A wash-up mechanism for the DPP revaluation rate

A report prepared for Vector

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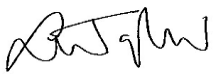
Dear Ian,

We are pleased to provide our report on a wash-up mechanism to account for differences between revaluation rates based on forecast and actual inflation with regards to a default price-quality path (DPP).

This report is provided in accordance with the scope of work dated 17 March 2014 and the associated terms of engagement, and is subject to the restrictions set out in Appendix A.

If you have any queries please do not hesitate to contact us.

Yours sincerely



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Introduction

Vector has asked us to consider potential changes to the electricity distribution business (EDB) and gas pipeline business (GPB) DPP Determinations, to potentially introduce a 'wash-up' mechanism whereby the effects on the DPP price paths of differences between revaluation rates based on forecast and outturn inflation lead to compensating adjustments to DPP price paths in subsequent years.

This report focusses on DPP Determinations, but we note that similar issues could also be addressed in future CPP Determinations.

This report proceeds as follows:

- We set out how revaluation rates used to set DPP price paths are based on forecast inflation, and consider the rationale for a wash-up.
- We analyse the effect of CPI forecast error relative to the revaluation rate on price paths in the current DPP regulatory period.
- We consider options for implementing a wash-up for the revaluation rate.

Background

The use of CPI forecasts for revaluation rates in setting the DPP price path

A forecast of the Consumer Price Index (CPI) is used to determine the revaluation rate for each year of the DPP period, as part of the calculation of DPP maximum allowable revenue (MAR). The revaluation rate used affects revaluations in that year, as well as the regulatory asset base (RAB) roll-forward (revaluations and depreciation), return on capital, and regulatory tax amounts in subsequent years.

The CPI forecast hence directly affects the revenue which an EDB or GPB can earn during a regulatory period. We note that in subsequent DPP periods the RAB values are reset and will reflect actual CPI (up to the relevant base year).

Inflation risk

The use of CPI forecasts to determine the revaluation rate used in setting the price path means that EDBs and GPBs are exposed to inflation risk. If outturn inflation differs from that forecast, EDBs/GPBs may over- or under-recover an efficient level of costs.

Vector wishes to consider options for sharing this inflation risk with consumers, by introducing an *ex post* 'wash-up' mechanism which would compensate EDBs/GPBs for the effects on DPP price paths of differences between revaluation rates based on forecast and outturn CPI.

We note that a wash-up for the revaluation rate could account for the effects of revaluation rate differences in any of the following three ways:

- The effects on the annual revaluation building block could be determined, using the same opening RAB values.
    - The revaluation building block is deducted from allowable regulatory income, and is calculated as the opening RAB value multiplied by the revaluation rate (for assets that are not disposed of or fully depreciated in the year).
- The revaluation building block could be considered (as above), and also all of the flow-on impacts on the RAB roll-forward amounts – including depreciation, and opening and closing RAB values.
- As above, and also the effects on the regulatory tax allowance and deferred tax resulting from the changes in RAB values.

In our view, the last option is preferable. In particular, it is not consistent with the principle of financial capital maintenance (FCM) to include a wash-up for the direct impact on the revaluation building block, without also accounting for the partially offsetting effects on the depreciation and return on capital building blocks.

Rationale for a wash-up

Ex post revenue adjustments can be used to help EDBs/GPBs recover efficient levels of expenditure, in situations where forecasts are used to set the *ex ante* price path.

It is important to ensure that any *ex post* adjustments do not compromise the incentives for EDBs/GPBs to control and minimise expenditure. This means that *ex post* adjustments are best limited to items that are largely outside the control of the EDB/GPB. The reason that Vector wishes to consider a wash-up for the revaluation rate is that CPI inflation is not under its control.

One of the key benefits of a wash-up for the revaluation rate is that it can help preserve the FCM principle that underpins the asset valuation IM. The annual revaluation of assets has the effect of transferring revenue from the current year to the future (through deducting revaluations from building blocks allowable revenue (BBAR), and then basing depreciation and return on capital on the revalued RAB and recovering them over time).

Without a wash-up, the revaluation amounts reflected in the price path may be over- or under-stated, but the longer-term depreciation and return on capital amounts will reflect actual revaluation rates, since the DPP RAB is reset using actual revaluations every five years. A wash-up for the DPP revaluation rate will ensure that FCM is maintained, consistent with the asset valuation IM. We note that this risk was highlighted during the IM development process – ie that the method of including revaluations in RAB and deducting them from BBAR, is dependent on businesses being able to achieve full recovery of revaluations through depreciation and return on capital over the life of the asset.

Consumers should be indifferent to whether regulated asset values are indexed or not, and only an indexed method uses a CPI forecast. The purpose of a wash-up for the revaluation rate is to ensure that FCM is maintained over time under the indexed method. Any other CPI forecasts inherent in the DPP are not affected by the method with which FCM is maintained.

The effect of CPI forecast error in the current regulatory period

We have modelled the effect on EDB DPP price paths over the FY11-15 period, if the revaluation rates in the 2012 DPP reset model were replaced with values based on actual CPI values.

Table 1 shows the revised revaluation rates used in our analysis. Actual CPI values have to date been published up to March 2014. Accordingly this modelling does not reflect revaluation rate differences for FY15.

Table 1. Revaluation rates: Forecast used in EDB DPP model, updated with FY11-14 actuals

Revaluation rates used	2010	2011	2012	2013	2014	2015
Forecast revaluation rate (original DPP model)	1.72%	1.98%	2.43%	2.29%	2.14%	2.00%
Updated revaluation rate	2.05%	2.42%	1.57%	0.86%	1.53%	2.00%
Difference	**-0.32%**	**-0.44%**	**0.86%**	**1.43%**	**0.61%**	**0.00%**

Tables 2 and 3 show the changes in BBAR when actual rather than forecast CPI values are used for the revaluation rates in FY11-14, by EDB and on average. Note that there is an effect on BBAR in FY15, despite an unchanged revaluation rate, due to the flow-on effects on RAB values from prior year revaluation rate differences.

Table 2. Change in EDB DPP BBAR when revaluation rates are based on actual CPI values instead of CPI forecasts (to FY14) (% terms)

Change in BBAR when actual CPI used instead of forecast (%)					
EDB	2011	2012	2013	2014	2015
Alpine Energy	-2.4%	6.0%	9.1%	3.0%	-1.5%
Aurora Energy	-3.1%	7.2%	11.1%	3.7%	-1.4%
Centralines	-2.8%	6.9%	10.2%	3.2%	-1.6%
Eastland	-3.3%	7.6%	11.4%	3.6%	-1.6%
Electricity Ashburton	-3.6%	8.4%	12.8%	4.1%	-1.8%
Electricity Invercargill	-2.7%	6.5%	9.7%	3.1%	-1.4%
Horizon Energy	-2.9%	6.7%	10.2%	3.3%	-1.4%
Nelson Electricity	-2.6%	6.4%	10.6%	3.4%	-1.5%
Network Tasman	-3.1%	7.3%	10.8%	3.3%	-1.6%
OtagoNet	-3.3%	7.8%	11.5%	3.5%	-1.8%
Powerco	-3.1%	7.3%	10.8%	3.4%	-1.6%
The Lines Company	-3.1%	7.2%	10.9%	3.6%	-1.5%
Top Energy	-2.6%	6.2%	9.7%	3.2%	-1.3%
Unison	-3.1%	7.1%	10.8%	3.5%	-1.5%
Vector	-3.5%	8.0%	12.0%	3.9%	-1.6%
Wellington Electricity	-3.0%	7.1%	10.4%	3.2%	-1.6%
Average	**-3.0%**	**7.1%**	**10.8%**	**3.4%**	**-1.5%**

Note: Values in the table are positive if BBAR would have been higher had the actual CPI been used instead of the forecast.

Table 3. Change in EDB DPP BBAR when revaluation rates are based on actual CPI values instead of CPI forecasts (to FY14) ($ terms)

Change in BBAR when actual CPI used instead of forecast ($000)						
EDB	2011	2012	2013	2014	2015	Total
Alpine Energy	-733	1,918	3,174	1,130	-604	4,886
Aurora Energy	-1,635	3,795	6,144	2,138	-844	9,598
Centralines	-247	616	960	314	-164	1,479
Eastland	-657	1,505	2,347	776	-357	3,614
Electricity Ashburton	-961	2,252	3,673	1,229	-556	5,637
Electricity Invercargill	-344	805	1,261	415	-199	1,938
Horizon Energy	-566	1,312	2,077	701	-308	3,216
Nelson Electricity	-156	415	741	246	-114	1,132
Network Tasman	-847	1,973	3,047	968	-496	4,646
OtagoNet	-740	1,755	2,742	886	-473	4,170
Powerco	-7,241	16,701	25,853	8,413	-4,095	39,630
The Lines Company	-976	2,236	3,502	1,179	-511	5,429
Top Energy	-796	1,922	3,178	1,117	-491	4,930
Unison	-2,551	6,020	9,824	3,396	-1,525	15,165
Vector	-13,329	30,473	48,013	16,315	-7,027	74,446
Wellington Electricity	-3,067	7,120	10,966	3,489	-1,887	16,621
Total	**-34,846**	**80,819**	**127,503**	**42,712**	**-19,651**	**196,537**

Table 4 shows the relative impacts of the different effects of the revaluation rate on BBAR discussed on pages 2 and 3. The direct impacts of the different revaluation rates on the revaluation building block in each year are the most significant; however the flow-on impact on RAB values has an offsetting impact in subsequent years. The tax impacts are immaterial.

Table 4. Change in EDB DPP BBAR when revaluation rates are based on actual CPI values instead of CPI forecasts (to FY14), disaggregated effects (% terms)

Change in BBAR when actual CPI used instead of forecast (%)					
Average over non-exempt EDBs	2011	2012	2013	2014	2015
Effect of change on revaluation building block	-3.2%	6.5%	10.9%	4.6%	0.0%
Flow-on effects on RAB roll-forward values	0.2%	0.5%	-0.1%	-1.2%	-1.5%
Tax effects	0.0%	0.0%	0.0%	0.0%	0.0%
Total effect of changes to revaluation rates	**-3.0%**	**7.1%**	**10.8%**	**3.4%**	**-1.5%**

How a wash-up could be implemented

Overview

The effect on DPP price paths of the difference between revaluation rates based on forecast and actual CPI values would be determined. The best method for doing this is most likely re-running the models from the last DPP reset, but with the revaluation rates based on actual rather than forecast CPI values.

A compensating adjustment would then be made to allowable revenue in a subsequent year(s), equal to the revenue difference adjusted for the time value of money. There would need to be a one-year lag between the revenue effect and the compensating adjustment, because actual CPI values would not be published in time for prices to be set for the following year.

The mechanism could either be symmetric (ie adjust for both unders and overs) or one-sided. We consider that it is preferable for the mechanism to be symmetric. It does not seem reasonable for the wash-up to make an adjustment where the use of a CPI forecast for the revaluation rate has led to an under-recovery, and not also to adjust in the case of over-recovery, or vice versa.

The adjustment could either be made in all cases, or only if the adjustment met a specified materiality threshold – eg a X% allowable revenue change.

When should the wash-up occur?

There are two main options for the timing of a wash-up:

1. **Annually**
   The effect on the DPP price path could be calculated each year, and then a compensating adjustment to allowable revenue could be made two years later. (The two-year lag is required because actual CPI values would not be published in time for prices to be set for the following year.)

2. **At the end of each DPP period**
   The effects on the DPP price path could be calculated in total over the DPP period. Compensating adjustment(s) could be made in the next DPP period – either in the second year of the period, or spread over the last four years.

An annual wash-up would minimise the cash-flow impacts, as well as any price changes required. If the revaluation rate was systematically under- or over-forecast during the DPP period, waiting until the end of the period to make the wash-up could lead to a large cash-flow impact and a large step-change in prices.

Making a wash-up every five years allows 'self-correcting' of variances. That is, if an over-forecast in one year is followed by an under-forecast in the following year, the two effects will (to some extent) offset each other, reducing the wash-up adjustment required.

Each option also involves some practical complexities.

- An annual wash-up would be able to operate independently of the length and type of the regulatory period. However an end-of-period wash-up would need to be designed such that it could still function if, for example, an EDB/GPB applied for a CPP during a DPP period.

- The effects on the DPP price path in a given year need to include the effects on other parts of the RAB roll-forward (eg depreciation) caused by differences in the revaluation rate in previous years of the DPP period. This is straightforward when the effects on the price path are calculated for all years of the DPP period at the same time. But under an annual wash-up, the method of re-running

the models will need to ensure that the effect on the price path calculated includes the effects of cumulative differences in the revaluation rate since the start of the DPP period, not just the effect of that year's revaluation rate.

Method of adjusting future allowable revenue

The most appropriate method for effecting a compensating adjustment is adjusting allowable notional revenue (ANR).

- The adjustment could potentially be included as a recoverable cost. However, this would require a variation to the IMs, since this type of adjustment is not consistent with the current IM definition of recoverable costs.
    - Pass-through and recoverable costs are cost items which are outside the control of the supplier and are uncertain in terms of the amount. The IMs distinguish between the two categories by the extent to which they are outside the supplier's control – recoverable costs are considered to be not completely outside the control of the supplier. The IMs specify the list of recoverable cost items, and that the amounts need to be approved by the Commission. Currently, the IMs do not provide for new recoverable costs to be included for the DPP (unlike for pass-through costs, where there is such a provision).
- Without a change to the IMs, the adjustment would need to be made to DPP allowable revenue – either to MAR or ANR. Adjusting MAR would be difficult in practice, since in most cases MAR would need to be determined before the amount of the effects on allowable revenue can be determined.
- Therefore adjusting ANR seems to be the most feasible option.

The amount of the adjustment to ANR would need to account for lagged quantities, by dividing the amount by two years of estimated quantity growth.

The time value of money

The adjustments to allowable revenue in future years will need to account for the time value of money, between the year of the allowable revenue difference and the year of the compensating adjustment.

There are two main options for an estimate of the time value of money in this context: the regulatory cost of capital, and the corresponding cost of debt.

The Commission has used both of these in different regulatory contexts. For example:

- The cost of capital is used to calculate the present values of BBAR and MAR series for the purpose of smoothing price paths (under the CPP IMs and in the 2013 preliminary DPP reset financial model).
- The cost of capital was used in Orion's CPP Decision to determine the value of claw-back.
- We understand that the cost of capital was used to determine the amount of Wellington Electricity's settlement in respect of its DPP price path.
- The cost of debt is used in the current EDB DPP Determination for the purpose of determining the value of claw-back to be recovered in 2014/15 from the difference between actual revenue and MAR in 2012/13.
- The cost of debt was used in Orion's CPP Determination to spread the recovery of CPP fees and costs over the CPP period.
- The cost of debt is used for the 'lagged recovery mechanism' for pass-through and recoverable costs which is part of the current gas distribution DPP Determination.

Two worked examples

Below we show how both an annual wash-up and an end-of-DPP period wash-up could operate.

Annual wash-up

At the end of each year, once actual inflation is known for that year, the DPP models relevant to that year are re-run using revaluation rates based on actual CPI instead of forecasts (for all of the years since the base year of the DPP period for which actual CPI values are available).

The difference in MAR, for the most recent year, between the models using actual CPI and forecast CPI, is determined. This difference incorporates the flow-on effects (eg on RAB and depreciation) of revaluation rate differences in previous years.

The adjustment to ANR, to be made two years later, is determined as follows:

$$ANR_t^{wash-up} = \frac{effect_{t-2}(1+r)^2}{(1+constant\ price\ revenue\ growth_t)(1+constant\ price\ revenue\ growth_{t-1})}$$

where:

$effect_t$ is the difference in MAR in year t of the DPP period

r is the time value of money

$constant\ price\ revenue\ growth_t$ is as determined by the DPP models for year t.

End-of-DPP period wash-up

At the end of the DPP period, once actual inflation for the whole period is known, the DPP models are re-run using revaluation rates based on actual CPI instead of forecasts.

The annual differences in MAR, for each year of the DPP period, between the models using actual CPI and forecast CPI, are determined.

The total effect on the DPP price path of the use of revaluation rates based on CPI forecasts, as at the end of the DPP period, is determined as follows:

$$Total\ revenue\ effect\ (as\ at\ end\ of\ period) = \sum_{t=1}^{5} effect_t(1+r)^{5.5-t}$$

where:

$effect_t$ is the difference in MAR in year t of the DPP period

r is the time value of money.

The annual adjustment(s) to ANR in the subsequent DPP is then determined as follows:

$$ANR_t^{wash-up} = \frac{MAR_t^{wash-up}}{(1+constant\ price\ revenue\ growth_t)(1+constant\ price\ revenue\ growth_{t-1})}$$

where:

$MAR_t^{wash-up}$ is the adjustment to allowable revenue in year t, which is determined such that the PV of the series of these amounts over the subsequent DPP period is equal to the total revenue effect as at the end of the DPP period (as determined above).

$constant\ price\ revenue\ growth_t$ is as determined by the DPP models for year t.

Note that the '5.5-t' index on the time value of money in the first of the above equations reflects an assumption that revenue is earned in the middle of the year. It means that the effect on year 1 is adjusted by four and half years of the time value of money (for example). This formula can be amended if it was deemed preferable to assume that revenue was earned 148 days before year end, consistent with the timing assumed in the DPP/CPP BBAR formula.

Coordination with other wash-up mechanisms

This wash-up could be implemented alongside other wash-up mechanisms.

If there are other 'forecast vs actual' wash-ups, these could be included when the DPP models are re-run – that is, the models are re-run with revaluation rates based on actual CPI values, and also actual values for any other items being washed-up. The effect on the DPP price path could be calculated in aggregate, and the method for making the compensating adjustments (eg the formulae in the above worked examples) could apply in the same way as for revaluation rates only.

If there are wash-ups for other situations, such as for differences between ANR and NR due to mis-forecasting of pass-through and recoverable costs, these wash-ups will require separate adjustments to ANR. The introduction of multiple wash-ups of different types could introduce additional complexity to the ANR calculation.

Appendix A: Restrictions

This report has been prepared for Vector Limited (Vector) to consider a wash-up mechanism to account for differences between revaluation rates based on forecast and actual CPI values with regards to a default price-quality path. This report has been prepared solely for this purpose and should not be relied upon for any other purpose. We accept no liability to any party should it used for any purpose other than that for which it was prepared.

To the fullest extent permitted by law, PwC accepts no duty of care to any third party in connection with the provision of this report and/or any related information or explanation (together, the "Information"). Accordingly, regardless of the form of action, whether in contract, tort (including without limitation, negligence) or otherwise, and to the extent permitted by applicable law, PwC accepts no liability of any kind to any third party and disclaims all responsibility for the consequences of any third party acting or refraining to act in reliance on the Information.

We have not independently verified the accuracy of information provided to us, and have not conducted any form of audit in respect of the information we have used. Accordingly, we express no opinion on the reliability, accuracy, or completeness of the information provided to us and upon which we have relied.

The statements and opinions expressed herein have been made in good faith, and on the basis that all information relied upon is true and accurate in all material respects, and not misleading by reason of omission or otherwise.

The statements and opinions expressed in this report are based on information available as at the date of the report.

We reserve the right, but will be under no obligation, to review or amend our report, if any additional information, which was in existence on the date of this report, was not brought to our attention, or subsequently comes to light.

This report is issued pursuant to the scope of work dated 17 March 2014 and the terms of business associated with that scope of work.