APPENDIX B

PwC - Debt Risk Premium and Equity Raising Costs

January 2012

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Powerlink

Debt risk premium and equity raising costs

January 2012

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Executive summary

Debt risk premium

The AER's debt risk premium estimation methodology

The AER's proposed method to determine the debt risk premium was to identify a sample of Australian corporate bonds with a credit rating of BBB+ and one notch either side (i.e., BBB, BBB+ and A-) with a term to maturity between 7 and 13 years and to take a simple average of those yields. It then proposed to test this estimate by expanding the sample to include bonds with a wider range of terms to maturity (centred on 10 years) between 5 and 15 years. In addition, all bonds on issue (fixed and floating rate) were included if:

- there are no strong qualitative grounds to indicate the bond is unrepresentative of a benchmark 10 year, BBB+ rated Australian corporate bond, and
- the bonds are standard or able to be adjusted to remove the effect of non-standard features (i.e., contain no embedded options).

The debt risk premium for each bond is calculated as the average of the Bloomberg and UBS debt risk premiums where both sources are available, and using one source otherwise (and with the Bloomberg BGN figures preferred to the Bloomberg BVAL figures).

The AER applied this method during the Powerlink averaging period and derived a debt risk premium from a sample of 9 bonds with a remaining term between 7 and 13 years and obtained a debt risk premium of 319 basis points. This was compared to the results from examining the wider set of bonds (13 bonds, average debt risk premium of 325 basis points) and found to be sufficiently robust, and so the AER adopted a debt risk premium of **319 basis points**.

In addition, the AER further justified its proposed debt risk premium by comparing its proposed debt risk premium to what were described as 'market analyst outlooks', from which it concluded that current borrowing costs for regulated businesses were between 150 and 330 basis points, with the AER considering it 'reasonable to assume the expected spreads on a BBB+ should be closer to 150 basis points than to 330 basis points'.[1] From this analysis, the AER concluded that its proposed debt risk premium 'is within the top of the range considered in the market commentary'.[2]

Much of the bulk of the AER's discussion is directed to its analysis of the appropriateness of the Bloomberg method, where it identifies a series of concerns with that method, including that its approach is not transparent, has not followed expectations of how debt risk premiums should have moved, and is not held out by Bloomberg as a predictive source of information.

Our assessment of the AER debt risk premium estimate

We note that the amount of market evidence that is available with respect to the cost of financing through long dated, Australian corporate bonds has increased

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[1] AER, Draft Decision, p.225.

[2] AER, Draft Decision, p.225.

since we provided a report for Powerlink on this matter about a year ago.[3] As a consequence of this new information, many of the issues that we addressed in that earlier report (such as the AER's then approach of attaching special weight to a single bond) are now no longer relevant.

We acknowledge that the AER's objective behind its new method is to take account of the widest set of market evidence that is avaliable and to interpret that information in an unbiased manner, which is a desirable objective. In our view, however, there are a number of shortcomings to the approach the AER has adopted, which has led to its estimate of the debt risk premium understating the debt risk premium that reflects the current Australian market for funds, which relate to:

- the AER's complete setting aside of the Bloomberg fair value curve, which we consider should be retained as a method for calculating a debt risk premium that should be taken into account alongside a direct interpretation of the market evidence as the AER has proposed
  - the robustness of a method (such as the AER's) that involves a direct interpretation of the market evidence with the sample extended as widely as possible is dependent on the reliability of the information on which it is based, but we consider that shortcomings remain in the quality of that data
  - a strength of Bloomberg in this regard is that it includes checks for the quality of the evidence that it will use, including which bonds (including new bonds) should be taken into account when estimating its fair value curve
- the manner in which the AER has applied its own approach, namely:
  - our view that more sophisticated approaches would be justified for undertaking a direct interpretation of the market information, and
  - what we consider to be errors in interpreting the wider market evidence the AER has cited.

Our views on these matters are summarised in turn below.

The Bloomberg fair value curve

A key aspect of the AER's new method is to set aside completely the Bloomberg fair value curve. In our view, it would be premature to set aside the Bloomberg fair value curve, but rather it would be appropriate to retain the curve as one method for deriving a debt risk premium alongside the new method that the AER has proposed, and methods that include the use of more sophisticated techniques to interpret the market evidence.

The Bloomberg fair value curve has a number of advantages as an input into a regulatory determination, which the AER has underweighted. In particular:

- the Australian Competition Tribunal has endorsed the Bloomberg fair value curve as an appropriate benchmark for estimating the debt risk premium,

[3] In order to meet the timetable for Powerlink's regulatory proposal, our draft report on this matter (which is where a method was recommended) was provided in November 2010, which was subject to limited updating before being finalised in April 2011.

including because it appears to be accepted by the market as providing accurate yield estimates[4]

- the Bloomberg fair value curve is an observable benchmark and is simple to apply, and
- the Bloomberg method imposes a series of tests to ensure that the data that it applies is of sufficient quality.

The benefit of this last aspect should not be underestimated. As a matter of practice, a revised proposal is required some four months prior to the debt risk premium being set. The inbuilt tests in Bloomberg allowed regulators prior to the GFC to commit to using Bloomberg during an averaging period in advance. However, under the AER's new method, if new bonds are issued after the draft decision averaging period, a further series of consultation would be required prior to that bond being admitted to the sample, given that testing the appropriateness of the sample is a key aspect of the new method.

We also consider that the AER's criticisms of the Bloomberg method are overstated.[5] Much of its criticism of the ability for Bloomberg to 'follow the market' is explained by the fact that Bloomberg understated the cost of debt between late 2008 and the end of 2009. We demonstrated this fact in a report that was submitted to the AER approximately two years ago.[6] In addition, the letter that the AER has received from Bloomberg explaining the nature of its service is anything but clear in its advice and easily capable of multiple interpretations.[7]

We found that during the Powerlink draft decision averaging period, the Bloomberg 7 year BBB fair value curve implied a debt risk premium of 381 basis points. We estimated the 10 year BBB+ debt risk premium by extrapolating the Bloomberg 7 year fair value curve value by 9 basis points per annum, which was the average annual increment observed for paired Telstra and Stockland bonds during the draft decision averaging period. This yielded a 10 year debt risk premium of 408 basis points.

Application of the AER's new method – a direct interpretation of market data

Simple average of a sample of bonds

In our view, the AER has made a number of errors when applying its new method, in particular:

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4 The Tribunal decided that both the Bloomberg and CBASpectrum fair value curves were "widely used and market respected" in the ActewAGL decision (this is the implication of paragraphs 78 and 80, Application by ActewAGL Distribution [2010] ACompT 4), although the Tribunal appeared to change its view with respect to the CBASpectrum fair value curve in the Jemena Gas decision (para 64, Application by Jemena Gas Networks (NSW) Ltd (No 5) [2011] ACompT 10).

5 We acknowledge that there are some shortcomings with the Bloomberg fair value curve from the point of view of applying the NER requirements (as interpreted by the Australian Competition Tribunal). It does not include A- bonds and does include BBB- bonds) and includes only floating rate bonds. In addition, not all of its computations are open to scrutiny.

6 PricewaterhouseCoopers (November, 2009), *Victorian Distribution Businesses – Methodology to Estimate the Debt Risk Premium*.

7 The AER places significant weight on Bloomberg's statement that it is not intended to be a source of 'predictive pricing information' (AER, Draft Decision, p.226). However, the Bloomberg letter does state that its curves are 'intended to indicate if a bond is trading rich or deep as compared to peer bonds (as defined by the curve)', which is what its curve is being used for when setting a regulatory debt risk premium. It may be that Bloomberg was saying that its curve was not intended to predict beyond the range of its data inputs.

- the AER's sample included the Coca Cola Amatil bond, which is a bond issued in the European market
- the bonds issued by SPI entities should have been excluded given the views of its own adviser that these bonds are non-representative[8]
- we also found an additional bond that the AER should have included in its wider sample (a Sydney Airport bond), and
- we found several technical errors in its calculation of debt risk premia, albeit which were largely offsetting.[9]

Table 1 –Summary of estimates after correcting errors

Sample group average	Remaining term of 7 to 13 years (basis points)	Remaining term of 5 to 15 years (basis points)
AER	319	325
Fix technical errors	315	322
Exclude Coca Cola Amatil bond	334	336
Exclude SPI bonds	346	356
Include Sydney Airport bond	346	351

Source: Bloomberg, UBS, PwC's analysis

In our view, therefore, a proper application of the AER's new method to Powerlink's draft decision averaging period (the 40 business days to 14 October, 2011), should have implied an estimated debt risk premium of 346 basis points or 3.51 basis points.

The potential to use more sophisticated techniques when undertaking a direct interpretation of the market evidence

In our view, a more robust approach for converting the risk premia from the individual bonds (with their unique terms and credit ratings) into a benchmark 10 year, BBB+ rated Australian corporate bond would be to apply econometric techniques to allow more analysis of the unique features of bonds. It is noted that the AER's proposed new approach relies upon it limiting the information so that the the average remaining term and credit rating are approximately centred on 10 years and BBB+. Econometric techniques would permit the totality of the available empirical evidence to be considered.

In this report, we have undertaken an econometric analysis of the current market evidence. This analysis has highlighted the fact that shortcomings remain with the quality of the evidence with respect to Australian corporate bond yields. As such, we recommend that this analysis be used as an alternative approach for directly

8 Oakvale Capital (February, 2011), *Report on the cost of debt during the averaging period: The impact of callable bonds*, p.25. We note in the report that Oakvale Capital also criticised the inclusion of the DBCT bonds. However, we note there that Oakvale Capital's criticism of those bonds related to issues that existed at a point in time and that would have no effect on the ongoing risk premium for the DBCT bond. In contrast, its concerns with the SPI bonds (namely, the effect of ultimate ownership by the Singapore Government) are continuing.

9 These errors were as follows: a) in the Dalrymple Bay Coal Terminal bond maturing 12/12/2022, the AER used the incorrect CGS yield; b) in SPI Electricity and Gas the AER used the pure Bloomberg value rather than averaging with UBS.

interpreting the market evidence alongside a proper application of the the AER's approach, which is to use a simple averaging of yields. As discussed earlier, the direct interpretation of market evidence would be considered alongside the Bloomberg fair value curve to derive the debt risk premium.

The specifc analysis we undertook can be summarised as follows:

- We identified the maximum number of BBB, BBB+ and A- rated Australian, senior and non-financial fixed rate or floating rate corporate bonds with greater than one year term to maturity, and used the AER's method to derive debt risk premiums for those bonds for Powerlink's draft decision averaging period.

- We first derived estimates with all of the bonds 'pooled' (that is, with no distinction of credit ratings), albeit noting that the average credit rating for the sample was very close to BBB+. Secondly, we attempted to estimate the effect of credit rating on the premium.

  – For the pooled case, we found that a quadratic (concave) function (with 'term' as the independent variable) had the best fit for the data.

  – For the second case, we applied the same functional form and also included a series of dummy variables for the credit rating, and including a series of interactions to permit the slopes and degree of concavity of the functions of the different credit ratings to differ.

Using the 'pooled approach', we estimated a 10 year BBB+ debt risk premium of 363 basis points during the Powerlink draft decision averaging period. We also note that the function itself has a close fit to the data, and has a functional form that is consistent with expectations.

Where we included variables that distinguished credit ratings, our results were more difficult to interpret. Our estimated debt risk premium for BBB+ debt was 407 basis points at 10 years; however, the predicted a 10 year BBB debt risk premium was 359 basis points. We expect that these results reflect, to some extent, data anomalies caused by market illiquidity and the after-effects of the global financial crisis.

Our view is that the more reliable method at this stage is the first approach, whereby bonds are pooled across the different credit ratings. This method implies a predicted debt risk premium for a 10 year, BBB+ bond of 363 basis points for Powerlink's draft decision averaging period.

Conclusion from a direct interpretation of market evidence

We conclude that a debt risk premium of approximately **355** basis points for a 10 year BBB+ rated bond during Powerlink's draft decision averaging period is obtained from a direct interpretation of the market evidence. This value is supported by the 346 to 351 basis points debt risk premium values obtained when the AER's method is applied correctly and by the 363 basis points predicted by our econometric analysis that is based on observations for 68 bonds across the BBB, BBB+ and A- bands (with an average BBB+ credit rating).

Conclusion on the debt risk premium for the draft decision averaging period ending 14 October, 2011

We conclude that a debt risk premium in the range of **355 basis points to 408 basis points** would have been appropriate for a 10 year BBB+ rated bond during the draft decision period.

This range reflects the values obtained by applying two estimation approaches, namely:

- an upper bound debt risk premium estimate of 408 basis points obtained by extrapolating the Bloomberg fair value curve to the required term of 10 years for the averaging period, and
- a lower bound debt risk premium estimate of 355 basis points, which is derived from a direct interpretation of the market evidence.

We argue below that the high degree of uncertainty in the current market for funds makes it appropriate for the AER to adopt a conservative estimate of the cost of debt. This would be achieved by adopting a point estimate from the upper end of the range identified above.

Debt risk premium for the 40 day averaging period ending 9 December, 2011

Our Scope of Work required us to re-apply our methodology to the 40 business day averaging period ending 9 December 2011. With respect to this averaging period our findings were as follows:

- **Bloomberg fair value curve –** extending the 7 year BBB Bloomberg fair value curve to 10 years by applying the annual increment in the debt risk premium observed for matched pair bonds with long terms to maturity derives an estimated 10 year BBB+ value of 391 basis points.
- **Direct interpretation of market evidence –** the evidence indicates a debt risk premium of approximately 360 basis points, which is supported by:
  - A debt risk premium of between 351 and 356 basis points applying the AER's methodology with term to maturity ranges of 7-13 and 5-15 years respectively, and
  - A debt risk premium of 367 basis points estimated by applying econometric analysis to a 'pooled sample' of bonds.

Conclusion on the debt risk premium for the 40 business day averaging period ending 9 December 2011

We conclude that debt risk premium range of **360 basis points** to **391 basis points** would have been appropriate for a 10 year BBB+ rated bond for the averaging period covering the 40 business days to 9 December 2011.

This range reflects the values obtained by applying two estimation approachess, namely:

- an upper bound debt risk premium estimate of 391 basis points obtained by extrapolating the Bloomberg fair value curve to the required term of 10 years for the averaging period, and
- a lower bound debt risk premium estimate of 360 basis points, which is derived from a direct interpretation of the market evidence.

We argue below that the high degree of uncertainty in the current market for funds makes it appropriate for the AER to adopt a conservative estimate of the cost of debt. This would be achieved by adopting a point estimate from the upper end of the range identified above.

Other information the AER took into account

Lastly, we have identified a number of material errors with how the AER has interpreted the other information that led it to conclude that borrowing costs for regulated businesses currently were between 150 and 330 basis points, and closer to the lower end of this range, which include that:

- the debt risk premia (spreads) the AER quotes are defined over the swap rate, rather than the bond rate, which means that the premia are understated materially
- most of the issues to which the AER refers are for short term bank debt – all of which have a term of 5 years or less – and hence cannot provide a direct test of the cost of 10 year debt, and
- where bank debt is issued, part of the margin is paid upfront, which it was not clear has been taken into account.

Conclusion on estimating a debt risk premium in the current market

One of the implications of the analysis above is that there remains considerable uncertainty with respect to the estimate of the debt risk premium for BBB+ 10 year debt that is obtained from an analysis of Australian corporate bonds. If there were stable market conditions and a large set of comparator bonds with close to 10 year terms to maturity, the estimation of a debt risk premium based on a comparator bond analysis of the type undertaken by the AER would be a relatively simple matter. However, the Australian corporate bond market remains thin, and the few bonds on issue are infrequently traded. Hence concerns remain about the quantity and quality of the evidence, and therefore the precision of debt risk premium estimates.

When faced with uncertain market conditions, and when the evidence is divergent, regulators tend to adopt conservative positions with respect to the cost of capital parameter they are estimating. This approach was present in the AER's overview of the methodology that it had adopted when undertaking the electricity transmission

and distribution network service providers WACC parameter review in 2009, when it noted that:[10]

> Where, however, the parameter is a fixed value, the global financial crisis has influenced the AER to adopt a cautious approach to interpreting the market data whilst endeavouring to maintain the integrity of the CAPM framework pursuant to the NER.

Hence, in the case of the debt risk premium for Powerlink, we recommend that the AER employ a conservative position that would adopt a point estimate at the higher end of the range identified in this report.

Equity raising costs

AER draft decision

The AER has re-applied its methodology for estimating the equity raising costs that would be incurred by a benchmark electricity transmission business in Powerlink's position. As before, the AER has assumed that the benchmark firm in Powerlink's position would payout just sufficient dividends to distribute all of the franking credits created in any year, which the AER has asserted is required for consistency with the assumption about 'gamma' that applies to transmission businesses. In addition, the AER has assumed that 30 per cent of dividends paid out would be returned through a dividend reinvestment plan, in so doing pointing to an error in how we interpreted the evidence (we had recommended assuming an 18 per cent return). Lastly, the cost of a secondary equity offering was assumed to be 3 per cent, while the cost of a dividend reinvestment plan is assumed to be 1 per cent of the proceeds.

The result of applying the AER's assumptions is an implied benchmark equity raising cost of $0.9 million.

Assessment of the AER draft decision

We note that the AER's assumptions about the cost of dividend reinvestment and seasoned equity offerings are not in dispute, and hence we do not address those matters in this report.

Turning first to the proportion of dividends that are reinvested, we accept the AER's reasoning that the proportion of dividends reinvested should consider only observations where dividend reinvestment was required and a dividend reinvestment plan was in place, and consider the AER's estimate of 30 per cent success for a dividend reinvestment plan is appropriate.

However, we remain of the view that the AER's assumption about the quantum of dividend payments – namely that just sufficient dividends are paid to exhaust the franking account – is inappropriate and that our assumption – namely to derive a benchmark dividend yield on the basis of comparable entities – is superior.

First and foremost, we note that consistency with the AER's assumption for 'gamma' only requires that a minimum payment of dividends be paid out (that is, so that the franking account is fully exhausted). It does not require the additional assumption that no further dividends be paid. We note for completeness that businesses are not constrained to payout only franked dividends.

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[10] AER (May, 2009) *Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters – Final decision*, p. iii.

Secondly, the effect of the AER's assumption is to assume that a benchmark entity in Powerlink's position would pay a very low dividend yield, which would be commercially unsustainable for an infrastructure entity. As we have argued previously, investors in infrastructure businesses constitute a clientele that demands much higher dividend payouts than the shareholders in the average firm that is listed on the Australian stock exchange.

Thirdly, a proper examination of the evidence implies that the most robust method for deriving the benchmark assumption about the quantum of dividend payments is to set those payments such that a benchmark dividend yield is achieved. We note in particular that the dividend yield across listed infrastructure firms is stable over time (once the effect of unusual market events that pose challenges for measuring dividend yield are eliminated) and that dividend yield is the measure of dividends that is of most relevance to investors.

Fourthly, as demonstrated by the ACCC's modelling during the 1998 GasNet decision, the actual tax rate of an infrastructure business will rise over time, and eventually exceed the average effective rate and statutory rate. The ACCC's analysis implies that over time the dividend payouts and dividend yields calculated using the AER's methodology of assuming that dividends are tied mechanically to the amount that will distribute all franking credits but no more would imply dividend payments that vary substantially over time, commencing at unrealistically low levels and then rising to levels that far exceed those observed in the market. This demonstrates that the AER's methodology is unreasonable now and likely to be unsustainable in the long term, and should not be used.

Hence, we continue to recommend the assumption of a dividend policy that is informed by the long term dividend yield that is observed in the market for infrastructure businesses.

Conclusion on estimated up-front equity raising costs

Following from the discussion set out above, applying the methodology that we applied in our earlier report for Powerlink, but accepting the AER's valid criticism about the proportion of dividends reinvested, we have applied the following inputs to derive the annual values of benchmark equity raising costs:

- a dividend yield of 8.06 per cent, which is a figure that takes account of updated financial market information (our previous estimate was slightly higher, at 8.4 per cent)
- a 30 per cent return of dividends through a dividend reinvestment plan
- a seasoned equity issue cost of 3 per cent of the proceeds raised
- a dividend reinvestment plan cost of 1 per cent of the proceeds raised, and
- the draft decision nominal vanilla WACC of 8.31 per cent.

Using these inputs, and based on the values in an indicative PTRM provided by Powerlink, we estimate a total equity issue requirement of $29.4 million, which implies a total discounted cost of new equity funding of **$23.8** million as at 1 July 2012.

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1 Scope of work

Powerlink has engaged PricewaterhouseCoopers (PwC) to provide advice to it regarding certain aspects of the Australian Energy Regulator's (AER's) recent Draft Decision on Powerlink's revenue proposal 2012-13 to 2016-17, in relation to the debt risk premium and equity raising costs. Powerlink's brief requires us to undertake the following four tasks:

1) Provide a full and comprehensive response to the AER's Draft Decision in relation to the reasonableness of the AER's methodology for calculating a debt risk premium, and its movement away from any reliance on Bloomberg's BBB rating band fair value curve
2) Provide an updated risk free rate and debt risk premium estimate using PwC's methodology
3) Prepare a response to the AER's Draft Decision on equity raising costs, which has disagreed with PwC's approach, and
4) Identify the inputs using the PwC approach to estimating equity raising costs that should be inserted into the AER's PTRM input sheet to estimate equity raising costs.

PwC is required to provide an updated risk free rate and debt risk premium estimate using PWC's methodology for inclusion in Powerlink's Revised Revenue Proposal (using 40 business days ending 9 December 2011).

2 Debt risk premium

2.1 The AER's new debt risk premium methodology

2.1.1 The AER's methodology to estimate a 10 year BBB+ debt risk premium

The AER's previous methodology to estimate a 10 year BBB+ debt risk premium was to take an average of the estimated Bloomberg 10 year BBB+ debt risk premium (based on the Bloomberg 7 year BBB+ debt risk premium extrapolated to 10 years using the last available annual increment in the Bloomberg AAA debt risk premium between 7 and 10 years) and the 10 year debt risk premium of the APA bond.

The AER's new methodology does not make any reference to the Bloomberg fair value curve. Instead, the AER's methodology is to collate bonds with:

- Australian issuance
- rated BBB, BBB+ or A- by S&P
- 7 to 13 year term
- yield data observed by UBS or Bloomberg during the draft decision averaging period
- fixed rate or floating rate converted reliably to a fixed rate equivalent
- standard bonds (not callable or subordinated)
- no strong qualitative grounds that the bond is 'unrepresentative of a benchmark 10 year, BBB+ rated Australian corporate bond' (i.e. consistent with NER 6A.6.2e), and
- annualise yields and convert to spreads over CGS.

In applying its new methodology, the AER calculates the debt risk premium for a 10 year BBB+ bond as the simple average of the debt risk premiums for the 9 bonds in its sample with a range of terms from 7 to 13 years and a spread of credit ratings from BBB to A-. For the bonds in the sample, the AER's methodology was to take an average of the UBS yield and the Bloomberg BGN value, or the BVAL value when a BGN is not available.[11]

2.1.2 Comments on the AER's methodology

The AER's setting aside of the Bloomberg Fair Value Curve

In adopting its new methodology, the AER has decided to set aside completely the Bloomberg fair value curve. While the Bloomberg fair value curve does occasionally

[11] The Bloomberg BGN value is yield that is derived on the basis of the individual securities industry feeds to Bloomberg (i.e. a combination of the contributor opinions about the yield), while the BVAL value is Bloomberg's opinion of the yield.

depart from providing debt risk premium information that is reflective of the current market, it has a series of advantages and it would be reasonable to continue to take it into account when assessing the debt risk premium. The main advantage with the Bloomberg fair value curve is that it is an observable benchmark, and is simple to apply. Bloomberg imposes a series of tests to ensure that the data that it applies is of sufficient quality, and it is this screening process that has led to its current problems, since it has not included all of the new bonds that have been issued. This, in turn, has been interpreted by the AER as ignoring relevant information.

Bloomberg derives particular strength from these last two points. Within the Australian regulatory framework for setting prices, the last formal opportunity that regulated businesses have to comment on the WACC is some four or five months before the WACC is locked in, and during which time markets can change materially. Since the Bloomberg fair value curve is observable and Bloomberg is careful about taking account of new evidence, it has allowed regulators (at least prior to the global financial crisis) to commit to using the Bloomberg curve in advance without requiring a detailed analysis of the outcomes in a particular averaging period.

In contrast, the reliability of the outcome under the AER's new method is highly dependent on the quality of the bonds that are present at any point in time, and on that sample of bonds having an average credit rating and term that approximate the required characteristics. As discussed below, we have concerns about a number of the bonds that the AER has used in its sample. It is conceivable that more Australian bonds (or bonds that the AER interprets as Australian corporate bonds) may be issued prior to Powerlink's averaging period, which could have a material impact on the outcome. If the AER seeks to incorporate new bonds into the sample that is used to determine Powerlink's debt risk premium, then this would amount to a change in the method the AER has applied, which would warrant Powerlink being provided with an opportunity to comment on the applicability of the new bonds that the AER proposes to include in the sample.

We also consider that the AER's criticisms of the Bloomberg fair value curve are overstated. This matter is addressed in section 2.8.

The use of more sophisticated techniques to interpret the market evidence

In our view, a more robust approach for converting the risk premia from the individual bonds (with their unique terms and credit ratings) into a benchmark 10 year, BBB+ rated bond is to apply econometric techniques to allow more analysis of the unique features of bonds. It is noted that the AER's proposed new approach relies upon it limiting the information so that the the average remaining term and credit rating are approximately centred on 10 years and BBB+. Econometric techniques would permit the totality of the available empirical evidence available to be considered.

In response to the AER's draft report on Powerlink, we have undertaken an analysis using econometric techniques to estimate a benchmark debt risk premium. Accordingly, this analysis provides an alternative approach to what the AER has proposed for undertaking a direct interpretation of the market evidence. The analysis that we have undertaken, and our views on how this analysis should be interpreted, is set out in section 2.4 below.

2.2 The AER's application of its new debt risk premium methodology

2.2.1 The AER's conclusions on the debt risk premium

For an average term of close to 10 years, an average credit rating near BBB+ and an averaging period covering 40 business days to 14 October 2011, the AER obtained a debt risk premium estimate of 319 basis points. Applying a sensitivity analysis that broadens the 7-13 year term ranges to 5-15 years, the AER showed that a debt risk premium value of 325 basis points is obtained, that is, close to the estimate using a spread of observations from 7 to 13 years. These results are displayed in Table 2 in section 2.2.3.

2.2.2 Comments on the AER's findings

Our analysis of the AER's application of its methodology has revealed a number of shortcomings, which are elaborated upon below.

The validity of the AER's bond sample

We note that a majority of the bonds in the AER's sample are not included in the analysis undertaken by Bloomberg, and none of the bonds have been included in the group of bonds that are monitored on a continuous basis by the Australian Financial Markets Association (AFMA), which is a highly regarded and representative body in the Australian financial market. In February, 2011, the AER's own adviser, Oakvale Capital, has noted that 'AFMA pricing sources are increasingly used by market practitioners'.[12] AFMA's criteria for inclusion of bonds are available on its website.[13] In order to be included the bonds must be Australian denominated and:

- they are issed by a bank, corporate or other non-government entity, acceptable to the AFMA Debt Capital Markets Committee
- the Issue has a minimum face value greater than AUD 100 million outstanding
- the Issue has more than twelve (12) months to run to maturity at time of issue; and
- at least three Contributing Price Makers are willing to provide regular Reference Rates.

The list of current contributing AFMA price makers comprises 11 significant Australian financial institutions.[14] Given this large list of contributors, the fact that AFMA does not report values for any of the AER's bond sample is a concern. Putting aside the wider issue of the non-inclusion of these bonds by Bloomberg and AFMA, we have observed a number of irregularities with respect to individual bonds that have been included in the AER sample, and the estimates made of individual bond yields and debt risk premiums.

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[12] Oakvale Capital (February, 2011), *Report on the cost of debt during the averaging period: The impact of callable bonds*, p.25.

[13] http://www.afmadata.com.au/markets/bonds2.asp

[14] AFMA's current list of contributors is: Australian & New Zealand Banking Group Limited; Citigroup Global Markets, Commonwealth Bank of Australia, Deutsche Bank AG, Macquarie Bank Limited, National Australia Bank Limited, Royal Bank of Canada, Royal Bank of Scotland, Societe Generale, Australia, TD Securities, and Westpac Banking Corporation.

In our view, the incomplete coverage of bonds and irregularities between sources of information suggest that it would be reasonable to continue to exercise caution about how the current market evidence is interpreted. In addition, this also suggests that the AER's criticism of the Bloomberg fair value curve for not including all recent bonds is overstated.

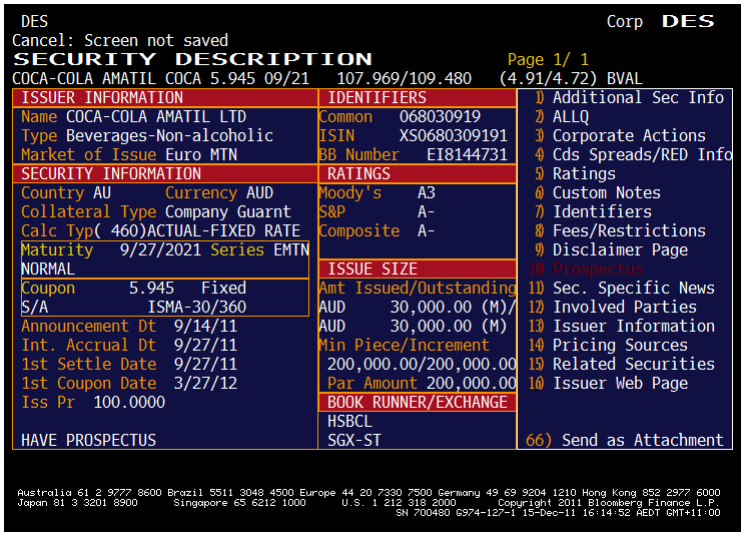
Technical calculation errors

In applying the AER's methodology to each debt risk premium in the AER's sample of 9 bonds, we found that in two cases an error had been made. The source of these errors are set out in Table 2 in section 2.2.3 below. Correcting for these errors, would have reduced the AER's debt risk premium estimate to 315 basis points.

The inclusion of the Coca Cola Amatil bond

The Coca Cola Amatil bond, which has by far the lowest debt risk premium in the AER's sample, is not a valid observation since it was issued in a foreign (European) market. A screen shot from Bloomberg that describes the bond as a 'Euro MTN' (Eurpoean medium term note) is set out below.

Figure 1 – Bloomberg screenshot of Coca Cola Amatil bond



Source: Bloomberg

Accordingly, the inclusion of this bond does not meet the requirements of the National Electricity Rules to use the 'observed annualised Australian benchmark corporate bond rate'.[15]

Excluding the Coca Cola Amatil bond for a range of terms to maturity between 7 and 13 years (the AER's base case) raises the AER's debt risk premium estimate by 20 basis points to 339 basis points, or 334 basis points after corrections of the AER's technical errors. For the Australian bonds (i.e. excluding the Coca Cola Amatil bond) we also undertook a sensitivity for a longer term spread of 5 to 15 years. This provided a relatively similar debt risk premium estimate for the AER's Australian bond sample of 339 basis points using the AER's numbers, and 334 basis points after correcting for the AER's technical errors.

[15] NER, rule 6A.6.2(e).

Inclusion of the SPI bonds

After the Coca Cola Amatil bond, in the AER's sample, the bonds issued by SPI had the lowest observed debt risk premia, with premia of 263 basis points (9.5 year term, in the main sample) and 222 basis points (6.0 year term, in the extended sample).

These bonds are distinguished from the others due to a majority holding by Temasek, which is the investment arm of the Singapore Government. When assessing this bond the AER's adviser, Oakvale Capital, noted that a key issue impacting the low relative yield was the fact that 'the risk is in fact the risk of the Government of Singapore.'[16] Due to the unique sovereign risk issues associated with this bond, the AER should have excluded it from the sample.

We note for compleness that Oakvale Capital also expressed concern with the DBCT bonds. However, we note that Oakvale Capital's concerns related to the instability while under its previous ownership prior to Brookvale becoming owner. We note that this related to events back in 2009, and cannot be considered to have any influence in the bond's current pricing.

Exclusion of a relevant Sydney Airport bond

The AER appeared to have excluded a Sydney Airport bond from its sample of bonds with remaining term of 5-15 years.

We believe the Sydney Airport bond should be included in the AER's extended sample. It is a senior BBB rated fixed rate corporate bond issued in the Australian market and in Australian dollars with a remaining term of approximately 6.8 years. We could not find any reason to exclude this bond from the analysis.

A further bond has been issued since the conclusion of Powerlink's draft decision averaging period

We note for completeness that since the conclusion of Powerlink's draft decision averaging period, a relevant bond was issued by Caltex. This bond had a 7 year term at issuance and is BBB+ rated. Its yield was first reported by Bloomberg on 21 November 2011 (with a debt risk premium at that time of 358 basis points).

We have examined this bond and consider that there would be no reason to exclude it from the sample that is used to derive Powerlink's debt risk premium during its averaging period.

However, we have only included this bond when estimating the debt risk premium for a subsequent averaging period covering the 40 business days ending 9 December 2011 (see section 2.6 below).[17] This is because Bloomberg and UBS only began reporting yields for the Caltex bond after the draft decision averaging period.[18]

2.2.3 Debt risk premium using the AER's methodology when correctly applied

For the draft decision averaging period, Table 2 shows the effect of excluding the Coca Cola Amatil and SPI bonds and including the Sydney Airport bond. It also

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16 Oakvale Capital (February, 2011), *Report on the cost of debt during the averaging period: The impact of callable bonds*, p.25.

17 Under the Scope of Work, Powerlink requested that we re-apply our debt risk premium estimation methodology to a second averaging period covering the 40 business days to 9 December, 2011.

18 Bloomberg and UBS began reporting yields for Caltex as at 21/12/2011 and 23/12/2011 respectively.

shows the differences between ourselves and the AER in our estimates of the debt risk premia for the different bonds.

Table 2 shows that eliminating the Coca Cola Amatil bond alone raises the estimate to 339 or 334 basis points for the samples that include ranges in remaining term of 7-13 years and 5-15 years, respectively. In addition, the other required changes to the sample set raise these estimates to 346 and 351 basis points, respectively. We note that the additional sample of bonds from increasing the term to maturity range is highlighted in grey.

Table 2 – Debt risk premium analysis applying the AER's methodology for Powerlink's draft decision averaging period

Bond	AER's estimate (basis points)	PwC's estimate (basis points)	Source of AER error	Maturity	S&P Credit rating	Maturity type
APT	309	309		22/07/2020	BBB	Fixed
Brisbane Airport	267	267		9/07/2019	BBB	Fixed
Sydney Airport	381	382		20/11/2021	BBB	Floating
Sydney Airport	390	390		11/10/2022	BBB	Floating
Dalrymple Bay Coal Terminal	430	430		9/06/2021	BBB+	Floating
Dalrymple Bay Coal Terminal	383	355	Used incorrect CGS	12/12/2022	BBB+	Floating
Coca Cola Amatil	159	159	Euro issue	27/09/2021	A-	Fixed
SPI Electricity & Gas	263	252	Only used Bloomberg	1/04/2021	A-	Fixed
Stockland	291	291		25/11/2020	A-	Fixed
Transurban	376	377		10/11/2017	A-	Floating
Sydney Airport	n/a	306		6/07/2018	BBB	Fixed
SPI Electricity & Gas	222	223		25/09/2017	A-	Fixed
DB RREEF trust	310	310		21/04/2017	BBB+	Fixed
Dalrymple Bay Coal Terminal	444	447		9/06/2026	BBB+	Floating
7 to 13 years with CCA (AER)	319	315				
7 to 13 years (AER Aust only)	339	334				
5 to 15 years (AER Aust only)	339	334				
7 to 13 years (All Aust, no SPI)	350	346				
5 to 15 years (All Aust, no SPI)	358	351				

Source: Bloomberg, UBS, RBA, PwC's analysis

2.3 Other information the AER relied upon

2.3.1 Market analyst reports

The AER also contended that its finding that a 10 year BBB+ rated bond would be priced at a 319 basis points spread to the 10 year risk free rate was supported by a number of security firm analyst reports. In summary, these market analysts reports indicated that:

- APA (BBB) is expected to refinance $900m of bank debt at a 240 basis points spread;
- Spark Infrastructure (A-) is raising debt at a 150-160 basis points spread, and

- DUET (BBB-) is refinancing $3 billion at approximately a 300 basis points spread compared with 330 basis points recently.

AER contends the 319 basis points it has estimated therefore is in the top of the range considered by market analysts. In addition, the AER quotes JP Morgan International, which has stated that demand for Australian utility BBB debt remains buoyant, and funding costs have diminished since 2008-09.

Comment on market analyst reports

We agree with JP Morgan that compared with funding costs during 2008-09, current funding costs are lower. However, it is indisputable that current funding costs are significantly higher than they were previously (i.e. in the decade before the Global Financial Crisis). We also consider that it is clear that the current worsening of the European soverign debt crisis is creating even more volatility in financial markets, which has been reflected in an upturn in the credit default swap index (as quoted in the AER's draft decision). Indeed, some financial market practitioners believe that the European soverign debt crisis may well turn out to be more significant for finanical markets that the Global Financial Crisis:[19]

> "This [European debt crisis] has potential to be significantly worse than the Lehman Brothers collapse and the subprime crisis because now we are talking about nation states"

However, the market quotations for bank debt that are referred to by the AER are not evidence that the AER's 319 basis points is a reasonable estimate. We note that the terms of these bank deals are not mentioned by the AER; however, virtually all bank debt is for terms of 2 to 5 years, and we are unaware of any bank deals being concluded for a term of 10 years. Neither are the conditions associated with the deals quoted by the AER elaborated on. In particular, we would note that bank deals are generally quoted with reference to a spread relative to the Bank Bill Swap Rate (BBSY), which is generally well above the yield on Commonwealth Government bonds rate (recently in the order of 60 basis points for longer terms). As such, the spread to Commonwealth Government bonds would be likely to be higher for the quoted bank deals.

Table 3 below displays the margins over BBSY struck in the bank deals concluded during 2011, and the equivalent margin over Commonwealth Government bonds that this equated to in the month of the deal. In addition, we have added on the annualised upfront average bank fees net of the 9 basis points per annum debt raising transaction fee applied by the AER. We find that the bank deals for terms of 3 to 5 years were priced at 194 to 301 basis points over CGS. Given the maximum term of 5 years, this does not support the AER's hypothesis that its 319 basis points for 10 year debt is at the high end of the range. Indeed, this evidence does not provide support for the AER's estimate even being within the range, but rather that it understates the current cost of debt.

[19] Ralph Norris (CEO of Commonwealth Bank), Sydney Morning Herald, GFC II on its Way: Norris, 25 November 2011.

Table 3 –Analysis of costs in Australian bank debt deals concluded in 2011 (basis points)

Company	Date	Tenor (yrs)	Margin over BBSY	BBSY	Total yield	CGS	Margin over CGS	Up front fee – bank debt	Average up front fee	Annual fee - bonds	Mod. margin over CGS*
APA	Nov-11	2	145	399	551	341	210	25-35	30	9	217
	Nov-11	3	160	408	576	341	235	35-45	40	9	240
	Nov-11	4	175	422	606	349	257	45-55	50	9	261
AGL	Jul-11	3	150	504	664	455	209	n/a	n/a	9	n/a
Asciano	Oct-11	3	160	439	608	384	224	30	30	9	226
	Oct-11	5	185	466	661	399	262	50	50	9	264
Boral	Nov-11	4	200	422	632	349	283	n/a	n/a	9	n/a
Crown Group	Jan-11	4	200	565	780	527	253	n/a	n/a	9	n/a
	Jan-11	5	200	577	792	535	258	n/a	n/a	9	n/a
Incitec Pivot	Mar-11	3	150	541	703	507	196	20	20	9	194
Qantas	Apr-11	4	160	564	737	526	211	35-55	45	9	214
Goodman Fielder	Nov-11	3	180	408	597	341	256	30-36	33	9	258
	Nov-11	5	210	438	659	361	298	50-60	55	9	301

Note: * 'Mod' means modified, where we have modified the margin over CGS to account for differences between the transaction fees applying to the issuance of bank debt as opposed to corporate bonds.

Source: Loan connector, Bloomberg, PwC's analysis

IPART decision

In the same week that the AER released its draft decision on Powerlink, IPART released its final report on the Sydney Desalination Plant (SDP).[20] While the AER's decision for a 10 year BBB+ bond was a debt risk premium of 319 basis points, IPART's decision provided a debt risk premium of 330 basis points for a 5 year BBB+ bond.

We note that the IPART decision gave some weight to the Bloomberg 5 year BBB fair value curve (a debt risk premium of 342 basis points), 11 domestic bonds, and 4 Australian bonds issued in the American bond markets. The average debt risk premium for this group of observations was 328 basis points.

Given that the AER is required to estimate a debt risk premium for a term 5 years longer than the term that IPART adopted, the decisions appear incongruous.

2.4 Use of more sophisticated techniques for interpreting the empirical information

2.4.1 The econometric analysis that we undertook

The sample of bonds that we used for the econometric analysis was assembled as follows:

- the bond was issued in the Australian market

[20] IPART (December, 2011), *Review of water prices for Sydney Desalination Plant Pty Limited.*

- the credit rating was BBB, BBB+ or A-
- the issuing entity was a non-financial entity and the debt was senior debt (i.e. not subordinated), and
- the term to maturity for the bond was greater than 1 year during the relevant averaging period.

This resulted in a sample of 68 bonds.

The debt risk premium for each bond was measured for Powerlink's draft decision averaging period using the AER's preferred practice, that is, using an average of the Bloomberg and UBS debt risk premiums where these are both available, and if not taking the debt risk premium that is available from either Bloomberg or UBS. For Bloomberg, the BGN prices were used where available (that is, in preference to the BVAL prices).

We then estimated two different equations, with the difference being how differences in credit rating were treated.

- we first estimated the relationship between debt risk premium and term without distinguishing the credit rating of the bonds, which are referred to as the 'pooled' estimates below. We note that the average credit rating for the sample was very close to BBB+.[21]
- secondly, we attempted to estimate the effect of credit ratings on the debt risk premium, allowing for the credit rating to affect the level, slope and degree of concavity of the relationship.

In both cases, the equations assume a quadratic (concave) relationship between the debt risk premium and remaining term. We tested the quadratic functional form and alternative functional forms and found that the quadratic form had a better fit for the data[22].

For the second case, we applied the same functional form and also included a series of dummy variables for the credit rating, and including a series of interactions to permit the slopes and degree of concavity of the functions for the different credit ratings to differ.

This is discussed in more detail below.

Regression analysis on a single pool of BBB, BBB+ and A- rated bonds

Our first approach was to estimate a regression equation with debt risk premium as the dependent variable, and TERM (in years to maturity) and $TERM^2$ (to allow for a concave relationship) as the independent variables, without reference to the individual credit ratings of the bonds. That is, we treated all 68 bonds as a single pool of bonds. In essence, this is close to the methodology applied in the AER's methodology that calculates the simple average debt risk premium of a set of bonds

[21] We determined this average credit rating by assigning a rank to each bond. BBB bonds were assigned a rank of 1, BBB+ bonds 2 and A- bonds a rank of 3. We then averaged the rankings of the 68 bonds and found that it was approximately 2.06, which is very close to the BBB+ rank of 2.0.

[22] We tested the functional forms by performing a Ramsay RESET test. In summary, this tests whether the regression equation is correctly specified. We found that when we differentiated by credit rating, the equation with a quadratic relationship with debt risk premium and remaining term passed the Ramsay RESET test, while the linear relationship equation did not. However, when we did not differentiate by credit rating, both functional forms passed the test. This implies that when we differentiate by credit rating, a quadratic equation is a better fit to the data, and when we do not differentiate by credit rating, neither the linear equation nor the quadratic equation can be rejected as an appropriate functional form.

from the BBB, BBB+ and A- credit rating bands.We find that the average credit rating of the entire sample of 68 bonds used in the regression analysis is close to BBB+.

Regression analysis estimating the debt risk premium by credit rating

We also estimated equations that attempt to distinguish the effect of credit rating on the debt risk premium. We did this by introducing dummy variables for two of the three credit ratings (so that the gap between BBB and BBB+ was allowed to differ to the gap between BBB+ and A-). The exact changes to the model were as follows:

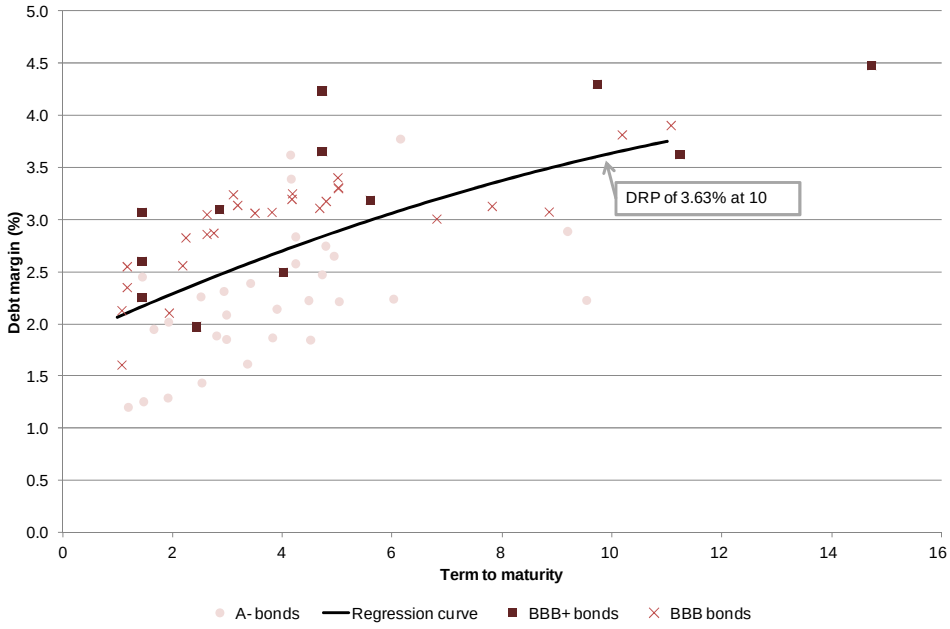
- Two dummy variables indicating whether a bond has a BBB or BBB+ credit rating, respectively, allowing for the level of the curves to differ
- Two further variables being the product of each dummy variable and the TERM variable, allowing the slope of the functions to differ between credit ratings, and
- Two further variables being the product of each dummy variable and the $TERM^2$ variable, allowing the degree of concavity of the functions to differ between credit ratings.

2.4.2 Debt risk premium estimates based on the econometric analysis

Appendix A sets out all of the coefficients for the equations that we estimated, together with the results of the specification tests that we undertook. Appendix B lists the bonds that were included in our sample of 68, together with its credit rating and the debt risk premium value that we derived.

Figure 2 below shows the scatter of observations (with credit rating indicated by different symbols) and the fitted regression line for the pooled estimate. From the regression equation for the single pool of bonds, the predicted debt risk premium for a term of 10 year bond is 363 basis points, which is very close to the number of 358 basis points that was derived above using the AER's methodology correctly applied. The equation achieves a reasonable goodness of fit (adjusted R-squared of 0.37), and is statistically significant overall (F statistic of 20.8). The coefficient on TERM is also highly statistically significant (at better than the 99 per cent confidence interval), while the coefficient measuring concavity ($TERM^2$) is only significant at a 66 per cent level of confidence. Given that there are sound a priori expectations for a concave relationship, we consider it appropriate to retain $TERM^2$ as an explanatory variable in the equation when predicting debt risk premium.

Figure 2 – Regression analysis - debt risk premium for a single pool of BBB, BBB+ and A- bonds – draft decision averaging period



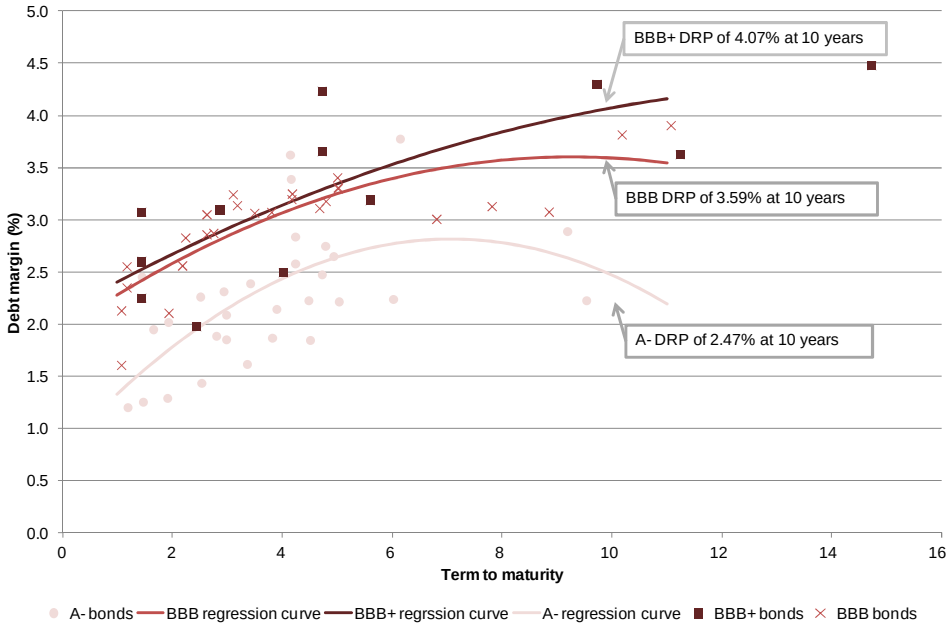
Source: Data from Bloomberg, UBS, RBA, PwC analysis.

Figure 3 sets out the predicted relationships where the effect of credit rating is distinguished. This delivers three different fitted regression lines, one for each credit rating in the sample.

We note that while the overall goodness of fit is improved by using the more complex regression technique (adjusted R-squared rises to 0.62), the results displayed in Figure 3 below are somewhat puzzling. In particular, we find that contrary to the vast majority of empirical findings, the A- curve experiences a hump that peaks at approximately 7 years. Of even greater concern, however, is the fact that the fitted BBB+ curve is at every term to maturity higher than the lower rated BBB curve at the same term to maturity. This is contrary to financial theory, corporate practice, and the findings of empirical analysis. As a result, the predicted 10 year BBB+ debt risk premium at 10 years is 407 basis points, while the BBB counterpart is only 359 basis points. Given the unusual results, we consider the 'pooled' estimate to be more reliable.

What these regression results highlight is the doubtful quality of many of the observations that are available, and are being used to estimate the debt risk premium. This result explains the caution that is being exercised by Bloomberg and AFMA when selecting bonds for inclusion as benchmarks, and to use in deriving estimates of a fair value curve for a given credit rating band. Hence, it supports the need to address the issue of debt premium estimation with a degree of caution.

Figure 3 – Regression analysis - debt risk premium of bonds by individual credit rating – draft decision averaging period



Source: Data from Bloomberg, UBS, RBA, PwC's analysis

2.5 The Bloomberg Fair Value Curve

During Powerlink's draft decision averaging period, the Bloomberg fair value curve provided an estimate of the debt risk premium for 7 year debt of 381 basis points.

A controversial issue has been how to extrapolate the Bloomberg BBB curve from the longest term for which it is currently produced (7 years) to the required 10 year term to maturity.

In our last report, we estimated the relationship between the debt risk premium and term by finding and analysing pairs of bonds that had been issued by the same entity but had different terms, and hence were identical apart from their terms. We used the observed change in the debt risk premium between these bonds divided by the difference in the terms to estimate the approximate annual average change in the debt risk premium as the term is extended.

One of the AER's criticisms with that analysis was that the average term of the longer dated of the pairs of bonds in our sample was only 5 years and the average term of the shorter dated bonds was 1.8 years,which the AER concluded was unlikely to be representative of the change in the premium between remianing terms of 5 and 10 years or 7 and 10 years.

We have responded to that criticism by focussing only on pairs of bonds where the longer dated bonds have a remaining term of close to 10 years.

The recent issue of a new Stockland bond with a term to maturity of 10 years has enabled us to compare two pairs of bonds (Telstra and Stockland) with terms running from 3.5 and 4.95 years to 8.91 and 9.27 years, respectively. As shown in Table 4 below, the debt risk premium over the averaging period that was used for Powerlink's draft decision increased by 9 basis points per annum for each bond.

Table 4 – Average annual increment in the debt risk premium for the draft decision averaging period

Bond (Credit rating)	Maturity	Term to maturity (years)	Debt Risk Premium (Basis points)	DRP increment per annum (Basis points)
Telstra (A)	02/08/2016	4.95	225	
Telstra (A)	15/07/2020	8.91	261	9
Stockland (A-)	18/02/2015	3.50	239	
Stockland (A-)	25/11/2020	9.27	291	9
Average increment				9

Source: Bloomberg, UBS, PwC's analysis

As noted above, during Powerlink's averaging period the Bloomberg fair value curve indicated a debt risk premium for 7 year debt of 381 basis points. To this base number we added 3 years of increments of 9 basis points to derive a 10 year BBB+ debt risk premium estimate of **408 basis points**.

2.6 Debt risk premium for the 40 business day averaging period ending 9 December, 2011

Powerlink's Scope of Works requested that we estimate the debt risk premium for the 40 business days to 9 December 2011. For this averaging period we derive a debt risk premium range of 360 basis points to 391 basis points. In deriving this estimate we have applied the methodology developed in previous sections as follows:

- first, we have determined the debt risk premium indicated by the 7 year Bloomberg BBB fair value curve, and have extended this to 10 years using the annual increment indicated by paired bonds with a relatively long term to maturity
- secondly, we have derived estimates based on a direct interpretation of market data:
  - first, we have examined the market data directly by applying the AER's methodology to the appropriate sample of bonds over the averaging period, and
  - secondly, we have examined the market data directly by undertaking a regression analysis using a sample of 68 bonds with varying terms to maturity, and have estimated the debt risk premium predicted for a 10 year term BBB+ rated bond.

We have also assessed the degree of uncertainty inherent in the data, and in the current market, and have recommended that a range be applied.

2.6.1 The Bloomberg fair value curve

The extrapolated Bloomberg fair value curve estimates a debt risk premium of 391 basis points for the averaging period covering the 40 business days to 9 December, 2011.

Using the same two pairs of bonds as in the analysis for the draft decision averaging period (Telstra and Stockland), we found a slightly higher average debt risk premium increment per year of 10 basis points per annum for the later averaging period (compared with 9 basis points per annum). Applying this annual increment to the new 7 year Bloomberg fair value curve debt risk premium of 361 basis points, we derive a 10 year BBB+ debt risk premium estimate of 391 basis points.

Table 5 – Average annual increment in the debt risk premium for the 40 business days to 9 December 2011

Bond (Credit rating)	Maturity	Term to maturity (years)	Debt Risk Premium (Basis points)	DRP increment per annum (Basis points)
Telstra (A)	02/08/2016	4.79	232	
Telstra (A)	15/07/2020	8.74	269	9
Stockland (A-)	18/02/2015	3.34	262	
Stockland (A-)	25/11/2020	9.11	321	10
Average increment				10

Source: UBS, Bloomberg, RBA, PwC's analysis

2.6.2 Direct interpretation of market evidence - the AER's methodology

Table 6 shows the result of applying the AER's methodology for the averaging period covering the 40 business days to 9 December 2011. With the exception of the new Caltex bond, the relevant sample with terms to maturity between 5 and 15 years has not changed compared with the draft report averaging period. We note that we have excluded the Coca Cola Amatil bond because this is an international bond issue. As before, the additional sample of bonds obtained by widening the term to maturity range is highlighted in grey.

Excluding the SPI bonds, the debt risk premium is estimated at 351 basis points and 356 basis points for term ranges of 7 to 13 years and 5 to 15 years respectively. The Caltex bond did not have the full 40 days of observations for the updated averaging period, however excluding it from the sample does not materially impact on the result, reducing the debt risk premium estimate by 1 basis point. For the sample including bonds with terms to maturity of 5 to 15 years, excluding the SPI bonds derives an estimate of 356 basis points. If the Caltex bond was not included, the estimate is 355 basis points.

Table 6 – Debt risk premium analysis applying the AER's methodology for the 40 business days to 9 December 2011

Bond	PwC's estimate (basis points)	Maturity	S&P Credit rating	Maturity type
APT	309	22/07/2020	BBB	Fixed
Brisbane Airport	272	9/07/2019	BBB	Fixed
Sydney Airport	383	20/11/2021	BBB	Floating
Sydney Airport	391	11/10/2022	BBB	Floating
Dalrymple Bay Coal Terminal	432	9/06/2021	BBB+	Floating
Dalrymple Bay Coal Terminal	347	12/12/2022	BBB+	Floating
SPI Electricity & Gas	253	1/04/2021	A-	Fixed
Stockland	321	25/11/2020	A-	Fixed
Transurban	380	10/11/2017	A-	Floating
Sydney Airport	307	6/07/2018	BBB	Fixed
SPI Electricity & Gas	232	25/09/2017	A-	Fixed
DB RREEF trust	314	21/04/2017	BBB+	Fixed
Dalrymple Bay Coal Terminal	453	9/06/2026	BBB+	Floating
Caltex	356	23/11/2018	BBB+	Fixed
7 to 13 years (AER Aust only)	339			
5 to 15 years (AER Aust only)	339			
7 to 13 years (All Aust, no SPI)	351			
5 to 15 years (All Aust, no SPI)	356			
5 to 15 years (All Aust, no SPI, no Caltex)	355			

Source: UBS, Bloomberg, RBA, PwC's analysis

As shown in Table 7, applying the methodology to the later averaging period raises the debt risk premium from 334 to 339 basis points for samples with remaining terms of 7 to 13 and 5 to 15 years respectively. Excluding the two SPI bonds from the sample, the debt risk premiums are 351 and 356 basis points for the respective terms. This represents a 5 basis point increase in the estimated debt risk premium compared with the draft decision averaging period.

Table 7 – Comparison of estimates applying the AER's methodology (basis points)

	Draft decision averaging period	40 business days to 9 December 2011	Difference
7 to 13 years (AER Aust only)	334	339	5
5 to 15 years (AER Aust only)	334	339	5
7 to 13 years (All Aust, no SPI)	346	351	5
5 to 15 years (All Aust, no SPI)	351	356	5
5 to 15 years (All Aust, no SPI, no Caltex)	n/a	355	n/a

Source: UBS, Bloomberg, RBA, PwC's analysis

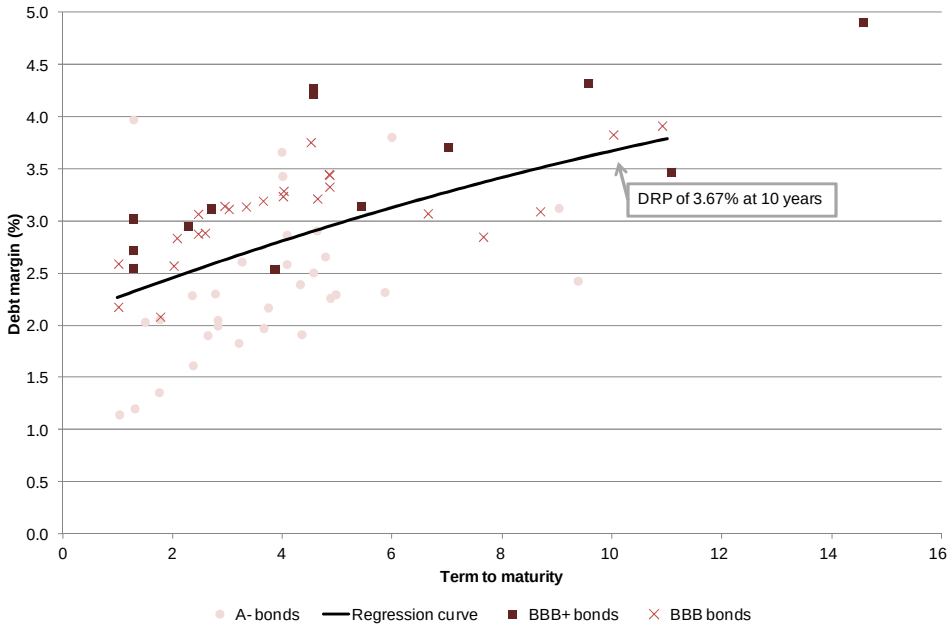
2.6.3 Direct interpretation of market evidence – applying econometric analysis

We reviewed the sample of bonds to apply in the regression analysis. For the 40 business days to 9 December, 2011, the sample remains largely the same as that examined for the draft averaging period. Although two fixed rate bonds were excluded because their terms to maturity were less than a year, they were replaced by two recent fixed rate bond issuances[23]. This resulted in a sample of 68 bonds, the same number as in the draft averaging period. Again the spread of credit ratings of the sample of bonds averages at very close to BBB+.

We then estimated regression equations that first, differentiated between credit ratings, and secondly, used a 'pooled sample approach (i.e. did not differentiate by credit rating). We found that neither the quadratic (i.e. curvilinear) nor linear form showed a better fit to the data.[24] However, we prefer the quadratic form as there are *a piori* reasons for expecting the debt risk premium to be concave with respect to term.

Figure 4 below shows the scatter of observations (with credit rating indicated by different symbols) and the fitted regression line for the 'pooled' regression estimate. From the regression equation for the single pool of bonds, the estimated 10 year BBB+ debt risk premium is found to be 367 basis points. The regression equation has a reasonable fit to the data (adjusted R-squared of 0.28)and is highly statistically significant overall (F statistic of 14.2). As for the draft decision averaging period, although the TERM coefficient is statistically significant (T-statistic of 2.1) the $TERM^2$ coefficient is only significant at approximately the 43 per cent confidence level.

Figure 4 – Regression analysis - debt risk premium for a single pool of BBB, BBB+ and A- bonds – 40 business days to 9 December, 2011



Source: Data from Bloomberg, UBS, RBA, PwC analysis.

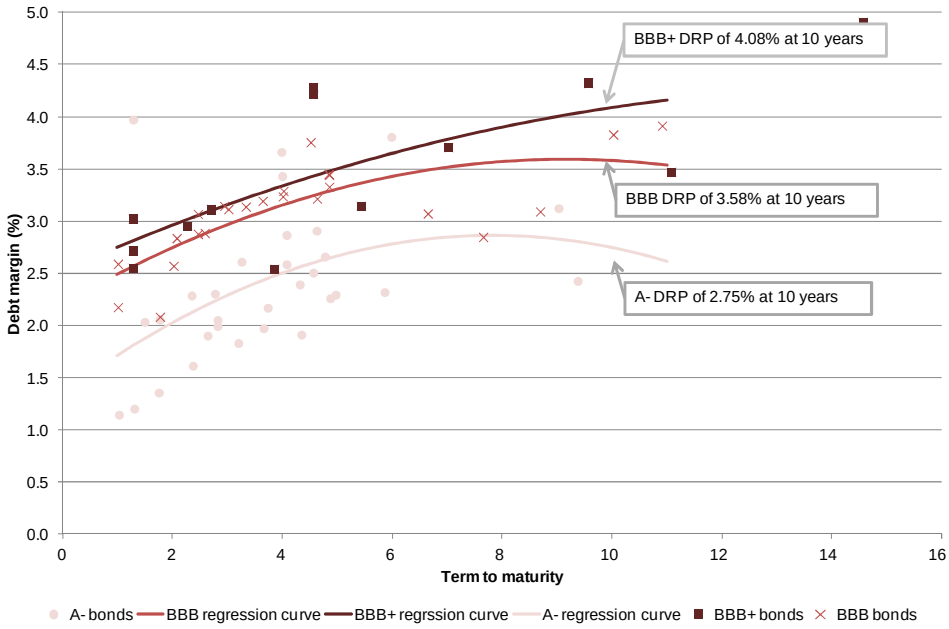
[23] These are an A- Wesfarmers bond maturing on 4 Nov 2016 and a BBB+ Caltex bond maturing on 23 Nov 2018

[24] The Ramsay Reset test did not reject the hypothesis that the equation is correctly specified for both the quadratic and linear functional form. This means that either functional form is reasonable.

Figure 5 sets out the updated regression estimates where the effect of credit rating is distinguished. While the goodness of fit is improved (adjusted R-squared increases to 0.51), the results exhibit the same puzzling relationships as were observed for the draft averaging period. The A- curve has a hump at approximately 7 years term to maturity and the BBB+ curve is always above the BBB curve. As in the draft averaging period, we consider the 'pooled' estimate to be more reliable.

Although the two new bonds (Wesfarmers and Caltex) did not have 40 days of observations, excluding them from the regressions did not have a material impact on the results. In the 'pooled' regression case, the 10 year debt risk premium estimate was 367 basis points irrespective of whether these two bonds were used or not. If we distinguish between credit ratings, the 10 year BBB+ debt risk premium estimate is 408 basis points if we include the two bonds, and 410 basis points if we exclude them.

Figure 5 – Updated regression analysis - debt risk premium of bonds by individual credit rating– 40 business days to 9 December, 2011



Source: Data from Bloomberg, UBS, RBA, PwC's analysis

2.7 Conclusion on debt risk premium

2.7.1 Estimation of a range

We conclude that a for a 10 year BBB+ rated bond, a range for the debt risk premium of **355 basis points to 408 basis points** would have been appropriate for the draft decision averaging period (40 business days ending 14 October 2011); and a range for the debt risk premium of **360 basis points to 391 basis points** would have been appropriate for the averaging period covering the 40 business days ending 9 December 2011.

These ranges have been derived based on the outcomes of the two methods that have been applied in this report, namely the direct interpretation of the market evidence and the application of the Bloomberg fair value curve. Our conclusions from each of those methods are as follows.

For the draft decision averaging period (40 business days to 14 October, 2011):

- a direct interpretation of the market evidence provides an estimate of the debt risk premium of approximately **355 basis points**, which in turn is supported by:
  - An estimated debt risk premium of 351 basis points from the proper application of the AER's methodology,[25] and
  - An estimated debt risk premium of 363 basis points from the econometric analysis that we undertook that was based on a sample of 68 bonds across the BBB, BBB+ and A- ratings (with an average credit rating of approximately BBB+), and
- an estimate for the debt risk premium of **408 basis points** is provided by commencing with the Bloomberg 7 year BBB fair value curve and then extrapolated that curve to provide an estimate of the debt risk premium for the required term of 10 years.

For the averaging period covering the 40 business days ending 9 December 2011:

- a direct interpretation of the market evidence indicates a debt risk premium of approximately **360 basis points,** supported by:
  - an estimated debt risk premium of 356 basis points from the proper application of the AER's methodology[26], and
  - an estimated debt risk premium of 367 basis points from our updated econometric analysis based on a new sample of 68 bonds and an average credit rating of approximately BBB+, and
- a debt risk premium of **391 basis points** is estimated by extrapolating the Bloomberg 7 year BBB fair value curve to a 10 years term to maturity.

2.7.2 Point within the range

One of the implications of the analysis above is that there remains considerable uncertainty with respect to the estimate of the debt risk premium for BBB+ 10 year debt that is obtained from an analysis of Australian corporate bonds. If there were stable market conditions and a large set of comparator bonds with close to 10 year terms to maturity, the estimation of a debt risk premium based on a comparator bond analysis of the type undertaken by the AER would be a relatively simple matter. However, the Australian corporate bond market remains thin, and the few bonds on issue are infrequently traded. Hence concerns remain about the quantity and quality of the evidence, and therefore the precision of debt risk premium estimates.

When faced with uncertain market conditions, and when the evidence is divergent, regulators tend to adopt conservative positions with respect to the cost of capital parameter they are estimating. This approach was present in the AER's overview of the methodology that it had adopted when undertaking the electricity transmission and distribution network service providers WACC parameter review in 2009, when it noted that:[27]

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[25] That is, when the errors in the AER sample are corrected (i.e. excluding the Coca Cola Amatil bond, excluding the SPI bonds, and including the Sydney Airport bond), and the errors in the AER's estimation of the debt risk premium estimation are corrected.

[26] This is inclusive of the Caltex bond. If the Caltex bond is excluded than the estimate would be 355 basis points

[27] AER (May, 2009), pp. ii-iii.

> The AER in its review of each WACC parameter must have regard to, amongst other requirements, the need for the rate of return to be forward looking and commensurate with the prevailing conditions in the market for funds and the risk involved in providing prescribed transmission services or distribution standard control services. The AER has necessarily taken a long term view, reflective of current market conditions to the extent that the AER considers that these conditions may prevail over the period the revised WACC paramters apply.
>
> Such a task is challenging even in a stable financial market environment. The additional uncertainty as a result of the 'global financial crisis' has clearly added another dimension to the task.
>
> Where a method rather than a value has been prescribed for a parameter, such as the risk-free rate, this will be determined at the beginning of each regulatory reset period and so the value of the parameter will reflect those market conditions prevailing at that time. Where, however, the parameter is a fixed value, the global financial crisis has influenced the AER to adopt a cautious approach to interpreting the market data whilst endeavouring to maintain the integrity of the CAPM framework pursuant to the NER.
>
> For example, the AER has now adopted a market risk premium of 6.5 per cent (whereas, the AER proposed a value of 6 per cent in its explanatory statement) in this final decision, which recognises the additional uncertainty on a forward looking basis associated with the global financial crisis. Similarly, the AER has taken a cautious approach to the interpretation of empirical evdence on the equity beta of a benchmark electricity network business by adopting a value that is above the range indicated by empirical estimates.

Hence, in the case of the debt risk premium for Powerlink, we recommend that the AER employ a conservative position that would adopt the higher end of the range identified in this report.

2.8 Other issues raised in the AER's draft decision

In this section we review and respond to a number of other issues that were raised in the AER's draft decision for Powerlink.

2.8.1 That Bloomberg does not intend to predict bond yields

During its analysis of the Bloomberg fair value curve, the AER made a number of general comments about the curve.

A key matter that the AER relied upon was a letter from Bloomberg in which Bloomberg noted that was that that Bloomberg's fair value curve is 'not intended to be a predictive source of pricing information'.[28]

Comment

We have read the Bloomberg letter, and consider that the statement is at best ambiguous. The Bloomberg letter also notes its fair value curve is 'intended to indicate if a bond is trading rich or deep as compared to peer bonds (as defined by

[28] AER (2011), p.226. Emphasis in original.

the curve)'.[29] Hence, the Bloomberg fair value curve does in fact establish a benchmark or predictive value for a bond of a given term to maturity, which indicates that a particular bond is 'rich' (price higher and yield lower than the predicted value) or 'deep' (price lower and yield higher than the predicted value.) This is presumably why the Blooomberg service will be of value to its clients – investors and issuers of bonds who are assessing the market for bonds for investment or debt issuance purposes.

We note that one of the areas of contention with the use of the Bloomberg fair value curve has been how to deal with the fact that the curve currently finishes at 7 years, whereas a 10 year term is required. In practice, this has been dealt with by extrapolating the curve, a practice, however, that is subject to limitations. It may well be that Bloomberg was suggesting that it does not wish to be drawn into the debate over extrapolation, and confirming that its curve is not intended to predict bond yields beyond the reach of its data, which would be a reasonable statement.

We also note that the Australian Competition Tribunal has endorsed the Bloomberg fair value curve as an appropriate benchmark for estimating the debt risk premium, including because it appears to be accepted by the market as providing accurate yield estimates.[30]

2.8.2 Does Bloomberg represent the data?

A key reason for the AER adopting it new estimation methodology is its claim that the Bloomberg fair value curve is not representative of the data. In addressing this issue, the AER sought clarification from Bloomberg about the methodology it applies, and the objectives of its analysis.

Comment

We note that while the AER maintains that Bloomberg's fair value curve is not representative of the data, Bloomberg's letter states that its curve is representative of the data that Bloomberg selects, since the Bloomberg fair value curve minimises the vertical difference in its 'option adjusted spread'. Bloomberg's letter explains that its analysis is based on just 9 bonds, which it considers to be representative and appropriate to include in its analysis. While conceding that an analysis based on data for say 100 bonds, rather than the 9 bonds it has selected would be more representative, Bloomberg does not elaborate (and was not specifically asked to elaborate) on the reasons for exclusion of other bonds.

While the AER is correct in stating that the Bloomberg fair value curve excludes floating rate note yield data, and therefore does not represent the full range of data available, this again highlights the question of data quality. A wider data source is recommended, but the observations must be valid, and comparable.

Our view is that while the Bloomberg fair value curve is currently based on a relatively small sample of bonds, and this is likely to raise issues of the representativeness of the Bloomberg fair value curve, particularly at longer terms to maturity, it is a respected market opinion, and it is reasonable for it to be given weight. In particular, Bloomberg's explicit consideration of whether to include bonds and exclusion of most of the available long dated bonds from its analysis, does serve to highlight the continuing uncertainty associated with estimating debt

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[29] Bloomberg (2011), in par. 2.

[30] The Tribunal decided that both the Bloomberg and CBASpectrum fair value curves were "widely used and market respected" in the ActewAGL decision (this is the implication of paragraphs 78 and 80, Application by ActewAGL Distribution [2010] ACompT 4), although the Tribunal appeared to change its view with respect to the CBASpectrum fair value curve in the Jemena Gas decision (para 64, Application by Jemena Gas Networks (NSW) Ltd (No 5) [2011] ACompT 10).

risk premia. In previous periods Bloomberg had regard to a larger sample of bonds, which may be an indicator that the current market should continue to be viewed with caution.

2.8.3 *That the Bloomberg curve has moved contrary to market opinion and the CDS margin*

The AER states that contrary to market opinion, for example JP Morgan's view that the yields on corporate bonds have fallen since the global financial crisis, Bloomberg's implied debt risk premium for 5 year and 7 year debt has risen since 2008-9. In other words, the AER considers that the Bloomberg curve has inaccurately predicted that the yields on corporate bonds now are higher than during the global financial crisis, while respected observers in the market say that the opposite has occurred. In addition, the AER has stated it would expect the 5 year Bloomberg debt risk premium to track credit default swaps, since the price at which default risk will be borne in the market should correlate to the debt risk premium. In a chart the AER shows that this has been so before and after the global financial crisis, but not during the crisis, when Bloomberg's fair value curve debt risk premium did not rise like credit default swaps. The AER claims that this de-coupling of the Bloomberg debt risk premium and the credit default swaps index during the global financial crisis raises questions about Bloomberg's accuracy in predicting the debt risk premium in the post global financial crisis period.

Comment

The relevant question is whether the Bloomberg methodology is appropriate today, rather than whether it was appropriate during the Global Financial Crisis.

In late 2009 PwC undertook a detailed review of the performance of Bloomberg during the Global Financial Crisis.[31] Our report showed that the Bloomberg standard method performed poorly during the worst of the Global Financial Crisis, and indeed that the level of information that was available on the then current market yield for corporate bonds was so poor that any estimation method would be seriously challenged. In particular, our analysis shows that:

- the level of disagreement between finanical institutions (who provide Bloomberg with their estimates of the current market yield for corporate bonds) during the Global Financial Crisis (measured as the coefficient of variation across the institutions' estimates) increased substantially during the crisis
- Bloomberg's method for deriving a market yield for the bond from the institutions' estimates systematically resulted in the Bloomberg value being at the lower end of the institutions' estimates, and
- Bloomberg's method for identifying and excluding outliers resulted in its fair value curve method systematically fitting a line below the bulk of the observations (whose yields were already downward biased, as noted in the previous point).

We also found that these problems with Bloomberg – for which we provided objective indicators – had passed by the end of 2009.

[31] PricewaterhouseCoopers (November, 2009), *Victorian Distribution Businesses – Methodology to Estimate the Debt Risk Premium*.

Given this analysis, it is not at all surprising that the Bloomberg curve has not followed the market since and after the Global Financial Crisis. However, a better interpretation of history and the analysis that was made available to the AER two years ago is that the problem with Bloomberg over the period of the Crisis and after, in short, is that it never followed the market up, not that it has not followed the market down.

2.8.4 *Comments on our previous application of regression techniques*

The AER raised a number of concerns with out application of econometric (regression) techniques in our report for Powerlink of approximately a year ago, which were described briefly in that report. The AER's concerns included:

- a disagreement with the choice of a linear functional form
- the inclusion of only BBB+ bonds, and
- a view that the DBCT bond had a disproportionate impact on the results.

Comment

First and foremost, the key shortcoming of the econometric analysis that was undertaken in our report a year ago was a distinct absence of data on current market yields around the term that is required. It was for this reason that we applied very little weight to the estimates and presented only a brief analysis.

Turning to these criticisms, we accept that it is appropriate to consider a broader sample than BBB+, and this is reflected in the econometric analysis presented earlier. Regarding functional form, we tested different functional forms and the linear function provided the best fit.[32] However, this testing was not assisted by the absence of information for longer dated debt. In the new analysis that was reported earlier, with the additional observations now available, when we differentiate the sample of bonds by credit rating, we have found that a concave functional form provides a better fit of the data.

Regarding the role of the DBCT bond, the AER simultaneously criticised our analysis for having too few observations, but also for retaining the only long dated bond in the sample. It is not clear that these criticisms can be reconciled, but thankfully the problems created by having far too few bond issues at term seems now to have been alleviated somewhat.

2.8.5 *The AER's averaging of the APA Bond and the Bloomberg Fair Value Curve*

The AER disagrees with PwC's characterisation of the APA bond as not being reflective of the benchmark, and that the AER had placed too much emphasis on this one bond in its previous methodology. The AER claims that the APA bond is a close match to other comparable bonds 'broadly, the observed yields on these comparator bonds were consistent with the APA Group bond.' Furthermore, the AER asserts that PwC's and Powerlink's concerns are no longer valid, as the new AER methodology has increased the sample to 9 bonds.

[32] The AER requested and obtained our spreadsheets, and will therefore be aware of our findings.

Comment

We consider that our concerns with a methodology that attributed a 25 per cent or 50 per cent weighting to one observation (which was the APA bond) were valid. As noted in our previous report, we are unaware of any regulatory decision in Australia or the UK where 25 per cent of the outcome regarding the debt risk premium has been determined by observation of a single bond.

We agree that the scope for the APA bond to have a disproportionate impact on the analysis is lessened as a result of the expansion in the sample of bonds that is now available. We have not recommended its exclusion from the current sample.

3 Equity raising costs

3.1 The method for estimating equity raising costs

3.1.1 The AER's Method

The AER's method for estimating equity raising costs is to:

- calculate retained earnings as internal cash flow less dividends
- deduct the equity portion of forecast capital expenditure and determine the external equity required
- assume the dividend payment to be the amount sufficient to distribute 100 per cent of imputation credits in the PTRM
- assume that 30 per cent of dividends paid will be returned via a dividend reinvestment plan that costs 1 per cent of the proceeds raised, and
- assume that the 'seasoned equity offer' will cost 3 per cent of proceeds.[33]

The amount of the seasoned equity offer will be equal to the equity component of forecast capex less the net cash flow available for capex (i.e. retained earnings plus dividends reinvested). Applying this methodology the AER estimated a $0.9 million equity raising cost allowance for Powerlink.

In reaching this conclusion, the AER has criticised two of the recommendations that we made to Powerlink in our previous advice, namely:

- that we were incorrect to recommend that the assumption about the quantum of dividends should be derived by applying a dividend yield (we estimated a benchmark yield of 8.4 per cent from comparable, share market listed entities), and
- our assumption that only 18 per cent of dividends are returned via a dividend reinvestment plan involved an incorrect interpretation of the data, and that the correct interpretation of our data implied that an assumption of 30 per cent was reasonable.

Our assessment of the AER's method (apart from the quantum of dividends)

We agree with the AER's assumptions with respect to the benchmark cost of implementing a dividend reinvestment plan and a seasoned equity offering.

In addition, we have reviewed the AER's concerns about how we derived the 18 per cent take up of dividend reinvestment plans. We agree with the AER's reasoning that the analysis should be undertaken using only businesses that had undertaken a dividend reinvestment plan. As noted by the AER, for the comparators that we used, this implied that the average amount of dividends returned was 32.7 per cent, which accords with the AER's assumption.

[33] A seasoned equity offer is an issue of new equity by an existing listed entity.

It follows that the only matter of disagreement between the AER and ourselves is how the benchmark quantum of dividends should be determined. This discussed separately next.

3.1.2 Determining a benchmark quantum of dividends

AER's arguments

The AER's arguments for rejecting our proposal appear to be that:

- it considers that its assumption that dividends are paid so that 100 per cent of imputation tax credits are distributed – but no more – is required for consistency with its decision on the value of imputation tax credits ('gamma'), and indeed it also appears to assert (albeit obliquely) that its assumption about dividend payments is mandated by its revised statement of WACC parameters, and

- there is a lack of comparable data from which to estimate a benchmark dividend yield and that assuming a benchmark dividend payout assumption would rectify the problems.

None of these arguments stand up to any scrutiny, just as they have not in the AER's previous decisions to which it refers.

We also note that the AER does not characterise correctly its own assumption about the quantum of dividends that would be paid. The AER's describes its approach as one where:[34]

> ...it is assumed that 100 per cent of notional after tax profit for a TNSP would be distributed to shareholders

However, this is not what the AER has assumed. The AER has in fact assumed that the benchmark transmission business will pay sufficient dividends so that all of the dividend imputation credits that are created in that year are distributed, but no more. Under this approach, dividend payments as a proportion of after tax profit will vary materially over time. Likewise, dividend payments as a proportion of the value of the equity – which is the measure of dividends that is of most relevance to investors – have the potential to vary erratically over time.

Our further comments on the AER's arguments are set out below.

A low dividend yield is not required for consistency with the gamma assumption

First and foremost, the statement of revised WACC parameters makes no reference to any assumption about the quantum of dividend payments, and so the AER is not in any sense bound to apply the method set out in the draft decision.

Secondly, consistency with the AER's gamma assumptions only requires that sufficient dividends be assumed to be paid for all the dividend imputation credits be able to be distributed, on average, over time. Consistency with this assumption does not require the quantum of dividends to match precisely the franking credits created in each year.

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34 AER, Draft Decision, p.157.

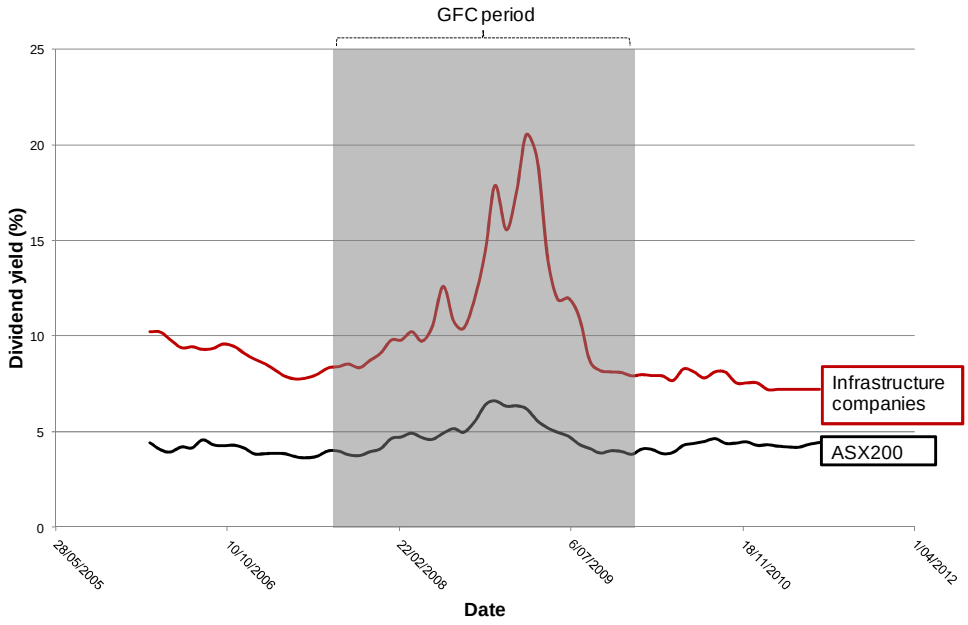
Dividend yields are stable over time

In contrast to the AER's assertions, we have demonstrated previously that the dividend yield of infrastructure businesses has been a remarkably stable parameter, once the effects of the Global Financial Crisis are removed.

We note in this regard that the problem with the Global Financial Crisis predominantly is one of measurement. Where shocks occur and substantial charges occur to both expected dividends and the market value of equity, it is a challenge to obtain an accurate estimate of the dividend yield. The correct thing to do is to remove the period from analysis. Removing abberant periods is not abnormal – this is what the AER has done in the past when estimating equity betas (in relation to the technology boom and bust).

For completeness, we have provided the same figure that we did in our previous report, but updated for the most recent evidence.

Figure 6 – Dividend yields – ASX200 vs infrastructure companies, (2006 – 2011)[35]



Source: Bloomberg, PwC's analysis

As is clear from Figure 6, dividend yields across this group of infrastructure firms has been extremely stable outside of the period of the Global Financial Crisis. In contrast, the AER's method is not likely to generate stable dividends over time.

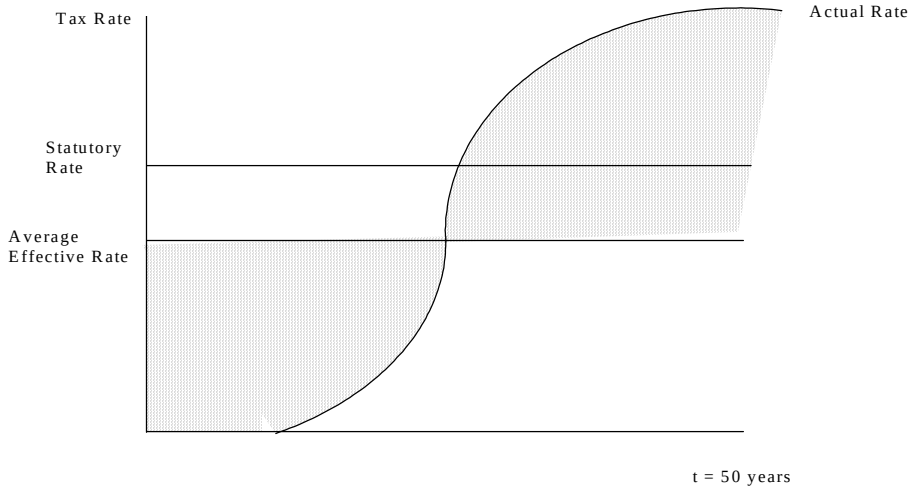
It is well known that entity's company taxation payments as a proportion of earnings can vary materially over time. It is for this reason that entities are required to 'smooth' the effect of taxation when reporting profit and losses (through a process that is known as 'tax effect accounting'). It follows that the AER's proposed assumption about dividend payments – under which dividends are assumed to have a direct relationship to taxation payments – would be expected to

35 The infrastructure companies are Connecteast Group. Intoll group, Transurban group, Australia infrastructure fund, MAP group, Telstra Corporation, APA Group, Hastings diversified utilities fund, DUET group, Envestra limited, Prime infrastructure, Spark infrastructure

have the potential to vary materially over time. This was recognised by the ACCC in 1998 in its Final Decision on GasNet, the Victorian gas transmission business:[36]

> The Victorian gas businesses will enjoy large tax depreciation allowances for the first 10-20 years of operation, and can be expected to pay little or no tax during their first few years of operation. Typically, the tax liability of the gas businesses will then rise over time. Depending on future inflation and capital spending, taxes may rise to the point where the effective rate of tax on rgulatory profits (calculated on the basis of economic depreciation) exceeds the statutory rate... Figure E.1 below [reproduced as Figure 5] shows a stylised example of the actual company tax liabilities (as a proportion of free cash flow) likely to be faced by the regulated Victorian gas businesses.

Figure 7 – Stylised taxation profile of a regulated gas business



Source: ACCC (1998), p.170

The ACCC's analysis, and the trajectory of actual tax rates shown in the ACCC's stylised figure (reproduced as Figure 7), demonstrates that continuous application of the AER's methodology to derive a dividend payout based on the fixed assumption that sufficient dividends will be paid to distribute all imputation credits – but no further dividends will be paid – would be expected to imply volatile assumed dividend payments over time, commencing with unrealistically low levels and then climbing over time to very high dividend levels (and materially higher than what is observed among infrastructure businesses). Infrastructure assets attract a clientele – dividends as low as the AER assumes would be uncommercial.

The application of a constraint on dividends in the AER's approach, which assumes that regulated businesses would pay dividends so that the franking account is just exhausted and no more, does not reflect observed behaviour in the market for funds. Businesses do not follow the rule hypothesised by the AER when they determine their dividend policy, and the AER has provided no evidence to support its position.

To restrict distributions in this way would result in a dividend yield in the range of 3.7 to 4.04 per cent. While this is broadly reflective of Australian businesses in general, it is substantially different to observed behaviour in the infrastructure

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[36] Australian Competition and Consumer Commission (6 October, 1998), *Victorian Gas Transmission Access Arrangements – Final Decision*, p.170.

sector. As we argued at length in our earlier report,[37] a characteristic of the infrastructure sector is that firms pay significantly higher dividend yields.

We have previously discussed the literature on this topic, which discusses how infrastructure businesses attract a specific clientele of investors who value a high dividend yield, and are much more sensitive than investors in general industrial firms to any reductions in the dividend payment of an infrastructure firm.[38] The existence of such a clientele means that reducing dividend payments would most likely cause the share price to fall and, with it, make it more difficult for new equity to be raised.

3.2 Re-estimation of Powerlink's equity raising costs

In order to re-estimate Powerlink's equity raising costs, we applied the following key assumptions:

- a dividend yield of 8.06 per cent, as explained below
- a return of 30 per cent of distributed dividends
- a seasoned equity offer issue cost of 3 per cent of the proceeds raised
- a dividend reinvestment plan cost of 1 per cent of the proceeds raised, and
- a nominal vanilla WACC of 8.31 per cent consistent with the draft decision.

The only controversial input amongst these is the first. Our earlier report on equity raising costs estimated a long term dividend yield (excluding the global financial crisis) of 8.4 per cent for infrastructure businesses. We have now updated our estimate of this parameter to the September quarter of 2011, and the new estimate is 8.06 per cent using an average of infrastructure company dividend yields and a wide GFC definition. The firms that we analysed and their dividend yields, are set out in Table 8 below.

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37 See PricewaterhouseCoopers (April, 2001), *Powerlink – Debt and Equity raising costs*, p.25. Also see, Allen Consulting Group (5 February, 2007), *Estimation of Powerlink's SEO transaction cost allowance – Memorandum*; and Allen Consulting Group, (9 May, 2008), *Transaction costs of raising equity finance: the dividend yield assumption*, Report to Transgrid.

38 Impson, Michael (1997), 'Market reaction to dividend decrease announcements; Public utilities vs. Unregulated industrial firms,' *The Journal of Financial Research*, Vol. 20, pp.407-422.

Table 8 – ASX200 vs Infrastructure company dividend yields

Company	Historical average yield[39]	Excluding GFC average yield (wide definition)[40]	Excluding GFC average yield (narrow definition)[41]
ASX200	4.45%	4.15%	4.23%
Infrastructure companies			
Connecteast Group	7.45%	6.48%	7.99%
Intoll Group	7.05%	5.21%	6.38%
Transurban Group	6.87%	6.74%	7.39%
Australia Infrastructure Fund	6.86%	6.00%	6.25%
MAP Group	9.04%	8.32%	8.41%
Telstra Corporation	8.44%	8.69%	8.23%
APA Group	8.23%	8.29%	7.95%
Hastings Diversified Utilities Fund	10.32%	8.47%	9.21%
DUET Group	11.38%	10.68%	10.50%
Envestra Limited	10.75%	9.23%	9.86%
Prime Infrastructure	22.08%	8.54%	10.96%
Spark Infrastructure	10.78%	9.03%	9.71%
SP Ausnet	9.88%	9.05%	9.45%
Average	**9.93%**	**8.06%**	**8.64%**

Source: Bloomberg, PwC's analysis

Powerlink provided us with an indicative PTRM (including capex program), and we re-input these values into our existing spreadsheet. Using these inputs, and the assumptions set out above, we estimate a total seasoned equity issue requirement of $29.4 million, which implies a total discounted cost of new equity funding of $23.8 million. These results are shown in Table 9 below.

We note that in the event the assumptions, such as capex and the WACC, change, then the allowance will need to be re-estimated.

39 We have used data from February 2006 to June 2011. February 2006 was chosen as the starting date because it was the date when the first observation for the ASX200 dividend yield was available. Some companies did not have historic data from February 2006 onwards, therefore we have used the data from when the company first began reporting dividend yields.

40 Wide GFC period defined as July 2007 to December 2009

41 Narrow GFC period defined as September 2008 (Collapse of Lehman Brothers) to December 2009

Table 9 – Powerlink – new equity requirements for 2012/13 to 2016.17 assuming a benchmark dividend yield of 8.06 per cent and 30 per cent of dividends paid being returned by a DRP

	2012/13	2013/14	2014/15	2015/16	2016/17
Opening RA**B**	6466.3	7245.4	7949.3	8604.6	9118.5
Capex	833.8	769.9	743.5	617.4	739.6
Nominal regulatory depreciation	54.7	66.0	88.2	103.5	120.9
Closing RAB	7245.4	7949.3	8604.6	9118.5	9737.2
Cash flow					
Revenue	790.5	890.6	982.3	1081.0	1153.0
Less, Opex	184.4	207.5	217.1	243.6	253.9
Less, Interest	291.4	326.5	358.2	387.7	410.9
Less, Tax payable	39.3	42.1	45.8	52.9	57.6
Less, debt repayment on regulatory nominal depn.	32.8	39.6	52.9	62.1	72.5
Less, dividend paid	208.5	233.6	256.3	277.4	294.0
Cash for equity portion of capex	34.1	41.3	52.0	57.3	64.2
Equity portion of capex to be funded	333.5	308.0	297.4	247.0	295.8
Less cash available	34.1	41.3	52.0	57.3	64.2
Total new equity required	299.4	266.6	245.5	189.7	231.7
Sources of funding					
Dividend reinvestment plan	62.5	70.1	76.9	83.2	88.2
Seasoned equity offerings	236.9	196.6	168.6	106.5	143.5
New equity raised	299.4	266.6	245.5	189.7	231.7
Total new equity raised					1232.9
Cost of funding					
Seasoned equity offerings	7.1	5.9	5.1	3.2	4.3
Dividend reinvestment plan	0.6	0.7	0.8	0.8	0.9
Annual allowance	7.7	6.6	5.8	4.0	5.2
Total allowance					29.4
Discounted upfront allowance (Discounted to 1/07/2012	23.8				

Source: Bloomberg, AER, Powerlink, PwC's analysis Note: Discounting at Draft Decision WACC.

Appendix A Regression outputs

The following equations and tables demonstrate the coefficients from our econometrics analysis, and the equation specification tests we undertook.

The tables below show summary regression statistics and Ramsay reset test results for equations with a linear and quadratic relationship between the DRP and term to maturity. We have also shown the results from our regression analysis when we have distinguished between credit ratings and not, and for the two different averaging periods. A summary of the scenarios is shown below in 10.

Table 10 – Summary of regression scenarios

Scenario number	1	2	3	4
Linear or quadratic term to maturity relationship	Quadratic	Linear	Quadratic	Linear
Whether different credit ratings are separately regressed	Distinguished	Distinguished	Not	Not

1 Scenario 1 – Quadratic term to maturity with credit rating distinguished

Equation 1 shows the functional form of the equation in this scenario. Table 11 and Table 12 show the summary statistics of the regression and the result of the Ramsay reset test respectively for this equation and draft decision averaging period. Table 13 and Table 14 show the results when we repeated the analysis for the 40 business days ending 9 December 2011.

Equation 1 $$DRP = c + \mathrm{D}_1 * \mathrm{BBB} + \mathrm{D}_2 * \mathrm{BBBplus} + \beta_1 * \mathrm{term} + \beta_2 * \mathrm{term}^2 + \gamma_1 * \mathrm{BBB} * \mathrm{term} + \gamma_2 * \mathrm{BBBplus} * \mathrm{term} + \tau_1 * \mathrm{BBB} * \mathrm{term}^2 + \tau_2 * \mathrm{BBBplus} * \mathrm{term}^2$$

Where:

- *DRP* is the debt risk premium
- *c* is the constant
- *BBB, BBBplus* are dummy variables for bonds with an S&P credit rating of BBB, BBB+. Note we did not specify a dummy variable for A- bonds because we don't need to estimate it.
- *Term* and *Term²* refer to the term to maturity and term to maturity squared
- *BBB*term* and *BBBplus*term*, and *BBB*term²* and *BBBplus*term²* reflect the interaction of the dummy variables with term to maturity and term to maturity squared

Table 11 – Summary statistics - Scenario 1 draft decision averaging period

Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.802589	0.353575	2.269924	0.0269
TERM	0.568067	0.154402	3.679147	0.0005
TERM^2	-0.040157	0.014629	-2.745075	0.0080
BBB	1.133604	0.463637	2.445027	0.0175
BBB_PLUS	1.321313	0.512580	2.577767	0.0125
BBB*TERM	-0.209330	0.201111	-1.040870	0.3022
BBB_PLUS*TERM	-0.274623	0.204537	-1.342660	0.1845
(TERM^2)*BBB	0.020818	0.018325	1.136019	0.2605
(TERM^2)*BBB_PLUS	0.030272	0.017003	1.780396	0.0802

R-squared	0.668852	Mean dependent var	2.702231
Adjusted R-squared	0.623950	S.D. dependent var	0.744063
S.E. of regression	0.456281	Akaike info criterion	1.391321
Sum squared resid	12.28336	Schwarz criterion	1.685079
Log likelihood	-38.30492	Hannan-Quinn criter.	1.507717
F-statistic	14.89598	Durbin-Watson stat	1.154516
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

Table 12 – Ramsay reset test - Scenario 1 draft decision averaging period

Ramsey RESET Test

Equation: EQ_QUADRATIC

Specification: DRP C TERM TERM^2 BBB BBB_PLUS BBB*TERM BBB_PLUS*TERM (TERM^2)*BBB (TERM^2)*BBB_PLUS

Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	1.920059	(2, 57)	0.1560
Likelihood ratio	4.433474	2	0.1090

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.775304	2	0.387652
Restricted SSR	12.28336	59	0.208193
Unrestricted SSR	11.50806	57	0.201896
Unrestricted SSR	11.50806	57	0.201896

LR test summary:

	Value	df
Restricted LogL	-38.30492	59
Unrestricted LogL	-36.08818	57

Unrestricted Test Equation:

Dependent Variable: DRP

Method: Least Squares

Sample: 1 68

Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.343528	0.513115	0.669496	0.5059
TERM	-4.363522	3.359663	-1.298798	0.1992
TERM^2	0.307274	0.236261	1.300568	0.1986
BBB	-8.742140	6.515157	-1.341816	0.1850
BBB_PLUS	-10.43562	7.736686	-1.348848	0.1827
BBB*TERM	1.581140	1.104851	1.431090	0.1579
BBB_PLUS*TERM	2.161974	1.515952	1.426149	0.1593
(TERM^2)*BBB	-0.151821	0.113475	-1.337923	0.1862
(TERM^2)*BBB_PLUS	-0.219667	0.169375	-1.296923	0.1999
FITTED^2	3.714073	2.303914	1.612071	0.1125
FITTED^3	-0.510592	0.285346	-1.789377	0.0789

R-squared	0.689753	Mean dependent var	2.702231
Adjusted R-squared	0.635324	S.D. dependent var	0.744063
S.E. of regression	0.449328	Akaike info criterion	1.384946
Sum squared resid	11.50806	Schwarz criterion	1.743985
Log likelihood	-36.08818	Hannan-Quinn criter.	1.527208
F-statistic	12.67246	Durbin-Watson stat	1.168609
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

Table 13 – Summary statistics - Scenario 1 40 business days to 9 December 2011

Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.353162	0.379795	3.56288	0.0007
TERM	0.38689	0.170873	2.264201	0.0273
TERM^2	-0.02471	0.016738	-1.476298	0.1452
BBB	0.845748	0.550991	1.534958	0.1301
BBB_PLUS	1.166215	0.548556	2.125973	0.0377
BBB*TERM	-0.082877	0.239821	-0.345579	0.7309
BBB_PLUS*TERM	-0.152477	0.221514	-0.688341	0.4939
(TERM^2)*BBB	0.008103	0.021987	0.368514	0.7138
(TERM^2)*BBB_PLUS	0.016912	0.019175	0.881989	0.3814

R-squared	0.566566	Mean dependent var	2.826551
Adjusted R-squared	0.507795	S.D. dependent var	0.753838
S.E. of regression	0.528873	Akaike info criterion	1.686598
Sum squared resid	16.50268	Schwarz criterion	1.980356
Log likelihood	-48.34433	Hannan-Quinn criter.	1.802994
F-statistic	9.640264	Durbin-Watson stat	1.740483
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

Table 14 – Ramsay reset test - Scenario 1 40 business days to 9 December 2011

Ramsey RESET Test

Equation: EQ_QUADRATIC

Specification: DRP C TERM TERM^2 BBB BBB_PLUS BBB*TERM BBB_PLUS*TERM (TERM^2)*BBB (TERM^2)*BBB_PLUS

Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	2.222043	(2, 57)	0.1177
Likelihood ratio	5.105189	2	0.0779

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	1.193594	2	0.596797
Restricted SSR	16.50268	59	0.279706
Unrestricted SSR	15.30908	57	0.26858
Unrestricted SSR	15.30908	57	0.26858

LR test summary:

	Value	df
Restricted LogL	-48.34433	59
Unrestricted LogL	-45.79174	57

Unrestricted Test Equation:

Dependent Variable: DRP

Method: Least Squares

Sample: 1 68

Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.645825	6.415814	-1.503445	0.1382
TERM	-7.565987	5.103724	-1.482444	0.1437
TERM^2	0.479593	0.321457	1.491937	0.1412
BBB	-16.64234	10.9098	-1.525448	0.1327
BBB_PLUS	-23.35946	15.47448	-1.509547	0.1367
BBB*TERM	1.539559	0.866822	1.776096	0.0811
BBB_PLUS*TERM	3.059328	1.812157	1.688225	0.0968
(TERM^2)*BBB	-0.143992	0.088463	-1.627707	0.1091
(TERM^2)*BBB_PLUS	-0.311195	0.205504	-1.5143	0.1355
FITTED^2	8.142187	4.805857	1.694222	0.0957
FITTED^3	-1.040885	0.55389	-1.879226	0.0653

R-squared	0.597915	Mean dependent var	2.826551
Adjusted R-squared	0.527374	S.D. dependent var	0.753838
S.E. of regression	0.518247	Akaike info criterion	1.670345
Sum squared resid	15.30908	Schwarz criterion	2.029383
Log likelihood	-45.79174	Hannan-Quinn criter.	1.812607
F-statistic	8.476099	Durbin-Watson stat	1.748047
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

2 Scenario 2 – Linear term to maturity with credit rating distinguished

Equation 2 shows the functional form of the equation in this scenario. Table 15 and Table 16 show the summary statistics of the regression and the result of the Ramsay reset test respectively for this equation and draft decision averaging period. Table 17 and Table 18 show the results when we repeated the analysis for the 40 business days ending 9 December 2011.

Equation 2 $DRP = c + D_1 * BBB + D_2 * BBBplus + \beta_1 * term + \gamma_1 * BBB * term + \gamma_2 * BBBplus * term$

Where:

- *DRP is the de*bt risk premium
- c is the constant
- $BBB, BBBplus$ are dummy variables for bonds with an S&P credit rating of BBB, BBB+. Note we did not specify a dummy variable for A- bonds because we don't need to estimate it.
- *Term* refer to the term to maturity
- *BBB*term* and *BBBplus*term* reflect the interaction of the dummy variables with term to maturity

Table 15 –Summary statistics – Scenario 2 draft draft decision averaging period

Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.627681	0.199132	8.173890	0.0000
TERM	0.160717	0.045616	3.523271	0.0008
BBB	0.745292	0.267316	2.788060	0.0070
BBB_PLUS	0.840496	0.304935	2.756314	0.0077
BBB*TERM	-0.020118	0.057860	-0.347706	0.7292
BBB_PLUS*TERM	-0.015908	0.056950	-0.279329	0.7809

R-squared	0.602021	Mean dependent var	2.702231
Adjusted R-squared	0.569926	S.D. dependent var	0.744063
S.E. of regression	0.487957	Akaike info criterion	1.486918
Sum squared resid	14.76232	Schwarz criterion	1.682757
Log likelihood	-44.55520	Hannan-Quinn criter.	1.564515
F-statistic	18.75745	Durbin-Watson stat	1.167080
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

Table 16 – Ramsay reset test - Scenario 2 draft decision averaging period

Ramsey RESET Test
Equation: EQ_LINEAR
Specification: DRP C TERM BBB BBB_PLUS BBB*TERM BBB_PLUS *TERM
Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	6.582115	(2, 60)	0.0026
Likelihood ratio	13.48862	2	0.0012

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	2.656141	2	1.328071
Restricted SSR	14.76232	62	0.238102
Unrestricted SSR	12.10618	60	0.201770
Unrestricted SSR	12.10618	60	0.201770

LR test summary:

	Value	df
Restricted LogL	-44.55520	62
Unrestricted LogL	-37.81089	60

Unrestricted Test Equation:
Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.50386	3.860612	2.720776	0.0085
TERM	2.492185	0.919050	2.711696	0.0087
BBB	10.85608	4.125734	2.631308	0.0108
BBB_PLUS	12.27179	4.756820	2.579830	0.0124
BBB*TERM	-0.050191	0.090374	-0.555368	0.5807
BBB_PLUS*TERM	0.081413	0.108116	0.753019	0.4544
FITTED^2	-4.311265	1.885550	-2.286476	0.0258
FITTED^3	0.359160	0.195268	1.839316	0.0708

R-squared	0.673628	Mean dependent var	2.702231
Adjusted R-squared	0.635552	S.D. dependent var	0.744063
S.E. of regression	0.449188	Akaike info criterion	1.347379
Sum squared resid	12.10618	Schwarz criterion	1.608498
Log likelihood	-37.81089	Hannan-Quinn criter.	1.450842
F-statistic	17.69137	Durbin-Watson stat	1.141065
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

Table 17 – Summary statistics – Scenario 2 40 business days to 9 December 2011

Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.821407	0.210975	8.633301	0.0000
TERM	0.145282	0.049612	2.928345	0.0048
BBB	0.774378	0.297694	2.601253	0.0116
BBB_PLUS	0.957074	0.325183	2.943185	0.0046
BBB*TERM	-0.031365	0.064626	-0.48533	0.6292
BBB_PLUS*TERM	-0.02432	0.061917	-0.392794	0.6958

R-squared	0.535483	Mean dependent var	2.826551
Adjusted R-squared	0.498022	S.D. dependent var	0.753838
S.E. of regression	0.534097	Akaike info criterion	1.66762
Sum squared resid	17.68611	Schwarz criterion	1.863459
Log likelihood	-50.69907	Hannan-Quinn criter.	1.745217
F-statistic	14.29442	Durbin-Watson stat	1.625514
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

Table 18 – Ramsay reset test - Scenario 2 40 business days to 9 December 2011

Ramsey RESET Test
Equation: EQ_LINEAR
Specification: DRP C TERM BBB BBB_PLUS BBB*TERM BBB_PLUS *TERM
Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	2.250433	(2, 60)	0.1142
Likelihood ratio	4.918719	2	0.0855

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	1.234136	2	0.617068
Restricted SSR	17.68611	62	0.28526
Unrestricted SSR	16.45198	60	0.2742
Unrestricted SSR	16.45198	60	0.2742

LR test summary:

	Value	df
Restricted LogL	-50.69907	62
Unrestricted LogL	-48.23971	60

Unrestricted Test Equation:
Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.66254	7.369496	1.446849	0.1531
TERM	1.865557	1.286918	1.449632	0.1524
BBB	9.50986	6.729513	1.413157	0.1628
BBB_PLUS	11.90964	8.509386	1.399589	0.1668
BBB*TERM	-0.216214	0.225872	-0.95724	0.3423
BBB_PLUS*TERM	-0.052618	0.202996	-0.259208	0.7964
FITTED^2	-3.304156	2.835201	-1.165404	0.2485
FITTED^3	0.250539	0.287969	0.870018	0.3878

R-squared	0.567897	Mean dependent var	2.826551
Adjusted R-squared	0.517485	S.D. dependent var	0.753838
S.E. of regression	0.523641	Akaike info criterion	1.654109
Sum squared resid	16.45198	Schwarz criterion	1.915228
Log likelihood	-48.23971	Hannan-Quinn criter.	1.757572
F-statistic	11.26513	Durbin-Watson stat	1.738118
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

3 Scenario 3 – Quadratic term to maturity with credit rating not distinguished

Equation 3 shows the functional form of the equation in this scenario. Table 19 and Table 20 show the summary statistics of the regression and the result of the Ramsay reset test respectively for this equation and draft decision averaging period. Table 21 and Table 22 show the results when we repeated the analysis for the 40 business days ending 9 December 2011.

Equation 3 $DRP = c + \beta_1 * \text{term} + \beta_2 * \text{term}^2$

Where:

- *DRP is the de*bt risk premium
- c is the constant
- *Term* and *Term*^{2} refer to the term to matur*ity an*d *t*erm to maturity squared

Table 19 – Summary statistics – Scenario 3 draft decision averaging period

Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.821676	0.226858	8.030028	0.0000
TERM	0.243317	0.086528	2.812013	0.0065
TERM^2	-0.006219	0.006483	-0.959379	0.3409

R-squared	0.390074	Mean dependent var	2.702231
Adjusted R-squared	0.371307	S.D. dependent var	0.744063
S.E. of regression	0.589969	Akaike info criterion	1.825621
Sum squared resid	22.62412	Schwarz criterion	1.923541
Log likelihood	-59.07113	Hannan-Quinn criter.	1.864420
F-statistic	20.78516	Durbin-Watson stat	1.197310
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

Table 20 –Ramsay reset test – scenario 3 draft decision averaging period

Ramsey RESET Test
Equation: EQ_AVERAGE
Specification: DRP C TERM TERM^2
Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	1.048132	(2, 63)	0.3566
Likelihood ratio	2.225805	2	0.3286

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.728554	2	0.364277
Restricted SSR	22.62412	65	0.348063
Unrestricted SSR	21.89557	63	0.347549
Unrestricted SSR	21.89557	63	0.347549

LR test summary:

	Value	df
Restricted LogL	-59.07113	65
Unrestricted LogL	-57.95823	63

Unrestricted Test Equation:
Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.542782	27.04723	-0.167957	0.8672
TERM	-0.939376	6.944372	-0.135272	0.8928
TERM^2	0.054290	0.210098	0.258403	0.7969
FITTED^2	2.837281	11.00750	0.257759	0.7974
FITTED^3	-0.532224	1.463746	-0.363604	0.7174

R-squared	0.409715	Mean dependent var	2.702231
Adjusted R-squared	0.372237	S.D. dependent var	0.744063
S.E. of regression	0.589533	Akaike info criterion	1.851713
Sum squared resid	21.89557	Schwarz criterion	2.014912
Log likelihood	-57.95823	Hannan-Quinn criter.	1.916377
F-statistic	10.93204	Durbin-Watson stat	1.178885
Prob(F-statistic)	0.000001		

Bloomberg, UBS, PwC's analysis

Table 21 – Summary statistics – Scenario 3 40 business days to 9 December 2011

Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.074262	0.246026	8.431073	0.0000
TERM	0.200261	0.094277	2.124184	0.0375
TERM^2	-0.004051	0.007159	-0.565831	0.5735

R-squared	0.30376	Mean dependent var	2.826551
Adjusted R-squared	0.282338	S.D. dependent var	0.753838
S.E. of regression	0.638614	Akaike info criterion	1.984081
Sum squared resid	26.50879	Schwarz criterion	2.082
Log likelihood	-64.45875	Hannan-Quinn criter.	2.02288
F-statistic	14.17933	Durbin-Watson stat	1.684819
Prob(F-statistic)	0.000008		

Bloomberg, UBS, PwC's analysis

Table 22 – Ramsay reset test – scenario 3 40 business days to 9 December 2011

Ramsey RESET Test
Equation: EQ_AVERAGE
Specification: DRP C TERM TERM^2
Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	0.736213	(2, 63)	0.483
Likelihood ratio	1.570997	2	0.4559

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.605409	2	0.302705
Restricted SSR	26.50879	65	0.407827
Unrestricted SSR	25.90338	63	0.411165
Unrestricted SSR	25.90338	63	0.411165

LR test summary:

	Value	df
Restricted LogL	-64.45875	65
Unrestricted LogL	-63.67325	63

Unrestricted Test Equation:
Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-19.92535	63.6235	-0.313176	0.7552
TERM	-2.954577	10.62841	-0.277989	0.7819
TERM^2	0.128333	0.307572	0.417246	0.6779
FITTED^2	7.86366	20.9535	0.375291	0.7087
FITTED^3	-1.331512	2.909565	-0.457633	0.6488

R-squared	0.319661	Mean dependent var	2.826551
Adjusted R-squared	0.276465	S.D. dependent var	0.753838
S.E. of regression	0.641221	Akaike info criterion	2.019802
Sum squared resid	25.90338	Schwarz criterion	2.183001
Log likelihood	-63.67325	Hannan-Quinn criter.	2.084466
F-statistic	7.400229	Durbin-Watson stat	1.687736
Prob(F-statistic)	0.00006		

Bloomberg, UBS, PwC's analysis

4 Scenario 4 – Linear term to maturity with credit rating not distinguished

Equation 4 shows the functional form of the equation in this scenario. Table 23 and Table 24 show the summary statistics of the regression and the result of the Ramsay reset test respectively for this equation and draft decision averaging period. Table 25 and Table 26 show the results when we repeated the analysis for the 40 business days ending 9 December 2011.

Equation 4 $DRP = c + \beta_1 * \text{term}$

Where:

- *DRP* is the debt risk premium
- *c* is the constant
- *Term* refer to the term to maturity

Table 23 – Summary statistics – Scenario 4 draft decision averaging period

Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.999050	0.131384	15.21534	0.0000
TERM	0.164060	0.025716	6.379576	0.0000

R-squared	0.381437	Mean dependent var	2.702231
Adjusted R-squared	0.372065	S.D. dependent var	0.744063
S.E. of regression	0.589613	Akaike info criterion	1.810270
Sum squared resid	22.94448	Schwarz criterion	1.875550
Log likelihood	-59.54920	Hannan-Quinn criter.	1.836136
F-statistic	40.69899	Durbin-Watson stat	1.212462
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

Table 24 –Ramsay reset test – Scenario 4 draft decision averaging period

Ramsey RESET Test
Equation: EQ_AVERAGE_LINEAR
Specification: DRP C TERM
Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	1.475397	(2, 64)	0.2364
Likelihood ratio	3.065090	2	0.2160

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	1.011257	2	0.505628
Restricted SSR	22.94448	66	0.347644
Unrestricted SSR	21.93323	64	0.342707
Unrestricted SSR	21.93323	64	0.342707

LR test summary:

	Value	df
Restricted LogL	-59.54920	66
Unrestricted LogL	-58.01665	64

Unrestricted Test Equation:
Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17.02264	10.08603	1.687744	0.0963
TERM	2.728007	1.660658	1.642727	0.1053
FITTED^2	-4.879711	3.282729	-1.486480	0.1421
FITTED^3	0.493217	0.347371	1.419859	0.1605

R-squared	0.408700	Mean dependent var	2.702231
Adjusted R-squared	0.380983	S.D. dependent var	0.744063
S.E. of regression	0.585412	Akaike info criterion	1.824019
Sum squared resid	21.93323	Schwarz criterion	1.954578
Log likelihood	-58.01665	Hannan-Quinn criter.	1.875751
F-statistic	14.74537	Durbin-Watson stat	1.181472
Prob(F-statistic)	0.000000		

Bloomberg, UBS, PwC's analysis

Table 25 – Summary statistics – Scenario 4 40 business days to 9 December 2011

Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.187372	0.142677	15.33096	0.0000
TERM	0.14936	0.028061	5.322623	0.0000

R-squared	0.300331	Mean dependent var	2.826551
Adjusted R-squared	0.28973	S.D. dependent var	0.753838
S.E. of regression	0.635316	Akaike info criterion	1.959583
Sum squared resid	26.63936	Schwarz criterion	2.024862
Log likelihood	-64.62581	Hannan-Quinn criter.	1.985448
F-statistic	28.33032	Durbin-Watson stat	1.688688
Prob(F-statistic)	0.000001		

Bloomberg, UBS, PwC's analysis

Table 26 – Ramsay reset test – Scenario 4 40 business days to 9 December 2011

Ramsey RESET Test
Equation: EQ_AVERAGE_LINEAR
Specification: DRP C TERM
Omitted Variables: Powers of fitted values from 2 to 3

	Value	Df	Probability
F-statistic	0.81652	(2, 64)	0.4465
Likelihood ratio	1.713338	2	0.4246

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.662824	2	0.331412
Restricted SSR	26.63936	66	0.403627
Unrestricted SSR	25.97654	64	0.405883
Unrestricted SSR	25.97654	64	0.405883

LR test summary:

	Value	df
Restricted LogL	-64.62581	66
Unrestricted LogL	-63.76914	64

Unrestricted Test Equation:
Dependent Variable: DRP
Method: Least Squares
Sample: 1 68
Included observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.69919	18.17491	1.303951	0.1969
TERM	3.001173	2.361472	1.270891	0.2084
FITTED^2	-5.875638	4.982672	-1.179214	0.2427
FITTED^3	0.589605	0.514877	1.145138	0.2564

R-squared	0.31774	Mean dependent var	2.826551
Adjusted R-squared	0.285759	S.D. dependent var	0.753838
S.E. of regression	0.63709	Akaike info criterion	1.99321
Sum squared resid	25.97654	Schwarz criterion	2.123769
Log likelihood	-63.76914	Hannan-Quinn criter.	2.044942
F-statistic	9.93528	Durbin-Watson stat	1.69832
Prob(F-statistic)	0.000018		

Bloomberg, UBS, PwC's analysis

Appendix B Sample of bonds

ISIN	Name	Maturity date	S&P Credit rating	Debt risk premium		Maturity type
				draft decision period	40 business days to 9 December 2011	
AU000SCA0032	SOUTHERN CROSS	11/10/2012	BBB	1.61	n/a	Fixed
AU300CLPF010	CLPAUST	16/11/2012	BBB	2.35	2.18	Fixed
AU3CB0136059	VWGN	26/11/2012	A-	1.20	1.14	Fixed
AU000SHL0034	SNOWYHYDRO	25/02/2013	BBB+	2.25	2.71	Fixed
AU300SPT0090	STOCKLAND	15/05/2013	A-	1.95	2.03	Fixed
AU3CB0157394	VWGN	17/08/2013	A-	1.29	1.35	Fixed
AU300GPTM218	GPT	22/08/2013	A-	2.01	2.05	Fixed
AU3CB0170835	LEASEPAUST	24/02/2014	BBB+	1.97	2.95	Fixed
AU3CB0145381	TRANSURBAN	24/03/2014	A-	2.26	2.28	Fixed
AU3CB0146256	VWGN	31/03/2014	A-	1.43	1.61	Fixed
AU3CB0174464	QICF	7/07/2014	A-	1.88	1.90	Fixed
AU3CB0157576	MLBAIRPORT	25/08/2014	A-	2.31	2.30	Fixed
AU3CB0126860	WESFARMERS	11/09/2014	A-	1.85	1.99	Fixed
AU3CB0168912	VWGN	28/01/2015	A-	1.61	1.83	Fixed
AU3CB0138030	STOCKLAND	18/02/2015	A-	2.39	2.61	Fixed
AU3CB0145837	MIRVAC FD	15/03/2015	BBB	3.07	3.14	Fixed
AU3CB0154003	SYDAIRPORT	6/07/2015	BBB	3.07	3.19	Fixed
AU3CB0179109	VWGN	14/07/2015	A-	1.86	1.97	Fixed
AU3CB0156230	SPIAA	12/08/2015	A-	2.14	2.17	Fixed
AU300ST50076	SANTOS	23/09/2015	BBB+	2.49	2.54	Fixed
AU300APAM047	MLBAIRPORT	14/12/2015	A-	2.58	2.58	Fixed
AU3CB0171	CPOF	11/03/2016	A-	2.22	2.39	Fixed

924						
AU3CB0172039	WOOLWORTHS	22/03/2016	A-	1.84	1.91	Fixed
AU3CB0176014	GAIF	19/05/2016	BBB	3.11	3.76	Fixed
AU3CB0176667	TRANSURBAN	8/06/2016	A-	2.47	2.50	Fixed
AU300BBIF018	BBIDBCTFIN	9/06/2016	BBB+	3.65	4.21	Fixed
AU3CB0166122	STOCKLAND	1/07/2016	A-	2.75	2.90	Fixed
AU3CB0157584	MLBAIRPORT	25/08/2016	A-	2.65	2.65	Fixed
AU3CB0160687	MIRVAC FIN	16/09/2016	BBB	3.41	3.45	Fixed
AU300NTFC026	ADLAIRPORT	20/09/2016	BBB	3.31	3.44	Fixed
AU3CB0173128	ETSA	29/09/2016	A-	2.21	2.26	Fixed
AU3CB0185478	WESFARMERS	4/11/2016	A-	n/a	2.29	Fixed
AU3CB0147833	DB RREEF	21/04/2017	BBB+	3.19	3.14	Fixed
AU3CB0145696	SPI E&G C	25/09/2017	A-	2.24	2.31	Fixed
AU3CB0176485	SYDAIRPORT	6/07/2018	BBB	3.01	3.07	Fixed
AU3CB0186385	CALTEX	23/11/2018	BBB+	n/a	3.70	Fixed
AU3CB0173201	BRISAIR	9/07/2019	BBB	3.13	2.85	Fixed
AU3CB0155133	APT	22/07/2020	BBB	3.08	3.09	Fixed
AU3CB0164820	STOCKLAND	25/11/2020	A-	2.89	3.12	Fixed
AU3CB0173482	SPI E&G C	1/04/2021	A-	2.22	2.42	Fixed
AU000SCA0040	SYDAIRPORT	11/10/2012	BBB	2.13	n/a	Floating
AU300CLPF028	CLPAUST	16/11/2012	BBB	2.55	2.59	Floating
AU000SHL0042	SNOWY (W)	25/02/2013	BBB+	3.07	3.02	Floating
AU000SHL0059	SNOWYHYDRO	25/02/2013	BBB+	2.60	2.55	Floating
AU000CPR0044	CPOWER (W)	28/02/2013	A-	2.45	3.97	Floating
AU300CCAL035	COCACOLA	8/03/2013	A-	1.25	1.20	Floating
AU300GPTM226	GPT	22/08/2013	BBB	2.11	2.08	Floating
AU3FN0001335	SYDAIRPORT	20/11/2013	BBB	2.56	2.57	Floating
AU300BR40044	BACL	11/12/2013	BBB	2.83	2.84	Floating
AU3FN0008488	TABCORP	1/05/2014	BBB	2.86	2.88	Floating
AU0000TAHHA1	TAHHA	1/05/2014	BBB	3.05	3.07	Floating

AU3FN001 0500	ADLAIRPORT	15/06/2014	BBB	2.87	2.89	Floating
AU3FN000 8835	DB RREEF	28/07/2014	BBB+	3.09	3.11	Floating
AU3FN000 9098	WESFARMER S	11/09/2014	A-	2.08	2.05	Floating
AU300UEL M012	UNITE EN W	23/10/2014	BBB	3.24	3.14	Floating
AU300SAF C025	SYDAIRPORT	20/11/2014	BBB	3.14	3.11	Floating
AU300TFC 0082	TRANSB (W)	10/11/2015	A-	3.62	3.66	Floating
AU300PLL C034	POWERCOR	15/11/2015	A-	3.39	3.43	Floating
AU300CLP F036	CLPAUST	16/11/2015	BBB	3.20	3.24	Floating
AU300SAF C033	SYDAIRPORT	20/11/2015	BBB	3.25	3.29	Floating
AU300APA M054	MLBAIRPORT	14/12/2015	A-	2.83	2.86	Floating
AU300BBI F026	BBIDBCTFIN	9/06/2016	BBB+	4.23	4.27	Floating
AU300BR4 0051	BRISAIR	1/07/2016	BBB	3.18	3.21	Floating
AU300NTF C034	ADLAIRPORT	20/09/2016	BBB	3.30	3.33	Floating
AU300TFC 0090	TRANSB (W)	10/11/2017	A-	3.77	3.80	Floating
AU300BBI F034	BBIDBCTFIN	9/06/2021	BBB+	4.30	4.32	Floating
AU3FN000 1244	SYDAIRPORT	20/11/2021	BBB	3.82	3.83	Floating
AU3FN000 1251	SYDAIRPORT	11/10/2022	BBB	3.91	3.91	Floating
AU3FN000 1368	BBIDBCTFIN	12/12/2022	BBB+	3.62	3.47	Floating
AU300BBI F042	BBIDBCTFIN	9/06/2026	BBB+	4.47	4.90	Floating

Source: Bloomberg, UBS, PwC's analysis

Note: The debt risk premium is an average of estimates between 19 August 2011 and 14 October 2011

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