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Estimating a debt risk premium

Essential Services Commission of Victoria

Final

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1 Scope and outline of report

1.1 Scope of the report

The Essential Services Commission of Victoria (ESCV or the Commission) has engaged PricewaterhouseCoopers (PwC) to update the estimates of the debt risk premium applying the same methodology as outlined in PwC's report to ESCV dated 20 March 2013 (the First Report). Specifically, we were asked to update the values contained in the First Report that:

- estimated a 10 year BBB+ debt risk premium using the methodology the Australian Energy Regulator (AER) currently applies to extrapolated the Bloomberg BBB fair value curve; and
- approximated the incremental debt risk premium that would be required if the ESC were to assume credit ratings of BBB or BBB-.

The measurement period for the 10 year BBB+ debt risk premium should be the 20 and 40 business days up to and including 23 May 2013 (the averaging period), describing the maximum, minimum and average values. In addition, the measurement period for the approximation of the incremental debt risk premium from assuming a BBB or BBB- credit rating should be as close as practicable to the averaging period.

This report should be read in conjunction the First Report. That report contains a fuller description of the methodology we applied, and therefore the context and background by which the results should be interpreted.

1.2 Outline of the report

The report is structures as follows:

- Chapter 2 reiterates the methodologies as initially outlined in the First Report to estimate 10 year BBB+ debt risk premium, and to approximate the incremental debt risk premium that would be required if BBB or BBB- credit ratings were to be assumed; and
- Chapter 3 reports the updated values.

2 Estimating a debt risk premium

In this chapter we summarised the methodologies we have applied to estimate 10 year BBB+ debt risk premium, and to approximate the incremental debt risk premium that would be required if BBB and BBB- credit ratings were to be assumed.

2.1 Methodology

2.1.1 The AER's Bloomberg extrapolation methodology

The AER's current approach for deriving a 10 year BBB+ DRP is to take Bloomberg's BBB fair value curve estimate at its longest term (currently 7 years) as the base, and to extrapolate to 10 years based on the average annual increment in the debt risk premium observed for pairs of bonds of different terms to maturity issued by the same entity where:[1]

- the paired bonds are in the credit rating bands of A-, BBB+ or BBB
- the longer dated bond has a term to maturity that is close to 10 years
- the shorter dated bond has a term that is closest to the shorter term that is of concern (i.e. closest to 7 years)
- the match is between a pair of fixed coupon bonds, or a pair of floating rate bonds
- they are of Australian issuance
- the issuing entity is not a financial entity
- the corporate bond is senior (i.e. not subordinated), and
- the bonds are standard corporate bonds without special features such as call options attached.

The UBS and Bloomberg data services were accessed to obtain the set of pairs of such bonds and information on their yields. In the event that both data sources reported yields for a bond, the debt risk premiums from the two sources were averaged. We applied the AER's current estimation methodology to two averaging periods that spanned the 40 and 20 business days ending on and including 23 May 2013.

[1] In its most recent debt risk premium estimation methodology the AER relied on the selection criteria for paired bonds that were developed by PwC (May, 2012) *Electranet Pty Ltd – Estimating the benchmark debt risk premium*, p. iv.

2.1.2 *Approximating the debt risk premium for the BBB and BBB- credit rating bands*

We have applied two approaches to estimate the incremental debt risk premium required by bonds in the BBB and BBB- credit rating bands relative to a BBB+ rated bond. As in the First Report, the estimates in both cases reflect a recent comparable averaging period over the 20 business days ending 22 April, 2013 using the Bloomberg BBB fair value curve. The results were then cross-checked by using our econometric techniques.

Our first approach was to observe the difference in the BBB and BBB- bonds relative to the Bloomberg fair value curve. The difference was calculated by subtracting the debt risk premiums for bonds in these credit rating categories, and the DRP predicted by the Bloomberg BBB fair value curve. These differences were then separately grouped for the BBB and BBB- credit rating bands, and then averaged to produce the average differential. If the term to maturity for the BBB and BBB- bonds were greater than 7 years, the Bloomberg fair value curve was extrapolated using the AER's extrapolation methodology to calculate the difference.

Our second approach is to create our own econometrically estimated fair value curve for BBB+ bonds (and constrained this to be a well behaved function) and then measuring the distance between this function and the yields on BBB and BBB- bonds to provide an alternative estimate of the premium.

Our econometric analysis relied on a database of 66 bonds that have a credit rating of BBB, BBB+ and A-, with a term to maturity of greater than 1 and yields that were reported by either Bloomberg or UBS. Again, if yields were reported by both Bloomberg and UBS for a given bond, they were averaged.

We applied linear regression to estimate the debt risk premium as a function of term to maturity. The linear functional form was chosen because it has both theoretical and empirical support, and has performed well against alternative functional forms over the last two years of data. [2] As the population of bonds was relatively evenly split between BBB and A- bonds, the average credit rating was approximately BBB+, and therefore provided confidence that the estimated regression function reflected a BBB+ credit rating.[3]

Finally, we cross-checked the average differential from our first approach by applying the same process. That is, instead of using the Bloomberg BBB fair value curve to estimate the additional average increment, we used the DRP predicted by the linear regression function.

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[2] Our previous analysis of bond yields has shown that a linear function performs strongly. Furthermore, a linear function has theoretical and empirical support in academic papers (e.g. Edwin Elton, Martin J. Gruber, Deepak Agrawal, and Christopher Mann, (February, 2001), 'Explaining the Rate Spread on Corporate Bonds', *The Journal of Finance*, Vol. LVI, No. 1, pp. 247-277, and Marco Sorge and Blaise Gadanecz (2008), 'The term structure of credit spreads in project finance,' *International Journal of Finance and Econometrics*, Vol. 123).

[3] We use a pool of BBB, BBB+ and A- bonds to estimate a proxy for the BBB+ curve because there are too few bonds on issue in the BBB+ band to allow a curve to be estimated only with reference to BBB+ observations.

3 Debt risk premium estimates

3.1.1 Introduction

In this chapter we provide the results of the analysis. First we address the question of the debt risk premium for a 10 year BBB+ bond over the 40 and 20 business days to 23 May, 2013. Secondly, we provide an indication of the additional debt risk premium for 10 year corporate bonds that are rated BBB or BBB-.

3.1.2 Debt risk premium for a 10 year BBB+ rated corporate bond

Using the AER's extrapolation approach, the average 10 year BBB+ debt risk premium was estimated to be 3.04 per cent for the 20 business day averaging period, and 3.07 per cent for the 40 business day averaging period.

In applying the AER's approach we identified four sets of paired bonds, which is one set more than the sample in the First Report. These were bonds issued by CBA Property fund (rated A-), Stockland (A-), Sydney Airport (rated BBB), and GPT (rated A-) – the additional paired bond compared with the First Report are those issued by CBA Property fund. After estimating their average annual DRP increment of 16.5 basis points for 20 business days and 15.8 basis points for 40 business days, we extrapolated the 7 year Bloomberg fair value curve to 10 years to arrive at 304.4 basis points and 307.0 basis points respectively. This is shown below in Table 1.

Comparing the two averaging period lengths, we see that it was relatively stable. Although the 40 business day averaging period had a higher Bloomberg 7 year DRP, this was partially offset by a lower average annual DRP increment from the paired bonds.

Table 1 – Estimation of cost of 10 year debt using the AER's current methodology – 20 and 40 business days to 23 May 2013 in basis points

	20 business days	40 business days
Paired bonds (basis points per annum)		
CBA Property fund (A-)	9.4	7.9
GPT (A-)	10.0	9.7
Stockland (A-)	12.2	11.5
Sydney Airport (BBB)	34.3	34.2
Average	**16.5**	**15.8**
3 times average	49.4	47.5
Bloomberg 7 yr DRP	255.0	259.6
Extrapolated DRP	**304.4**	**307.0**

Source: Bloomberg, UBS, PwC analysis

Note: Some figures may not equate due to rounding

The range between the minimum and maximum debt risk premiums was again larger for the 40 day averaging period (18.5 basis points) compared with the 20 business day averaging period (13.6 basis points).

Table 2 – Estimation of cost of 10 year debt range using the AER's current methodology – 20 and 40 business days to 23 May 2013 in basis points

	20 business days	40 business days
Minimum daily observation	297.3	297.3
Average	304.4	307.0
Maximum daily observation	310.9	315.8

Source: Bloomberg, UBS, PwC analysis

3.1.3 Indicative debt risk premiums for 10 year BBB and BBB- rated corporate bonds

As shown in Table 3 below, using our first method (i.e., measuring the distance between the Bloomberg fair value curve and BBB and BBB- bonds) for the 20 day averaging period ending 22 April, 2013 delivered an estimated incremental debt risk premium for a credit rating of BBB compared with a BBB+ credit rating of 11 basis points and 51 basis points for a BBB- credit rating.

Table 3 – Bloomberg fair value curve estimation of BBB and BBB- cost of 10 year debt range – 20 and 40 business days to 23 May 2013 in basis points

	20 business days	40 business days
BBB+ credit rating		
Minimum daily observation	297.3	297.3
Average	304.4	307.0
Maximum daily observation	310.9	315.8
BBB credit rating (+11 basis points)		
Minimum daily observation	308.6	308.6
Average	315.7	318.3
Maximum daily observation	322.2	327.0
BBB- credit rating (+51 basis points)		
Minimum daily observation	348.4	348.4
Average	355.5	358.1
Maximum daily observation	362.0	366.9

Source: Bloomberg, UBS, PwC analysis

The results from using our second method (i.e., measuring the distance between the BBB and BBB- bonds and our econometrically estimated BBB+ fair value curve) are set out in Table 4 below. The analysis shows that the incremental debt risk premium for a credit rating of BBB compared with a BBB+ credit rating was higher at 48 basis points, and a BBB- credit rating was estimated to require an additional 85 basis points compared with a BBB+ debt risk premium.

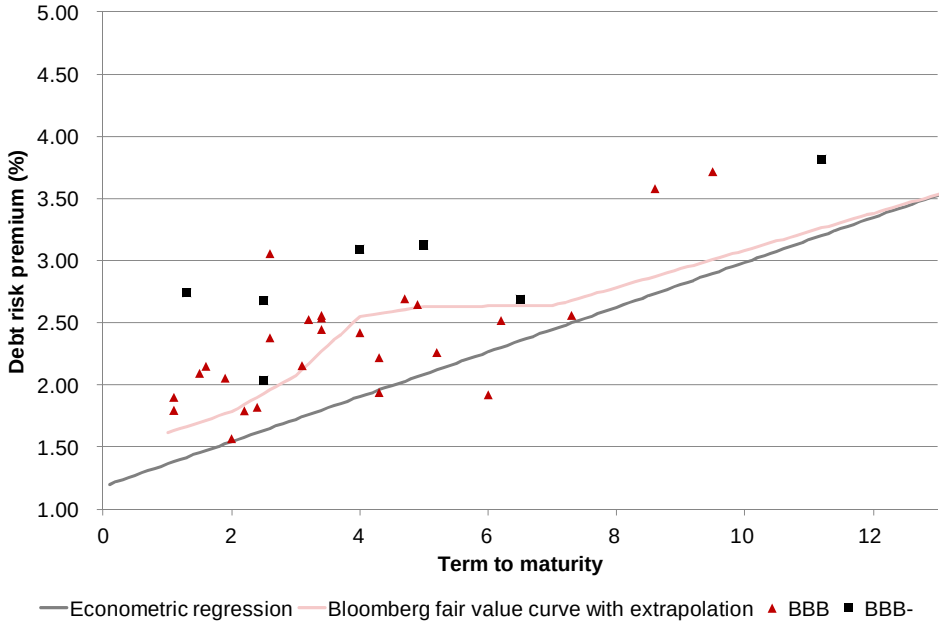
Table 4 – Econometric technique estimation of BBB and BBB- cost of 10 year debt range – 20 and 40 business days to 23 May 2013 in basis points

	20 business days	40 business days
BBB+ credit rating		
Minimum daily observation	297.3	297.3
Average	304.4	307.0
Maximum daily observation	310.9	315.8
BBB credit rating (+48 basis points)		
Minimum daily observation	345.1	345.1
Average	352.2	354.8
Maximum daily observation	358.7	363.6
BBB- credit rating (+85 basis points)		
Minimum daily observation	382.3	382.3
Average	389.4	392.0
Maximum daily observation	395.9	400.8

Source: Bloomberg, UBS, PwC analysis

The primary reason why the estimated DRP increments are larger using our econometric technique as the reference curve compared with the Bloomberg fair value curve is because its estimated DRP is lower for almost all maturities, especially for the shorter term bonds. As seen below in Figure 1 the econometric regression is lower than the extrapolated Bloomberg fair value curve for most maturities, especially around the three to six year term to maturity range. The increment is estimated as the difference between a bond's and reference curve's DRP, therefore a reference curve with a relatively lower reference curve DRP would produce a greater DRP increment.

Figure 1 – BBB and BBB- bonds compared with different DRP estimation methods



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