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# Debt risk premium of coal transporters

## A report for Aurizon Network

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# Table of Contents

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<b>1</b>	<b>Executive summary</b>	<b>1</b>
<b>2</b>	<b>Introduction</b>	<b>8</b>
<b>3</b>	<b>Overview of DRP methodologies</b>	<b>9</b>
3.1	QCA's previous approach: PwC simple portfolio approach	9
3.2	QCA's current approach: Incenta (2016a) and Incenta (2016b)	10
3.3	Other approaches	16
<b>4</b>	<b>Applying methodologies to arrive at BBB+ and BBB DRPs</b>	<b>18</b>
4.1	Parameters	18
4.2	Bond sample	18
4.3	Econometric estimation	20
4.4	RBA, BVAL and Reuters vs PwC/Incenta	23
4.5	Including foreign currency bonds	34
<b>5</b>	<b>Coal premium analysis</b>	<b>35</b>
5.1	Defining a benchmark efficient entity for Aurizon	38
5.2	Aurizon compared to energy utilities	40
5.3	Aurizon compared to other coal-transporting railroads	42

# List of Figures

---

Figure 1-1: Third party estimates vs PwC/Incenta (annualised) .....	2
Figure 1-2: Snapshot on 2 August 2016 - third party estimates vs PwC/Incenta.....	3
Figure 1-3: Snapshot on 2 August 2016 - third party estimates vs PwC/Incenta.....	4
Figure 4-1: DRPs of bonds in the sample.....	19
Figure 4-2: BBB to A- rated bonds including financial issuers and bonds with options (annualised).....	21
Figure 4-3: BBB- to BBB+ rated bonds including financial issuers and bonds with options (annualised).....	21
Figure 4-4: BBB- to A- rated bonds including financial issuers and bonds with options (annualised).....	22
Figure 4-5: Third party estimates vs PwC/Incenta (annualised) .....	24
Figure 4-6: Linear regression of BVAL sample (annualised) .....	26
Figure 4-7: BVAL yield curve and constituents 30 June 16 (semi-annual).....	28
Figure 4-8: BVAL DRP curve and constituents 30 June 16 (semi-annual).....	29
Figure 4-9: BVAL yield curve and constituents 29 July 16 (semi-annual).....	29
Figure 4-10: BVAL DRP curve and constituents 29 July 16 (semi-annual) .....	30
Figure 4-11: Snapshot on 2 August 2016 - third party estimates vs PwC/Incenta (annualised).....	31
Figure 4-12: Snapshot on 2 August 2016 - third party estimates vs PwC/Incenta (annualised).....	32
Figure 4-13: Snapshot on 2 August 2016 - third party estimates vs PwC/Incenta (annualised).....	34
Figure 5-1: Yields of bonds issued by Aurizon (semi-annual) .....	40
Figure 5-2: DRPs of AUD bonds issued by Aurizon and other Australian utilities networks (semi-annual) .....	41
Figure 5-3: Comparison of coal logistics firms against USD BBB benchmark.....	45



# List of Tables

---

Table 1-1: June 2016 regression estimates (financial bonds and options excluded (annualised))	1
Table 1-2: Change in DRP for BBB+ coal railway operators (semi-annual)	6
Table 4-1: Financial bonds and options included (annualised)	22
Table 4-2: Financial bonds and options excluded (annualised)	23
Table 4-3: Financial bonds and options excluded; Australia Pacific Airports Excluded (annualised)	23
Table 4-4: BVAL sample DRP compared to QCA's DRP from BBB+ BBB BBB-samples (annualised)	26
Table 4-5: Financial bonds and options excluded, LW474837 excluded (annualised)	30
Table 4-6: Impact of including foreign currency and option adjusted DRPs (annualised)	35
Table 5-1: Change in DRP for BBB+ coal railway operators (semi-annual)	39
Table 5-2: List of coal-transporting railroad companies	43
Table 5-3: Change in DRP (measured relative to US Treasuries) for BBB+ coal railway operators with bonds issued in USD (semi-annual)	44

# 1 Executive summary

1. PwC proposed to estimate the BBB+ DRP by pooling debt risk premium (DRP) data from BBB to A- S&P rated bonds and running a simple linear regression. Incenta proposed a modification of this approach to only use BBB+ bonds (or dummy variables) if there was an asymmetry between the slope (and/or level) of single rating DRP curves apparent in the data.
2. In the month of June 2016, application of the:
  - PwC pooled data methodology resulted in estimates of 2.29% for BBB+ (2.60% for BBB);
  - Incenta single BBB+ regression resulted in estimates of 2.47% for BBB+ (2.63% for BBB).

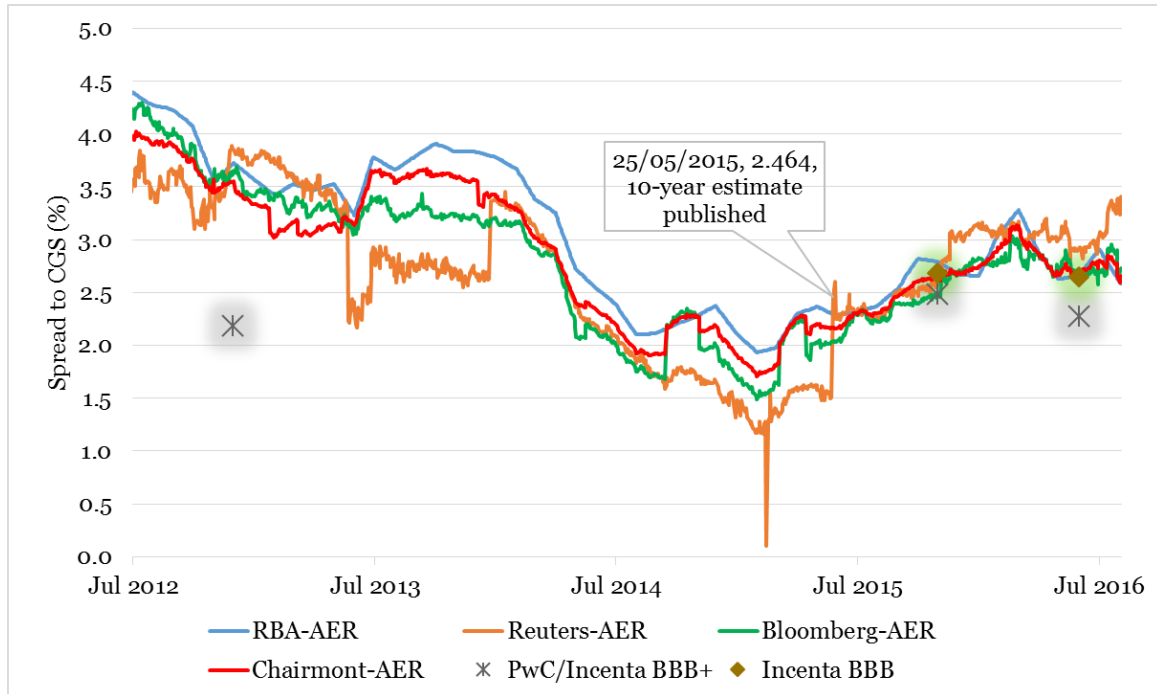
**Table 1-1: June 2016 regression estimates (financial bonds and options excluded (annualised))**

Model	A-, BBB+, BBB		BBB+, BBB, BBB-		A-, BBB+, BBB, BBB-	
	BBB+	BBB	BBB+	BBB	BBB+	BBB
Pooled	2.29	-	-	2.60	-	-
Dummies	2.32	2.47	2.29	2.44	2.23	2.37
Single rating	2.47	2.63	2.47	2.63	2.47	2.63

Source: Bloomberg, RBA, CEG analysis

3. These BBB+ estimates are lower than the estimates of third party providers (RBA, Bloomberg and Reuters) who estimate DRPs for the broad BBB class. By contrast, the BBB estimates are broadly consistent with the Bloomberg BVAL estimate (2.69%), but considerably lower than the RBA (2.79%) and Reuters (2.94%) estimates. The PwC/Incenta method has typically resulted in lower estimates than the third party providers as is illustrated in the below time series, shown up to 31 July 2016. (Note that Figure 1-1 shows estimates actually published by PwC and/or Incenta – the June 2016 CEG application of PwC/Incenta methodology reported above are not shown).

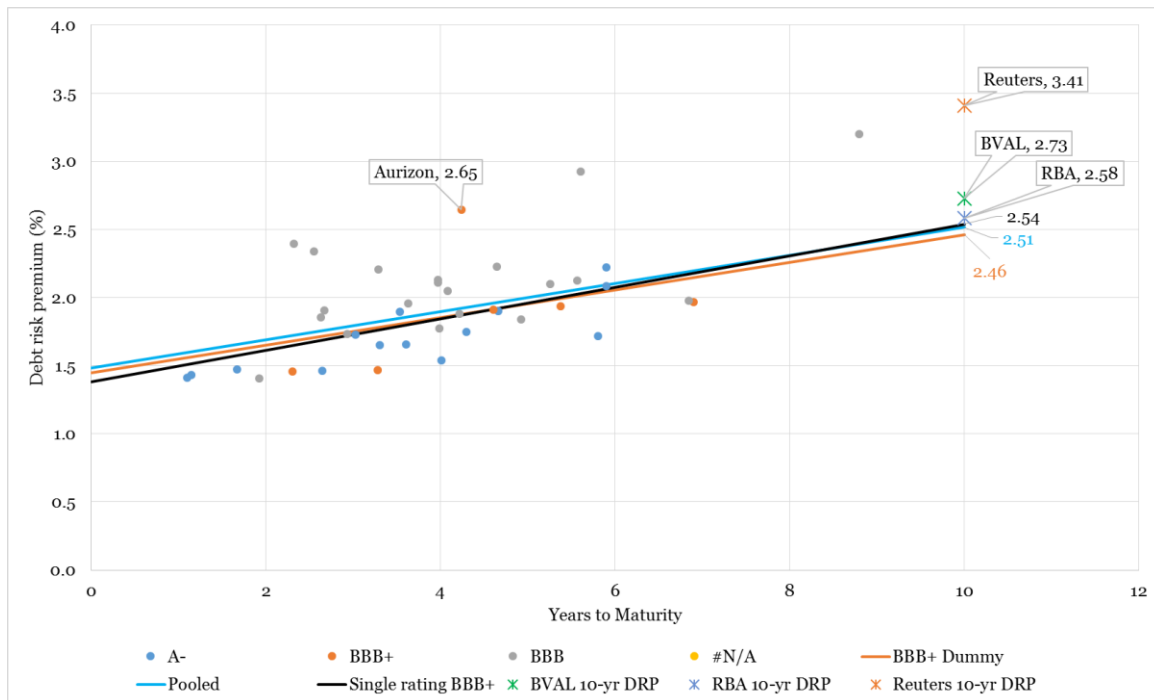
**Figure 1-1: Third party estimates vs PwC/Incenta (annualised)**



Source: Bloomberg, RBA, Reuters, CEG analysis.

4. There has, however, been significant fluctuations in the recent values of the third party providers' estimates – with material falls in both the RBA and BVAL estimates – as can be seen on the right hand side of Figure 1-1 above. At least for the Bloomberg curve, this reflects the issuance of a new low DRP Jemena bond in June which receives full weight in our application of the Incenta/PwC method but which, for proprietary reasons unknowable to us, has only begun exerting a material influence on the Bloomberg estimates in late July.
5. In order to provide an up-to-date comparison of the PwC/Incenta estimates against RBA/BVAL/Reuters estimates we have updated our analysis to 2 August 2016 (the date after the RBA's most recent estimate and after the date that Bloomberg began assigning the Jemena bond material weight).

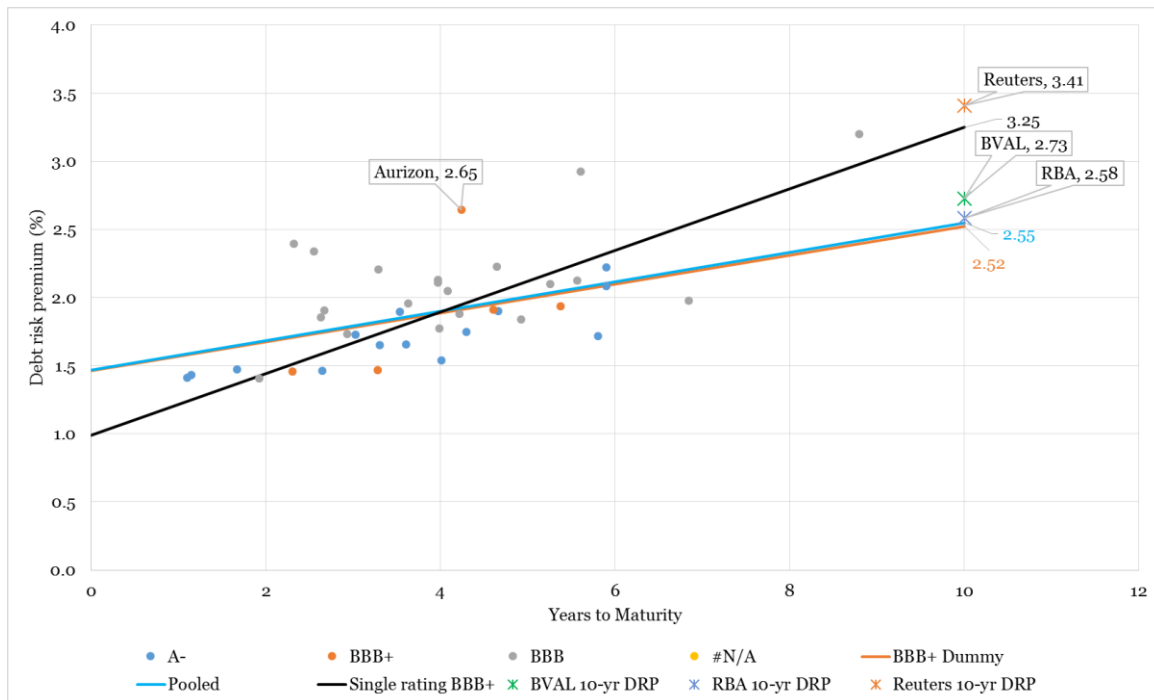
**Figure 1-2: Snapshot on 2 August 2016 - third party estimates vs PwC/Incenta**



Source: Bloomberg, RBA, Reuters, CEG analysis

6. It can be seen that on 2<sup>nd</sup> August 2016 the gap has narrowed materially and now the single regression Incenta BBB+ 10 year estimates is 2.54% which is very close to, but still below, Bloomberg's (2.73%) and RBA's (2.58%) 10 year estimates.
7. It can be seen that Incenta's BBB+ only regression methodology is very sensitive to variations in data. There are only 6 BBB+ bonds in this sample and the BBB+ only linear regression is very sensitive to the location of the specific observations. For example, if the 7 year Jemena BBB+ bond at 7 years maturity (DRP just under 2%) is removed from the sample then all of the regression estimates increase but the BBB+ single regression increases dramatically (by 71bp). This is illustrated in Figure 1-3 below.

**Figure 1-3: Snapshot on 2 August 2016 - third party estimates vs PwC/Incenta**



Source: Bloomberg, RBA, Reuters, CEG analysis

8. It should be noted that the Jemena bond in question is rated A3 (equivalent to A-) by Moody's and is included in the A- curve by Reuters. The reason this bond is in the Incenta BBB+ sample is because Incenta selects credit ratings according to a method that is similar to the Bloomberg composite rating, which usually assigns the bond the lower rating when there is a conflict between rating agencies. The different treatment by Reuters and Bloomberg of this Jemena bond is likely to at least partially explain their different 10 year estimates.
9. In light of the issues discussed above, should the QCA elect to retain the main components of PwC's (2013) methodology, it would be prudent for Aurizon Network (henceforth referred to as "Aurizon") to carry out analysis of the actual bond sample after its averaging period is completed in order to ensure the methodology delivers appropriate estimates given the specific sample data that exists at that time.
10. This is because the appropriate linear regression to apply is an empirical matter and cannot be selected without knowing the DRP sample for the actual averaging period - a point noted by Incenta (2016b). A mechanistic application of any one of the variations of the linear regression approach risks giving rise to highly variable/unpredictable results that may end up being inappropriate.
11. If the QCA decides to abandon PwC's (2013) methodology in favour of third party estimates, three sources that it could consider are the BVAL, RBA, and Reuters



curves. The main benefit of using third party estimates is that the third party curves can incorporate independent expert judgement, such as the removal of certain bonds from the sample and also assigning different weights to observations when fitting a curve. On the other hand, the exercise of independent judgement also reduces transparency, especially with the BVAL and Reuter's curves, whose estimation procedure is not publicly available.

12. We further note that CEG has recently carried out its own review of the third party estimates and concluded that the RBA curve had the best performance, while the Reuters and BVAL curves were equally second best.<sup>1</sup>
13. A further important issue is that, while the DRP of the Aurizon bond is typically similar in *level* with the BVAL benchmark, there are nevertheless periods in which Aurizon's debt is perceived to be higher risk, as was the case after the spike in the DRP of Aurizon's AUD bond in February 2016. We consider that this likely reflects a 'coal' premium being priced in by debt investors who are concerned about Aurizon's ability to recover its fixed and sunk investments (primarily in below rail assets) serving the expanded coal sector.
14. While the operation of a revenue cap does provide Aurizon with some short term protection against its coal customers' declining usage and/or bankruptcy, regulation cannot shield Aurizon from the longer term risks to recovery of sunk costs. Specifically, the risk that coal prices fall to a level where a shrinking base of coal volumes cannot support the full recovery of Aurizon's sunk infrastructure expenditure. That is, regulation can allow for recovery of Aurizon's network costs to be reallocated to the most profitable miners as less profitable mines close/scale back production. However, regulation cannot force miners as a whole to pay Aurizon's costs if the price of coal falls below the level at which it can support the recovery of all costs in the supply chain.
15. Moody's and S&P have retained Aurizon's Baa1/BBB+ credit rating for now (although Moody's has placed Aurizon on 'negative watch' in part due to "increased likelihood of volatility in cash flow because of potential defaults by mine counterparties").<sup>2</sup> Investors appear to have taken a less sanguine view of Aurizon's exposure to the coal sector and are demanding a higher premium than most BBB, let alone BBB+, rated bonds.
16. Aurizon's experience in this regard is shared by other downstream coal transport companies in Australia and internationally. This includes coal terminals DBCT and

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<sup>1</sup> CEG, Criteria for assessing fair value curves, January 2016.

<sup>2</sup> Moody's Investor Service, Rating Action: Moody's confirms Aurizon Holdings Baa1 rating; outlook negative. Global Credit Research - 11 Apr 2016

Abbot Point who have both suffered credit rating downgrades on 14 March 2016 explained with the same language:<sup>3</sup>

*"The rating downgrade reflects the increasing likelihood of material volatility in DBCT's [AAPT's] cash flows due to the weakened position of its coal mining counterparties, the sole source of such cash flows..."*

17. Moreover, other railway operators internationally with significant coal operations have suffered significant increases in DRP in recent periods. For example, the four railways with the highest percentage of coal related revenues in North America are (in order): CSX (19%), Burlington Northern Santa Fe LLC (17%), Norfolk Southern (17%) and Canadian Pacific Railways (10%). With the exception of Burlington, these are all rated BBB+. The DRP on the bond closest to 10-year residual maturity as issued by each of these three BBB+ businesses increased by 27.6% on average between January 2015 and January 2016.
18. Outside North America internet research suggests that Transnet in South Africa (28%) and Aurizon in Australia (almost 100%) are the other railway owners with high reliance on coal traffic. For these businesses the increase in DRP from January 2015 to January 2016 has been 76.4% and 28.3%.
19. These results are summarised in the below table.

**Table 1-2: Change in DRP for BBB+ coal railway operators (semi-annual)**

Company	Country	DRP in January 2015 <sup>4</sup>	DRP in January 2016	Change in DRP
CSX Corp	USA	1.60	1.96	36 bp
Canadian Pacific Railway	Canada	1.73	2.14	41 bp
Norfolk Southern Corp	USA	1.28	1.76	48 bp
Transnet Soc Ltd	South Africa	2.87	5.06	219 bp
Aurizon	Australia	1.66	2.13	47 bp

Source: Bloomberg; ^Transnet Soc Ltd has a BBB+ local issuer credit rating and BBB- foreign issuer rating; ^EJ889313 Corp, an AUD bond, is used here for comparison purposes since no USD bonds issued by Aurizon was identified in our search.

20. Aurizon's increase in DRP is in line with the increase in DRP for comparable businesses. In light of this evidence we consider that it is reasonable to conclude that

<sup>3</sup> Moody's Investor Service, Rating Action: Moody's downgrades DBCT's rating to Ba2; outlook negative. And, Moody's Investor Service, Rating Action: Moody's downgrades Adani Abbot Point Terminal's rating to Ba2; outlook negative.

<sup>4</sup> CSX: EC071537 1/12/2028; Canadian Pacific Railway: EC470634 15/10/2031; Norfolk: ED943095 17/5/2025; Transnet: EJ293642 26/7/2022; Aurizon: EJ889313 28/10/2020 (this bond was selected because it is an AUD bond).



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the increase in Aurizon's observed DRP is consistent with a generalised debt market view that infrastructure providers serving the coal network attract a material risk premium compared to other similarly rated businesses.



## 2 Introduction

21. CEG has been asked by Aurizon to provide an application of the PwC/Incenta methodology for estimating a BBB DRP over the month of June 2016. Aurizon has also asked us to provide any commentary on the potential issues created by future application of this methodology to set compensation for Aurizon in providing below rail services predominantly to facilitate haulage of coal for export markets.
22. This report has the following structure:
  - Section 3 provides an overview of DRP estimation techniques;
  - Section 4 applies these techniques and makes comparisons between the results and the DRP estimates of third party publishers (RBA, Bloomberg and Reuters);
  - Section 5 examines evidence for a DRP premium arising from exposure to the coal sector.

## 3 Overview of DRP methodologies

23. This section reviews various approaches that regulators in Australia have used to estimate the 10-year DRP. We first begin with the QCA’s previous approach set out by PwC (2013),<sup>5</sup> followed by the QCA’s approach in its regulatory decision for DBCTM as set out in Incenta (2016a) and Incenta (2016b).<sup>6</sup>
24. We then review the alternative approaches that the AER and West Australian ERA have used for estimating DRP, and finally discuss some modifications to the Incenta and PwC approaches that could be appropriate for Aurizon’s specific circumstances.
25. This analysis ties in with section 4, which describes how the suggested approach can be econometrically estimated to obtain Incenta’s 10-year DRP estimate.

### 3.1 QCA’s previous approach: PwC simple portfolio approach

26. PwC (2013) sets out two approaches for estimating debt risk premium, which they refer to as the “simple portfolio approach” and “complex portfolio approach”.
27. The primary difference between the two approaches is that the complex portfolio approach includes foreign-denominated bonds issued by firms incorporated in Australia, and uses cross-currency swaps to convert the foreign-denominated DRPs to AUD fixed equivalents. PwC ultimately concluded that the simple portfolio approach was more appropriate, and this was also the approach that QTC decided to implement.
28. The simple portfolio approach is based on econometric estimation of the DRP curve using a sample of bonds identified according to the following criteria:<sup>7</sup>
  - Australian issuance by an Australian entity;
  - investment grade credit rating by Standard and Poor’s;
  - the issuing entity is not a financial entity;
  - the corporate bond is senior (i.e. not subordinated);

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<sup>5</sup> PwC, A cost of debt estimation methodology for businesses regulated by the Queensland Competition Authority, June 2013.

<sup>6</sup> Incenta, DBCT 2015 DAU: Review of WACC parameters, March 2016 (Incenta 2016a); Incenta, DBCT – debt risk premium to 31 May 2016, June 2016 (Incenta 2016b).

<sup>7</sup> PwC, A cost of debt estimation methodology for businesses regulated by the Queensland Corporation, June 2013, p. 34.

- standard corporate bonds without special features such as call options attached;
  - a term to maturity greater than one year; and
  - yields reported by either Bloomberg or UBS.
29. The relevant sample for each business would be obtained by pooling bonds with credit ratings that are within one rating on either side of the benchmark rating. For example, in the case of Aurizon, this sample would include bonds with BBB, BBB+, and A- credit ratings.
30. The 10-year DRP would then be estimated through econometric estimation of the DRPs of the bonds in the sample. PwC considered six different functional forms of its econometric model:
- i. Linear;
  - ii. Quadratic;
  - iii. Exponential;
  - iv. Cubic;
  - v. Logarithmic; and
  - vi. Power.
31. Based on the Schwartz Information Criterion (SIC), PwC considered that the linear functional form was most appropriate, and also had the further advantage of being simple to implement and interpret.

## **3.2 QCA's current approach: Incenta (2016a) and Incenta (2016b)**

### **3.2.1 Incenta (2016a)**

32. As part of its review of WACC parameters for DBCT's 2015 DAU, Incenta (2016a) reviewed the DRP methodology set out in PwC (2013).
33. Incenta (2016a) found that the appropriate credit rating for DBCT was BBB, although the benchmark in the "high scenario" would be BBB+. As such, the modelling in Incenta (2016a) sought to estimate benchmark DRPs for both BBB and BBB+ credit ratings.

### 3.2.1.1 Bond search criteria

34. Incenta (2016a) carried out its own bond search using criteria adapted from PwC (2013). Compared to PwC’s criteria, Incenta’s bond search:

- expanded the credit rating requirement to instead require at least one investment grade credit rating from Standard & Poor’s, Moody’s, or Fitch in order to increase the sample size;
- recommended that future estimates use Bloomberg BVAL data without requiring UBS estimates, due to UBS’ added restrictions on data distribution;<sup>8</sup>
- restricted the sample to bonds issued in Australia (ISIN starting with “AU”);<sup>9</sup>
- removed inflation-linked bonds; and
- made a further modification by excluding a bond issued by Glencore, on the basis that it was clearly an outlier.

35. It is worth noting that Incenta’s restriction of the sample to bonds with an ISIN of “AU” has a material impact on the analysis. It results in the exclusion of bonds issued in AUD by Coca Cola Amatil that have very low DRP relative to other BBB+ bonds. These bonds were, at one stage, included in both Bloomberg and the RBA’s BBB sample but have since been removed and, at least in the case of Bloomberg, treated as A rated bonds in the construction of it’s a curve. Bloomberg explained its change in curve construction as follows:<sup>10</sup>

*The reason that some coca cola bonds appeared in the AUD BBB curve in April but not anymore is because of internal changes we made. We assessed the AUD BBB curve and, whilst these coca cola bonds are indeed BBB rated, they were much richer than other BBB rated AUD bonds (see attached file). As such, we decided that the A rated curve (BVSCO160 Index) is more appropriate for these bonds and better represents their yields, which is where you will be able to find them now.*

36. Incenta’s curve construction had the same effect but achieved this by applying a blanket rule related to ISIN’s rather than application of judgement in relation to the existence of outliers. As we shall see below, a similar issue arises in June 2016 with the issuance of a Jemena bonds with a very low DRP which at least one service

<sup>8</sup> Incenta (2016a) did use UBS data in its analysis, but Incenta (2016b) only used Bloomberg data.

<sup>9</sup> PwC (2013) restricted the sample to bonds denominated in AUD and issued by firms incorporated in Australia, but did not require the bonds to be issued in Australia.

<sup>10</sup> Quoted by ACCC Regulatory Unit, Return on debt estimation: a review of the alternative third party data series, August 2014, p.32.

provider (Reuters) includes in its broad A curve while Bloomberg (for now) includes in its broad BBB curve.

37. In terms of the expanded credit ratings, Incenta used the published credit rating if there was only one rating available, and used the Bloomberg composite rating if the bond was rated by two or three agencies.
38. In addition, while Incenta (2016a) stated that it removed bonds with optionality,<sup>11</sup> our analysis suggests that its final sample of 78 bonds still included 9 callable bonds. Furthermore, 28 of the 78 bonds were issued by entities that were classified as “Financials” under the BICS level 1 sector classification, even though these were reported to have been removed from the sample.

### 3.2.1.2 *Econometric estimation*

39. Incenta (2016a) applied PwC’s (2013) approach to obtain the 10-year BBB+ DRP using linear regression of a pooled sample of bonds with BBB, BBB+, and A- credit ratings. This produced a benchmark BBB+ DRP estimate, which Incenta then used to generate a BBB DRP estimate by adding the average deviation of BBB bonds from the pooled regression line.
40. The estimates obtained from the linear regression were then compared against estimates obtained from the following alternative approaches:
  - Individual linear regressions for each credit rating band;
  - A linear regression with dummy variables for different credit ratings; and
  - Estimates from Bloomberg and RBA.
41. Based on the estimates from these alternative methods, Incenta (2016a) concluded that the BBB DRP obtained from the pooled linear regression approach modified from PwC (2013) was the best estimate of DBCT’s DRP.

### 3.2.2 **Incenta (2016b)**

42. Incenta (2016b) also sought to estimate the 10-year DRP for DBCT, except with a different averaging period compared to Incenta (2016a). In addition, the benchmark DRP for Incenta (2016b) was BBB instead of BBB+.
43. Incenta (2016b) featured additional modifications to the approach used in Incenta (2016a), both to the bond selection criteria and econometric estimation methodology.

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<sup>11</sup> Incenta (2016a), p. 61.



### 3.2.2.1 *Bond search criteria*

44. The bond search criteria for Incenta (2016b) is largely similar to the criteria used in Incenta (2016a). Similar with our observations in section 3.2.1.1, our analysis suggests that Incenta (2016b) also included bonds issued by financial institutions in its estimates, and did not exclude bonds with options such as callable bonds.<sup>12</sup>
45. In addition, unlike Incenta (2016a), which used the Bloomberg composite rating to derive the appropriate credit rating of bonds with multiple published ratings, Incenta (2016b) devised its own method for collating the credit ratings published by the three rating agencies. This method adopted:
  - the “predominant credit rating” if three ratings were available;<sup>13</sup>
  - the lower credit rating if there were two credit ratings that were one notch apart; and
  - the average credit rating if there were two credit ratings that were more than one notch apart.
46. We note that the above approach usually obtains the same credit rating as the Bloomberg composite. One aspect where they differ, however, is that the latter returns an “NA” rating if one of the three credit agencies publishes an “NA” rating for the bond, even if the other two do publish investment grade ratings for the same bond.

### 3.2.2.2 *Risk-free rate*

47. The risk-free rate is estimated using linear interpolation of the yields of Commonwealth Government Bonds obtained from the RBA website.<sup>14</sup>

### 3.2.2.3 *Econometric estimation*

48. Since the target credit rating for DBCT is BBB, a pooled regression approach would involve estimating the regression line on a sample of bonds with BBB-, BBB, and

<sup>12</sup> Although Incenta stated that it eliminated bonds issued by finance businesses (see: Incenta (2016b), p. 7), 31 of the 84 bonds in their sample were classified as “Financials” under BICS Level 1. For example, EK5135125 Corp is a callable bond issued by AMP Capital Wholesale Office Fund, which is classified as being part of the “Financials” sector (BICS Level 1) and the “Funds & Trusts” industry (BICS Level 2).

<sup>13</sup> We interpret this to mean that if two of the three agencies obtained the same credit rating, then that rating would be used. If all three ratings were different, then the average would be obtained and rounded down. In addition, since Incenta (2016b) did not set out how it treated ratings that were on credit watch, we assume that the credit watch component is ignored. For example, a bond with a “BBB /\*-” rating is assumed to have a BBB rating.

<sup>14</sup> Incenta (2016b), p. 9.

BBB+ credit ratings. Incenta (2016b) considered that the simple linear regression approach used in PwC (2013) and Incenta (2016a) was not appropriate for the particular dataset they had.

49. Specifically, Incenta (2016b) noted that there was material asymmetry in the margin between bonds with BBB- and BBB credit ratings compared to the margin between bonds with BBB and BBB+ credit ratings. With the dataset in Incenta (2016b), the margin between BBB- and BBB was larger than the margin between BBB and BBB+. Incenta (2016b) argued that such an asymmetry is incompatible with the pooled regression approach because the resulting estimate would be biased upwards.<sup>15</sup>
50. Incenta (2016b) therefore considered three approaches for accommodating the asymmetry in the dataset:
  - a. Pooled linear regression using BBB, BBB+, and A- bonds, with the resulting BBB+ estimate being adjusted upwards to obtain a BBB estimate;
  - b. Linear regression using BBB bonds only, omitting BBB- and BBB+ bonds; and
  - c. Dummy variable regression, with binary 0-or-1 variables for BBB- and BBB+.
51. Approach (a) carries out linear regression on bonds with BBB, BBB+, or A- credit ratings – a sample that did not have the same asymmetry observed in the sample pooled around the BBB rating. The linear regression estimate from this pooled sample will approximately correspond to a BBB+ credit rating, which would then be adjusted upwards by adding the average differential between the DRPs of BBB bonds and the regression line. Incenta (2016b) ultimately did not adopt the estimates from this approach because it assumes that BBB DRPs have the same slope as BBB+ DRPs.
52. Approach (b) uses a linear regression on BBB bonds only. Such an approach will not suffer from asymmetry problems since only bonds with the target BBB credit rating are included, and does not require any assumptions about the relative DRP slopes for different credit ratings, since the BBB DRP is estimated directly. The drawback to this approach is that restricting the sample to BBB bonds only results in a small sample that can have non-robust results. In this case, there were 25 BBB bonds in the sample, and Incenta (2016b) concluded that this sample size was large enough.<sup>16</sup>
53. The dummy variable regression in approach (c) assigns binary 0-or-1 variables for BBB- and BBB+, whereby the observation is assigned a value of one if the bond has

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<sup>15</sup> We note that, in addition to symmetry in credit rating margins, there would also need to be symmetry in the number of BBB- and BBB+ bonds in order for the pooled regression estimate to be unbiased. For example, if there were to be considerably more BBB+ bonds than BBB- bonds in the sample, then the resulting pooled regression estimate would be biased downwards.

<sup>16</sup> We note that there were 5 bonds with BBB ratings that were issued by financial firms and/or were callable bonds. Had the selection criteria in Incenta (2015a) been strictly followed, there would only be 20 bonds with BBB rating.

the same credit rating as the binary variable, and a value of zero otherwise. The two dummy variables thus separately estimate the margins between the DRP at the BBB credit rating and the other two ratings, which then allows the asymmetries in the dataset to be taken into account as part of the estimation. This approach implicitly assumes that the DRPs of the pooled credit ratings all exhibit the same slope.

54. After reviewing the three approaches above, Incenta (2016b) concluded that the linear regression on BBB bonds only as described in approach (b) was most appropriate:<sup>17</sup>

*Of these estimates, we recommend using the last of these – the 2.65 per cent that is obtained by direct regression on BBB bonds – as the best estimate from an econometric approach in the spirit of the PwC (2013) report (albeit modified to respond to asymmetry in debt risk premia around the BBB credit rating at present).*

#### 3.2.2.4 Methodological issues

55. Although Incenta (2016b) concluded that single-credit regression was most appropriate for the DBCT dataset, it is important to note that Incenta (2016b) stressed that the choice to carry out a single credit rating regression was an empirical matter, and that a different choice might have been more appropriate depending on the observations in the specific dataset.
56. For example, in deciding to deviate from PwC’s (2013) original pooled regression approach, Incenta (2016b) noted [emphasis added]:<sup>18</sup>

*We observe that whether the curves for the different credit ratings have a different slope – or are parallel – as well as the magnitude of any differential is **ultimately an empirical issue**, and it is plausible for any such differentials to vary over time.*

57. When assessing the appropriateness of obtaining a BBB estimate via a pooled regression around BBB+ and then applying a differential (approach (a)), Incenta (2016b) also commented [emphasis added]:<sup>19</sup>

*However, it may be objected that by constraining the slope of the BBB debt risk premium function to be equal to that of the BBB+ function (based on the pooled regression) this approach does not allow for the fact that the BBB*

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<sup>17</sup> Incenta (2016b), p. 19.

<sup>18</sup> Incenta (2016b), p. 7.

<sup>19</sup> Incenta (2016b), p. 13.

*function may be steeper with term, as was commented on by PwC(2103) [sic].<sup>20</sup> **Ultimately, this is an empirical matter.***

58. Furthermore, as will be observed from our analysis in section 4, the DRP estimates derived from the PwC (2013) and Incenta (2016a, 2016b) methods could be highly sensitive to the inclusion of certain individual bonds. These bonds, which are referred to in econometrics as “high leverage observations”, will exhibit disproportionate influence on the final DRP estimate if their residual maturities are substantially higher than the average residual maturity of the sample.
59. For these reasons, we are of the view that it would be bad practice to apply the PwC (2013) and Incenta (2016a, 2016b) approaches in a mechanistic way without having had the opportunity to assess the dataset first. It would therefore be appropriate for Aurizon to advise the QCA that it will provide (or reserves the right to provide) its best estimate of the 10 year DRP once the averaging period is over and analysis can be undertaken of the relative merits of each method, and potential modifications to the methods, given the available data.

### 3.3 Other approaches

60. The AER and West Australian ERA have applied different approaches for estimating the benchmark spread. These approaches are discussed in sections 3.3.1 and 3.3.2 respectively.

#### 3.3.1 AER approach

61. The AER’s preferred approach is purely based on third-party data, with no econometric modelling carried out. In addition, the AER focuses on estimating the 10-year spread to swap instead of DRP, which will then be added to the 10-year swap rate instead of the risk-free rate.
62. The AER’s preferred approach refers to Bloomberg’s broad BBB BVAL yield curve and the RBA’s broad BBB DRP curve (RBA Table F3). The 10-year DRP from each curve is derived by extrapolating the curves to 10 years where necessary, and the two estimates are then averaged to obtain the benchmark 10-year DRP.<sup>20</sup>
63. We note, however, that the AER’s preferred approach has been subject to substantial criticism in a number of stakeholder submissions, with several DNSPs proposing to

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<sup>20</sup> Extrapolation is necessary for the BVAL curve if the published estimates do not extend to the 10-year tenor. With the RBA curve, extrapolation is required because the effective tenor of the 10-year estimate is often less than 10 years.

We note that the AER’s method for extrapolating the BVAL and RBA curves involves several steps and is not simply based on linear extrapolation of the spreads to swap at available tenors.

include estimates from the Reuters broad BBB curve, and at least one DNSP proposing to undertake some econometric modelling.<sup>21</sup>

64. The AER has also publicly indicated in a number of DNSP final decisions that it is currently involved in an appeal to the Australian Competition Tribunal on a number of regulatory issues, possibly including the methodology for estimating DRP.
65. Section 4.4 contains a more detailed discussion of the differences between the PwC (2013) / Incenta (2016a, 2016b) methodology and that of the BVAL and RBA curves, as well as the relative merits of each approach.

### **3.3.2 ERA approach**

66. The West Australian ERA uses its own set of search criteria to obtain a sample of bonds. These criteria are largely similar to the criteria that the RBA for identifying its sample – which notably includes both foreign currency issues (swapped back into AUD) and bonds with options (callable and puttable bonds) where the DRPs on those bonds are adjusted to take account of the impact of the option (using Bloomberg’s OAS (option adjusted spread) calculations). That said, there are a few differences such as a higher minimum residual term to maturity and the inclusion of bonds denominated in GBP.
67. The ERA uses econometric methods to obtain three yield curves, and derives its 10-year yield estimate as the simple average of all three. The three spread to swap curves are:
  - Gaussian kernel extrapolated to 10 years;
  - Nelson-Siegel curve; and
  - Nelson-Siegel-Svensson curve.
68. Finally, the 10-year yield is converted to a 10-year spread to swap by deducting the 10-year swap rate obtained from Bloomberg.

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<sup>21</sup> CEG, Best estimate of debt risk premium for the 16 November to 4 December 2015 period, February 2016, in Jemena, Victorian 2016-2020 Electricity Distribution Process Review: Submission to the Victorian EDPR Process, February 2016, pp. 7-9.

## 4 Applying methodologies to arrive at BBB+ and BBB DRPs

### 4.1 Parameters

#### 4.1.1 Credit rating

69. Aurizon currently has a BBB+ S&P credit rating. As will be shown in section 5.3, however, analysis of the historical DRPs associated with Aurizon's bonds suggest that a coal premium should be applied to Aurizon's bonds. This could possibly be implemented by estimating the benchmark DRP for a BBB rating, which is one notch higher than Aurizon's actual rating.

#### 4.1.2 Debt term

70. There is considerable regulatory precedence in Australia that supports the use of a 10-year debt term when estimating the return on debt. This assumption was used by PwC (2013) and Incenta (2016a, 2016b), as well as by the AER and West Australian ERA. There is no evidence in support of a deviation away from the accepted regulatory precedence, and we assume a debt term of 10 years for the rest of our analysis in this section.

#### 4.1.3 Averaging period

71. For the purpose of this analysis, we assume a placeholder averaging period between 1 June 2016 and 30 June 2016.

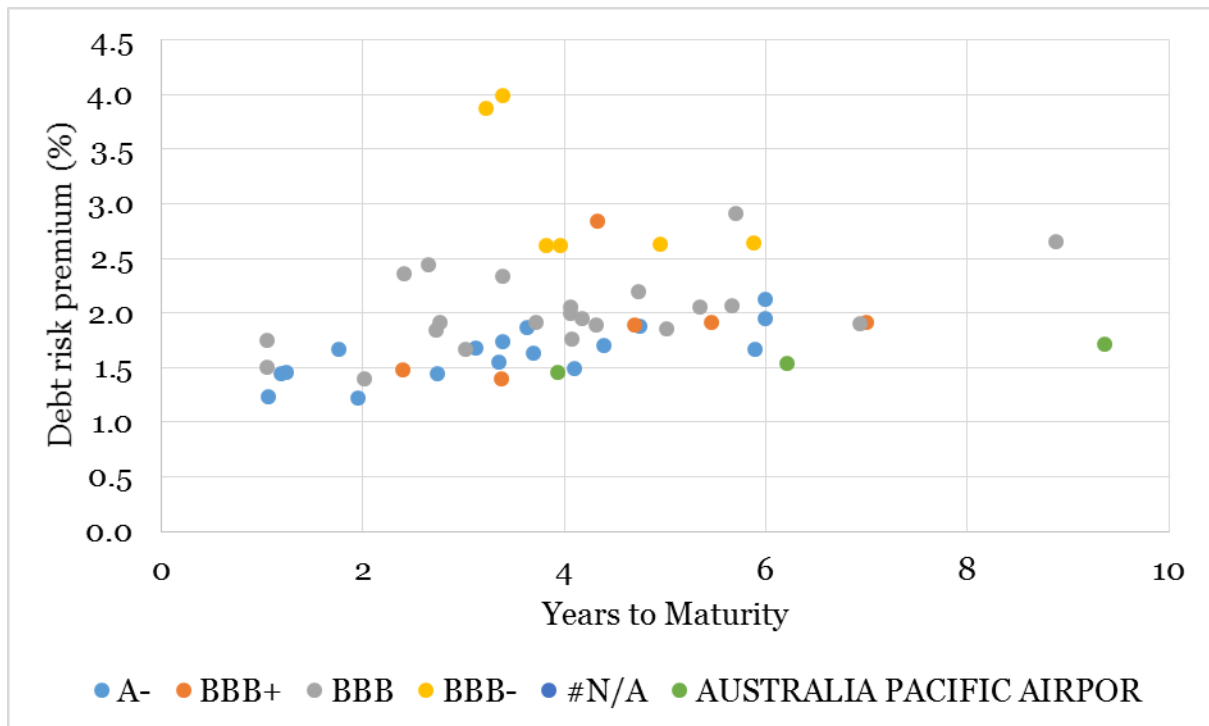
### 4.2 Bond sample

72. We conducted a Bloomberg search using the same criteria set out by Incenta (2016b):

- Bonds issued in Australia by an entity incorporated in Australia;
- At least one credit rating between A- and BBB- (inclusive) as published by S&P, Moody's, or Fitch;
- Denominated in AUD;
- Senior debt;
- Not inflation-linked;
- Fixed rate or floating coupons;
- Issued on or before 30 June 2016; and

- Maturing on or after 30 June 2017.
73. As noted in section 3.2.2, Incenta (2016b) purported to exclude bonds issued by financial firms and bonds with maturity options, but this was not reflected in their published dataset. We therefore follow Incenta’s (2016b) approach and do not exclude such bonds from our sample. The resulting sample consists of 90 bonds, which is broadly comparable to the sample size of 84 bonds identified by Incenta (2016b).
74. Following Incenta (2016b), we collect the historical yields of the bonds identified in our sample and deduct the interpolated Commonwealth Government bond yields from RBA Table F16 to obtain the bond DRPs. These are shown in Figure 4-1.

**Figure 4-1: DRPs of bonds in the sample**



Source: Bloomberg, RBA, CEG analysis

75. A few qualitative observations can be made from a visual inspection of Figure 4-1. First, the margins between adjacent credit notches (i.e., margins from A- to BBB+; BBB+ to BBB; and BBB to BBB-) appear to be asymmetric. As was pointed out by Incenta (2016b), such an asymmetry could result in biased estimates for the pooled regression.
76. Second, the slopes of each credit notch also visually appear to be somewhat unequal. For example, A- bonds appear to have flatter slopes than bonds with the other credit ratings. Incenta (2016b) noted that such asymmetry could also result in biased

estimates for the pooled regression with dummy variables. This is because the dummy variables only accommodate differences in levels but not differences in slopes.

77. Finally, two possible BBB- outliers can be observed in Figure 4-1, with DRPs at 3.87% and 3.99%. These bonds were issued by Glencore Australia Holdings and Alumina Ltd respectively. We note that Incenta (2016a) removed the same Glencore bond on the basis that it was an outlier, but its DRP at that time was 7.42%. The DRP of the Glencore bond has almost halved since then, and it is possible that there is no longer a good reason to exclude it. It may also be prudent to include the Alumina bond since its DRP is far below the 7.42% level that Incenta (2016a) observed in the outlying Glencore bond at that time.
78. Applying the same reasoning adopted by Incenta (2016b) suggests that it may be appropriate to carry out linear regression on the single target rating notch without pooling the bonds with different credit ratings. However, we note that there are only eleven bonds in the sample with BBB+ credit ratings (six if financial firms and callable bonds are excluded), which is considerably smaller than the 25 BBB bonds in Incenta's (2016b) sample.
79. As was pointed out by Incenta (2016b), the above issues are primarily empirical and should not be assumed to apply generally to all datasets. The most appropriate approach that should be applied to the dataset derived from Aurizon's actual averaging period therefore cannot be determined beforehand without first carrying out analysis on the actual dataset.

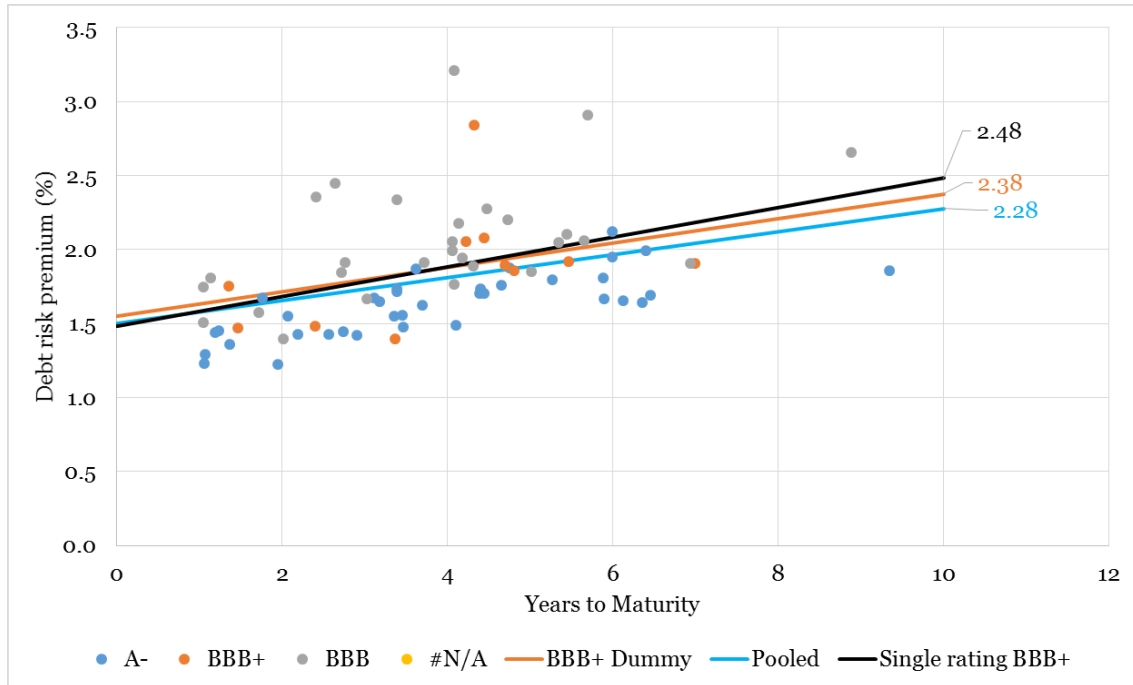
## 4.3 Econometric estimation

### 4.3.1 Incenta method

80. Figure 4-2 to Figure 4-4 show the linear regression estimates using the three regression techniques set out in Incenta (2016b):
  - Pooled linear regression;
  - Pooled linear regression with dummies for each credit rating; and
  - Linear regression on the BBB+ single rating.
81. Figure 4-2 shows the estimates when applied to the subsample containing A-, BBB+, and BBB bonds, while Figure 4-3 shows the estimates when applied to BBB+, BBB, and BBB- bonds. Figure 4-4 shows the estimates for the entire sample of bonds (A-, BBB+, BBB, and BBB-).
82. The 10-year DRP estimates from the different samples are summarised in Table 4-1.

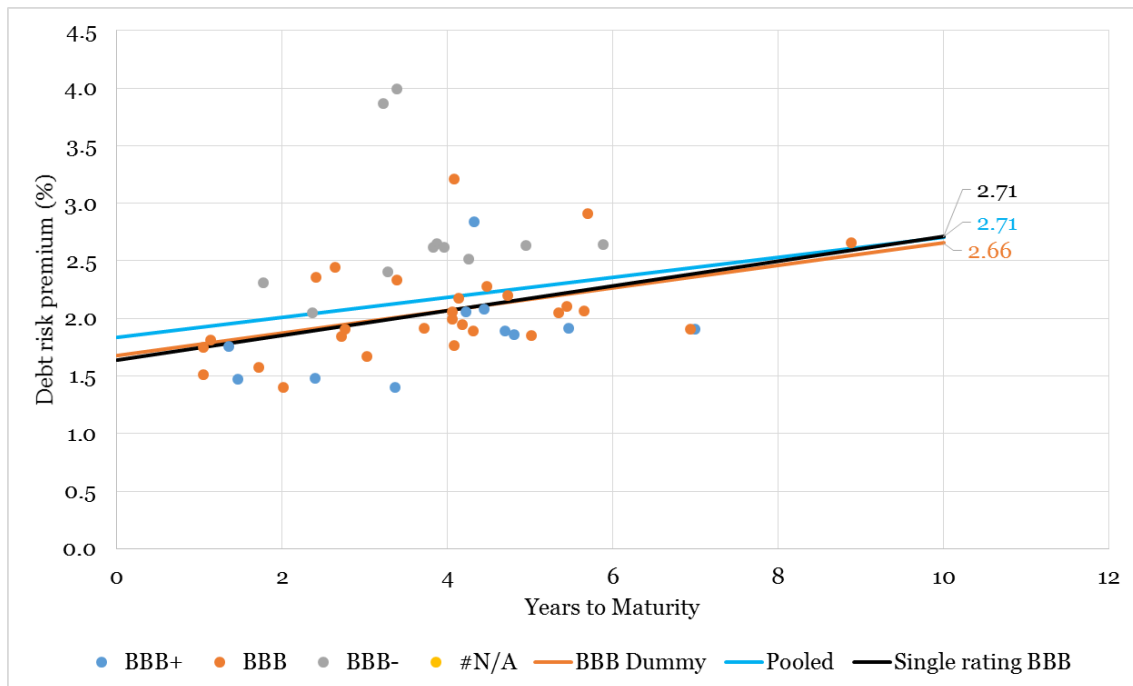


**Figure 4-2: BBB to A- rated bonds including financial issuers and bonds with options (annualised)**



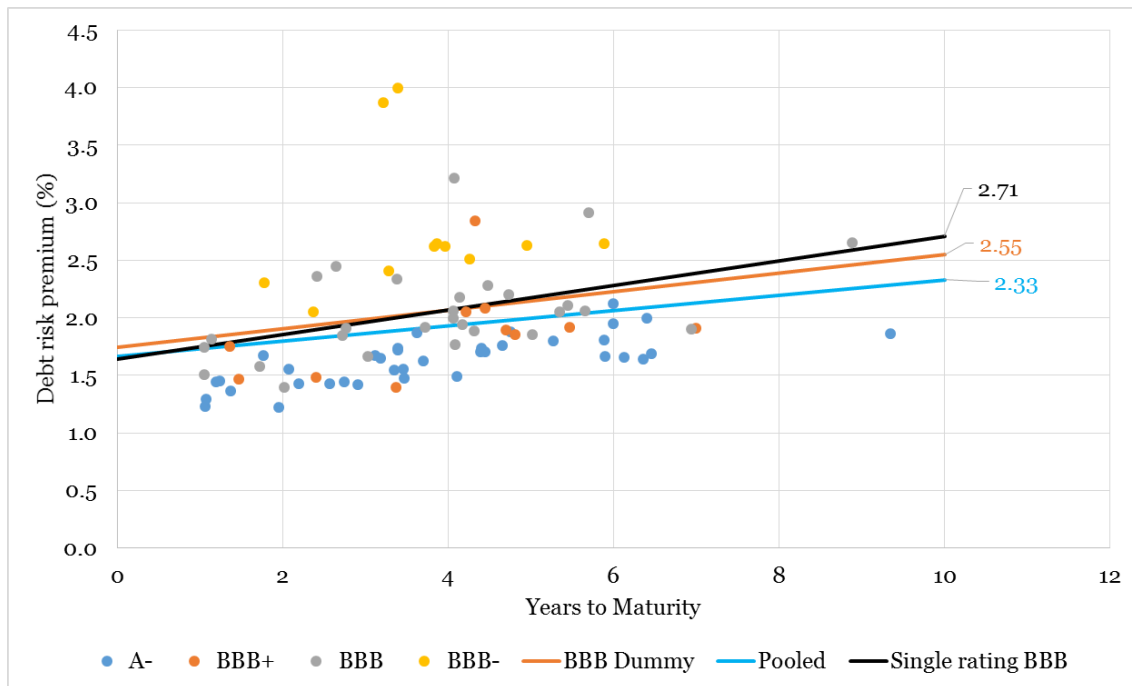
Source: Bloomberg, RBA, CEG analysis

**Figure 4-3: BBB- to BBB+ rated bonds including financial issuers and bonds with options (annualised)**



Source: Bloomberg, RBA, CEG analysis

**Figure 4-4: BBB- to A- rated bonds including financial issuers and bonds with options (annualised)**



Source: Bloomberg, RBA, CEG analysis

83. Table 4-1 below provides estimates of DRP based on the PwC/Incenta methodology leaving financial bonds and bonds with optionality in the sample. (As discussed in section 3.2.1.1 and 3.2.2.1, Incenta (2016a, 2016b) states that it removed these bonds but our analysis suggests that this was not actually done.) The PwC method of pooling all the bonds one notch above/below BBB+ gives an estimate 2.28%. However, the Incenta method of using just BBB+ bonds gives 2.48%. Note that we consider the criteria for adopting the Incenta departure from PwC pooled estimate are met. The same logic applied to BBB gives 2.71% irrespective of which method is used.

**Table 4-1: Financial bonds and options included (annualised)**

Model	A-, BBB+, BBB		BBB+, BBB, BBB-		A-, BBB+, BBB, BBB-	
	BBB+	BBB	BBB+	BBB	BBB+	BBB
Pooled	2.28	-	-	2.71	-	-
Dummies	2.38	2.56	2.47	2.66	2.36	2.55
Single rating	2.48	2.71	2.48	2.71	2.48	2.71

Source: Bloomberg, RBA, CEG analysis

84. Table 4-2 repeats the analysis excluding financial issuers and bonds with options. The BBB+ estimates are 2.29%-2.47% and the BBB estimates are 2.44%-2.63%.

**Table 4-2: Financial bonds and options excluded (annualised)**

Model	A-, BBB+, BBB		BBB+, BBB, BBB-		A-, BBB+, BBB, BBB-	
	BBB+	BBB	BBB+	BBB	BBB+	BBB
Pooled	2.29	-	-	2.60	-	-
Dummies	2.32	2.47	2.29	2.44	2.23	2.37
Single rating	2.47	2.63	2.47	2.63	2.47	2.63

Source: Bloomberg, RBA, CEG analysis

85. However, it is worth noting that the pooled regression excluding Financials/callable bonds results are sensitive to the inclusion of APA (Melbourne Airport) bonds. The two A- bonds with the long tenor in Figure 4-2 and Figure 4-4 above consist of: a callable bond issued by Dexus Financial (which is excluded if financials/callable bonds are excluded) and an APA bond. APA bonds are the lowest A- bonds in the sample and the fact that they happen to have one of only two bonds with maturity above 7 years gives them a lot of weight in the pooled regression. If we exclude APA bonds the pooled estimate increases from 2.29% to 2.51% (i.e., above the BBB+ only estimate).

**Table 4-3: Financial bonds and options excluded; Australia Pacific Airports Excluded (annualised)**

Model	A-, BBB+, BBB		BBB+, BBB, BBB-		A-, BBB+, BBB, BBB-	
	BBB+	BBB	BBB+	BBB	BBB+	BBB
Pooled	2.51	-	-	2.60	-	-
Dummies	2.44	2.61	2.29	2.44	2.32	2.47
Single rating	2.47	2.63	2.47	2.63	2.47	2.63

Source: Bloomberg, RBA, CEG analysis

86. As mentioned in section 4.2, we consider that asymmetries in the margins and slopes of adjacent rating notches could result in biased estimates in the pooled regression and pooled regression with dummy variables.
87. Applying the single rating approach from Incenta (2016b) to this placeholder sample produces estimates of 10-year DRP at 2.48% for a benchmark BBB+ rating and 2.71% for a benchmark BBB rating.

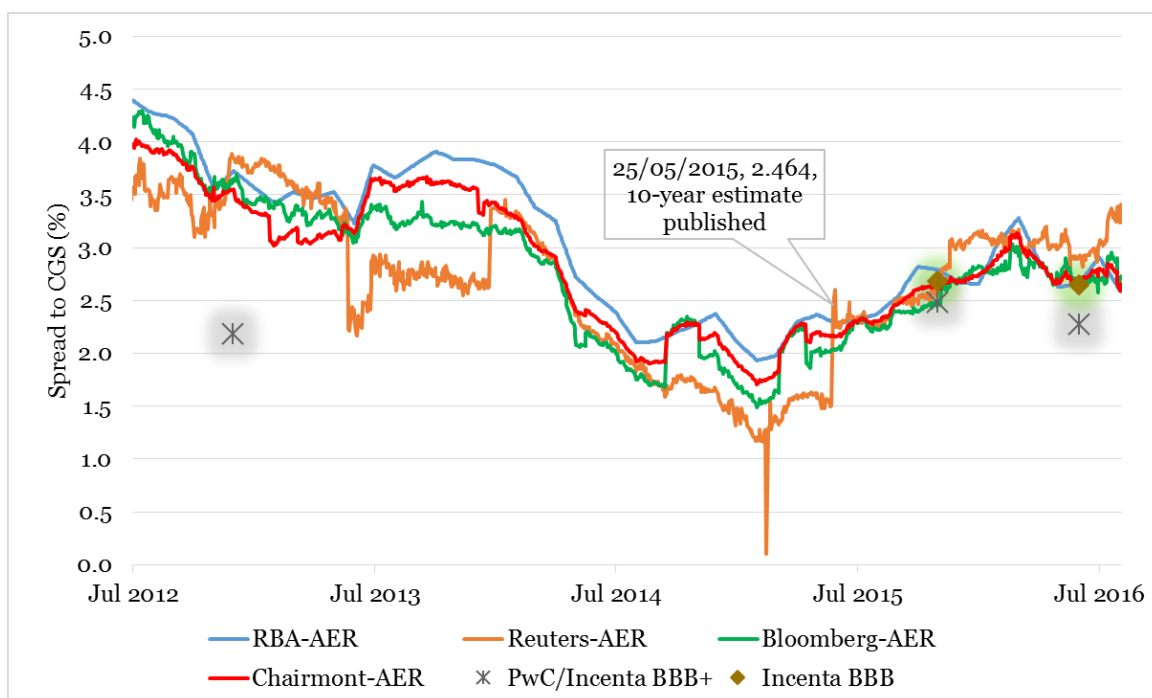
#### 4.4 RBA, BVAL and Reuters vs PwC/Incenta

88. Other sources of 10-year DRP estimates are:
- Bloomberg AUD Australia Corporate BBB+ BBB BBB- BVAL Yield Curve (“BVAL curve”);
  - Reuters BBB rating AUD credit curve (“Reuters curve”); and

- RBA estimates of average BBB DRPs for non-financial Australian corporates (including on debt issued in foreign currencies and swapped back into AUD).

89. The historical levels of these curves compared to applications of the PwC/Incenta method is illustrated in Figure 4-5 below. In the below figure each series is extrapolated to 10 years where necessary using the AER methodology (which is why each series has “AER” in its description).

**Figure 4-5: Third party estimates vs PwC/Incenta (annualised)**



Source: Bloomberg, RBA, Reuters, PwC, Incenta, CEG analysis

90. It can be seen that the DRP estimates obtained by PwC (2013) and Incenta (2016a, 2016b) have typically been lower – and seldom materially above the other estimates.
91. Not shown in this chart is the material difference between BVAL (2.69%) / RBA 2.79%) / Reuters (2.94%) and CEG’s application of the Incenta methodology (2.29% to 2.47% for BBB+ and 2.44% to 2.63% for BBB) in June 2016. An important explanation for why the BBB+ Incenta estimate is lower in this period is the issuance of a new BBB+ rated bond by Jemena and the different weight it is given by the Incenta method vs the weight BVAL, RBA and Reuters give this bond in June. That said, from late July BVAL appears to have given this bond much more weight which is coincident with the dramatic fall in BVAL DRPs observed on the far right of the above diagram. This is discussed further in section 4.4.3 below.

#### 4.4.1 Differences in sample selection across the methods

92. The BVAL and Reuters samples are both “broad BBB” curves, which incorporate bonds from all three BBB rating notches. This contrasts with the pooled regression approaches of PwC (2013) and Incenta (2016a), both of which include bonds from the A-, BBB+, and BBB ratings. RBA includes only fixed rate BBB- to BBB+ bonds issued by non-financial Australian corporates but includes bonds issued by these corporates in foreign currency.
93. The BVAL sample is restricted to AUD-denominated bonds issued by Australian firms, while the Reuters sample is restricted to AUD-denominated bonds but does not impose restrictions on the country of the issuing firm. Similar to the BVAL sample, the PwC (2013) and Incenta (2016a) samples both restrict their bonds to AUD-denominated bonds.
94. In addition, the BVAL and Reuters samples both exclude non-bullet bonds and bonds with optionality. In contrast, the PwC (2013) and Incenta (2016a) approaches include floating-rate bonds while excluding bonds with optionality. Incenta (2016b) includes floating-rate bonds, and states that it excludes bonds with optionality but does not actually do so. The RBA sample includes bonds with optionality but adjusts the estimated yields using the Bloomberg OAS function (option adjusted spread).
95. Unlike the RBA, the BVAL and Reuters samples both do not exclude bonds issued by firms in the financial sector. However, PwC (2013) and Incenta (2016a) do exclude them. Incenta (2016b) purports to exclude such bonds, but does not actually do so.<sup>22</sup>
96. Finally, we note that the BVAL and Reuters samples seem to apply some form of judgement in their sample selections. This can be seen in their exclusion of various BBB+ bonds issued by Coca Cola Amatil, which appear to exhibit lower yields than the rest of the constituent bonds, and are therefore arguably not representative of the yields of benchmark BBB bonds.
97. Although Incenta (2016a) and Incenta (2016b) also exclude most of the bonds issued by Coca Cola Amatil by removing bonds that do not have an “AU” prefix in their ISIN numbers, this additional constraint does not have the same result as a blanket removal of bonds issued by Coca Cola Amatil. Specifically, the Incenta (2016a) and Incenta (2016b) samples still contain one Coca Cola Amatil bond, while the Reuters sample does include bonds without “AU” prefixes in their ISIN numbers.
98. In terms of sample size, the RBA curve has historically featured the largest number of bond constituents among the three third-party curves, followed by the Reuters curve, while the BVAL curve has the smallest sample size. As at 1 August 2016, the RBA sample has 89 bonds, the Reuters sample has 40 bonds, and the BVAL sample has 20 bonds. In addition, only the RBA sample contains long-dated bonds, with 5

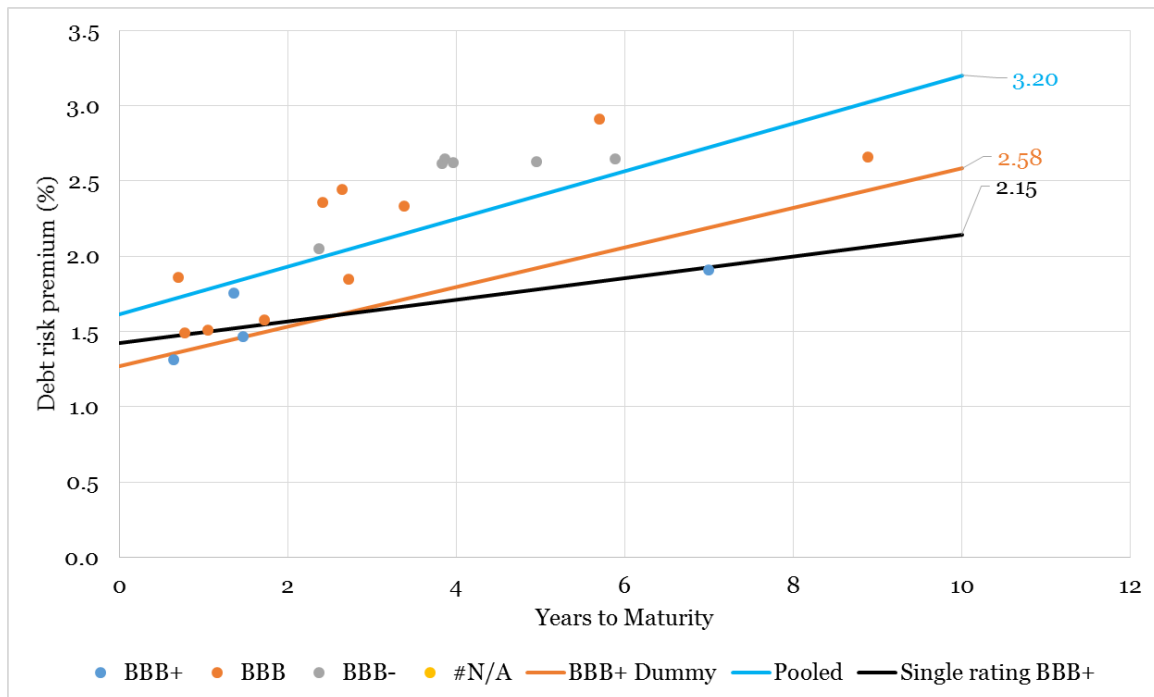
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<sup>22</sup> See sections 3.2.1.1 and 3.2.2.1.

bonds having residual maturities exceeding 10 years, while the BVAL and Reuters curves have none.

99. In order to investigate the impact of differences in sample selection, we re-estimate Figure 4-3 using only the constituent bonds of the BVAL curve as at 30 June 2016. The results are shown in Figure 4-6 and Table 4-4.

**Figure 4-6: Linear regression of BVAL sample (annualised)**



Source: Bloomberg, RBA, CEG analysis

100. Note that the blue (BBB+) observation at 7 years maturity is the recently issued Jemena bond discussed above (and discussed further below in section 4.4.3).

**Table 4-4: BVAL sample DRP compared to QCA’s DRP from BBB+ BBB BBB- samples (annualised)**

Sample Model	Incl. Finc & Options		Excl. Finc & Options		BVAL sample	
	BBB+	BBB	BBB+	BBB	BBB+	BBB
Pooled	-	2.71	-	2.60	-	3.20
Dummies	2.47	2.66	2.29	2.44	2.58	3.02
Single rating	2.48	2.71	2.47	2.63	2.15	3.19

Source: Bloomberg, RBA, CEG analysis

101. As can be seen from Table 4-4, using the BVAL sample generally results in large increases in the estimated 10-year DRP except for the single-rating regression of

BBB+ bonds. As shown in Figure 4-6, this exception probably arises due to small sample size, whereby the single BBB+ bond with approximately 7 years to maturity is a high-leverage observation that has disproportionate influence on the linear regression estimates. We further investigate the characteristics and influence of this bond (LW474837 Corp) in section 4.4.3.

#### 4.4.2 Differences in estimation

102. Unlike PwC (2013) and Incenta (2016a, 2016b), which apply variations of linear models to their datasets in order to obtain estimates of the 10-year DRP, none of the three independent sources discussed in section 4.4.1 rely on linear methods.
103. The RBA fits its DRP and spread to swap curves non-parametrically using a Gaussian kernel approach, in which the spread at each tenor is calculated as a weighted average of the spreads of the bonds in the sample.<sup>23</sup> The weight assigned to each bond varies according to the issue amount (larger issues have more weight) and residual tenor (bonds with residual tenors close to the target have more weight).
104. Reuters fits its curve using a smoothing spline approach,<sup>24</sup> which seeks to minimise the sum of squared residuals and a smoothness term, which is represented by a “roughness penalty”.<sup>25</sup> In this way, the curve fitting approaches balances the trade-off between having a curve with a better fit, versus a smoother curve.
105. The methodology used for estimating the BVAL curve is proprietary and thus not publicly available. CEG has in the past carried out its own analysis of the characteristics of the BVAL curve,<sup>26</sup> but it is ultimately not possible to determine with certainty how the curve is estimated. While Bloomberg has released some documentation on how it estimates its curves,<sup>27</sup> the information provided is still relatively sparse, although it is known that the Bloomberg uses a series of reference curves as part of its estimation process.<sup>28</sup>

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<sup>23</sup> RBA, New Measures of Australian Corporate Credit Spreads, December 2013.

<sup>24</sup> Reuters, Thomson Reuters: Customer Zone – Data Support – Bond-derived Zero Curves, accessed on 8 February 2016. URL (Reuters login required): <https://customers.thomsonreuters.com/a/datasupport/Realtime/bondderived.aspx>

<sup>25</sup> Reuters, Govt Bond Zero Curve – Calculation Methods, accessed on 8 February 2016. URL (Reuters login required): <https://customers.thomsonreuters.com/a/datasupport/Realtime/bondderived.aspx>

<sup>26</sup> See, for example: CEG, Recent financial market conditions and the BVAL curve – updated to 19 February 2016, February 2016.

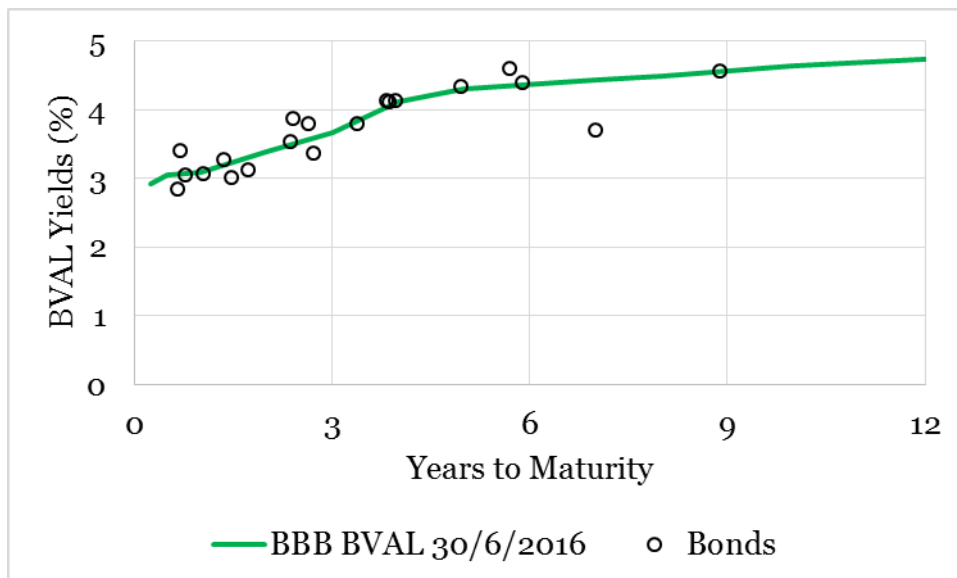
<sup>27</sup> Bloomberg, BVAL Curves, p. 4.

<sup>28</sup> Lally, Review of Submissions on implementation issues for the cost of debt, October 2015, p. 14.

#### 4.4.3 LW474837 Corp: SGSP Australia 28/06/2023 (Jemana)

106. LW474837 Corp is a 7-year fixed-rate bullet bond issued by SGSP Australia Assets Pty Ltd (a subsidiary of Jemena) on 28 June 2016 and matures on 28 June 2023.
107. One feature of the bond is its conflicting credit ratings – S&P rated the bond BBB+ on 21 June 2016, while Moody’s assigned it an A3 rating on 27 June 2016. In addition, the bond is a constituent of the BVAL broad-BBB curve and the Reuters broad-A curve.
108. The position of LW474837 Corp relative to the BVAL yield curve and BVAL DRP curve as at 30 June 2016 is shown in Figure 4-7 and Figure 4-8. Both charts show that LW474837 is clearly anomalous relative to the rest of the sample. The charts also suggest that the 10-year DRP as at 30 June 2016 is primarily influenced by the bond with around 9 years to maturity (EK907291 Corp, issued by Asciano Finance), with LW474837 Corp appearing to have little impact.
109. The corresponding charts as at 29 July 2016 are shown in Figure 4-9 and Figure 4-10. Here, it can be seen that LW474837 Corp has a greater influence on the 10-year DRP estimate, which contrasts with the negligible estimate it had on 30 June 2016. The reason for this shift in influence is unknown since the BVAL curve-fitting methodology is not publicly available.

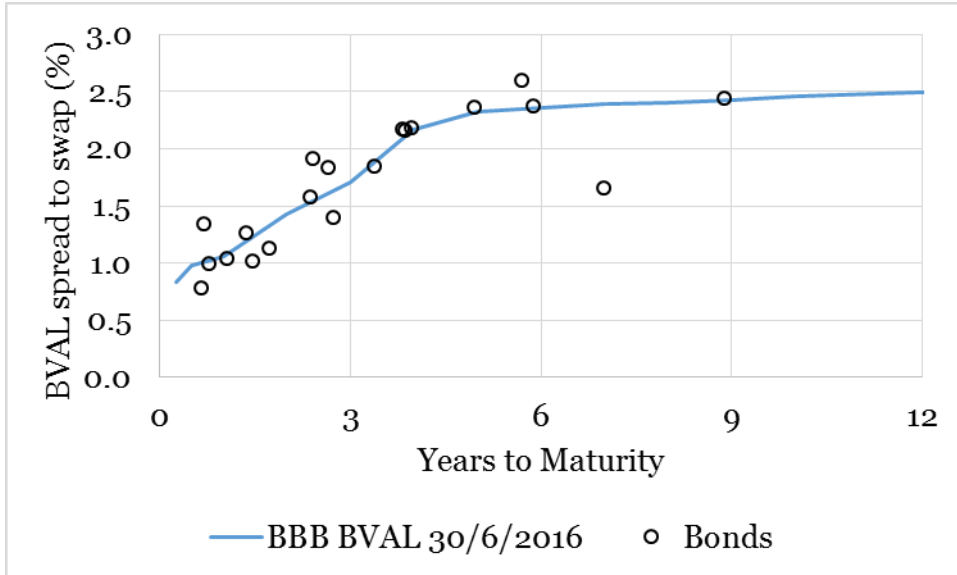
**Figure 4-7: BVAL yield curve and constituents 30 June 16 (semi-annual)**



Source: Bloomberg

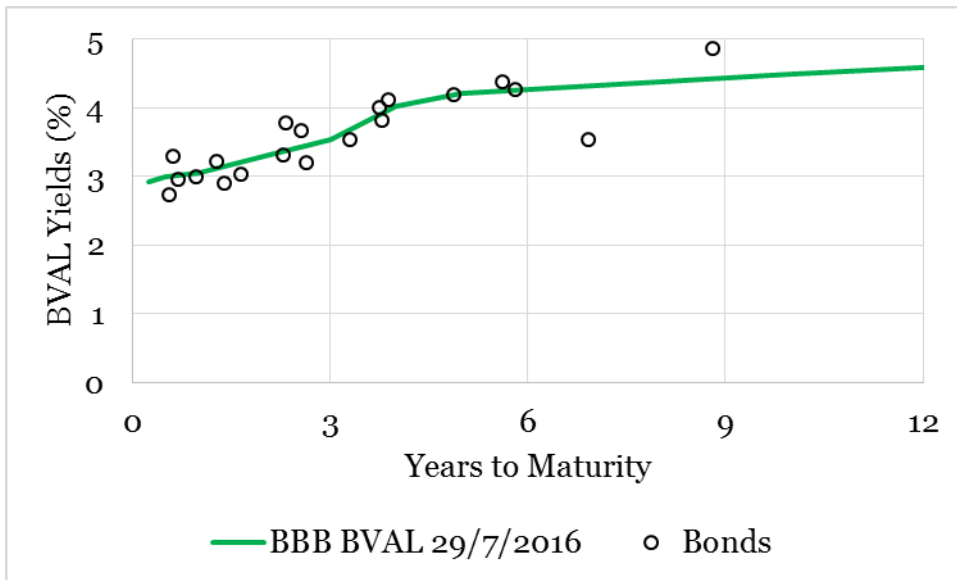


**Figure 4-8: BVAL DRP curve and constituents 30 June 16 (semi-annual)**



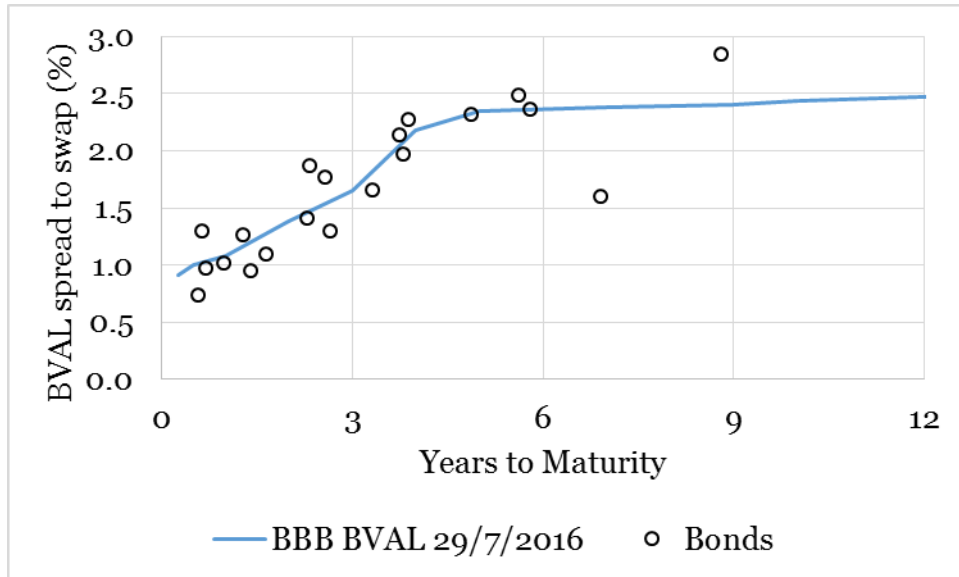
Source: Bloomberg, CEG analysis

**Figure 4-9: BVAL yield curve and constituents 29 July 16 (semi-annual)**



Source: Bloomberg

**Figure 4-10: BVAL DRP curve and constituents 29 July 16 (semi-annual)**



Source: Bloomberg, CEG analysis

110. In order to investigate the impact of LW474837 Corp, we re-estimate Table 4-2 with LW474837 Corp excluded. These new results are shown in Table 4-5. Comparing the Table 4-5 and Table 4-2, it can be seen that the removal of LW474837 Corp generally results in approximately 5 bp increases in 10-year DRP estimates. We note, however, that a number of estimates exceed 3% (highlighted yellow). This illustrates the potential impact of a single bond on mechanistic application of the PwC/Incenta methodology.

**Table 4-5: Financial bonds and options excluded, LW474837 excluded (annualised)**

Model	A-, BBB+, BBB		BBB+, BBB, BBB-		A-, BBB+, BBB, BBB-	
	BBB+	BBB	BBB+	BBB	BBB+	BBB
Pooled	2.31	-	-	2.72	-	-
Dummies	2.38	2.49	2.36	3.50	2.27	2.39
Single rating	3.28	2.63	3.28	2.63	3.28	2.63

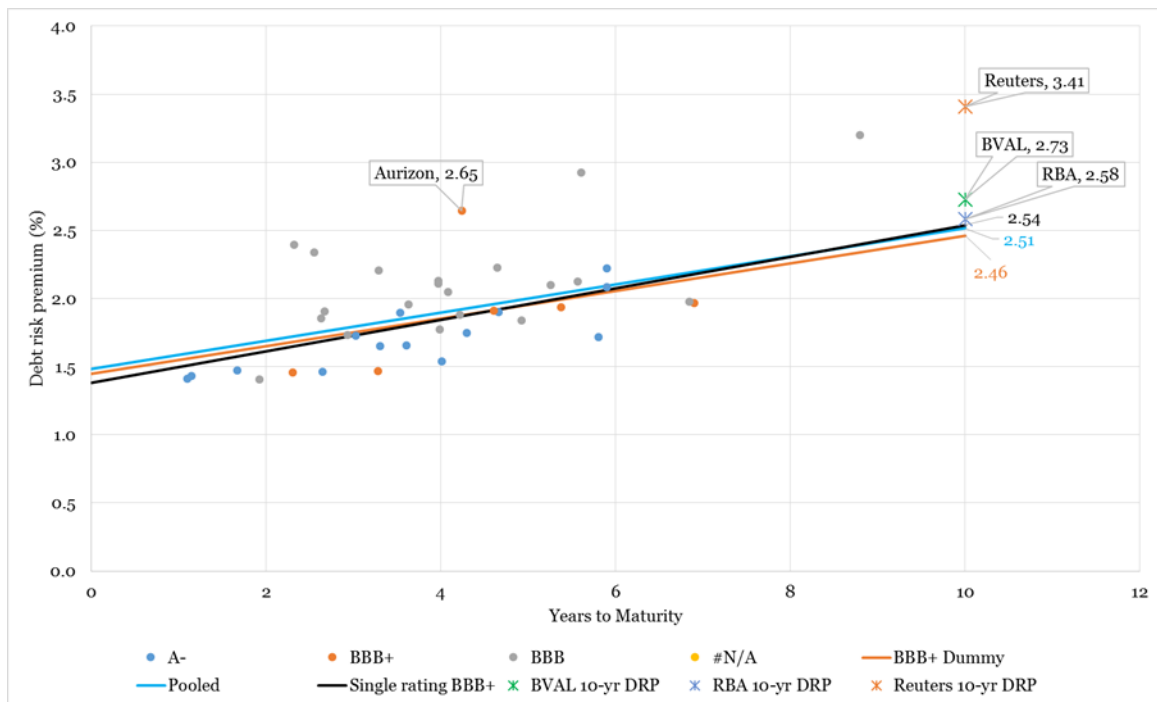
Source: Bloomberg, RBA, CEG analysis

#### 4.4.4 More up-to-date estimates

111. Given that there have been significant fluctuations in the recent values of the third party provider's estimates – with material falls in both the RBA and BVAL estimates as can be seen on the right hand side of Figure 4-5 above – it is useful to compare the most recent estimates from the relevant methods.

112. In order to provide an up-to-date comparison of the PwC/Incenta estimates against RBA/BVAL/Reuters estimates we have updated our analysis to 2 August 2016 (the date after the RBA's most recent estimate and after the date that Bloomberg began giving the Jemena bond material weight).

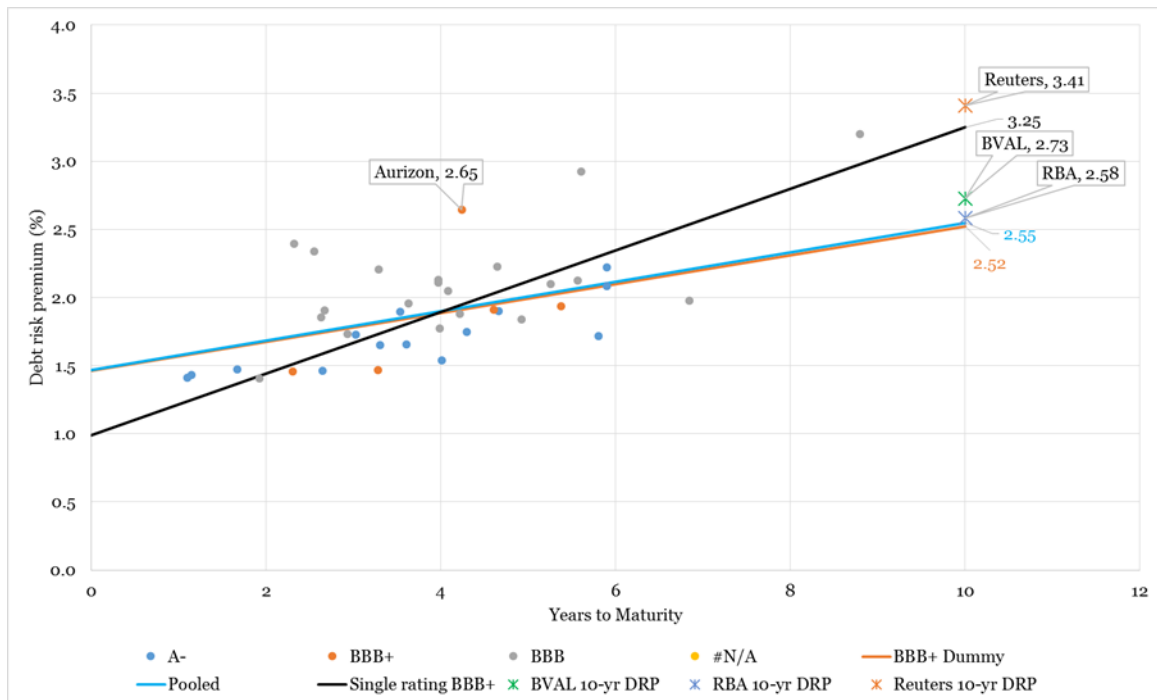
**Figure 4-11: Snapshot on 2 August 2016 - third party estimates vs PwC/Incenta (annualised)**



Source: Bloomberg, RBA, Reuters, CEG analysis

113. It can be seen that on 2<sup>nd</sup> August 2016 the gap has narrowed materially and now the single regression Incenta BBB+ 10 year estimates is 2.54% which is closer to, but still below, Bloomberg's (2.73%) and RBA's (2.58%) 10 year estimates.
114. It also can be seen that Incenta's BBB+ only regression methodology is sensitive to variations in data. There are only 6 BBB+ bonds in this sample and the BBB+ only linear regression is very sensitive to the location of the specific observations. For example, if the 7 year Jemena BBB+ bond at 7 years maturity (DRP just under 2%) is removed from the sample then all of the regression estimates increase but the BBB+ single regression increases dramatically (by 71bp). This is illustrated in Figure 4-12 below.

**Figure 4-12: Snapshot on 2 August 2016 - third party estimates vs PwC/Incenta (annualised)**



Source: Bloomberg, RBA, Reuters, CEG analysis

115. It should be noted that the Jemena bond in question is rated A3 (equivalent to A-) by Moody's, and Reuters has thus included this bond in the underlying sample of its broad A curve. However, the reason it is in the Incenta BBB+ sample is because Incenta applies the lower rating whenever there is a conflict between rating agencies. This can be expected to bias the average credit quality assigned to each credit rating upwards (with bonds that some credit agencies believe should be rated higher included in the sample but bonds which some credit rating agencies believe should be rated lower excluded). The different treatment by Reuters and Bloomberg of this Jemena bond likely partly explains their different 10 year estimates.

#### 4.4.5 Summary and evaluation

116. The DRPs in the placeholder sample identified by the PwC (2013) and Incenta (2016a, 2016b) samples appear to exhibit a number of characteristics that caused Incenta (2016b) to deviate from the pooled linear regression approach set out in PwC (2013) and Incenta (2016a). Specifically, the bonds in the sample appear to exhibit different slopes across different credit ratings, and the margins between the ratings on either side of the central target rating appear to asymmetric.
117. Incenta (2016b) ran into similar issues and ultimately decided to apply a single credit rating regression, although it was noted that the choice of the appropriate method to

use was an empirical issue, which should be determined from an analysis of the underlying data.

118. In light of the issues discussed above, should the QCA elect to retain the main components of PwC's (2013) methodology, it would be prudent for Aurizon to first carry out analysis of the actual bond sample after its averaging period is over before proposing its DRP estimate.
119. This is because the appropriate linear regression to apply is an empirical matter and cannot be selected without knowing the DRP sample for the actual averaging period - a point noted by Incenta (2016b). A mechanistic application of any one of the variations of the linear regression approach would thus lead to unpredictable results that may end up being inappropriate.
120. If the QCA decides to abandon PwC's (2013) methodology in favour of third party estimates, three sources that it could consider are the BVAL, RBA, and Reuters curves. The main benefit of using third party estimates is that the third party curves can incorporate independent expert judgement, such as the removal of Coca Cola Amatil bonds from the broad BBB curve. On the other hand, the exercise of independent judgement also reduces transparency, especially with the BVAL curve, whose estimation procedure is not publicly available.
121. We further note that CEG has recently carried out its own review of the third party estimates based on the following five criteria, and concluded that the RBA curve was had the best performance, while the Reuters and BVAL curves were equally second best:<sup>29</sup>
  - a. The source is derived from a dataset that best matches the characteristics of debt issued by a benchmark efficient entity (BEE).
  - b. The source is derived from a large data set of the type of bonds specified in criterion (a);
  - c. The source is derived using a transparent methodology that is accurate and robust – in the sense that the source can be relied on to provide an accurate estimate of the cost of debt for a BEE, and is not unduly influenced by a small number of observations in the dataset;
  - d. The source is regularly published by an independent reputable organisation that is not a stakeholder in regulatory determinations;
  - e. The source has a track record of accuracy.

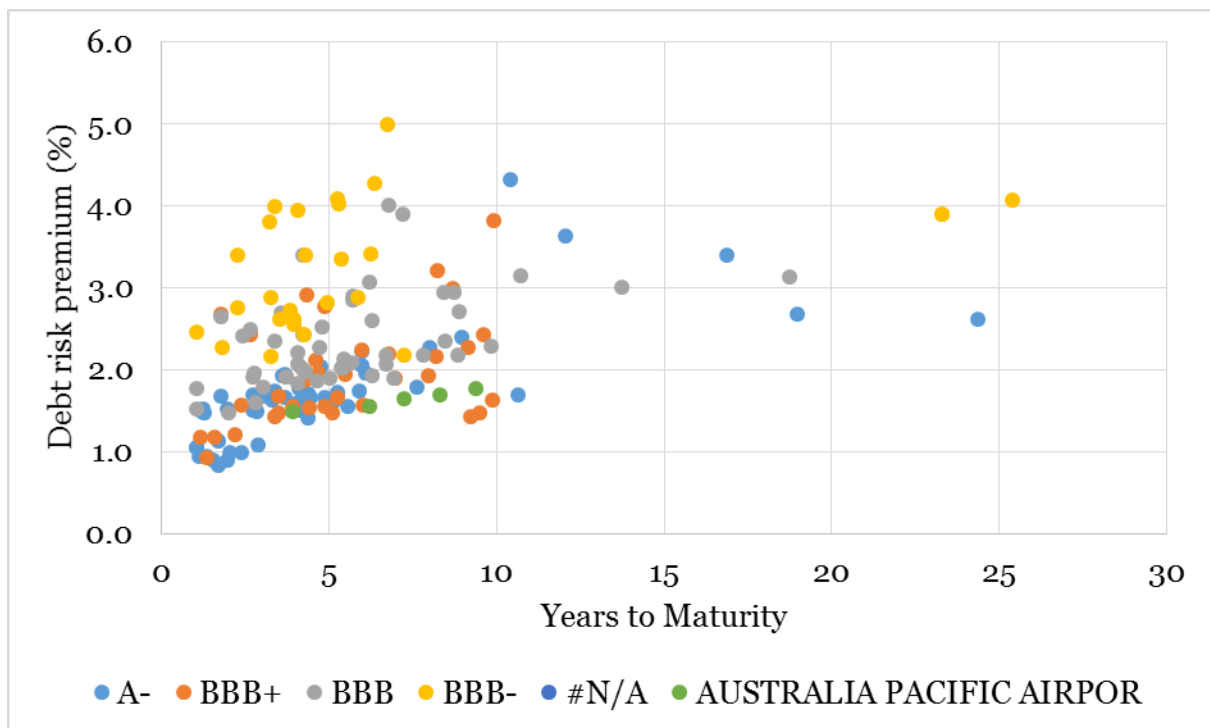
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<sup>29</sup> CEG, Criteria for assessing fair value curves, January 2016.

## 4.5 Including foreign currency bonds

122. Given the potential concerns with application of the PwC/Incenta method with a small sample size, we consider that some consideration should be given to the inclusion of bonds issued in foreign currencies (swapped back into AUD) and bonds issued with options (but with DRPs adjusted using ERA's methodology as cited in section 3.3.2). This involves more or less adopting the ERA/RBA approach to sample selection.
123. When we do this the sample size increases materially as illustrated in Figure 4-13 below, which includes callable and putable bonds while excluding bonds issued by financial firms.

**Figure 4-13: Snapshot on 2 August 2016 - third party estimates vs PwC/Incenta (annualised)**



Source: Bloomberg, RBA, Reuters, CEG analysis

124. The application of PwC/Incenta methodology to this sample results in the following DRPs which may be less sensitive to issues pertaining to small sample sizes.

**Table 4-6: Impact of including foreign currency and option adjusted DRPs (annualised)**

Model	A-, BBB+, BBB		A-, BBB+, BBB	
	BBB+	BBB	BBB+	BBB
	No maximum maturity restriction		Exclude bonds with greater than 20 years maturity	
	Incenta/PwC sample			
Pooled	2.29	-	2.29	-
Dummies	2.32	2.47	2.32	2.47
Single rating	2.47	2.63	2.47	2.63
	FX and option adjusted DRPs included*			
Pooled	2.47	-	2.55	-
Dummies	2.42	2.79	2.47	2.84
Single rating	2.40	2.74	2.40	2.74

Source: Bloomberg, RBA, CEG analysis; \*EFO69549 Corp removed from the sample for consistency since historical Bloomberg yields were not available for this bond.

## 4.6 Contingencies for the PwC and Incenta methods

125. As discussed in section 3.2.2.4, Incenta (2016b) noted that the statistical issues influencing the choice among the pooled, dummy, and single-rating methods is an empirical issue that ultimately depends on the dataset.
126. In addition to Incenta's (2016b) observation, it is also possible for all three methods to generate inappropriate results - including such that the resulting 10-year DRP estimates may differ substantially from third-party estimates. In this regard, we note that PwC (2013), Incenta (2016a), and Incenta (2016b) all drew comparisons of their 10-year DRP estimates with reference to third-party estimates from Bloomberg and/or the RBA.
127. We therefore propose some high-level principles that could be used as indicators of peculiarities in the dataset, although these proposed principles are not intended to supersede Incenta's (2016b) caution regarding the need to evaluate the properties of each individual dataset. The proposed principles are described in sections 4.6.1 to 4.6.3.

### 4.6.1 Estimates that vary greatly with the pooled, dummy, and single-rating approaches

128. Estimates in which the pooled, dummy, and single-rating approaches generate a wide range of estimates should be treated with caution, since such high variability could be indicative of underlying issues with the specific dataset that result in imprecision

of estimates. Examples of such issues could include outliers, sampling error due to small or asymmetric samples,<sup>30</sup> and non-linearity.

129. The 10-year DRP estimates from the pooled, dummy, and single-rating approaches from PwC (2013), Incenta (2016a) and Incenta (2016b) are shown in **Error! Reference source not found.**

**Table 4-7: 10-year DRP estimates using dummy variables, pooled regression, and individual regressions**

	Dummy	Pooled	Individual	Range (bp)
PwC (2013)	3.55	3.18	-	37
Incenta (2016a)	2.24	2.31	2.10	21
Incenta (2016b) BBB	2.54	3.01	2.65	47

#### 4.6.2 Estimates that are at odds with independent third-party estimates

130. PwC (2013) compared its DRP estimate with the Bloomberg BFV estimate, while Incenta (2016a) and Incenta (2016b) make comparisons against Bloomberg’s BVAL estimate as well as the RBA’s estimate. Recently, the AER has also considered the Reuters BBB curve as a possible source of estimates.<sup>31</sup>
131. All three sources make use of different sampling criteria and curve-fitting techniques, which in turn result in different DRP estimates. One possible indicator of the validity of the DRP estimates obtained from the PwC/Incenta methods is to check whether the estimates lie within the range of estimates obtained from the third party sources. Specifically, caution should be exercised if the PwC/Incenta estimate turns out to be higher or lower than all three third party estimates, or is materially different from the average of the third party estimates.

#### 4.6.3 Outliers and high leverage observations

132. Outliers and high leverage observations can be particularly problematic if the underlying sample only contains a small number of bonds. However, identifying outliers is often difficult in practice, while observations with high leverage do not necessarily reflect errors in the data.

<sup>30</sup> Small sample problems could arise out of individual credit ratings having a small number of bonds, or from the lack of bonds with terms to maturity close to the target tenor of 10 years. Similarly, problems could arise if the sample of bonds exhibits asymmetry with unequal bond numbers in each credit rating and across different maturities.

<sup>31</sup> See, for example: AER, Final Decision: Australian Gas Networks Access Arrangement 2016-21, Attachment 3 – Rate of Return, May 2016, p. 3-123.



133. One possible approach to identifying outliers and high leverage observations that should be removed would be to compare the bonds in the PwC/Incenta sample against the bonds selected by third parties. That is, bonds that have been omitted by Bloomberg/RBA/Reuters in spite of fulfilling the respective selection criteria should be assessed more closely in order to determine whether such bonds are representative of the target sample.
134. The exclusion of the recently issued Jemena bond by Bloomberg and Reuters from the BBB curve is an example of this conduct (see section 4.4). Another example is that CEG previously noted that the BVAL and RBA curves had omitted a number of bonds issued by Coca-Cola Amatil, even though the bonds appeared to meet the criteria set by the third parties.<sup>32</sup> We note that these bonds ended up being omitted from the PwC/Incenta samples due to the different sampling criteria used. However, had the Coca-Cola Amatil bonds fulfilled the PwC/Incenta sampling criteria, it might have been prudent to consider removing them if their DRPs appeared to be unrepresentative of the benchmark efficient firm.
- 135.

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<sup>32</sup> CEG, Criteria for assessing fair value curves: an update, September 2016, p. 15.

## 5 Coal premium analysis

### 5.1 Defining a benchmark efficient entity for Aurizon

136. A further important issue is the fact that DRPs on Aurizon’s bonds are materially higher than the DRPs on other BBB+ bonds. We consider that this likely reflects a ‘coal’ premium being priced in by debt investors who are concerned about Aurizon’s ability to recover its fixed and sunk investments (primarily in below rail assets) serving the expanded coal sector.
137. This is likely true notwithstanding that Aurizon is subject to a revenue cap. While the operation of a revenue cap does provide Aurizon with some short term protection against its coal customers declining usage and/or bankruptcy, regulation cannot shield Aurizon from the longer term risks to recovery of sunk costs. Specifically, the risk that coal prices fall to a level where a shrinking base of coal volumes cannot support the full recovery of Aurizon’s sunk infrastructure expenditure.<sup>33</sup> That is, regulation can potentially allow for recovery of Aurizon’s network costs to be reallocated to the most profitable miners as less profitable mines close/scale back production. However, regulation cannot force miners as a whole to pay Aurizon’s costs if the price of coal falls below the level at which it can support the recovery of all costs in the supply chain.
138. Moody’s and S&P have retained Aurizon’s Baa1/BBB+ credit rating for now (although Moody’s has placed Aurizon on ‘negative watch’ in part due to “increased likelihood of volatility in cash flow because of potential defaults by mine counterparties”)<sup>34</sup>. Investors appear to have taken a less sanguine view of Aurizon’s exposure to the coal sector and are demanding a higher premium than most BBB, let alone BBB+, rated bonds.
139. Aurizon’s experience in this regard is shared by other downstream coal transport companies in Australia and internationally. This includes coal terminals DBCT and Abbot Point who have both suffered credit rating downgrades on 14 March 2016 explained with the same language:<sup>35</sup>

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<sup>33</sup> Or where political pressure resulting from mine closures/coal sector job losses results in future Governments limiting the ability of Aurizon to recover its fixed costs from a dwindling customer base.

<sup>34</sup> Moody’s Investor Service, Rating Action: Moody’s confirms Aurizon Holdings Baa1 rating; outlook negative. Global Credit Research - 11 Apr 2016

<sup>35</sup> Moody’s Investor Service, Rating Action: Moody’s downgrades DBCT’s rating to Ba2; outlook negative. And, Moody’s Investor Service, Rating Action: Moody’s downgrades Adani Abbot Point Terminal’s rating to Ba2; outlook negative.

*"The rating downgrade reflects the increasing likelihood of material volatility in DBCT's [AAPT's] cash flows due to the weakened position of its coal mining counterparties, the sole source of such cash flows..."*

140. Moreover, other railway operators internationally with significant coal operations have suffered significant increases in DRP in recent periods. For example, the four railways with the highest percentage of coal related revenues in North America are (in order): CSX (19%), Burlington Northern Santa Fe LLC (17%), Norfolk Southern (17%) and Canadian Pacific Railways (10%). With the exception of Burlington, these are all rated BBB+. These railways also have significant oil, chemicals and metals bulk haulage (as summarised in Table 5-2 below). The average DRP on the bond closest to 10-year residual maturity as issued by each of these three BBB+ businesses increased by 27.6% on average between January 2015 and January 2016.
141. Outside North America internet research suggests that Transnet in South Africa (28%) and Aurizon in Australia (close to 100%) are the other railway owners with high reliance on coal traffic. For these businesses the increase in DRP from January 2015 to January 2016 has been 76.4% and 28.3%.
142. These results are summarised in the below table.

**Table 5-1: Change in DRP for BBB+ coal railway operators (semi-annual)**

Company	Country	DRP in January 2015 <sup>36</sup>	DRP in January 2016	Change in DRP
CSX Corp	USA	1.60	1.96	36 bp
Canadian Pacific Railway	Canada	1.73	2.14	41 bp
Norfolk Southern Corp	USA	1.28	1.76	48 bp
Transnet Soc Ltd	South Africa	2.87	5.06	219 bp
Aurizon	Australia	1.66	2.13	47 bp

Source: Bloomberg; ^Transnet Soc Ltd has a BBB+ local issuer credit rating and BBB- foreign issuer rating; ^EJ889313 Corp, an AUD bond, is used here for comparison purposes since no USD bonds issued by Aurizon was identified in our search.

143. Aurizon's increase in DRP is in line with the increase in DRP for comparable businesses. In light of this evidence we consider that it is reasonable to conclude that the increase in Aurizon's observed DRP is consistent with a generalised debt market view that infrastructure providers serving the coal network attract a material risk premium compared to other similarly rated businesses.

<sup>36</sup> CSX: EC071537 1/12/2028; Canadian Pacific Railway: EC470634 15/10/2031; Norfolk: ED943095 17/5/2025; Transnet: EJ293642 26/7/2022; Aurizon: EJ889313 28/10/2020 (this bond was selected because it is an AUD bond).

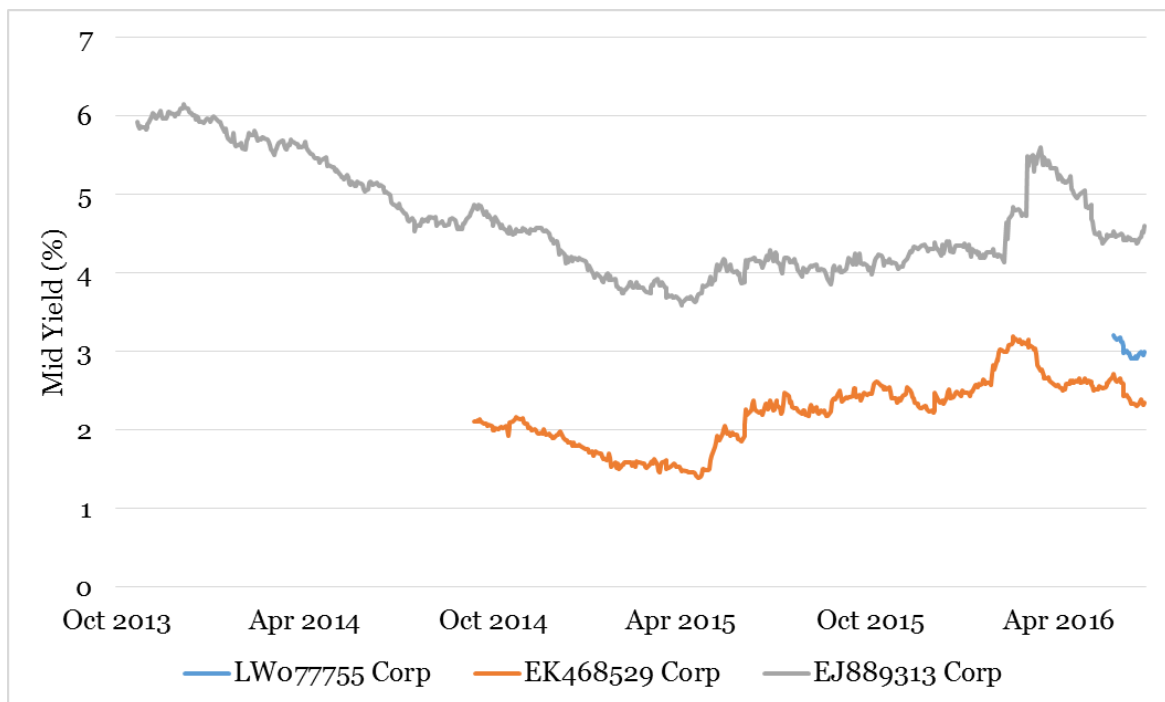
## 5.2 Aurizon compared to BVAL broad-BBB benchmark

144. Bloomberg lists three active bonds that were issued by Aurizon:

- EJ889313 Corp: BBB+ AUD bond issued on 28 October 2013 and maturing on 28 October 2020;
- EK468529 Corp: BBB+ EUR bond issued on 18 September 2014 and maturing on 18 September 2024; and
- LWO77755 Corp: BBB+ EUR bond issued on 1 June 2016 and maturing on 1 June 2026.

145. All three bonds are bullet bonds with fixed maturities. A comparison of the yields of all three bonds can be seen in Figure 5-1 (these yields are not adjusted for the currency of issue).

**Figure 5-1: Yields of bonds issued by Aurizon (semi-annual)**



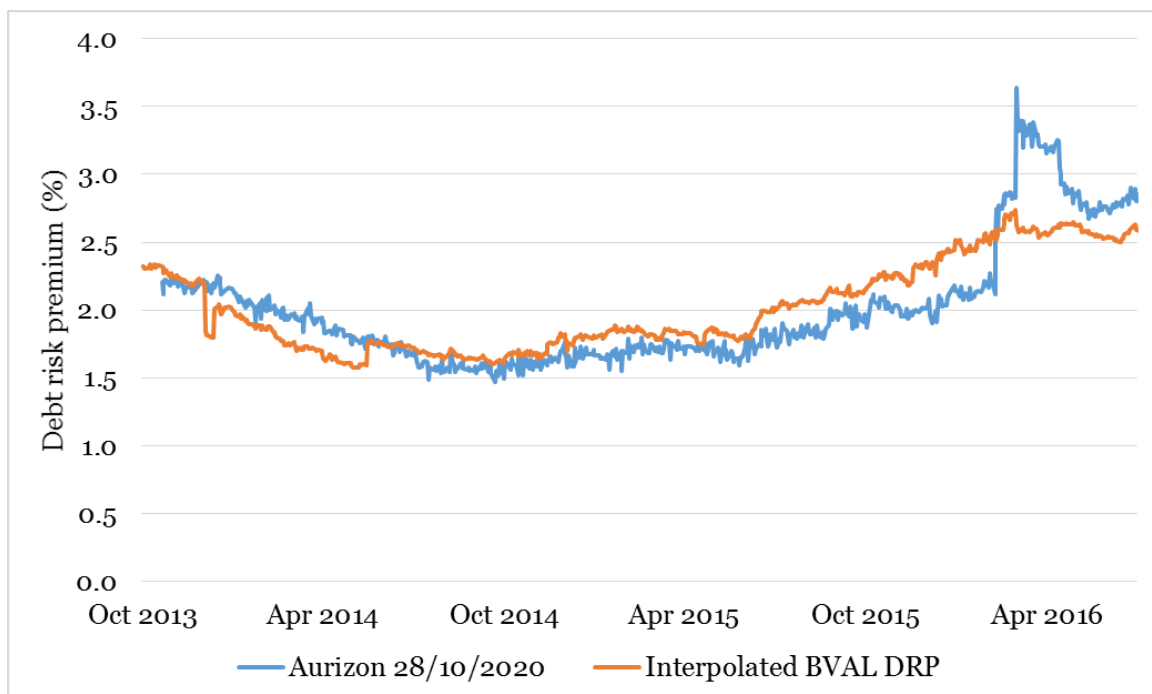
Source: Bloomberg

146. Given the QCA's approach for estimating DRP has historically focused on bonds denominated in AUD, we now focus our analysis on the EJ889313 Corp bond.

147. We evaluate the performance of Aurizon's bonds by comparing the historical DRP of Aurizon's AUD bond against that of Bloomberg's BVAL broad-BBB benchmark curve. Bloomberg fits the BVAL curve against AUD bullet bonds that have BBB+, BBB, or BBB- credit ratings, and that were issued by Australian firms.

148. The comparison is carried out by linearly interpolating the BVAL curve on each trading day in order to obtain an estimate of the benchmark yield with the same time to maturity as the Aurizon AUD bond. We then convert the historical yields into DRP by deducting the risk-free rate, which we obtained by linearly interpolating the yields of Commonwealth Government bonds from the RBA website (Table F16).
149. Figure 5-2 shows the historical DRP of Aurizon’s AUD bond compared to the BVAL broad-BBB benchmark DRP.

**Figure 5-2: DRPs of AUD bonds issued by Aurizon and the interpolated BVAL curve (semi-annual)**



Source: Bloomberg, RBA, CEG analysis

150. It can be seen that Aurizon’s AUD bond tracked fairly closely with the BVAL benchmark between October 2013 and June 2015, although there was a period between December 2013 and May 2014 where Aurizon’s DRP exceeded the BVAL benchmark, as well as a period between November 2014 and June 2015, where the BVAL benchmark had a slightly higher DRP than Aurizon’s.
151. After June 2015, however, there appeared to be a marked divergence in the movements of Aurizon’s AUD bond compared to the BVAL benchmark. From June 2015 to February 2016, the DRP of the BVAL benchmark was consistently above that of Aurizon’s AUD bond.
152. Aurizon’s DRP then spiked on 9 February 2016, which eliminated the spread between the DRP of the Aurizon AUD bond and the benchmark DRP, before undergoing

another spike on 1 March 2016 that raised the Aurizon DRP considerably above the benchmark DRP. While the spread between the DRP of the Aurizon bond and the benchmark series declined after March 2016, Aurizon’s DRP still remained 21 bp higher than the BVAL broad-BBB benchmark as at 30 June 2016.

153. Two observations can be made from the preliminary evidence above. First, the DRP of the Aurizon bond is broadly similar in level compared to the BVAL broad-BBB benchmark.
154. Second, while the DRP of the Aurizon bond is similar in *level* with the BVAL benchmark, it can be seen that there are periods in which the former Aurizon’s debt is perceived to be higher risk, as evidenced by the elevated DRP of the Aurizon bond after the spike on 9 February 2016, which is consistent with the experiences of other coal carriers in the same timeframe, as will be shown in section 5.3. This observation calls into question the implicit assumption that Aurizon’s regulatory regime will always be able to protect it from asset stranding risk.

### 5.3 Aurizon compared to other coal-transporting railroads

155. Having compared the DRP of Aurizon’s AUD bond against the BVAL benchmark, we now analyse the DRPs of bonds issued by coal-transporting railroads. Due to data constraints, we expand our search to include bonds issued by foreign firms.

#### 5.3.1.1 Empirical evidence

156. We identified comparator firms by first carrying out a Bloomberg search for bonds issued by firms in the “Railroad” industry as defined by BICS,<sup>37</sup> and with maturities on or later than 30 June 2016.
157. We then manually checked each of the issuers in order to identify the companies that own railroads while also offering coal-transporting services. This check was carried out based on Bloomberg descriptions and through internet searches. Some of the excluded firms include companies that only transport passengers, as well as companies that carry only own rolling stock without owning the railroads or transporting coal.
158. The companies that we identified are shown in Table 5-2.

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<sup>37</sup> These are bonds with “Industrials” as their Bloomberg Industry Classification System (BICS) Level 1 Sector Name, and “Railroads” as their BICS Level 2 Industry Name.

**Table 5-2: List of coal-transporting railroad companies**

Company	Country	S&P rating	Coal transport revenue (%)	Coal, oil, chemicals and metals revenue (%)
Burlington Northern Santa Fe LLC	USA	A	17	26#
CSX Corp	USA	BBB+	19	42
Canadian National Railway Co	Canada	A	5	38
Canadian Pacific Railway Ltd	Canada	BBB+	10	37
Kansas City Southern	USA	BBB-	7	39*
Norfolk Southern Corp	USA	BBB+	17	46
Transnet Soc Ltd	South Africa	BBB+^	28	42##
Union Pacific Corp	USA	A	16	36**

Source: Bloomberg, Company public documents<sup>38</sup>; ^Transnet Soc Ltd has a BBB+ local issuer credit rating and BBB- foreign issuer rating; #Calculated as 17% coal plus 35% × 26% industrial products; \*Calculated as revenues from energy, chemical and petroleum, and 39% of industrial and consumer products; ##Includes only coal and iron ore; \*\*Calculated as sum of revenues from coal, chemicals, and 15% of industrial products.

159. Since Aurizon’s benchmark credit rating is BBB+, we focus primarily on the four firms that also have BBB+ S&P ratings. These four firms are:
- CSX Corp;
  - Canadian Pacific Railway Ltd;
  - Norfolk Southern Corp; and
  - Transnet Soc Ltd.
160. Having identified a sample of coal-transporting railroad companies, we then carried out individual Bloomberg searches in order to identify bonds issued by the four companies and their subsidiaries. As with the approaches used by PwC (2013) and Incenta (2016a), we restrict the sample to bullet bonds with no options.
161. We also restricted the sample to bonds denominated in USD in order to maintain comparability across the four firms. From the resulting sample of bonds, we identify one benchmark bond from each firm with residual maturities close to 10 years. The Bloomberg IDs for the selected bonds are:
- EC071537 Corp: CSX, 1/12/2028;
  - EC470634 Corp: Canadian Pacific Railway, 15/10/2031;

<sup>38</sup> Burlington Northern Santa Fe LLC, 2016 Fixed-income investor call, May 2016, pp. 10, 32; CSX, 2015 Annual Report, pp. 3, 26; Canadian National Railway Co, 2015 Annual Report, p. 17; Canadian Pacific Railway, CP Works Annual Report 2015, pp. 34-37; Kansas City Southern, 2015 Annual Report pp. 28-30; Norfolk Southern, 2015 Annual Report, p. K5, K20; Transnet, Integrated report 2015, p. 128; Union Pacific Corporation, 2015 Investor Fact Book, pp. 12, 26.

- ED943095 Corp: Norfolk Southern Corp, 17/5/2025; and
- EJ293642 Corp: Transnet Soc, 26/7/2022.

162. Next, we collected the historical mid yields of these four bonds using Bloomberg’s “yld\_ytm\_mid” command, and used BVAL as our data source. We also obtained the USD risk-free rates using the Bloomberg Generic Government Yield curve, and then calculated the DRPs for each bond by subtracting the interpolated risk-free rate from the yields of the four bonds. Since the available data on these bonds is somewhat sparse for various time periods, we used linear interpolation to obtain daily DRPs on all weekdays.
163. The average DRP on the bond closest to 10-year residual maturity as issued by each of these three North American BBB+ businesses increased by 27.6% on average between January 2015 and January 2016. Outside North America, Transnet in South Africa and Aurizon in Australia are the other railway owners with high reliance on coal traffic. For these businesses the increase in DRP from January 2015 to January 2016 has been 76.4% and 28.3%.
164. These results were shown in Table 5-1, which we reproduce below in Table 5-3.

**Table 5-3: Change in DRP (measured relative to US Treasuries) for BBB+ coal railway operators with bonds issued in USD (semi-annual)**

Company	Country	DRP in January 2015 <sup>39</sup>	DRP in January 2016	Change in DRP
CSX Corp	USA	1.60	1.96	36 bp
Canadian Pacific Railway	Canada	1.73	2.14	41 bp
Norfolk Southern Corp	USA	1.28	1.76	48 bp
Transnet Soc Ltd*	South Africa	2.87	5.06	219 bp
Aurizon <sup>^</sup>	Australia	1.66	2.13	47 bp

Source: Bloomberg; \*Transnet Soc Ltd has a BBB+ local issuer credit rating and BBB- foreign issuer rating; <sup>^</sup>EJ889313 Corp, an AUD bond, is used here for comparison purposes since no USD bonds issued by Aurizon was identified in our search.

165. Aurizon’s increase in DRP (relative to US Treasuries) is in line with the increase in DRP for comparable businesses with long term USD debt. In light of this evidence we consider that it is reasonable to conclude that the increase in Aurizon’s observed DRP is consistent with a generalised debt market view that infrastructure providers

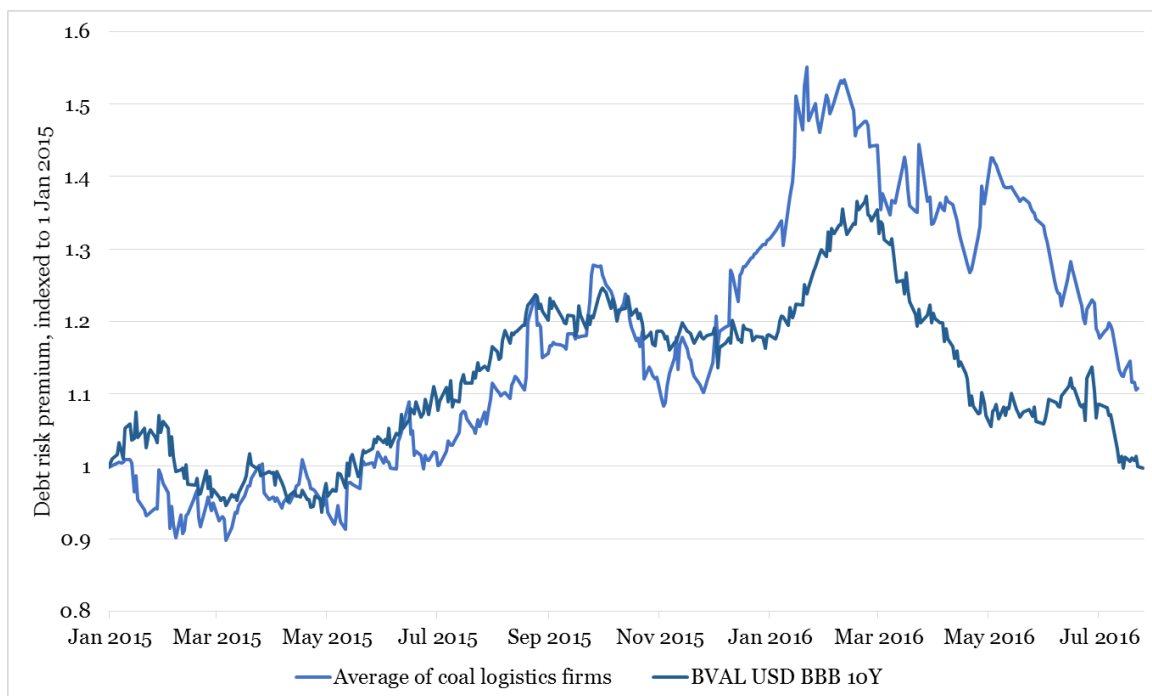
<sup>39</sup> CSX: EC071537 1/12/2028; Canadian Pacific Railway: EC470634 15/10/2031; Norfolk: ED943095 17/5/2025; Transnet: EJ293642 26/7/2022; Aurizon: EJ889313 28/10/2020 (this bond was selected because it is an AUD bond).



serving the coal network attract a material risk premium compared to other similarly rated businesses.

166. Comparing the change in average DRP of the above four bonds relative to the BVAL USD broad BBB Corporate 10-year yield confirms that the increase in DRPs of bonds issued by coal railway operators cannot be sufficiently explained by movements in the general market.
167. Specifically, the average DRP of the four non-Aurizon bonds in Table 5-3 divided by the BVAL broad BBB 10-year yield resulted in a 1.08 ratio in January 2015. This ratio increased to 1.23 in January 2016, which shows that the DRPs of bonds issued by coal/bulk commodity carriers increased by a higher percentage compared to the market increase.
168. This relation can also be seen in Figure 5-3, which compares the average debt risk premium of the above four bonds against the 10-year estimate of the Bloomberg USD broad BBB curve. Since we are aiming to compare the relative movements of the estimates from 1 January 2015 onwards, both curves in Figure 5-3 have been indexed to be equal to one as at 1 January 2015.

**Figure 5-3: Comparison of coal logistics firms against USD BBB benchmark**



Source: Bloomberg, CEG analysis

169. As seen in Figure 5-3, the average DRP of the four bonds experienced substantial growth above and beyond that seen of the BBB benchmark from December 2015

onwards, and continued to remain considerably above the benchmark from that point onwards. This observation is consistent with the increase in DRP observed with Aurizon's bond in Figure 5-2.

### 5.3.1.2 *Third-party assessments*

170. Aurizon faces substantial asset stranding risk if demand for coal declines, since demand for Aurizon's freight services will also be expected to decline as coal miners reduce their coal outputs. Given that transportation of coal forms a substantial portion of Aurizon's revenues, any such fall in demand would increase the risks of asset stranding, under which Aurizon will not be able to recover its costs. This is true even though Aurizon is subject to a revenue cap.
171. The key issue here is that a revenue cap will not protect Aurizon from the possibility of its largest clients becoming insolvent and Aurizon being unable to recover its largely fixed costs from remaining customers without also forcing these customers into insolvency. This is a problem that energy firms experience to a far lesser extent.
172. Moody's echoed the above sentiments in its decision to downgrade Adani Abbot Point Terminal's (AAPT) senior secured rating from Baa3 to Ba2 [emphasis added]:<sup>40</sup>

*"The ratings downgrade reflects the **increasing likelihood of material volatility in AAPT's cash flows due to the weakened position of AAPT's coal mining counterparties, the sole source of such cash flows,**" says Mary Anne Low, a Moody's Analyst, adding, "the ongoing severe pressure facing the coal sector translates into an **increased likelihood of AAPT's counterparty contracts either not being renewed or subject to early termination.**"*

173. Moody's went on to comment on the characteristics of the coal industry and the dependency of coal transporters on the financial health of counterparty coal producers [emphasis added]:<sup>41</sup>

*Given the material challenges facing the coal sector, Moody's considers that AAPT's financial leverage and debt coverage metrics are no longer consistent with the previous ratings.*

*Moody's believes that the current coal market downturn is structural in nature, with weak conditions likely to persist. Such conditions will*

<sup>40</sup> Moody's Investors Service, Rating Action: Moody's downgrades Adani Abbot Point Terminal's rating to Ba2; outlook negative, March 2016.

<sup>41</sup> Moody's Investors Service, Rating Action: Moody's downgrades Adani Abbot Point Terminal's rating to Ba2; outlook negative, March 2016

*continually erode the mine counterparties' financial capacity over time, increasing the likelihood of a default.*

*Unlike other infrastructure asset classes such as airports and tollroads, which ultimately derive revenue from an extensive and broad base of customers, **Moody's believes that if an AAPT counterparty defaults, weak coal market conditions will make it challenging for AAPT to secure replacement tonnage on equivalent terms.***

174. We note that Moody's downgrade of AAPT's credit rating was made in March 2016, which broadly coincides with the spike in the yield of Aurizon's AUD bond as shown in Figure 5-2.
175. Furthermore, even if the remaining customers were able to pay Aurizon's higher unit costs without becoming uneconomic themselves they can be expected to lobby heavily to avoid having to do so. The QCA cannot credibly vouchsafe that such lobbying would not be successful at the level of the State government over multiple regulatory periods. That is, even if the QCA's current intention would be to allow Aurizon to materially increase prices in the face of falling demand they QCA itself may not be able to make good on such an intention.
176. Moody's shared similar views that there was a material prospect that the regulatory process might not enable coal logistics firms to fully recover their costs. In assessing the credit rating of Newcastle Coal Infrastructure Group Pty Ltd (NCIG), Moody's commented [emphasis added]:<sup>42</sup>

***Moody's believes that the coal market risks are outweighing the benefit of the structural protections available to NCIG to mitigate the risk of counterparty default.** Such protections include NCIG's contractual right to immediately draw on third-party provided security covering 12 months of ship-or-pay obligations, the ability to recover shortfalls in revenue by increasing tariffs to the remaining users up to a finance charge cap, in addition to its right to sell or assign such default capacity.*

*"Whilst NCIG's management has provided relief to miners by reducing the terminal's operating cost through various efficiency initiatives, in the event of a material counterparty default, it is our view that **NCIG may be unable to fully recover the lost revenue from remaining mines due to their not having the capacity to pay such an amount,**" says Low.*

177. Moody's was also cognisant about the effect that the weak coal market would have on coal logistics firms. In downgrading DBCT's credit rating to Ba2, Moody's was careful

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<sup>42</sup> Moody's, Rating Action: Moody's places NCIG's ratings on review for downgrade, December 2015, p. 1.

to draw a distinction between coal logistics businesses and utility networks [emphasis added]:<sup>43</sup>

*Moody's believes that the current coal market downturn is structural in nature, with weak conditions likely to persist. Such conditions will continually erode the mine counterparties' financial capacity over time, increasing the likelihood of a default.*

***Unlike other infrastructure asset classes such as regulated utility networks, which ultimately derive revenue from an extensive and broad base of customers, Moody's believes that if a DBCT counterparty defaults, weak coal market conditions will make it challenging for DBCT to secure replacement tonnage on equivalent terms.***

*High levels of coal production and shipments to date by mine counterparties are not necessarily synonymous with ongoing profitability at some coal mines, and may be indicative of mines maximizing production in order to generate sufficient cash flows to cover their fixed cost base (including their take-or-pay liabilities). Such a situation may not be sustainable for mines at current coal prices. Furthermore, downside risk associated with coal prices remains high, and further deterioration in coal prices from current levels will add more pressure on coal mines supplying DBCT's coal terminal.*

178. The analysis carried out by Moody's corroborates our assessment that coal logistics firms such as Aurizon are subject to economic conditions that differ from that of other businesses, particularly utilities networks. Our analysis also concurs with Moody's assessment that such differences in economic conditions have become more pronounced recently due to weaknesses in the coal market.

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Moody's, Rating Action: Moody's downgrades DBCT's rating to Ba2; outlook negative, March 2016, p. 1.