REVIEW OF SUBMISSIONS ON THE COST OF CAPITAL FOR FIBRE NETWORK LOSSES

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CONTENTS

1. Introduction

Firms engaged in the construction of the Fibre Network have not yet been regulated under the Telecommunications Act 2001, but are expected to be, and losses incurred by them in the pre-regulation phase must be added to their initial regulatory asset base (as required by the Telecommunications Act 2001). The Commerce Commission proposes to deal with this through a building block model, and this gives rise to a number of questions including what cost of capital should be used to determine the cost of capital allowance within the building block approach, what cost of capital should be used to compound the losses forward to the regulatory commencement date, the implications of Crown financing, and the treatment of losses incurred during the pre-regulatory phase once the regulatory process commences. Lally (2019) addresses a number of issues relating to this, leading to a number of contrary arguments in submissions to the Commission. This report addresses these contrary arguments.

2. Review of Submissions

Vodafone (2019a, pp. 23-24) argues that the WACC rate during the losses period must take account of the significantly lower risk for the businesses during this period. However, they do not address the problem of how to estimate the beta for the loss period, as described in Lally (2019, section 3).

Vodafone (2019b, pp. 11-13) argues that the analysis in Lally (2019, section 3) that leads to the conclusion that the beta in the pre-implementation period is positive (because of regulatory estimation errors relating to the MRP) is wrong, for a number of reasons. Firstly, Vodafone argues that whilst the estimate may be wrong in any particular period, it will tend to be accurate on average over the long run. This may be true but possible error in the estimate at the beginning of the regulatory period induces systematic risk over the pre-implementation period and therefore the return allowed by the regulator over this period must compensate for the risk in this period to the extent that investors require such compensation. In the CAPM world, that compensation is the product of beta and the MRP. If investors in general have the very long-term focus envisaged by Vodafone, in which case risks tend to offset over time, they will perceive 'risky' assets to have a lower degree of risk and therefore the MRP will be lower. Since the MRP is empirically determined, the Commission's estimate of it will then reflect the extent to which investors have this very long-term focus. So, if Vodafone's view about

investors is correct, it will already be reflected in the MRP, and therefore in the Commission's empirically derived estimate of the MRP.

Secondly, Vodafone argues that the Commission will re-estimate the MRP prior to the commencement of regulation, thereby drastically reducing the chance that it is incorrectly estimated in the pre-implementation period. However, the analysis in Lally (2019, section 3) already recognises that the MRP is estimated at the end of the pre-implementation period. The fact that it is estimated at this point does not guarantee that it will be estimated correctly because the true value fluctuates over time and is therefore difficult to estimate. So Vodafone's point reflects a misunderstanding about the argument.

Thirdly, Vodafone argues that the MRP has been very stable over time, at around 7%. However, Vodafone is confusing the Commission's estimate of the MRP with its true value, and it is precisely because the estimate is so stable over time that it is likely to be materially low at some times and materially high at other times.

Fourthly, Vodafone argues that the Commission can and has adjusted the MRP for significant events, such as the 0.5% adjustment during the GFC. However this is the only variation that the Commission has undertaken in the entire period for which it has estimated this parameter (2001-2019), and it is very unlikely that the true value has been that stable. This point, that the true value has likely been much more variable over time than the estimate, is the very point raised in Lally (2019, section 3). Thus, Vodafone's observation supports rather than rebuts the point raised there.

Fifthly, Vodafone argues that the beta estimate used after the implementation date will already account for this risk, because many of the comparator businesses face similar regulatory risk. However, the beta estimate applied to period X accounts for systematic risk only in period X, and not for any earlier (or later) period. Thus, the beta estimate applied from the implementation date accounts for systematic risk only from the implementation date.

Chorus (2019, pp. 36-37) argues that the beta in the pre-implementation period is higher than post-implementation, due to high operating leverage, high demand risk and longer-term cash

flows in the construction and early growth phase, and cites Oxera (2019a) in support of this.[1] Oxera (2019a, section 2D) provides plausible arguments in support of these claims in an unregulated situation. However, as shown in equation (1) or (2) in Lally (2019), the businesses are compensated through the loss calculation for their operating costs net of revenues earned in the pre-implementation period. Consequently, these features of their cash flows noted by Chorus and Oxera do not subject these businesses to risk in the pre-implementation period, and therefore do not warrant a higher beta than in the post-implementation period. Oxera (2019a) does not directly address this point but Oxera (2019a, section 2A.2) refers to discussion of the impact of the loss carry-forward process ("wash-up mechanism") in Oxera (2019b, section 3E). In turn, Oxera (2019b, section 3E) argues that the wash-up mechanism does not fully protect the businesses because of stranding risk. This is true but stranding risk is only relevant to beta to the extent that it is systematic. Oxera notes that stranding risk is at least partly demand risk, and some of this demand risk is likely to be systematic. However, regardless of the extent to which stranding risk is systematic, it equally affects the loss-carry forward and the rest of the RAB at the commencement of regulation. Thus, there is still no basis here for a higher beta in the pre-implementation period.

Chorus (2019, pp. 37-40) argues that the appropriate risk-free rate to use in the pre-implementation period is the ten-year rate prevailing shortly before December 2011, in accordance with the Commission's usual regulatory approach. In effect, Chorus treats the pre-implementation period as simply another regulatory period, whose life is ten years. However, that usual regulatory scenario involves setting allowed revenues or prices (and hence a cost of capital) at the beginning of each regulatory period so that the present value of these revenues (net of cash outflows) plus the regulatory asset value at the end of the period is equal to the regulatory asset value at the beginning of the period, i.e., the NPV = 0 principle. It follows from this that the allowed risk-free rate must be that prevailing at the beginning of the regulatory period, and for a term equal to that of the regulatory period. This regulatory scenario has no relevance to the current exercise, which does not involve setting prices in the pre-implementation period (this exercise having already been done and through a competitive tendering process rather than a cost-based process)[2]. Instead, the current exercise involves

[1] Chorus (2019, page 36) cites Oxera (2019a, section 3E) but the reference should be to section 2D.

[2] Prior to the receipt of tenders, CFH (the Crown entity dealing with this matter) developed cost-based estimates of appropriate prices, but the prices accepted under the competitive tendering process were lower (Oxera, 2019b, paragraph 3.17).

compounding forward the losses in this period to the regulatory commencement date for adding to the initial investment at that date, in accordance with equation (2) in Lally (2019), at which point prices or revenues are set to reimburse that investment in present value terms at that time. So, if a loss of $100m is incurred in 2015, it is compounded forwards to the commencement of regulation (in 2022) at an appropriate rate, and the risk-free rate used there must be the six-year rate prevailing at the beginning of 2016. The ten-year rate prevailing in 2011 would be the wrong rate for this compounding exercise. Similarly, if a person should have received $100m at the end of 2015, and payment does not occur until 2022, the appropriate payment in 2022 would be $100m compounded forwards to 2022 using the six-year risk-free rate (and possibly also some margin) prevailing at the beginning of 2016.

Chorus (2019, page 38) also refers to the businesses being subject to price caps under a contract from December 2011, in support of its claim that the appropriate risk-free rate to use in the pre-implementation period is the ten-year rate prevailing shortly before December 2011. These price caps would have affected the revenues earned by the businesses. This is not relevant to the rate at which the losses are compounded forwards as shown in equation (2) in Lally (2019).

Remarkably, Chorus (2019, page 38) claims that I endorse their approach, and cite Lally (2019, page 6) in support of that. However, the very section of my report that they cite states that "Thus, if regulation commences in 2022, net cash flows incurred in (say) 2015 should be compounded forwards using (inter alia) the seven-year risk-free rate and DRP prevailing in 2015." Chorus's claims to the contrary are a complete misrepresentation of my views.

Houston Kemp (2019, section 3.1) repeats Chorus's (2019) argument that the pre-implementation period is equivalent to a regulatory period, that the Commission's general practice with regulatory periods is to set the risk-free rate equal to that prevailing at the beginning of the regulatory period and with a term equal to that of the regulatory period, and therefore this practice should be invoked here. The comments made above in response to Chorus apply equally here.

Houston Kemp (2019, section 3.2) also favours a five-year trailing average for the DRP, consistent with the Commission's usual regulatory practice, but with averaging commencing in 2011 (using the 2011 DRP) in recognition of the fact that the businesses would raise debt in 2011 and gradually transition to a five-year average. Thus, the DRP used in 2015 would be a

trailing average of the DRPs for 2011…2014. However this rate would not correspond to the DRP incurred by a firm that incurred a loss in 2015, which would require financing until 2022. In this case, the firm would borrow the debt-financed fraction of the loss at the end of 2015 and then gradually transition to a five-year trailing average (by borrowing 20% of the total initial sum for one year, which would be replaced at its maturity by five-year debt, 20% of the total initial sum for two years, which would be replaced at its maturity by five-year debt, etc). So, for the purposes of compounding the 2015 loss to 2022, the DRP paid for 2016 would be the five-year DRP prevailing at the beginning of 2016 (assumed to be the same for shorter terms at that time), the DRP paid for 2017 would average over the five-year rates at the beginning of 2016 (80% weight) and 2017 (20% weight), etc. In Lally (2019, section 3), I proposed use of the six-year DRP prevailing at the beginning of 2016 to compound forward 2015 losses to 2022. This proposal did not account for the Commission's preference for a trailing average DRP. Given the DRP data required to undertake this trailing average calculation, a simplification here would be to estimate the year corresponding to the median loss over the 2011-2022 period. If this were (say) 2015, one would then use the six-year DRP prevailing at the beginning of 2016 in all of the compounding exercises for losses within the 2011-2022 period. I proposed the same simplification in an earlier report (Lally, 2019, section 3).

To assess the error from this simplification requires estimates of the DRP for each year within the loss period and the losses each year. For example, suppose that the cash losses for the years ending 30 June 2012, 2013, …..2021 are $400m, $365m, $358m, $350m, $340m, $327m, $313m, $295m, $275m, and $250m respectively. In addition the Commission has estimated the five-year DRPs over the same periods (for illustrative purposes only) as .0214, .0213, .0179, .0160, .0158, .0163, .0160, .0160, .0160, and .0160 respectively (with the last two numbers being that for their predecessor). So, for the losses incurred in the year ending 30 June 2012, the compounded result involves the losses of $400m, the DRP paid in the 2012-2013 year of .0214, the DRP paid in the 2013-2014 year of .02138 (80% of .0214 and 20% of .0213), and so on until a five-year trailing average is paid in 2016-2017, after which the five-year trailing average is maintained, yielding a figure at 30 June 2022 of $479.8m. Across the entire set of losses, the sum of these compounded figures is $3,617m. By contrast, in accordance with the simplification proposed in the previous paragraph, the uncompounded losses total $3,273m, the median loss then occurs in 2015-2016, and the five-year DRP associated with this is .0158. Use of this figure to compound all of the losses yields an

aggregate compounded loss of $3,592m, which is less than the 'correct' figure of $3,617m by only 0.7%.

An alternative simplification, proposed by the Commission, is to use the DRP values as if they were one-year DRPs and the firm borrowed successively for one year terms. So, for the losses incurred in the year ending 30 June 2012, the compounded result involves the losses of $400m, the DRP observed in the 2011-2012 year and paid in the 2012-2013 year of .0214, the DRP observed in the 2012-2013 year and paid in the 2013-2014 year of .0213, and so on, yielding a compounded loss figure at 30 June 2022 of $474.7m. Across the entire set of losses, the sum of these compounded figures is $3,606m, which is only 0.3% less than the correct figure. This provides a better approximation than that suggested by me, but requires collection of all of the DRP data required to properly deal with the issue and therefore offers little benefit from properly doing so.

Incenta (2019, paragraph 30) argues that the Commerce Commission's (2018, paragraph 7.73) Method 1 for dealing with the benefits of zero-cost Crown finance is incorrect and proposes an alternative. In particular, Incenta (ibid, section 1) argues that the Crown finance would only be zero cost if the Crown were accepting a proportionate share of the project risk, that this is not the case because the Crown finance is essentially all debt finance, that Chorus therefore bears a residual risk, and this residual risk warrants application to the Crown finance of the project WACC less the market rate for the (debt) capital supplied by the Crown. Letting p denote the proportion of finance supplied by the Crown, k_w the project WACC in the absence of Crown financing, and k_{gc} the cost of the (effectively debt) finance supplied by the Crown (which reflects the structure of the debt contract with the Crown) if it were charged at a commercial rate, the overall cost of capital for the UFB project would be a weighted average over the rate k_w applied to the non-Crown finance and the rate $(k_w - k_{gc})$ applied to the Crown finance, as follows:

$$k = (1 - p)k_w + p\left(k_w - k_{gc}\right) \qquad (1)$$

I agree with Incenta's (2019, section 3) analysis that leads to the conclusion that the Crown finance is in substance all debt finance (at no interest) despite half being labelled "equity". In particular, I agree with Incenta's analysis that leads to the conclusion that Chorus would be

unlikely to repay the "equity" by issuing preference shares to the Crown with a yield equal to the 180 day BB rate plus 6%. I also agree with Incenta's analysis that leads to the conclusion that Chorus would be unlikely to repay the "equity" by issuing Chorus shares to the Crown at a 5% discount to the contemporaneous market price. Thus, Chorus would most likely repay the equity with cash matching the amount provided. I also agree with Incenta's analysis that leads to the conclusion that the warrants issued to the Crown (in response to the Crown providing this financing) have minimal value relative to the finance provided by the Crown. Accordingly, the Crown finance is in substance all debt finance (at no interest) despite half being labelled "equity".

Despite agreeing on this fundamental point, equation (1) does not follow. Equation (1) is not an overall cost of capital. An overall cost of capital is a weighted average over the costs of capital for various types of capital and each of these costs of capital is an expected rate of return or a promised yield on the associated type of capital. However the rate ($k_w - k_{gc}$) applied to the Crown finance is neither an expected rate of return nor a promised yield on the Crown supplied finance; the appropriate rate is zero and the residual risk that Incenta refers to would be reflected in the cost of capital for the non-Crown finance. Even in a conventional situation in which both debt and equity were supplied at commercial rates, the debt holders do not bear a proportionate share of the project risk, but this is manifested through the cost of equity being raised to reflect the higher leverage and hence the higher risk to which equity holders are subject. Furthermore, the cost of capital k_w applied to the non-Crown finance in equation (1) would have to reflect the nature and extent of the Crown finance (just as the cost of equity reflects the extent of debt financing and vice versa), but the rate k_w used does not satisfy that requirement. Thus, equation (1) is invalid.

It might be thought that the presence of zero-cost Crown (debt) finance would require a departure from the usual formula. This is not the case. Letting w denote the proportion of debt capital (from all sources including the Crown), k_e the cost of equity (determined in the usual way), and k_d the overall cost of debt (including that from the Crown), the overall cost of capital for the UFB project is (as usual)

$$k = (1 - w)k_e + wk_d \qquad (2)$$

The fact that the Crown supplies some or all of the debt capital does not invalidate this equation, whilst the fact that the Crown does not charge for the debt capital it supplies merely affects the numerical value for k_d. Similarly, if a commercial supplier of debt mistakenly charged at a sub-commercial rate, equation (2) would still be valid but the debt supplier's error would lead to a lower value for k_d in equation (2). Turning to the current situation, suppose the proportion of total finance coming from the Crown (denoted p) is no more than the proportion of finance coming from all suppliers of debt (w). In this case, the proportion of debt coming from the Crown would be p/w, and this proportion is at zero cost. Letting the cost of debt coming from other debt suppliers be denoted k_{do} (which will reflect features of the Crown's debt contract, most particularly the fact that most of the Crown debt is subordinated), the overall cost of capital for the UFB project will then be

$$k = (1-w)k_e + w\left[k_{do}\left(1-\frac{p}{w}\right)\right]$$

$$= (1-w)k_e + k_{do}(w-p) \qquad (3)$$

So, if $p = w$, the cost of debt drops out of the WACC equation (3) because all of the debt is then Crown financed at a zero cost. This case is particularly interesting because it properly shows that the overall cost of capital k would be unaffected if the Crown's debt were subordinated (because there would then be no other debt for it to be subordinated to) whereas Incenta's equation (1) would generate a lower k due to a higher k_{gc} if the Crown's debt were subordinated. This provides further evidence that Incenta's equation (1) is incorrect.

Now suppose that Crown financing exceeds the total debt finance desired for the UFB project. Debt is a claim on the entire firm rather than only one of its projects. So, the Commission could act as if the 'surplus' zero-cost Crown finance replaced debt elsewhere in the business. So, equation (3) would still hold but the last term in it would become negative to reflect the fact that zero-cost Crown finance was displacing debt capital not only in the UFB project but elsewhere in the firm's business.

To demonstrate that this is correct, let the loss at time 1 be denoted L_1 and it must be compounded forwards for one year to yield compounded loss CL_2 at time 2. Absent free Crown finance, CL_2 is as follows:

$$CL_2 = L_1(1-w)(1+k_e) + L_1 w(1+k_{do})$$

With free Crown financing equal to proportion *p* of the total financing need L_1, the compounded loss CL_2 is reduced by the benefit from that free financing, and this is $L_1 p k_{do}$. Deducting this from the previous equation yields

$$CL_2 = L_1(1-w)(1+k_e) + L_1 w(1+k_{do}) - L_1 p k_{d0} = L_1[1 + (1-w)k_e + k_{do}(w-p)]$$

Furthermore, this equation is valid regardless of the size of *p* so long as the free financing can be used to displace debt at commercial rates elsewhere in the firm's business if it exceeds proportion *w*. So, equation (3) is correct even if *p* exceeds *w*.

In addition, the proportion *w* is determined independently of the size of the losses and therefore need not be changed over time whilst the Crown financing is presumably not perfectly altered over time in line with the losses and therefore the proportion *p* changes over time as the losses grow. For example, suppose the losses are \$400m at time 1 and \$200m at time 2, and must be compounded forwards till time 3. In addition, the free Crown financing is \$400m provided at time 1 for two years. The fraction *p* is then 1 for the first year and 0.67 for the second year.

Equation (3) should also be compared with the Commerce Commission's (2018, para 7.73) two methods for dealing with the benefit from zero-cost Crown finance in the pre-implementation period. The first of these (referred to by the Commission as Method 1) is to subtract the face value of the concessional finance from the cost of the assets when determining the allowed rate of return. So, if the total finance is \$100m, at a project WACC of 10%, and \$50m of the finance is supplied by the Crown, the dollar finance cost of \$100m x 0.1 = \$10m would be reduced to \$5m using this approach. By contrast, if $w = p = 0.5$, equation (3) shows that the presence of the zero-cost Crown finance would reduce the dollar cost of capital from \$100m x 0.1 = \$10m to \$50mk_e and, since k_e must exceed the WACC of 10%, the dollar cost of capital will be above \$5m. This reveals that the Commission's Method 1 is incorrect. More generally, deleting only debt capital from a mix of capital will raise the cost per \$1 of the remaining capital because some of it will be equity and leverage will rise. In Lally (2019, section 3), I concurred with Method 1. The analysis presented here supplants that conclusion.

The second of the Commerce Commission's (2018, para 7.73) methods for dealing with the benefit from zero-cost Crown finance in the pre-implementation period (Method 2) is to, for each year, determine the financing cost that would have applied if (zero-cost) Crown financing had not been advanced, and then to add up these benefits in present value terms, followed by deducting them from the loss calculation at the end of the pre-implementation period. Since Crown financing is debt financing, it would substitute for normal debt financing and therefore the financing cost that would otherwise have applied would be the commercial cost of debt. This method is consistent with equation (3).

To demonstrate the equivalence of equation (3) and the Commission's method 2, suppose that the only cash loss (investment, opex and tax net of revenues) is L_1 at time 1 and the loss period ends two years' later at time 3, so that the cash loss must be compounded forwards for two years. Using equation (3), the compounded loss at time 3 is:

$$CL_3 = L_1[1 + (1 - w)k_e + k_{do}(w - p)]^2 \qquad (4)$$

By contrast, using the Commission's Method 2, the compounded loss in one year (at time 2) is L_1 compounded using the normal WACC less the benefit from the free finance (and the latter is the product of the loss to be financed, the proportion of funding supplied by the Crown and the commercial borrowing rate that is avoided through the Crown's free financing):

$$CL_2 = L_1[1 + (1 - w)k_e + wk_{do}] - L_1pk_{do} = L_1[1 + (1 - w)k_e + k_{do}(w - p)]$$

The compounded loss one year later (at time 3) follows the same pattern and therefore is

$$CL_3 = CL_2[1 + (1 - w)k_e + k_{do}(w - p)] = L_1[1 + (1 - w)k_e + k_{do}(w - p)]^2$$

This is the same as equation (4), thereby demonstrating that equation (3) is consistent with the Commission's Method 2. This equivalence holds even if the free Crown finance is available for only a finite period. For example, if it is available for only one year, equation (3) holds for that first year followed by the use of the conventional equation (4).

Incenta (2019, paragraph 31) represents Lally (2019, section 4) as claiming, in relation to some additional costs to the businesses associated with Crown financing (in the form of obligations over phasing of the roll out, restrictions on the actions of the businesses, and penalties for failing to meet connection targets), that "because certain cost items cannot simply be observed and are difficult to quantify that they are not actual costs." Incenta notes that WACC cannot be observed but can be and is estimated, and implies that the same holds for these other costs. However, the claims attributed to me are incorrect. I referred to these costs as unquantifiable rather than unobservable, and therefore Incenta's WACC analogy is not appropriate. If Incenta can offer estimates of these additional costs, they should do so.

L1 Capital (2019, section C) argues that the businesses' need to maintain an investment grade credit rating leads them to choosing a debt term of several years, which implies the same term for the risk-free rate embedded in the cost of debt. However, regardless of the term of the debt, the underlying risk-free rate component could be shorter through appropriate use of interest rate swap contracts. For example, a firm could borrow for ten years but subject itself to the five-year risk-free rate by swapping the ten year risk-free rate for the five year rate.

TelstraSuper (2019, page 1) argues that the Commission's use of actual risk-free rates after 2011 has led to lower rates (than in 2011) with the benefit of hindsight, and that this would discourage investment in future infrastructure projects. However, in accordance with equation (1) in Lally (2019), the Commission's use of rates arising after 2011 reflects the costs actually incurred by businesses. For example, if a firm invests $100m in 2015, the Commission's use of the interest rate prevailing in 2015 in order to roll-forward the expenditure to 2022, at which point reimbursement commences through the usual regulatory process, corresponds to the fact that the firm would have to borrow in 2015 at the contemporaneous rate rather than in 2011.

3. Conclusions

Amongst these submissions, I agree with two points. One of these is Houston Kemp's point that the DRP should in principle be a five-year trailing average in accordance with the Commission's usual regulatory practice. However, in contrast to Houston Kemp's proposal, the trailing average applied to borrowing in (say) 2015 should commence with the 2015 DRP and transition to a five-year trailing average, rather than commence with an average of the 2011-2015 DRPs. Furthermore, in view of the complexity here, a simplification could be

adopted; if the median loss is estimated to occur in (say) 2015, this simplification would be to use a single DRP throughout the compounding exercise, being the six-year DRP prevailing at the beginning of 2016. Analysis of this issue shows that this simplification would probably induce only a very small error.

Secondly, I agree with Incenta's view that the Commission's Method 1 for dealing with zero-cost Crown finance is incorrect. However, I disagree with Incenta's proposed approach, as it is inconsistent with the definition of a cost of capital. I propose a different approach, which accords with the standard formula and is equivalent to the Commission's Method 2.

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