AusNet Transmission Group Pty Ltd

Transmission Revenue Review 2017-2022

Revised Revenue Proposal

Appendix 6E: Review of AER Position on Curve Selection

Submitted: 21 September 2016

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Memorandum

To:	Jones Day
From:	CEG – Asia Pacific
Date:	1 June 2016
Subject:	**Review of AER's position on curve selection**

1 AER's correspondence with Bloomberg does not refute our argument

1. In a memo dated 3 February 2016, CEG stated [emphasis added]:[1]

> ***The BVAL bond selection criteria results in a sample containing only a single bond – issued by Asciano – with a residual maturity greater than 6.3 years.*** *Moreover, the Bloomberg curve fitting methodology, while not transparent, clearly results in this bond having a disproportionate impact on the 10-year spread to swap estimate. Because this Asciano bond did not exhibit any increase in spread to swap over January 2016, the resulting 10-year spread to swap estimate also did not increase over this period.*

2. In criticising CEG's argument concerning the high influence of the Asciano bond on the longer tenors of the BVAL curve, the AER stated that their correspondence with Bloomberg showed conflicting evidence [emphasis added]:[2]

> ***In summary of its analysis, CEG submits that the BVAL bond selection criteria 'results in a sample containing only a single bond'.*** *As noted in recent decisions, this is not a correct characterisation of Bloomberg's approach. In a recent report, CEG submitted that the Bloomberg estimate from beyond 7 years was exclusively informed by the CGS curve. In response,* ***we corresponded with Bloomberg who confirmed that the yield estimate at 10 years is influenced by all of the constituent bonds within the curve, even where there are few or no constituent bonds within the 7 to 10 year band.***[1271] *This means that the entire bond sample within the BVAL curve is used to derive*

[1] CEG, Recent financial market conditions and the BVAL curve, February 2016, p. 4.

[2] AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-329 to 3-330.

the 10 year estimate, not a single bond as CEG has submitted. While bonds closer to the 10 year term may exert a relatively greater influence on the yield estimate at points around that term, CEG's characterisation does not accurately reflect the operation of the curve.

1271 AER, Email correspondence with Bloomberg, ***12 September 2015****.*

3. We first note that the phrase that the AER quoted directly from our report is lacking in context. The key point of the relevant sentence in our quote was that: out of all the bonds in the BVAL sample, only one had a residual maturity greater than 6.3 years. We did not state that the BVAL sample had only one bond.

4. The email correspondence referred to by the AER in footnote 1278 does not appear to be publicly available, but we note that the crucial component appears to have been set out in Lally's (2015) report [underlining added]: [3]

Thirdly, CEG's claim that Bloomberg extends its curve beyond seven years by simply using the CGS curve is rejected by Bloomberg themselves. In particular, on 12 September 2015, Mr Varun Pawar (Head of Bloomberg Evaluated Pricing, New York) confirmed the following statement put to Bloomberg by the AER:

"While the government benchmark (CGS yields) influences the shape of the BVAL curve (as the "underlying reference curve"), the shape of the curve is also influenced ***at all points along its term structure by the underlying constituent bonds****. Therefore, BVAL curve estimates will, at all points along its term structure, reflect both the underlying risk free/base rate component, and a DRP/margin component. Depending on both* ***the underlying constituent bonds*** *and the term structure of the government benchmark, this extrapolation may be either steep or shallow, but it will incorporate both of those inputs."*

5. CEG has, in fact, addressed the above quote in our January 2016 report [figures omitted]:[4]

96. However, there is nothing in this statement that is a rejection of our analysis and conclusion that, beyond the maturity of the constituent bonds, Bloomberg appears to be extrapolating with the effect that, beyond that point, the shape of the BBB corporate bond curve is the same, or very similar to, that of the CGS curve. Mr Pawar has not explicitly stated the weight that each component has on the resulting BBB estimates. As the above analysis has shown, the shape of the CGS curve appears to have a considerably greater influence on the extrapolation as compared to the

3 Lally, Review of Submissions on implementation issues for the cost of debt, October 2015, p. 14.

4 CEG, Criteria for assessing fair value curves, January 2016.

> *underlying constituent bonds. Moreover, our view is based on empirical observation. Lally may reasonably read into the above words that something else could be true but simple examination of Figure 19 above (reproduced from our June 2015 report for AGN) and Figure 20 below which is an updated version of the same analysis clearly shows that the actual practice is consistent with our description.*

6. There is nothing in the statement from Bloomberg that is inconsistent with our analysis or interpretation. We note that our long-standing position has been that a scarcity of bonds in the Bloomberg sample with a tenor close to 10 years results in Bloomberg giving a high weighting to any such bonds (e.g., the Asciano bond). The AER asserts that "CEG's characterisation does not accurately reflect the operation of the curve". This assertion misses the point of our criticism, which is that the BVAL extrapolation results in a shape that closely resembles that of the CGS curve, which suggests that the CGS curve has a considerable influence on the extrapolation, while the yields of the underlying bonds have comparatively lower influence (given there are no such bonds with maturity greater than the Asciano bond).

7. We note that the above discussion does tie in with another one of our criticisms regarding the opaqueness of the proprietary curve-fitting methodology behind the BVAL curve.

2 Base rate as an explanatory variable and the issue of multicollinearity

8. The AER also criticised another CEG memorandum dated 29 February 2016,[5] in which we carried out two sets of regressions of the BVAL 10-year spread to swap against the Asciano bond spread to swap. Both sets featured incremental regressions in which the BVAL 10-year spread to swap was first regressed against the spread of the Asciano bond, while the remaining three regressions in the set featured incrementally more regressors consisting of average spreads to swap of bonds in the 6-7 year, 5-6 year, and 4-5 year tenors. The first set carries out regressions on the levels of the variables, while the second set carries out regressions on the percentage changes in the variables.

9. The AER made a number of criticisms of CEG's regression analysis, with the first two shown in the following quote:[6]

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5 CEG, Recent financial market conditions and the BVAL curve – updated to 19 February 2016, February 2016.

6 AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-330 to 3-331.

More recently, CEG submitted regression analysis to establish a causative relationship between the 10 year Asciano spread to swap. As CEG's regression analysis was submitted for the first time in a late submission, we have had limited time to assess the new analysis in detail. However, CEG has not included a variable for an underlying base rate component (either the swap curve or CEG) in its regressions. This is important, because the swap curve is a key driver of pricing:

- *Since the Asciano bond was issued, there is a strong negative correlation between the swap curve matching the Asciano bond's term to maturity and the spread-to-swap on the Asciano bond. This suggests that, for the Asciano bond, the swap curve may be an important driver of the spread-to-swap on the Asciano bond. In turn, this might suggest that the base rate and not the spread-to-swap on the Asciano bond is a key determinant of the BVAL 10 year spread-to-swap.*
- *Similarly, we mirrored CEG's approach and regressed the BVAL 10 year spread-to-swap against the swap rate. This regression produced a higher R^2 value (0.95) than CEG's regression (0.93). This might indicate a degree of multicollinearity within the regression, which would in turn suggest that CEG's results should be interpreted cautiously.*

10. The AER's first criticism is problematic because the purpose of our regression analysis was to examine whether the Asciano bond received materially higher weight *relative to* the rest of the bonds in the sample by virtue of the fact that it is the only long-dated bond. While there could be a range of variables that are correlated with the spread to swap of the Asciano bond, such as takeover bids for Asciano, including such variables in the regression would be counterproductive to the purpose of the test – which is to determine the relative weight that the BVAL estimation technique gives to the Asciano bond when setting the 10 year BVAL estimate.

11. By way of illustration, imagine that a takeover announcement had the effect of reducing the DRP on the Asciano bond and this had the effect of reducing the BVAL 10 year yield by the same amount. That is, let it be the case that the takeover announcement affects the Asciano bond yield and, via this mechanism, indirectly effects the BVAL yield. It is correct that the ultimate cause of the change in BVAL 10 year DRP is the takeover bid announcement. Were we interested in identifying the ultimate cause, we could include a dummy variable for that announcement. However, we are not interested in the ultimate cause of changes in bond yields in the BVAL sample – we are interested in how Bloomberg arrives at a DRP estimate given the DRPs in the sample.

12. The same logic applies to the swap rate. It may well be correct that the spread of the Asciano bond is inversely correlated with the swap rate [indeed it is our view and Charimont's view that this is typically the case for BBB bonds and this is why we do

not consider a 100% hedging strategy is efficient]. However, if this is so, inclusion of the base rate in our regression would render it useless for the purpose we use the regression – specifically, to test the weight Bloomberg's BVAL methodology gave to the Asciano bond DRP *relative to other bonds in the BVAL sample*. By including other explanatory variables (such as some measure of the level/change in swap rates) we may identify the ultimate economic cause of changes in DRP but this is not the question that is relevant to our analysis.

13. In any event, performing the regression that the AER suggests is a simple exercise. The AER has not presented or attempted to analyse the results of this. Had they done so they would also have run into the interpretation problems described above.

14. The AER's second criticism is not justified because it would not be reasonable to postulate that a regression suffers from multicollinearity purely on the basis that it has a high R^2.

15. Huegin's submission to the AER on behalf of Jemena provides a helpful explanation of multicollinearity:[7]

> *One difficulty with using the Translog functional form, particularly within the context of electricity distribution is that electricity distribution tends to have highly correlated variables that exhibit little intra-group variation. This is known as multicollinearity, and it can result in unstable estimates that can change significantly given minor changes in the model specification or underlying data.*

16. As explained above, multicollinearity occurs when the regression is carried out on explanatory variables that are highly correlated. This cannot apply to a regression with only one explanatory variable, which is the case for our first regression of BVAL 10-year spreads against the Asciano bond spreads.

17. The criticism also does not invalidate the rest of our regressions. As explained by McKenzie and Partington (2013), which the AER's draft decision cites with approval in their analysis of dividend drop off studies [emphasis added]:

> *Finally, there are conceptual and econometric problems. For example, multicolliniarity* [sic] *in the regression equation used to separate the value of the dividends and franking credits. Reflecting the inaccuracy of the ex-dividend method and associated regression technique,* ***the standard errors of the estimates from the regression equations are typically quite large****.*

18. As shown in Figure 5 of our memo, the spread to swap of the Asciano bond is statistically significant in all four of our regressions on the level of spread to swap.

7 Huegin, Jemena Electricity Networks (Vic) Ltd Productivity Study: Efficiency and growth for the 2015-2020 regulatory period, April 2015, p. 14.

With the second set of four regressions on the percentage changes in spread to swap, the first two regressions feature coefficients that are all statistically significant. This indicates that the standard errors of our regressions are not "quite large", which therefore suggests that multicollinearity is unlikely to be in issue with our regressions.

19. In any case, the AER's only justification for claiming that our regressions could suffer from multicollinearity is that the respective Adjusted R^2 statistics are very high. However, this criticism does not apply to the second set of regressions in Figure 6 of our memo, which has a maximum Adjusted R^2 of only 0.51. This is high enough to indicate that the regressors have substantial impact on the dependent variable, but not as high as the one seen in our first set of regressions.

20. We have also carried out further analysis on the issue of multicollinearity using the Variance Inflation Factors (VIF) test, which confirms that multicollinearity is not a problem in our regression with the relevant swap rate included. These results are presented in Appendix B.

21. The next three criticisms raised by the AER concern the fact that base rates are not included in our regressions. These are similar to the first two cited above and have already been addressed, so we do not provide additional individual responses to them:[8]

> *CEG also does not appear to have tested:*
>
> - *the impact of any variable for the base rate, either a risk free rate (CGS) or a swap rate (ADSWAP)*
> - *whether spreads to swap within either the RBA or BVAL samples are substantially influenced by movements in the risk free rate or swap curve*
> - *the consequences of these issues for the explanatory power of its submission.*

3 Other criticisms of CEG's regression analysis

22. Finally, the AER provides two more criticisms of our regression analysis:

> *In addition, CEG has not explained methodological choices and assumptions in its regression. For example, CEG has:*
>
> - *combined spreads to swaps for individual bonds into weekly averages prior to undertaking regressions—it is unclear how this improves the*

[8] AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-331.

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efficacy of the regression, but it does appear to reduce the number of observations and mask potential variation in these underlying data points

- *averaged all bond data within term-to-maturity bands—again, it is unclear how this improves the efficacy of the regression, but it does appear to reduce the number of observations and mask potential variation in these underlying data points.*

23. We selected the weekly average as a methodological choice. This practice is standard when measuring the relationship between assets, especially where daily data is noisy and where there may be variable lags in the speed with which one price responds to another (or both prices respond to the same economic news). Professor Olan Henry, who is one of the AER's consultants, made the same choice when estimating equity beta. In using weekly data for his analysis in Henry (2014),[9] which formed part of the AER's electricity transmission and distribution WACC parameters review, Professor Henry referred to his previous report in Henry (2008):[10]

> *This analysis suggests that the estimates of β obtained are broadly comparable across sampling frequencies and concludes that the weekly frequency offers a reasonable trade-off between the noise in daily data and the small sample issues associated with monthly data.*

24. Our reason for averaging the bond data within term-to-maturity bands is similar to our response in paragraph 10 above. Specifically, the primary question we were addressing in our memo was the weight that the Asciano bond, as the only long-dated bond in the BVAL sample, was being given relative to other bonds in the sample. Consistent with this, our focus on the Asciano bond arises purely because it is the single bond with maturity close to 10 years and is far away from other bonds in terms of residual maturity. It therefore makes sense to investigate how bonds in different maturity segments influence the BVAL 10-year yield, as opposed to tracking individual bonds.

25. For example, the bond with the second-longest maturity in our sample, EK269091 issued by QANTAS, had a time to maturity of 6.2 years. There was also another Downer Group bond with 6.1 years to maturity. Our regressions averaged the DRP/change in DRP for these bonds. This is because we are interested in whether the average DRPs in this maturity range play a role in determining the 10 year BVAL yield.

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9 Henry, Estimating β: An update, April 2014, p.

10 Henry, Econometric advice and beta estimation, November 2008, p. 5.

26. In contrast, the AER's criticism appears to suggest that it would be more appropriate for us to carry out a regression with one parameter for every single bond. Such an approach is, we consider, unjustified because it proceeds as though Bloomberg picks individual short term bonds and assigns them more weight in determining the 10 year BVAL estimate than other individual bonds with the same maturity. We have no reason to believe that Bloomberg would have such a methodology. Moreover, without a good economic reason to believe that Bloomberg would have such a method, including all bonds as unique observations would come at a significant cost to the accuracy of the regression because it would introduce around 20 additional variables – materially raising the prospect of spurious correlation with some of these.

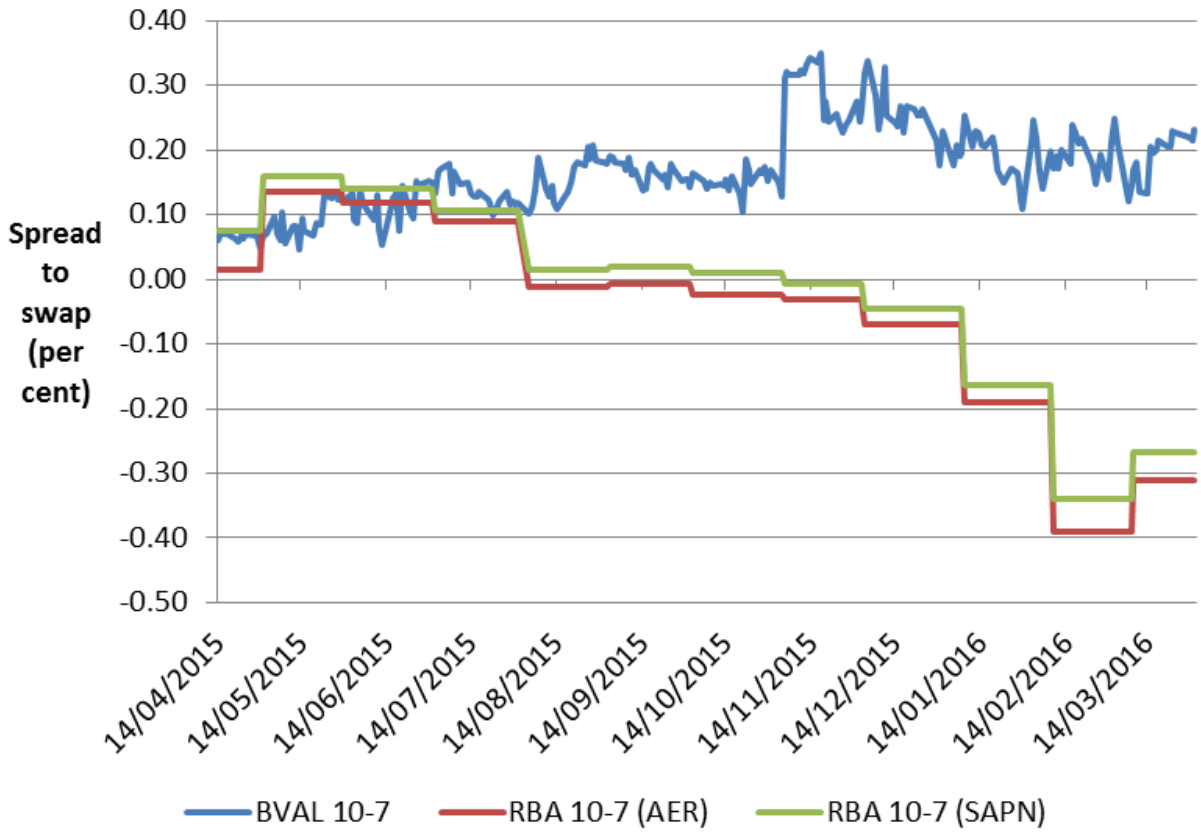
4 Comparison of 7- to 10-year margins of the BVAL and RBA curves

27. The AER argued that the 7- to 10-year margin of the spread-to-swap estimates of the BVAL and RBA curves can be used to assess the impact of the Asciano bond on the BVAL estimate:[11]

> *If the 10 year spread-to-swap estimate is disproportionately and downwardly impacted by an influential and unrepresentative bond, we would expect to see this reflected in the margin between 7 and 10 year spread-to-swap estimates. Specifically, in these circumstances we would expect to see a relatively smaller margin between the 7 and 10 year spread-to-swap estimates compared to the RBA curve, which CEG submits is not affected by this disproportionate impact.*

28. The AER then presented Figure 3-22 of their report (reproduced below), showing that the 7- to 10-year margins of the RBA curve (AER and SAPN extrapolations) were both lower than that of the BVAL curve since August 2015.

[11] AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-331 to 3-332.



29. Based on the figure, the AER concluded that there is no evidence that the 10-year BVAL spread to swap is artificially depressed:[12]

> *As set out in Figure 3-22, the DRP margin between the BVAL 10 and 7 year estimates has been similar to or higher than the same margin for the RBA curve since August 2015. This may reflect a range of different factors in underlying bond market conditions at the seven year term or at shorter terms. However, we are not persuaded that there is evidence the Bloomberg 10 year spread-to-swap is artificially depressed compared to peer bonds that meet Bloomberg's bond selection criteria.*

30. The AER's argument is flawed because such an analysis focuses only on comparing the gradients of a small segment of each curve. It overlooks the slope at other parts of the curve, and most importantly, completely ignores the level of the whole curve. This invalidates the AER's conclusion because bias in the estimated spread of a single bond will first affect the level of said bond, and then its slope relative to other bonds in the sample. Comparing only the slopes of the curves without accounting for differences in levels is meaningless.

[12] AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-332.

31. Carrying out the comparison in the way that the AER has done involves an implicit assumption that:

    - the 7-year estimates of both curves are at the same level. This assumption is clearly incorrect, and the AER has not made any attempt to justify it; or
    - that the 7-year BVAL estimate is an appropriate estimate of the benchmark cost of debt for a BEE issuing 7 year debt. This assumes, amonst other things, that the benchmark assumption is that debt is issued in AUD – which is not the benchmark practice of utilities or of other firms.

32. In any case, as was suggested in a previous CEG report, and as will be explained in section 5, whether or not the Asciano bond is consistent with the rest of the BVAL sample is not informative since the BVAL sample is not representative of the most relevant bond data – that being long term bonds issued internationally.

5 Representativeness of the Asciano bond

5.1 Comparison of Asciano bond against bonds issued in foreign markets

33. In rejecting CEG's analysis that the Asciano bond is not representative of the benchmark entity, the AER argues that the difference could plausibly be explained by the fact that the bonds in our comparator subset of the RBA sample were issued in foreign markets:[13]

> *In CEG's analysis, it compares the movement of the Asciano curve over January 2015 to bonds issued exclusively in Europe or the United States. Its analysis suggests that the Asciano bond has performed differently to the comparator bonds and that this indicates it is not representative of the benchmark entity. However, it is unsurprising that different market circumstances would divergently affect bonds issued in different markets.*

34. Firstly, we repeat that the eleven bonds in our analysis were chosen as the subset of the RBA's bond sample with residual maturities between 8 and 12 years. The fact that all eleven turned out to be foreign-denominated bonds is simply an offshoot of the fact that AUD-denominated bonds with long maturities are rare. Indeed, this is why the Asciano bond was the only bond in the BVAL sample with residual maturity between 8 and 12 years (given that the BVAL sampling methodology only includes bonds denominated in AUD) but is one of many bonds that meet the same criteria in the RBA sample.

[13] AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-333.

35. The scarcity of long-term AUD bonds was also observed by the RBA in their documentation of the RBA spread to swap curve:[14]

> *Almost all of the BBB-rated bonds outstanding with residual maturities above 7 years are denominated in US dollars. Australian dollar-denominated BBB-rated bonds are slightly less than 20 per cent of the total outstanding at this rating, and are skewed heavily towards shorter residual maturities.*

36. Second, the AER's argument in the quote set out below paragraph 33 above fails to address the point of our analysis. That is, even if the AER had conclusively shown that the differences in movement of the Asciano bond compared to that of the comparator sample was due to the fact that they were issued in different markets (which they have not shown), this does not address the issue of whether or not the Asciano bond is representative of the benchmark entity.

37. Specifically, if it is indeed the case that the benchmark entity issues its debt in foreign markets, then it follows that the benchmark entity would also be subject to the movements of bonds across those different markets. These movements should therefore be interpreted as being representative of the benchmark efficient entity.

5.2 Downward sloping yield curves

38. The AER also referenced the following quote from CEG [emphasis added]:[15]

> *It would give rise to estimates that are inconsistent with standard predictions of finance theory in that it would impose a downward sloping term structure for credit spreads (**and inconsistent with a clear upward slope where there is available data**);*

39. This, the AER claims, indicates a logical inconsistency in our reasoning, given that the RBA curve in 2016 has shown a lower spread to swap at the 10-year target tenor compared to the spread to swap at the 3-year target tenor.

40. Without endorsing the view that that an inverted yield curve was "inconsistent with finance theory", the AER questions "why it [CEG] remains unconcerned at the consistent downward sloping observations observed in the RBA curve".[16]

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14 RBA, New Measures of Australian Corporate Credit Spreads, Bulletin, December 2013, p. 17.

15 AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-334.

16 AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-334.

41. Once again, the AER appears to have misunderstood our statement, and does not provide adequate context behind it.. The end of the quote specifically refers to a scenario in which there is "a clear upward slope where there is available data". The quote was therefore cautioning against using a curve that:

    a. Extrapolates downward beyond the maximum tenor of its underlying sample of bonds (i.e.,: beyond "where there is available data"); and

    b. Is inconsistent with the clear upward slope of the curve where there is data (i.e.,: "clear upward slope").

42. The more relevant quote from the same report is as follows (emphasis added):

> *This [the Bloomberg] 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.*
>
> ***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.*** *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 highly unrealistic shape to the yield curve.*

43. Taken in its entirety, that report supports our current contentions – especially when it is noted that the RBA functional form is flexible and also has a large number of observations. When put into context, the quote set out by the AER does not apply to the downward slope that is currently being observed on the RBA curve. What does apply, however, is the rest of the quotation in our report, which was omitted by the AER .[17] This is provided in Appendix A for convenience.

44. That full quote illustrates the consistency between our current and past advice. The BVAL curve continues to be "unnecessarily reliant on a single or small number of observations and/or individual views", and also does not capture "the impact of clear changes in market conditions".

[17] CEG, Criteria for assessing fair value curves, January 2016, pp. 41 – 42. The quote embeds a further quote from: CEG, Estimating the cost of 10 year BBB+ debt, June 2009.

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5.3 Accurately reflecting the costs faced by a benchmark efficient entity

45. As part of its criticism about CEG's analysis of the Asciano bond, the AER also compared the shapes of the BVAL and RBA curves [emphasis added]:[18]

> *The different shapes of these spreads to swaps across the entire term spectrum suggest that significant factors other rather* [sic] *than simply the Asciano bond are influencing the different spreads to swap between the two curves.* ***It is not clear which shape is more accurately reflecting debt market conditions****, however:*
>
> - *the BVAL spread-to-swap curve reflects a more 'typical' upward sloping yield curve*
> - *the RBA curve in 2016 has consistently exhibited a higher spread-to-swap at the 3 year published estimate compared to the 10 year published estimate.*

46. The AER concluded its criticism of our analysis by reiterating that we had not established that the Asciano bond was unrepresentative of the benchmark entity:[19]

> *However, we are not satisfied that there is persuasive evidence in support of these arguments. The analysis submitted by CEG and AusNet services may support a conclusion that the movements in the Asciano bond are not representative in the movements of bonds issued in European and American bond markets. However, yields on both the Reuters and BVAL curves have trended downwards since November 2015, where the RBA curve has trended upwards. As set out in our previous decisions, the BVAL bond criteria includes only AUD denominated bonds. The Reuters criteria similarly allow only AUD denominated bonds. In contrast, the RBA curve includes AUD denominated bonds, but the majority of bonds within the RBA curve are USD or EU denominated.*

47. The AER is conflating the issue of independent publication by a third party with the issue of matching the debt characteristics of a benchmark entity – an issue that we discussed in our previous report.[20]

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18 AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-333

19 AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-334.

20 CEG, Criteria for assessing fair value curves, January 2016, p. 17. *"The reason that the first criterion promotes the ARORO is, we believe, self-evident. If the source is not derived from a dataset that reflects the characteristics of debt issued by a BEE it is unlikely that it will result in an estimate of costs that is commensurate with those incurred by a BEE. By way of example, one characteristic of the debt that a BEE is assumed to issue is that it is long term (around 10 years maturity). If a source arrives at a cost*

48. That report concluded that the RBA curve was superior to the Bloomberg and Reuters curves in terms of being based on a dataset that matches the characteristics of debts issued by a BEE, since it is the only one of the three that includes: foreign currency bonds; multiple long term bonds with residual maturities exceeding 8 years; and bonds with optionality.[21]

49. In addition, the RBA is transparent in setting out its curve fitting methodology and in justifying its sample selection criteria. Specifically, the empirical analysis in the RBA's documentation clearly shows that its sampling criteria was designed with the actual bond issuing profile of Australian non-financial companies in mind.[22]

50. In contrast, Bloomberg applies the same broad criteria for the curves of several countries.[23] Based on its own description, Bloomberg does not appear to have

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of debt based on a dataset that does not include any long term debt then it is unlikely that it will result in an estimate of costs that is commensurate with the costs of a BEE"

21 CEG, Criteria for assessing fair value curves, January 2016, p. 27.

22 RBA, New Measures of Australian Corporate Credit Spreads, Bulletin, December 2013, pp. 16 – 17.

As a result of the historical prominence of offshore issuance, the majority of outstanding Australian NFC bonds are denominated in foreign currencies, particularly in US dollars. By face value, around two-thirds of the bonds currently outstanding are rated A, and this share has increased over time (Graph 3). Close to half of the A-rated bonds are denominated in US dollars, distributed evenly across tenors, while euro-denominated bonds account for around 20 per cent of bonds outstanding. Most of the remaining outstanding A-rated bonds are denominated in Australian dollars, though these tend to be concentrated at the shorter residual maturities (i.e. of less than 5 years). US dollar-denominated securities account for an even larger share of the outstanding BBB-rated bonds. Almost all of the BBB-rated bonds outstanding with residual maturities above 7 years are denominated in US dollars. Australian dollar-denominated BBB-rated bonds are slightly less than 20 per cent of the total outstanding at this rating, and are skewed heavily towards shorter residual maturities. Over time, the value and number of outstanding Australian NFC bonds with longer residual maturities has increased significantly, especially in the 7 to 10 year range.

23 Bloomberg, BVAL Curves, p. 4 (this document was cited in: CEG, Criteria for assessing fair value curves, January 2016, p. 38, footnote 50).

> *To most effectively use the diverse amount of market data in curve construction, bonds must meet the following criteria:*
>
> *• For all asset classes, a BVAL Score of 6 or greater (see BVAL Score section below)*
>
> *• For Sovereign, Agencies and Investment Grade Corporates, fixed rate institutional issues without call/put/convertible options and/or sinking/amortizing/inflation linked structures*
>
> *• For High Yield Corporates, fixed rate institutional issues without convertible option and/or amortizing structures*
>
> *• For U.S. Municipals, fixed rate taxable and tax-exempt bullet and callable bonds*
>
> *To promote the consistent creation of credit notched corporate sector curves through the term structure, the BVAL Sector Curve methodology abides by the following criteria:*
>
> *» Reference Curves*

tailored their bond sample specifically to Australian companies in the manner that the RBA did in order to account for the fact that Australian companies mostly issue their long-term debt in foreign currencies. It is also telling that the ERA, which regulates the energy sector in Western Australia, uses its own sample of bonds based on search criteria that are highly similar to the RBA's in that it also includes foreign-denominated bonds and bonds with optionality.

51. We therefore disagree with the AER's claim that "[i]t is not clear which shape is more accurately reflecting debt market conditions". It is, in fact, clear that the RBA sample consists of bonds that reflect the debt conditions of Australian firms. The same conclusion is also reached when using the AER's definition of a benchmark efficient entity as "a pure play, regulated energy network business operating within Australia".[24]

52. It is important to note that the independence of the data provider is a different issue from the appropriateness of the curve estimate for a given purpose. As set out in the CEG report:[25]

> *We do not cast any aspersions on the status of Bloomberg and the RBA as independent and reputable institutions. Instead, our analysis is centred on the suitability of their methodologies for producing yield curve estimates, specifically in the context of regulation and the characteristics of a BEE.*

6 Claim that CEG supported averaging Bloomberg and RBA as best practice in the past

53. The AER states:

> *BVAL utilizes an extensive library of reference curves to help construct term structure shape through the 30-year point for sparsely populated curves*
>
> *» Curve Constraints*
>
> *BVAL has implemented curve constraints to prevent curve crossing*
>
> *» Outlier Detection*
>
> *BVAL has implemented outlier detection to exclude bonds that breach certain thresholds*
>
> *» Credit Quality Calibration*
>
> BVAL utilizes all direct observations through the credit quality spectrum at each sector level to aid curve construction for sparsely populated curves. This data is carefully calibrated to best reflect the credit risk in yield-to-maturity through the term structure

[24] AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-279.

[25] CEG, Criteria for assessing fair value curves, January 2016, p. 27.

> *Nonetheless, its own analysis appears to indicate that a simple average of the Bloomberg and RBA curves is representative of the costs faced by a benchmark efficient entity over the preceding 9 years. Therefore, regardless of whether Australian bond issuance is predominantly domestic or foreign, CEG's analysis appears to suggest that a combination of the BVAL and RBA curves has been reflective of those costs over multiple regulatory periods.*

54. This mischaracterises our advice. What we actually said in the relevant report was:

> *We have not attempted to carry out monthly analysis of the kind undertaken in section 5 throughout the relevant 9 year history. Such an exercise would require the collection of a very large dataset comprising all BBB rated bonds on issue at some point in time since 2005/06. Our analysis shows that this exercise would be of little utility,* ***because the average difference between third party estimates and across different extrapolation methodologies over this period is very small.***

55. In short, nothing turned on the selection of a curve over the period because on average they produced very similar estimates at that point in time (although very different in certain periods). In section 5 of the same report (referred to in the above quote) we suggested prospective testing of the accuracy of the curve using a sample similar to the RBA's sample – in essence an endorsement of the RBA sample selection. Consistent with this we found, for the period analysed, the RBA estimate superior to the BVAL estimate (when extrapolated using AER methodology). However, we ultimately adopted an average of RBA and BVAL using SAPN extrapolation because, once more, they were almost identical at 10 years at that point in time.

56. The AER goes on to state:

> *Further, to the extent that foreign debt issuance becomes materially more expensive than domestic debt issuance, we would expect that a benchmark efficient entity might seek to issue a greater proportion of its new debt domestically, and/or at shorter terms. We are satisfied that this is an available and viable strategy. It also appears to be consistent with CEG's submission that longer term foreign debt issuance is attractive because it is relatively less expensive.[1294] Specifically, CEG's analysis suggests that service providers will seek debt raising strategies at least in part where they are less costly.*

57. Implicitly the AER assumes that BVAL yields lower than RBA yields implies AUD issues are cheaper. However, if this was so we would already have seen long term bond issuance switch into AUD (refer AER chart *Comparison of RBA and BVAL yields showing BVAL lower than RBA since December 2013*). We have not seen an increase in AUD issues (and the BVAL sample remains so small) which

implies that the BVAL estimates are not representative of costs that most firms perceive for issuing long term debt in AUD.

7 Bias being ameliorated by conservative estimates of other parameters

58. The AER also claims that there are several conservative aspects of its implementation of the return on debt estimate:[26]

> *Further, even to the extent there is a transient downward bias, it is not clear that this would result in a worse estimate of the costs faced by a benchmark efficient entity. We consider that our implementation of the return on debt estimate includes several conservative features:*
>
> - *While we have adopted a 10 year benchmark term, this was based on a weighted average term to maturity of 8.7 years. We have extrapolated both the RBA and Bloomberg curves for consistency with our benchmark. However, this arguably introduces an upward bias into our estimate in more common circumstances where the yield curve is upward sloping.*
> - *While we have adopted an industry benchmark credit rating of BBB+, both the BVAL and RBA curves include BBB+, BBB and BBB– rated bonds.*

59. We do not agree with this claim for three reasons. First, the AER's estimates are not necessarily conservative. Second, it is not good statistical practice to attempt to offset one bias against another, since the resulting estimates could have undesirable properties. Third, the AER has not attempted to quantify the effects of the downward bias in the BVAL curve for it to arrive at any conclusion that it would not result in a worse estimate of the benchmark costs.

8 Appendix A: Full quote from Jan 2016 report (quoting CEG report for Country Energy)

> *106. CEG has previously, in numerous reports, argued that the published Bloomberg fair value curve did not behave appropriately during the global financial crisis (GFC). For example, in a June 2009 report for Country Energy focusing on market conditions in May 2009 (in the midst of the GFC) we made the following conclusion – echoing many of the themes in this 2015 report:*

[26] AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of Return, May 2016, 3-335.

On the basis of the evidence in this report, I do not consider that sole reliance on the Bloomberg fair value estimates for estimating the benchmark rate (as per the AER methodology) is reasonable. Such a method, when measured against the criteria developed in section 2 would perform poorly.

i. It would not reflect a representative yield at the time of issue for 'typical' corporate bonds with a maturity of 10 years and a BBB+ long-term credit rating from Standard & Poor's. ***Rather, it would in effect rely almost entirely on the Bloomberg estimate of the fair value for a single bond being the Santos bond****;*

ii. ***It would utilise a methodology that is unnecessarily reliant on a single or small number of observations and/or individual views*** *and would not efficiently use the totality of information available, particularly given that the available information is sparse;*

*iii. It would give rise to estimates that are inconsistent with standard predictions of finance theory in that it would impose a downward sloping term structure for credit spreads (****and inconsistent with a clear upward slope where there is available data****);*

iv. It would not give rise to estimates that are consistent with current market conditions and ***would not have captured the impact of clear changes in market conditions*** *in September and October 2008; and*

v. It would give rise to yield estimates that are not consistent with other potential proxies for the benchmark rate as described in Section 4 of this report.

….

The CBASpectrum BBB+ 10 year fair value yield performs better against these criteria. It does not rely on a single observation but rather employs a method that uses all the available bond data – a method that will work relatively better than the Bloomberg methodology in the presence of limited data. It gives rise to estimates that are more consistent with other information and it did capture the expected movement in credit spreads following the events of September and October 2008. However, this does not imply that 100% weight should be given to this source for an estimate of the benchmark rate. The CBASpectrum estimate tended to overestimate the only recent observed issue price for a BBB+ Australian bond (the Tabcorp issue) and also was higher than the rates reported by the RBA (although the difference in both cases was less pronounced than for the Bloomberg under-estimates). For these reasons, if one was required to

rely on one or the other of the two estimates of fair value as a proxy for the benchmark rate then I would rely on CBASpectrum's 10 year BBB+ estimate.

I note that an alternative approach would be to rely on neither data services estimate of fair value. In theory it may be possible to develop an alternative procedure for estimating the benchmark rate that does not rely on either Bloomberg nor CBASpectrum fair value estimates.

167. A problem with this approach is that it will inevitably require the exercise of significant judgment and this is especially true in the current market conditions with little in the way of observations of actual trades or issue of Australian BBB+ bonds. Ultimately his is likely to score poorly against criteria vi at paragraph:

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

9 Appendix B: Review of AER reported regression results

60. The AER's final decision for AusNet contains the following quote:[27]

> *Similarly, we mirrored CEG's approach and regressed the BVAL 10 year spread-to-swap against the swap rate. This regression produced a higher R^2 value (0.95) than CEG's regression (0.93). This might indicate a degree of multicollinearity within the regression, which would in turn suggest that CEG's results should be interpreted cautiously.*

61. The use of the term 'mirrored' suggests that that the AER has used the same time period we reported (2015 May 25th to 2016 February 19th) and also weekly averages of the variables. This is the basis of our results reported in this memo (we also report results using daily data at the end of the memo and note that these are similar).

62. The obvious reading of first sentence of the above quote is that the AER conducted a simple linear regression with only one variable, in which the BVAL 10 year spread-to-swap is regressed a swap rate (presumably the 10 year swap rate but conceivably against the swap rate at the same tenor as the Asciano bond).

63. We have attempted to replicate the AER's result by regressing the BVAL 10 year spread-to-swap estimate against the 10 year swap rate (both potential definitions). Our regression shows that, when the BVAL 10 year spread-to-swap estimate is regressed against:

[27] AER, Final Decision: AusNet Services distribution determination 2016 to 2020, Attachment 3 – Rate of return, May 2016, p. 3-331.

- the 10 year swap rate, the R^2 is only 0.33, with an adjusted R^2 of 0.31;
- the swap rate with the same tenor as the Asciano bond, the R^2 is only 0.60, with an adjusted R^2 of 0.59.

64. These R^2 estimates considerably differ from the AER's reported R^2 of 0.95.

65. However, we do achieve an R^2 and an adjusted R^2 of 0.95 when the BVAL 10 year spread-to-swap estimate is regressed on both the 10 year swap yield and the Asciano spread-to-swap. It is therefore possible that the AER has actually conducted a multiple regression against these two parameters as opposed to carrying out a simple linear regression against the swap rate only. This wold be consistent with the AER's reference to multicollinearity in the above quote - which only applies to regressions with multiple explanatory variables. The results of the two regression estimation are shown in Table 1Table 2 and Table 2 (which only differ in terms of whether the tenor of the swap rate variable is 10 years or the tenor of the Asciano bond).

66. Had the AER reported the full results of its regression (assuming that this is their regression) it would have shown that:

- the effect of the Asciano spread-to-swap on the BVAL 10 year spread-to-swap is almost one-for-one (coefficient of 0.95) and is much more economically and statistically significant compared to the swap rate; and
- both regressors are statistically significant.

67. The finding that both regressors are statistically significant suggests that they both have low standard errors and that multicollinearity is not a problem. As explained by McKenzie and Partington (2013), which the AER's draft decision cites with approval in their analysis of dividend drop off studies [emphasis added]:

> *Finally, there are conceptual and econometric problems. For example, multicolliniarity [sic] in the regression equation used to separate the value of the dividends and franking credits. Reflecting the inaccuracy of the ex-dividend method and associated regression technique,* ***the standard errors of the estimates from the regression equations are typically quite large****.*

68. That is, the results of the AER's own regression, if fully disclosed, not only continued to support a conclusion that the Asciano bond DRP and the BVAL 10 year swap rate move in tandem but also tend to suggest that the potential econometric problem identified by the AER is not indicated.

69. We also investigate the correlation between the 10 year/Asciano tenor swap rate and the Asciano spread-to-swap. The correlation between the two variables is -0.67/-0.69 (-0.68 on a daily basis). This concurs with the AER's finding that "there is a strong negative correlation between the swap curve matching the Asciano bond's

term to maturity and the spread-to-swap on the Asciano bond", although we note that the AER found a slightly less negative correlation of -0.65.[28] Nevertheless, a correlation of -0.69 is too low in magnitude to indicate that multicollinearity is a problem (noting again that any multicollinearity problem identified by the AER applies to its regressions and not ours because only its regressions include the swap rate).

70. We have also run a Variance Inflation Factors (VIF)[29] test to determine whether multicollinearity exists between the two variables. The VIF statistics between the two variables is only 1.9, which is much less than the typical rule-of-thumb threshold of 10, above which multicollinearity is identified as a problem.

Table 1: Regression results (swap tenor = 10)

	BVAL 10 year spread-to-swap estimate	BVAL 10 year spread-to-swap estimate
Constant	5.13***	0.60*
10 year swap yield	-1.00***	-0.18**
Asiano spread-to-swap		0.95***
R Squared	0.33	0.95
Adjusted R Squared	0.31	0.95

*CEG Analysis using Bloomberg Data. Note: *** 99% Sig, **95% Sig, *90% Sig*

Table 2: Regression results (swap tenor = tenor of Asciano bond)

	BVAL 10-year spread against 10 year swap rate only	BVAL 10-year spread against 10 year swap rate and Asciano spread
Constant	5.69***	0.63*
10 year swap rate	-1.17***	-0.18**
Asiano spread-to-swap		0.95***
R Squared	0.60	0.95
Adjusted R Squared	0.59	0.95

*CEG Analysis using Bloomberg Data. Note: *** 99% Sig, **95% Sig, *90% Sig*

[28] Ibid.

[29] See: Greene, Econometric Analysis, 7th edition, p. 130-131.