NZCC further consultation on using cost of debt revenue wash-ups to target a nominal return on debt

Dr. Tom Hird
October 2023

COMPETITION ECONOMISTS GROUP

Table of Contents


ceg
COMPETITION
ECONOMISTS
GROUP

List of Figures

List of Figures

COMPETITION ECONOMISTS GROUP

1 Executive summary

1. The Commerce Commission has proposed a reform intended to correct for an "error" in the current regulatory regime. Specifically, the current regime delivers compensation "as if" 100% of an EDB's debt funding of the RAB moves in line with actual inflation. However, the Commerce Commission argues that the nominal cost of debt is "fixed at the reset" and does not vary with inflation.

2. The Commerce Commission has proposed a "revenue wash-up" calculated assuming that 100% of all debt funding is fixed prior to the beginning of the DPP (i.e., during the cost of debt averaging period).

3. The key conclusions of this report are as follows:

    a. **First.** Circa 98% of the reason the current regime does not deliver compensation for a fixed nominal cost of debt is due to revaluation of the debt RAB using actual inflation. It is peculiar that the Commission's preferred "solution" is to leave the source of the problem (RAB indexation) unchanged and, to attempt to offset this via a revenue adjustment.

    b. **Second.** It is impossible for an EDB to fix 100% of its debt funding over the DPP in the presence of unexpected inflation that feeds into RAB indexation. This is because funding costs for variations from the expected RAB cannot be hedged with interest rate swaps.

    c. **Third.** From the second conclusion it follows that the Commission must not attempt to target a nominal return on debt via a revenue wash-up (leaving the debt RAB indexed to actual inflation). Doing so amounts to designing a regulatory regime under which EDBs cannot have a fixed nominal cost for 100% of their debt portfolio but then calculating a wash-up 'as if' they do.

        i. If the Commission's preferred model was in place during DPP3 then, based on actual and forecast inflation to date, it would have overestimated the revenue wash-up by at least 23% in the final year of DPP3.

        ii. This estimate is based on the (unrealistic) assumption that an EDB hedged both: a) 100% of their initial portfolio of debt at the beginning of the DPP; plus b) 100% of the expected growth in their debt portfolio using forward starting swaps. If more realistic assumptions are used that better reflect EDBs actual practices the 23% overestimate calculation would be materially higher.

    d. **Fourth**. There would also be significant economic costs and dislocation to EDB's capital management activities, cash-flows, and "financeability" if a revenue wash-up were pursued. These costs would not exist if the adjustment was solely to RAB indexation.

e. **Fifth.** The Commission's "Blended CPI" method is far superior to a revenue wash-up. This method can be amended in line with the discussion in Section 6 to allow for more realistic modelling of what debt costs can reasonably be assumed to be fixed at the beginning of the DPP. If the Commission is not able at this stage of the consultation to adopt more realistic assumptions about how much debt it is possible/efficient to fix during the cost of debt averaging period then the Commission should reconsider making any changes to the current regime.

f. **Sixth.** The Commission states that it prefers a revenue wash-up over a "Blended CPI" (or similar) solution on the grounds that the former is simpler to implement within existing regulatory/spreadsheet models. I do not agree that this is the case. However, even if it were the case, the additional complexity of spreadsheet models is trivial when compared to the cost of additional complexity in EDBs' capital management if a revenue wash-up is implemented.

2 Introduction

4. I, Tom Hird of [redacted], have been engaged by the Big 6 group of EDBs to provide advice on the New Zealand Commerce Commission's ("NZCC") proposed approach to targeting a nominal return on debt.

5. I hold the following qualifications:

   - Bachelor of Economics (Honours First Class), Monash University (1989); and
   - PhD in Economics, Monash University.

6. From 1990 to 2000 (both prior to, during and after the completion of my PhD in economics) I was employed by the Commonwealth Treasury. Since 2001 I have worked as a consulting adviser specialising in economics: first with Arthur Andersen, then NERA Australia and, since 2007, for my own firm, Competition Economists Group ("CEG"). I have advised private clients, regulators, and other Government agencies on a large number of cases specialising in finance theory.

7. I have more than 30 years of experience in the economic analysis of markets and in the provision of expert advice in regulatory, litigation and policy contexts. I have provided expert testimony before courts and tribunals and in numerous regulatory forums in Australia but also in the United Kingdom and New Zealand.

2.1 Report structure and outline

8. Section 3 explains that failure of the current regime to deliver a constant nominal cost of debt is around 98% attributable to the revaluation of the debt portion of the RAB being different to forecast and around 2% attributable to debt compensation in revenues being different to forecast. It follows that if a nominal cost of debt was to be targeted then it would be logical for this to involve reform to the source of the failure (the debt RAB indexation) and not an adjustment to revenues which will relatively accurately target the forecast component of debt costs included in revenues.

9. In section 4 I explain that the cost of debt can only be treated as fixed for funding the expected RAB. Unexpected inflation, by definition, creates an unexpected change in the debt RAB. This must be funded at prevailing interest rates. As a consequence, it is not correct to treat the cost of debt as fixed in the consequence of unexpected inflation. Taking account of this can be demonstrated to show that the Commission's demonstration model calculations are biased.

10. Section 5 critiques the NZCC's rationale for its preferred approach to targeting a nominal cost of debt (i.e., by implementing adjustments to revenues).

    - Section 5.1 explores the NZCC's reasoning for concluding that a pure "revenue adjustment" solution is less complicated, and therefore to be preferred, than

correcting the source of the problem (i.e., debt RAB indexation). I do not believe that correcting RAB indexation is more complicated from regulatory spreadsheeting perspective. However, even if this were the case, the costs of such complications to regulatory spreadsheeting would be trivial compared to the real economic costs associated with EDBs adapting their capital management practices to accommodate unexpected revenue variations.

- Section 5.2 explores the cash flow implications of the Commission's proposed model.
- Section 5.3 explains why the Commission's proposed approach to compensating for the nominal cost of debt will not have an NPV=0 result. This is because the volatility in revenues (driven by unexpected inflation and the NZCC revenue adjustment mechanism) drives corresponding volatility in debt raising. However, this debt raising occurs at a nominal rate that reflects the inflation rates at the time.
  - In fact, the very act of attempting to adjust *revenues* to account to target an assumed "fixed nominal cost of debt" will cause that cost of debt to vary (to not be fixed). This is because the unexpected revenue variation forces suppliers to raise more (less) than expected when inflation is unexpectedly high (low). As a result, the NZCC adjustment mechanism will actually cause nominal interest rates paid by suppliers to be higher on average than the cost of debt being targeted.
- Section 5.4 illustrates the materiality of these concerns by modelling the impact of the Commission's proposed approach if it had been applied during DPP3.
  - If this was the case then the "over recovery" of nominal debt costs to be "offset" by negative revenue adjustments would have been circa 15% of the opening debt RAB for EDBs;
  - Even with the Commission's proposed smoothing method this would have involved a reduction in revenues of circa 5% of the opening debt RAB for EDBs during DPP3 (with the residual in DPP4 even assuming no compounding adjustments due to inflation forecast errors in DPP4);
  - Because base interest rates[1] at which this debt would have to be raised are circa four times higher than at the beginning of DPP3 this implies *the revenue adjustment would cause* a 15% (=4.0×5.0% + 1.0×95.0%) increase in the average base rate of interest cost of debt for EDBs above the "fixed"

[1] "Base rates" of interest refer to the risk free rates/swap rates at which interest costs would have been fixed. EDBs cannot use any available hedging instruments to fix the debt risk premium (DRP). This is always floating. I do note that a revenue wash-up would, compared to changing RAB indexation, force EDBs to have much lumpier debt raising which would, in turn, be inconsistent with the IM approach to the DRP (which assumes smooth debt raising overtime).

nominal base rate upon which the Commission's demonstration model is using to estimate the wash-up.

- Section 5.5 demonstrates that even on its own terms the Commission's model is not NPV = 0.
- Section 5.6 raises the concerns about the compounding effect of a revenue wash-up on an EDB that does not, or only partially, follows the Commerce Commission's assumed debt management strategy. Implementing a revenue wash-up could be interpreted as requiring EDBs to follow that strategy or face the risk of a severe penalty. This should only be implemented if there is good evidence that the Commerce Commission's assumed debt management strategy is more efficient than the EDB's actual debt management strategy.
- Section 5.7 discusses the financeability concerns and complications the Commission's preferred approach would create;
- Section 5.8 explains that no other regulator has implemented a similar approach.

11. Section 6 explains that these problems can be largely avoided by adopting a variation on the NZCC's Blended CPI option (an approach that leaves the current approach to revenue indexation unchanged and achieves an NPV=0 approach solely by amending RAB indexation).

3 What is the source of current failure to target a nominal cost of debt?

12. In the presence of inflation forecast error, the current regulatory regime does not deliver a nominal return on debt over a regulatory period. I explain in sections 4 and 5 that this may actually be appropriate (or, at least, less "wrong" than the Commission currently assumes) because RAB growth due to unexpected inflation cannot be funded at the DPP fixed rate of interest.

13. However, in this section I proceed with the simplifying but unrealistic assumption that EDBs can borrow (or lend) an infinite amount at the DPP cost of debt estimate. This allows me to assume that unexpected RAB growth due to unexpected inflation can be accommodated at the DPP cost of debt estimate (which is also what the Commission's demonstration model assumes).

14. There are two mechanisms by which the current regime delivers a higher cost of debt compensation when unexpected inflation is positive. One is RAB revaluation and the other is revenue indexation both of which use actual inflation.

15. Paragraph 45 of the Further Consultation paper incorrectly states that the problem that is being addressed is "revenue windfall gains and losses".

> *The hybrid proposal does not address the problem that we are endeavouring to solve, which is the uncertainty in revenue windfall gains and losses associated with the inconsistency between the annual revenue wash-up for inflation and the assumption that suppliers fix their cost of debt at the reset.*

16. As I explain below, the reason the current regime does not deliver compensation for a nominal cost of debt is overwhelmingly because too much compensation is provided in RAB indexation. The hybrid proposal does address this problem as does the Commissions "Blended CPI" method and, indeed, any method that used forecast inflation to roll forward the debt portion of the RAB.

17. The relative importance of these two mechanisms (revenue and RAB compensation for inflation) can be illustrated by a simple example. Imagine a one-year regulatory period where the debt portion of the opening RAB is $100 and where the nominal cost of debt is 4.0% and forecast inflation is 2.0%. The current regime will provide:

    - $2.0 in expected revenues (=$100×(4% RoD - 2% forecast inflation). This is the BBAR component of the cost of debt less the BBAR reduction that relates to the revaluation of the debt RAB; plus
    - $2.0 in expected revaluation of the debt portion of the RAB (=$100 × 2% forecast inflation).

18. That is, half of the compensation for the nominal cost of debt is forecast to be provided in revenues and half in indexation of the RAB. However, if actual inflation is 5% then the actual compensation received by the EDB will be $7.1 comprised of:

    - $2.1 in actual revenues (=$2.0×$\frac{(1+5\%)}{(1+2\%)}$)[2]; plus
    - $5.0 in actual revaluation of the debt portion of the RAB (=$100 × 5% actual inflation).

19. That is:

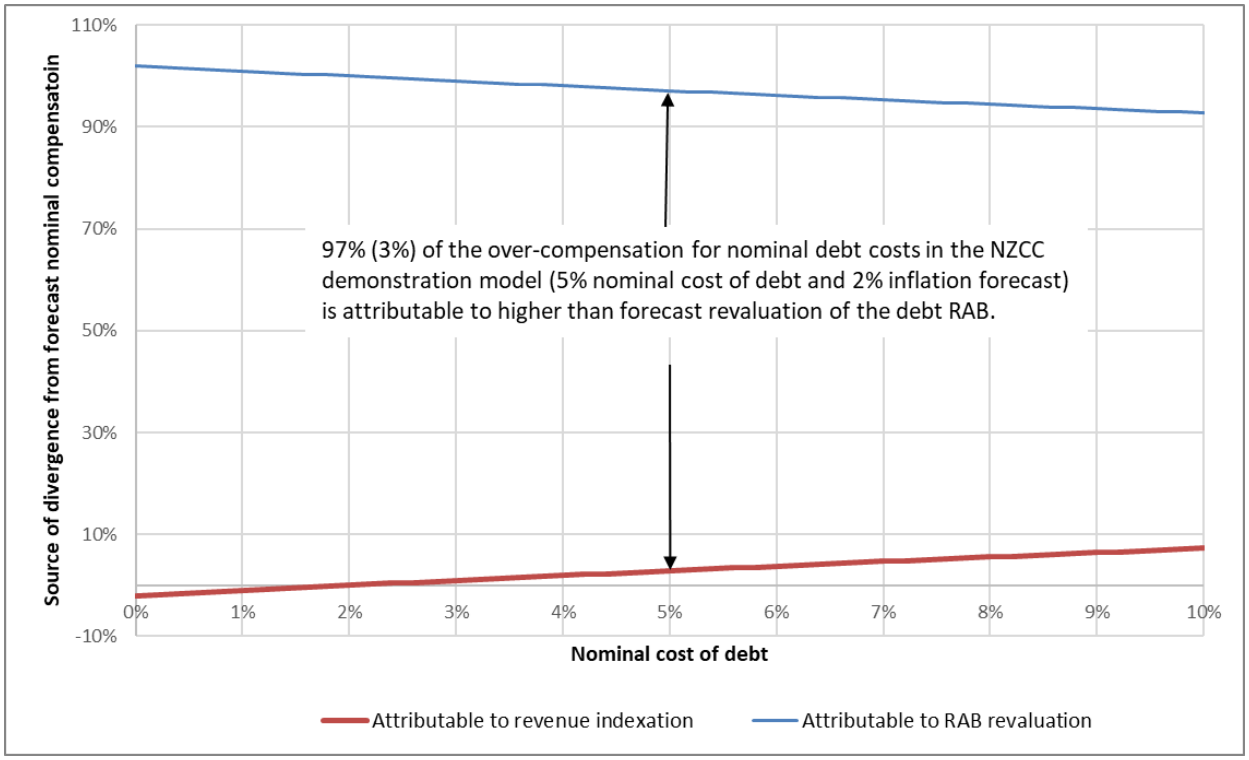
    - $0.1 (=$2.1-$2.0) of overcompensation relative to forecast nominal debt compensation is provided via revenues (**or 2% of total overcompensation**); and
    - $3.0 (=$5.0-$2.0) of overcompensation relative to forecast nominal debt compensation is provided via revaluation (**or 98% of total overcompensation**).

20. This 98% revaluation and 2% revenue breakdown is not sensitive to the assumptions used. Revaluation will always be the vast majority of the reason why actual debt compensation varies from the forecast nominal cost of debt. In fact, in the above example, this result in not sensitive to the assumed actual inflation rate. If this was 3% or 10% it would still be the case that revaluation would account for 98% of higher than forecast nominal debt compensation. The only factors that affect the 98%/2% breakdown are the forecast nominal cost of debt and the forecast inflation rate (which together determine the relative importance of forecast nominal debt compensation that is provided via revenue versus revaluation).

21. If there is a higher nominal cost of debt (or a lower the forecast inflation rate) then the 98% value will fall. However, for plausible values of the nominal cost of debt and forecast inflation this will always be greater than 90%. Figure 3-1 below illustrates the relative importance of "revenue" vs "revaluation" assuming forecast inflation of 2% and the nominal cost of debt varying between 0% and 10%.

[2] This is forecast revenues at 2% inflation adjusted to be 3% higher due to actual inflation being 5%.

Figure 3-1: Revaluation will always be the main reason the current regime does not deliver a nominal return on debt



22. Table 2-1 illustrates how the current regime would operate over a 5 year DPP period when there is: a) a forecast 4% nominal cost of debt, b) expected inflation of 2% pa; c) actual inflation of 5% pa.

Table 3-1: Illustration of the compensation for the cost of debt in the current regulatory regime when inflation is higher than expected

	1	2	3	4	5	6
Nominal cost of debt	4.0%	4.0%	4.0%	4.0%	4.0%	
Forecasts						
Forecast inflation	2.0%	2.0%	2.0%	2.0%	2.0%	
Forecast debt ORAB	100	102.0	104.0	106.1	108.2	110.4
Forecast revenue compensation for debt	2.0	2.0	2.1	2.1	2.2	
Forecast revaluation	2.0	2.0	2.1	2.1	2.2	
Forecast return on debt ORAB	4.0%	4.0%	4.0%	4.0%	4.0%	
Actual regulatory compensation						
Actual inflation	5.0%	5.0%	5.0%	5.0%	5.0%	
Actual ORAB	100.0	105.0	110.3	115.8	121.6	127.6
Actual revenue compensation for debt	2.1	2.2	2.3	2.4	2.5	
Actual revaluation	5.0	5.3	5.5	5.8	6.1	
Actual return on debt ORAB	7.1%	7.1%	7.1%	7.1%	7.1%	
Actual less forecast compensation						
Revenues	0.06	0.12	0.19	0.26	0.34	
Revaluation	3.00	3.2	3.4	3.7	3.9	
% contribution to overcompensation						
Revenues	1.9%	4%	5%	7%	8%	
Revaluation	98%	96%	95%	93%	92%	

23. The first column of this table has already been described in paragraphs 17 to 19. All this table adds is the compounding effect over a full regulatory period on the assumption that the difference between actual and forecast inflation is maintained over every year. In which case, the relative importance of revaluation as a source of overcompensation of nominal debt costs declines but still averages 95% (or more in a present value sense).

24. The point I am attempting to convey with the above analysis can be put by asking a rhetorical question:

> *If the source of the "problem" is over 90% found in too high RAB revaluation, why try and fix this "problem" by changing the way that revenues are set?*

25. The rest of this report will explain precisely why the Commission should attempt to fix the "problem" at its source in the RAB revaluation (or, even, not try and fix the "problem" at all). I will explain why attempting to fix the problem via revenue adjustments is arguably impossible (or, at least, extremely complex).

4 Debt funding costs can only be assumed fixed for the expected debt RAB

26. The Commerce Commission's rationale for a cost of debt wash-up assumes that EDBs have "a nominal cost of debt over the DPP that is fixed at the beginning of the DPP". Expressed in words as I have just done, this assumption is somewhat ambiguous. For example, does it assume:

    a. That an EDB has fixed the nominal rate of return on the debt portfolio that existed immediately prior to the DPP beginning including any refinancing of that existing debt?

    b. That an EDB fixed rates on both the existing portfolio plus refinance and has also fixed rates on all new debt expected to be issued to fund expected RAB growth over the DPP period? Or

    c. That an EDB has fixed rates on all expected debt funding and all unexpected debt funding over the DPP.

27. One can argue about whether a. or b. might be part of an efficient or prudent debt management strategy. However, "strategy" c is impossible[3] so its prudency or otherwise does not enter into the question. That is, it is wrong and unreasonable to assume that an EDB can fund unexpected changes in the RAB due to unexpectedly high (low) inflation during the DPP at the interest rates prevailing at the beginning of the DPP.

28. However, this is implicitly what the demonstration model assumes in its cost of debt wash-up calculation. Specifically, the demonstration model assumes that an EDB can borrow (or lend) to fund unexpectedly high (low) RAB growth due to unexpectedly high (low) inflation.

29. This assumption is unreasonable because for it to be true the EDB would have had to expect the unexpected RAB growth and taken out the matching interest rate swaps during the cost of debt averaging period prior to the DPP beginning. This is, of course,

[3] In order to hedging debt raising for a flexible value (to cover unexpected RAB growth) would amount to entering into a contract with a third party that allows you to borrow or lend from that party an amount at your discretion at a fixed rate of interest set in advance (at the beginning of the DPP) irrespective of what prevailing interest rates were. No counterparty would sensibly enter such a contract as they would expect an EDB to use it to arbitrage capital markets. Once it existed, the EDB would rationally attempt to borrow (lend) as much as much as possible as soon as market rates rose (fell) above (below) the fixed rate. The EDB would then turn around and invest (borrow) at market rates making a guaranteed profit at the counterparty's expense. That is, such a contract would be a one-way bet for the EDB.

internally inconsistent. An EDB can only ever seek to "fix" their nominal cost of debt at the beginning of the DPP for the portfolio that they have at that time (or, more aggressively and unreasonably, for the portfolio that the EDB expects to evolve over the DPP).

30. Recognising this fact has two important implications for the analysis both of which flow from the fact that, if the debt RAB is adjusted for actual inflation, then the EDB cannot be assumed to fund that RAB growth at the fixed rate of interest determined at the beginning of the DPP.

- First, the demonstration model's revenue wash-up will overestimate the value of the appropriate wash-up (positive or negative) and correcting this will be complex and error prone; and
- Second, the best mechanism for targeting a fixed nominal cost of debt must be to stop indexing the debt RAB for actual inflation because indexing the debt portion of the RAB for actual inflation is in conflict with the assumption that the cost of debt is fixed in nominal terms.

4.1 On the basis of what hedging strategy does the Commission assume fixed interest rates for debt at the beginning of the DPP

31. It is very important to be precise about what we mean when we say that "the cost of debt is fixed in nominal terms at the beginning of the DPP". Obviously the cost of debt is not fixed in nominal terms in debt markets over the course of the DPP. If EDBs raise new debt during a DPP they will pay the prevailing rate in debt markets and those prevailing rates will typically differ materially from rates prevailing at the beginning of the DPP. This is especially true if inflation is materially different to the level forecast at the beginning of the DPP.

32. It has been put to regulators, including by myself, that the cost of debt should be compensated based on a trailing average of nominal debt costs in order to capture the interest costs that EDBs pay on average over-time as they refinance old debt and finance new RAB growth (due to net capex and revaluation). Arguably, this trailing average should be weighted to reflect by RAB growth and refinancing in each year.

33. The Commerce Commission has rejected these proposals in the past on the basis that, while EDBs must pay varying rates over time when they issue new debt, it is nonetheless possible for EDBs to hedge their interest rate costs at the beginning of the DPP for the duration of the DPP.

4.1.1 The Commission's assumed debt management strategy

34. The 2023 IM Draft Decision describes the Commission's justification for assuming a fixed nominal cost of debt as follows:

> *3.147 Consistent with our assumed debt management strategy, we assume that suppliers will use interest rate swaps to match the term of the regulatory period using fixed-to-floating interest rate swaps:*
>
> *3.147.1 swapping fixed (with a term above five years) rate for a base floating rate at the time of issuance;*
>
> *3.147.2 swapping the base floating rate at the time of the regulatory reset determination window for five-year fixed rate.*

35. I set this strategy out in more detail below. It is assumed that the EDB always issues floating rate debt[4] such that at any given time its payments on debt obligations are solely equal to the floating (monthly or quarterly) rate of interest plus a trailing average DRP. Then, immediately before the DPP (during the cost of debt averaging period), the EDB enters into a set of pay fixed/receive floating interest rate swaps that are equal to the value of its debt RAB (debt portfolio). This interest rate swap will have a maturity the length of the regulatory period – allowing the EDB to repeat the same practice for the next DPP.

36. If the debt RAB is expected to grow over the course of the DPP (due to net capex and revaluation) then the EDB might also (somewhat speculatively and aggressively) be assumed to, during the same cost of debt averaging period, enter into forward starting interest rate swaps that only commence in the year in which the RAB growth is expected and will have maturity equal to the end of the DPP. For example, if the debt RAB is expected to grow by $100m in the middle of year 3 then the EDB will, during the cost of debt averaging period immediately prior to the start of the DPP, enter into an interest rate swap contract that only begins in 2.5 years (i.e., the EDB only begins receiving the floating rate payment and paying the fixed rate payment in 2.5 years-time). In this way, when the EDB raises the debt to fund the expected debt RAB growth it will have hedged against higher floating rates at that time by contracting (2.5 years earlier) to receive the prevailing floating rate in exchange for a fixed rate (the fixed rate that was agreed 2.5 years before hand).

37. Forward starting swaps are not standard/liquid products which makes them expensive to trade in. In addition, if the yield curve is upward sloping during the cost of debt averaging period then it can be expected that the "hedged" forward rate is

[4] Or issues fixed rate debt but simultaneously enters into a pay floating receive fixed interest rate swap for the same maturity.

higher than the risk free rate set in the DPP. It is also the case that the NZCC cost of debt makes no explicit allowance for the use of forward starting swaps to hedge expected RAB growth. For this reason, I consider that it is unlikely that an EDB would attempt to fully hedge its cost of debt to cover expected RAB growth.

38. However, even if an EDB did follow this debt management strategy then it could only be said to have a "fixed nominal cost of debt over the DPP" for the debt RAB growth that was expected prior to the DPP commencing.

39. That is, an EDB will only ever have a fixed nominal cost of debt for that portion of the debt RAB that it has hedged prior to the beginning of the DPP. Moreover, the most that an EDB would ever sensibly hedge is the expected level of the debt RAB. If an EDB took out interest rate swaps for more (less) than the expected level of the debt RAB then this would be interest rate speculation not hedging.

4.2 The demonstration model assumes EDBs can fund unexpected RAB growth at the DPP cost of debt

40. When an unexpected inflation event causes the debt RAB to rise (fall) relative to forecast levels then this, by definition, could not have been expected at prior to the DPP starting (i.e., when interest rate swaps were being contracted according to the Commission's assumed debt management strategy).

41. This is important because nominal interest rates and inflation are correlated variables. When inflation is higher than expected then interest rates will be higher than expected when inflation was expected to be lower. To put some magnitudes on this, inflation has been three times higher than expected at the beginning of the DPP and risk-free interest rates are currently five times higher than they were during the cost of debt averaging period for DPP3.

Figure 4-1: 5 year interest rates on NZGB

Source: RBNZ, CEG analysis

42. This means that substantial portions of the debt RAB growth must be funded at interest rates that are up to 5 times higher than the interest rates in the DPP cost of debt averaging period.

43. An extreme illustration can be used to demonstrate why this is important. First, assume that the DPP forecasts were for a 10% nominal cost of debt and zero inflation and a constant debt RAB of $100. Under these assumptions then DPP forecast compensation for debt costs would have been $10 per year and this would have been 100% in revenues (because zero inflation indexation was expected).

44. However, let us now assume that instead of inflation being 0% as forecast it was 100%. We also assume that, as is the case under the current IMs, the debt RAB is indexed for actual inflation. In this case, by the end of the DPP the debt RAB will be $3,200 – or 32 (thirty two) times the forecast debt RAB at the end of the regulatory period. This, in turn, means that there has been unexpected RAB growth, due to unexpected inflation, of 31 times the expected RAB.

45. We now need to make an assumption about the rate of interest that an EDB incurs in funding this unexpected RAB growth. Table 4-1 models two alternative assumptions:

    - **Implicit in the demonstration model**. The 31 times unexpected RAB growth can be funded at a nominal rate of 10% (which is equivalent to a real rate pf negative 45%). That is, the nominal rate of interest on unexpected RAB growth is assumed to be constant notwithstanding that actual inflation is 100% higher than forecast.

- **More reasonable assumption**. Debt markets respond to unexpected inflation by raising nominal interest rates to maintain the same real interest rate as existed prior to the DPP (10%). Under this assumption, nominal interest rates are 120% (10% + 100% + 10%×100% = (real rate)+ (inflation on the principal)+ (inflation on the real return).

46. Table 4-1 demonstrates that under the more reasonable assumption the actual level of overcompensation is $110 in each year (see row "I"). By contrast, the demonstration model estimates overcompensation to be $110 in the first year but this doubles every year after (row "H"). By the final year, of the DPP actual overcompensation under the assumption that debt markets reflect higher inflation in correspondingly higher interest rates, is just 6% of the demonstration model estimate (i.e., the demonstration model would overestimate overcompensation by a factor of almost 17 (1,700%)).

Table 4-1: Illustrative example (expected/actual inflation =0%/100% and pre-DPP interest costs are 10%)

	Year	1	2	3	4	5
A	ODRAB grows at 100%	100	200	400	800	1,600
B	CDRAB	200	400	800	1,600	3,200
		Current regime compensation				
C=B-A	Reval compensation	100	200	400	800	1,600
D=A*10%* $\left(\frac{1+100\%}{1+0\%}\right)^{Year}$	Cash compensation in revenues	20	40	80	160	320
E=D+B-C	Total compensation	120	240	480	960	1,920
		Alternative estimates of actual interest costs				
F=10% *A	Demonstration model estimate of debt costs)	10	20	40	80	160
G=10% of expected ORAB + 120% of unexpected ORAB	Actual debt costs if unexpected debt is raised at the same real rate of interest	10	130	370	850	1,810
H=E-F	Demonstration models estimate of overcompensation	110	220	440	880	1,760
I=E-G	Actual overcompensation	110	110	110	110	110
I/H	Actual overcompensation as a % of NZCC estimate	100%	50%	25%	13%	6%

47. The difference between these rows "I" and "H" is, in essence:

- row "I" assumes that an EDB hedges a fixed nominal interest rate for the expected debt RAB but that unexpected variations in the debt RAB must be funded at market rates and market rates move one-for-one with inflation (i.e., are consistent with the real cost of debt implied by DPP forecasts);
- row "H" assumes that market rates of interest over the DPP are the same as they were in the DPP cost of debt averaging period (which assumes, amongst other things, that they are unaffected by inflation being 100% higher than expected).

48. Of course, Table 4-1 uses an extreme example with round numbers (RAB doubling every year) to clearly illustrate the difference between locking in a fixed rate of interest on the expected debt RAB versus the actual debt RAB which is impacted by inflation.

49. However, the effect is still material for less extreme examples. For example, over DPP3 actual inflation is likely to average around 5% compared to 2% forecast inflation. The nominal cost of debt in DPP3 was 2.92% (although the result is not sensitive to this input). If I replace the extreme assumptions in Table 4-1 with these DPP3 consistent assumptions then I generate Table 4-2 below.

Table 4-2: Application to DPP3 the demonstration model would have overestimated the wash-up by circa 23% (1/0.81 -1)

	Year	1	2	3	4	5
A	ODRAB grows at 5%	100	105	110	116	122
B	CDRAB	105	110	116	122	128
		Current regime compensation				
C=B-A	Reval compensation	5.0	5.3	5.5	5.8	6.1
D=A*2.92%* $\left(\frac{1+5\%}{1+2\%}\right)^{Year}$	Cash compensation in revenues	0.9	1.0	1.0	1.1	1.2
E=D+B-C	Total compensation	5.9	6.2	6.6	6.9	7.2
		Alternative estimates of actual interest costs				
F=2.92% *A	Demonstration model estimate of debt costs)	2.9	3.1	3.2	3.4	4
G=2.92% of expected ORAB + 8.1% of unexpected ORAB	Actual debt costs if unexpected debt is raised at the same real rate of interest	2.9	3.2	3.5	3.9	4
H=E-F	Demonstration model estimate of overcompensation	3.0	3.2	3.3	3.5	3.7
I=E-G	Actual overcompensation	3.0	3.0	3.0	3.0	3.0
I/H	Actual overcompensation as a % of NZCC estimate	100%	95%	90%	86%	81%

50. Based on these assumptions, by the last year of DPP3 the demonstration model would have overestimated the "benefits" of hedging to EDBs by around 23% (=1/0.81 – 1).

4.3 Regulatory design implications of debt the fact that EDBs cannot hedge (fix) interest rates for unexpected RAB movements

51. The preceding analysis has the following implications for the Commerce Commission's regulatory design.

    a. **First.** Any regulatory design aimed at targeting a fixed nominal cost of debt should focus on limiting unexpected RAB movements due to unexpected inflation. This is because the rationale for assuming a fixed nominal cost of debt breaks down in the presence of unexpected RAB movements (including for unexpected inflation).

i. That is, if the Commerce Commission continues to pursue this goal it should index the debt portion of the RAB over the DPP at the same rate used in the DPP financial model (e.g., use expected inflation in both the DPP financial model and the RAB roll-forward model).

ii. The "Blended CPI" model developed by the Commission is an example of such a model. However, as I will explain below, it is not obviously superior (closer to NPV=0) than simply leaving revenue indexation unchanged and simply indexing the debt RAB between DPPs using forecast inflation.

b. Second. If the Commission were to continue to index the debt RAB for actual inflation, and thereby create unexpected RAB growth that the Commission then attempts to offset using a "revenue wash-up" then the Commission would need to amend that wash-up calculation to account for the fact that unexpected RAB growth must be funded at prevailing market rates. This would ultimately be a much more complicated wash-up calculation than currently envisioned and would require:

i. An assumption about the expected debt RAB that was actually hedged prior to the DPP;

ii. Tracking of how the actual debt RAB has deviated from expected;

iii. Tracking how prevailing debt funding rates have changed since the pre-DPP cost of debt averaging period; and

iv. Applying the DPP cost of debt to the expected debt RAB in i); and applying the prevailing debt funding rates to the unexpected growth in the debt RAB in ii).

c. **Third.** The Commission may reconsider the appropriateness of targeting a nominal cost of debt at all – given that the reality more complex than a simple assumption that 100% of the debt RAB can always be financed at a fixed rate of interest set prior to the DPP. I also elaborate on this below.

5 Concerns with a revenue adjustment

5.1 NZCC preferred reform

52. Notwithstanding that the source of the departure from forecast nominal debt returns is almost entirely due to the over (under) compensation for inflation via the current revaluation of the RAB, the Commission's preferred solution is to offset this revaluation effect by altering revenues.

53. In the following sections I explain why targeting a nominal return on debt with revenue adjustments would, in my view, be and extremely poor regulatory design and would be worse than no reform.

54. The Commission has identified a methodology that would (primarily) target a nominal cost of debt by changing the way in which the RAB is indexed. The Commission refers to this approach as the "Blended CPI" option.

55. This method does not result in revenue volatility that is inversely related to unexpected inflation outcomes - which is a key problem with the Commission's preferred approach. Rather, this method, to a close approximation, revalues the debt portion of the RAB at forecast inflation and the equity portion of the RAB at actual inflation. It is consistent with my suggested solution to only index the debt portion of the RAB for forecast inflation. It also changes the revenue indexation to, in effect, index the debt portion of revenues at forecast rather than actual CPI. For reasons set out in section 6 I do not consider that this is necessary.

56. However, the Commission does not prefer this methodology because, in essence, it regards it as more complex for the Commission to implement. I include the Commission's full reasoning below.

> *52. Importantly, for this option to achieve NPV=0, the RAB is adjusted at each regulatory reset by dividing the closing RAB by the forecast CPI then multiplying by the blended CPI (in effect, this is a similar adjustment as proposed by CEG). As a result, the RAB would grow at a rate different from actual inflation.*
>
> *53. In addition, we would need to amend our information disclosure (ID) requirements so the RAB for ID purposes is updated each year using the blended CPI.*
>
> *54. These considerations suggest that, compared to our preferred option of smoothing the cost of debt wash-up, the blended CPI option would entail drawbacks in terms of the other overarching objectives of the framework:*[14]

> *54.1 Promoting the s 52R IM purpose more effectively (without detrimentally affecting the promotion of the s 52A purpose):* ***the complexity and challenge of tracking and applying a blended index of the forecast inflation rate and actual inflation rate is less likely to promote certainty for suppliers and consumers in relation to the rules, requirements and processes applying to Part 4 regulation under the s 52R IM purpose****; and*
>
> *54.2 Significantly reducing compliance costs, other regulatory costs, or complexity (without detrimentally affecting the promotion of the s 52A purpose):* ***the nature of the additional IM and ID requirements to implement the blended CPI option would likely materially increase complexity and compliance costs for suppliers in adapting their operating and compliance systems and models.***
>
> *55. In comparison, our preferred option of smoothing the cost of debt wash-up we proposed in the draft decision is relatively straightforward in terms of implementation and operation, which better aligns with the two framework overarching objectives outlined above.*

57. In my opinion, this reasoning gives too much weight to avoiding more complexity of what can be summarised as "regulatory spreadsheet modelling" as opposed to the complexity of "actually running an energy business".

58. For the reasons set out in section 4 and 5.4, the Commission's preferred approach of solely adjusting revenues to offset unexpected RAB revaluation:

- would dramatically increase the complexity and cost of capital management at EDBs (causing wild swings in debt raising requirements);
- would be internally consistent with the IM's assumed debt management policy and, ultimately, with the assumption that EDBs have a fixed nominal cost of debt. That is, the revenue adjustment mechanism proposed to target a fixed nominal cost of debt would itself cause EDBs to be unable to achieve a fixed nominal cost of debt.

59. Relative to this context, I regard the "complexities" that the Commission refers to for the Blended CPI model as trivial. In any event, in Section 5.6 I set to out a simpler version the Blended CPI method that achieves NPV=0 outcomes solely by changing the way the RAB is revalued (i.e., with no change to the current way in which DPP revenues are indexed to CPI).

60. I note that adjusting the debt RAB revaluation for inflation forecast error both:

- Corrects the actual source of the over (under) compensation for unexpectedly high (low) inflation; and
- Can be thought of as the natural way to smooth of the adjustment (noting that the purpose of RAB adjustments (e.g., for lumpy capex) is precisely to smooth the recovery of those costs over multiple regulatory periods).

5.2 Cash-flow implications of revenue adjustments

61. It is important to understand the cash-flow implications of making revenue adjustments. Take an unexpected inflation event of 10%. In this case, the Commission's preferred approach can reasonably be characterised as:

    - First, giving an EDB a 10% positive revaluation of its debt RAB which the EDB does not need (because their debt costs have not risen by 10% of the debt RAB); and
    - Second, correcting this error of giving "too much" compensation in the debt RAB by reducing revenues by an equivalent present value amount over 5 years.

62. In combination, these policies can reasonably be described as:

    - The regulatory regime will give an EDB compensation in the RAB that it does not require. This will raise revenues over the next 40+ years;
    - The regulatory regime will "correct" this error by removing the equivalent value from revenues over 5-years. In doing so, the regulatory regime will force the EDB to raise new debt to offset this unexpected reduction in cash-flow.

63. The unpredictable nature of this debt raising is potentially highly problematic. For example, 3 years in a row of 10% unexpected inflation would lead to a reduction in revenues of over 30%[5] of the debt RAB over 7 years. For three consecutive years this would be 6% of the debt RAB per year.

64. Moreover, this additional debt raising would be occurring:

    - during a period of high inflation in which debt costs will almost certainly be unusually high and, potentially, when whatever shock caused the inflation is undermining the systematic stability of financial markets;
    - not just for one EDB, but for all EDBs simultaneously (creating a sudden increase in demand for debt from the industry that can itself be expected to raise the return on debt investors demand for heightened exposure to the industry).

65. In favourable circumstances (for an EDB and debt markets) this heightened demand for debt might able to be accommodated by debt markets. However, in other

5 Over 30% because the wash-up would be carried forward at a discount rate.

circumstances, such as if this occurs in the midst of a large capex spend when financial ratios were already under pressure, debt markets might refuse to lend or at least charge a significant risk penalty for lending.

5.3 Conceptual critique of the NZCC preferred reform

66. I previously argued that targeting a nominal return on debt by adjusting revenues within the DPP (rather than RAB revaluation at the start of the next DPP) was inappropriate because:

    a. The main source of the failure to compensate nominal debt costs accurately in the current regime is attributable to the use of actual inflation in revaluations (see section 3 above); and

    b. Attempting to offset this by changing revenues would create significant revenue volatility; and

    c. That revenue volatility would be disruptive to EDBs capital management strategies. Forcing EDBs to go to debt markets to fill unexpected gaps in revenues when inflation was unexpectedly high (or invest unexpectedly high revenues when inflation was unexpectedly low).

    d. Unexpected high borrowing levels would be correlated with unexpected high inflation and, therefore, unexpected high interest costs (above the nominal cost of debt assumed in the DPP).[6]

    e. Forcing EDBs to have unexpected recourse to debt markets in this way was internally inconsistent with the assumption that debt costs were fixed in nominal terms at the beginning of the regulatory period. It could be expected to raise EDBs actual nominal debt costs above the DPP forecast – undermining the rationale for reform itself.

67. The last point is, in my view, critical. The justification for targeting a nominal return on debt (based on prevailing interest rates at the beginning of the DPP) is that:

    - immediately prior to the DPP, EDBs can predict their borrowing requirements over a DPP; and
    - based on this prediction can "lock-in" interest rate swaps for the requisite amount of borrowing at the nominal interest rates prevailing immediately prior to the DPP; and
    - on the basis of this assumption, the Commerce Commission estimates the nominal cost of debt based on an assumed "debt management strategy" where

[6] Similarly, unexpected low borrowing levels would be correlated with unexpected low inflation and, therefore, unexpected low interest costs (above the nominal cost of debt assumed in the DPP).

EDBs "lock-in" a nominal cost of debt using interest rate swaps during the cost of debt averaging period.

68. In summary:

    a. The rationale for assuming EDBs debt costs are fixed in nominal terms is that they can accurately forecast their likely debt raising requirements and lock-in interest rates prevailing immediately prior to the DPP;

    b. Seeking to target a fixed nominal compensation for debt prevailing at the beginning of the DPP by adjusting DPP revenues in the face of unexpected inflation is internally inconsistent with the rationale for doing so.

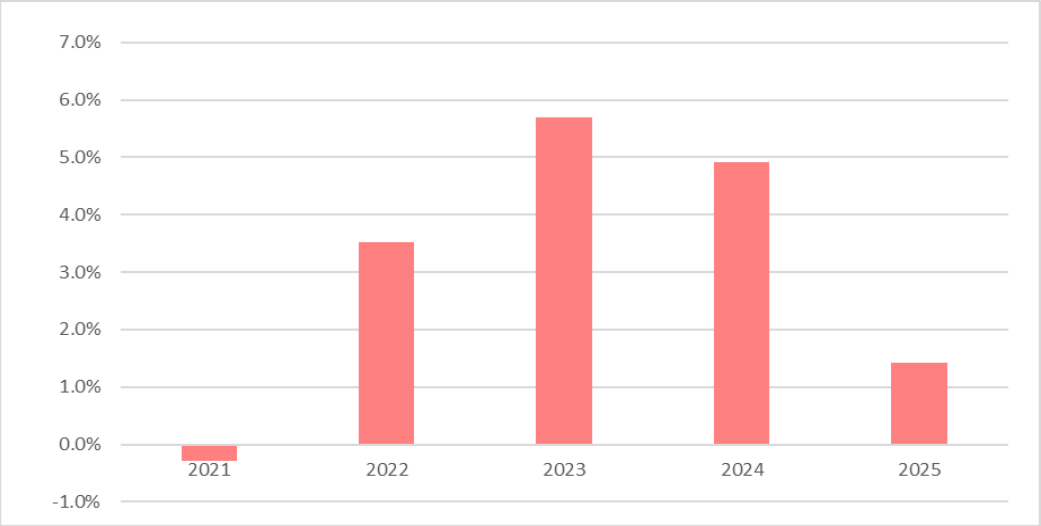
69. If the regulatory debt compensation is to target fixed nominal debt costs then, in my view, it behoves the Commerce Commission to design the regime in which the quantum of borrowing is predictable at the beginning of the DPP. That is, the Commission should eschew revenue adjustments in favour of revaluation adjustments.

5.4 Materiality of problems identified

70. I have estimated the impact on debt raising had a revenue adjustment for inflation forecast been in place in DPP3. Had a revenue adjustment been in place in DPP3, EDBs would have had to raise additional (i.e., unexpected) debt worth around 15% of their 2022 opening RAB due to unexpectedly high inflation to March 2022 and beyond. This 15% estimate is based on the Commission's own modelling.[7]

[7] NZCC, "*IM review 2023: Calculation of windfall gains and losses arising from inconsistencies between the revenue washup and the calculation of the WACC (Debt compensation issue)*", Published 5 October 2023. 15% is calculated as the difference between "Forecast cost of debt" and "Actual cost of debt" (rows 31 and 32 of the "main calculation" sheet over the four years 2022 to 2025. This is $213m. I have then divided this by the opening debt RABB in 2022 ($1.43bn) to arrive at 15%. I note that I also estimate 15% using every year of DPP3 (i.e., including 2021 where inflation was less than forecast).

Figure 5-1: Unexpected debt RAB revaluation gain as a % of opening DPP3 RAB

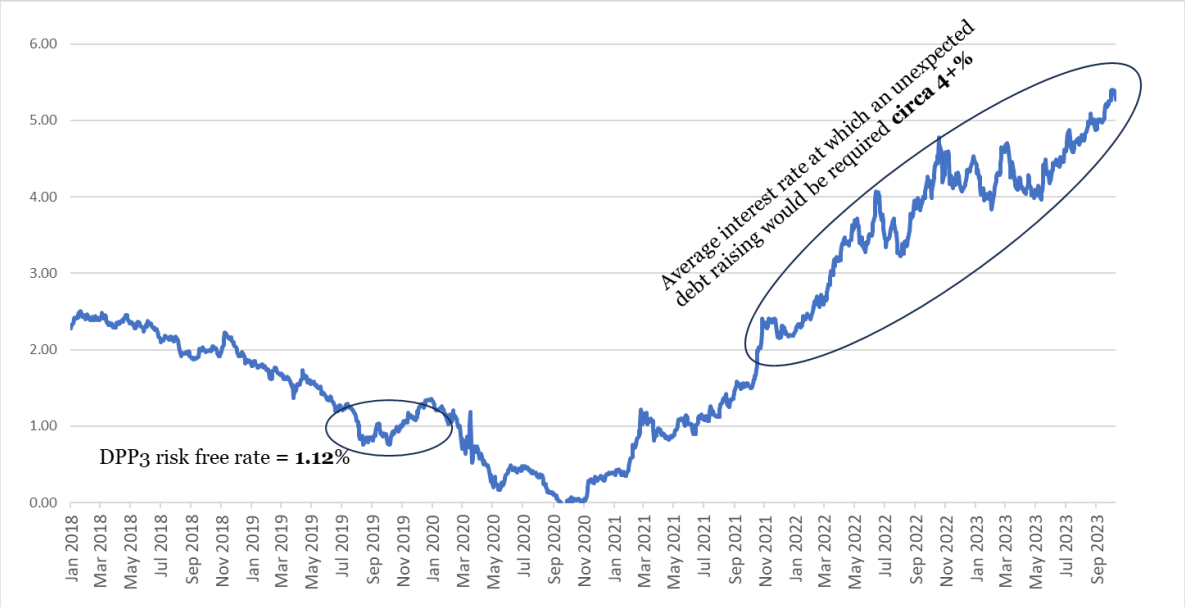


Source: NZCC, "IM review 2023: Calculation of windfall gains and losses arising from inconsistencies between the revenue washup and the calculation of the WACC (Debt compensation issue)", Published 5 October 2023. CEG analysis.

71. Having to raise unexpectedly large amounts of debt to cover unexpected revenue shortfalls is problematic for an EDB even if debt markets are relatively stable over time. However, in the current context, the Commission would be requiring EDBs to access debt markets for unexpectedly large amounts precisely at a time when inflation is unexpectedly high.

72. Figure 5-2 below shows the path of 5-year interest rates. It can be seen that the interest rates are which EDBs would have had to fund the unexpected revenue reductions associated with the NZCC preferred method are substantially higher (circa four times) the interest rates underpinning the DPP3 cost of debt.

Figure 5-2: 5 year NZGB interest rates over DPP3 to date



Source: RBNZ, CEG analysis

73. I note that the NZCC has proposed to apply a 5 year smoothing of the cost of debt revenue adjustment. I estimate that this would result in unexpectedly higher debt raising during DPP3 of around 5% of the opening DPP3 RAB. If this was done at an interest rate that was four times the interest rates at the start of DPP3 then this would still raise the average nominal cost of debt for EDBs by 15%[8] (=5%*4.0+95%*1.0 – 1.0).

74. That is, the very act of the NZCC attempting to target a fixed nominal cost of debt via revenue adjustments would, in fact, cause EDBs to raise more debt at higher interest rates - with the effect that EDBs' cost of debt would be raised above the level that the NZCC was targeting.

5.5 NZCC demonstration model is not NPV=0

75. There is also a significant complication with smoothing that the current illustration model does not grapple with. Even putting aside the problems identified in section 4, the demonstration model is not NPV=0 even assuming a perfectly elastic fixed nominal cost of debt.

76. The published formulae applied to preserve the present value of the adjustment in rows 161 to 170 all refer to a single discount rate that reflects actual inflation in 2021 (which is an input into the nominal cost of equity) and the nominal cost of debt for

8 This is 15 percent – not 15 percentage points.

the first regulatory period. If I change the actual inflation in 2021 to be different to actual inflation in other years, the NPV=0 result does not hold. I also note that it is not obvious why the relevant discount rate would still reference the first DPP cost of debt and equity even when it was being carried over into the second DPP.

77. It is likely possible to fix these problems – but doing so requires making explicit assumptions about the carry-forward and how EDBs will efficiently fund this across two DPPs. These are assumptions that the demonstration model does not grapple with.

5.6 Compounding impact where EDBs do not hedge 100% of expected RAB growth

78. . The IM draft decision notes that not all EDBs use interest rate swaps in the manner that the Commission assumes.[9]

> *We understand that some regulated suppliers choose to use interest rate swaps to seek alignment with the regulatory period and some do not.*

79. Figure 3-1 immediately below this quote in the draft decision suggest that two firms have repricing of more than 7.5 years (presumably two large EDBs with access to bond markets), four firms have repricing of less than 2.5 years and the remainder have repricing of between 2.5 and 7.5 years (the figure does not allow the reader to understand whether any of those are close to 5 years).

80. A reasonable interpretation of this evidence might be that the average EDB fixes around half of its debt portfolio over the DPP. In any event, it is important to consider what the effect of any IM reform would be on EDBs that do not follow the extreme version of the Commerce Commission's assumed debt management strategy (i.e., hedge 100% of all existing and expected future debt raising).

81. A firm that only hedged half of its debt portfolio would, in the context of an unexpected inflation spike, already be paying a higher average cost of debt on its portfolio than assumed in the demonstration model wash-up calculations. Indeed, they may already be paying a higher interest rate on their debt portfolio than the current regime would compensate them even before a wash-up was applied.

82. Applying a wash-up "as if" they hedged 100% of their expected portfolio could easily lead to those firms materially under-recovering their actual cost of debt and would have the potential to place them in financial distress. That is, the cost of debt revenue wash-up would tend to have a compounding effect. An EDB who was already paying interest rates above the DPP forecast level on some or all of its debt would still face a

9 NZCC, Cost of capital topic paper, Part 4 Input Methodologies Review 2023 – Draft decision2023, p. 29.

cost of debt wash-up impact on revenue based the assumption that it fixed its debt costs (which it had not done).

83. Of course, firms could reduce this risk by seeking to more closely mimic a 100% hedged debt management strategy more closely. In fact, I would expect firms to move in this direction if a revenue wash-up was implemented.

84. However, this is a further reason for caution in implementing such a policy. If firms are not currently implementing the Commerce Commission's debt management strategy it is reasonable to believe that they have good reasons not to. That is, it is reasonable to believe that EDBs are expert in their efficient capital management strategies.

85. If the Commerce Commission goes down the route of applying a cost of debt revenue wash-up based on a different debt management strategy than EDBs currently follow, then this will tend to force them towards adopting the Commission's debt management policy. The Commission should be wary about doing so unless it has strong evidence that EDB's current debt management strategies are inefficient.

5.7 Financeability concerns and complications

86. EDBs and their advisors have proposed that the NZCC adopt financeability testing as standard practice.[10]

87. Whether a firm is "financeable" depends on its ability to raise sufficient capital to fund its requirements and deliver its operations including an efficient capital expenditure program. A business is "financeable" if it can raise capital to continue to operate efficiently, and "unfinanceable" if it cannot. The ability to raise capital depends on the firm's ability to earn sufficient revenue to cover its operating costs, its debt interest payments, and retain sufficient profit to attract equity investors. Businesses that are not "financeable", or are not perceived as "financeable" in debt and equity funding markets, will ultimately face financial distress, which will disrupt services to their customers and effect their ability to invest.

88. The Commission's preferred approach to targeting a nominal cost of debt by making revenue adjustments both:

- Puts at risk the actual financeability of EDBs; and
- Makes any external assessment of the financeability of a DPP decision highly problematic.

[10] For example, see PwC, Including a financeability test in the Input Methodologies for electricity distribution businesses 19 July 2023, a report for Vector.

89. This is because any projection of revenues over the DPP and beyond would be contingent on the inflation forecast being correct. By way of illustration, I have already estimated that, if revenue adjustments had been in place for DPP3, then actual revenues over DPP3 and DPP4 would have been lower than forecast by 15% of the opening debt value of the RAB. This is solely based on inflation forecast error over DPP3 (i.e., it assumes no compounding inflation forecast error over DPP4).

90. In this context, it is difficult to see how any future financeability testing by the NZCC could proceed unless it involved "stress testing" associated with:

- large deviations of actual inflation from forecast inflation leading to materially lower than forecast revenues; and
- modelling of the fact that these lower than forecast revenues, if the occur, would have to be funded with debt raised in a high inflation environment leading to both:
  - more expensive average debt funding than the DPP assumes and compensates; and
  - a greater quantum of debt funding than the DPP assumes and compensates.

91. This highlights the essential problem with the NZCC's preferred approach. It materially raises the uncompensated risks that EDBs are exposed to. If the NZCC were to proceed with its preferred approach it would be all the more important for the NZCC to model financeability including modelling the impact of inflation forecast errors on financeability.

92. I further note that the current IM's do not allow for a more than 10% increase in revenues from one year to the next. As a consequence, it may be that the IM's do not allow revenues to automatically return to cost recovery levels following a significant reduction in revenues due to a cost of debt wash-up because returning to full cost recovery may require a more than 10% revenue increase (especially if underlying inflation is high).

5.8 No regulatory precedent for the NZCC's proposed approach

93. To the best of my knowledge there is no international regulatory precedent for the NZCC's proposed approach to targeting a nominal cost of debt. Regimes that do target a nominal cost of debt are commonplace (for example this is standard practice in the United States). However, to the best of my knowledge this is always achieved by not indexing the debt funded portion of the asset base by inflation.

6 Blended CPI and an alternative simpler reform

6.1 Alternative to the Blended CPI model

94. The demonstration model includes a "Blended CPI" option. To a first approximation, the blended CPI is simply equal to the weighted average of forecast and actual inflation - with the debt leverage being used as the weight for forecast inflation and "1- debt leverage" equity being used as the weight for actual inflation.

95. This Blended CPI is then applied in two places within the regulatory regime.

- First, the RAB is revalued between DPPs using the Blended CPI; and
- Secondly, within the DPP regulatory period the return on capital component of revenues is indexed by Blended CPI.

96. That is, the Blended CPI method changes both the revaluation of the RAB and the revenue indexation. To understand the reason for both changes it is useful to break the forecast nominal cost of debt down into its real and inflation components.

$$Nominal\ RoD_F = \ Real\ RoD_F + Real\ RoD_F \times Inflation_F + Inflation_F$$

97. The two inflation terms in the above formula can be thought of as preserving the purchasing power of the capital (this what the last term "$+Inflation_F$" does) and preserving the real purchasing power of the interest (this what the term "$+Real\ RoD_F \times Inflation_F$" does).

98. The current IMs essentially provide compensation for both of these terms using actual inflation

- The "$+Inflation_{Actual}$" term in the RAB revaluation between DPPs; and
- The "$+Real\ RoD_F \times Inflation_{Actual}$" term by indexing the cost of debt component of revenues by inflation.

99. However, if we wish to target compensation equal to the forecast nominal return on debt then one way to do so is to replace $Inflation_{Actual}$ with $Inflation_{Forecast}$ in both the RAB revaluation and the revenue indexation components of the current regime. This is essentially what the Blended CPI option in the demonstration model does.

100. However, an alternative approach that is arguably simpler would be to continue to index all revenues (including the cost of debt component) by actual CPI but to amend the RAB indexation formula to account for the impact of doing so. This approach is set out in Table 6-1 below.

Table 6-1: RAB indexation targets the residual return on capital not provided in revenues

Formula	DPP Year	1	2	3	4	5
A	Leverage	41.0%	41.0%	41.0%	41.0%	41.0%
B	Forecast nominal cost of debt	5.0%	5.0%	5.0%	5.0%	5.0%
C	Forecast nominal cost of equity	7.0%	7.0%	7.0%	7.0%	7.0%
D=B*A+C*(1-A)	Forecast nominal WACC	6.2%	6.2%	6.2%	6.2%	6.2%
E	Forecast inflation	2.0%	2.0%	2.0%	2.0%	2.0%
F	Actual inflation	5.0%	5.0%	5.0%	5.0%	5.0%
G=[1+(C-E)/(1+E)]*(1+F)-1	Actual cost of equity	10.15%	10.15%	10.15%	10.15%	10.15%
H = 100 then previous year CRAB	ORAB	100.00	103.73	107.55	111.45	115.43
I =H*A*B	Total required return on debt if all debt is fixed before DPP	2.05	2.13	2.20	2.28	2.37
J=H*(1-A)*G	Total required return on equity	5.99	6.21	6.44	6.67	6.91
K=[(D-E)*ORAB/(1+E)]*(1+F) in year 1 then indexed to F in subsequent years	Actual return on capital in revenues based on forecast nominal WACC, forecast inflation and indexation to actual inflation	4.30	4.52	4.74	4.98	5.23
L = I + J + K	Required revaluation (I+J-K)	3.73	3.82	3.90	3.98	4.05
M=H+L	Closing RAB	103.73	107.55	111.45	115.43	119.47
N = (119.47/100)^(1/5)	Average RAB indexation rate	3.62%				
	IRR	8.04%				

101. The logic of this table is as follows:

- All revenues (including the cost of debt building block) are indexed by actual inflation. Row K tracks the compensation for the return on capital (debt plus equity) building block recovered in revenues;
- The revaluation in the RAB each year (Row L) is simply specified as:
  - The total required return on capital each year (Row I + Row J); less
  - The compensation for return on capital provided in revenues (Row K);

102. The closing RAB each year is simply equal to the opening RAB plus the total return on capital required less the return on capital actually provided in revenues. That is, the closing RAB is essentially solved to guarantee that the full cost of equity and debt is recovered.

103. This simple approach allows for different assumptions about the required return on debt to be inputted into Row I. In Table 6-1 the assumption has been made that the cost of debt each year is fixed at 5% (the forecast nominal cost of debt) of the debt portion of the RAB (41% of the ORAB). This results in the average RAB revaluation rate over the five years being 3.62% (= $\left(\frac{119.47}{100}\right)^{\frac{1}{5}}$). This is less than the weighted average of forecast and actual inflation because revenues have continued to be indexed to actual CPI (including the cost of debt building block). However, it delivers the same IRR (8.04%) as the Blended CPI method would deliver under the same assumptions (the above assumptions are the default assumptions in the demonstration model).

104. However, the advantage of this approach is that it is flexible in that it allows different assumptions about the cost of debt and revenue indexation to be made. For example:

- if it was assumed that the cost of debt was real (not fixed nominal) then Row I would simply be replaced with the cost of debt assuming that it moved with inflation (8.09%) and the average revaluation of the RAB would be 5% (actual inflation).
- If it was assumed that the cost of debt was nominal but that revenues were indexed to the Blended CPI (3.7837%) then the average revaluation of the RAB would be the Blended CPI.

105. Table 6-2 illustrates the fact that the model set out in Table 6-1 is capable as generating results consistent with the Blended CPI model and with the current real cost of debt regime.

Table 6-2: Equivalence between methods

Variations to Table 6-1	Input: Indexation of cost of capital building block in revenues	Output: Average RAB revaluation	Output: IRR	Note
None	5.00% (actual inflation)	3.62%	8.04%	8.04% is the nominal WACC if debt costs are 100% fixed at 5% and equity costs vary with inflation. 9.30% is the nominal WACC if both vary with inflation
Replace Row K with (lower) Blended CPI indexation of revenues	3.78% (Blended CPI)	3.78%	8.04%	
Replace Row I with a real cost of debt adjusted for actual inflation (8.09%)	5.00% (actual inflation)	5.00%	9.30%	

106. The flexibility of this model is also important in the context of modelling the cost of debt as only partially fixed nominal (for the expected RAB) and partially floating (for the unexpected RAB). I discuss this more in the following section.

107. I note that in this presentation I assume that all of the relevant information to estimate the RAB revaluation is available prior to the beginning of the next DPP. I believe that this is the case or, at least, that I am not assuming any additional information that is not already required (noting that the RAB revaluation formula only uses actual inflation and values set out at the beginning of the DPP (i.e., the nominal cost of debt and real cost of equity). I have not included capex in this model, but I see no reason why it could not easily be incorporated.

6.2 More accurate accounting for funding cost of unexpected RAB growth

108. The Blended CPI model is a significant improvement on the Commission's preferred revenue adjustment model. This is because the Blended CPI model limits the unexpected variations in the RAB that must be funded at prevailing cost of debt rates.

109. However, the Blended CPI model only limits these variations – it does not eliminate them. This is because the Blended CPI still increases relative to forecast CPI when inflation increases above forecast (and *vice versa*).

110. At this point, it is useful to note that the debt RAB can be thought of as growing each year in two steps:

- First, the debt RAB is indexed to forecast inflation and the equity RAB is indexed to actual inflation; then
- If actual inflation exceeds forecast inflation then, in order to maintain leverage at 41%, the EDB must issue new debt equal to 41% of the increase in the equity

portion of the RAB for unexpected inflation (i.e., 41%*(1-41%)*ORAB*($Inflation_{Actual} - Inflation_{Forecast}$)).

111. At this point, the issues raised in section 4 return to complicate the analysis. Any method that relies on actual inflation to index the RAB (including the Commission's Blended CPI method) creates unexpected growth in the debt RAB.

112. As currently constructed, the Commission's "Blended CPI" model and the model set out in Table 6-1 (which is a general form of the Blended CPI model) both (inaccurately) assume that unexpected RAB growth can be funded by new debt raised at the same rates that existed during the DPP cost of debt averaging period.

113. However, the model set out in Table 5-1 can be easily amended to accommodate an assumption that the debt portion of unexpected RAB growth must be funded at prevailing rates of debt (proxied by the assumption that the prevailing cost of debt is equal to the DPP forecast real cost of debt plus actual inflation).

114. This can be done by separately modelling the actual RAB (using the same method set out in Table 6-1) but also keeping track of the expected and unexpected debt RAB.

115. By way of illustration, if I retain all of the assumptions underpinning Table 6-1 except I assume that nominal debt costs are only fixed for the forecast debt RAB but that debt costs are real in nature for the unexpected ORAB then I generate the results in Table 6-3.

116. Table 6-3 follows the same logic as Table 6-1 except Table 6-3 includes a new row for the nominal cost of equity that is to be applied to the unexpected debt RAB and new rows to keep distinguish the expected and unexpected debt RABs. The new rows are marked in red.

117. Ultimately the IRR is raised from 8.04% to 8.08% in recognition of the fact that higher cost of debt (associated with higher inflation) is incurred in funding unexpected debt RAB growth. This higher IRR is solely achieved by higher indexation of the RAB (3.67% vs 3.62%). This reflects the fact that revenues are the same in both tables and, consequently, all of the RAB revaluation is the balancing item and must increase to compensate for higher assumed costs in Table 6-3.

118. I note that the increase in IRR when more accurately modelling actual debt costs is relatively small in this scenario (0.04%). However, it is important to note that this is not linear with the inflation forecast error. If the inflation forecast error was doubled (from 3% to 6%) the IRR increment would almost quadruple (from 0.04% to 0.15%).

119. This is an important consideration when designing a regulatory regime that will be accurate not just in "normal" circumstances but in unusual circumstances too.

Table 6-3: RAB indexation targets the residual return on capital not provided in revenues but only the expected RAB is funded with fixed nominal debt

Formula	DPP Year	1	2	3	4	5
Rows A to F are as per Table 6-1		10.15%	10.15%	10.15%	10.15%	10.15%
G1=[1+(C-E)/(1+E)]*(1+F)-1	Actual cost of equity	10.15%	10.15%	10.15%	10.15%	10.15%
G2=[1+(B-E)/(1+E)]*(1+F)-1	Nominal cost of debt associated with actual inflation (for funding unexpected debt RAB growth)	8.09%	8.09%	8.09%	8.09%	8.09%
Forecast ORAB	Forecast ORAB	100.00	102.00	104.04	106.12	108.24
H = 100 then previous year CRAB	ORAB	100.00	103.73	107.57	111.52	115.57
H - Forecast ORAB	Unexpected ORAB	-	1.73	3.53	5.40	7.33
I =Forecast ORAB*A*B + Unexpected ORAB*G2	Total required return on debt if debt to fund expected ORAB is fixed but not to fund unexpected ORAB	2.05	2.15	2.25	2.35	2.46
J=H*(1-A)*G	Total required return on equity	5.99	6.21	6.44	6.68	6.92
K=[(D-E)*ORAB/(1+E)]*(1+F) in year 1 then indexed to F in subsequent years	Actual return on capital in revenues based on forecast nominal WACC, forecast inflation and indexation to actual inflation	4.30	4.52	4.74	4.98	5.23
L = I + J + K	Required revaluation (I+J-K)	3.73	3.84	3.95	4.05	4.15
M=H+L	Closing RAB	103.73	107.57	111.52	115.57	119.72
N = (119.47/100)^(1/5)	Average RAB indexation rate	3.62%				
	IRR	8.08%				

120. Finally, I note that this model can also accommodate other more realistic assumptions about how EDBs use interest rate swaps to fix the nominal cost of debt. As I have explained above, it is costly to use forward starting swaps and it is not obvious that the current regime compensates for this cost. Therefore, a more reasonable assumption might be that the nominal cost of debt is only fixed for the opening debt RAB at the beginning of the DPP and that all RAB growth is funded at prevailing rates.

121. If I amend Table 6-3 in line with this assumption then the IRR/RAB indexation rises to 8.12%/3.71%. Of course, in the above example, the only expected growth in the debt RAB is due to 2% forecast inflation. In many circumstances, especially with potentially large net capex to achieve electrification, expected debt RAB growth over a DPP will be much higher (and the unexpected variance around that net capex may also be high).

122. In this context, it would be important for the Commission to consider and consult on what precisely is the efficient use of interest rate swaps at the beginning of the regulatory period. Specifically, whether EDBs are assumed to use interest rate swaps to hedge some fraction of the opening debt RAB, all of the opening debt RAB, or, less realistically, all of the opening debt RAB and 100% of expected growth in the debt RAB?

123. These are important considerations especially in the context of potentially large RAB growth in the context of electrification. The Commission should not proceed with a model that assumes 100% of the expected debt RAB is hedged without being confident that this would be an efficient practice that EDBs could actually implement.

124. The method set out in this section can be amended to allow for more realistic modelling of what debt costs can reasonably be assumed to be fixed at the beginning of the DPP. If the Commission is not able at this stage of the consultation to adopt more realistic assumptions about how much debt it is possible/efficient to fix during the cost of debt averaging period then the Commission should reconsider making any changes to the current regime.