Relative volatility of cost of debt estimation methods

A REPORT FOR VECTOR

January 2024

COMPETITION ECONOMISTS GROUP

Table of Contents

COMPETITION ECONOMISTS GROUP

List of Figures

List of Tables

COMPETITION ECONOMISTS GROUP

1 Introduction & summary

1. Vector commissioned CEG to perform a comparison of the volatility of the cost of debt estimated based on the New Zealand Commerce Commission's (NZCC) versus a simple trailing average.

2. Our analysis demonstrates that, over the last 20 years, the Commission's current method is between 3.5 and 5.7 times more volatile than a simple ten-year trailing average. This is because the NZCC methodology is very sensitive to the prevailing risk-free rate. It is for this reason that the NZCC methodology will very likely result in a more than doubling (greater than 100% increase) in the cost of debt estimate between DPP3 and DPP4. This is occurring at the same time that the cost of equity (which is also based on the prevailing risk-free rate) is also increasing dramatically relative to DPP3.

3. By contrast, if ten-year trailing average was in place, then the cost of debt would fall modestly (circa 18%) from DPP3 to DPP4. Not only is this less volatile than the NZCC estimate it has a negative correlation with the cost of equity – with the effect that, rather than compounding the impact on the WACC of volatility in the cost of equity, it would be partially offsetting that volatility.

2 Volatility of the NZCC cost of debt method

4. The Commission's current estimation methodology is to estimate the cost of debt based on:

   - the prevailing risk-free rate at a 5-year tenor immediately before the DPP ; plus
   - a five-year average debt risk premium (DRP) on 5-year tenor BBB+ bonds.

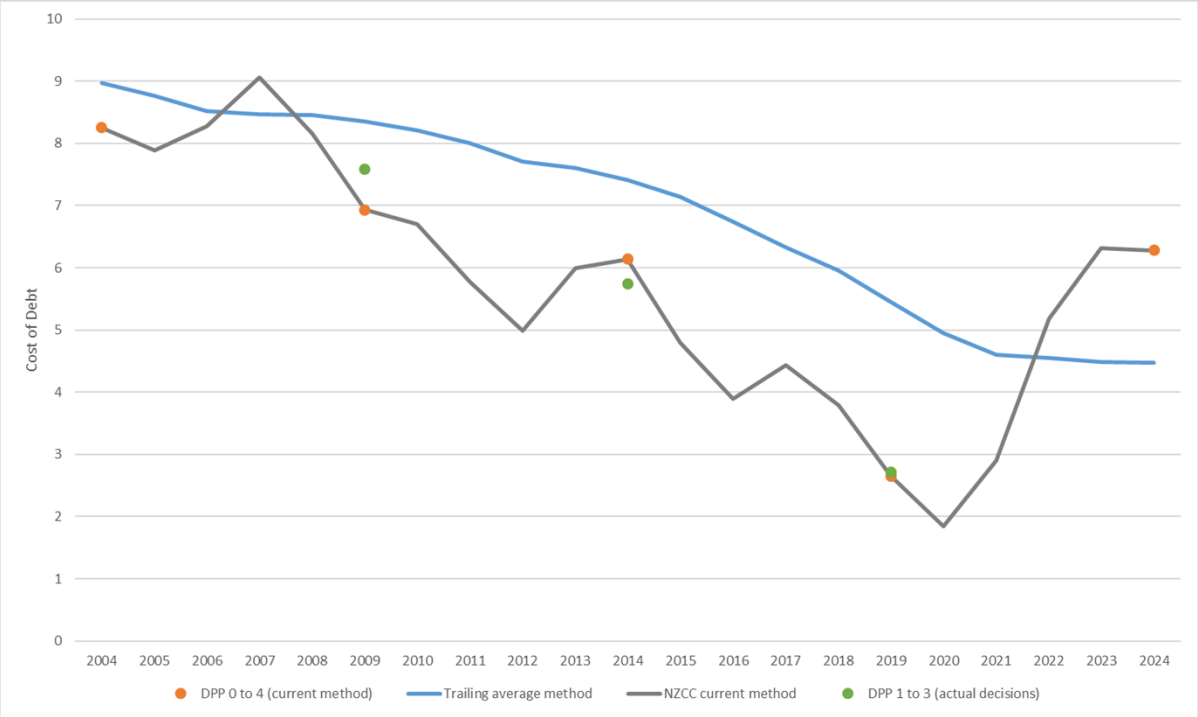
5. We compare the volatility of the NZCC method with the volatility of a simple ten-year trailing average of the yield on 10-year tenor BBB+ bonds. Our data is described in Appendix A.

2.1 Estimation and volatility of cost of debt methods

6. In This is illustrated in Figure 2-1 above and in Table 2-1 below. below, we have reapplied the current NZCC method once per year. The NZCC method is represented by the grey line in this figure between 2004 and 2024. However, the NZCC method is only applied once every 5-years (at the beginning of a DPP). The orange dots represent our estimates of the application of this method on the same five yearly timeline as covered by DPP1 to DPP4. We also include an orange dot in 2004 representing the estimate "as if" there was a DPP decision then ("DPP0").

7. The blue line shows the 10-year trailing average. The green dots represent actual DPP decisions on the cost of debt (excluding debt raising costs). Note that for DPP1 and DPP2 the green dots are materially different to the orange dots because in those decisions the NZCC was not using a trailing average DRP and the NZCC did not estimate the risk-free rate over 3 months.

Figure 2-1: Cost of debt under reproduced NZCC method and trailing average method



RBNZ, NZCC ID DRP estimates, Bloomberg.

8. For DDP3 the difference between the orange and green dot is much smaller reflecting small methodological differences between our time series estimation method and the Commission's method for the DPP.[1]

9. It is important to understand that the fact that the NZCC method is lower, on average, than the trailing average is an artefact of falling risk free rates over the last 20 years. This causes the prevailing risk-free rate to be lower than the trailing average. But the opposite is true if the risk-free rate is rising (as it has been in recent years). In that scenario the NZCC method results in a higher cost of debt estimate. On average over the long run, the two methods will give very similar results[2] – it is just that the NZCC method will give much more volatile estimates.

10. This is illustrated in Figure 2-1 above and in Table 2-1 below. Based on Table 2-1 below, I estimate that the NZCC method is 3.5 times (55.2/15.7) more volatile than

[1] I use RBNZ Hb3 5 year estimates (not annualized) while the NZCC interpolates between specific NZGB bonds and annualizes. I also estimate the DRP over two periods (at the beginning of the year for EDBs and at the end for GPBs ID decisions).

[2] The only long run difference is the long run difference between the 10- and 5-year risk free rates. Lally (2023) has estimated this at 0.14% for the NZCC "*Firstly, the average differential for the New Zealand five- and ten-year rates from 1985-2022 inclusive has been 0.14%*". See Lally, ESTIMATION OF THE TAMRP, 10 April 2023 available at this link.

the trailing average method, as measured by the average (absolute) percentage change in the cost of debt between each regulatory period. This estimate rises to 3.7 if I exclude the "hypothetical" DPP0.

Table 2-1: Volatility of cost of debt between regulatory periods

Regulatory period	NZCC current method	Trailing average method
DPP0 to DPP1	-16.0%	-6.9%
DPP1 to DPP2	-11.5%	-11.3%
DPP2 to DPP3	-56.8%	-26.4%
DPP3 to DPP4	136.7%	-18.1%
Average change (absolute value)	55.2%	15.7%

11. The NZCC methodology is sensitive to the prevailing risk-free rate. It is for this reason that the NZCC methodology will very likely result in a greater than 100% increase in the cost of debt estimate between DPP3 and DPP4. This is occurring at the same time that the cost of equity (which is also based on the prevailing risk-free rate) is also increasing dramatically relative to DPP3.

12. By contrast, if ten-year trailing average was in place, then the cost of debt would fall modestly (circa -18%) from DPP3 to DPP4. Not only is this less volatile than the NZCC estimate it has a negative correlation with the cost of equity – with the effect that, rather than compounding the impact on the WACC of volatility in the cost of equity, it would be partially offsetting that volatility.

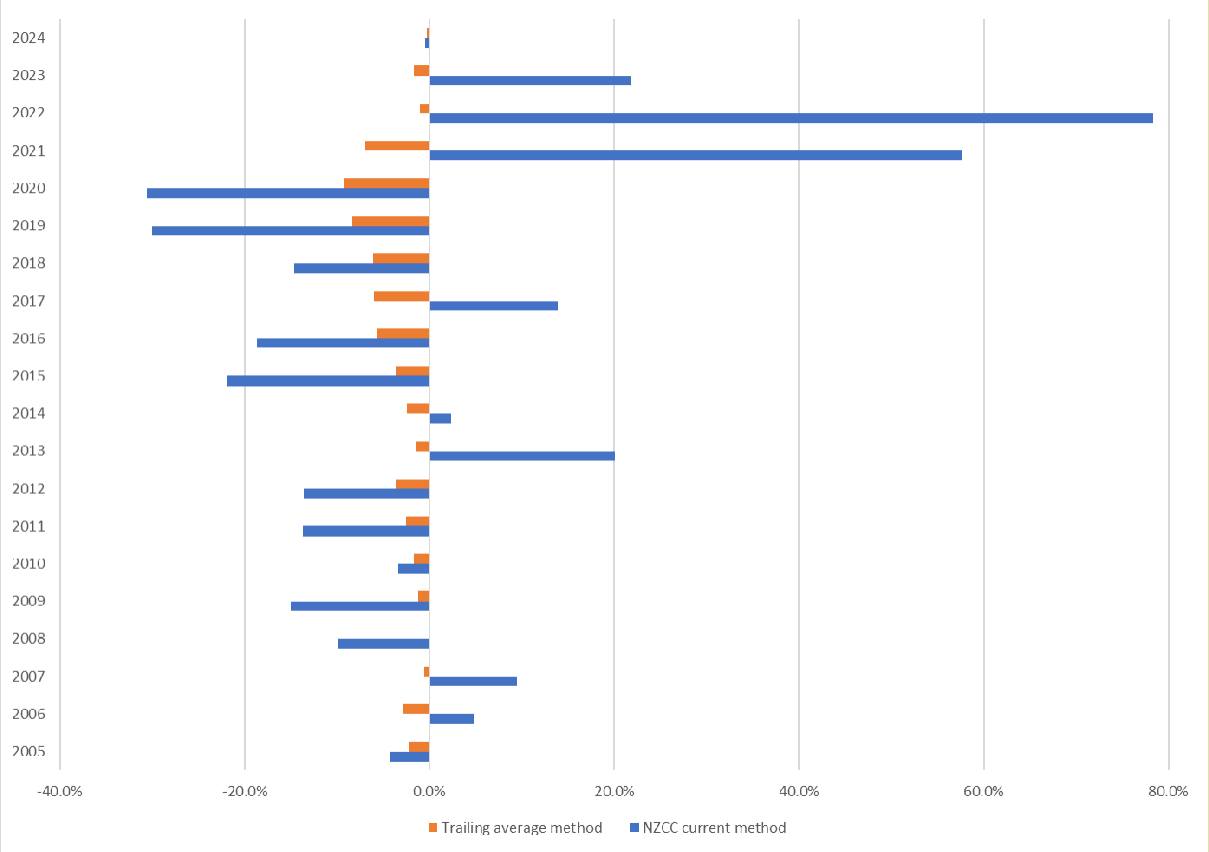
13. If I repeat the same analysis every year (instead of every 5 years) then the NZCC method is 5.7 times more volatile than the 10-year trailing average.

Table 2-2: Change in cost of debt each year

Year	NZCC current method	Trailing average method
2005	-4.3%	-2.3%
2006	4.8%	-2.9%
2007	9.5%	-0.6%
2008	-10.0%	-0.1%
2009	-15.0%	-1.2%
2010	-3.4%	-1.7%
2011	-13.7%	-2.6%
2012	-13.6%	-3.7%
2013	20.1%	-1.4%
2014	2.3%	-2.5%
2015	-21.9%	-3.7%
2016	-18.7%	-5.7%
2017	13.9%	-6.1%
2018	-14.6%	-6.1%
2019	-30.0%	-8.5%
2020	-30.6%	-9.5%
2021	57.7%	-7.0%
2022	78.3%	-1.1%
2023	21.9%	-1.7%
2024	-0.5%	-0.3%
Average change (absolute value)	19.2%	3.4%

14. The above data is visualised in Figure 2-2 in the form of a bar chart.

Figure 2-2: Percentage change in cost of debt – NZCC method versus trailing average



15. Table 2-3 summarises the difference in cost of debt between the methods and the impact on revenues per $1,000 of RAB, assuming 42% leverage.

Table 2-3: Difference in cost of debt

Period	NZCC current method (%)	Change (%)	$ pa value change per $1,000 RAB	Trailing average (%)	Change (%)	$ pa value change per $1,000 RAB	$ Change: NZCC– trailing average
DPP1	6.93	-	-	8.26	-	-	-
DPP2	6.14	-0.80	-3.35	7.31	-0.94	-3.95	0.61
DPP3	2.65	-3.48	-14.63	5.35	-1.96	-8.23	-6.40
DPP4	6.28	3.63	15.23	4.37	-0.99	-4.15	19.38

16. Notably, between DPP2 and DPP3 the cost of debt compensation fell by more than half (6.14% to 2.65%[3]) and then, between DPP3 and DPP4 it is forecast to more than double (from 2.65% to 6.28%). By contrast, the trailing average cost of debt would have fallen by less than 2% (from 7.31% to 5.35%) between DPP2 and DPP3 and it is forecast to keep falling (albeit modestly) in DPP4. This is because the higher than average risk free rates over the last 2-3 years only receive a 20-30% weight in the 10 year trailing average (compared to 100% weight in the NZCC method).

3 As already explained, the actual estimate for DPP3 was 2.72%. Our estimate is slightly different due to slight differences in our method of estimating the risk-free rate and DRP – which we apply consistently through time.

Appendix A Data description

17. We used RBNZ data[4] to estimate the risk-free rate. We took the simple average of the yields in July, August, and September each year between 1995 and 2023. This gives us a time series of the estimated risk-free rate for 5- and 10-year bonds and is reproduced in Table 2-4 below.

4 NZRB (2023), Wholesale Interest Rates – B2 Monthly (1985-current), https://www.rbnz.govt.nz/statistics/series/exchange-and-interest-rates/wholesale-interest-rates.

Table 2-4: Average Q3 yields for 5 and 10 year NZ government bonds

Year (Q3)	5 year NZRB	10 year NZRB
1995	7.90	7.78
1996	8.41	8.34
1997	6.97	6.91
1998	6.32	6.15
1999	6.43	6.78
2000	6.73	6.72
2001	6.41	6.61
2002	6.10	6.35
2003	5.36	5.80
2004	6.14	6.18
2005	5.78	5.74
2006	6.16	5.84
2007	6.95	6.44
2008	6.04	6.04
2009	4.82	5.73
2010	4.59	5.31
2011	3.70	4.68
2012	2.95	3.54
2013	3.90	4.47
2014	4.03	4.25
2015	2.75	3.35
2016	1.91	2.29
2017	2.53	2.92
2018	2.03	2.68
2019	1.01	1.28
2020	0.23	0.72
2021	1.32	1.70
2022	3.65	3.77
2023	4.88	4.87

18. We use 5-year tenor BBB+ estimates from the NZCC Information Disclosure (ID) cost of capital decisions.[5] For each year we use the average of GPB and EDB DRP estimates. The Commerce Commission does not publish 10-year BBB+ DRP

5 NZCC (2023), Cost of capital guidelines and determinations, https://comcom.govt.nz/regulated-industries/input-methodologies/input-methodologies-for-electricity-gas-and-airports/cost-of-capital-guidelines-and-determinations.

estimates and, consequently, we assume that 5- and 10-year DRP estimates are the same.[6]

19. For 2010 to 2013, we estimated this by reading off charts published in ID decisions. Between 2014 and 2024 we relied on the exact reported values in the GPB and EDB. As there are no published estimates prior to 2010, we have assumed the debt premium prior to 2010 is constant at the value that it was in 2010. This is summarized in Table 2-5 below.

20. We have assumed that the 5- and 10-year risk free rates in July to September 2024 will be the same as in the corresponding period of 2023 (e.g., for the purpose of estimating the DPP4 risk free rate using the NZCC current method).

21. For the purposes of this report, debt issuance costs are omitted from our estimate of the cost of debt.

[6] This assumption may not be true in reality but, given we are interested in relative volatility, the level of 5- and 10-year DRPs are irrelevant to the analysis – the only relevant consideration would be the correlation between these DRPs and the risk-free rate. By assuming the same DRP we are, in effect, assuming the same correlation between DRP and risk-free rate at a 10- and 5-year tenor.

Table 2-5: Debt premium derived from NZCC estimates

Year	Debt premium	GPB chart	GPB chart	GPB table	EDB table
1995	2.11				
1996	2.11				
1997	2.11				
1998	2.11				
1999	2.11				
2000	2.11				
2001	2.11				
2002	2.11		Assumed to be constant before 2010		
2003	2.11				
2004	2.11				
2005	2.11				
2006	2.11				
2007	2.11				
2008	2.11				
2009	2.11				
2010	2.11	1.95	2.27		
2011	1.94	1.75	2.14		
2012	1.96	2.00	1.93		
2013	2.34	2.50	2.19		
2014	2.19			2.34	2.04
2015	1.80			1.84	1.76
2016	1.63			1.66	1.59
2017	1.57			1.54	1.59
2018	1.64			1.65	1.63
2019	1.60			1.60	1.60
2020	1.63			1.65	1.60
2021	1.50			1.45	1.55
2022	1.25			1.35	1.15
2023	1.18			1.10	1.25
2024	1.45			1.45	-