Review of the proposed TCSD calculations

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1 Executive summary

1. The Commission estimates an average "DRP slope" (the basis point increase in DRP for each year of tenor above 5 years) using 2010 to 2016 of 5.6 bppa. However, the Commission's technique of pooling DRP estimates across months is not statistically valid. We have corrected this and a number of other problems with the Commission's analysis and our resulting estimates of the average "DRP slope" (the basis point increase in DRP for each year of tenor above 5 years) using 2010 to 2016 data is between 9.4 and 12.1 based on the results reported in Table 1 below.

Table 1: Average monthly DRP slope (bppa increase per year of tenor)

	Simple	Weighted
5 year DRP estimated with only BBB+ bonds		
BBB+ only bonds	10.9	10.4
5 year DRP estimated with BBB to A- bonds and credit rating dummy variables		
A-	9.4	12.1
BBB+	11.8	11.2
BBB	NA	NA

Source: CEG analysis using Bloomberg data

2. We have validated this by estimating the average DRP slope for each BBB+ and other issuers over the same time period. Our results are summarised in Table 2 and Table 3 below. These results are consistent with our amended version of the Commission's analysis. They are not consistent with the Commission's original estimate of 5.6 bppa.

Table 2: Best estimates DRP slope and correlation of DRP slope with short term DRP for BBB+ issuers

Issuer	Average slope (basis points)
Genesis	10.45
Mighty River Power	10.90
Wellington	12.51
BBB+	**11.29**

Source: Bloomberg data; CEG analysis. Monthly regressions were run on BBB+ bonds that had a minimum term to maturity of 3.5 years.

3. We also report estimates for other credit ratings as they demonstrate results that are broadly similar the results of BBB+ bonds. Overall, the slope average of 9.90 bps is similar to the BBB+ slope average of 11.29 bps.

Table 3: Estimates of DRP slope and correlation of DRP slope with short term DRP

Issuer	Average slope (basis points)	Correlation
Auckland International Airport	6.43	-0.0957
Genesis	10.45	-0.3538
Mighty River Power	10.90	-0.4360
Vector	NA	NA
Wellington	12.51	-0.9399
Contact	2.03	0.0615
Powerco	NA	NA
Spark Finance	13.22	-0.7804
Telstra	NA	NA
Fonterra	13.79	0.2841
Meridian	NA	NA
Christchurch International Airport	NA	NA
Average	**9.90**	**-0.3229**

Source: Bloomberg data; CEG analysis. Note that these are the regression and correlation results from a monthly regression on bonds that have a minimum term to maturity of 3.5 years.

4. The above estimates are, consistent with the Commission's approach average estimates all for the period 2010 onwards. We consider that the most recent estimates should be given the most weight. This is consistent with the fact that the number and quality of observations has been highest in this period (See Figure 5 and Figure 7 below in the body of the report). In addition, the logic used by the Commission to adopt a prevailing 5 year DRP instead of a trailing average DRP equally implies a prevailing DRP slope should be adopted. This implies the most recent estimates should be given the most weight. The more recent estimates of the DRP slope are summarised below.

Table 4: Summary of recent estimates

Methodology	Estimate (bppa)
Commerce Commission NSS estimates since January 2014 (Table 34 of Topic paper 4)	13 (2014 and 2016) to 16 (2015)
CEG estimates since January 2014 as per modified Commission method (Table 23)	10 (2014) to 15 (2016)
CEG estimates since January 2014 averaged across individual issuers (Table 25)	9 (2014) to 14 (2016)

5. Our most recent estimate of the BBB+ DRP slope for the first 6 months of 2016 is around 14-15 bppa depending on the method employed. This is consistent with the Commission's own 13 bppa estimates of the NSS slope over the 3 months January to

March 2016.[1] Including estimates from 2014 onwards this suggests a range of around 10 to 16 bppa. These more recent estimates are is slightly above our best estimate of the average DRP slope over the last 5 years of around 9.4 to 12.1bp based on the results reported in Table 11 (using our amended version of the Commission's method) and which are corroborated by the individual BBB+ issuer DRP slopes (10.5 to 12.5) reported in Table 13.

[1] The Commission reports NSS parameters in Table 34 for this period. The average slope between 10 and 5 years based on these parameters is 13 bppa. Over the year to January 2016/2015 the average slope based on the Commission's NSS parameters reported in Table 34 is 16bp/13bp. Therefore, an estimate of around 15bp bppa is not just consistent with the most recent data but also consistent with the Commission's estimates over the last 2.5 years.

2 Introduction

6. CEG has been asked to critique the Commission's estimate of the 5.6 bppa increase in DRP with tenor above 5 years.[2] This is an average estimate over the period 2010 to 2016. The remainder of this report has the following structure:

- Section 3 corrects the invalid pooling of data from different interest rate environments by the Commission and makes other amendments to the Commission's methodology. We find that these amendments roughly double the estimated DRP slope to 9.4 to 12.1 bppa;
- Section 4 cross validates these estimates using a different methodology of looking at the average DRP slope for each issuer individually. This provides a consistent result to the estimates in section 3;
- Section 5 explains why the most recent estimates of the DRP slope should be used. This section explains that in the last 2 years our estimates are entirely consistent with the Commissions own analysis and, at 13 to 16 bppa are above the estimates using longer time series of data (both our own 2010 to 2016 estimates and the Commissions 2010 to 2016 estimates);
- Section 6 concludes.

[2] The analysis around Figure 23 of the Commission's Topic Paper 4.

3 Using the Commission method to arrive at a monthly DRP slope from 2010 to 2016

3.1 Summary of approach and results

3.1.1 Key results

7. Our key results in this section are summarised below. The first row of results involves the application of our amended version of the Commission's methodology using just BBB+ bonds. The results reported below that involve application of the amended Commission methodology using A- and BBB bonds but including a dummy variable for credit rating to arrive at a benchmark 5 year DRP for each credit rating (against which the DRP slope is measured by comparing to yields on bonds with the same credit rating but greater than 5 years to maturity).

Table 5: Average monthly DRP slope (bppa increase per year of tenor)

	Simple	Weighted
5 year DRP estimated with only BBB+ bonds		
BBB+ only bonds	10.9	10.4
5 year DRP estimated with BBB to A- bonds and credit rating dummy variables		
A-	9.4	12.1
BBB+	11.8	11.2
BBB	NA	NA

Source: CEG analysis using Bloomberg data

3.1.2 Amending the Commission method to derive monthly DRP slope estimates

8. The Commission's methodology estimates a single DRP slope from 2010 to 2016 using two regressions that pool all monthly bond data from 2010 to 2016. We consider that this methodology is unreliable and can be improved by instead applying the identical methodology to each month of data individually rather than to all months of data pooled together.

9. The pooling method is only valid if:

"the coefficient vectors … are assumed all to be equal."[3]

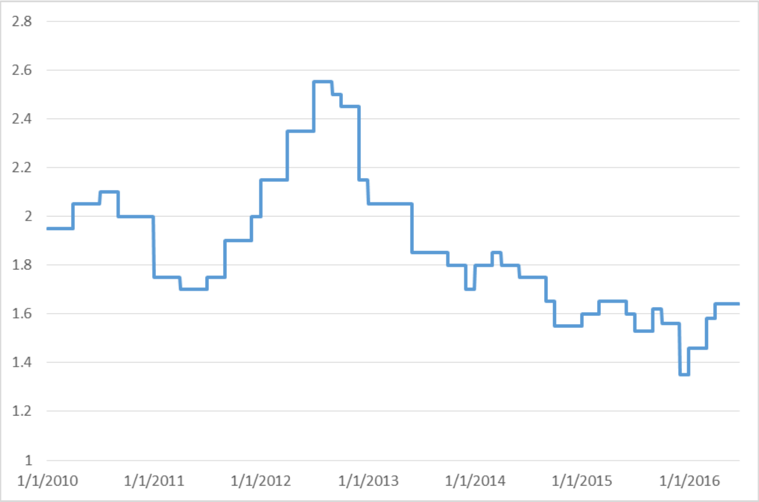
10. This is a well-known problem with pooled cross section analysis. Pooling is only valid if:

"the effect of each explanatory variable,…, has remained constant"[4]

11. This implies all parameters, including the constant, remains constant across time. Clearly this assumption is violated in the Commission's sample because the average DRP (adjusted for tenor) have varied dramatically over this time period. Consider Figure 2 of Topic Paper 4 which shows the 5 year DRP estimated by the Commission varying from 2.5% in 2012 to below 1.5% in late 2015. That is, even if the average DRP slope had remained constant over time the intercept term has not.

12. Figure 1 shows the trend in 5 year DRP as reported by the Commerce Commission. In order to test whether the DRP is constant across time, the Nyblom-Hansen test for single parameter is applied to the DRPs. The model tested is $DRP_t = \overline{DRP} + \epsilon_t$, where DRP_t is the DRP for date t and $\overline{DRP}$ is the average DRP across the whole sample period. The Nyblom-Hansen test checks if $\overline{DRP}$ is constant across the whole period. The resultant test statistic is 104 which rejects the null hypothesis that $\overline{DRP}$ is constant with a p-value of less than 1%. Since the DRP curve is unstable across time, the pooled model should not be applied to this dataset.

Figure 1: Commerce Commission Reported 5 year DRP



CEG analysis using Commerce Commission data

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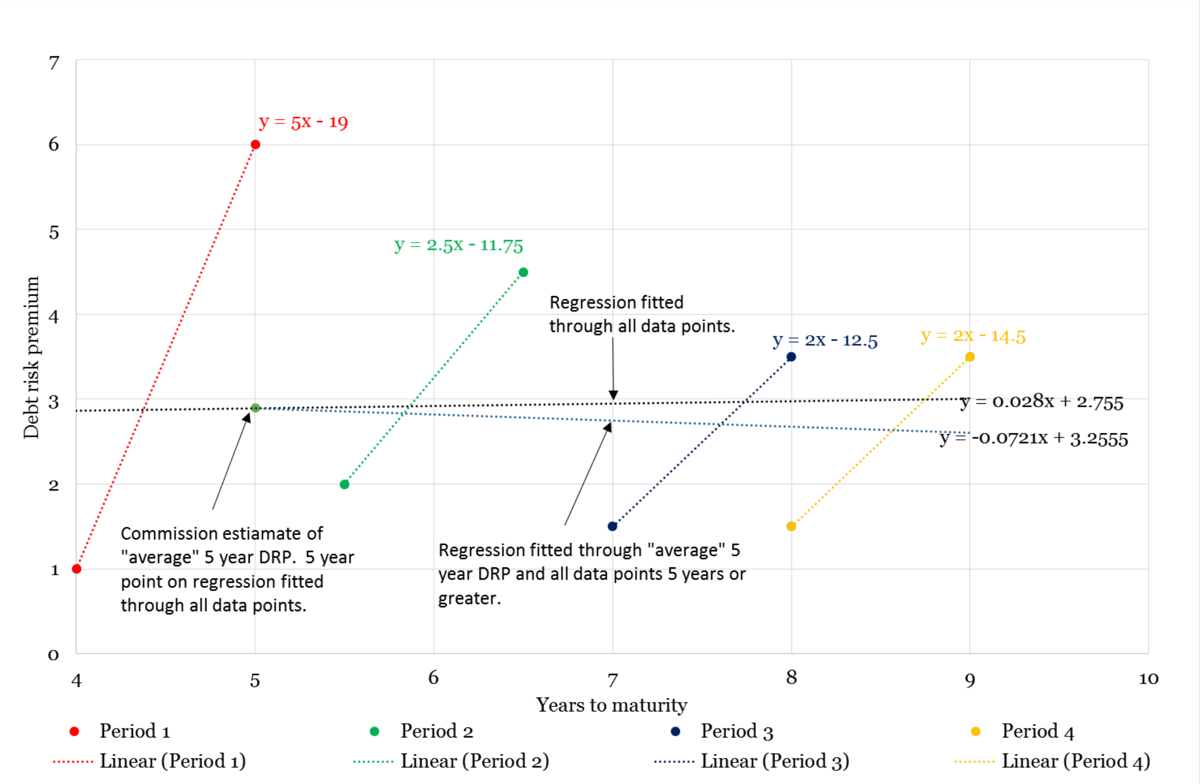
3 William H. Greene, "Econometric Analysis", Pearson, 7th Edition, International Edition, 2012

4 See Jeffrey M. Wooldridge, "Introductory Econometrics: A Modern Approach", South-Western, 2nd Edition, 2002

13. As a consequence we follow the Commission's methodology but apply it on a month by month basis instead of pooled data across months. This means that we use NSS techniques to estimate a 5 year BBB+ DRP each month and then estimate the DRP slope using a linear regression restricted to bonds with more than 5 years to maturity in that month and restricted such that the regression line passes through our 5 year NSS DRP estimate. This contrasts with the Commissions method which attempts to use NSS to estimate a single average 5 year BBB+ estimate over the five years and then a single linear regression to fit all bond observations over 5 years.

14. The benefits of our approach can be illustrated with a simple example. The following chart shows eight different bond observations – with two observations taken from four different sampling periods(month).

Figure 2: DRP Slope illustration



15. In each different month (designated by different colour coding) there is a strong upward slope for the DRP with tenor of bond. However, when all of the data is pooled the slope estimated in a single regression is much lower (but still positive) than the true slope observed in each month. This is the regression line shown as "Y=0.028X + 2.755". Using this slope from this regression would clearly be an error because it underestimates the true average slope observed in each month (which is strongly positive).

16. However, the Commission's methodology would not directly use this pooled slope. Rather, the Commission uses this regression to estimate the 5 year "average" DRP as the point on this regression line at 5 years. The Commission then implements another regression which is constrained to pass through this point and which provides the best fit to the (pooled) observations for bonds with DRPs of at least 5 years. In our illustrative example, this results in the second regression line that has an even lower (negative) slope than the first regression line. The second regression compounds the misestimation associated with the first regression.

17. IN addition to not pooling data across months, we also apply a further criteria which is that there must be at least 3 bonds with more than 5 years to maturity and at least 6 bonds overall in order for a monthly estimate to be derived. This is to avoid months with insufficient data to provide reasonably robust estimates being included in the analysis. We report the simple average of these monthly DRP slope estimates. We also report the weighted average – where each month is given a weight in accordance to the number of bonds with more than 5 years to maturity in excess of our 2 bond cut-off for exclusion of that month. This means that a month where there are only 3 bonds will get assigned a weight of 1 (=3-2) while a month with 4 bonds will get assigned a weight of 2 (4-2) etc.

3.1.3 Amending the Commission method to exclude issuers who are 100% government owned in the relevant month

18. In Topic Paper 4, the Commission proposes to prospectively include bonds issued by majority government owned businesses in its sample – removing the current IM requirement to give such bonds the least weight. The rationale for this approach is that:[5]

> *However, in practice, government ownership appears to 170. have had a limited effect on the observed debt premiums for publicly traded New Zealand bonds. If anything, government ownership appears to have had the opposite effect to that expected. The debt premium data we have collected since the cost of capital IMs came into effect (in December 2010) indicates that government ownership has had a positive effect on debt premiums **since 2013.***
>
> *Most of the government-owned companies in the sample 171 of bonds we consider are electricity gentailers (ie, Meridian, Genesis, and Mighty River Power), which could explain the limited impact of government ownership we have observed. Due to the competitive nature of electricity generation and retailing, the government would not necessarily be expected to bail out these companies if they experienced financial difficulty.*

5 Commerce Commission, Topic Paper 4, pp.45 to 46.

Given that government ownership appears to have had limited effect on observed debt premiums ***in recent years****, we no longer intend to place reduced weight on bonds issued by companies that are issued by the Crown or a local authority. Removing this restriction will increase the number of bonds we are able to place significant weight on when estimating the debt premium (particularly for EDBs, Transpower and GPBs, given the high proportion of BBB+ bonds that are majority government-owned).* [Emphasis added.]

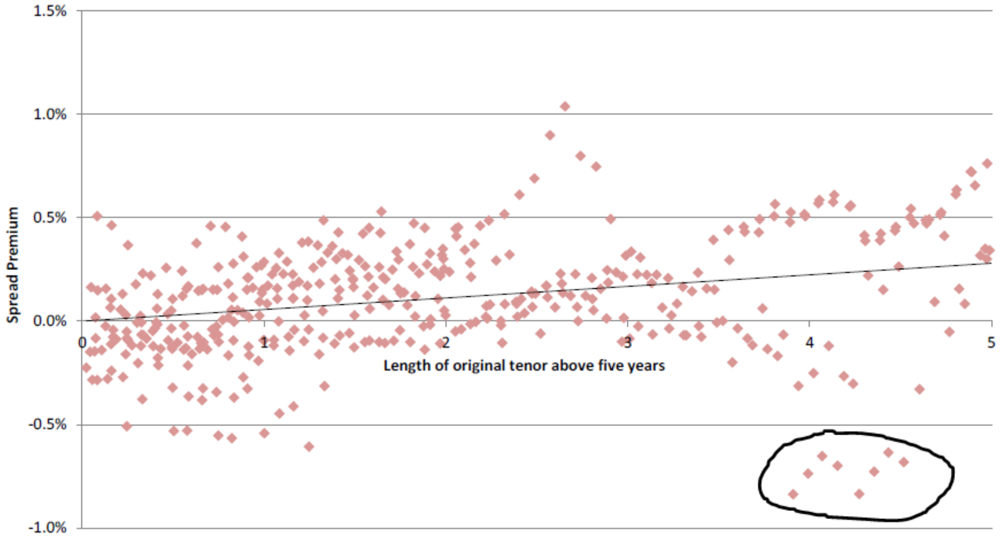
19. This logic may be reasonable basis for the inclusion of partially privatised, but still majority government owned, private firms. However, the Commission's estimate of the TCSD term premium does not only include these firms' bonds on issue post privatisation in 2013, it also includes these firms' bonds on issue pre 2013 when they were 100% government owned. In fact, the Commission's analysis is dominated by bonds from these issuers – with only these firm's bonds in the Commission's sample between January 2010 and November 2012.

20. We note that yields on bonds with 100% government ownership can reasonably be expected to behave differently to yields to other bonds and to have a different relationship of the DRP on these bonds and the tenor of the bonds. In particular, while default risk is an important determinant of the relationship between debt premium and tenor on bonds issued by privately owned entities, liquidity risk and the expected model/timing of any future privatisation is likely to have a more significant impact on the observed DRPs (including their relationship with tenor) on 100% Government owned businesses. In this regard we note that the Commission's conclusions that:

> *…government ownership appears to have had limited effect on observed debt premiums* ***in recent years****, …*

21. Is consistent with the fact that in more distant years the entities in question were 100% government owned and the nature and timing of any future privatisation, including its impact on the value of debt already on issue, was uncertain and varied through time. In this regard, we note that the 8 bond observations in the Commission's regression that are amongst the clearest candidates for "outlier" status are the DRPs on two bonds on issue by Genesis and Mighty River Power between December 2010 and March 2013. These are circled in black on the below amended version of Figure 23.

Figure 23: Observed relationship between spread premium and length of tenor for BBB+ rated bonds (2010-2016)



22. Not only are these monthly observations the lowest DRP in the entire sample they are also amongst the longest tenor. It may be that these observations can be explained by electricity generation and retailing being perceived has having particularly low long term risk in these four months. However, a reasonable probability must be put on these observations reflecting the existence of 100% government ownership of these entities at the time of the observations. That is, even if these bonds (where the issuer was 100% government owned) had reliable yield estiamtes in these months, they cannot be used in an "apples for apples" comparison with the debt of private businesses.

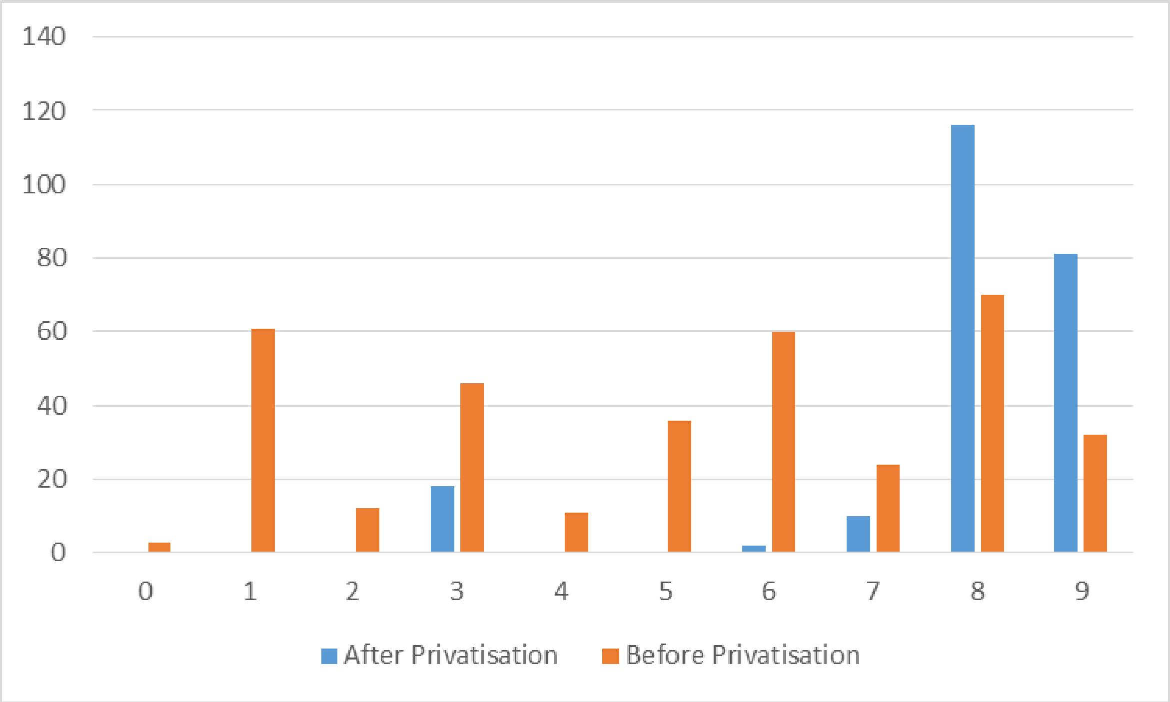
23. Moreover, the yields on these bonds may be very illiquid and difficult to value prior to privatisation. That is, the data points themselves may not robust (as opposed to the ability to mix the observations with those for privately issued debt). Consistent with this, we note that the 8 'outlier' observations marked in the above chart all have very low measures of reliability as assigned by Bloomberg.

24. Bloomberg assigns each bond yield estimate a BVAL score from 1 to 10 – with 10 being the most liquid bonds with reliable pricing information and 1 being the least liquid and least reliable yield estimates. Six of the eight marked observations have a BVAL score of 1 (being the lowest reliability score). The remaining 2 outlier observations have a BVAL score of 2 (the second lowest).

25. More generally, the BVAL score for bonds in the Commission's sample whose issuer was 100% government owned is very low compared to the average overall and the average BVAL score for the same issuers post privatisation. We have obtained BVAL scores for each bond in the Commission's sample on the 15th of every month. If the 15th is weekend or public holiday, the closest BVAL score before the 15th is used.

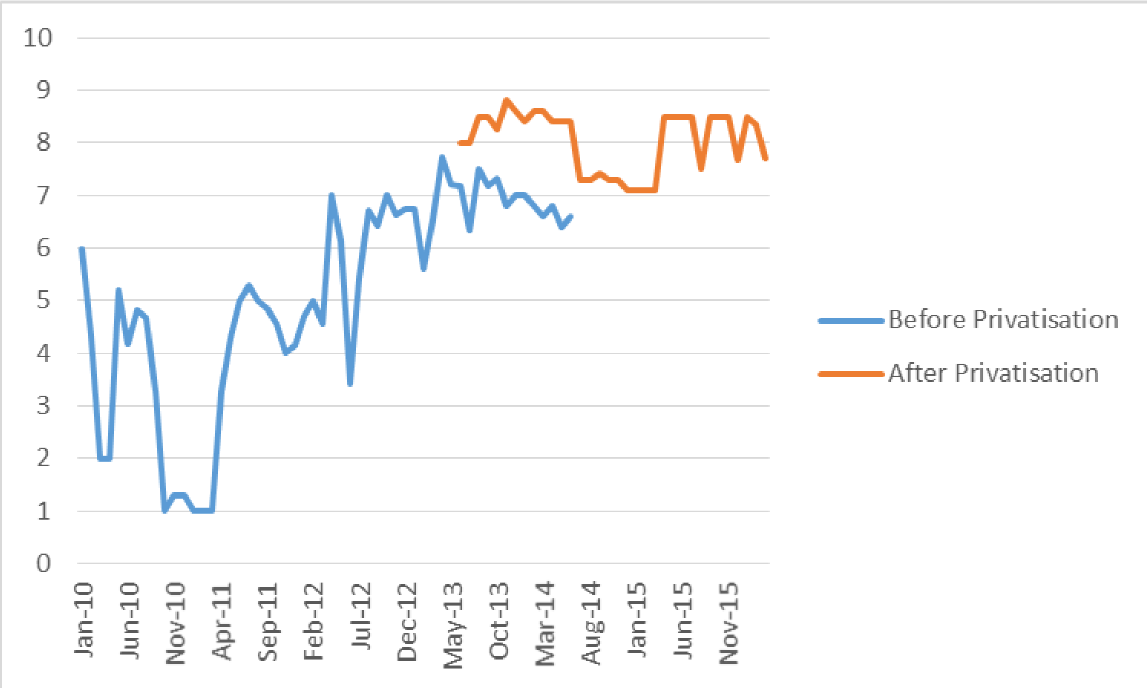
26. Figure 3 and Figure 4 show the distribution and trend of BVAL scores for firms that have undergone privatisation. Both figures show that the BVAL Score is much higher on average after the firms have undergone privatisation.

Figure 3: Histogram of BVAL Score before and after privatisation



Source: CEG analysis using data from Commerce Commission and Bloomberg Data

Figure 4: Time series of average BVAL Score before and after privatisation



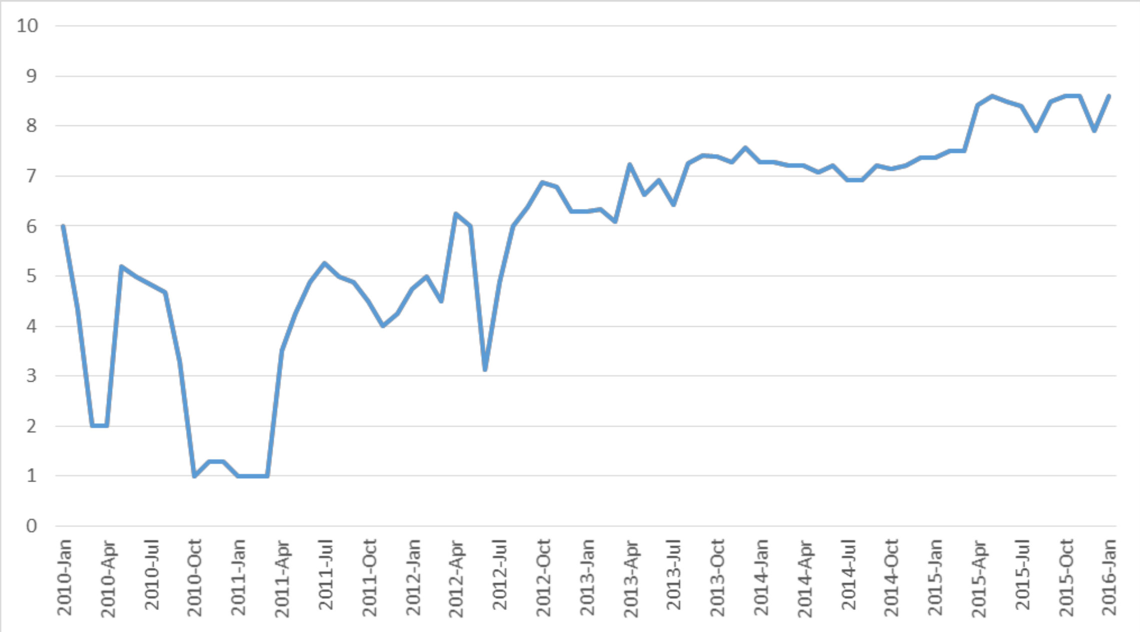
Source: CEG analysis using data from Commerce Commission and Bloomberg Data

27. More generally, the average quality of the BVAL scores across all bonds in the Commission's sample (100% government owned or not) is much higher and more stable from 2013 onwards.

28. Figure 5 shows the trend of average monthly BVAL score of the Commerce Commission sample used to determine the 5 year benchmark BBB+ DRP from 2010 to 2016.[6] Figure 5 shows that data from earlier periods in the sample has lower BVAL score compare to more recent data. Therefore this implies more recent data is more reliable in determining the 5 year DRP.

[6] Commerce Commission, "IM-review Reponse-to-NSS-data-request-21-July_2016."

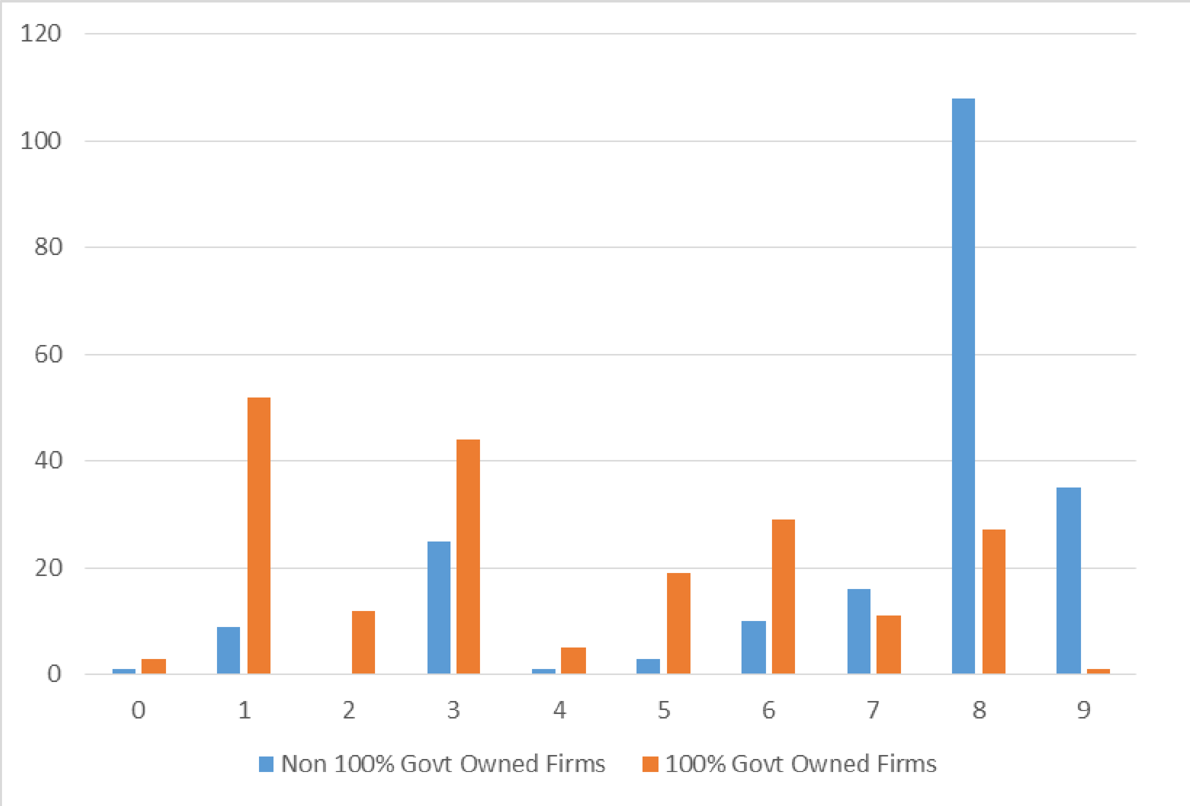
Figure 5: Trend in the BVAL Score of Commerce Commission dataset



Source: CEG analysis using data from Commerce Commission and Bloomberg Data

29. This trend is consistent with the fact the early period is dominated by bonds issued by 100% government owned entities. Figure 6 shows the distribution of BVAL scores broken down by the type of ownership. The figure shows that, for 100% government owned firms, there are more observations with low BVAL score than higher BVAL score. Whereas for non-100% government owned firms, the data quality is much higher with majority of the BVAL scores in the 8 to 9 region.

Figure 6: Histogram of BVAL Scores by Ownership



Source: CEG analysis using data from Commerce Commission and Bloomberg Data

3.1.4 Amending the Commission method to include A- and BBB bonds

30. The Commission's method only reports results for BBB+ bonds. We have followed the Commission's elsewhere reported methodology for estimating NSS curves using data for BBB to A- bonds with dummy variables for credit ratings. We have used this method to arrive at an estimate of the 5 year DRP for each credit rating in each month. We have then followed the Commission's linear regression using just bonds with more than 5 years maturity to arrive at an estimate of the DRP slope for each credit rating.

3.1.5 Results

31. Our core results are summarised in the below table.

Table 6: Average monthly DRP slope (bppa increase per year of tenor)

	Simple	Weighted
5 year DRP estimated with only BBB+ bonds		
BBB+ only bonds	10.9	10.4
5 year DRP estimated with BBB to A- bonds and credit rating dummy variables		
A-	9.4	12.1
BBB+	11.8	11.2
BBB	NA	NA

Source: CEG analysis using Bloomberg data

32. The estimates of slope we have derived are roughly double those reported by the Commission. While there are a number of methodological reasons that give rise to the differences, an important reason is the exclusion of bonds from months where there issuer was 100% government owned. Were we not to apply this exclusion we would estimate the following table:

Table 7: Average monthly DRP slope if 100% government owned entities included

	Simple	Weighted
5 year DRP estimated with only BBB+ bonds		
BBB+ only bonds	5.9	7.3
5 year DRP estimated with BBB to A- bonds and credit rating dummy variables		
A-	9.6	12.4
BBB+	7.0	8.0
BBB	NA	NA

Source: CEG analysis using Bloomberg data

33. It is only the BBB+ DRP slope estimates that fall dramatically when 100% government owned entities bonds are included in the monthly estimates. We note that the A- DRP slope estimates are steady across Table 6 and Table 7 and are consistent with the BBB+ slopes in Table 6. This reflects the fact that there are no 100% government owned A- rated bonds in the period. For the reasons set out earlier we do not believe that such bonds should be included. The fact that their inclusion leads to such a dramatic fall in the BBB+ DRP slope, relative to both BBB+ and A- slope estimates, supports the view that this data is anomalous.

34. It is also worth noting that weighted average estimates for BBB+ fall relative to the simple average in Table 6 but rise dramatically in Table 7. This also suggests that the data underpinning the simple average estimates in Table 7 are heavily influenced by regression results from months with a relatively small number of bonds with greater than 5 years term to maturity.

35. In our view, the best estimates of the BBB+ DRP slope over the period 2010 to 2016 is given by the range of estimates reported in Table 6; being 9.4bppa to 12.1bppa.

3.2 Methodology

36. The dataset covers the S&P BBB+ bonds issued by industrial, manufacturing and utility firms from January 1st, 2010 to March 31st 2016. Table 8 lists the bond issuers used for analysis.

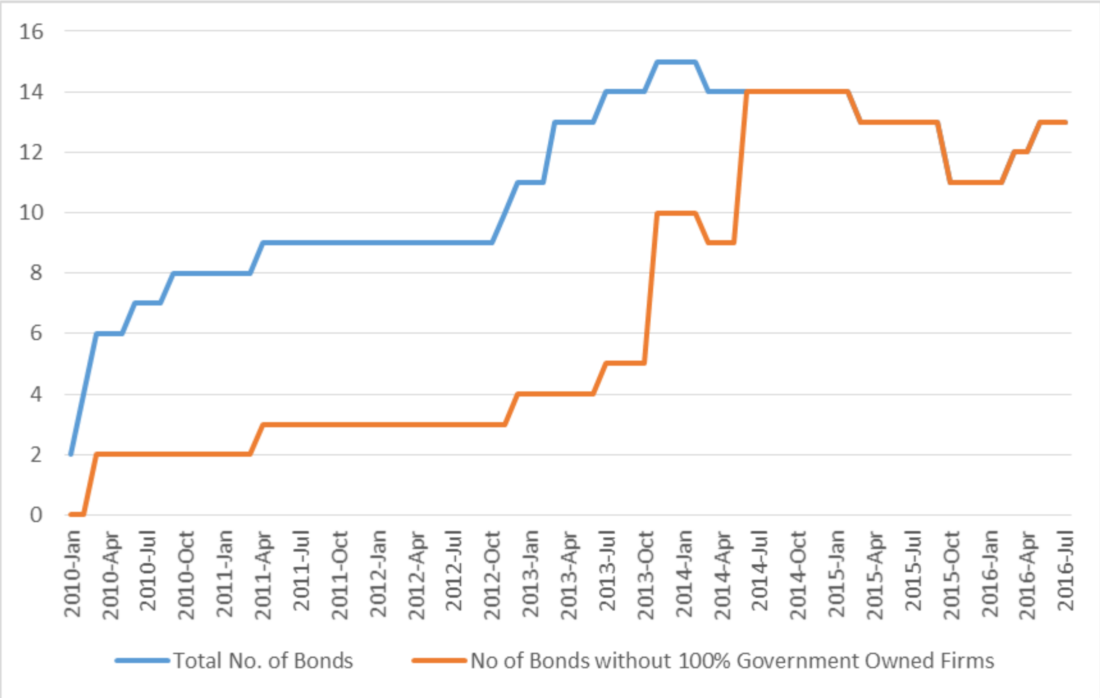
Table 8: Bond Issuers

Issuers	Total monthly individual bond observations with tenor greater than 5 years	Total monthly individual bond observations with tenor greater than 5 years post partial privatisation
Genesis Energy	157	49
Wellington International Airport	56	56
Mighty River Power	133	67
Christchurch International Airport	58	58
Auckland International Airport	114	114
Contact Energy	62	62
Meridian Energy	30	5
Fonterra Co-Operatives	39	39
Powerco Limited	61	61
Spark	50	50
Vector	0	0

37. Figure 7 shows the number of bonds issued by the above issuers that are outstanding each month. The blue line shows the total number of bonds and the orange line shows the total number of bonds that are issued by firms that are not 100% government owned. The chart shows that prior to late 2012, nearly all the BBB+ firms' bonds are issued by 100% government owned firms. Only from late 2013 are the majority of the bonds non-100% government owned firms (and only from mid 2014 are there no bonds issued by 100% government owned firms). This is due to the partial privatisation of the three 100% government owned electricity generators.[7]

[7] Energy is partially privatised in April 2014. Meridian Energy is partially privatised in October 2013. Mighty River Power is partially privatised in May 2013.

Figure 7: Number of bonds on issue each month



Source: CEG analysis using Bloomberg Data

38. Using daily yield data from Bloomberg, the debt risk premium (DRP) is calculated based on the difference in the yield of the particular bond on that day against the interpolated risk free rate with the same tenor of that bond on that day. The risk free rate used for each bond is calculated by identifying the two New Zealand government bonds with the closest shorter/longer tenor to the BBB+ bond in question. Then a linear interpolation is calculated based on the yield of these two New Zealand government bonds. The monthly observation of each bond is calculated by taking the average of the daily DRPs and tenors of the bond within the month. Observations with tenor less than one year are dropped.

39. The functional form for debt spread is assumed to be the Nelson Siegel Svensson (NSS) model. The debt spread is estimated for each month and the monthly 5 year DRP is calculated using the estimated parameters. Due to the multiple local optima problem of NSS, differential evolution (DE) algorithm is used to solve for the global solution. This algorithm is recommended by Gilli, Große and Schumann(2010)[8] to optimise complex functional forms such as the NSS. DE is a class of global optimizers

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8 See Manfred Gilli, Stefan Große and Enrico Schumann, *"Calibrating the Nelson-Siegel-Svensson model,"* COMISEF working paper series, 2010.

that search and evolve a population of candidate solutions toward the optimal state[9]. The computation is conducted in R using the Numerical Methods and Optimization in Finance[10] package. In addition, the months where the number of observations is less than the minimum required to identify the NSS model are dropped. Since the number of parameters in the NSS model is 6, at least 6 observations are required to correctly identify the parameters of the model. If less than 6 observations are available, then infinite sets of parameters can fit the model exactly.

40. The monthly 5 year DRP is used to calculate the Term Credit Spread Differential (TCSD) for that month. The methodology used to calculate the TCSD follows the same approach undertaken by Commerce Commission (2016)[11]. For each month, the DRP of bonds with tenor greater than 5 years are adjusted by subtracting the monthly NSS estimated 5 year tenor DRP. This results in the spread premium of each bond against the 5 year tenor NSS DRP. Then the monthly slope of the spread premium is calculated by regressing the credit term spread of each bond against the remaining tenor above 5 years, assuming an intercept of zero.

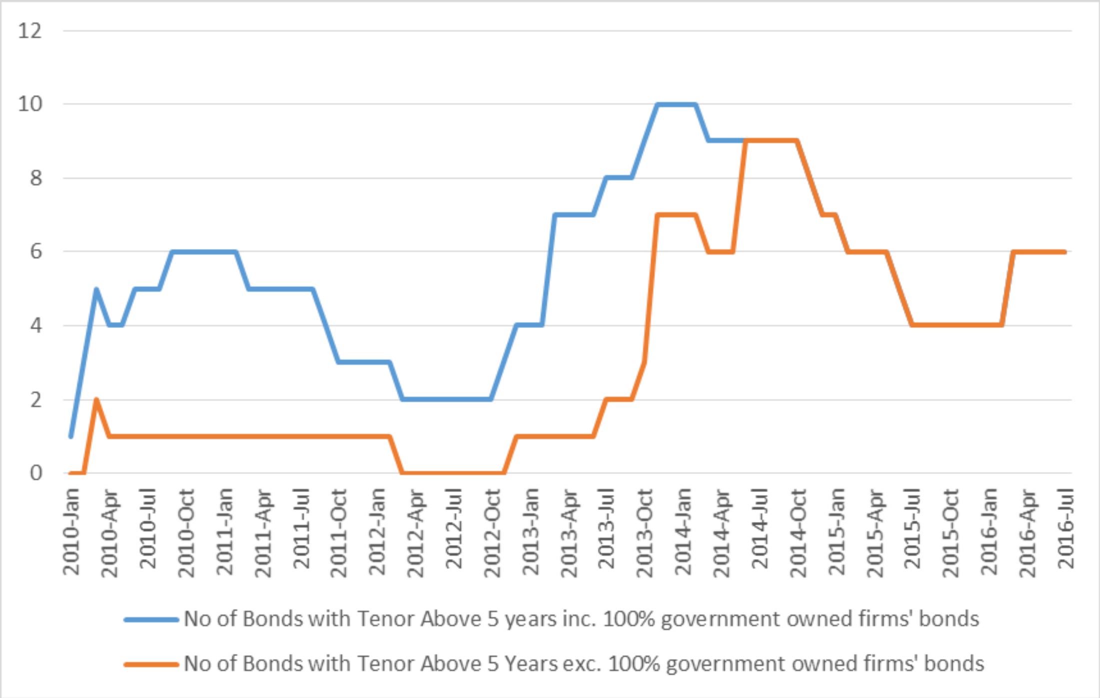
41. Figure 8 shows the number of bonds with tenor greater than 5 years, which are used to estimate the spread premium slope, for each month. Figure 8 indicates that the number of bonds with greater than 5 years maturity is very low in some months – even when bonds issued by 100% government owned issuers are included (excluding these issuers there are zero bonds or sometimes one bond prior to 2013). This suggests that the slope estimation is some months may be less reliable than others.

[9] *For details of the algorithm, see Kenneth V. Price, "Differential Evolution," Handbook of Optimization, pg 187-214, 2013.*

[10] *See Manfred Gilli, Dietmar Maringer and Enrico Schumann. "Numerical Methods and Optimization in Finance," Academic Press, 2011.*

[11] *Commerce Commission New Zealand, Input methodologies review draft decisions, Topic paper 4: Cost of capital issues," ISBN 978-1-869455-13-2, Project no. 17.01/15081, 2016*

Figure 8: Monthly Number of bonds with tenor >= 5 years



Source: CEG analysis using Bloomberg Data

3.2.1 Results

42. Table 9 contains the result that includes both 100% government owned and non-100% government owned firms' bonds. Table 10 excludes bonds whose issuer is 100% government owned. The tables show the average, standard deviation and other statistics regarding the spread premium slopes across the months. The first column calculates the summary statistics without weights, while in the other two columns, the summary statistics are weighted by the number of observations each month.

43. It can be seen that the standard deviation of the monthly regression slopes is much higher (6.9 vs 2.6 focusing on the simple averages) when bonds from 100% government owned issuers are included in the analysis. This 6.9 standard deviation exceeds the mean estimate of 5.9 bppa. By contrast, when these bonds are excluded from the analysis the standard deviation is much lower in absolute terms and relative to the mean (around one 3rd of the mean). Similarly, the range between the maximum and minimum estimates falls from 32 bppa to 12 bppa.

44. This increase in accuracy from the exclusion of bonds issued by 100% government owned firms could be due in part to these bonds having different properties to bonds issued by privately owned firms or it could simply reflect the smaller number of total bonds on issue in the earlier period – making estimates from earlier periods less

reliable. Alternatively, it could simply reflect greater volatility in term premium slopes in the period 2010 to 2013 when only such bonds were on issue.

Table 9: Statistics of monthly spread premium slopes (bppa of tenor), including 100% government owned firms, at least 3 bonds > 5 year tenor

	Simple	Weighted on number of bonds beyond minimum threshold with tenor >= 5 Years
Mean	5.93	7.25
Std. Dev.	6.88	5.74
Min.	-10.47	-10.47
Max.	21.22	21.22
Number of Months	69	69

Source: CEG analysis using Bloomberg Data

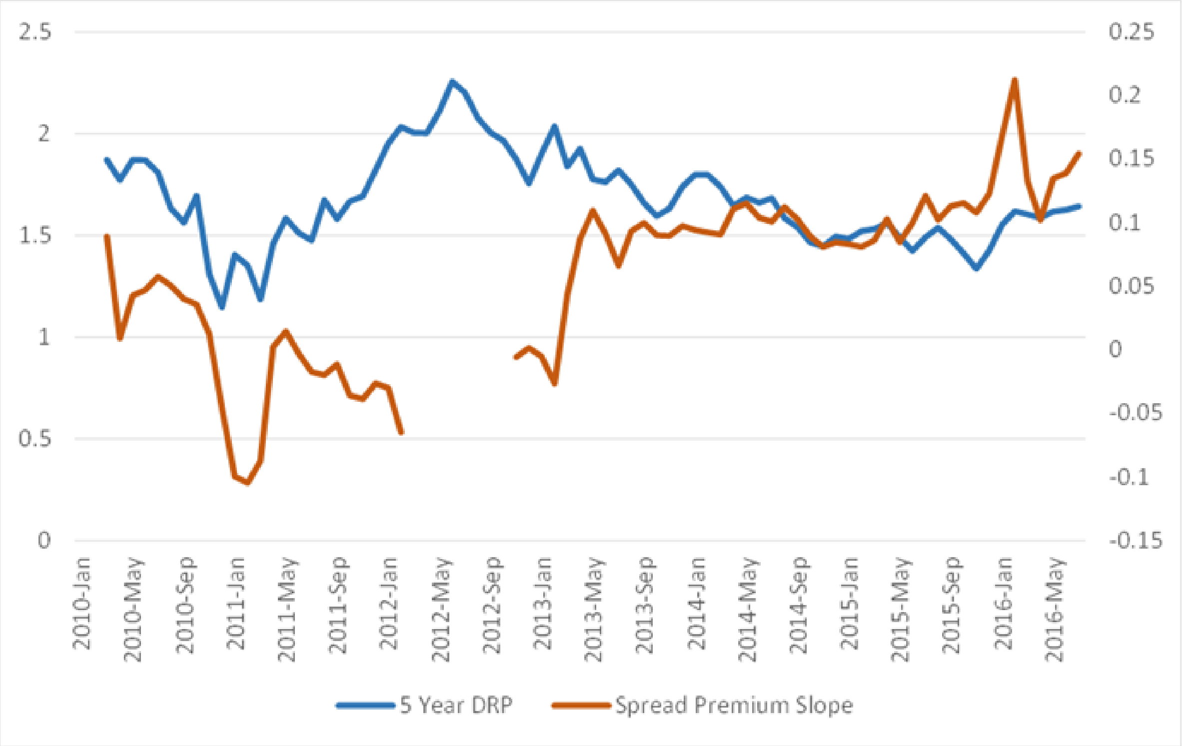
Table 10: Statistics of monthly spread premium slopes (bppa of tenor), excluding 100% government owned firms, at least 3 bonds > 5 year tenor

	Simple	Weighted on number of bonds beyond minimum threshold with tenor >= 5 Years
Mean	10.86	10.43
Std. Dev.	2.57	2.22
Min.	8.10	8.10
Max.	20.16	20.16
Number of Months	33	33

Source: CEG analysis using Bloomberg Data

45. Our results are also illustrated in Figure 9 which shows the time series for the estimated DRP slope (right hand axis) when no restriction is placed on the inclusion of 100% owned bonds (the number of bonds on issue is shown on the left hand axis). We observe that the estimated DRP slope (right hand axis) is typically negative or undefined (2 or less bonds on issue with maturity greater than 5 years as per Figure 8 above) in the period from late 2010 to late 2012. This is the period when 100% government owned bonds dominate the (unrestricted) sample – as can be seen by the difference in the blue and orange series.

Figure 9: Spread Premium Slope trend



Source: CEG analysis using Bloomberg Data

46. Table 9 also shows that when the average slope is weighted by the number of bonds in each month, the average slope is higher. This indicates that during the periods where the sample is lower (which is also when 100% government owned firms' bond issued dominates) the estimated spread premium is lower.

47. When the bonds, whose issuers are 100% government owned firms, are removed, the weights have less effect as seen in Table 10. The weighted average slope during this period, weighted based on the number of bonds with tenor greater than or equal to 1 year, is 10.86 bppa, almost twice the slope calculated in the Commerce Commission report[12].

3.2.2 Comparison against A- and BBB bonds

48. This section compares the spread premium slope of BBB+ bonds against the slopes of A- and BBB bonds. The methodology of this section is similar to the procedure in the previous section. The first step is to estimate the monthly 5 year DRP using the

12 Commerce Commission New Zealand, Input methodologies review draft decisions, Topic paper 4: Cost of capital issues," ISBN 978-1-869455-13-2, Project no. 17.01/15081, 2016

NSS model. In the previous section, the estimation is limited to BBB+ bonds, however in this section the estimation is conducted on A-, BBB+ and BBB bonds. Due to the differences in default risk across bonds of different ratings, dummy variables for A- and BBB bonds are used to capture the differences. This is the same approach as the method adopted by the Commerce Commission[13]. The estimated parameters allow us to calculate the monthly 5 year DRP for A-, BBB+ and BBB bonds. Using the interpolated 5 year DRP, the spread premium slopes for A-, BBB+ and BBB bonds are calculated separately by conducting monthly regressions on the monthly average DRP on bonds within each rating group on their monthly average tenor.

49. The DRP slope for BBB+/A- bonds is 11.8/9.4 for unweighted and 11.2/12.12 for weighted. This is shown in Table 11. The average slope for BBB bonds is not calculated because only 3 months of data is available.

Table 11: Statistics of monthly spread premium slopes (bppa of tenor), at least 3 bonds > 5 year tenor.

	Unweighted		**Weighted on number of bonds beyond minimum threshold with tenor >= 5 Years**	
	A-	BBB+	A-	BBB+
Mean	9.41	11.78	12.12	11.16
Std. Dev.	4.87	3.54	4.44	3.18
Min	1.43	6.83	1.43	6.83
Max	20.09	23.71	20.09	23.71
Number of Months	23	38	23	38

Source: CEG analysis using Bloomberg Data

50. When 100% government bonds are included the unweighted slope for BBB+/A-bonds is 7.0/9.6 bppa. The average slope for BBB bonds is not calculated because only 3 months of data is available. When the statistic is weighted the slope is 12.4 bppa for A- bonds and 8.04 bppa for BBB+ bonds.

13 Commerce Commission New Zealand, Input methodologies review draft decisions, Topic paper 4: Cost of capital issues," ISBN 978-1-869455-13-2, Project no. 17.01/15081, 2016

Table 12: Statistics of monthly spread premium slopes (bppa of tenor), at least 3 bonds > 5 year tenor, inc. 100% government owned firms

	Unweighted		Weighted on number of bonds beyond minimum threshold with tenor >= 5 Years	
	A-	BBB+	A-	BBB+
Mean	9.59	7.00	12.43	8.04
Std. Dev.	4.99	6.46	4.50	5.85
Min	1.71	-12.34	1.71	-12.34
Max	19.69	19.20	19.69	19.20
Number of Months	23	70	23	70

Source: CEG analysis using Bloomberg Data

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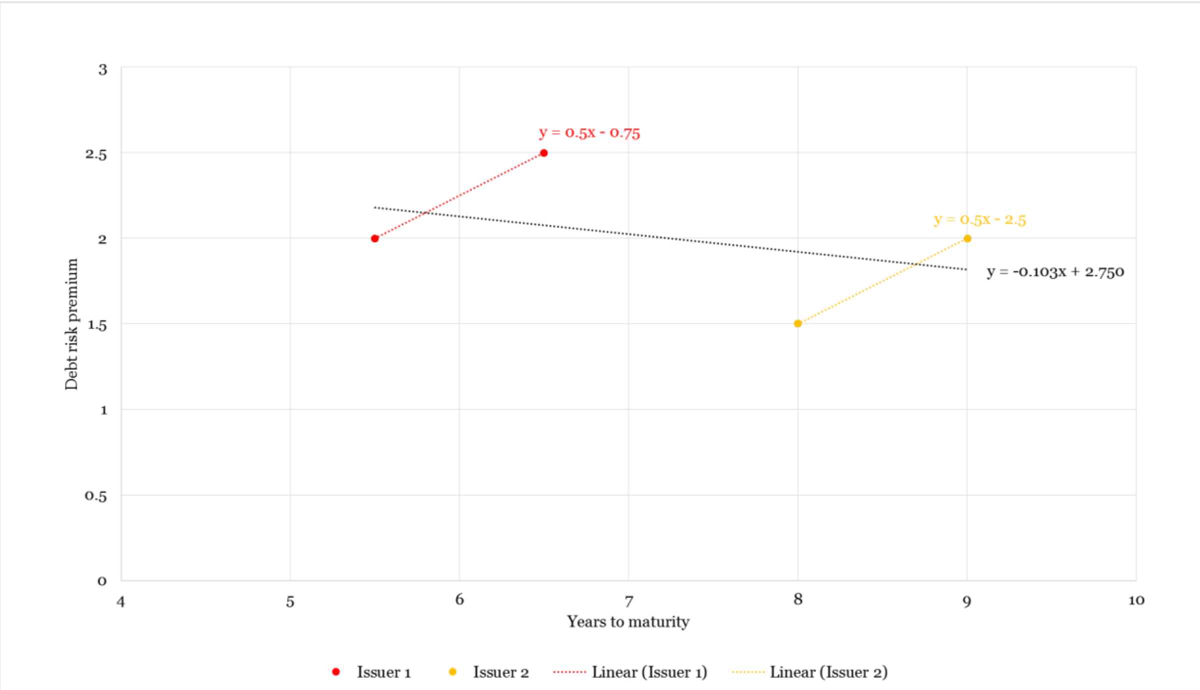
4 DRP slopes per issuer

51. In addition to pooling data across months, a further potential problem with the Commission's analysis is the pooling of data across issuers. If all issuers with the same credit rating had the same DRP on bonds with the same tenor then this pooling would not be problematic. However, if some issuers with the same credit rating have different DRPs when controlling for tenor then inclusion of them in the same regression can bias results.

52. For example, imagine that one low DRP BBB+ issuer has more long term debt and one high DRP BBB+ issuer has more short term debt. If we include these issuers in the same regression we might incorrectly conclude that the DRP slope is negative even though it is positive within each issuer. Consider the following example illustrated in Figure 10.

Figure 10: Illustration of potential bias from pooling across issuers



53. In this illustration there are two issuers and the DRP slope for each is positive at 50 bppa but when they are pooled the estimated DRP slope is -10 bppa. The restriction of data to specific credit ratings (or the use of credit rating dummy variables) can be expected to limit the amount of such potential bias but not necessarily to acceptable levels.

54. In order to eliminate this potential bias, we estimate the average DRP slope per issuer in this section. This can then be compared to our results in the previous section where we did pool data across issuers. We also report the correlation between the short term DRP in each month and the estimated slope in that month for an issuer. This supports the conclusion of strong negative relationship between these variables as discussed in section 5.

55. Our key conclusions are summarised below. Following the Commerce Commission's approach of deriving the debt risk premium based on BBB+ rated corporate bonds, BBB+ bonds are the primary focus of our analysis. The results below were derived from data that excluded observations on bonds whose issuers were 100% government owned in the month in question and estimated the slope for each issuer if there were at least 3 bonds.

Table 13: Best estimates DRP slope and correlation of DRP slope with short term DRP for BBB+ issuers (at least 3 bonds)

Issuer	Average slope (basis points)	Correlation
Genesis	10.45	-0.3538
Mighty River Power	10.90	-0.4360
Wellington	12.51	-0.9399
BBB+	**11.29**	**-0.5765**

Source: Bloomberg data; CEG analysis. Monthly regressions were run on BBB+ bonds that had a minimum term to maturity of 3.5 years.

56. We also report estimates for other credit ratings as they demonstrate results that are broadly similar the results of BBB+ bonds. Overall, the slope average of 9.90 bps is similar to the BBB+ slope average of 11.29 bps.

Table 14: Estimates of DRP slope and correlation of DRP slope with short term DRP (at least 3 bonds)

Issuer	Average slope (basis points)	Correlation
Auckland International Airport	6.43	-0.0957
Genesis	10.45	-0.3538
Mighty River Power	10.90	-0.4360
Vector		
Wellington	12.51	-0.9399
Contact	2.03	0.0615
Powerco		
Spark Finance	13.22	-0.7804
Telstra		
Fonterra	13.79	0.2841
Meridian		
Christchurch International Airport		
Average	**9.90**	**-0.3229**

Source: Bloomberg data; CEG analysis. Note that these are the regression and correlation results from a monthly regression and using bond data with a minimum term to maturity of 3.5 years.

4.1 Methodology

57. The following raw data was sourced from Bloomberg:

- Corporate bond yields (A, A-,BBB+,BBB)
- New Zealand Government Bond (NZGB) yields

58. Corporate bonds exhibiting negative yields were removed from the sample on the basis that these reflected unreliable observations.

59. Bonds exhibiting periodically high yields (for example, when the bond was first issued) were cross-checked against the BVAL Score[14] reported in Bloomberg. The BVAL Score assigns a bond a score from 1-10 to give an insight into the amount and consistency of data used to produce the BVAL Price. If the periodically high yield data corresponded to a low BVAL Score, the data was replaced with #N/A N/A. Data from the following bonds, where exhibiting low BVAL scores, were removed:

- EG 065497 (BVAL Score of 1/10)
- EJ 999624 (BVAL Score of 3/10)
- EJ 331939 (BVAL Score of 4/10)

14 The BVAL Score is produced from a proprietary formula. Although the BVAL Score is not a liquidity indicator, it is possible that securities with higher BVAL Scores have more market makers providing prices.

60. Furthermore, bonds issued by issuers with the same ultimate parent company (for example, Genesis Energy Ltd and Genesis Power Ltd) were consolidated as shown in Table 15.

Table 15: Consolidation of issuers

Issuer	Constituent issuers
Genesis	Genesis Power Ltd, Genesis Energy Ltd
Spark Finance	TCNZ Finance Ltd, Spark Finance Ltd
Fonterra	Fonterra Co-Operative, Fonterra Cooperative Group

61. The Commerce Commission's analysis included bond data at the time some issuers were 100% government owned. For the reasons described in section 3, we do not believe it is appropriate to use this data. Accordingly, we also removed bonds where the issuers were 100% government owned in the relevant month. That said, we also report the results of including bonds on issue where the issuer was 100% government owned at the time.

62. We calculated a daily time series of the residual maturities for all of the corporate bonds, NZGBs and swaps respectively from 01/01/2010 to 18/07/2016. This is the same start date as the Commission but the end data has been extended to include more recent data.

63. The yields on the NZGBs were then interpolated based on their residual maturities to generate yields that corresponded to the residual maturities of the corporate bonds. The interpolated NZGB yields were then subtracted from the corporate bond yields to derive a DRP.

64. In order to identify the bonds that could be used in our analysis, a minimum and maximum residual maturity was identified. This was 3.5-15 years. We chose 3.5 years as the minimum maturity in order to target an average maturity of the shortest dated bond close to 5 years (had we chosen 5 years, then the average maturity of the shortest dated bond in our analysis would have been around 6 years). This was true for all bonds and BBB+ bonds in particular, as demonstrated in Table 16 and Table 17.

Table 16: Lowest maturity bond in monthly regressions for BBB+ bonds

Criteria	Overall average lowest maturity bond in regressions
Including pre-privatisation, term to maturity 3.5-15 years	4.93
Excluding pre-privatisation, term to maturity 3.5-15 years	5.26

Table 17: Lowest maturity bond in monthly regressions (all issuers)

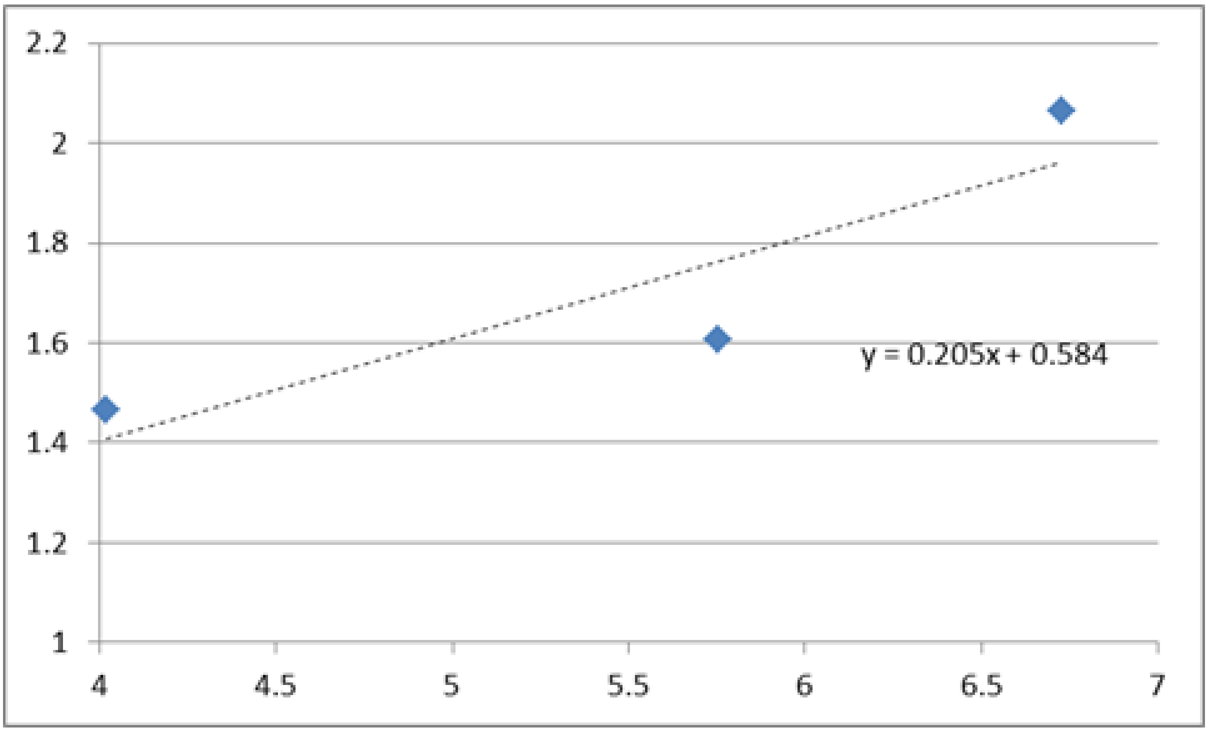
Criteria	Overall average lowest maturity bond in regressions
Including pre-privatisation, term to maturity 3.5-15 years	4.71
Excluding pre-privatisation, term to maturity 3.5-15 years	4.86

65. If a bond's residual maturity fell within the specified range, it would be deemed a bond that could form part of our analysis for a specific issuer in a specific month. This was applied to all corporate bonds and across the time series. For each issuer, if there were at least 3 bonds that fell in the residual maturity range on a particular day then an average slope was calculated across all observations using ordinary least squares regression. Setting a criterion that in a particular month, for a particular issuer, there needed to be at least 3 bonds with residual maturities greater than 3.5 years for a regression to be estimated was important in ensuring the robustness of the estimates.

66. Consistent with the Commerce Commission's use of monthly average DRP observations, we also calculated the regression on monthly data, by averaging the daily DRP and residual maturities for each month, and then computing a linear regression on the monthly time series.

67. By way of example, Figure 11 illustrates the regression result for Genesis in the month of May 2016 when 3 bonds were on issue. There is a strong positive relationship between DRP and term to maturity.

Figure 11: Regression result for Genesis in month of June 2016



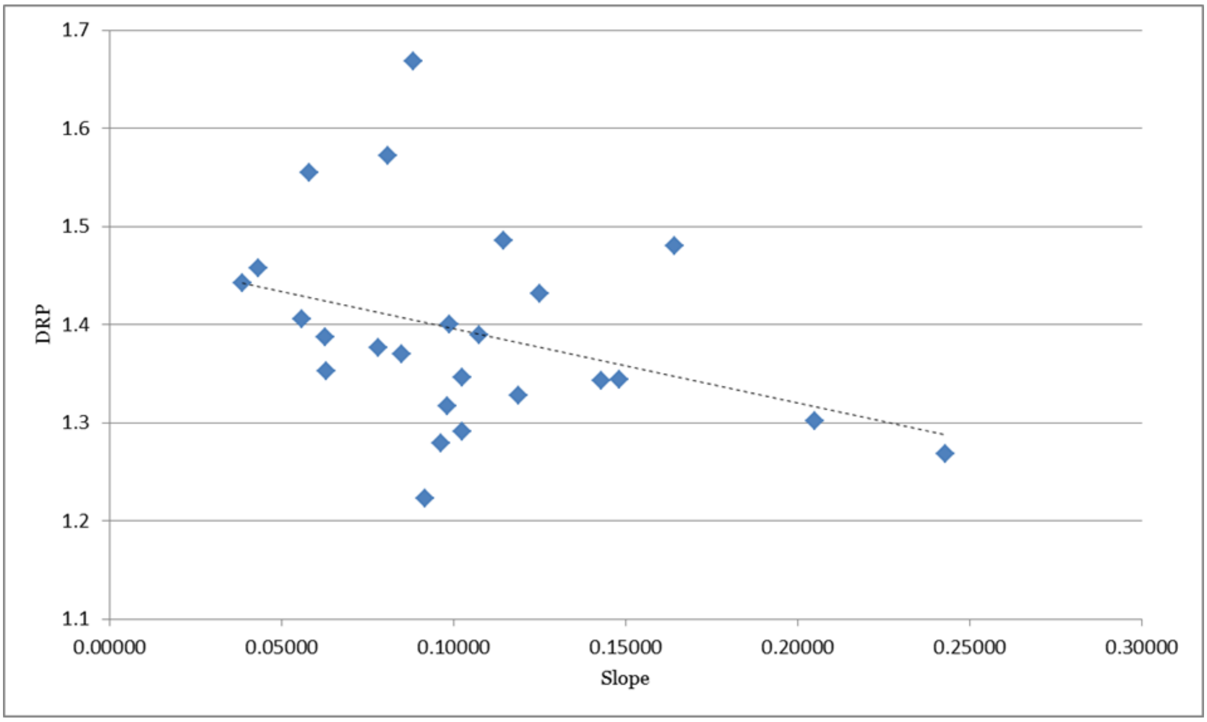
68. We have repeated this analysis for each issuer in each month in which there are at least three bonds with maturity greater than 3.5 years.

69. In order to investigate the relationship between the slope for each issuer and the DRP of a short-term bond, the regression results were used to solve for the estimated DRPs of bonds with a residual maturity of 3.5 years, across the monthly time series, using the equation below:

$$drp = intercept + slope \times 3.5$$

70. The correlation between the 3.5 year DRP and the slope was then calculated. By way of example, Figure 12 below illustrates the negative relationship between the monthly estimate of DRP slope (horizontal axis) and the estimated DRP at 3.5 years using the regression that produced the DRP slope estimate (vertical axis).

Figure 12: Inverse relationship between DRP and slope for Genesis (January 2010 – July 2016)



4.1 Results

71. Table 18 and Table 19 below report the results of a monthly regressions based on credit ratings. These regressions exclude data from the periods when certain issuers were 100% privatised. The average slopes for both BBB+ and A- are above 11 bppa (11.29 and 11.74 respectively), and averaged across 56 and 64 regressions respectively. The average correlation between the slope and the DRP evaluated at a term to maturity of 3.5 years for all credit ratings is strongly negative, aside from BBB bonds. Note that the quarterly results for BBB+ and A- bonds not only validate the monthly regression results in that the average slopes are above 11 bppa, but the average slopes are also in fact higher (11.43 and 11.87, respectively).

Table 18: Average slope – monthly regression

Credit rating	Average slope (basis points)	Correlation	Number of monthly regressions
All issuers	9.90	-0.3229	145
A	10.81	-0.1980	6
A-	11.74	-0.4095	64
BBB+	11.29	-0.5765	56
BBB	2.03	0.0615	19

Table 19: Average slope – quarterly regression

Credit rating	Average slope (basis points)	Correlation	Number of quarterly regressions
All issuers	10.06	-0.3601	57
A	10.06	1.0000	2
A-	11.87	-0.4898	25
BBB+	11.43	-0.6715	21
BBB	2.28	0.1206	9

4.2 Results including bonds in months where the issuer is 100% government owned

72. We also report the results of monthly and quarterly regressions on a dataset that includes data of bonds from the periods when the relevant issuer was 100% government owned. This exclusively affects the BBB+ results. Despite the inclusion of this data in the monthly and quarterly regressions, the average slopes of BBB+ bonds are still greater than 9 bppa.

Table 20: Average slope – monthly regression

Credit rating	Average slope (basis points)	Correlation	Number of monthly regressions
All issuers	9.01	-0.3528	197
A	10.81	-0.1980	6
A-	11.74	-0.4095	64
BBB+	9.19	-0.6464	108
BBB	2.03	0.0615	19

Table 21: Average slope – quarterly regression

Credit rating	Average slope (basis points)	Correlation	Number of quarterly regressions
All issuers	9.05	-0.3896	75
A	10.06	1.0000	2
A-	11.87	-0.4898	25
BBB+	9.07	-0.7404	39
BBB	2.28	0.1206	9

4.3 Inverse relationship between DRP level and slope

73. The data suggests a clear inverse relationship between short term DRP and the slope of the DRP regression.

Table 22: Correlation between short-term DRP and slope by issuer

Issuer	Correlation (including pre-privatisation)	Correlation (excluding pre-privatisation)
Auckland International Airport	-0.0957	-0.0957
Genesis	-0.3749	-0.3538
Mighty River Power	-0.6244	-0.4360
Vector		
Wellington	-0.9399	-0.9399
Contact	0.0615	0.0615
Powerco		
Spark Finance	-0.7804	-0.7804
Telstra		
Fonterra	0.2841	0.2841
Meridian		
Christchurch International Airport		
Average	**-0.3528**	**-0.3229**

Source: Bloomberg data; CEG analysis. Note that these are the correlation results from a monthly regression and using data satisfying a minimum term to maturity of 3.5.

74. The data suggests a strong negative correlation between the short-term DRP and slope, aside from Contact and Fonterra. This is discussed in further detail in the section below.

5 DRP term premium inversely related to DRP level

75. This section surveys the international evidence of an inverse relationship between the level of the DRP on shorter term debt and the DRP slope above that short term maturity. We find that, consistent with theory, there is a strong negative relationship. This is important because it informs the objective of the TCSD.

76. The TCSD is intended compensate businesses who issue long term debt for the additional costs of doing so. The TCSD focusses only on the higher DRP for long term debt. The justification for doing so is that businesses who issue long term debt can nonetheless reset the risk free component of that debt every 5 year regulatory period using swap rates. However, this is not possible for the DRP component and, therefore, a business that issues 10 year debt (chosen for the purpose of illustration) will pay a 10 year DRP irrespective of the length of the regulatory period. There are two implications of this:

- First, at any given time the DRP being paid by a business on its debt portfolio will reflect the historical average 10 year DRP based on the timing of past debt issuance; and
- Second, prospective debt that will be issued over the regulatory period will pay a 10 year DRP not the 5 year DRP estimated at the beginning of the regulatory period.

77. How the TCSD should be structured depends on which of these two sources of deviation from the 5 year DRP estimated in the averaging period are of concern.

- If the deviation from the historical average DRP is the issue of concern then the TCSD would not just reflect the difference in between 5 and 10 year DRP historically. Rather, the TCSD would reflect the difference between 10 year DRP historically and the 5 year DRP determined in the averaging period prior to the DPP period;
- If the deviation between 10 year DRPs on prospective debt issues and the 5 year DRP in the averaging period is the issue of concern then the TCSD should compensate for the forecast DRP slope premium over the regulatory period. This would suggest using the most recent data to estimate the DRP slope premium.

78. The Commission's estimate of the average 5 year DRP over the last 5 years is around 1.85%[15] and would be higher still if the average extended back to 2009 (when the Commission first published consistent DRP estimates); noting that 10 year debt

15 See paragraph 106 of the Topic 4 paper.

issued in 2009 will not mature until 2019. This suggests that, were the Commission attempting to compensate for the inability to hedge historical DRPs then the TCSD should:

- start by adding around 39bp to the prevailing DRP (to capture the generally higher historical 5 year DRPs); and
- then make an additional adjustment for the historical average DRP slope over this period (to capture the additional cost of issuing long term debt in the past).

79. However, the Commission's current TCSD does not attempt to make any adjustment for the first consideration. Therefore, it can be assumed that the Commission is not attempting to compensate for the difference between prevailing and historical average DRPs. Indeed, the Commission has explicitly argued against adopting a trailing average on the basis that incentives are best supported by using prevailing estimates.[16]

80. If this logic is accepted it applies equally to the TCSD premium as to the 5 year DRP. In which case, the primary purpose of the TCSD is to provide adequate compensation for the prospective costs of issuing long term debt over the forthcoming averaging period. In that case, the best estimate of the 5 year DRP that will prevail over that period is likely derived from the most recent estimates of DRP slope (proximate to the beginning of the regulatory period). Therefore, there is no need to make the adjustment of the kind envisioned in the first dot point in paragraph 78 above. This means that the failure of the Commission's TCSD methodology to do so can be reconciled to an objective to provide adequate compensation for prospective (as opposed to retrospective) debt issues.

81. However, if this is the case then it equally follows that the prevailing estimate of the DRP slope should be adopted as the DRP slope that provides:

- the best estimate of the DRP slope over the next five years of the DPP; and
- is internally consistent with the 5 year DRP that is estimated for the DPP.

82. As a general rule the best estimate of the prospective 5 year DRP / DRP slope is the 5 year DRP / DRP slope that prevails proximate to the regulatory period. However, there are further compelling reasons for combining a prevailing 5 year DRP and the DRP slope. This is because there is a well-documented inverse relationship between short term DRPs and the slope of the DRP yield curve.

83. That is, the term premium in DRP is inversely related to the level of the DRP. This means that it is not by pure chance tht the current 5 year DRP is low relative to the

16 Topic Paper 4 (para 135.1 and 135.2)

last 5 years and the current DRP slope above 5 years is high. When this is understood then it can be seen that the Commission's current effective approach of:

- Rejecting a trailing average for the 5 year DRP in favour of ; and
- Adopting what is in effect a trailing average estimate for the DRP slope
- Involves a mismatch that, in current market circumstances, is expected to undercompensate businesses for their DRP costs on both: previously issued long term debt; and newly issued long term debt.

84. When this is recognised most weight should be given to the most recent estimates of the DRP premium.

5.1 Finance theory

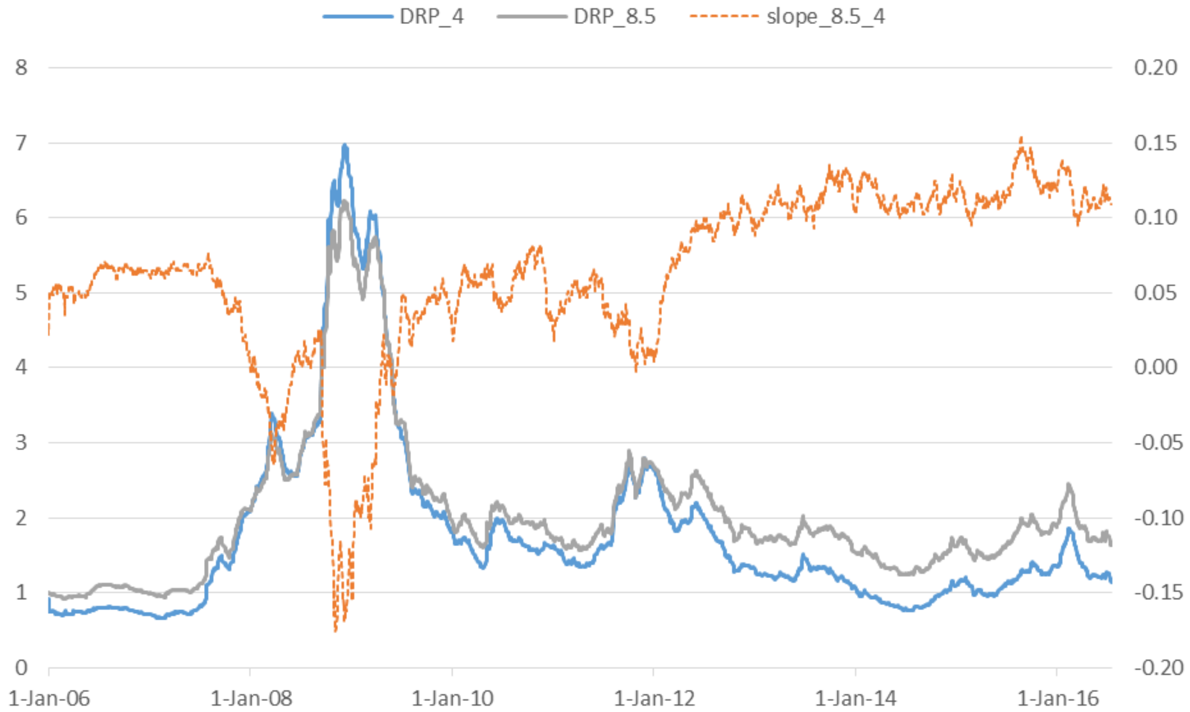
85. Figure 13 below shows that 8.5 year[17] and 4 year Merrill Lynch[18] US Corporate DRP along with the slope[19] of the yield curve on the secondary y-axis (on the right) since 2006. It can be seen that the DRP slope tends to decrease when the level of the short term DRPs (and DRPs more generally) are high (e.g., the period around GFC and 2011/12); while the DRP slope increases when the level of the DRPs are low (period after GFC and since 2012/13). That is, gap between the blue and grey lines is inversely related to their levels.

17 An average of 7-10 year bond credit spreads

18 Federal Reserve Economic Data, www.fred.stlouisfed.org

19 Difference between DRP_8.5 and DRP_4 divided by 4.5 (difference in tenor)

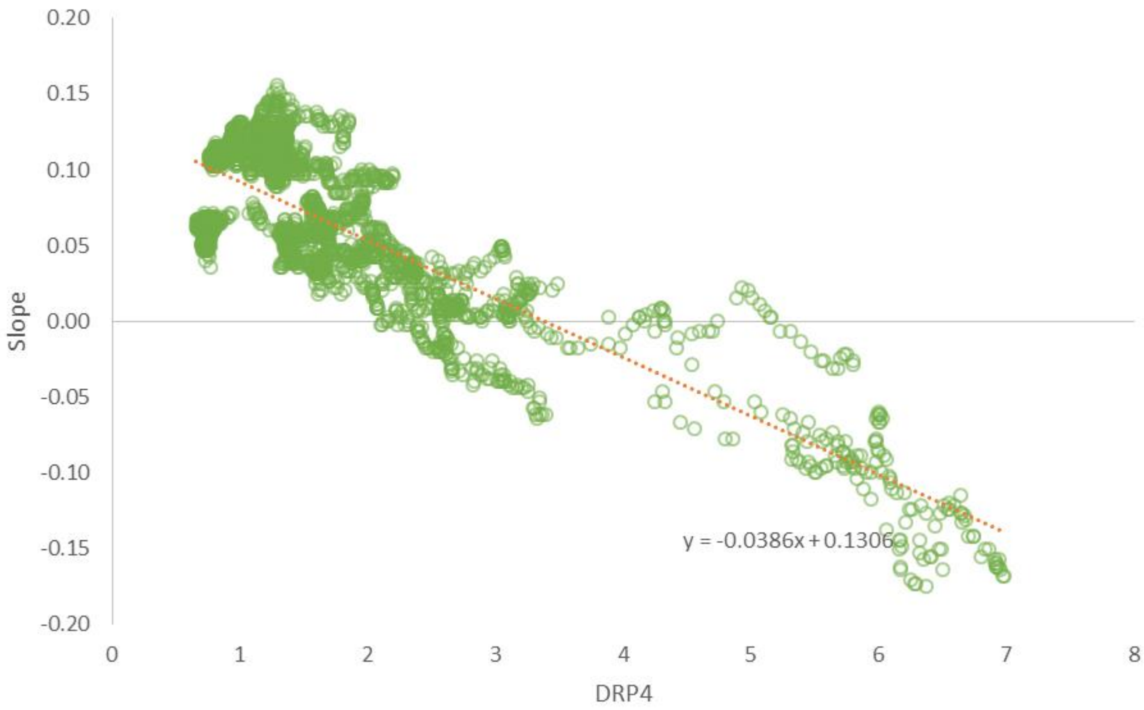
Figure 13: Merrill Lynch US Corporate 8.5 and 4 year option-adjusted spread



Bloomberg data, CEG analysis

86. It can be seen from Figure 13 that at the peak of GFC, the short-term DRP (blue) was even higher than then long term DRP (grey), suggesting a downward-sloping yield curve. The negative correlation between short-term DRP and the slope of the yield curve is further demonstrated in the scatter plot in Figure 14 below. It can be seen that the negative correlation between DRP and the slope is significant and persistent.

Figure 14: Scatter plot of 4-year DRP and the slope of yield curve (8.5 year v 4 year)



Source: FRED data, CEG analysis

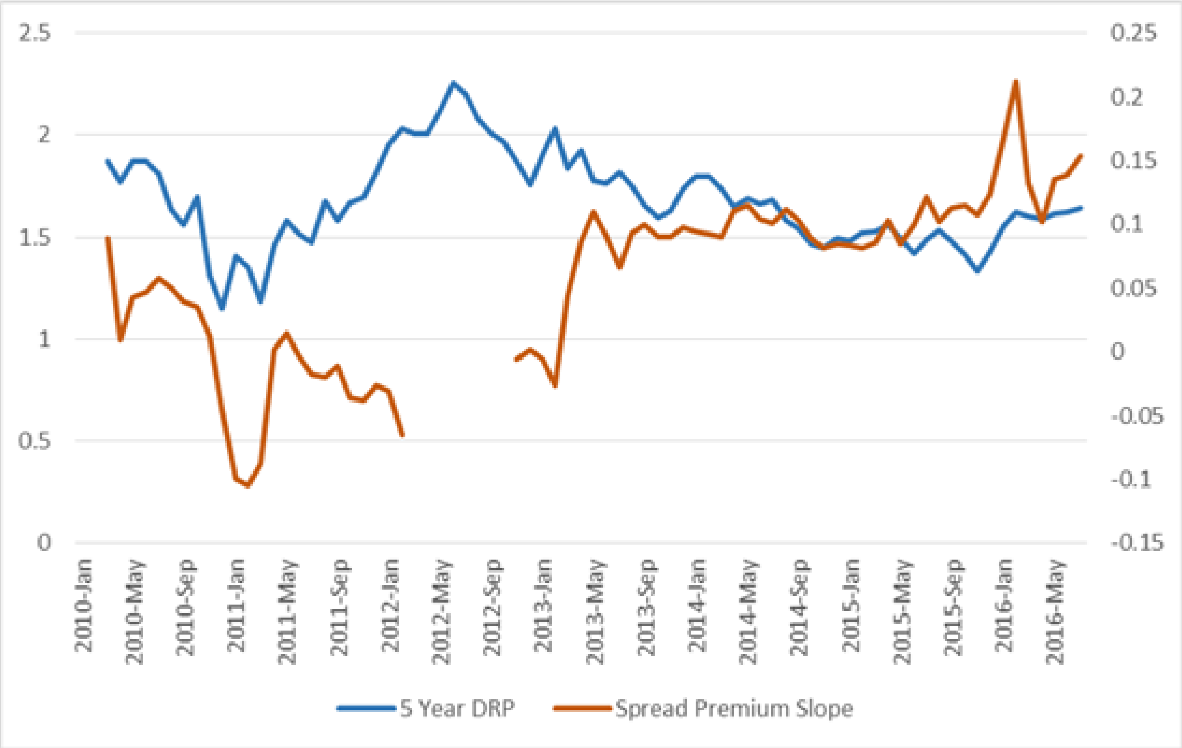
87. A plausible explanation for this phenomenon is provided by Johnson (1967).[20] Long term DRPs are typically above short term DRPs, especially for investment grade debt, because there is little short term probability of default but the further into the distance is repayment the greater the probability of events unfolding such that default does occur prior to repayment. Johnson pointed out that, if a firm faces a heightened immediate threat to its ability to refinance debt (as would be consistent with high short term DRPs), then the probability of default in the short term can be very high and the margin on short-term debt can be very high. However, if the firm manages to see out its short term threats, it may be expected that the per annum probability of default falls. This consideration will tend to compress the difference between short and long term DRPs when short term DRPs are high.

[20] Johnson, Ramon E., 1967, "The term structure of corporate bond yields as a function of risk of default," Journal of Finance 22 (2), 313-345.

5.2 Evidence – Monthly NSS calculations using Commerce Commission data and method

88. The figure below demonstrates the existence of an inverse relationship between NSS estimated term premiums (right hand axis) and the level of the 5 year DRP (left hand axis) – with much higher average term premiums over the last 3 years vs the previous 2.

Figure 15: Term premium vs 5 year DRP



Source: CEG analysis of Bloomberg data.

89. The gap in the DRP slope series exists because in the relevant months there were less than 3 bonds with maturity in excess of 5 years. From 2014 onwards estimated 5 year DRPs have been relatively stable and the number and quality of observations has been highest.[21] The DRP slopes in the above figure from 2014 are summarised below.

[21] See Figure 5 and Figure 7 above.

Table 23: Estimates of DRP slope since 2014

Period	Estimate
Calendar 2014	9.8 bppa
Calendar 2015	10.1 bppa
January to 19 July 2016	14.9 bppa

5.3 Evidence – individual issuers

90. The evidence from individual issuers was briefly signposted in section 4. Consistent with the evidence and theory surveyed above it also showed a strong negative correlation between short term DRP and the DRP slope.

91. The issuer-specific results in section 4.3 are repeated below for illustration. The average correlation across all issuers is -0.3528 when pre-privatisation data is included and -0.3229 when pre-privatisation data is excluded. All individual issuers, excluding Contact and Fonterra, demonstrated a strong negative correlation between short term DRP and DRP slope.

Table 24: Correlation between short-term DRP and slope by issuer

Issuer	Correlation (including pre-privatisation)	Correlation (excluding pre-privatisation)
Auckland International Airport	-0.0957	-0.0957
Genesis	-0.3749	-0.3538
Mighty River Power	-0.6244	-0.4360
Vector		
Wellington	-0.9399	-0.9399
Contact	0.0615	0.0615
Powerco		
Spark Finance	-0.7804	-0.7804
Telstra		
Fonterra	0.2841	0.2841
Meridian		
Christchurch International Airport		
Average	**-0.3528**	**-0.3229**

Source: Bloomberg data; CEG analysis. Note that these are the correlation results from a monthly regression and using data satisfying a minimum term to maturity of 3.5.

92. Figure 16 and Figure 17 add the Genesis example at Figure 12 above to illustrate this negative correlation for Mighty River Power and Spark selected issuers.

Figure 16: Inverse relationship between DRP and slope for Mighty River Power (January 2010 – July 2016)

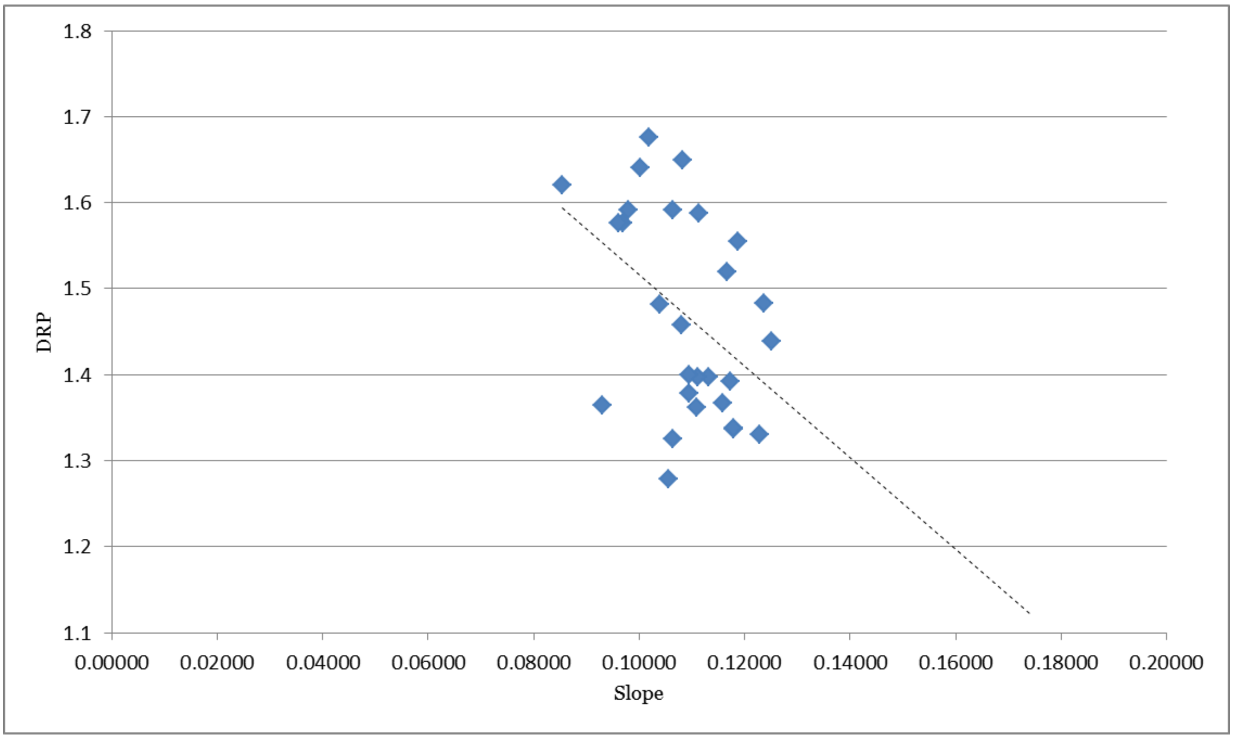
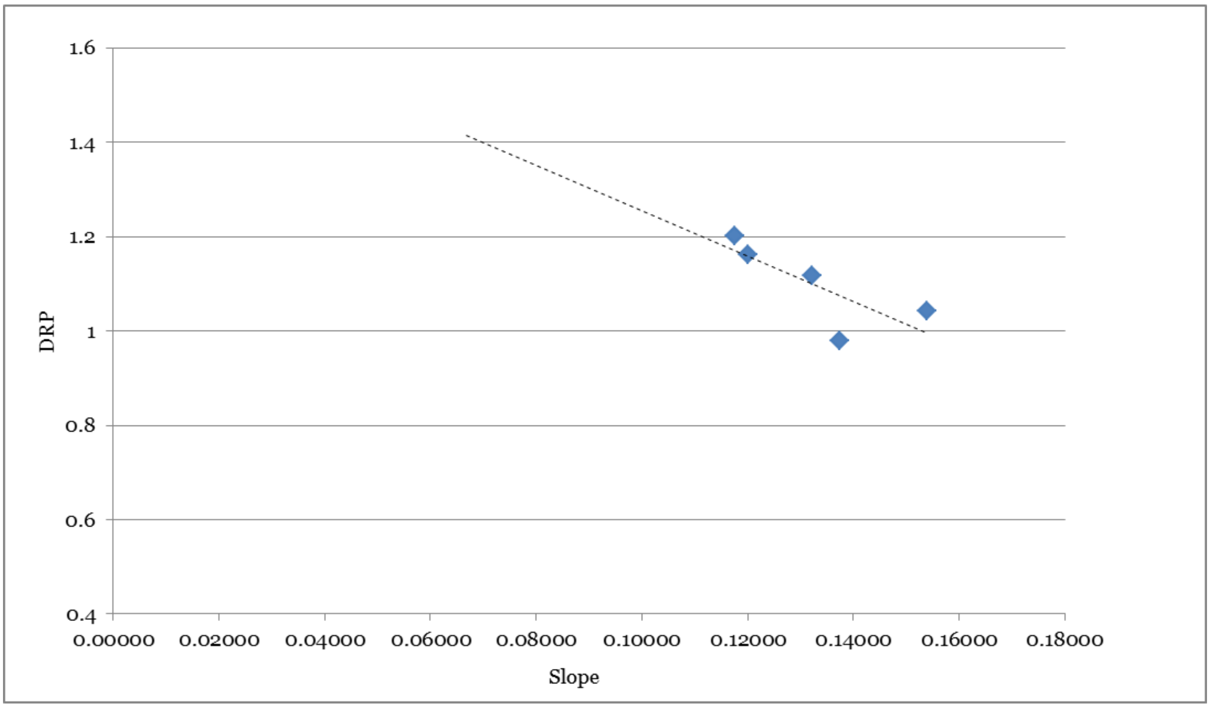


Figure 17: Inverse relationship between DRP and slope for Spark Finance (January 2010 – July 2016)



93. As per the previous section we report the average slopes across the three BBB+ issuers with observations since 2014. These are very similar to those found in Table 23 above

Table 25: Estimates of DRP slope since 2014 (individual BBB+ issuers)

Period	Estimate
Calendar 2014	8.6 bppa
Calendar 2015	10.2 bppa
January to July 2016	14.4 bppa

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6 Conclusion

94. Our results are summarised in Table 26 below:

Table 26: Results summary

Methodology	Estimate (bppa)
Commerce Commission NSS estimates since January 2014 (Table 34 of Topic paper 4)	13 (2014 and 2016) to 16 (2015)
CEG estimates since January 2014 as per modified Commission method (Table 23)	9.8 (2014) to 14.9 (2016)
CEG estimates since January 2014 averaged across individual issuers (Table 25)	8.6 (2014) to 14.4 (2016)
CEG Monthly NSS estimate January 2010-July 2016 (Table 11)	9.4-12.1 (average since 2010)
CEG Monthly average slopes of individual BBB+ issuers January 2010-July 2016 (Table 13)	10.5-12.5 (average since 2010)

95. Our most recent estimate of the BBB+ DRP slope for the first 6 months of 2016 is around 14-15 bppa depending on the method employed. This is consistent with the Commission's own 13 bppa estimates of the NSS slope over the 3 months January to March 2016.[22] These more recent estimates are is slightly above our best estimate of the average DRP slope over the last 5 years of around 9.4 to 12.1bp based on the results reported in Table 11 (using our amended version of the Commission's method) and which are corroborated by the individual BBB+ issuer DRP slopes (10.5 to 12.5) reported in Table 13.

22 The Commission reports NSS parameters in Table 34 for this period. The average slope between 10 and 5 years based on these parameters is 13 bppa. Over the year to January 2016/2015 the average slope based on the Commission's NSS parameters reported in Table 34 is 16bp/13bp. Therefore, an estimate of around 15bp bppa is not just consistent with the most recent data but also consistent with the Commission's estimates over the last 2.5 years.