Review of expert submissions on further draft determinations for UCLL and UBA services

The case for a WACC uplift

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Contents

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1 Introduction

Following the publication of further draft determinations for unbundled copper local loop (UCLL) and unbundled bitstream access (UBA),[1] the New Zealand Commerce Commission received a number of submissions from companies and experts.

Several submissions comment on the Oxera report published alongside the Commission's further draft determinations on assessing the case for a WACC uplift. In this context a WACC uplift refers to using a WACC above the midpoint of the estimated range in deriving the TSLRIC price. Table 1.1 lists the submissions that explicitly comment on Oxera's approach.

Table 1.1 Expert submissions on the WACC uplift

Submission body	Title
Competition Economists Group (CEG)	Response to the further draft determinations, on behalf of Chorus
Network Strategies	Revised draft determination for the UCLL and UBA price Review, UCLL and UBA Final Pricing Principle, on behalf of Spark New Zealand and Vodafone New Zealand
Sapere Research Group	Economic Comment on UCLL and UBA Pricing Issues, on behalf of Chorus
WIK-Consult	In response to the Commerce Commission's 'Further draft pricing review determination for Chorus' unbundled bitstream access service' and 'Further draft pricing review determination for Chorus' unbundled copper local loop service', including the revised cost model and its reference documents, on behalf of Spark New Zealand and Vodafone New Zealand
Network Strategies	Response to submissions on revised draft determination, Final report for Spark New Zealand and Vodafone New Zealand
Sapere Research Group	Cross-submissions on UCLL and UBA price determination issues, Report for Chorus Limited

Source: The reports can be found at New Zealand Commerce Commission, 'Unbundled Copper Local Loop and Unbundled Bitstream Access services final pricing principle', http://www.comcom.govt.nz/regulated-industries/telecommunications/regulated-services/standard-terms-determinations/unbundled-copper-local-loop-and-unbundled-bitstream-access-services-final-pricing-principle/.

In this report, we set out our response to the key points raised in these submissions, and provide our updated assessment of the case for a WACC uplift. In summary, the key points raised by the submissions can be grouped into the following categories:

- comments on how the costs of a WACC uplift are estimated (discussed in section 2);
- comments on how the potential benefits of a WACC uplift are estimated (discussed in section 3);
- comments on the overall framework used to compare the costs and benefits (discussed in section 4).

While there are some valid points raised in the expert submissions and cross-submissions, overall we do not consider that our analysis needs to be amended

[1] New Zealand Commerce Commission, 'Unbundled Copper Local Loop and Unbundled Bitstream Access services final pricing principle', http://www.comcom.govt.nz/regulated-industries/telecommunications/regulated-services/standard-terms-determinations/unbundled-copper-local-loop-and-unbundled-bitstream-access-services-final-pricing-principle/.

at this stage in the process. The analysis provides a useful scaling exercise of the potential benefits and costs of a WACC uplift, using available evidence to calibrate the relationship.

As noted in our June report, while it is intuitive that there is a link between a WACC uplift and investment in general, the link between a WACC uplift for UCLL/UBA specifically and innovation is more difficult to establish with certainty. This uncertainty is one of the reasons why we interpreted the results of our modelling with caution. Specifically, we concluded that although there may be a case for a modest uplift, the evidence overall was not strong. We continue to stand by this conclusion in light of the comments received.

We faced some similar issues in the Part 4 context; however, the link between the allowed WACC for energy networks and network investment was stronger. Therefore, while there were also some uncertainties about the underlying assumptions, the confidence with which the analysis could be relied upon was greater.

2 Costs of a WACC uplift

In the model presented in Oxera (2015),[2] the estimates of the costs of a WACC uplift include two main components: the direct costs of a WACC uplift on the existing asset base; and the potential direct costs of a WACC uplift applied to new investment, on the assumption that the new investment could be regulated in a similar way to copper networks.

The direct costs of a WACC uplift for existing assets, in turn, are a function of:

- the price effect resulting from higher UCLL/UBA prices;
- the demand effect resulting from lower volumes consumed at the higher price (the deadweight loss).

The price effect is estimated assuming 100% pass-through of the UCLL/UBA price increase by the RSPs to end-users. The demand effect is estimated using a range of the own-price elasticity for copper-based services of -0.5 to -1.5, reflecting the available empirical elasticity estimates.

In addition, if there is a reasonable chance of the new investment (that the WACC uplift is intended to incentivise) becoming regulated in a similar way to UCLL/UBA, we assume that a WACC uplift will also apply to the new service.

In the analysis, we assume that the asset base of the new investment will be similar in size to the existing asset base. Therefore, the total costs of a WACC uplift are effectively double the cost estimated for the existing asset base. This is because, in our framework, a WACC uplift affects only the timing of the investment, rather than whether an innovation actually occurs. In other words, on the assumption that the service/technology would be regulated, consumers would always bear the cost of a WACC uplift, regardless of whether it was successful in bringing forward investment.

This section provides our response to the key issues raised in relation to our estimate of the costs of a WACC uplift:

- doubling of the capital base to which a WACC uplift is applied (section 2.1);
- adjusting the cost estimate for the probability of innovation (section 2.2);
- using a constant elasticity assumption to estimate indirect costs (section 2.3);
- using a consumer welfare standard (section 2.4).

2.1 Doubling of the capital base to which a WACC uplift is applied

Two respondents—CEG and Sapere Group—have commented on our assumption that the new investment will have the same asset base as the existing network, claiming that it is unrealistic and unduly conservative.

Specifically, CEG notes:[3]

> the doubling of the asset base should not be regarded as a conservative assumption, but rather as an error in understanding the form of regulation for the UCLL and UBA that in effect depreciates the existing asset to reflect the migration of customers from copper services to fibre services. That is, because the TERA model adopts the 100% demand assumption, the effect of an uplift to the WACC

[2] Oxera (2015), 'Is a WACC uplift appropriate for UCLL and UBA?', June.
[3] CEG submission, para. 221.

on the existing RAB is reduced by the proportion of customers who migrate to fibre.

Sapere Group suggests that our assumption 'is more appropriately described as unrealistic as history indicates that superior new telecommunications technology tend to come at a lower capital cost'.[4]

Our approach is equivalent to assuming that the total investment in the new technology is of similar scale to the investment in the existing technology. While we have not reviewed empirical evidence on capital costs of different technologies over time, we consider that our assumption is reasonable. We note that Sapere Group has not provided any historical evidence to back up its proposition that capital costs have been reducing over time.

As would be expected, leaving all else equal but assuming a smaller cost of new investment would increase the net benefits of a WACC uplift, as shown in 4.4A1. However, assuming different costs of new investment potentially also raises the question of whether the benefits also need to re-scaled to reflect the lower investment cost. Given the limitations of such sensitivity analysis, and the materiality of the effects of other assumptions on the results (such as the assumed acceleration effect), changing this assumption would not fundamentally alter our overall conclusion that the evidence is mixed and does not strongly support the case for an uplift.

We disagree that our assumption is a fundamental misrepresentation of the regulatory framework. The main purpose of our analysis was to provide plausible ranges around the costs and benefits under simplifying assumptions on how a WACC uplift could act as a signalling mechanism for investment in innovation. In this type of scaling exercise, we see limited benefit in very detailed modelling that attempts to capture all aspects of the current TSLRIC methodology.

2.2 Adjusting the cost estimates for the probability of innovation

In our assessment we assume that, if there is a major innovation in the telecommunications industry, it will be commercialised in New Zealand at some optimal point in the future. The WACC uplift will then affect only the timing of this commercialisation—i.e. a WACC uplift might have the effect of bringing the investment forward relative to the optimal timing when a midpoint WACC is used.

In this case, if there is an institutionalised policy of applying a WACC uplift to UCLL/UBA and, by extension, to the new service (reflecting the likelihood that it will become regulated), consumers will always bear the cost of a WACC uplift on the new investment, regardless of whether the uplift is successful in accelerating the investment. In other words, we do not apply any probability weighting to the additional costs of a WACC uplift on the new asset base.

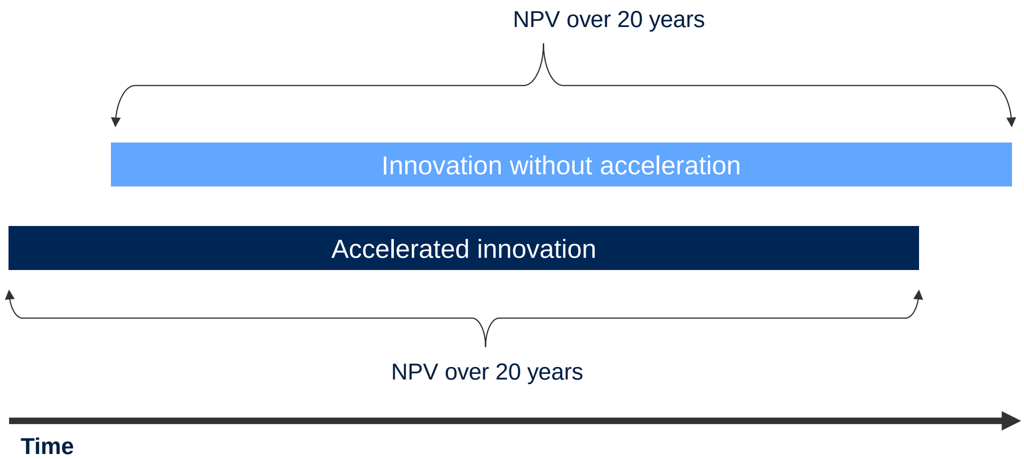
CEG appears to suggest that this is inconsistent with our treatment of the benefits, which are probability-weighted.[5] In its cross-submission, Network Strategies appears to agree with CEG's observation.[6]

Our rationale for not applying a probability weighting to the additional costs is explained above. If there is acceleration of the investment relative to the natural optimal timing (e.g. as a result of a WACC uplift being granted), in principle there

[4] Sapere Group submission, para. 141.
[5] CEG submission, para. 225.
[6] Network Strategies cross-submission, p. 75.

will be differences in the timing of consumers bearing this additional cost. This is illustrated in Figure 2.1.

Figure 2.1 Difference in the timing of benefits and costs



Source: Oxera.

In calculating the annualised benefits of acceleration, we focused on the difference between the net present value (NPV) of the two streams of benefits of NZ$1.5bn occurring either immediately or two or five years from today. This produced a range of NZ$1.8bn and $5.3bn depending on the assumed acceleration effect and the discount rate.[7]

However, we noted that it was not known when the next wave of innovation would occur. Assuming that the acceleration effect from a WACC uplift continued into perpetuity then consumers could get the above benefits on average every 20 years, in exchange for paying for a WACC uplift. We therefore converted the estimated benefits into an annuity over a 20-year period, which produced a range of NZ$150m to NZ$550m a year. Table 2.1 reproduces our estimates of the annualised benefits of acceleration.

Table 2.1 Annualised net benefit of acceleration (NZ$m)

Discount rate	Two-year acceleration	Five-year acceleration
5%	150	300
10%	250	550

Note: Figures are rounded to the nearest NZ$50m.

Source: Oxera calculations.

It would be possible to factor in the potential difference in the timing of when consumers bear the cost of a WACC uplift on new investment by calculating the difference in the NPV of two 20-year benefit streams (net of the cost of a WACC uplift on the new investment), and converting the results into an annuity. However, this calculation would need to be performed separately for each WACC percentile, which would add considerable complexity to the presentation of the analysis. Given the relatively wide range of estimated benefits, we consider that any further insight this would provide would not be material to the findings.

Furthermore, because we are looking at potential benefits and costs over several consecutive waves of innovation where one innovation replaces another

[7] Oxera (2015), 'Is a WACC uplift appropriate for UCLL and UBA?', section 4.6.

in perpetuity, assuming that consumers bear the cost of a WACC uplift on the new investment annually appears to be a reasonable simplifying assumption.

2.3 Using a constant elasticity assumption to estimate indirect costs

There were few comments on our estimates of the indirect costs. CEG noted that our estimates were conservative because of our assumption of constant own-price elasticity of copper-based services:

> In reality, the elasticity of demand for broadband would be expected to decline as broadband becomes increasingly a necessity. Over time therefore, a constant uplift would be expected to have a smaller effect on consumption decisions and hence a declining cost.[8]

CEG's proposition is sensible, but given the uncertain nature of the exercise, we preferred to use conservative estimates where possible. Furthermore, this is not a critical assumption that drives the overall results—hence, where possible, it seemed more appropriate to use input assumptions that could be reconciled to currently available empirical evidence.

2.4 Using a consumer welfare standard

Sapere Group suggests that we should be using a total welfare rather than a consumer welfare approach.[9] In the further draft determinations, the Commission has considered both a consumer welfare and a total welfare approach, to the extent that the latter captures long-term benefits to end-users. Our analysis is based on a consumer welfare approach. This is consistent with the Commission's interpretation that, in the type of analysis presented, the difference between a producer and a consumer surplus was due to anything other than a wealth transfer, which does not need to be included in its assessment.[10]

[8] CEG submission, para. 226.
[9] Sapere Group submission, para 140.
[10] Commerce Commission (2015), 'Cost of capital for the UCLL UBA pricing reviews', further draft decision, 2 July, paras 235–41.

3 Potential benefits of innovation

To put a scale on the potential benefits of innovation in the telecommunications industry, we drew on historical evidence where possible to consider three key factors:

- the typical cycle of disruptive innovations. Based on the last 40 years for a range of technology groups, we found that it is reasonable to assume that a major innovation occurs every 20 years on average;
- the typical benefits to consumers once the investment is made. The available empirical evidence related mainly to user benefits of broadband. This evidence suggested that an annual benefit of around NZ$1.5bn was plausible;
- the typical timing of commercialising innovations relative to the leader. We focused on evidence from developed countries only, looking in particular ADSL2+ deployment. In the end, we used a range of two to five years to illustrate the impact of bringing the investment forward under a WACC uplift.

To estimate the potential benefits to users of a WACC uplift, we compared the annualised difference in the net present value (NPV) of a 20-year benefit stream, assuming that the WACC uplift brings the investment forward by two or five years. This produces a relatively wide range of potential benefits, depending on the strength of the acceleration effect (two versus five years), the discount rate, and other assumptions.

Broadband has arguably been one of the more transformational technologies over the recent past (and hence might be associated with larger benefits than an 'average' innovation). However, we have been relatively cautious in our estimate of the frequency of average innovations (i.e. we have used only innovations that we were confident enough in categorising as truly disruptive). On balance, therefore, we consider that our estimates of the benefits, when taking into account the frequency of the innovation cycle, give plausible ranges of magnitude.

This section discusses the specific comments on each of our three main elements of the estimation:

- frequency of innovation (section 3.1);
- historical evidence on the benefits of innovation (section 3.2);
- the acceleration effect (section 3.3).

Section 3.4 reviews comments on the overall framework for assessing the benefits.

3.1 Frequency of innovation

Network Strategies was the only party to provide substantive comments on our analysis of the frequency of innovation. Specifically, Network Strategies appears to suggest that we should have considered only disruptive technologies that deliver regulated services or services that are likely to be regulated in the future.[11]

[11] Network Strategies submission, p. 90.

To understand the likely frequency and benefits of innovation, we do not think it is necessary to restrict the analysis to technologies that deliver a regulated service. First, the technology could be an input or part of a service or improvement—such as DSL equipment. Second, the length of a typical innovation cycle (in this example, 20 years) makes little difference to the results. This is because a shorter cycle will reduce the overall NPV benefit to consumers of accelerating investment, although they will receive this benefit more often. Therefore, on an annualised basis, the length of the cycle is not a critical assumption.

For the purposes of gauging plausible estimates of the frequency of disruptive innovations, using as wide a cross-section of examples as possible seems appropriate. The purpose of the analysis is not to try to predict which innovations will deliver a regulated service. In its cross-submission, Sapere Group also notes that it is difficult to predict when a disruptive technology will occur.[12]

3.2 Historical evidence on the benefits of innovation

To estimate the potential user benefits of innovation, we relied primarily on the results of two studies: Alcatel-Lucent (2011) and Criterion (2003).[13] These results, presented in section 4 of our report, are relatively consistent with each other, and suggest an annual total consumer surplus of around NZ$1.65bn,[14] or (equivalently) NZ$360/person per year, on average.

The Criterion (2003) study provides two separate methodologies and resulting benefits of broadband. In particular, we have given weight only to the consumer surplus estimate of NZ$352/person per year, as shown in Table 4.2 of the Oxera report. This was derived from an underlying figure of around US$180/person per year in 2003 prices. CEG[15] and Network Strategies[16] both note that, in Appendix A2 of our report, we also show an estimate of the consumer surplus impact of broadband from Criterion (2003) of US$1,000/person per year. A summary of the estimates is reproduced in Table 3.1.

Table 3.1 Consumer surplus estimates

Author	Consumer surplus per person per year)
Alcatel-Lucent (2011)	NZ$366
Criterion (2003)	US$180 (NZ$352)
Criterion (2003): alternative estimate	US$1,000

Source: Alcatel-Lucent (2011), op. cit.; and Criterion Economics (2003), op. cit.

The US$1,000/person figure refers to the case in the Criterion (2003) paper where there is no explicitly modelled ‘choke price’ (a price above which no consumers will purchase the product in question), and a linear demand curve. The other consumer welfare number used by Oxera from Criterion (2003) is more conservative, in that it assumes constant elasticity of demand and a choke price of US$120/month (in 2003 prices) for broadband access. Given the non-essential nature of broadband in 2003, we believe that this estimate is more likely to capture the dynamics determining consumer behaviour. The lower

[12] Sapere Research Group cross-submission, para. 118.
[13] Alcatel-Lucent (2011), ‘Building the Benefits of Broadband: How New Zealand can increase the social & economic impacts of high-speed broadband’. Criterion Economics (2003), ‘The Effects of Ubiquitous Broadband Adoption on Investment, Jobs and the US Economy’.
[14] We use a figure of NZ$1.5bn in our assessment to ensure that we are capturing benefits, net of investment costs.
[15] CEG submission, para. 230.
[16] Network Strategies submission, p. 92.

estimate is also much closer to the estimates we obtained from other studies of the consumer surplus associated with the adoption of broadband. Hence, although we present the US$1,000/person figure in the Appendix, we think there are good reasons not to place any weight on it.

Network Strategies also notes that the Criterion (2003) study is dated and so should not be used in our analysis. Network Strategies is more supportive of the use of the Alcatel-Lucent (2011) study, although it notes that 'reliance on one study for an estimate of a key assumption in the Oxera analysis is obviously problematical.'[17]

We consider both papers to be relevant, and the fact that they produce similar results (using the methodology we consider to be more reasonable) is reassuring.

3.3 Acceleration effect

To scale the potential impact that a WACC uplift might have on bringing the investment forward, we assume in our analysis that a WACC uplift could bring the investment forward by two or five years. The two-year acceleration is based primarily on the timing of commercialisation of ADSL2+ technology in a sample of developed countries. The five-year acceleration is used to capture the fact that a typical lag in commercialisation might be longer for more complex technologies.

Network Strategies considers our analysis of the potential acceleration effect 'highly speculative and potentially irrelevant':[18]

> It would have been preferable for Oxera to attempt to establish the average time lag (if any) between commercial launches of disruptive technologies in New Zealand operators compared to the leaders.

The purpose of our lag study was to hold technology constant, and assess, first, what the total time horizon for a phase of development was, and, second, where New Zealand sits on this spectrum. Looking only at operators in New Zealand could include the possibility that regulation (or other factors) was holding back investment. Such analysis would provide only an estimate of the intra-New Zealand lag, which might not capture all potential acceleration effects.

Furthermore, Network Strategies suggests that the regulated access provider (Chorus) would have an incentive to adopt a disruptive technology as soon as possible, if the technology emerged during the next regulatory period:[19]

> Furthermore, if a disruptive technology emerges in the short to medium term that reduces costs for access services currently regulated using the TSLRIC standard then it would be in the financial interests of the regulated access provider to adopt it as early as possible within the regulatory period. Given that the proposed regulatory period for UCLL and UBA services is relatively long (five years), the prospective new technology could reduce costs below the efficient price estimated in 2015 by the Commission, which would increase margins for the access provider. The resultant cost savings would not be passed on to the access seeker or the end-user, unless the access provider chose to offer services below the regulated price.

We do not think it is that clear-cut that a disruptive technology will reduce TSLRIC costs per user. Any new technology is likely to require upfront

[17] Network Strategies submission, p. 92.
[18] Network Strategies submission, pp. 92–3.
[19] Network Strategies submission, p. 91.

investment, and be subject to features that may deter investment, such as demand risk, large fixed and sunk costs, and platform risk. It is therefore not clear that the presence of some new technology on its own would necessarily provide sufficient incentives to bring the investment forward.

Furthermore, the timeframe for delivering such investment is likely to be beyond a single regulatory period. For these types of investment, the indirect signalling effect of a WACC uplift may be more important.

3.4 Overall assessment of the benefits

Given the specific issues highlighted by Network Strategies in relation to our assessment of the benefits, its overall conclusion is that 'key assumptions on which Oxera bases its NPV estimates of early technology introduction benefits, at best, have a large associated margin of error.'[20] The main concerns relate to the fact that we have not demonstrated that New Zealand operators are technology 'laggards' and 'the lack of clarity concerning the next disruptive technology that will have services subject to regulation and is likely to offer benefits on a similar scale as the introduction of high-speed broadband'.[21]

We do not consider that it is crucial for the framework to show that New Zealand operators are 'laggards'. All we are highlighting is that there is dispersion in the adoption of a particular technology between countries, and that, on average, it is more realistic to assume that the optimal point to invest (when the WACC is set at the midpoint) is associated with some lag relative to the leader. There are a number of reasons why this could be the case, including the uncertainty around the costs and the take-up of new technology as well the uncertainty in the WACC itself.

Similarly, the main purpose of our framework is not to identify the next technology and prove that it will be subject to regulation, but rather to identify a reasonable cycle over which innovation could occur.

We agree that the assessment of potential benefits is fundamentally uncertain. Moreover, in combination with other factors discussed further in section 4, we do not fundamentally disagree with Network Strategies that it is challenging to justify a WACC uplift with a sufficient degree of confidence on the basis of this evidence. Nevertheless, we maintain that our approach does provide a useful scaling exercise.

[20] Network Strategies submission, p. 93.
[21] Network Strategies submission, p. 93.

4 Comparing the potential benefits and costs

For each choice of the WACC percentile, the potential benefits depend on how the WACC uplift influences the probability that the investment will indeed be brought forward. Since there is uncertainty around the WACC itself, it is intuitive that the ‘acceleration benefits’ are more likely to be realised, the greater the uplift.

In our framework, it is assumed that, at the 50th percentile (the midpoint WACC), there is no incentive for the players to bring investment forward—i.e. the potential benefit is zero. In other words, the investment is made at some optimal point in time from the investor’s perspective. On average, however, this optimal point is associated with some natural industry and market ‘equilibrium point’ assumed to be either two or five years after a new technology or service becomes first commercialised.

This approach does not rule out the possibility that New Zealand will be the first country to commercialise an innovation. However, an assumption of later adoption is likely to be more realistic for most investments. Even if New Zealand were assumed to be the leader, it could still be the case that a WACC uplift could speed up the investment by New Zealand operators.

We note in our assessment that, in practice, the effectiveness of the uplift might depend on two factors: the greater the uplift, the higher the expected NPV to the investor; and the greater the uplift, the greater the likelihood that the investor realises a positive NPV, given the uncertainty in the WACC. The probability of the investment being accelerated by two (or five) years is therefore an increasing function of the WACC uplift.

For illustration, we assumed that the ‘acceleration probability’ increased linearly (starting from zero at the midpoint of the WACC range) as the percentile was increased. We noted that defining the function linearly was likely to be a simplification, but, in the absence of clearly superior alternatives, it remained a useful way to understand the relative costs and benefits of a WACC uplift. Specifically, we considered three potential scenarios for how the acceleration probability would change with the WACC percentile. Such an approach essentially produces three linear benefit curves for each estimate of the acceleration benefits.

This section presents our response to the key issues raised in relation to our framework—specifically:

- the assumed shape of the benefits curve (section 4.1);
- the treatment of the probability of underinvestment in innovation (section 4.2);
- the impact on other investment incentives (section 4.3);
- evidence of a causal relationship (section 4.4).

4.1 Assumed shape of the benefits curve

CEG questions our linearity assumption used to derive the benefits function:[22]

> The benefit curve is likely to be convex against uplift percentile because we assume that the true WACC is drawn from a normal distribution. It is the possibility of being allowed a WACC that is significantly more than the true WACC

[22] CEG submission, para. 237.

that drives the potential for accelerated investment. However, as we discuss below, the probability that the allowed WACC is significantly greater than the true WACC is not a linear function of the uplift percentile. Assuming a straight line relationship where one does not exist does not appear reasonable.

The two assumptions (i.e. that the true WACC is drawn from a normal distribution, and that the probability of being allowed a WACC significantly above the true WACC will be a key driver of whether the investment is accelerated) are both reasonable, and we do not disagree with them. We do not think that our framework is fundamentally at odds with these assumptions.

One interpretation of these points is to assume that the acceleration probability simply reflects the probability of the allowed WACC being above the true WACC.[23] As shown in Table 4.1, this, however, would still imply a linear relationship between the estimated benefits and the WACC percentile.

Table 4.1 Expert submissions on the WACC uplift

WACC percentile	Probability of acceleration (Oxera modelling)			Probability of the allowed WACC being above the true WACC
	Illustration 1	Illustration 2	Illustration 3	
50%	0%	0%	0%	50%
55%	11%	10%	9%	55%
60%	21%	20%	18%	60%
65%	32%	30%	27%	65%
70%	42%	40%	35%	70%
75%	53%	50%	44%	75%
80%	63%	59%	53%	80%
85%	74%	69%	62%	85%
90%	84%	79%	71%	90%
95%	95%	89%	80%	95%

Source: The reports can be found at New Zealand Commerce Commission, ‘Unbundled Copper Local Loop and Unbundled Bitstream Access services final pricing principle, http://www.comcom.govt.nz/regulated-industries/telecommunications/regulated-services/standard-terms-determinations/unbundled-copper-local-loop-and-unbundled-bitstream-access-services-final-pricing-principle/.

A number of considerations have led to us not basing our benefit assessment on the probabilities in the last column of the table.

If we were to assume that the only driver of the acceleration effect was the probability of the allowed WACC being above the true WACC then, by going from the midpoint WACC (the 50th percentile) to a relatively high percentile (e.g. the 95th percentile), the increase in the probability of investment being accelerated would be 45%.

However, in our base case (at the 50th percentile), we assume that the investment is made at some optimal point in time, and that there is no incentive to bring it forward. This optimal timing and the assumption of no incentives to bring investment further forward already reflects the 50/50 likelihood of the allowed WACC being above or below the true WACC. Our expected acceleration benefit in this case is zero. If we then consider a relatively high percentile (e.g. the 95th percentile), we can be quite confident that the investment will be brought forward to the earliest possible date. Choosing such a

[23] For example, this is one of the options suggested by Professor Vogelsang in his review of our work. Vogelsang, I. (2015), ‘Review of Oxera’s report. Is a WACC uplift appropriate for UCLL and UBA?’, 29 June.

high percentile would send quite a strong signal to investors about the regulator's commitment to ensuring that investors recover their costs. Hence, assuming that the probability of the benefits being realised increases by only 45% relative to the midpoint WACC intuitively understates the likely acceleration effect.

CEG then suggests that our assumption that investors weigh probability linearly is an assumption of expected utility theory. It notes that there is empirical evidence that 'decision-makers weigh probabilities in a non-linear manner.'[24] As an alternative, CEG calibrates the benefits function using empirical estimates produced by Prelec (1998), with the resulting benefits curve exhibiting an inverse S-shape. Under this calibration, CEG concludes that the 55th WACC percentile would yield the maximum benefit to consumers.[25]

We agree that there is some empirical evidence that casts doubt on some of the assumptions of expected utility theory. We also see some merit in the argument that the acceleration probability is unlikely to increase linearly as the size of the WACC uplift is increased. Indeed, this is acknowledged in our report. For example, we note that the increase in the incentive to bring investment forward is likely to be greater for modest values of the uplift than implied by the linear projection. For example, the introduction of the policy of applying a WACC uplift, even a relatively small one, could provide a powerful signal to investors that, on average, they should expect to recover more than their costs. Alternatively, if investors require a margin between the allowed and the true WACC before the signalling is effective, this could also lead to a non-linear benefits curve.

However, to what extent the empirical estimates from one academic paper provided by CEG can be relied on to produce a more robust basis for the Commission's decision is questionable. It is not obvious that these parameter values would be applicable in the current context. For example, Network Strategies presents some additional evidence suggesting that there is no consensus on whether the Prelec function is the most widely used and accepted alternative to expected utility theory. It is therefore difficult to ascertain whether the CEG's proposal provides a more robust basis for the Commission's decision-making.

In addition, a number of other variables, such as the assumed acceleration impact (two versus five years), are a significant driver of the results. Given the uncertainty around some of these variables, adopting a different functional form for the benefits is unlikely to change the overall conclusion that this exercise is subject to significant uncertainty (and therefore the Commission's interpretation of the evidence that a WACC uplift cannot be easily justified would remain reasonable).

While we faced some similar issues in the Part 4 context, that analysis focused on underinvestment which could result in major network outages, whereas this analysis focuses on bringing forward potential new investment in innovation technologies (the timing and benefits of which are quite uncertain). The link between the allowed WACC for energy networks and network investment was a stronger one, in our judgement, which allowed us to place greater weight on the available evidence.

[24] CEG submission, para. 240.
[25] CEG submission, para. 244.

4.2 Reflecting the probability of underinvestment in innovation

Another key issue raised by CEG is the fact that our framework does not give sufficient weight to 'the probability of a delay in UFB investment/penetration as a result of the possibility that the true WACC might be less than the allowed rate'.[26] CEG offers an alternative framework that explicitly takes into account the probability of delay.

First, it appears to us that CEG has interpreted our references to investment in innovation to mean investment in fibre. To clarify, the main purpose of our modelling was to provide a framework and assess the potential scale of benefits and costs of a WACC uplift more generally, without a specific reference to the innovations that are likely to emerge in the near future. In other words, we look at the question on the assumption that, were a policy of a WACC uplift introduced, it would prevail over multiple pricing periods and would apply to most major innovations or new services that might emerge in the future, but that do not yet exist. This reflects the relatively high pace of technological innovation in the industry.

Second, as explained previously, our optimal timing of investment that is consistent with the midpoint WACC reflects the probability that the allowed WACC could be below the true WACC. Furthermore, although not explicitly stated in our report, if there is evidence that innovation is being significantly delayed (e.g. if most major developed countries invest in a particular technology and there is no sign of interest from New Zealand operators), it might be reasonable to assume that the Commission could intervene in some way to prevent any further delay.

The primary intention of the WACC uplift, if one were to be applied, would be to incentivise the bringing forward of investment (with associated user benefits) that would occur naturally at some point in the future. If the potential benefits of disruptive innovation could be material then ensuring that New Zealand adopts a particular technology more quickly than it otherwise would could outweigh the costs of a WACC uplift.

4.3 Impact on other investment incentives

Sapere Group suggested that we had not given sufficient weight to the fact that, through a WACC uplift:[27]

- Chorus obtains additional incentive to invest in the copper network to maintain reliability and to provide augmentation and upgrades, particularly in the areas where 25% of the population is not covered by UFB; and
- there will be an increase in the UCLL/UBA price which will result in increased migration to UFB with attendant positive externalities.

We generally considered that potential costs of underinvestment in the copper network were likely to be smaller in the telecommunications industry than, for example, in the energy industry, and, hence, we did not model them explicitly. Competitive pressure and the less essential nature of fixed-line services, together with a more local nature of any potential outages, suggest that the potential costs to users from underinvestment in copper will not be as significant as any potential forgone benefits from innovative investment not being brought forward. Hence, in our framework we focused on the potential impact on innovation.

[26] CEG submission, para. 246.
[27] Sapere Group submission, para. 139.

As regards the potential impact on the increased migration to fibre, and associated positive externalities, these considerations were outside the scope of the Oxera study.

Separately, WIK-Consult noted the impact on investment in innovative services conducted by RSPs.[28] First, our framework does not assume that new investment will necessarily be undertaken by Chorus. Rather, it is assumed that the new investment is likely to be regulated in a similar way to copper (i.e. with a WACC uplift). This therefore captures, indirectly and to a degree, the impact on investment incentives of the RSPs. Second, where there might be indirect effects on RSPs' investment incentives as a result of the change in the access price for UCLL/UBA, these effects are quite difficult to quantify and likely to be small compared with the direct price effect.

4.4 Evidence of a causal relationship

The key weakness of our analysis highlighted by Network Strategies is 'the absence of evidence of a causal relationship between a WACC uplift and the acceleration of investment in disruptive technologies'.[29]

We agree that, to an extent, this relationship is taken as a given in our framework. The primary aim of our work was to provide a framework to test the impact of different assumptions and beliefs about the potential benefits and costs of a WACC uplift. It is intuitive that there is a link between a WACC uplift and investment—however, the link between a WACC uplift for UCLL/UBA specifically and innovation more generally is more difficult to establish with certainty.

This uncertainty about the link between the WACC uplift for UCLL/UBA and investment is one of the reasons why we interpret the results of our modelling with caution. Specifically, we conclude that, while there might be a case for a modest uplift, the evidence overall is not strong. We continue to stand by this conclusion in light of the comments received.

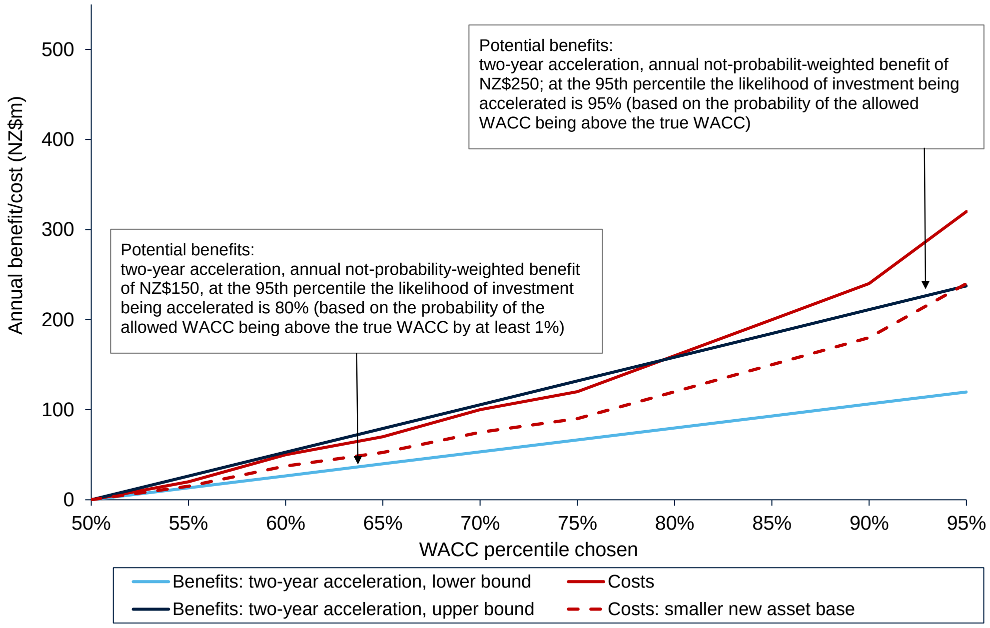
While we faced some similar issues in the Part 4 context, the link between the allowed WACC for energy networks and network investment was a stronger one. Therefore, although there were also some uncertainties about the underlying assumptions, the confidence with which the analysis could be relied on was greater.

[28] WIK-Consult submission, para. 187.
[29] Network Strategies submission, p. 93.

A1 Sensitivity to the size of the new asset base

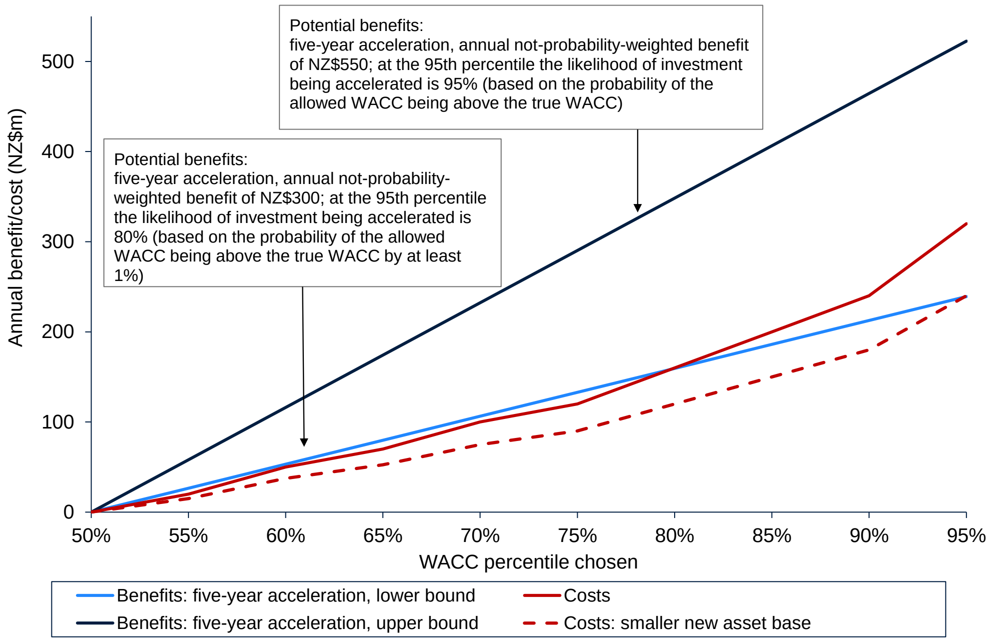
Figure A1.1 and Figure A1.2 show the sensitivity of the results to assuming that the new asset base is equal to 50% of the existing asset base.

Figure A1.1 Two-year acceleration



Source: Oxera.

Figure A1.2 Five-year acceleration



Source: Oxera.

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