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Estimating a debt risk premium

Essential Services Commission of Victoria

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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 estimate a 10 year BBB+ debt risk premium using the methodology the AER currently applies to extrapolate the Bloomberg BBB fair value curve (FVC).

The debt risk premium should be estimated using a 20 and 40 business day averaging period, ending on and including 4 March 2013, demonstrating the maximum, minimum and average values.

In addition, the ESCV requested that we provide an approximation of the incremental debt risk premium that would be required if instead the Commission were to assume credit ratings of BBB or BBB-.

1.2 Outline of the report

The report is structures as follows:

- Chapter 2 explains 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 or BBB- credit ratings were to be assumed; and

- Chapter 3 reports the results of the analysis.

2 Estimating a debt risk premium

In this chapter we explain 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

Both currently and in the past, regulators have placed significant reliance on Bloomberg's BBB fair value curve to estimate a 10 year BBB+ debt risk premium. In the years immediately preceding the global financial crisis (2005 to 2007), Bloomberg provided daily estimates of the 10 year BBB fair value yield curve (FVC) for Australian corporate bonds. Both regulators and regulated businesses considered this to be an appropriate estimate of the BBB+ FVC, from which a BBB+ debt risk premium could be derived.

In October 2007 Bloomberg discontinued publishing the BBB FVC to 10 years, causing regulators and regulated businesses to consider alternative methodologies. The current approach that is applied by the AER extrapolates the 7 year debt risk premium, based on the Bloomberg BBB FVC, to 10 years using a 'paired bonds' approach as explained below. [1]

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:[2]

- 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

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[1] For example, see Australian Energy Regulator (September, 2012), *Access arrangement draft decision – SPI Networks (Gas) Pty Ltd 2013-17.*

[2] 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.

- 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 4 March, 2013.

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. In both cases, the estimates reflect a recent comparable averaging period over the 20 days ending 28 November, 2012. using the Bloomberg BBB fair value curve. The results were then cross-checked by using our econometric techniques. Both were estimated for

Our first approach was to observe the difference in the BBB and BBB- bonds relative to the Bloomberg fair value curve. More specifically, we calculated the difference between 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.

However, the focus on the accuracy of much (but not all) of the testing of the Bloomberg BBB fair value curve has been on its performance in predicting a BBB+ rated bond yield at longer terms (10 years). There has been less work on testing the Bloomberg BBB fair value curve at shorter maturities, and we note that the curve is not a smooth and well behaved function. Thus, we have less confidence that the Bloomberg fair value curve is an accurate predictor of the yield on a BBB+ bond at shorter terms to maturity. As the universe of BBB and BBB- bonds span a range of maturities – but are more numerous at shorter maturities – any error in the Bloomberg curve at shorter maturities will affect the estimated premiums for BBB and BBB- bonds.

In view of this, we have also estimated our own econometrically estimated fair value curve for BBB+ bonds (and constrained this to be a well behaved function) and measured 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 70 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.[3] 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.[4]

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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[3] 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).

[4] 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 4 March, 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 3.15 per cent for the 20 business day averaging period, and 3.17 per cent for the 40 business day averaging period.

In applying the AER's approach, we identified three sets of paired bonds. These were bonds issued by Stockland (rated A-), Sydney Airport (rated BBB), and GPT (rated A-). After estimating their average annual DRP increment of 11.7 basis points for 20 business days and 11.2 basis points for 40 business days, we extrapolated the 7 year Bloomberg fair value curve to 10 years to arrive at 314.7 basis points and 317.3 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 4 March 2013 in basis points

	20 business days	40 business days
Paired bonds (basis points per annum)		
Stockland (A-)	7.8	7.2
Sydney Airport (BBB)	19.9	19.9
GPT (A-)	7.3	6.6
Average	**11.7**	**11.2**
3 times average	35.0	33.7
Bloomberg 7 yr DRP	279.7	283.6
Extrapolated DRP	**314.7**	**317.3**

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 only slightly larger for the 40 day averaging period (22.7 basis points) compared with the 20 business day averaging period (21.1 basis points).

Table 2 – Estimation of cost of 10 year debt range using the AER's current methodology – 20 and 40 business days to 4 March 2013 in basis points

	20 business days	40 business days
Minimum daily observation	302.5	302.5
Average	314.7	317.3
Maximum daily observation	323.6	325.3

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 28 November, 2012 delivered an estimated incremental debt risk premium for a credit rating of BBB compared with a BBB+ credit rating of 15 basis points and 102 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 4 March 2013 in basis points

	20 business days	40 business days
BBB+ credit rating		
Minimum daily observation	302.5	302.5
Average	314.7	317.3
Maximum daily observation	323.6	325.3
BBB credit rating (+15 basis points)		
Minimum daily observation	317.0	317.0
Average	329.2	331.8
Maximum daily observation	338.2	339.8
BBB- credit rating (+102 basis points)		
Minimum daily observation	405.0	405.0
Average	417.1	419.7
Maximum daily observation	426.1	427.7

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 38 basis points, and a BBB- credit rating was estimated to require an additional 128 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 4 March 2013 in basis points

	20 business days	40 business days
BBB+ credit rating		
Minimum daily observation	302.5	302.5
Average	314.7	317.3
Maximum daily observation	323.6	325.3
BBB credit rating (+38 basis points)		
Minimum daily observation	340.2	340.2
Average	352.4	355.0
Maximum daily observation	361.4	363.0
BBB- credit rating (+128 basis points)		
Minimum daily observation	430.4	430.4
Average	442.5	445.1
Maximum daily observation	451.5	453.1

Source: Bloomberg, UBS, PwC analysis

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