturity points. The estimation procedure minimises the sum of squared deviations between actual observed yields and fair yields on bonds, assuming that the fair yields on bonds selling at par with maturity dates between two nominated maturity points are determined from a straight line joining the fair yields on the two immediately surrounding bonds with maturities equal to the predetermined maturity points.

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[56] See page 9 of a presentation by Michael Lee to the International Bond Market Conference 2007, Taipei. Available at http://taipeibond.gretai.org.tw/cv/Bloomberg%20Mr.%20Lee(panel%203-1).ppt . This presentation predates the global financial crisis and it is general in nature so we cannot know to what extent it reflects current practice.

57 Page 230 of NSW distribution determination 28 April 2009 references: NERA, *Critique of available estimates of the credit spread of corporate bonds*, May 2005.

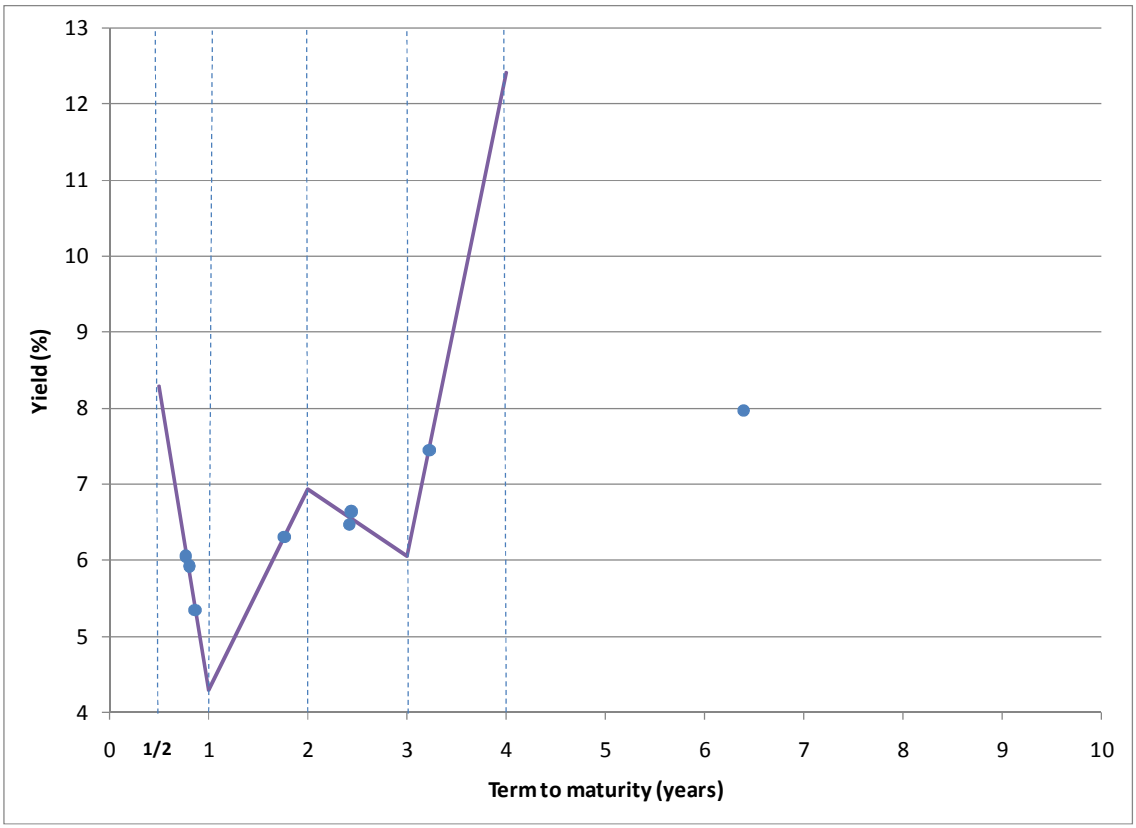
As such, there is no predetermined mathematical relationship (functional form) linking the values on the yield curve at each predetermined point."

259. This methodology has an important potential advantage in that it does not specify a particular shape for the yield curve (mathematical functional form). Rather, it lets the available data determine the shape of the yield curve. For example, the shape of the yield curve could be upward sloping in some maturities and downward sloping in other maturities if that was what the data actually showed to be the case.

260. However, this potential strength of the above methodology is a weakness in situations where there are only a small number of bonds being used to estimate the yield curve and where there is significant dispersion in the yields of those bonds. Specifically, the Bloomberg methodology described above will only give rise to a well defined yield curve when there are multiple bonds between each predetermined maturity point. When there are a limited number of bonds between each predetermined maturity date it will give a very poor estimate of the true yield curve for a *representative* bond of that credit rating. In the extreme, where there is one bond between each of the relevant maturity dates then the above methodology will be able to perfectly fit all the data points but will do so by taking on a lowly unrealistic shape to the yield curve.

261. This is demonstrated in the below figure which shows the outcome of using this methodology on 6 May 2009 to derive the best fit between the bonds identified by Bloomberg as underlying its BBB fair value curve.

Figure 16: Fair value BBB curve based on 2005 NERA description of Bloomberg methodology using data from 6 May 2009



Source: NERA, Bloomberg, CEG analysis

262. The reason the fitted curve takes the above 'zig-zag' shape is that there are insufficient observations of bonds between any given predetermined maturities such that the best fit is given by extreme slopes between those predetermined maturities – with those extreme slopes going 'un-penalised' because they can simply be reversed to fit the next data point. The bonds and yields in the above figure are is described in Table 13 below.

Table 13: Bonds and yields underlying the Bloomberg BBB Fair value curve on 6 May 2009

	Years to maturity	Yield to maturity
Bank of Queensland	0.77	6.052
Snowy Hydro	0.81	5.924
Fosters Group	0.86	5.347
Dexus Property	1.76	6.309
Origin	2.42	6.473
Tabcorp	2.44	6.639
Wesfarmers	3.22	7.445
Santos	6.38	7.968

263. As Table 13 shows, the first three bonds in the Bloomberg sample have a maturity between 0.5 years and 1.0 years. Of these three bonds, the shortest maturity bond (Bank of Queensland) has the lowest yield, the middle maturity bond (Snowy) has a lower yield and the longest maturity bond (Fosters) has a significantly lower yield still. Also, despite having significantly different yields the term to maturity for each bond are actually very close – all are within seven weeks of each other. As a consequence, the straight line that best fits the data between the predetermined maturity of a half year and the predetermined maturity of one year has a significantly negative slope (starting at a low yield of 8.3% at a maturity of one half of a year and ending at 4.3% at a maturity of one year).

264. Between one and two years to maturity there is only one bond (Dexus Property Group) which has a yield of 6.3%. Naturally, with only one point between one and two years it is possible to draw a line that directly passes through this point (which clearly minimises the sum of squared differences). Given the yield at 1 year to maturity has been estimated to be 4.3%, fitting a 6.3% yield at 1.76 years to maturity requires a steep upward slope between one and two years. To fit the next two points (Origin and Tabcorp) between two and three years (which are very close together) a downward slope is required. To fit the next point (Wesfarmers is only one bond with maturity between three and four years) it is necessary to impose a significantly upward sloping line (which can obviously fit the single data point between three and four years).

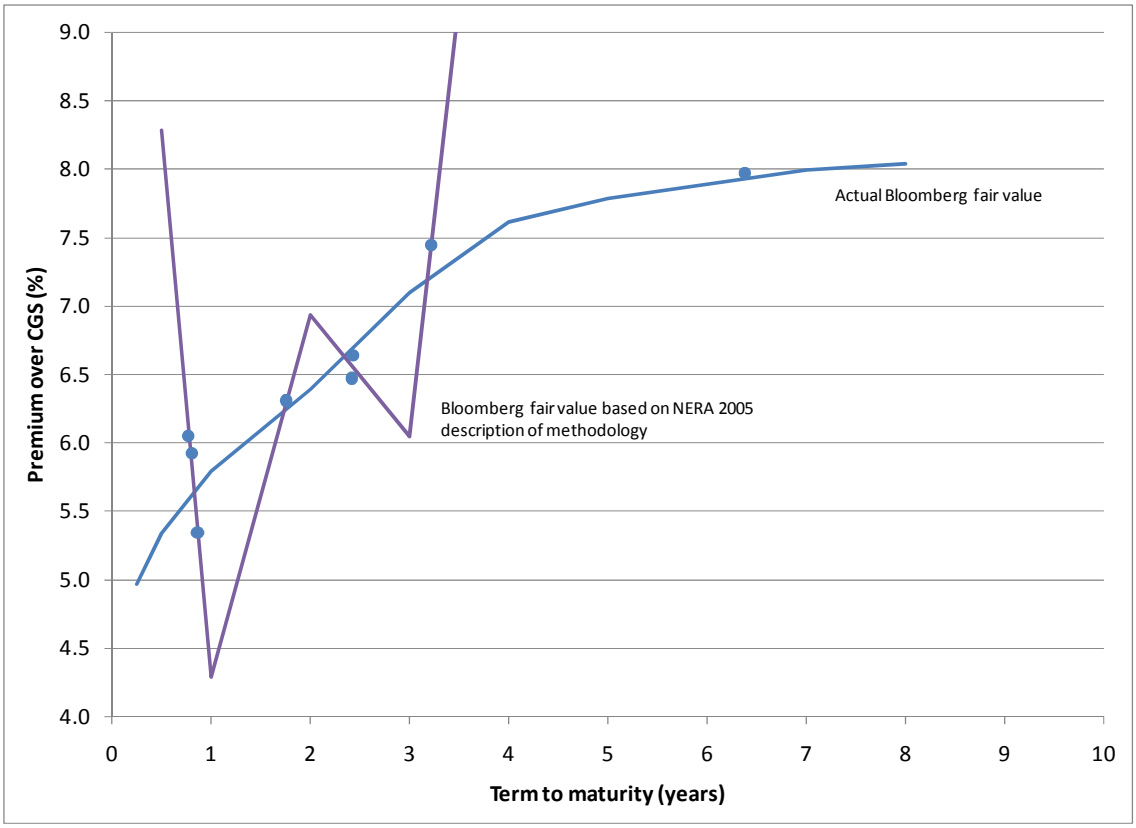
265. This is the unique set of straight lines between the Bloomberg predetermined maturities that best fits the underlying data points (ie, minimises the sum of squared differences). The final data point (Santos at 6.38 years to maturity) could be fitted by an infinite number of straight lines. This point is the only data point with a maturity of more than 4.0 years. Given Bloomberg has predetermined maturity points at five and seven years one could draw any straight line between four and five years maturity and

still be able to draw another straight line between five and seven years to exactly cross through the Santos observation.

266. As the above discussion demonstrates, application of the methodology described by NERA in 2005 results in an extremely unusual "fair value" curve – one that falls and rises dramatically at different maturity levels. This would not be the case if there were more bonds between each predetermined maturity level. The key point to note here is that when there are a limited number of bonds for which Bloomberg publishes BGN yields and where there is a dispersion in those yields the above methodology gives rise to shapes for the fair value curve that, despite fitting the data almost perfectly, are inconsistent with any theoretical prior beliefs about what the shape of BBB+ yield curve would be. I am unaware of any theoretical basis for expecting a yield curve to behave in the manner consistent with the application of the methodology described in the NERA report.

267. I assume that Bloomberg also finds the above outcomes undesirable as its fair value curves do not reflect the above shape. The difference between the actual Bloomberg fair value curve on 6 May 2009 and the above curve (derived according to the methodology described in the NERA 2005 report) is demonstrated in the below graph (the scale of this graph has been reduced to enable some further observations about the Bloomberg actual methodology on 6 May 2009)

Figure 17: Actual vs NERA Bloomberg BBB fair value on 6 May 2009



Source: Bloomberg, CEG analysis

268. Bloomberg can only achieve the more standard shape to its yield curve by imposing restrictions other than that the fair value curve simply be the best fit of the underlying data. In my view it is appropriate to impose restrictions that prevent the shape of the estimated fair value curve from being materially inconsistent with the properties predicted by both finance theory and/or empirical studies. This is especially true when there is a paucity of the underlying data. Clearly, the shape of the actual Bloomberg yield curve is a more credible description than the curve implied by a strict reading of the methodology reported by NERA of how yield to maturity changes with maturity for BBB rated bonds.

269. It is unclear what the further restrictions are that Bloomberg is imposing but a number of observations are possible:

- Bloomberg extends the curve beyond the points where it has BGN yields. In particular, the longest dated bond underlying the Bloomberg curve on 6 May 2009 was the Santos bond with 6.38 years to maturity. Yet Bloomberg reports fair value

for both seven and eight years maturity – despite not having any BBB bond data to support a view on how fair value should move beyond seven years;

- The same is true at the low maturity end. Bloomberg has no data points with maturity shorter than one half of a year but still reports a fair value at one quarter of a year maturity.

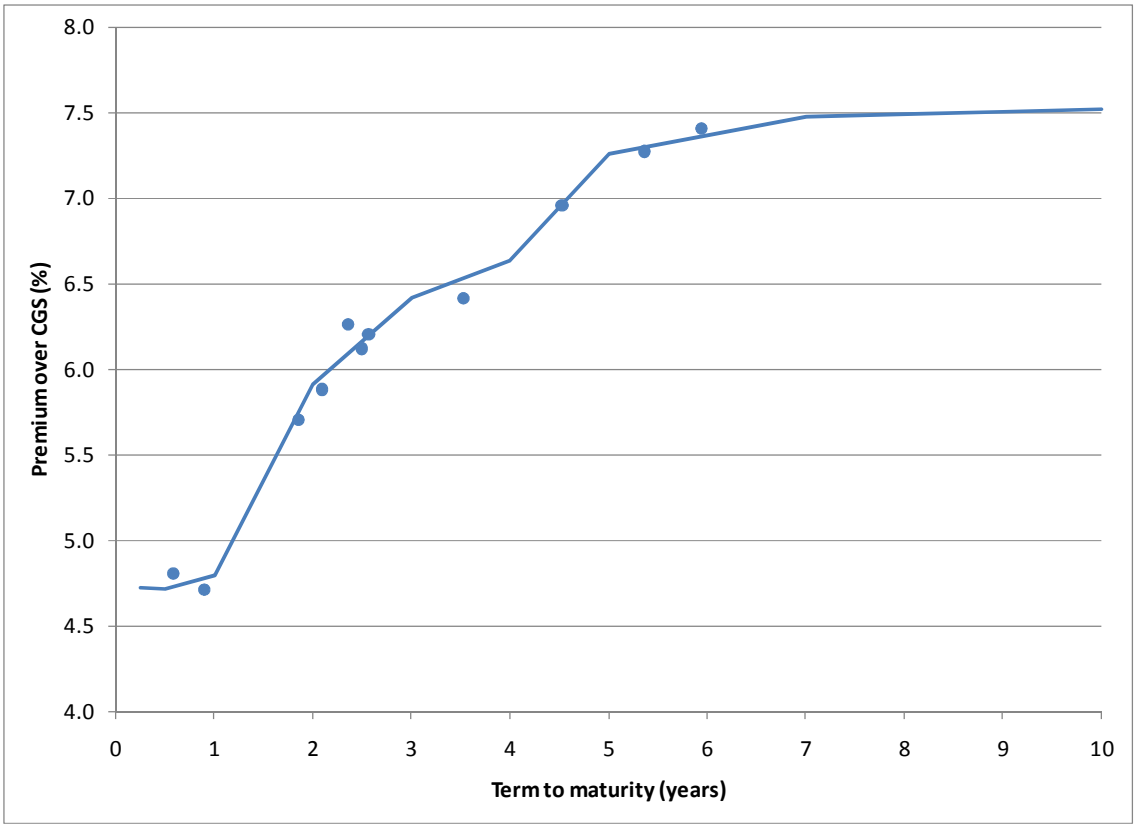
- Bloomberg uses its discretion to impose a nearly flat shape of the BBB fair value yield curve beyond seven years (as I shall discuss this is actually flatter than the CGS yield curve in that region – implying that credit risk falls with increases in maturity); and
- Bloomberg essentially fits the fair value curve at the long end to the single observation of the Santos data point (at 6.38 years to maturity).

270. The last dot point above is important as it suggests that, in the absence of other BBB+ bonds of similar maturity, Bloomberg's methodology is not sufficiently nuanced to enable it to distinguish between a 'typical' BBB+ fair value at that maturity and the Santos BBB+ bond yield.

271. Alternatively, it could be that Bloomberg has consciously decided that the Santos bond is 'typical' and it is only because of this conscious decision that it fits the fair value curve to this point. However, I do not find this a credible alternative explanation because Bloomberg's fair value curves always closely approximate any single observation used to build the curve. The only time Bloomberg's methodology does not do this is when there are multiple observations with similar maturity but different yields (ie, the only time that Bloomberg's fair value yields do not fit to the underlying data is when it is impossible to do so). It is clear that once a bond is included by Bloomberg in its sample to build the curve then it is treated 'as if' it is typical. It follows that a single observation will drive the shape of the curve unless there are other observations in the sample with a close maturity. Of course, this would not be problematic if there were a large number of bonds at all maturities. However, in the current circumstances it means that the estimated Santos bond yield entirely drives the Bloomberg BBB fair value estimate beyond 6 years.

272. It is also relevant to examine the Bloomberg estimation of the fair value for the A credit rating as this curve is also used by the AER to determine its estimate of BBB+ 10 year fair value. The following figure summarises the Bloomberg A rated fair value curve and the underlying data points Bloomberg reports that the curve is based on (ie, after removal of 'outliers').

Figure 18: Bloomberg A fair value on 6 May 2009



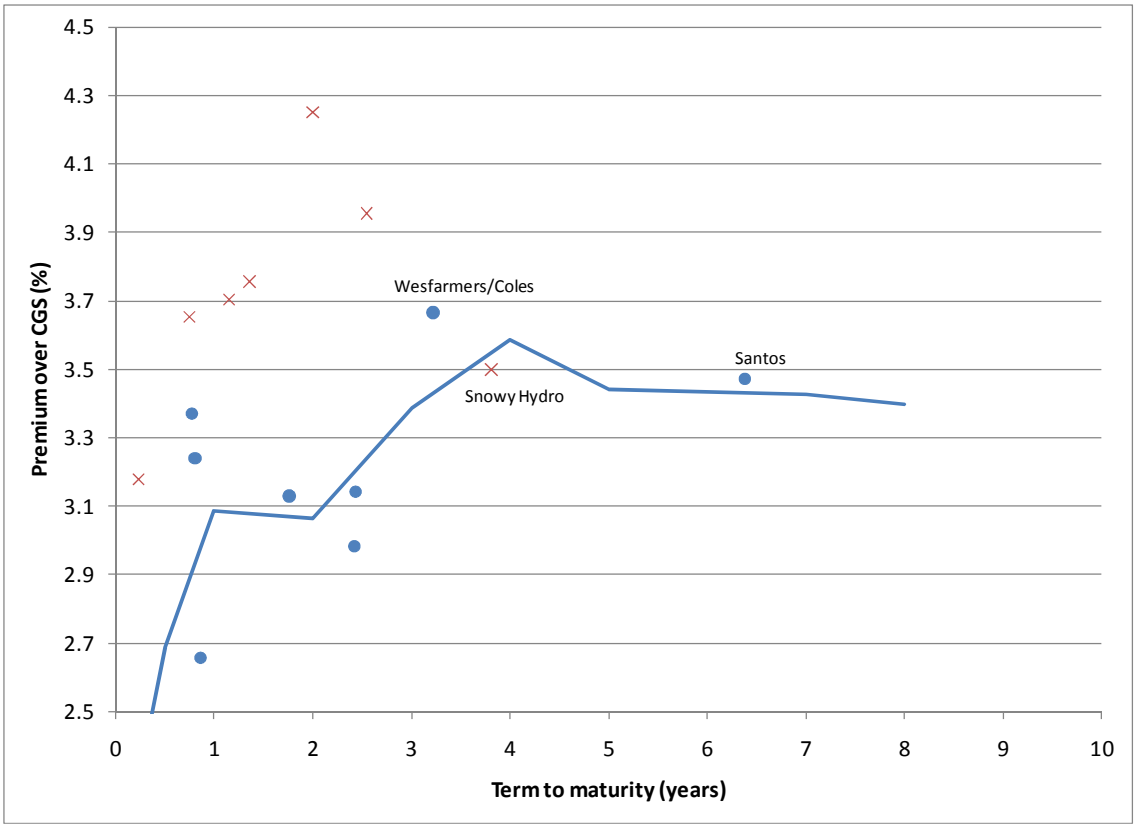
Source: Bloomberg

273. The same sort of observations can be made about the exercise of discretion in Bloomberg developing this curve. For example:

- Bloomberg extends the curve beyond the points where it has data. In particular, the longest dated bond underlying the Bloomberg curve on 6 May 2009 was a Telstra bond of 5.94 years to maturity. Yet Bloomberg reports fair value for both seven, eight, nine and ten years – despite not having any A rated bond data to support a view on how fair value should move beyond six years. The same is true at the low maturity end. Bloomberg has no data points with maturity shorter than one half of a year but still reports a fair value at one quarter of a year maturity.
- Bloomberg uses its discretion to impose a nearly flat shape of the A fair value yield curve beyond seven years.

274. The declining spread to CGS implicit in the Bloomberg long term fair value curves is illustrated in the below figures (which have the same coding for bonds used to build the fair value curve and bonds not used to build that curve).

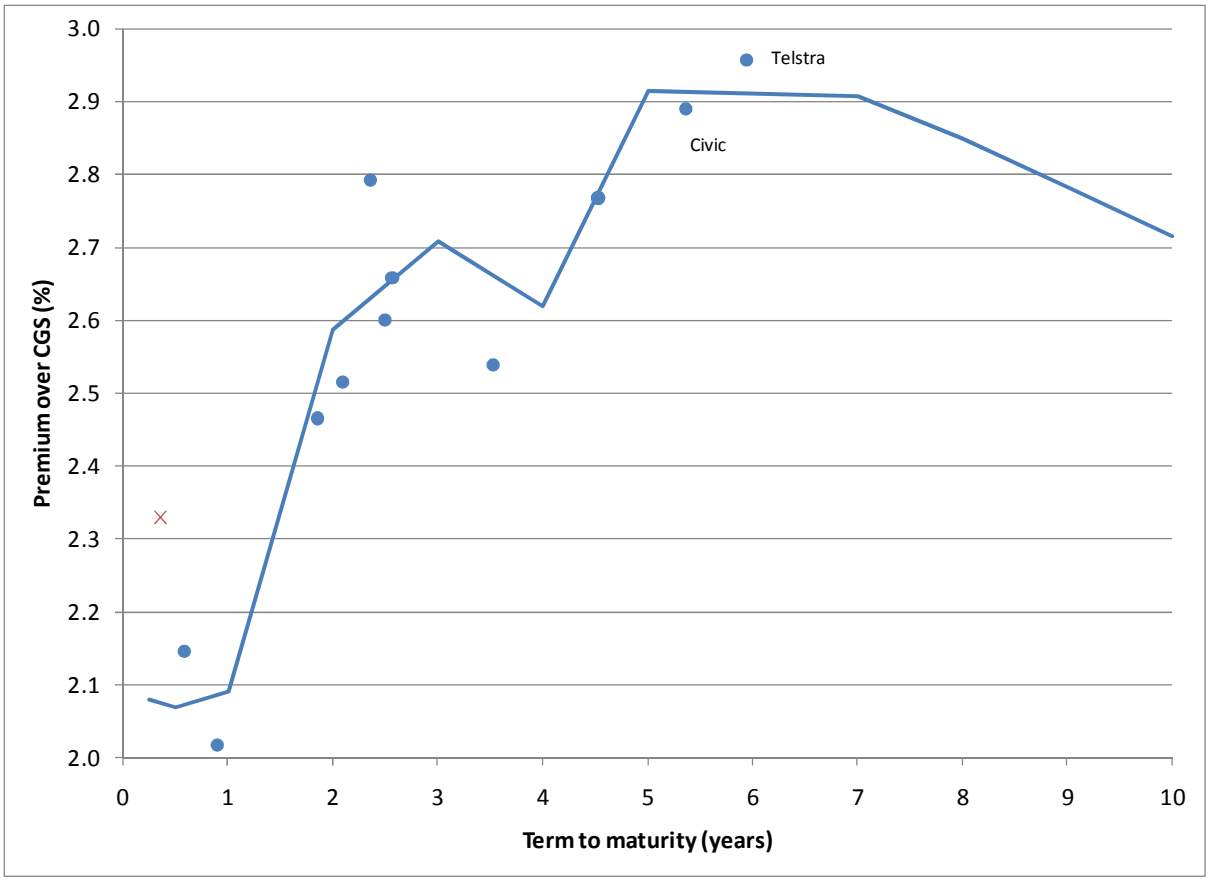
Figure 19: Bloomberg BBB fair value spread to CGS on 6 May 2009



Source: Bloomberg

275. As can be seen Bloomberg's fair value BBB curve is associated with a relatively steep increase in implied credit risk (spread to CGS) where Bloomberg has the most data (ie, zero to four years). However, beyond four years, Bloomberg imposes a reduction in credit spreads as maturity increases. This appears to be purely driven by an attempt to fit the fair value curve to the Santos observation at 6.38 years to maturity. However, even between 7 and 8 years where Bloomberg has no data it still imposes a declining spread to CGS as maturity increases.

Figure 20: Bloomberg A fair value spread to CGS on 6 May 2009



Source: Bloomberg

276. Once more, Bloomberg's fair value A curve is associated with a relatively steep increase in implied credit risk (spread to CGS) where Bloomberg has the most data (ie, zero to six years). However, beyond six years, Bloomberg imposes a reduction in credit spreads as maturity increases. This is most steep between 7 and 10 years despite Bloomberg having no data between 7 and 10 years.

Summary of conclusions

i) Bloomberg uses discretion and a proprietary approach in arriving at its pricing for individual bonds. The effect of the exercise of this discretion on its estimated pricing for individual bonds is unknown;

ii) Bloomberg appears to limit the construction of its fair value curves to rely heavily on information contained in bond prices within that credit rating and only peripherally to information contained in bonds in other credit ratings. This can be advantageous where that bond pricing data is plentiful. However, in the current market circumstances when bond pricing data is scarce it can be problematic.

iii) Bloomberg uses discretion in determining which of these bonds it will use to determine the fair value curves. The basis for this discretion in unknown. The effect of this discretion in recent history appears to be to reduce estimated fair value curves.

iv) To the extent that this reflects a Bloomberg policy of estimating fair value curves for liquid corporate bonds then it is likely to make the Bloomberg fair value curves an inappropriate proxy for the NER benchmark corporate bond rate in a market where most corporate bonds are illiquid.

v) Bloomberg uses discretion in the construction of the fair value curves (both within periods it has data and beyond the periods for which it has data). The effect of this discretion is to reduce the estimated fair value spread to CGS for long dated bonds. It is unclear what basis Bloomberg might have for assuming that this is appropriate.