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Cost of capital for the UCLL and UBA pricing reviews

Final decision

Date: 15 December 2015

The Commission: Dr Stephen Gale

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List of defined terms and abbreviations

Act	Telecommunications Act 2001
CAPM	Capital asset pricing model
DGM	Dividend growth model
DRP	Debt risk premium
DSL	Digital subscriber line
FPP	Final pricing principle
FTTH	Fibre-to-the-home
FTTN	Fibre-to-the-node
GFC	Global financial crisis
IMs	Input methodologies
IPP	Initial pricing principle
LFC	Local fibre company
MRP	Market risk premium
PIE	Portfolio investment entities
RAB	Regulatory asset base
RSP	Retail service provider
S&P	Standard and Poor's
TAMRP	Tax-adjusted market risk premium
TCSD	Term credit spread differential
TSLRIC	Total service long-run incremental cost
UBA	Unbundled bitstream access
UCLL	Unbundled copper local loop
UFB	Ultra-fast broadband
VDSL	Very-high-bit-rate digital subscriber line
WACC	Weighted average cost of capital

Executive summary

1. This paper sets out our final decision on the weighted average cost of capital (WACC) for the unbundled copper local loop (UCLL) and unbundled bitstream access (UBA) pricing reviews. It should be read in conjunction with our final determinations for the UCLL and UBA pricing reviews, which have been published at the same time as this paper.[1]

2. We are required to set "forward-looking" cost-based access prices for UCLL and UBA using a total service long-run incremental cost (TSLRIC) methodology. WACC is one of the key inputs to the TSLRIC models for UCLL and UBA.

3. We have determined a forward-looking post-tax WACC estimate of 5.56% for the final UCLL and UBA pricing reviews.[2] Given the similarities between the two pricing reviews, this decision covers WACC for both the UCLL and UBA services.

4. Commissioner Duignan's view that the starting date for the regulatory period should be 1 December 2014 implies a different level for WACC. This is covered in the backdating chapters of the final UCLL and UBA pricing review determinations.[3] Except for the specific aspects discussed in the context of backdating, the analysis and decisions in this paper are agreed by all Commissioners.

Our mid-point post-tax WACC estimate for UCLL and UBA is 5.56%

5. The parameters used to generate our mid-point post-tax WACC estimate of 5.56% for UCLL and UBA are summarised in Table 1 below. The risk-free rate and debt premium are estimated as at 1 September 2015, which is approximately three months prior to the date of the final UCLL and UBA pricing review determinations.[4] This was necessary to enable us to complete modelling and other work prior to finalising our decision.

6. For ease of comparison, Table 1 also includes the parameters used to generate the mid-point post-tax WACC estimate from the December 2014 draft decision (6.47%) and the July 2015 further draft decision (6.03%). The risk-free rate and debt premium for the December 2014 draft decision and July 2015 draft decision were estimated as at 1 August 2014 and 1 April 2015 respectively.

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1 Commerce Commission "Final pricing review determination for Chorus' unbundled cooper local loop service" 15 December 2015 and Commerce Commission "Final pricing review determination for Chorus' unbundled bitstream access service" 15 December 2015.

2 The post-tax WACC is the weighted average of the post-tax cost of debt and the post-tax cost of equity.

3 Commerce Commission "Final pricing review determination for Chorus' unbundled cooper local loop service" 15 December 2015, Chapter 7 and Commerce Commission "Final pricing review determination for Chorus' unbundled bitstream access service" 15 December 2015, Chapter 7.

4 We noted in the July 2015 further draft determination that we intended to update the risk-free rate and debt premium for the final decision as at 1 September 2015.

Table 1: UCLL and UBA WACC estimates

Parameter	Estimate for December 2014 draft	Estimate for July 2015 further draft	Estimate for December 2015 final
Risk-free rate	4.19%	3.26%	2.74%
Debt premium	1.85%	1.75%	1.85%
Leverage	43%	37%	38%
Asset beta	0.40	0.45	0.43
Debt beta	0.00	0.00	0.00
TAMRP	7.0%	7.0%	7.0%
Corporate tax rate	28.0%	28.0%	28.0%
Investor tax rate	28.0%	28.0%	28.0%
Debt issuance costs	0.25%	0.25%	0.25%
Cost of executing interest rate swaps	0.04%	0.08%	0.08%
Equity beta	0.70	0.71	0.69
Cost of equity	7.92%	7.32%	6.80%
Cost of debt	6.33%	5.34%	4.92%
Post-tax WACC (mid-point)	**6.47%**	**6.03%**	**5.56%**

Our estimate of the cost of debt is 4.92%

7. We have estimated a pre-tax cost of debt (including associated costs) for UCLL and UBA of 4.92%. Our estimate of the cost of debt comprises four components:

   7.1 a risk-free rate of 2.74%, estimated using the observed market yield to maturity of benchmark New Zealand Government bonds (for a five-year term);

   7.2 a debt premium of 1.85%, based on a seven-year term and a BBB+ Standard and Poor's (S&P) long-term credit rating;

   7.3 an allowance for debt issuance costs of 0.25%; and

   7.4 an allowance for interest rate swap costs of 0.08%.

8. The five-year term of the risk-free rate matches the length of the regulatory period for the UCLL and UBA pricing reviews. This is consistent with the approach used in the draft and further draft determination papers, as well as the cost of capital input methodologies (IMs) set under Part 4 of the Commerce Act 1986.[5]

[5] The IMs apply to electricity lines businesses, gas pipeline businesses and specified airport services.

9. Compared to the July 2015 further draft determinations, the risk-free rate has reduced from 3.26% to 2.74%, and the debt premium has increased from 1.75% to 1.85%, to reflect current interest rates on government and corporate bonds as at 1 September 2015.

Our estimate of the cost of equity is 6.80%

10. We have estimated a cost of equity for UCLL and UBA of 6.80%. Under the simplified Brennan-Lally capital asset pricing model (CAPM), our estimate of the cost of equity comprises four main components:[6]

    10.1 a risk-free rate of 2.74%, estimated using the same approach as for the cost of debt;

    10.2 an investor tax rate of 28%, set to reflect the maximum prescribed investor rate under the portfolio investment entities (PIE) regime;

    10.3 an asset beta of 0.43, estimated using Oxera's refined sample of comparator firms; and

    10.4 a TAMRP of 7.0%.

11. Compared to the July 2015 further draft determinations, the asset beta has reduced from 0.45 to 0.43. We have estimated the asset beta for this final determination using updated data for Oxera's refined comparator set, through to 1 September 2015.

We have used notional leverage of 38%

12. We have used a notional leverage of 38% for UCLL and UBA, which is the average leverage of the refined comparator sample used when estimating asset beta. We have also continued to assume a zero debt beta, which is consistent with the approach in the cost of capital IMs.[7]

13. Since the July 2015 further draft determinations, we have updated our leverage estimate to reflect data over the most recent 10-year period, to be consistent with the approach to estimating asset beta. This has resulted in an increase in leverage from 37% to 38%.

We have not applied an adjustment to our mid-point WACC estimate

14. We have not applied an uplift or downwards adjustment to our mid-point WACC estimate for UCLL and UBA. In reaching this view, we considered whether there is

[6] The simplified Brennan-Lally CAPM is described in more detail in paragraphs 124 to 130 below.

[7] We have determined leverage based on the average of the sample of comparator firms to address the "leverage anomaly". The leverage anomaly is a well-known counter-intuitive characteristic of the simplified Brennan-Lally CAPM, where WACC increases with increasing leverage. Using the average leverage of the comparator sample means that WACC is the same regardless of whether the debt beta is set at zero, or at a level to make the estimated cost of capital invariant to leverage (or any level in between).

any reason to depart from the mid-point, which is our best "parameter-based" estimate of the cost of capital for UCLL and UBA.

15. In our view, the strongest justification for departing from the mid-point WACC relates to incentives to invest in innovative new telecommunications services. Applying a WACC uplift for UCLL and UBA could send a signal to investors in that the risk of under-estimating the allowed WACC is lower. This in turn could mean the risk of delaying deployment of new telecommunications services in New Zealand is reduced.

16. Prior to the July 2015 further draft determinations, we commissioned Oxera to consider the case for applying an uplift to our mid-point WACC estimate, focussing on potential benefits associated with investment in innovative new telecommunications services.[8] Oxera concluded that "…the evidence [in support of an uplift] is not strong, and requires significant speculation about the nature and scale of benefits of future innovation, and, therefore, does not contradict the continued use of a midpoint WACC for UCLL/UBA".[9]

17. Although several submissions suggested changes to Oxera's quantitative modelling, we consider that the key deficiency in the argument for an uplift is the significant uncertainty associated with measuring the potential benefits of a WACC uplift. This reflects:

    17.1 the uncertain connection under a TSLRIC pricing principle between applying a WACC uplift for UCLL/UBA and incentives to invest in new telecommunications technologies more generally; and

    17.2 a lack of information about key relationships and input values when attempting quantitative modelling (eg, the impact of the allowed regulatory WACC on the timing of investment in new technologies, and yearly benefits to consumers associated with new telecommunications services).

18. When evaluating the submissions, Oxera found that no compelling evidence had been presented that would lead it to change the assumptions in its June 2015 report.[10] After reviewing Oxera's model and associated submissions, Professor Vogelsang also found the evidence for applying an uplift was not strong.[11]

19. Overall, we consider that the link between a WACC uplift for UCLL and UBA under the TSLRIC pricing principle and benefits from earlier deployment of new services is too weak to justify an uplift, when compared to the certain (and potentially very large) cost to consumers.

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8 Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015.

9 Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 37.

10 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services" 17 November 2015, p. 2-3.

11 Professor Ingo Vogelsang "Review of Oxera's Report, Is a WACC uplift appropriate for UCLL and UBA?" 29 June 2015, para [9]; and Professor Ingo Vogelsang "Review of some Submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, para [61-71].

20. We also considered making a downwards adjustment to our mid-point WACC estimate, but have concluded that it would not be appropriate. Therefore, we consider that the mid-point WACC estimate is the most appropriate.

Introduction

21. This decision sets out our WACC estimate for the final UCLL and UBA pricing review determinations, explaining how we reached our views on each of the parameters. It should be read in conjunction with our final determinations for the UCLL and UBA pricing reviews, which have been published at the same time as this decision.[12]

22. The UCLL and UBA pricing reviews are conducted under the Telecommunications Act 2001 (the Act). The Act requires us to set forward-looking cost-based access prices for UCLL and UBA using a TSLRIC methodology.

23. WACC is one of the key inputs to the TSLRIC cost model for UCLL and UBA. WACC is used to estimate the return on capital component of the cost-based prices for these services.

The WACC is the expected financial return investors require

24. The cost of capital is the expected financial return investors require from an investment given its risk. Investors have choices, and will not invest in an asset unless the expected return is at least as good as the return they would expect to get from a different investment of similar risk. The cost of capital is an estimate of that expected rate of return.

25. There are two main types of capital: debt and equity capital. Both have a cost from the perspective of the entity that is seeking funds from investors. For debt, it is future interest payments. For equity, it is the expectation of dividend payments by the firm, and where profits are retained and reinvested, the expectation of larger dividend payments by the firm sometime in the future.

26. WACC reflects the cost of debt and the cost of equity, and the respective portion of each that is used to fund an investment. WACC cannot be observed directly. Rather it must be estimated. The relevant estimate is of the market's view of the cost of capital for providing the service, not the cost of capital specific to one supplier, or a supplier's view of its cost of capital for that service.[13] This is particularly the case in the context of the UCLL and UBA pricing reviews, where we are estimating the WACC for a hypothetical efficient operator (rather than Chorus itself).

Approach to estimating WACC for UCLL and UBA

27. We estimate the cost of debt by observing the interest rate on New Zealand Government bonds, and the additional interest rate paid by New Zealand corporates (with appropriate investment-grade credit ratings) above that paid by the

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[12] Commerce Commission "Final pricing review determination for Chorus' unbundled cooper local loop service" 15 December 2015 and Commerce Commission "Final pricing review determination for Chorus' unbundled bitstream access service" 15 December 2015.

[13] This point is discussed further in our IM reasons paper. That discussion is in the context of a workably competitive market standard, rather than a hypothetical efficient operator. However, in our view, similar logic applies. Commerce Commission "Input methodologies (electricity distribution and gas pipeline services): Reasons paper" December 2010, paras [6.2.2-6.2.7].

Government. The premium above the interest rate on New Zealand Government bonds reflects the corporates' greater riskiness, relative to that of the Government.

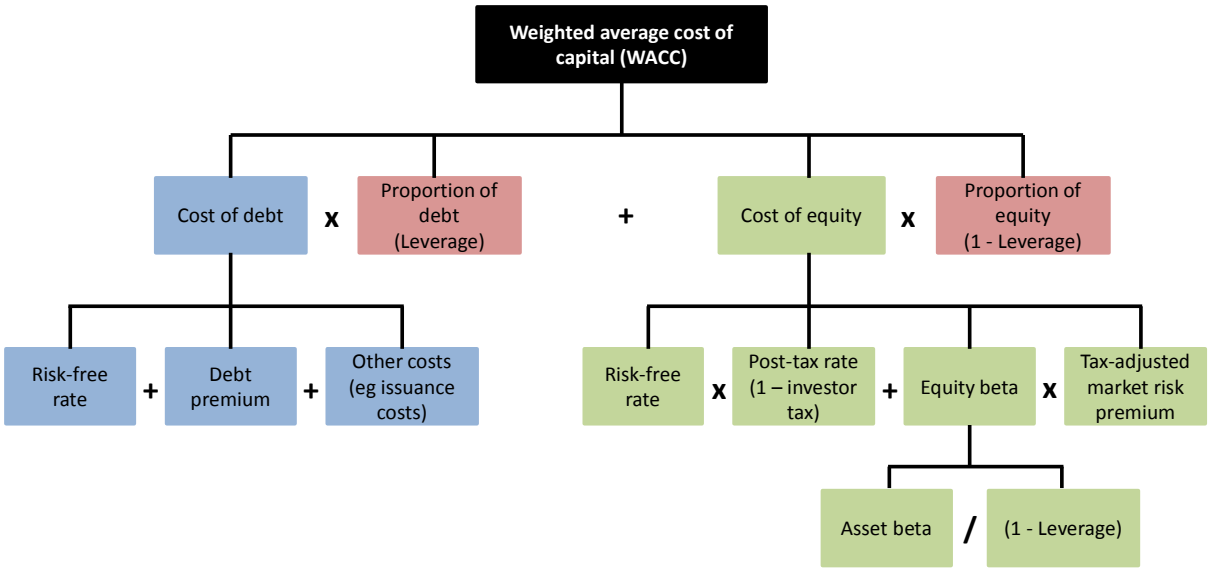
28. We estimate the cost of equity using a financial model, the CAPM, which assumes the return on equity for any given investment reflects:

    28.1 the return from holding an asset with no risk; and

    28.2 the riskiness of the particular investment relative to the riskiness of the total market (ie, the correlation between the two), multiplied by the market risk premium (ie, the return above that of a risk-free asset, based on the market portfolio of all risky stocks).

29. Figure 1 below illustrates the various components of WACC. We have produced our WACC estimate for UCLL and UBA by estimating each of these components.

Figure 1: WACC and its components



30. When setting prices for UCLL and UBA, we seek an estimate of WACC relating to these services only. This is important as investors may seek a higher or lower return on capital from providing other telecommunications services, due to differences in perceived riskiness. As such, our WACC estimate for a hypothetical efficient operator for UCLL and UBA services may differ from our and other analysts' estimates of WACC for Chorus (and other telecommunications providers), given these companies also provide other services (for example, mobile services).

31. Given the similarities between the pricing reviews for UCLL and UBA, this final decision covers WACC for both services. This is consistent with the approach taken for both the December 2014 draft and July 2015 further draft determinations.

32. We use a forward-looking, post-tax WACC estimate as an input to setting TSLRIC prices for UCLL and UBA. A forward-looking estimate is required by the Act and a

post-tax WACC estimate is consistent with our approach to the treatment of taxation in the TSLRIC modelling for UCLL and UBA.[14]

We have used the cost of capital IMs as a starting point

33. We have estimated a WACC for these final determinations generally following the same approach that we used for the December 2014 draft determinations and the July 2015 further draft determinations. Our view remains that the analysis and reasons in the cost of capital IMs provide an appropriate starting point for determining WACC for the UCLL and UBA pricing reviews. The IMs were developed through a thorough consultation process involving a range of stakeholders (including Telecom, prior to structural separation).

34. The cost of capital IMs were based on our draft cost of capital guidelines, which were intended to apply to a range of services (including telecommunications). The cost of capital IMs were developed in parallel with consultation to revise the draft guidelines. Further information regarding our approach to cost of capital under Part 4 of the Commerce Act is available on our website, and in the IMs reasons papers.[15]

35. On 7 March 2014 we released a consultation paper on the cost of capital for the UCLL and UBA pricing reviews.[16] That paper proposed using the IMs as a starting point for estimating the WACC for UCLL and UBA. Submissions generally supported this approach, while noting that consideration also needs to be given to service-specific factors.[17]

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14 The definition of TSLRIC in Schedule 1 of the Telecommunications Act refers to "forward-looking costs". A post-tax WACC includes the post-tax cost of debt.

15 See http://www.comcom.govt.nz/regulated-industries/input-methodologies-2/cost-of-capital/ for further details regarding the development of the cost of capital input methodologies. The October 2005 draft cost of capital guidelines, and the June 2009 revised draft guidelines, both covered telecommunications. Commerce Commission "Input methodologies (electricity distribution and gas pipeline services): Reasons paper" 22 December 2010; Commerce Commission "Input methodologies (airport services): Reasons paper" 22 December 2010; Commerce Commission "Input methodologies (Transpower): Reasons paper" 22 December 2010.

16 Commerce Commission "Determining the cost of capital for the UCLL and UBA price reviews - Technical consultation paper" 7 March 2014.

17 Chorus "Submission in response to the Commerce Commission's Process and issues paper for determining a TSLRIC price for Chorus' unbundled copper local loop service in accordance with the Final Pricing Principle" 14 February 2014, p. 58, para [288]; Telecom "Submission on Process and issues paper for determining a TSLRIC UCLL price" 14 February 2014, p. 49, para [172]; Frontier Economics "Determining a TSLRIC price for Chorus' UCLL service" February 2014, p. 29; Vodafone "Comments on process and issues paper for the unbundled copper local loop (UCLL) final pricing principle" 14 February 2014, p. 29, para [I1.2]. Although Telecom agreed that the cost of capital IMs provide the logical starting point, it submitted that different approaches to estimating the cost of capital should always be under consideration. It noted that the rate of technological change in telecommunications is much greater than the industries covered by the cost of capital IMs, so the Commission should remain open to other approaches: Telecom "Process and issues paper for determining a TSLRIC UCLL price" 14 February 2014, p. 50, para [174].

36. The cost of capital IMs for the energy utilities and airports were determined in 2010, and were subject to a merits review by the High Court. The Court dismissed all the appeals against our cost of capital IMs.[18]

Differences between the Part 4 and telecommunications regulatory regimes affect WACC

37. While we have used the IMs as the starting point for estimating the cost of capital for UCLL and UBA, changes in approach are required to address differences between Part 4 and the context for this decision. This reflects that:

    37.1 UCLL and UBA are different services to those regulated under Part 4; and

    37.2 regulated UCLL and UBA prices, and price-quality paths for energy utilities, are set under different statutory frameworks.

38. Different services may have different risks and, therefore, a different required return. This is reflected in the beta estimate for each service.[19] If beta differs between services, the resulting WACC estimates will also differ.

39. The cost of capital IMs and the WACC for the UCLL and UBA pricing review determinations are also set under different legislative contexts.

40. We have considered whether differences in the purpose statements and price setting methodologies between the Telecommunications Act and the Commerce Act affect how we estimate WACC for the services we regulate. In our view, these differences do not affect the methodology for making our central estimate of WACC (ie, our mid-point WACC), since the cost of capital is determined by the return required by investors in the market. Our mid-point WACC is our best estimate of that return.

41. However, the different purpose statements and price setting methodologies are relevant when deciding whether to apply an adjustment to our mid-point WACC estimate. In particular, the Telecommunications Act specifies a TSLRIC methodology for setting service-based access prices, but price-quality paths under Part 4 of the Commerce Act are determined using a building blocks approach.

42. The definition of TSLRIC in Schedule 1 of the Telecommunications Act specifies that forward-looking costs are used. We generally prefer current (forward-looking) estimates of the value of the WACC parameters, but in some cases we also consider historic information, particularly where this provides reliable information to help inform the best estimate of the value of a parameter.

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[18] Wellington International Airport Ltd & Ors v Commerce Commission [2013] NZHC, 11 December 2013. The High Court queried the evidential basis for our decision to use a WACC above the mid-point estimate when setting price-quality paths under Part 4. We reconsidered this issue during 2014, and issued our final decision in October 2014. Our reasons are set out in: Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services" 30 October 2014.

[19] See paragraphs 136-171 below for further discussion on beta for the UCLL and UBA services.

Process for estimating the cost of capital for UCLL and UBA

43. The key steps in our approach to estimating WACC for the further draft UCLL and UBA pricing reviews were as follows.

    43.1 On 6 December 2013, we released a process and issues paper for the UCLL pricing review, which included several questions regarding the approach to estimating WACC.[20]

    43.2 On 7 March 2014, we released a consultation paper on WACC for the UCLL and UBA pricing reviews.[21] Amongst other things this paper proposed to:

        43.2.1 use the cost of capital IMs as a starting point;

        43.2.2 use the simplified Brennan-Lally CAPM to estimate the cost of equity; and

        43.2.3 estimate the cost of debt by reference to:

            (a) the risk-free rate (to a term matching the length of the regulatory period);

            (b) the debt premium (by reference to publicly-traded New Zealand dollar corporate debt); and

            (c) the costs of issuing debt.

    43.3 We then sought independent expert advice on beta, leverage, credit rating, cost of debt, and TAMRP, and on the submissions and cross submissions received in response to our March consultation paper. Specifically, we sought advice from Dr Lally on the cost of debt and TAMRP, and advice from Oxera on beta, leverage and the target long-term credit rating.

    43.4 On 23 June 2014, we released the independent expert reports from Dr Lally and Oxera for consultation.

    43.5 We received submissions (on 22 July 2014) and cross submissions (on 6 August 2014) on the independent expert reports from Dr Lally and Oxera.

    43.6 After receiving submissions and cross submissions on these reports, we then sought further independent expert advice from Dr Lally and Oxera in response to points raised.

    43.7 On 2 December 2014, we released our draft decision on WACC for the UCLL and UBA pricing reviews. We also released updated expert reports from Oxera and Dr Lally with this draft decision.[22]

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[20] Commerce Commission "Process and issues paper for determining a TSLRIC price for Chorus' unbundled copper local loop service in accordance with the Final Pricing Principle" 6 December 2013, pp.42-45.

[21] Commerce Commission "Determining the cost of capital for the UCLL and UBA price reviews - Technical consultation paper" 7 March 2014.

43.8 We received submissions (on 20 February 2015) and cross submissions (on 20 March 2014) on our December 2014 draft determination and the independent expert reports from Dr Lally and Oxera.

43.9 We deemed CEG's cross submission for Chorus to be a late submission, and allowed for further cross submissions, which we received on 11 May 2015.

43.10 On 2 April 2015, we released a paper in advance of the conference (to be held on 15 – 17 April 2015), which presented a potential framework for considering whether an uplift should be applied to our mid-point WACC estimate for UCLL and UBA.[23] We received written submissions on that paper on 11 May 2015.

43.11 On 15, 16 and 17 April 2015 we held a conference with industry to discuss a number of key issues relating to the UCLL and UBA pricing reviews, including WACC.

43.12 On 2 July 2015, we released our further draft decision on WACC for the UCLL and UBA pricing reviews. We also released a further expert report from Oxera regarding asset beta, and new reports from Oxera, Professor Vogelsang and Professor Dobbs which are relevant to whether a WACC uplift should be applied, with the further draft decision.[24]

43.13 We received submissions (on 17 August 2015) and cross submissions (on 24 September 2015) on the July 2015 further draft decision.

43.14 After receiving submissions and cross submissions on these reports, we then sought further independent expert advice from Dr Lally, Oxera and Professor Vogelsang in response to points raised.

43.15 On 15 December 2015, we released our final decision on WACC for the UCLL and UBA pricing reviews.

Structure of this final decision

44. The rest of this final decision sets out our views on WACC for the UCLL and UBA pricing reviews, including:

44.1 our approach to estimating the cost of debt;

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22 During consultation on the choice of WACC percentile under Part 4 of the Commerce Act we received some submissions which we consider are relevant to this process. In particular, we refer to submissions from Chorus and Spark, and their consultants: Chorus "Submission on further work on WACC IMs" 5 May 2014, with attached submissions from CEG and Professor Grundy; Chorus "Submission on Proposed amendment to the WACC percentile for electricity lines services and gas pipeline services" 29 August 2014; Spark "Cross-submission on Proposed amendment to the WACC percentile for electricity lines services and gas pipeline services" 12 September 2014.

23 Commerce Commission "Agenda and topics for the conference on the UCLL and UBA pricing reviews" 2 April 2015, Attachment C.

24 Commerce Commission "Cost of capital for the UCLL/UBA pricing reviews – Further draft decision" 2 July 2015.

44.2 our approach to estimating the cost of equity;

44.3 our view on the appropriate mix of debt and equity (leverage);

44.4 our overall mid-point post-tax WACC estimate for UCLL and UBA;

44.5 whether an adjustment should be applied to our mid-point WACC estimate; and

44.6 whether our WACC estimate for UCLL and UBA is reasonable in light of other available information.

Approach to estimating the cost of debt

45. Debt is an important source of capital for many businesses. We estimate the cost of debt by observing the interest rate paid by the New Zealand Government, and the additional premium corporate borrowers pay to compensate investors for the additional risks of lending to them (relative to the Government). We also allow for the costs of issuing debt (for example, to cover roadshows and brokerage), and the cost of entering interest rate swaps to shorten the term of part of the cost of debt and match it to the length of the regulatory period.

46. Our estimate of the cost of debt for UCLL and UBA comprises four components:

    46.1 the risk-free rate;

    46.2 the debt premium;

    46.3 debt issuance costs; and

    46.4 an allowance for swap costs.

Risk-free rate

47. In this section, we:

    47.1 provide our estimate of the risk-free rate, noting that we have used the return on New Zealand Government bonds to estimate the risk-free rate; and

    47.2 explain why we have used a five-year term of the risk-free rate.

Our estimate of the risk-free rate is 2.74%

48. We have estimated a risk-free rate of 2.74% for the further draft UCLL and UBA pricing reviews. This risk-free rate is estimated as at 1 September 2015, using data for the month of August 2015.[25]

49. We have used the same methodology to estimate the risk-free rate for UCLL and UBA as was used for the December 2014 draft determinations and July 2015 further draft determinations. We have used current interest rates, rather than long-term averages, for the reasons given below.

50. The risk-free rate is the interest rate on an asset with no default risk. In practice, the risk-free rate cannot be observed; it is usually approximated by the return on a very safe asset such as a government bond. We have used the observed market yield to maturity of benchmark New Zealand Government, NZ$ denominated, nominal bonds to estimate the risk-free rate.

51. Market interest rates are constantly changing. To enable us to complete modelling and other work prior to finalising our decision, we need to settle on an estimate of

[25] We used a risk-free rate of 3.26% for the July 2015 further draft determinations, which was estimated it as at 1 April 2015 (approximately four months prior to that decision).

the risk-free rate in advance of the final determination, as the estimate of the WACC is an input into the UCLL and UBA prices. For the purpose of this decision, we have estimated the risk-free rate (and the WACC as a whole) as at 1 September 2015 (approximately three months prior to the date of the final decision).

52. We estimated the risk-free rate by averaging the observed market yields on government bonds over one calendar month (August 2015) immediately prior to when the cost of capital is being estimated (1 September 2015). This is the same approach as we have used in the IMs. We consider this provides a suitable balance between reducing the degree of volatility that affects daily data, and delivering a relatively up-to-date estimate of the risk-free rate.

We have used a five-year term of the risk-free rate

53. When estimating WACC for UCLL and UBA, we are estimating the cost of capital for a hypothetical efficient operator of these services. Use of a five-year term of the risk-free rate provides the appropriate benchmark, given that we have used a five-year regulatory period for the UCLL and UBA pricing reviews.[26]

54. We have set the length of the regulatory period for the UCLL and UBA pricing reviews at five years.[27] Accordingly, the term of the risk-free rate should also be five years. In the cost of capital IMs, we explained the reasoning as follows:[28]

> A fundamental concept in finance is that the interest rate applied to a set of cash flows should reflect the risk, and the term, of those cash flows. To illustrate, consider the pricing of a zero-coupon five-year bond. The only discount rate that will correctly price this bond is the five-year spot rate. Applying an interest rate with a term other than five years would generate either windfall gains or losses to the holder of the bond by mispricing it. The precise outcome will depend on the slope of the term structure of interest rates.

55. When prices are reset for each regulatory period, and those prices are reflective of prevailing interest rates, the supplier is not exposed to the risk of changes in the risk-free rate beyond the term of the regulatory period. Therefore, using a risk-free rate with a term longer than the pricing period would compensate a supplier for an uncertainty it does not bear.

56. Suppliers can be over or under-compensated if the term does not match the length of the regulatory period. Matching the risk-free rate to the length of the regulatory period avoids under- or over- compensating suppliers of regulated services because, as we explained in the IMs, they can:[29]

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[26] Our reasons for using a five-year term of the regulatory period are described in Chapter 2 of the final UCLL and UBA pricing review determinations.

[27] Commerce Commission "Final pricing review determination for Chorus' unbundled cooper local loop service" 15 December 2015, Chapter 2 and Commerce Commission "Final pricing review determination for Chorus' unbundled bitstream access service" 15 December 2015, Chapter 2.

[28] Input Methodologies (Electricity Distribution and Gas Pipeline Services) Reasons paper, 22 December 2010, p.439, para [H4.31].

[29] Input Methodologies (Electricity Distribution and Gas Pipeline Services) Reasons paper, 22 December 2010, p.442, para [H4.40].

> …reset their prices at the end of each regulatory period to reflect, among other things, changes in the risk-free rate if this has altered the cost of capital. Through the regular resetting of prices the premium for uncertainty over the level of long-term interest rates is being borne by users, rather than suppliers. Accordingly, suppliers' prices should not reflect a premium for the uncertainty of risk-free rates beyond the length of the regulatory period.

57. In the IMs merits appeals judgment, the High Court agreed with the principle that "…the term of the risk-free rate should be aligned to the regulatory term to avoid over and under compensation".[30]

58. Network Strategies (for Vodafone) supported matching the risk-free rate to the regulatory period. Network Strategies submitted that it agrees "…with the High Court sentiments that the term of the risk-free rate should match the regulatory period…" noting that this "…achieves consistency of the WACC with relevant cash flows".[31]

59. In the July 2015 further draft determinations, we invited views on the use of a prevailing rate rather than a trailing average approach. In response, Chorus stated that the use of the prevailing yield for the risk-free rate gave undue weight to short-term changes in yield.[32] Based on this perceived flaw in approach, Chorus proposed the use of a long-term average yield on the risk-free rate.

60. CEG (for Chorus) discussed the relationship between the risk-free rate and TAMRP components in setting the cost of equity.[33] The use of a prevailing risk-free rate was deemed to be appropriate should the TAMRP be estimated using a 100% prevailing approach. CEG submitted that:[34]

> … the best way to arrive at an internally consistent estimate of the risk free rate and TAMRP is to give 100% weight to prevailing estimates of both. However, to the extent that weight is to be given to historical average excess returns on the market, I consider that the methodology developed by the Belgian regulator (BIPT) of giving the same weight to forward-looking and historical information in the estimates of both TAMRP and the risk free rate provides a well-constructed and transparent methodology for arriving at internally consistent estimates.

61. When estimating the risk-free rate, we have continued to follow the approach in the July 2015 further draft determinations (and the IMs) of using prevailing interest rates. In our view, Chorus has not presented compelling evidence to change our approach on this parameter. We consider that using current interest rates:

    61.1 leads to a WACC estimate that more closely reflects changes in financial markets and, therefore, provides better signals for new investment; and

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30 *Wellington International Airport Ltd & Ors v Commerce Commission* [2013] NZHC [December 2013], para [1287].

31 Network Strategies "Commission consultation on WACC for UCLL and UBA services - Final report for Vodafone New Zealand - Report Number 33022" 27 March 2014, p.15.

32 Chorus "Submission for Chorus in response to Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services (2 July 2015) - Public version" 13 August 2015, paras [22-24].

33 CEG "Response to the further draft determination" August 2015, p. 19-61.

34 CEG "Response to the further draft determination" August 2015, para [4].

61.2 is consistent with the "forward-looking" requirement of the TSLRIC definition.

62. Therefore, we have responded to CEG's submission regarding a relationship between the risk-free rate and TAMRP in the context of our approach to estimating the TAMRP. This is discussed in paragraphs 172 to 192 below.

Debt premium

63. In this section we:

63.1 introduce the debt premium;

63.2 identify the market information we used to estimate the debt premium;

63.3 explain why we use a current estimate of the debt premium, rather than a historic average;

63.4 explain why we have used a seven-year term when estimating the debt premium;

63.5 explain why we estimate the debt premium on bonds with a S&P long-term credit rating of BBB+;

63.6 explain why we do not use foreign-currency bonds issued by New Zealand entities or a curve-fitting approach; and

63.7 provide our estimate of the debt premium for UCLL and UBA, including explanation of how we reached this estimate.

64. Using the same approach as the July 2015 further draft determinations, we have estimated a debt premium of 1.85% (as at 1 September 2015), based on a seven-year term to maturity and a BBB+ S&P long-term credit rating. This debt premium estimate does not include allowances for debt issuance costs and swap costs, which are addressed separately in paragraphs 107 to 122 below.

65. We had estimated a debt premium of 1.75% for the July 2015 further draft determinations following the same approach, but using prevailing interest rates as at 1 April 2015.

What is the debt premium?

66. The debt premium is the additional interest rate, over and above the risk-free rate, required by suppliers of debt capital to compensate them for being exposed to the risks of default in lending to a firm, plus an allowance for the inferior liquidity of corporate bonds relative to government bonds. In general, the longer the firm wishes to borrow the debt for, the higher the debt premium that the firm has to pay to the suppliers of debt capital.

Market information used to estimate the debt premium

67. We have estimated the debt premium by taking account of the average debt premium that would reasonably be expected to apply to publicly-traded vanilla New Zealand dollar denominated corporate bonds that:[35]

    67.1 are issued by a borrower that is neither majority owned by the Government nor a local authority; and

    67.2 have a S&P long-term credit rating of BBB+ (or equivalent rating from Moody's or Fitch). The target long-term credit rating is discussed in paragraphs 90 to 95 below.

68. Consistent with the IMs for energy utilities, we have excluded bonds issued by financial institutions, and those issued by companies which undertake (or are part of a group which undertakes) a majority of its business activities outside New Zealand.[36] This is to ensure that the bonds we have used are as representative as practicable of the conditions faced by the hypothetical efficient operator we are estimating the allowed WACC for.

69. The specific bonds we used are identified in the spreadsheet released with this final decision.[37]

70. In the December 2014 draft determinations, we placed little weight on the bonds issued by Genesis, Mighty River Power, and Meridian, noting that these were likely to be anomalous due to the NZ Power proposal.[38] However, in the July 2015 further draft determinations, we considered that these bonds were no longer clearly anomalous, post-election, so these were included in the benchmark sample for estimating the debt premium (although, following their inclusion in the benchmark sample, these bonds were given less weight as the issuing companies are majority owned by the Crown and as such are likely to have lower credit risk than the hypothetical efficient operator).

71. Network Strategies (for Vodafone) stated that the 1.75% figure used in the July 2015 further draft determinations appeared reasonable, but noted caution given the small number of bonds and the need for adjustments for credit rating and term.[39]

72. We agree that ideally there would be a greater number of bonds with credit ratings and terms comparable to the basis for our estimation approach. However, we believe that the data set is sufficient for estimating a reliable debt premium.

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35 Vanilla bonds means senior unsecured nominal debt obligations denominated in New Zealand dollars without callable, puttable, conversion, profit participation, credit enhancement or collateral features.

36 See the definition of qualifying issuer, in the various IM determinations, clause 1.1.4(2). The approach for airports is very similar except the specified credit rating is a Standard and Poor's long-term credit rating of A-.

37 Commerce Commission "WACC spreadsheet for UCLL and UBA final decisions" 15 December 2015.

38 NZ Power was a proposal, prior to the 2014 general election, which would have resulted in a new agency (called NZ Power) acting as a single buyer of wholesale electricity in New Zealand.

39 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 85.

We have estimated the debt premium using prevailing interest rates at the beginning of the regulatory period

73. We have estimated the debt premium based on interest rates observed immediately prior to the regulatory period, rather than using a long-term trailing average for the observed debt premium.

74. This is consistent with our approach in the December 2014 draft determinations and July 2015 further draft determinations, as well as under the cost of capital IMs. This approach makes use of current, publicly available information to estimate the debt premium for New Zealand corporates. In particular, we can estimate the debt premium in a reliable way by estimating the yields on a range of publicly-traded, New Zealand corporate bonds.

75. Using longer-term trailing average rates leads to estimated costs of equity and debt which tend to be relatively stable over time. In a price setting context, this relative stability will tend to lead to relatively stable returns to suppliers and prices to consumers.

76. The use of current rates, on the other hand, leads to estimated costs of equity and debt which more closely reflect changes in expectations in the financial markets. That is, they are more up-to-date estimates of interest rates and, therefore, the cost of capital. In a price setting context, using current rates means changes in expectations in the financial markets will be signalled more rapidly to suppliers, and to consumers. Therefore, we have used current interest rates when determining the debt premium for UCLL and UBA.

We have based the term of the debt premium on the average borrowing term

77. As we did in the December 2014 draft determinations and July 2015 further draft determinations, we have used a term of the debt premium of seven years. This is based on the assumption that the hypothetical firm that we are modelling would follow an efficient debt strategy, and seek to issue debt with relatively long terms, thereby reducing re-financing risk. Available evidence, discussed below, suggests seven years is a reasonable estimate of the average term to maturity of borrowing for large New Zealand corporates.

78. Before setting the IMs in 2010, we undertook a survey of debt management practices of energy companies, and the regulated airports. This survey highlighted that some of these companies were issuing debt with a tenor greater than five years, but most were not. We noted that while there were advantages to the firm and consumers from issuing such longer-term debt, only some firms were actually doing so.

79. In the IMs, we were unwilling to set a term for the debt premium which was longer than the regulatory period, when most firms were not incurring the additional cost of longer-term debt. If we had used a longer term of the debt premium, we would have compensated regulated suppliers for a cost most were not incurring.

80. On the other hand, we did not want the higher debt premium on longer-term debt to discourage firms from issuing such debt. To offset a possible disincentive to issuing long-term debt, we introduced a special allowance to compensate those firms for any additional costs involved in such borrowing. This was called the term credit spread differential (TCSD) allowance.

81. Only firms that issued debt with a term exceeding five years qualified for the TCSD allowance. In combination, a five-year debt premium and the TCSD produced an allowance for the cost of debt which matched the term of debt issued by firms.[40]

82. Unlike under Part 4, where regulated suppliers had a wide divergence of debt management practices, when setting UCLL and UBA prices under the Telecommunications Act we only need to estimate WACC for a single hypothetical efficient operator. For a single firm we can estimate a debt premium with a term reflecting the assumed term of its debt, and therefore there is no need for a TCSD in the current decision.

83. When considering the term of the debt premium for UCLL and UBA, we took advice from Dr Lally. He referred to our confidential debt survey of energy utilities and airports, the TCSD available under the IMs, and CEG's submission (for Chorus) that the term of the debt premium should be 10 years.

84. In his original report, Dr Lally advised that:[41]

> CEG's belief that the average debt term for regulated firms is ten years (CEG, 2014, pp. 48-50) seems to conflict with the evidence presented by the Commerce Commission (2010, pp. 449-451). However most of the apparent conflict in evidence arises because CEG presents data from a range of markets whilst the Commission favours New Zealand data. New Zealand data is preferable, because it is more relevant. However it does suggest a figure of about seven years rather than five years.

85. The term of seven years recommended by Dr Lally is consistent with the results of our 2010 survey.[42] We continue to agree with Dr Lally's recommendation.

86. We are required to establish the WACC for a hypothetical efficient operator. We consider such a firm would issue relatively long-term debt, and thereby incur a higher debt premium reflecting the longer term of its debt. We consider the average original tenor of around seven years observed for energy utilities and airports in the Commission's confidential survey in 2010 to still be a reasonable proxy for the debt tenor of an efficient provider of UCLL and UBA services, as this was based on New Zealand suppliers of infrastructure services.

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40 For those firms that issued debt with an original tenor exceeding five years. All other firms received a five-year debt premium only.

41 Dr Martin Lally, Capital Financial Consultants Ltd "Review of submissions on the cost of debt and the TAMRP for UCLL and UBA services" 13 June 2014, p. 14.

42 Commerce Commission "Input methodologies (electricity distribution and gas pipeline services): Reasons paper" December 2010, para [H5.11]

87. In its latest submission, Chorus argued that a 10-year debt premium should be used, but did not provide additional evidence to support this approach.[43] The 10-year term prosed by Chorus is consistent with its previous submissions on this topic. Given that no additional evidence was provided, we refer to our previous analysis on this matter, as described in the July further 2015 draft decision.[44]

88. Recent domestic bond issues further support a seven-year term for the debt premium. Corporate bonds from Transpower, PowerCo and SkyCity Entertainment Group have seven-year terms, while a Contact Energy corporate bond has a six-year term.[45]

89. In summary, although this decision on the cost of debt does not include a TCSD, our approach is consistent with many of its principles and its effect. In particular, we have:

    89.1 estimated the debt premium using an average borrowing term in excess of the length of the regulatory period (which the combination of the TCSD and a five-year debt premium also achieves for qualifying suppliers);

    89.2 included an allowance for swap costs (see paragraphs 112 to 122 below), which the TCSD also does; and

    89.3 made consistent assumptions around annual debt issuance costs (see paragraphs 107 to 111 below).

We have used a target long-term credit rating of BBB+

90. As in our December 2014 draft determinations and July 2015 further draft determinations, we have used an S&P long-term credit rating of BBB+ when estimating the debt premium for UCLL and UBA.

91. We originally sought advice from Oxera on the appropriate credit rating to assume when estimating the cost of debt. Oxera's report recommended a S&P long-term credit rating of A-/BBB+:[46]

> In the IM, NZCC used a target credit rating of BBB+ for gas and electricity, whereas for the airports it was determined to be A-. Consistent with the relative risk hierarchy of the different sectors, this further supports a recommendation to target a slightly higher credit

[43] Chorus "Submission for Chorus in response to Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services (2 July 2015) - Public version" 13 August 2015, para 232.

[44] Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, paras [83-99] and Attachment A. Chorus argued that a 10-year debt premium is consistent with debt raising practice from a wide sample of international telecommunications firms (included in the sample for estimating asset beta), however we noted that this does not reflect New Zealand conditions. We also did not find a strong relationship between original debt tenor and asset beta, and obtained publicly available information on debt for Spark and Chorus which was consistent with a seven-year term.

[45] The issue date for both Powerco and SkyCity Entertainment Group was 28 September 2015; the Transpower issue date was 30 June 2015; and the Contact Energy issue date was 4 September 2015.

[46] Oxera "Review of the beta and gearing for UCLL and UBA services - Evidence and recommendations prepared for New Zealand Commerce Commission" June 2014, p.42.

rating for telecoms of A-. Equally, the differential between A- and BBB+ is small, and should not impact the choice of the equity beta, and therefore either of these precedents could potentially be appropriate.

92. Chorus submitted, prior to the July 2015 further draft decision, that a credit rating of BBB- should be used, based on the CEG comparator group and practice of Australian Competition and Consumer Commission (ACCC) and Ofcom. Oxera stated that Chorus had not provided compelling evidence to suggest that BBB- is more appropriate than BBB+. Chorus continues to argue that a BBB- credit rating is appropriate.[47]

93. In estimating the WACC for UCLL and UBA, we seek to estimate the costs of a hypothetical efficient operator. We consider an efficient operator would seek to maintain an appropriate investment-grade credit rating so as to ensure satisfactory access to debt capital markets at reasonable cost. In selecting its target credit rating, an efficient operator would also prefer an appropriate investment-grade credit rating so as to provide it with a margin of safety.[48]

94. This led to us retaining the BBB+ credit rating for the July 2015 further draft determinations.[49] No new comments were received in submissions regarding the target credit rating.

95. We have, therefore, continued to assume a S&P long-term credit rating of BBB+ as we consider this:

    95.1 satisfies the criteria in paragraph 93 above (and does so better than alternative credit ratings such as the BBB- previously proposed by CEG (for Chorus);

    95.2 is in the middle of the range of credit ratings held by New Zealand corporates issuing publicly-traded bonds (as evidenced by our WACC determinations under Part 4); and

    95.3 is consistent with the advice on credit rating from Oxera (which recommends maintaining a rating of between A-/BBB+).

We have not included foreign-currency bonds issued by New Zealand entities, or adopted a curve-fitting approach, when estimating the debt premium

96. As in our December 2014 draft determinations and July 2015 further draft determinations, we have:

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47 Chorus "Submission for Chorus in response to Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services (2 July 2015) - Public version" 13 August 2015, p. 229.

48 A bond is considered investment grade if its credit rating is S&P BBB- or higher.

49 We also noted in the July 2015 further draft determination that Chorus' current S&P credit rating of BBB was affirmed on 4 December 2014, and the outlook was revised from negative to stable. Standard and Poor's "Research update: Chorus Ltd. Outlook Revised To Stable After Draft Regulatory Pricing Decision, 'BBB' Ratings Affirmed" 3 December 2014. https://www.nzx.com/files/attachments/205103.pdf

96.1 estimated the debt premium from New Zealand dollar denominated bonds, and have not considered the yields on foreign-currency bonds. This is consistent with the approach used in the cost of capital IMs, and advice from Dr Lally;[50] and

96.2 not used a curve-fitting approach due to practical implementation difficulties.[51] There is no agreed approach internationally to curve-fitting and we do not consider it provides a better approach to estimating the debt premium.

97. We have not received any subsequent submissions on these issues. Further details regarding the reasons for our approach are contained in our December 2014 draft determinations.[52]

Our estimate of the current debt premium

98. Using this methodology, we have estimated a debt premium of 1.85% as at 1 September 2015, based on a seven-year term and a S&P long-term credit rating of BBB+. The estimated debt premium has increased from 1.75% (in the July 2015 further draft determinations) to 1.85%, reflecting changes in current interest rates on New Zealand government and corporate bonds.

99. Details regarding the corporate bonds we have relied on when estimating the debt premium are summarised in Table 2 below. Further details are provided in the spreadsheet released with this final decision.[53]

100. Table 2 below lists the debt premiums on available corporate bonds, and separates out those bonds which are issued by an entity that is majority owned by the Crown or a local authority. Holding other factors constant, government ownership would generally be expected to lower the observed debt premium on a bond.

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50 Dr Martin Lally, Capital Financial Consultants Ltd "Review of submissions on the cost of debt and the TAMRP for UCLL and UBA services" 13 June 2014, p.9; and Dr Martin Lally, Capital Financial Consultants Ltd "Review of responses to review of submissions on the cost of debt and the TAMRP for UCLL and UBA services" 20 August 2014, p.4, 16.

51 This would involve fitting a curve through all the debt premium observations in a specified sample of bonds, to assist in estimating the debt premium for the hypothetical efficient operator for UCLL and UBA.

52 Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Draft decision" 2 December 2014, paras [105-109].

53 Commerce Commission "WACC spreadsheet for UCLL and UBA final decisions" 15 December 2015.

Table 2: Data on New Zealand corporate bonds used to estimate the debt premium

Corporate bonds used to estimate debt premium for UCLL and UBA (7 year term to maturity as at 1 September 2015)					
	Industry	**Rating**	**Remaining Term to Maturity**	**Debt premium**	
Determined Debt Premium	*Telecommunications*	*BBB+*	*7.0*	*1.85*	
Issuer	**Industry**	**Rating**	**Remaining Term to Maturity**	**Debt premium**	**Comment**
Non-majority owned by Crown/local authority:					
Fonterra[1]	Other	A	7.0	1.39	BBB+ debt premium would be higher.
Spark[2]	Telecommunications	A-	6.6	1.33	BBB+ and 7 year debt premium would be higher.
AIAL[3]	Other	A-	5.7	1.21	BBB+ and 7 year debt premium would be higher.
WIAL[4]	Other	BBB+	5.7	1.64	7 year debt premium would be higher.
Powerco[5]	Other	BBB	N/A	N/A	N/A
Contact[6]	Other	BBB	4.7	1.72	BBB+ debt premium would be lower and 7 year debt premium would be higher.
Majority owned by Crown/local authority:					
Transpower[7]	Other	AA-	7.0	1.15	
CIAL[8]	Other	BBB+	6.1	1.63	
Genesis Energy[9]	Other	BBB+	7.0	1.77	
MRP[10]	Other	BBB+	7.0	1.82	
Meridian[11]	Other	BBB+	N/A	N/A	

Notes on bonds analysed:

1 Fonterra 5.9% bond maturing 25/02/2022; 5.1% bond maturing 19/06/2025.
2 Spark 4.5% bond maturing 25/03/2022.
3 AIAL 5.5% bond maturing 28/05/2021.
4 WIAL 6.3% bond maturing 15/05/2021.
5 Not included as existing bonds secured against network assets.
6 CENNZ 5.3% bond maturing 27/05/2020.
7 Transpower 4.3% bond maturing 30/06/2022; 5.4% bond maturing 15/03/2023.
8 CIAL 6.3% bond maturing 04/10/2021.
9 Genesis Energy 8.3% bond maturing 23/06/2020; 5.81% bond maturing 8/03/2023.
10 MRP 8.2% bond maturing 11/02/2020; 5.8% bond maturing 06/03/2023.
11 Meridian 7.55% bond maturing 16/03/2017 (no Govt bond comparator).

101. When determining the debt premium for UCLL and UBA, greatest regard has been given to the estimated debt premium on Wellington International Airport Limited's (WIAL's) bond maturing in May 2021. This bond is publicly-traded, is issued by an entity that is not majority owned by the Crown or a local authority, has a rating of BBB+, and has a remaining term to maturity of 5.7 years (as at 1 September 2015).

102. We consider the WIAL bond to be the closest match to our requirements for determining the debt premium for UCLL and UBA. For the reasons discussed above, when estimating the debt premium for UCLL and UBA we have used a target long-term credit rating of BBB+ and a seven-year term to maturity. The WIAL bond is the only bond with a BBB+ credit rating from a company that is not majority owned by the Crown or a local authority.

103. As at 1 September 2015, the debt premium on the WIAL bond was estimated at 1.64%. This bond has a remaining term to maturity of 5.7 years, which is less than the seven-year term of the debt premium we have specified for UCLL and UBA. Given

that the debt premium is expected to increase with term, this implies that the debt premium on a bond with a term to maturity of seven years would be higher than 1.64% (approximately 1.75-1.85%).[54]

104. We have also had regard to the estimated debt premium on bonds from a range of other issuers, including Fonterra (1.39%, 7.0 years, rated A), Spark (1.33%, 6.6 years, rated A-), Auckland International Airport (AIAL) (1.21%, 5.7 years, rated A-) and Contact Energy (1.72%, 4.7 years, rated BBB).[55] Although these bonds are all issued by entities that are not majority owned by the Crown or a local authority, they are given less weight than the WIAL bond because they have credit ratings other than BBB+. Taking into account the likely impact of differences in credit rating and term to maturity, we consider that these debt premiums are generally consistent with an estimate of 1.75-1.85% for a BBB+ rated bond with a seven-year term to maturity.

105. The estimated debt premiums on the Transpower bonds (1.15%, 7 years, rated AA-), the Christchurch International Airport (CIAL) bond (1.63%, 6.1 years, rated BBB+), the Genesis Energy bonds (1.77%, 7.0 years, rated BBB+) and the Mighty River Power bonds (1.82%, 7.0 years, rated BBB+) are given less weight.[56] However, taking into account the likely impact of government ownership, the premiums on these bonds generally suggest that the estimate of the debt premium we use should be greater than 1.80% (approximately 1.85%).

106. Placing primary weight on the estimated debt premium on the WIAL bond (which has a term shorter than our benchmark term), but having regard to the debt premium on a range of other bonds, we have determined a debt premium of 1.85% for UCLL and UBA.

Debt issuance costs

107. As in the December 2014 draft determinations and the July 2015 further draft determinations, we have included an allowance for debt issuance costs of 0.25% per annum in our allowed cost of debt.

108. Firms that raise debt incur costs when issuing debt. These costs are in addition to the rate of interest payable on their debt. The cost of capital IMs included an allowance for debt issuance costs of 35 basis points per annum (0.35% p.a.). This was based on amortising the debt issuance costs over the same period as the term of the debt premium (ie, five years).

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54 While we have not attempted to precisely estimate the impact on the debt premium of an additional 1.3 years term to maturity, allowing a 10 basis point per year increase above the WIAL bond would lead to an estimate of 1.77%.

55 In the July 2015 further draft determinations, consideration was given to a Powerco bond, however it is no longer possible to estimate a debt premium for Powerco based on available corporate and government bond data.

56 In the July 2015 further draft determinations, consideration was given to a Meridian bond, however it is no longer possible to estimate a debt premium for Meridian based on available corporate and government bond data.

109. For the UCLL and UBA pricing reviews, we have used a debt premium term of seven years. Therefore, to calculate the debt issuance costs we multiplied 0.35% by the five-year debt term for the IMs and then divided by our seven-year debt premium term for this review, which equates to 0.25% p.a. That is, issuing longer-term debt reduces the frequency of incurring issuance costs for debt and, therefore, the allowance per annum required to cover these costs.

110. In its February 2015 submission, CEG (for Chorus) suggested that the cost of capital should be used to convert upfront debt issuance into an annual allowance, and that debt issuance costs of at least 0.35% per annum are appropriate if a seven-year debt term is used.[57] This position was supported by Chorus in its most recent submission.[58]

111. However, neither CEG nor Chorus produced data on Chorus' actual debt issuance costs, and available evidence from the IMs confidential debt survey indicated that our allowance of 0.25% is not an underestimate. In addition, CEG's analysis focussed on a single debt issue. Therefore, we have continued to use an allowance for debt issuance costs of 0.25% per annum.

Swap costs

112. We have included an allowance for interest rate swap costs of eight basis points, based on the cost of executing two swaps.

113. For the purpose of estimating the debt premium, we have assumed the hypothetical efficient operator would seek to manage re-financing risk by issuing long-term debt. Re-financing risk can also be managed by regularly issuing a portion of an operator's total debt (rather than issuing it less frequently, say, just once every seven years). This creates an interest rate risk, as interest rates when the debt is raised may be different to the rate prevailing when prices were set.

114. A supplier can manage interest rate risk by entering an interest rate swap that enables the supplier, if it wished, to cover the cost of aligning the interest rate setting to the price setting. Accordingly, we have included an allowance for the costs of entering interest rate swaps.

115. In the December 2014 draft determinations, we estimated the allowance for swap costs as four basis points, using the approach specified in the cost of capital IMs. The IMs include an allowance for swap costs as part of the TCSD.[59]

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57 CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, paras [76-87].

58 Chorus "Submission for Chorus in response to Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services (2 July 2015) - Public version" 13 August 2015, para [231].

59 That is, an amount which is half of the wholesale bid and offer spread for an interest rate swap, for a notional principal amount equal to the principal amount of the debt. See clause 2.4.9(1) in the IM Determination and Input Methodologies (Electricity Distribution and Gas Pipeline Services) Reasons paper 22 December 2010, p.476, para [H6.14].

116. In the July 2015 further draft determinations, we acknowledged that a supplier who issues fixed rate debt would need to enter into two swaps, with the fixed rate needing to be swapped to a floating rate, and the floating rate then needing to be swapped to a fixed rate. Therefore, based on our understanding that it is more common for New Zealand firms to issue fixed rate debt than floating rate debt, we doubled the allowance for swaps costs to eight basis points.[60]

117. Chorus submitted that two swaps costs will be required and referred to a previous CEG submission which estimated these costs as being 10 to 13 basis points if the debt can be raised domestically (and more if the debt is raised overseas).[61]

118. Network Strategies (for Spark and Vodafone), on the other hand, argued that the assumption that two swaps would be required was an over-estimation and that two swaps would be required in only half of cases.[62] This would suggest an allowance for swap costs of six basis points (ie, two basis points lower than proposed). Network Strategies' submission referenced the Pricewaterhouse Coopers (PwC) Treasury Management Survey 2015, stating that only 57% of the surveyed New Zealand firms' debt carried a fixed interest rate.[63]

119. Network Strategies also previously noted that CEG's swap costs estimate of 10 to 13 basis points was based on Australian data, but ideally any estimate for this parameter should be based on New Zealand data.[64] We agree that New Zealand-specific evidence regarding observed swap costs would be more persuasive – however, no such evidence has been provided by either Chorus or CEG.

120. Our approach to estimating a debt premium has been to focus on corporate bond yields, rather than bank finance. The PwC survey covers companies for whom corporate bonds represent less than 10% of their debt portfolio. The survey includes a number of smaller companies who may not be able to efficiently access bond markets, and are not representative of the hypothetical efficient operator. No information is provided on the split of corporate bonds using fixed rate and floating rate debt.

121. Therefore, we have placed limited weight on this survey evidence, and have continued to assume that two swaps will be required. Furthermore, we consider that it remains appropriate to focus on corporate bonds for our analysis of the cost of

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60 Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, paras [125-131].

61 Chorus "Submission for Chorus in response to Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services (2 July 2015) - Public version" 13 August 2015, para [230].

62 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 84.

63 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 84.

64 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand – Review of issues from UCLL and UBA submissions – Cross submission for the UCLL and UBA Draft Determination" 20 March 2015, p. 36-37.

debt. This is because corporate bonds are publicly-traded, transparent and used by regulators in setting price control determinations internationally.

122. No new evidence has been presented on the costs of an individual swap, so we have continued to assume a cost of four basis points for one swap. This results in an allowance of eight basis points in total on the cost of debt, based on the use of two swaps.

Approach to estimating the cost of equity

123. Equity is the second main source of capital. The cost of equity is harder to estimate than the cost of debt. Most analysts use a financial model to arrive at an estimate of the cost of equity (the CAPM). In this section, we discuss:

123.1 the model we use to estimate the cost of equity; and

123.2 the value of the parameters we have used to estimate the cost of equity.

We have used the simplified Brennan-Lally CAPM to estimate the cost of equity

124. We estimate the cost of equity using the simplified Brennan-Lally CAPM. Under the simplified Brennan-Lally CAPM, the expected cost of equity is a function of the risk-free rate (after tax), plus the equity beta multiplied by the TAMRP.[65]

125. The CAPM was developed by Sharpe, Lintner and Mossin during the early 1960s. Since then a number of variations to the CAPM have been developed which incorporate different taxation considerations, including the Officer CAPM for the Australian taxation system and the Brennan-Lally CAPM for the New Zealand taxation system. A different variant, the International CAPM, takes into account international investors.

126. The Brennan-Lally CAPM (Lally's adaptation for New Zealand circumstances of a CAPM model elaborated by Brennan) was developed to reflect New Zealand's taxation system. Specifically, it recognises the presence of imputation credits and the general absence of taxes on capital gains. There is an extended form of the Brennan-Lally CAPM and a simplified version, but it is the simplified Brennan-Lally CAPM that has become the dominant form of the CAPM used in New Zealand.

127. In New Zealand, the term simplified Brennan-Lally CAPM has become largely synonymous with the generic term CAPM, and the terms are frequently used interchangeably. It is reasonably rare to find a CAPM-based estimate of the cost of equity in New Zealand that does not rely on the simplified Brennan-Lally CAPM.

128. In the New Zealand context, we have generally used the simplified Brennan-Lally CAPM in prior cost of capital decisions. The reasons for preferring the simplified Brennan-Lally CAPM rather than other versions of the CAPM are:

128.1 the assumptions of the simplified Brennan-Lally CAPM are consistent with the New Zealand tax system, whereas the assumptions of other CAPMs are not. For example, the classical Sharpe-Lintner CAPM does not adjust for the effect of imputation credits and assumes the same rate of taxation on dividends as on capital gains. This is not representative of the New Zealand system of taxation. Professor Franks noted that the UK used a similar model to the

[65] Under the simplified Brennan-Lally CAPM the cost of equity = risk free rate × (1-investor tax rate) + equity beta × TAMRP.

simplified Brennan-Lally CAPM when it had a tax imputation regime that was similar to New Zealand's;[66]

128.2 the simplified Brennan-Lally CAPM is very widely used and accepted in New Zealand, including by companies, investment analysts, practitioners, independent takeover appraisal reports, and advisors, and is the preferred method for estimating the cost of capital in New Zealand; and

128.3 during the IMs determination, the continued use of the simplified Brennan-Lally CAPM was strongly supported at the cost of capital workshop.[67]

129. Submissions during the UCLL and UBA pricing reviews have also generally supported using the simplified Brennan-Lally CAPM.[68] For example, Spark submitted:[69]

> While the Brennan-Lally model is not without controversy, for practical reasons, we agree that the widespread use of the Brennan-Lally model in the New Zealand market, and the Commission's use of it across regulated firms in New Zealand mean that it is a reasonable basis for use in calculating the cost of capital for the UCLL service.

130. We consider the simplified Brennan-Lally CAPM is the best model for estimating the cost of equity in New Zealand. Like other models it has its imperfections, including the leverage anomaly (which is discussed in paragraphs 200 to 215 below. However, the simplified Brennan-Lally CAPM enjoys such widespread support, and competing models such limited support, that there is currently no credible alternative. Further discussion on the simplified Brennan-Lally CAPM, and the CAPM more generally, is set out in our IMs reasons paper.[70]

Parameters used to estimate the cost of equity under the simplified Brennan-Lally CAPM

131. The simplified Brennan-Lally CAPM requires us to estimate the following parameters:

131.1 the risk-free rate;

131.2 the investor tax rate;

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66 Franks, J., Lally M., & Myers S "Recommendations to the New Zealand Commerce Commission on an Appropriate Cost of Capital Methodology" 2008, p. 11.

67 Commerce Commission "Cost of Capital Workshop Transcript" (12-13 November 2009) p. 38-40. After the workshop, Vector noted that "[h]istorically the Commission has adopted the simplified Brennan-Lally CAPM. It was evident from the workshop that there was little dispute that this is an acceptable approach to use." Vector "Cross Submission to Commerce Commission on the Weighted Average Cost of Capital Workshop" 2 December 2009, p. 7.

68 Chorus "Submission in response to the Commerce Commission's Process and issues paper for determining a TSLRIC price for Chorus' unbundled copper local loop service in accordance with the Final Pricing Principle" 14 February 2014 p. 63, para [303]; Frontier Economics "Determining a TSLRIC price for Chorus' UCLL service" February 2014, p. 32-33.

69 Telecom "Submission on Process and issues paper for determining a TSLRIC UCLL price" 14 February 2014, p.51, para [178].

70 Commerce Commission "Input Methodologies (Electricity Distribution and Gas Pipeline Services) Reasons Paper" 22 December 2010, paras [6.4.17 – 6.4.19], [H2.44 – H2.78].

131.3 asset beta;[71] and

131.4 the TAMRP.

132. This section explains our approach to estimating each of these parameters.

Risk-free rate

133. We have used the same approach to estimating the risk-free rate for both the cost of equity and the cost of debt. In particular, we have assumed a term for the risk-free rate of five years. This ensures that the overall cost of capital is estimated using a consistent approach and that the term of the risk-free rate matches the regulatory period to which it will be applied.[72] This gives a risk-free rate figure of 2.74%.

Investor tax rate

134. As in the December 2014 draft determinations and July 2015 further draft determinations, the investor tax rate has been set to reflect the maximum prescribed investor rate under the PIE regime. This rate applies to investors other than those investors on lower personal tax rates. Under the PIE regime taxes on profits in a PIE are capped at the maximum prescribed investor rate, which is 28%. Therefore, we have used this rate to determine the investor tax rate.[73]

135. Tax situations specific to particular investors do not, in principle, affect the cost of capital. Taxes are ultimately borne by the individuals themselves, not by the firms of which they are shareholders.[74] Therefore, we have not provided for the tax circumstances of individual investors (for example, accumulated tax losses, inability to use imputation credits). This is consistent with the December 2014 draft determinations, the July 2015 further draft determinations, and the IMs.

Asset beta

136. We have estimated an asset beta of 0.43 for the UCLL and UBA services. We reached our view on the appropriate asset beta for UCLL and UBA considering Oxera's advice, the points raised in submissions, and our own analysis of the available information. The estimate of 0.43 is lower than the 0.45 used in the July 2015 further draft determinations.

137. Beta is a measure of exposure to systematic risk. Systematic risk measures the extent to which the returns on a company fluctuate relative to the equity returns in the stock market as a whole.

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[71] Under the simplified beta leveraging formula for the simplified Brennan-Lally CAPM (ie, assuming a debt beta of zero), equity beta = asset beta/(1 - leverage).

[72] See paragraphs 47 to 62 above for further discussion on the risk-free rate.

[73] The corporate tax rate is used to estimate the post-tax cost of debt and the post-tax WACC. The corporate tax rates used in calculating the cost of capital mirror the statutory corporate tax rate of 28%.

[74] While companies pay corporate income tax, they can pass a tax credit on to shareholders for this tax when they distribute dividends to shareholders.

137.1 If an investment had no systematic risk (ie, it showed no correlation with returns on the market), its equity beta would be zero.[75]

137.2 If an investment in the equity of a company is of average risk, the equity beta will be one. This means that the premium over the risk-free rate that equity investors expect will be the same as the average for the overall market (the TAMRP).

138. Beta is estimated empirically, but also requires a level of discretion. As the cost of capital is intended to be forward-looking, forward-looking betas are required. As there is no reliable way to forecast betas, we, like other analysts, assume that historic beta estimates are indicative of future betas. Historic estimates of average betas are used because beta is expected to be relatively stable over time.

139. The beta measures a security's sensitivity to market risk (ie, beta is a measure of exposure to systematic risk). As betas are not directly observable, they need to be estimated. For firms with traded stocks, the beta for the firm can be estimated directly from the historical returns on those stocks, relative to the market's return.

140. There are practical difficulties with reliably estimating beta, even historical betas, as:

140.1 Chorus, to our knowledge, is the only privately-owned, publicly-listed, vertically separated telecommunications network business; and

140.2 other comparators have other businesses, the risks of which may not be directly comparable to the risks from providing UCLL and UBA services.

We have based our asset beta estimate on Oxera's refined comparator sample

141. As in the December 2014 draft determinations and July 2015 further draft determinations, we have continued to base our asset beta estimate on Oxera's refined comparator sample.

142. Oxera's original report placed primary weight on the observed asset beta for Chorus when estimating WACC, and used a sample of comparator firms to validate the Chorus estimate:[76]

> In the case of estimating a beta for UCLL and UBA, a particular difficulty is the lack of other publicly listed fixed access network operators, either in the New Zealand telecommunications industry or beyond. Chorus is the only 'pure-play' fixed telecommunications operator. Whilst the TSLRC model does not directly model Chorus' costs, the market risks taken by Chorus' actual businesses and those taken by a hypothetical efficient operator are likely to be very similar.

143. Almost all submissions disagreed with placing primary weight on the Chorus estimate, given the increased risk of estimation error from relying on a single asset

[75] We are not aware of any company that has a beta of zero.

[76] Oxera "Review of the beta and gearing for UCLL and UBA services - Evidence and recommendations prepared for New Zealand Commerce Commission" June 2014, p.6.

beta estimate, and because the Chorus estimate was based on less than three years of trading data. For example, PwC (for Spark) submitted:[77]

> …there is still the significant estimation error from relying so heavily on only one comparator company's observed beta. Moreover, in Chorus' case there has been only a limited history of listing as a separate company - during which period there has been a significant downgrading of the company's share price around regulatory developments. The limited listing period, of just over two years, also precludes use of the more conventional use of monthly returns in the beta analysis.

144. We have used a sample of comparator firms to estimate the beta, which:

144.1 avoids placing undue weight on the beta estimate for Chorus, which is likely to be subject to significant measurement error (partly due to the short trading history); and

144.2 is consistent with the approach to estimating asset beta used in the IMs.

145. In response to the July 2015 further draft determinations, Schroders proposed using a beta estimated on cash flows rather than share prices, suggesting that share prices are reflective of opinion, which may be fickle.[78] However, we have retained our approach of using share prices to estimate beta, given that:

145.1 we are interested in estimating a forward-looking estimate for beta as part of an expected return calculation, and these return expectations should be reflected in the share price; and

145.2 the use of a share price based beta is a conventional and well-established regulatory approach, and we have not been presented with information convincing us why a move to cash flow based betas is more appropriate.

Firms included in the comparator sample for UCLL and UBA

146. We have used Oxera's refined comparator set when estimating asset beta and leverage for the UCLL and UBA services.

147. CEG (for Chorus) has previously argued that a larger sample of comparators should be used, a position they have re-stated in their most recent submission.[79] However, we have previously explained the reasons for using Oxera's refined comparator sample, and no new evidence has been presented on this issue.[80]

148. In the previous Oxera report, published alongside the July 2015 further draft determinations, the refined comparator sample was updated to remove Portugal

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77 PwC "Submission on Commerce Commission Expert's paper: Review of the beta and gearing for UCLL and UBA services" 21 July 2014, p.3.

78 Schroders "Submission on draft determinations of the UCLL and UBA access service final pricing principles" 27 July 2015.

79 CEG "Response to the further draft determination" August 2015, para [194].

80 Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Draft decision" 2 December 2014, paras [144-150].

Telecom. Portugal Telecom had undergone "a significant financial restructuring and experienced a period of dramatic stock price decline" which Oxera deemed "may give rise to unreliable recent beta estimates".[81]

149. In its submission on the July 2015 further draft determinations, Network Strategies (for Vodafone) stated that it agreed with the removal of Portugal Telecom for the most recent period, however it proposed that Oxera should remove the company from previous data periods for consistency.[82]

150. Oxera has updated its analysis to include more recent data, and address the points raised in submissions on its previous report. Oxera's latest report has been released at the same time as the final determinations for the UCLL and UBA pricing reviews.[83]

151. In its most recent report, Oxera has also removed Windstream Holdings from the refined comparator sample in addition to Portugal Telecom.[84] This was based on a significant financial restructuring that led to two separate entities being created. Windstream Holdings saw a sharp rise in gearing and 75% fall in market value, leading to its removal from the refined comparator sample.

152. Oxera disagreed with Network Strategies' submission suggesting Portugal Telecom be removed for previous data periods, noting that this would not change the conclusions of the analysis.[85] The same approach has been adopted for Windstream Holdings. We agree with Oxera and the method adopted for undertaking this updated analysis.

Time period and frequency of data for estimating asset beta

153. When estimating the asset beta for UCLL and UBA we have:

    153.1 used updated data from a combination of the two most recent five-year periods;

    153.2 considered rolling averages over the last 10 years, as additional evidence;

    153.3 considered two-year beta estimates, as additional evidence; and

    153.4 placed greatest weight on asset beta estimates derived from monthly observations, but also looked at estimates using weekly data.

154. This approach is consistent with our July 2015 further draft decision. For this final determination, we have used updated asset beta data to 1 September 2015.

155. Network Strategies (for Spark and Vodafone) submitted that it would be appropriate to look at adjacent time periods rather than the approach assumed in the July 2015

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81 Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p.6.

82 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p.78.

83 Oxera "Third review of submissions on the WACC for UCLL/UBA" 17 November 2015.

84 Oxera "Third review of submissions on the WACC for UCLL/UBA" 17 November 2015, p.7.

85 Oxera "Third review of submissions on the WACC for UCLL/UBA" 17 November 2015, p.7, footnote 21.

further draft determinations, where the five-year period to April 2009 was considered in addition to the five-year period to March 2015.[86]

156. Oxera agreed that this change is appropriate given there are now 14 months of additional data since its initial report.[87] The latest evidence looks at five-year periods to 1 September 2010 and 1 September 2015, such that these are adjacent and reflect the latest available data. We agree with this approach and note that the data cut-off is consistent with other cost of capital parameters.

157. There were submissions on the July 2015 further draft decision regarding what time period should receive attention. Network Strategies stated that no regard should be given to earlier periods because there were no significant changes in estimates, a smaller comparator set leading to a larger standard error in earlier data, and the figures being captured in the rolling beta estimate.[88]

158. CEG (for Chorus) disagreed with Network Strategies and argued that attention should be paid to a longer time horizon, looking at a period in excess of 10 years.[89] CEG also submitted that the global financial crisis (GFC) had led to lower beta estimates for non-financial companies for the 2009-2012 period, noting that recent estimates have highlighted increases in beta.

159. We have continued to focus on the last 10 years of data and have reduced our consideration of rolling averages to estimates for 2010 and 2015. This approach takes into account the most recent data points that are reflective of financial conditions, but balances this with historic information to ensure that the beta estimate is representative given the potential for "noisy" beta data.

Our view of the appropriate asset beta for UCLL and UBA

160. For the December 2014 draft determinations we started with the estimate of beta determined by Oxera from the most recent five-year period, using monthly estimates, for the refined comparator sample.

161. We then looked at other data periods, and other sampling frequencies, to test whether this initial estimate was out of line with beta estimates from other periods and sampling frequencies.

162. As a result of this evidence, we estimated the asset beta to be 0.40 for the December 2014 draft determinations.

163. Following submissions on the December 2014 draft determinations, Oxera included updated data in its May 2015 report. Oxera revised its recommended range for the asset beta, from 0.30-0.45 to 0.30-0.50, following an increase in the observed values

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86 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 79.

87 Oxera "Third review of submissions on the WACC for UCLL/UBA" 17 November 2015, p.4.

88 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 81.

89 CEG "Response to the further draft determination" August 2015, para [194].

across approaches. [90] In light of this, we determined an asset beta of 0.45 for the July 2015 further draft determinations.

164. In arriving at an asset beta of 0.43 for this decision, we have placed primary weight on the five-year monthly asset beta estimates for the two preceding five-year periods, but also paid some attention to other beta estimates. As shown in Table 3 below, which is replicated from Oxera's latest report, the average five-year monthly asset beta for the refined comparator set fell from 0.41 to 0.36 between March 2015 and August 2015.

165. The sharp reduction in the five-year monthly asset beta estimates suggests that a reduction in our asset beta estimate is appropriate. However, the other beta estimates for the refined comparator set increased slightly in this period. Therefore, on balance, we have made a small reduction to our asset beta estimate from 0.45 to 0.43.

Table 3: Summary of asset beta movements since our further draft determinations[91]

Asset beta	March 2015*	August 2015**
Chorus		
Two-year daily	0.30	0.35
Two-year weekly	0.49	0.52
Refined comparator set		
Five-year daily	0.38	0.41
Five-year weekly	0.39	0.41
Five-year monthly	**0.41**	**0.36**
Two-year daily	0.44	0.48
Two-year weekly	0.47	0.49
Oxera range	**0.30–0.50**	**0.30–0.50**

Note: * Data for the refined comparator set excludes Portugal Telecom. ** Data for the refined comparator set excludes Portugal Telecom and Windstream Holdings

Source: Oxera analysis based on Bloomberg, Datastream, and Hird, T. (2014), 'Response to Commerce Commission UCLL/UBA WACC consultation paper', March, p. 13.

90 Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p.19.

91 Oxera "Third review of submissions on the WACC for UCLL/UBA" 17 November 2015, p.14.

166. We checked our estimate against other information to ensure it was reasonable. In particular, we note that an asset beta of 0.43:

166.1 remains close to the estimates reported by Oxera for the refined comparator sample using daily data ending in 2010 and 2015 and estimates of beta from two-year sampling periods;[92]

166.2 is within the range of asset beta estimates observed for Chorus. Oxera notes that, in August 2015, the two-year daily asset beta for Chorus was 0.35, and the two-year weekly estimate was 0.52;[93]

166.3 is above the asset beta of 0.34 used for electricity lines services in the IMs. We think it is appropriate that there should be a higher beta for UCLL and UBA as there is greater risk of competition from other services and technologies for those services, relative to electricity lines services;[94] and

166.4 sits within Oxera's range of international regulatory precedent for asset beta determinations in the telecommunications sector (0.38-0.60).[95]

We have used the same asset beta for UCLL and UBA

167. We have used the same asset beta for UCLL and UBA. Although UCLL and UBA in principle may have different systematic risk, we note that:

167.1 these are closely related services; and

167.2 the Oxera analysis discussed below indicates that both the market data and theoretical analysis offers no evidence of a significant difference.

168. In Oxera's initial report it recommended that we use the same asset beta for UCLL and UBA:[96]

> …not only does the analysis not suggest evidence for a particular value for the differential, but both the market data and the theoretical analysis suggest that the hypothesis that the beta for Chorus as a whole is consistent with that for the copper business cannot be rejected. There is no compelling approach to determining a beta for UCLL or UBA that is 'better' than assuming that these are the same as Chorus' beta, after assessment against relevant comparators.

169. As discussed above, we have decided not to place sole weighting on the Chorus beta, and have instead used the average of the refined comparator sample. However, Oxera's argument is still relevant.

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92 Oxera "Third review of submissions on the WACC for UCLL/UBA" 17 November 2015, p.8-11.

93 Oxera "Third review of submissions on the WACC for UCLL/UBA" 17 November 2015, p.14.

94 We also note that our asset beta estimate of 0.43 for UCLL and UBA is similar to the asset beta we determined for gas pipelines under the cost of capital IMs (0.44). We consider this to be appropriate, as the risks faced by the hypothetical efficient operator for UCLL and UBA are likely to be similar to gas pipelines (which face competition from electricity lines).

95 Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p.20.

96 Oxera "Review of the beta and gearing for UCLL and UBA services - Evidence and recommendations prepared for New Zealand Commerce Commission" June 2014, p.56.

170. Submissions on the December 2014 draft determinations agreed with Oxera's view that the same asset beta should be used for the two services. PwC agreed with Oxera that it does not seem feasible to empirically estimate different betas for each service:[97]

> Given the challenges in assessing a fixed service operator's asset beta versus that of an integrated telecommunication operator it is unlikely to be practicable to empirically assess a further distinction between a UCLL and UBA asset beta. Making such an assessment based on subjective analysis is undesirable. This suggests that the best approach will simply be to treat the UCLL and UBA asset betas as being the same.

171. Network Strategies (for Vodafone) also agreed that there is no evidence to suggest that there should be different estimates of beta for the two services:[98]

> We agree with Oxera that there should not be separate asset betas for UCLL and UBA. While we recognise that there would be extreme practical difficulties in estimating different asset betas for the two services, due to the lack of suitable market data from Chorus and comparator companies, we agree that there is no compelling evidence to suggest that there should be separate betas.

Tax-adjusted market risk premium

172. We have used a TAMRP of 7.0%. This is based on advice from Dr Lally, and is the same value used in the cost of capital IMs, the December 2014 draft determinations, and the July 2015 further draft determinations.

173. The market risk premium (MRP) represents the additional return, over and above the risk-free rate, that investors look for to compensate them for the risk of holding a portfolio of average risk (more precisely, the market portfolio which is the average risk portfolio).

174. Under the simplified Brennan-Lally CAPM, the MRP is adjusted for tax faced by the investor on equity returns (therefore, tax-adjusted MRP, or TAMRP). The TAMRP can be derived from the MRP. Consistent with the use of a five-year term for the risk-free rate in the CAPM, Dr Lally used a five-year risk-free rate when providing his TAMRP estimate.

Approaches for estimating the TAMRP

175. The TAMRP is a forward-looking parameter which cannot be directly observed. A number of approaches can be used to estimate the TAMRP. These approaches include:

    175.1 studies of historic returns on shares relative to the risk-free rate;

    175.2 surveys of investors asking them to state their expected rate of return for the overall market; and

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97 PwC "Submission on Commerce Commission Expert's paper: Review of the beta and gearing for UCLL and UBA services" 21 July 2014, p.7.

98 Network Strategies "Expert reports on WACC for UCLL and UBA FPP: Final report for Vodafone New Zealand, Report number 34013" 21 July 2014, p.26.

175.3 empirical estimates of the MRP from share prices and expected dividends.

176. Our current TAMRP estimate is based on multiple methods, as recommended by Dr Lally.[99] Historically, including in the IMs, we have set a value of the TAMRP considering a range of information sources. The most common approach for estimating the TAMRP is to use historic returns on the market. While ex post returns have fluctuated significantly over time, regulators and practitioners have typically used or placed weight on estimates over long periods of time. Long-term estimates of historic returns are seen as useful predictors of future expected returns.

177. In its March 2015 cross submission, CEG (for Chorus) argued that it is an error to use a short-term estimate of the risk-free rate with a long-term estimate of the TAMRP. It suggested that this can result in a material mis-estimation of WACC when the risk-free rate is low.[100]

178. We disagreed with CEG's submission in the July 2015 further draft decision, noting that it was inconsistent with available empirical evidence from Dimson, Marsh and Staunton of low equity returns post 2000.[101]

179. In its August 2015 submission, CEG again argued that there is an inverse relationship between the risk-free rate and TAMRP.[102] This was supported by analysis of regulatory precedent regarding offsetting movements in these parameters. CEG submitted that:[103]

> The fall in New Zealand government bond yields cannot be mechanically assumed to have been associated with a fall in the cost of equity. Instead, the cost of equity must be estimated directly and not assumed to rise or fall with government bond yields.

180. CEG proposed a number of alternative approaches that it suggested would lead to an internally consistent approach, either through a change to the risk-free rate or TAMRP estimate.[104]

181. A change in the approach to estimating the risk-free rate would involve looking at historic averages, if the current approach to estimating the TAMRP was retained. CEG referred to the approach taken by the Belgian telecommunications regulator (BIPT), as a possibility.[105]

182. However, for the reasons described in paragraphs 47 to 62 above, we have continued to estimate the risk-free rate based on prevailing interest rates at the time

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99 Dr Martin Lally "Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services" 13 October 2015.

100 CEG, "Issues from submissions UCLL and UBA" March 2015, paras [69-74].

101 Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, para [192].

102 CEG "Response to the further draft determination" August 2015, p.8.

103 CEG "Response to the further draft determination" August 2015, para [139].

104 CEG "Response to the further draft determination" August 2015, p.19-60.

105 CEG "Response to the further draft determination" August 2015, p.56-60.

of determining WACC for the UCLL and UBA pricing reviews. We reiterate our rejection of the use of a trailing approach for this decision.

183. In its submission on the July 2015 further draft determinations, CEG referred to a number of methodological concerns regarding our approach to estimating the TAMRP. CEG submitted that:

183.1 primary weight should be placed on a dividend growth model (DGM);[106]

183.2 if multiple estimators are to be used, the set should be limited to the DGM and Siegel 2 methods;[107]

183.3 there is overlap between the Ibbotson and Siegel 1 methods, and that it is appropriate to only look at the Ibbotson method;[108] and

183.4 there are issues with the survey approach, given a small number of respondents, responses may not be very clearly thought out, responses may not be forward-looking, and responses may not be applicable to the risk-free rate used by the Commission.[109]

184. CEG referenced an International Monetary Fund (IMF) study on movements in the cost of equity and stated that government bond yields exhibit a negative beta value at present, providing insurance against equity market volatility.[110] CEG argued that this would require an uplift to address this negative risk premium.

185. CEG also submitted that, at the very least, the evidence used to estimate the TAMRP should be updated.[111] Based on its recreation of the Lally approach, CEG stated that this would give a figure of 7.4%. In its cross submission, Network Strategies (for Spark and Vodafone) agreed that the TAMRP data should be updated.[112]

186. We consider that there is difficulty in establishing a precise relationship between the risk-free rate and TAMRP, and favour updating the data for estimating the TAMRP rather than positing a relationship not fully supported in the literature.

187. Other regulators, and their expert advisors, have also not found clear evidence of the relationship between the risk-free rate and MRP suggested by CEG.

187.1 The Australian Energy Regulator (AER) previously commissioned expert reports on whether there was a relationship between the risk-free rate and MRP parameters. One report authored by McKenzie and Partridge stated that

106 CEG CEG "Response to the further draft determination" August 2015, p.12.
107 CEG "Response to the further draft determination" August 2015, para [325].
108 CEG “Response to the further draft determination” August 2015, paras [324-332].
109 CEG "Response to the further draft determination" August 2015, p.54-55.
110 CEG CEG "Response to the further draft determination" August 2015, p.31-32.
111 CEG CEG "Response to the further draft determination" August 2015, p.52.
112 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Response to submissions on revised draft determination - Pricing review - UCLL and UBA Final Pricing Principle - Public version" 24 September 2015, p.68.

"[t]he relation between the MRP and the level of interest rates is an open question and this relation is not sufficiently well established to form the basis for a regulatory adjustment to the MRP".[113]

187.2 This view was supported by another of the AER's consultants, CEPA, who found a shortage of evidence to make any conclusion regarding the relationship between the risk-free rate and MRP.[114]

187.3 Dr Lally was also appointed by the AER for the same decision. While Dr Lally noted that an inverse relationship between the risk-free rate and MRP was plausible, he also referred to phenomena that would change the risk-free but not the MRP.[115]

187.4 The Queensland Competition Authority (QCA) found that "[w]hile available evidence does not support the Wright method, at the same time it also does not preclude a possible negative relationship between the risk-free rate and the market risk premium. The question is the strength of the relationship, which is difficult to determine".[116]

188. Based on the lack of conclusive evidence of a relationship, we consider it prudent to update the TAMRP based on the latest data, as suggested in submissions.

189. We commissioned Dr Lally to update the data used in estimating the TAMRP and to address the methodological critiques presented by CEG.[117] In his report, Dr Lally:

189.1 rejected CEG's argument that an adjustment is required for the risk-free rate, given its negative beta.[118] This is because over a five-year regulatory period, a five-year government bond is virtually risk-free and thus the beta should be virtually zero. Over shorter periods, the beta may be negative or positive, but there is no basis for making any adjustment for this;

189.2 did not recommend adopting the approach used by BIPT, of giving the same weight to forward-looking and historical information when estimating the TAMRP and risk-free rate.[119] Dr Lally noted that this approach does not recognise that historic evidence can be used in estimating a forward-looking cost of capital. It also assumes that weight can be assigned to the extent to which a methodology is backwards- or forward-looking, which is not the case;

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113 AER "Better Regulation Explanatory Statement – Rate of Return guideline" December 2013, p.105.

114 AER "Better Regulation Explanatory Statement – Rate of Return guideline" December 2013, p.104.

115 AER "Better Regulation Explanatory Statement – Rate of Return guideline" December 2013, p.104.

116 The Wright method is based on the idea that a constant real return on equity over time is a better assumption than a constant market risk premium. The implication is that the market risk premium should vary one-for-one with movements in the risk-free rate. See QCA "Cost of Capital: Market parameters – Final Decision" August 2014, p. 19, 22.

117 Dr Martin Lally "Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services" 13 October 2015.

118 Dr Martin Lally "Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services" 13 October 2015, p.19.

119 Dr Martin Lally "Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services" 13 October 2015, pp.19-22.

189.3 did not believe any weight should be placed on the IMF report and the very simple DGM that is used.[120] Dr Lally further noted that use of this DGM indicates a 4.2% global MRP when looking at the suggested level rather than changes within periods, which would indicate a TAMRP below 7.0% is appropriate (significantly below the 9% CEG DGM estimate);

189.4 stated that CEG's DGM model should not be used exclusively, given that using a single estimate provides a less reliable result.[121] CEG's alternative suggestion of using two methodologies also suffers from the same drawback;

189.5 noted that although there are some similarities between the Ibbotson and Siegel 1 approaches, they result in significantly different outcomes.[122] There is empirical evidence to support the basis for the Siegel 1 approach, so CEG's contention that this methodology should be dropped is not supported;

189.6 did not believe that any drawbacks with the survey approach mean that it is inferior to other approaches.[123] While Dr Lally agreed that the responses may not be especially well thought out, he rejected criticisms regarding the sample size (31 respondents), a difference in timing (a limited difference applies) and that the MRP may be backward-looking (it is necessarily forward-looking); and

189.7 rejected other criticisms from CEG regarding the current approach to estimating the TAMRP, based on a lack of supporting evidence, incorrect interpretations, or the change being immaterial.

190. In concluding his review of the CEG submission, Dr Lally found that CEG's ranking of methods would appear to be driven by their outcomes rather than their inherent merits.[124]

191. Dr Lally consequently recommended no change in approach.[125] He re-estimated the TAMRP using updated data to 1 September 2015, based on the average of his preferred five methods. This resulted in a TAMRP of 7.0%, when rounded to the nearest 0.5%, as shown in Table 4 below.[126]

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120 Dr Martin Lally "Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services" 13 October 2015, p.36.

121 Ibid.

122 Ibid.

123 Dr Martin Lally "Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services" 13 October 2015, p.37.

124 Dr Martin Lally "Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services" 13 October 2015, p.38.

125 Dr Martin Lally "Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services" 13 October 2015, p.39.

126 Ibid.

Table 4: Updated TAMRP estimates using a five-year risk-free rate

Approach	New Zealand	International markets
Ibbotson estimate	7.1%	7.0%
Siegel estimate: version 1	5.9%	5.9%
Siegel estimate: version 2	8.0%	7.5%
DGM estimate	7.4%	9.0%
Surveys	6.8%	6.3%
Median	**7.1%**	**7.0%**

192. We agree with Dr Lally's recommendations regarding the approach to estimating the TAMRP, as set out in his report that accompanies this paper.[127] We have continued to use a TAMRP estimate of 7.0% for the following reasons.

192.1 Given that the various approaches to estimating TAMRP produce significantly different estimates of TAMRP, and that no approach to estimating TAMRP is generally accepted as superior or free from methodological criticisms, we prefer to place weight on a wide range of estimates (as Dr Lally does), rather than strongly preferring one approach (such as CEG's DGM analysis) over others.

192.2 Using a range of estimates is our long-standing approach, and this approach has produced a stable and predictable estimate of TAMRP. This has advantages for investors and consumer of regulated services.[128]

192.3 We do not think that CEG's DGM methodology provides a sufficiently robust estimate to place primary weight on compared to our established approach.[129]

192.4 We consider historic estimates of equity returns are useful indicators of a prevailing TAMRP, and understand that such methods are widely used by other analysts to estimate TAMRP, who continue to place weight on estimates of TAMRP derived from such approaches.

192.5 We understand that an estimate of TAMRP of 7.0% remains generally consistent with the estimates used by New Zealand investment banks. At the

[127] Dr Martin Lally "Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services" 13 October 2015, p.36.

[128] A TAMRP of 7.0% is the same figure used in the IMs, and in the December 2014 draft determinations and the July 2015 further draft determinations.

[129] In its March 2014 submission, CEG used a DGM analysis of the return on equity required on the New Zealand stock market over time to estimate the value of TAMRP as above 8%. For further details see Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews" 2 December 2014, paras [172-180].

time of the IMs, New Zealand investment banks had TAMRP estimates ranging between 6.5% and 7.25%.

Leverage

193. We have used a notional leverage of 38% for the final UCLL and UBA pricing reviews, which is the average leverage of the refined comparator sample used to estimate asset beta.

194. This section explains:

194.1 how we estimated notional leverage of 38% for the UCLL and UBA pricing reviews; and

194.2 why we have used the average leverage of Oxera's refined comparator sample (and assumed a zero debt beta), in light of the leverage anomaly.

We have determined notional leverage of 38%

195. In the July 2015 further draft determinations, the leverage over a 10-year period from 2006-15 was used for consistency with the approach to asset beta, which gave an estimate of 37%. We considered this to be the most appropriate estimate of leverage.[130]

196. In response to the July 2015 further draft determinations, Network Strategies (for Spark and Vodafone) noted the importance of assuming a leverage estimate that was consistent with the approach taken on the asset beta, and as such, if we focussed on the most recent five-year period on the asset beta, we should look at the five-year period for leverage.[131]

197. We agree with Network Strategies on the need to be consistent in our approach to estimating asset beta and leverage, given the leverage anomaly identified under the simplified Brennan-Lally CAPM.

198. Our approach to the asset beta continues to place primary evidence on the two most recent five-year periods using monthly beta estimates, with other beta estimates over this ten-year period and recent two-year beta estimates used as additional evidence.

199. In its most recent report on asset beta, Oxera has presented updated figures for leverage for the refined comparator set.[132] The leverage for the five years to 2010 was 35%, while the five years to 2015 was 40% when rounded to the nearest percentage point. This gives an average of 37.5%. Looking at the most recent estimate for a two-year rolling period of 41%, we think that it is appropriate to round up to 38% for leverage (based on cross-checking against beta estimates that would have yielded a slightly higher leverage figure).

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130 Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews - Further draft decision" 2 July 2015.

131 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 83.

132 Oxera "Third review of submissions on the WACC for UCLL/UBA" 17 November 2015, p.16.

The leverage anomaly and debt beta

200. Leverage refers to the mix of debt and equity capital that is used to fund an investment. Leverage is used in two places in estimating the cost of capital. One use is to re-lever the asset beta into an equity beta (and vice versa). The second is to derive a WACC from the estimates of the cost of debt and the cost of equity.

201. In a tax neutral world, leverage is generally understood not to affect a firm's WACC, since the cost of capital reflects the riskiness of the cash flows, rather than how these are divided up between equity and debt investors. When corporate tax is considered, the WACC is generally understood to decline with increases in leverage.[133] This is because interest costs are tax deductible to the firm but dividends are not.

202. When personal tax is considered, some of the tax advantages of debt are reduced. The New Zealand dividend imputation credit regime allows firms to pass on to their shareholders a credit for the tax the company has already paid.

203. When the simplified Brennan-Lally CAPM is used to estimate the cost of equity (in conjunction with the simplified beta leveraging formula, ie, debt beta is assumed to be zero), and the estimated cost of debt includes a positive debt premium, the resulting estimate of WACC increases as leverage increases.[134] This well-known counterintuitive characteristic of the simplified Brennan-Lally CAPM (ie, WACC increasing with higher leverage) is referred to as the "leverage anomaly".

204. The higher the value for the debt premium incorporated in the estimated cost of debt, the greater the effect on the resulting estimate of WACC as leverage increases.[135] This anomaly is created by the analytical models used to estimate the WACC, rather than simply reflecting unusual market conditions.

205. This positive relationship between leverage and the estimated cost of capital is a potentially serious anomaly as it is inconsistent with the behaviour of firms in workably competitive markets. That is, firms in competitive markets do issue debt and, so long as the debt levels are prudent, are considered to be acting rationally when they do so.

206. During the IMs consultation process, PwC (for the Electricity Networks Association and Telecom) identified two options to overcome the leverage anomaly: use the leverage of the sample of comparator companies, or use non-zero debt betas.

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133 This is the context normally set out in textbooks when discussing the use of the classical CAPM to estimate the cost of equity, as an input to estimating the WACC.

134 The debt premium itself is a function of leverage. That is, the debt premium would be expected to increase as leverage increases.

135 If the value for the debt premium incorporated in the estimated cost of debt is sufficiently high, the resulting estimate of WACC can increase as leverage increases, even if the cost of equity is estimated using the classical CAPM.

207. Debt beta measures a firm's systematic risk associated with borrowing, and is measured by the sensitivity of the returns on corporate debt to movements in returns on the market portfolio of all assets.[136] PwC submitted that:[137]

> If debt betas are to be excluded from the WACC analysis (which we concur with), then to be consistent the notional leverage used in the WACC estimation should be close to the average leverage of the comparator companies used to derive the (average) beta estimate. This is a fundamental requirement in order to be able to justify application of a "short cut" approach and thus ignore debt betas.

208. We recognise that the greater the riskiness of debt, the more it resembles equity. Therefore, the greater the systematic risk of debt due to market conditions, the greater is the debt beta.[138] Consequently, in principle, debt betas should be included in the cost of capital calculation. The use of non-zero debt betas is theoretically more sound than using notional leverage as the use of non-zero debt betas would reduce the extent to which the post-tax WACC estimate for each service varies with leverage.

209. However, we noted at the time of the IMs that most submissions preferred the use of zero debt betas, that most regulators do not use debt betas (though a minority do), and that we had not used non-zero debt betas in the past.[139] Further, there are practical difficulties in accurately estimating debt betas. Those challenges to the use of non-zero debt betas remain.

210. In its original report, Oxera proposed using a positive value for debt beta. In particular, Oxera noted that Chorus' actual gearing of over 60% (which had consistently risen over the period of analysis), was materially above a notional gearing assumption of 40%, that Chorus' gearing had risen over the period, and Chorus had a credit rating below Oxera's recommended credit rating (of A-/BBB+).

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136 In principle, the market portfolio should encompass all assets in the economy, including debt and equity securities, as well as those assets that are traded and untraded.

137 Electricity Networks Association "Submission on the Draft Input Methodologies Cost of Capital (Electricity Distribution Businesses and Gas Pipeline Businesses) Determinations and Draft Reasons Papers", Attachment: PricewaterhouseCoopers "Submission on the Cost of Capital parameter estimates in the Commerce Commission's Draft Electricity Distribution Services Input Methodology Determination: a report prepared for Electricity Networks Association" 13 August 2010, p. 8; Telecom Limited "Submission on the Draft Input Methodologies Cost of Capital (Electricity Distribution Businesses and Gas Pipeline Businesses) Determinations and Draft Reasons Papers", Attachment: PricewaterhouseCoopers "Submission on Cost of Capital Material In the Commerce Commission's Draft Input Methodologies Determination and Reasons Paper: a report prepared for Telecom New Zealand Limited" 13 August 2010, p. 10.

138 While considerable attention has been given to investigating the riskiness of common stocks, comparatively little empirical work has been done to measure the systematic risk of debt. Many analysts also assume a zero value for debt beta when estimating the cost of capital.

139 Notably, the Queensland Competition Authority (see, for example, Queensland Competition Authority "Gladstone Area Water Board: Investigation of Pricing Practices, Final Decision" June 2010, pp.126-127. And see also the UK Competition Commission (UK) "A report on the economic regulation of the London airports companies (Heathrow Airport Ltd and Gatwick Airport Ltd)", Appendix F - Cost of Capital, paras [88-90] 28 September 2007, pp. F21-F28. Ofcom, "Fixed Access Market Reviews: Draft Statement" 19 May 2014, Annex A14.109-A14.121.

Accordingly, Oxera considered there might be a sufficiently material impact on the analysis and proposed using a debt beta of between 0.05 and 0.10.

211. By contrast, we have not placed primary weight on Chorus' beta, and Chorus' leverage has much less influence on our analysis (which uses a sample of comparator companies with average leverage much lower than Chorus), than it did on Oxera's analysis of beta (which focussed on Chorus).

212. Further, as demonstrated in the IMs reasons papers, if we assume a value of leverage in line with that observed for the respective sample of comparator companies, then the cost of capital estimated will be the same for those services regardless of the value assumed for the debt beta.

213. Accordingly, we do not think there is any need for us to estimate a value for debt beta if we adopt the average leverage of the revised comparator sample.

214. In its submission on the December 2014 draft decision, Chorus argued that leverage of 50% is appropriate, giving more weight to its own observed leverage.[140] Chorus suggested that this approach is used by the ACCC, Ofcom, and most of the European regulators.[141] This position was reiterated in Chorus' submissions in February 2015 and August 2015.

215. However, our view was that notional leverage (determined by reference to the average leverage of the sample of comparator companies used to estimate asset beta) is more appropriate than using Chorus' actual leverage. As noted in paragraph 53 above, when estimating WACC for UCLL and UBA, we are estimating the cost of capital for a hypothetical efficient operator of these services (rather than Chorus). Using notional leverage based on the average of the comparator sample will also ensure:

    215.1 the WACC estimates for UCLL and UBA do not vary with leverage, as we do not consider that the actual cost of capital does in fact increase with leverage (so long as leverage is at prudent levels);[142]

    215.2 consistency with how we have set other WACC parameters for UCLL and UBA, especially asset beta; and

    215.3 Chorus does not have an incentive to increase its leverage, in order to increase the allowed WACC (and therefore, the resulting UCLL and UBA prices).

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140 Chorus "Submission for Chorus in response to Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services and Process and Issues Update Paper for the UCLL and UBA Pricing Review Determinations" CONFIDENTIAL, 20 February 2015, paras [581-595].

141 Chorus also suggest refinement of Oxera's comparator sample, by excluding firms where:
- observed gearing is significantly different to that allowed by the regulator; and
- the market debt to capital ratio is significantly different from its book debt to capital ratio.

142 See paragraphs 200to 215 above for discussion on the leverage anomaly.

Our mid-point post-tax WACC estimate for UCLL and UBA

216. Overall, we have estimated a mid-point post-tax WACC of 5.56%, as at 1 September 2015, for the final UCLL and UBA pricing reviews. The parameters used to generate our WACC estimate for UCLL and UBA are summarised in Table 5 below.

217. For ease of comparison, Table 5 also includes the parameter values used to generate the mid-point post-tax WACC estimates of 6.47% contained in our December 2014 draft decision and 6.03% contained in our July 2015 further draft decision. The WACC estimates for the December 2014 draft and July 2015 further draft decisions were estimated as at 1 August 2014 and 1 April 2015 respectively.

Table 5: UCLL and UBA WACC estimates

Parameter	Estimate for December 2014 draft	Estimate for July 2015 further draft	Estimate for December 2015 final
Risk-free rate	4.19%	3.26%	2.74%
Debt premium	1.85%	1.75%	1.85%
Leverage	43%	37%	38%
Asset beta	0.40	0.45	0.43
Debt beta	0.00	0.00	0.00
TAMRP	7.0%	7.0%	7.0%
Corporate tax rate	28.0%	28.0%	28.0%
Investor tax rate	28.0%	28.0%	28.0%
Debt issuance costs	0.25%	0.25%	0.25%
Cost of executing interest rate swaps	0.04%	0.08%	0.08%
Equity beta	0.70	0.71	0.69
Cost of equity	7.92%	7.32%	6.80%
Cost of debt	6.33%	5.34%	4.92%
Post-tax WACC (mid-point)	**6.47%**	**6.03%**	**5.56%**

Note: We calculate the cost of debt as the risk-free rate + debt premium + debt issuance costs + swap costs. The cost of equity is calculated as the risk-free rate × (1- investor tax rate) + the equity beta × the TAMRP. The mid-point post-tax WACC is calculated as the cost of debt × (1 – corporate tax rate) × leverage + cost of equity × (1 - leverage). Equity beta = asset beta/(1 - leverage).

Should an adjustment be applied to the mid-point WACC estimate?

218. This section explains the reasons why we have not applied an uplift or downwards adjustment to our central estimate of WACC for the UCLL and UBA services.

219. We currently apply an uplift to the mid-point WACC for electricity lines and gas pipelines services regulated under Part 4 of the Commerce Act, to mitigate the risk of under-investment in network quality leading to major supply outages.[143]

220. However, the context and statutory framework for regulation of UCLL and UBA is different from price-quality path regulation under Part 4 of the Commerce Act. This includes a difference in the underlying model used, with a TSLRIC model used for UCLL and UBA, and a regulatory asset base (RAB) model for price-quality path regulation. The services are also of a different nature and have varying levels of alternative services as substitutes.

221. We consider that the case for applying a WACC uplift to incentivise further investment is much weaker for UCLL and UBA (relative to electricity lines and gas pipelines). In particular, this is because:

    221.1 under TSLRIC pricing, new investment undertaken by Chorus does not affect the regulated price-caps, which suggests that a WACC uplift is less likely to materially affect Chorus' incentives to invest in UCLL/UBA. This differs from the situation under Part 4 of the Commerce Act, where new investment is rolled into the RAB; and

    221.2 for UCLL and UBA, the presence of substitutes (eg, mobile networks) reduces the impact on consumers of outages on the copper network. Further, outages are likely to be relatively localised, given that these services relate to the access network rather than the core network.

222. In our view, the strongest justification for departing from the mid-point WACC for UCLL and UBA relates to incentives to invest in innovative new telecommunications services that have yet to be deployed.

    222.1 Applying a WACC uplift for UCLL and UBA could potentially send a signal to investors in such new innovative services that the risk of under-estimation of the allowed WACC is reduced (relative to the situation where no uplift was applied) which, in turn, could lead to a lower risk of delayed deployment of new telecommunications services in New Zealand.

    222.2 The impact of delayed deployment of new telecommunications services could be significant, particularly where these new services offer material benefits to consumers that will not otherwise be realised.

223. However, we consider that there is insufficient evidence regarding the link between applying a WACC uplift for the UCLL and UBA services, and benefits associated with

[143] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" 30 October 2014.

reducing the risk of delayed deployment of new telecommunications technologies in New Zealand, to justify the certain higher costs to consumers. Therefore, we consider that applying an uplift to the mid-point WACC estimate would not best give effect to the section 18 purpose statement.

224. In reaching this conclusion we considered quantitative evidence regarding the potential costs and benefits of applying a WACC uplift for the UCLL and UBA services, including a report from Oxera that we commissioned on this subject (and on which we sought submissions). However, we consider that the quantitative modelling ultimately suggests that the link between a WACC uplift for UCLL/UBA under a TSLRIC pricing principle and incentives to invest in innovative new telecommunications services is too uncertain to justify an uplift (compared to the increased cost to consumers, which is relatively certain). For example, Oxera noted that:[144]

> …the evidence [in support of an uplift] is not strong, and requires significant speculation about the nature and scale of benefits of future innovation, and, therefore, does not contradict the continued use of a midpoint WACC for UCLL/UBA.

225. Although several submissions suggested changes to Oxera's quantitative modelling, we consider that the key deficiency in the argument for an uplift is the significant uncertainty regarding the strength of any causal link between an uplift and accelerated investment. Irrespective of potential tweaks to other assumptions, this leads us to the conclusion that the benefits are too uncertain to justify applying an uplift.

226. Further, when evaluating the submissions, Oxera found that no compelling evidence had been presented that would lead it to change the assumptions contained within its June 2015 report, or its conclusions based on the model.[145] After reviewing Oxera's model and associated submissions, Professor Vogelsang also found the evidence for applying an uplift was not strong.[146]

227. We have also considered whether it would be appropriate to apply a downwards adjustment to the mid-point WACC estimate. As explained in paragraphs 321 to 330 below, we have concluded that such an adjustment would send negative investment signals, such that a downwards adjustment would not promote competition for the long-term benefit of end-users. Accordingly, we consider that a downwards adjustment is not appropriate.

228. Chapter 5 of the UCLL pricing review determination also considers whether an uplift should be applied to the overall TSLRIC price for the UCLL service, to promote positive network effects from faster migration to fibre. However, we concluded that:

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144 Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 37.

145 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services" November 2015, p. 1-2.

146 Professor Ingo Vogelsang "Review of Oxera's Report, Is a WACC uplift appropriate for UCLL and UBA?" 29 June 2015, para [9]; and Professor Ingo Vogelsang "Review of some Submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, para [61-71].

228.1 departing from the central TSLRIC estimate would not best give effect to the section 18 purpose statement, because the positive network effects from faster migration to fibre are unlikely to outweigh the welfare losses from higher prices for copper-based services; and

228.2 even when the potential benefits from a WACC uplift (including investment benefits) and from an uplift to the TSLRIC estimate (including the promotion of migration to fibre) are taken together, applying an uplift to the regulated price (implemented by way of a WACC uplift) would not promote the section 18 purpose statement.

229. The rest of this section discusses in more detail the factors we considered when reaching the view that the mid-point WACC estimate should be applied, including:

229.1 our framework for considering whether to depart from the mid-point WACC estimate, including the key questions we considered and the welfare standard adopted when assessing quantitative modelling;

229.2 whether there is any reason to depart from the mid-point WACC estimate, based on our assessment of the potential role of a WACC uplift across different categories of investment;

229.3 the available quantitative evidence, including the Oxera model and associated submissions;

229.4 the role of international regulatory precedent regarding WACC uplifts;

229.5 other contextual factors associated with the approach to setting prices for UCLL and UBA which are likely to reduce the need for a WACC uplift;

229.6 possible reasons for setting WACC below the mid-point estimate; and

229.7 our response to Sapere's submission (for Chorus) regarding alleged "time-inconsistency" associated with not applying a WACC uplift for UCLL and UBA.

Framework for considering whether to make an adjustment to the mid-point WACC

230. There are two main aspects to our framework for deciding whether to make an adjustment to the mid-point WACC estimate:

230.1 the key questions we have considered, reflecting the approach taken in our 2014 WACC percentile review for energy businesses; and

230.2 whether a consumer welfare or total welfare standard should be applied when undertaking quantitative analysis of the WACC percentile.

Key questions we have considered when deciding whether to make an adjustment to the mid-point WACC estimate

231. In our 2014 review of the WACC uplift for electricity lines and gas pipeline businesses, we considered that there were two primary questions that needed to be addressed.[147]

231.1 Is there any reason to depart from the mid-point WACC estimate (ie, the best parameter-based estimate we have of the cost of capital)?

231.2 If so, what is the most appropriate percentile?

232. We consider that these two primary questions remain appropriate when deciding whether to depart from the mid-point WACC estimate for UCLL and UBA. Although this decision is made under the Telecommunications Act (rather than the Commerce Act), our view is that this two-part framework is still relevant in the context of UCLL and UBA.

233. Determining whether there is any reason to depart from the mid-point requires consideration of whether there is asymmetry in terms of the expected losses from under- and over-estimating WACC (given that the actual WACC is not observable, so must be estimated).[148]

234. If the expected losses are broadly symmetric, then we should apply the mid-point WACC estimate. However, if the expected losses are asymmetric, there may be a case for selecting a WACC percentile estimate that reflects this asymmetry. Even if such an asymmetry is identified, consideration needs to be given to whether a WACC uplift is the best tool to address the asymmetry.[149]

235. We currently use the 67th percentile WACC estimate for price-quality path regulation of electricity lines and gas pipelines businesses, because we expect the costs to consumers of under-estimating WACC to be greater than the costs to consumers of over-estimating WACC.[150]

236. In the Part 4 context, the main reason for setting a WACC percentile above the mid-point is to mitigate against the risk of under-investment relating to service quality generally, and contributing to major supply outages in particular. Our expert advisor

147 Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" 30 October 2014, p.28, para [2.6].

148 Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" 30 October 2014, p. 38-39, paras [3.6-3.10].

149 For example, our WACC percentile decision for electricity lines and gas pipeline businesses considered the role of a WACC uplift compared to other possible tools (such as required quality standards), across different categories of investment. Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" 30 October 2014, pp. 89-95, paras [5.53-5.77].

150 For further details see Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" 30 October 2014.

during the WACC percentile review for electricity lines and gas pipelines, Oxera, noted that:[151]

236.1 the potential costs to consumers of major electricity supply outages are material, stating that "evidence from actual events and analysis of potential events in other countries suggests that a severe outage event resulting from underinvestment could result in a cost with an annualised economic value equivalent to over NZ$1bn"; and

236.2 some WACC premium for customers to reduce the risk of under-investment in network quality appears "reasonable and proportionate".[152]

237. We have considered possible sources of asymmetry from under- and over-estimating the WACC in the context of the UCLL and UBA pricing reviews (including the TSLRIC objectives).[153] However, for the reasons discussed below, we consider that there is no strong justification for departing from the mid-point WACC estimate.

We have considered both consumer and total welfare approaches

238. When conducting quantitative analysis of whether a WACC uplift should be applied, it is necessary to consider whether a "consumer welfare" (ie, consumer surplus) or "total welfare" (ie, consumer surplus plus producer surplus) standard should be applied.

238.1 A total welfare standard is consistent with an objective of maximising economic efficiency benefits for both consumers and producers, where any distributional benefits (or costs) associated with transfers of wealth between consumers and producers due to price changes are ignored.

238.2 A consumer welfare standard is consistent with maximising benefits to consumers only, from both an efficiency and distributional standpoint. In particular, any financial benefit consumers might receive due to avoiding wealth transfers associated with producers setting higher prices in future will be taken into account.

239. Section 19 of the Telecommunications Act requires us to consider the purpose set out in section 18, and make a determination that we consider best gives or is likely to give effect to the section 18 purpose statement, which is:

> …to promote competition in telecommunications markets for the long-term benefit of end-users of telecommunication services within New Zealand by regulating, and providing for the regulation of, the supply of certain telecommunications services between service providers.

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151 Oxera "Input methodologies: Review of the '75th percentile' approach" 23 June 2014, p.6.

152 As discussed in paragraphs 259 to 265 below, we also note that under the RAB-based approach for setting price-quality paths under Part 4 of the Commerce Act, incremental investment undertaken by regulated suppliers directly increases the value of the asset base used to set future prices. Therefore, both the benefits and costs of incremental investment in network reliability are borne by consumers.

153 In particular, the efficient cost recovery objective: "A TSLRIC-based price can allow the service provider to recover only costs efficiently incurred, including through providing a normal return on efficient investment".

240. Therefore, when assessing quantitative modelling, we have considered whether the resulting estimates are consistent with the long-term benefit of end-users of telecommunications services, as specified in section 18. We consider that both consumer surplus and total surplus are relevant to the promotion of competition for the long-term benefit of end-users. In particular, while consumer surplus might appear to be the economic concept most closely connected to the language of section 18, we consider total surplus is relevant where it incorporates long-term benefits to end-users not otherwise captured by a more static consumer welfare measure.

241. This approach is consistent with the July 2015 further draft determinations, where we stated:[154]

> …it may be appropriate in practice to give some weight to producer surplus. However, this would only be to the extent producer surplus provides an appropriate proxy for some otherwise difficult to quantify (or unquantifiable) long-term (net) benefit to consumers, in particular as an indicator of the margin for error regarding incentives to invest.
> …
> In practice, we are not convinced, in the quantitative models provided, that the differences between the total welfare and consumer welfare estimates were due to factors other than a transfer of wealth from consumers to producers. This leads us to the view that the consumer welfare standard is appropriate in this case. As noted above, this is consistent with the approach taken in the regulation of electricity lines and gas pipelines businesses.

242. We consider that our approach is generally consistent with the submission from Wigley and Company, who stated that:[155]

242.1 the approach taken by the Commission should be based on the words of the Telecommunications Act, rather than in economic concepts such as consumer and total welfare;

242.2 economic concepts can only be a contextual aid when interpreting the words of the Act (and only if necessary, because the true meaning cannot be deduced from the Act overall); and

242.3 more weight should be placed on consumer welfare, capturing both the static and dynamic efficiencies. Where dynamic efficiencies cannot be captured, producer surplus may be considered, with caution, as part of a proxy approach.

243. Chorus submitted that section 18 requires us to apply a total welfare standard, as this best secures the long-term benefit of end-users by incentivising investment and innovation.[156] According to Chorus, the long-term benefit of end-users is served by

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154 Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, pages 56-57, paras [239.3 and 241].

155 Wigley and Company "Cross-submission in relation to UCLL and UBA draft pricing review determinations" 24 September 2015, paras [1.6, 2.23 and 2.28].

156 Chorus "Submission for Chorus in response to Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services (2 July 2015)" 13 August 2015, para [240].

promoting economic efficiency, which requires a total welfare standard. Chorus referred to Sapere's advice that promoting competition within a total welfare standard leads to long-term benefits for consumers and is well-accepted by economists.[157]

244. In its submission on the July 2015 further draft determinations, Sapere argued that a total welfare standard is required by the legislative history, case law and economics of section 18 of the Telecommunications Act. In particular, Sapere submitted that:[158]

244.1 Section 18 of the Telecommunications Act was intended to have the same meaning as section 1A of the Commerce Act.

244.2 The concept of "long-term benefit of end-users" in section 1A has been interpreted as a total welfare standard.

244.3 Unlike Part 4 of the Commerce Act, section 18 does not include an explicit provision to limit the ability of suppliers to extract excessive profits and so there is no reason to interpret section 18 as requiring anything other than a total welfare standard.

244.4 From an economic perspective, the Commission can be confident that applying a total welfare standard would lead to long-term benefits to end-users. A consumer welfare approach would negatively impact on dynamic efficiency and incentives to invest, require the Commission to impose its own distributional preferences at the expense of economic efficiency, and endorse the view that in promoting competition for the long-term benefit of consumers it was sometimes best to make everyone in society worse off.

244.5 Applying a consumer welfare, rather than total welfare, standard will make society worse off by $80m to $170m.

245. We disagree with Chorus and Sapere's view that section 18 requires us to apply a total welfare standard. As noted above, we have not simply adopted a consumer welfare approach to section 18 at the expense of total welfare and efficiency considerations.

245.1 We have approached section 18 on the basis that the promotion of competition for the long-term benefit of end-users of telecommunications services is the dominant provision in section 18, and that efficiency considerations and incentives to invest help us consider whether competition is being promoted to this end.[159]

245.2 When conducting quantitative analysis to see whether a WACC uplift would promote competition for the long-term benefit of end-users of telecommunications services, we have considered the impact of a WACC uplift on both consumer welfare and total welfare.

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157 Chorus "Submission for Chorus in response to Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services (2 July 2015)" 13 August 2015, para [241].

158 Sapere "Economic Comment on UCLL and UBA Pricing Issues" 11 August 2015, paras [38, 39, 44-46, 52, 55-59, 62-65, 68].

159 Commerce Commission "Further draft pricing review determination for Chorus' unbundled copper local loop service" 2 July 2015, p. 39-40, paras [141-147].

245.3 In particular, we acknowledge that a static assessment of consumer welfare may not capture efficiency or other benefits to consumers that occur over the long-term through, for example, innovation or quality improvements.

245.4 Accordingly, where estimates of consumer and total welfare differ, we have considered whether this is due to factors that may provide long-term benefits to end-users that would not otherwise be captured in the analysis.

245.5 However, where the differences reflect a transfer of wealth from consumers to producers due to higher prices, without being likely to induce additional innovation and investment that will provide benefits to consumers, we consider that consumer welfare provides a better basis for assessing the long-term benefit of end-users.

245.6 We have not been convinced that the differences between total and consumer welfare in the Oxera model were due to factors other than a simple transfer from consumers to producers that would not be in the long-term benefit of end-users. Therefore, we have found the consumer welfare standard more helpful in this case.

246. Our approach to considering the appropriate welfare standard can be illustrated by considering differences between the Oxera model and models based on the Dobbs (2011) framework.[160]

246.1 When considering models based on the Dobbs framework, we have previously highlighted the difficulties in assessing the appropriate WACC percentile using a static consumer surplus approach. For example, in the July 2015 further draft determinations, we noted that CEG's March 2015 model (based on an amended version of the Dobbs model) directly modelled the benefits to consumers of new services, but failed to address the expropriation of sunk costs when reporting consumer welfare results.[161] This is because the model reported *short-term* consumer surplus estimates, which did not take into account the possible longer-term detriment to consumers if prices were set too low (given the impact this could have on the level of investment from suppliers etc).

246.2 The Oxera model, on the other hand, quantifies benefits and costs to consumers over time, resulting from a WACC uplift bringing forward beneficial investment. In effect, this model attempts to directly quantify the dynamic efficiency benefits which would accrue to end-users, and compares these benefits to the costs associated with the uplift. We consider the Oxera approach to be more consistent with the section 18 purpose statement, given that the focus is on *long-term* benefits to consumers, rather than simply maximising *short-term* consumer surplus.

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[160] Dobbs, I., 2011. "Modelling Welfare Loss Asymmetries Arising from Uncertainty in the Regulatory Cost of Finance" Journal of Regulatory Finance 39, p.1-28.

[161] Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, p. 75, para [303.1]

247. Similarly, DotEcon (for Spark and Vodafone) disagreed with Sapere's submission, noting that the "…important differentiation between short-term and long-term effect seems to be largely absent from Sapere's discussion".[162]

248. Regarding Sapere's submission that applying a consumer welfare standard will make society $80m to $170m worse off, we note that:

248.1 Sapere's analysis based on a total welfare standard implies that the probability-weighted net benefits increase with the level of the uplift. The net benefits are maximised at the 95th percentile WACC estimate, which is the maximum percentile presented in the results.[163]

248.2 However, given that a total welfare standard is applied, transfers between consumers and Chorus are not counted as a cost of the uplift. Based on Oxera's modelling, at the 95th percentile WACC estimate consumers would incur additional costs of approximately $150m per annum on the existing network alone.[164] Sapere's total welfare analysis does not take into account these additional costs that would be incurred by consumers.

248.3 In our view, setting the WACC at the 95th percentile (as Sapere's total welfare analysis would suggest) would clearly not be in the long-term benefit of end-users of telecommunications services. We consider that Sapere's analysis is inconsistent with the purpose of the Telecommunications Act.

249. In terms of the other points raised by Sapere:

249.1 In our view, there is no absolute rule as to how wealth transfers should be treated in assessing the long-term benefit of end-users under section 1A or section 18. Rather, the appropriate approach will depend on the circumstances.[165]

249.2 Part 5 of the Commerce Act allows the Commission to authorise mergers that would likely result in a substantial lessening of competition if this is outweighed by benefits to the public.

249.3 In contrast, the Telecommunications Act addresses concerns about monopoly rents and the lack of competition to drive them out by establishing an access regime to promote competition for the long-term benefit of end-users. This means that distributive issues ought to be considered since it is unlikely to be possible to rely on the interplay of competitive forces to ensure appropriate treatment of any surplus.[166]

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[162] DotEcon "A review of "Economic Comment on UCLL and UBA Pricing Issues" by Sapere Research Group" September 2015, p. 14.

[163] Sapere "Economic Comment on UCLL and UBA Pricing Issues" 11 August 2015, Table 3, page 39.

[164] Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, Table 3.1, p. 15.

[165] Commerce Commission "Section 64 review and schedule 3 investigation into unbundling the local loop network and the fixed public data network: Final report" December 2003, para [37].

[166] Commerce Commission "Section 64 review and schedule 3 investigation into unbundling the local loop network and the fixed public data network: Final report" December 2003, paras [30-59]; Commerce

249.4 In this sense, the setting of access prices under the Telecommunications Act involves similar considerations to the regulation of existing market power under Part 4 of the Commerce Act (noting that one of the roles of the TSLRIC approach is to limit the service provider's ability to set prices at the monopoly level) and it is appropriate for us to consider and give weight to distributional effects.[167]

249.5 The Telecommunications Act prohibits the use of the "Baumol-Willig" efficient component pricing rule (ECPR) when implementing a forward-looking cost-based pricing principle (either IPP or FPP).[168] This appears to be clear guidance that the regulated prices were introduced to constrain monopoly pricing. In addition, the TSLRIC approach should constrain monopoly pricing under the FPP framework.

249.6 We are not imposing our own distributional preferences at the expense of economic efficiency, but rather considering whether a WACC uplift would promote competition for the long-term benefit of end-users of telecommunications services as required by sections 18 and 19 of the Telecommunications Act.

250. We also note that there appears to be a difference of views regarding the appropriate welfare standard between expert advisors working on behalf of Chorus.

251. Sapere claims that the view that a total welfare standard is consistent with the long-term benefit to consumers is well-accepted in the economic literature. This view is at odds with Professor Hausman's submission on behalf of Chorus, where he stated that "Economists have determined that consumer welfare should be the goal of regulation" and that "The consumer welfare standard of economists is very similar to the long-term benefit of end-users' (LTBE) approach used in the NZ Telecommunications Act".[169]

252. Professor Hausman later repeated his view "that the consumer welfare standard is the correct standard to evaluate telecommunications policy and regulation", adding that it is crucial that consumer welfare be evaluated over the correct timeframe.[170]

> In my view in [sic] concept of the "long-term benefit of end-users" (LTBE) the word "long-term" is very important because it incorporates the effects of investment. In economics "long-term" means taking

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Commission "Reconsideration final report on whether mobile termination should become a designated or specified service" 21 April 2006, paras [42-47].

167 Commerce Commission "Reconsideration final report on whether mobile termination should become a designated or specified service" 21 April 2006, paras [52-54]; Powerco Ltd v Commerce Comission [2008] NZCA 289, paras [30-32].

168 Clause 2 of Schedule 1 of the Act. Under the Baumol-Willig rule (also known as retail-minus pricing), regulated access prices are set by starting with the vertically-integrated incumbent operator's retail prices, and subtracting the costs avoided when providing a wholesale access service (rather than the retail service).

169 Professor Hausman "Response to the Commerce Commission's Draft Determination on Uplift" 18 February 2015, paras [16-17].

170 Professor Hausman "Clarification as to what welfare standard I think is required for the Commission's analytical framework of potential TSLRIC and/or WACC uplifts" 1 May 2015, paras [4- 5].

into account a period long enough so that the capital stock changes, and is not fixed, as it is in the short-term.

253. We have noted previously that we broadly agree with Professor Hausman's view that it is appropriate to focus on the potential changes to consumer welfare when implementing *ex ante* regulation through a cost-based pricing determination.[171] We also agree that in determining a forward-looking TSLRIC-based price, the "long term" must be considered to ensure that regulated prices take into account the efficient forward-looking costs of supplying the regulated service and provide incentives for investment. This is discussed in more detail in Chapter 5 of the UCLL and UBA FPP final determinations.[172]

Is there any reason to depart from the mid-point WACC estimate?

254. This section considers whether to make an adjustment to the mid-point WACC estimate for the UCLL and UBA services. We have considered whether to depart from the mid-point WACC estimate given the:

254.1 inherent uncertainty in estimating WACC. The WACC we apply is an estimate, because the actual cost of capital is not observable. Therefore, our WACC estimate could be higher or lower than the true WACC; and

254.2 potential asymmetries in terms of the expected losses from under- and over-estimating WACC (given that the actual WACC is not observable, so must be estimated).

255. When determining whether there is any reason to depart from the mid-point WACC estimate, we have considered the potential role of a WACC uplift across different categories of investment (given the potential asymmetries in terms of the expected losses from under- and over-estimation, as indicated above). The main categories we considered are:

255.1 investment in maintaining, upgrading and expanding Chorus' existing copper network; and

255.2 investment in new telecommunications services, either by Chorus or other parties.

256. Based on our analysis of these two categories of investment, our view is that there is no strong reason to depart from the mid-point WACC estimate for the UCLL and UBA services. Our reasons are discussed below.

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171 Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews" 2 July 2015, paras [239, 241].

172 Commerce Commission "Final pricing review determination for Chorus' unbundled cooper local loop service" 15 December 2015, Chapter 5 and Commerce Commission "Final pricing review determination for Chorus' unbundled bitstream access service" 15 December 2015, Chapter 5.

257. Given that we have determined there is no reason to depart from the mid-point WACC, it has not been necessary to specifically consider the question set out in paragraph 231.2 above (ie, "If so, what is the most appropriate percentile?").

Investment in maintaining, upgrading and expanding Chorus' existing copper network

258. Our view is that there is limited justification for a WACC uplift to incentivise further investment in Chorus' copper network.

259. In reaching this view, we note that the context for UCLL and UBA regulation is different to price-quality path regulation under Part 4, where we currently apply the 67th percentile WACC estimate for energy businesses. For example:

    259.1 The regulated price-caps for UCLL and UBA are set using a TSLRIC methodology. Price-quality paths under Part 4 of the Commerce Act, on the other hand, are determined using a RAB-based approach.

    259.2 The services are of a different nature and have varying levels of alternative services available as substitutes. Under Part 4, the focus is on investment undertaken by the incumbent suppliers, given that there is generally little or no prospect of competition.[173] Investment incentives for access seekers and alternative networks are much more relevant for UCLL and UBA, due to greater potential for competition.

260. In our view, differences between TSLRIC and RAB-based approaches to setting regulated prices, in terms of their treatment of additional investment undertaken by regulated suppliers, significantly reduce the case for applying a WACC uplift for investment in UCLL and UBA.

    260.1 Under a RAB-based approach, investment undertaken by regulated suppliers directly increases the value of the asset base used to set future prices. New investment is rolled into the RAB when prices are reset at the end of the regulatory period (and during the regulatory period, for Transpower major capex). Given that new investment enters the RAB, and directly impacts allowed revenues, regulated suppliers benefit from an incremental revenue stream resulting from undertaking additional investment.

    260.2 Under our TSLRIC model, regulated prices are set based on the costs a hypothetical efficient operator would incur in providing the relevant services, rather than the actual costs incurred by the service provider. The asset base used to determine regulated prices is largely independent of the service provider's actual network. Therefore, new investment undertaken by the service provider does not have a *direct* impact on the price-caps for the relevant regulated services. However, this also means that TSLRIC-based prices generate strong cost-minimisation incentives for the regulated supplier.

[173] We note that there are emerging technologies in the energy sector that could potentially impact on the competitive pressure faced by electricity distribution businesses.

261. In the TSLRIC context, there is no direct link between new investment in the UCLL/UBA services and higher regulated prices. In this situation, a WACC uplift is less likely to have a material impact on the service provider's investment incentives in respect of these services, relative to a RAB-based approach. In turn, this means that a WACC uplift under TSLRIC is materially less likely to promote competition for the long-term benefit of end-users, through incentivising the incumbent supplier's investment.

262. Although there is no direct link between new investment and regulated prices under TSLRIC, that does not mean that TSLRIC prices are unable to incentivise additional investment. For example, new investment may generate incremental volume (or avoid a loss of volume), the value of which will depend on the regulated TSLRIC price that is set (which in turn, depends on the allowed WACC).

263. A 2011 paper by Warwick Davis (from Frontier Economics), discussing the ACCC's proposal to move away from TSLRIC, highlighted difficulties in incentivising new investment under TSLRIC pricing.[174] He referred to the following (2006) quote from Telstra's Regulatory Affairs Manager:[175]

> …the TSLRIC models [are] actually already optimised, so the cost pool out of which access prices are determined is already in place and in fact is already almost a [FTTN] network. What that means is that we could spend multiple billions of dollars doing a [FTTN] roll-out – multiple billions – and the total cost pool we are allowed to recover from wholesale and retail prices would not go up a jot.

264. Use of a TSLRIC approach to setting UCLL and UBA prices is also likely to reduce the risk of over-investment in these services. As noted by Professor Vogelsang:[176]

> CEG is correct that over-investment in copper is unlikely under a too high price for UCLL/UBA. There will rather be less investment because of faster migration to UFB and to other competitors. Because it is based on the HEO and not the RAB, TSLRIC simply does not generate an Averch-Johnson effect. Even without an Averch-Johnson effect there is, however, still the negative effect of higher prices on consumers. Under-investment is also less of a problem than in an Averch-Johnson world because the firm is not rewarded with a lower rate base.

265. Given that additional investment undertaken by Chorus in UCLL and UBA will not directly affect the regulated price-caps, a WACC uplift would be less likely to incentivise further investment in these services (relative to a RAB-based approach).

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174 Davis, Warwick. 2011. 'From futility to utility – recent developments in fixed line access pricing'. Telecommunications Journal of Australia. 61 (2): pp. 32.1 to 32.16. Page 32.10 notes that "…as prices determined by the TSLRIC models would not rise when the substantial new investment was made, there was little incentive for Telstra to actually undertake the upgrade".

175 ACCC "Submission to the Department of Broadband, Communications and the Digital Economy - 'National Broadband Network: Regulatory Reform for 21st Century Broadband'" (June 2009), p. 46.

176 Ingo Vogelsang "Reply to Comments on my November 25, 2014, paper "Current academic thinking about how best to implement TSLRIC in pricing telecommunications network services and the implications for pricing UCLL in New Zealand" 23 June 2015, para [17]. The Averch–Johnson effect is the tendency of regulated companies to engage in excessive amounts of capital accumulation in order to expand the volume of their profits.

Therefore, any potential benefits from applying a WACC uplift for UCLL and UBA, in terms of additional investment in these services, are likely to be significantly reduced relative to the situation under Part 4. In our view, applying a WACC uplift would:

265.1 increase costs for end-users, because the higher WACC would be applied when determining the regulated price-caps for UCLL and UBA (based on the hypothetical efficient operator's costs); but

265.2 be unlikely to materially affect Chorus' incentives to invest in UCLL and UBA, because new investment actually undertaken by Chorus would not directly influence future prices.[177]

266. As discussed in the July 2015 further draft determinations, we also consider that the impact of outages for the UCLL and UBA services is likely to be significantly lower than for electricity lines services, further limiting the case for a WACC uplift to incentivise additional investment in Chorus' existing copper network. This is because:[178]

266.1 UCLL and UBA outages are likely to be relatively localised, given that these services relate to the access network. Prices for backhaul/transmission services, where network outages would be more likely to impact on a greater number of customers, are not within the scope of the current reviews.

266.2 The presence of substitutes (eg, mobile networks) reduces the impact on consumers of outages on the copper network. Although mobile networks may be dependent on fixed-line services (as noted in a previous submission by Houston Kemp), this dependency relates to backhaul/transmission services rather than the UCLL and UBA access services.[179]

266.3 Competitive pressure from other networks (such as mobile and fibre) may also help generate incentives to invest in maintaining the copper network, particularly in areas where Chorus is not the local fibre company (LFC).

267. However, Chorus submitted that our view regarding the severity of telecommunications outages is at odds with:[180]

267.1 the Minister initiating a review of outages in Canterbury following (localised) storms;

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177 However, for the reasons explained in paragraph 262 below, this does not mean TSLRIC prices are unable to incentivise additional investment in UCLL and UBA.

178 Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, paras [252-255].

179 Houston Kemp "Comment on the Commerce Commission's paper: Agenda and topics for the conference on the UCLL and UBA pricing reviews" 11 May 2015, p. 31.

180 Chorus "Submission for Chorus in response to Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services (2 July 2015)" 13 August 2015, p. 7.

267.2 the potential impact of an outage in Auckland, which would be localised but would affect a significant number of business and residential customers who rely on domestic and global connectivity and resilient broadband; and

267.3 the high vulnerability of the telecommunications regulatory framework of benchmarking and TSLRIC and its impact on incentivising investment, quality and price coherently (relative to RAB-based models).

268. Although we acknowledge the potential impact of outages for UCLL and UBA, our view remains that the impact of these is likely to be significantly less than for electricity outages for the reasons explained in paragraph 266 above. Further, for the reasons explained in paragraphs 259 to 265 above, we consider that differences between TSLRIC and RAB-based models mean that a WACC uplift is less likely to materially affect Chorus' incentives to invest in UCLL and UBA. Therefore, we agree with Oxera's approach of focussing on the potential impact of innovation when undertaking quantitative modelling, and not explicitly modelling the costs of outages.[181]

269. Regarding network expansion, capital contributions help cover the cost of any network new connections. Given that TSLRIC prices are based on average cost, regulated price-caps are expected to be above marginal cost, and there should be a strong incremental volume incentive for such investment to occur. This suggests no WACC uplift is required for this purpose.

270. Further, while it is not part of our core reasoning, we note that Professor Vogelsang has argued that the TSLRIC price is already "…likely to be substantially more than needed by Chorus for covering the cost of its copper access network".[182] Against this background, and recognising that we are not directly concerned with the incumbent's costs, we note that we have not been presented with evidence that our approach would result in a TSLRIC price that was insufficient to fund any investment required in the existing network.

271. For these reasons, our view remains that there is no strong justification for a WACC uplift to incentivise investment in maintaining, upgrading, or expanding Chorus' existing copper network. In turn, this means we consider that applying an uplift for this purpose would not best promote competition for the long-term benefit of end-users.

Investment in new telecommunications services

272. Previous submissions for Chorus have highlighted the importance of investment in new technologies. We agree that this is an important consideration, due to the rate

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181 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015, p. 14-15.

182 Ingo Vogelsang "Current academic thinking about how to best implement TSLRIC in pricing telecommunications network services and the implications for pricing UCLL in New Zealand" 25 November 2014, para [110].

of technological development in the telecommunications industry and potential benefits to consumers associated with investment in innovative new services.[183]

273. Although investment in innovative new services will typically not be captured by existing UCLL and UBA regulation, the decision regarding whether to apply an uplift to the mid-point WACC for UCLL and UBA could potentially send a signal to investors in telecommunications services more generally – particularly if there is the likelihood that the new service(s) could be regulated in the future.[184]

274. In principle, we consider there is potentially a case for an uplift to the mid-point WACC estimate for UCLL and UBA due to this signalling effect. This is because the UCLL and UBA prices we determine could potentially promote broader competition in telecommunications markets for the long-term benefit of end-users, through this signalling. Therefore, as discussed in paragraphs 290 to 298 below, prior to the July 2015 further draft determinations we commissioned Oxera to develop a quantitative framework for assessing the potential costs and benefits of applying a WACC uplift for UCLL and UBA.

275. However, based on our analysis in the July 2015 further draft determinations, we considered that the link between a WACC uplift for UCLL and UBA and innovation benefits relating to different services was highly uncertain. Figure 2 below describes several factors which are likely to influence the strength of this link.[185]

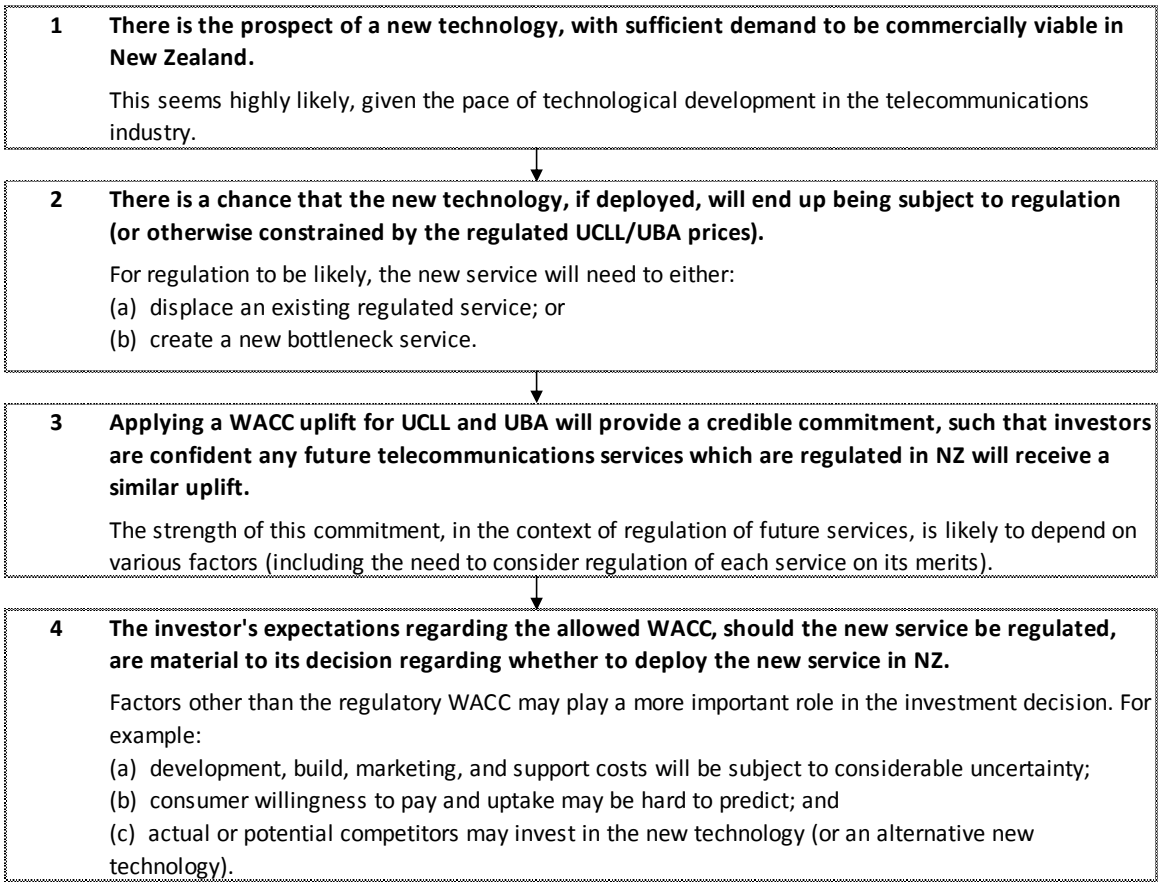
[183] Section 18(2A) of the Telecommunications Act requires us to consider the incentives to innovate that exist for, and the risks faced by, investors in new telecommunications services, when conducting our overall consideration of competition for the long-term benefit of end-users.

[184] The applicability of a WACC uplift to a new service would depend on the specific context and nature of regulation pertaining to that service.

[185] Professor Vogelsang previously noted that it is likely to be easier to show a relationship between the regulated access charge for an old service and the innovation incentives for other firms (relative to the innovation incentives for Chorus). This is because higher access charges for the old service will increase the incentives for other firms to replace the old service. However, the literature is ambiguous with respect to the incumbent's investment incentives, due to offsetting considerations (the wholesale revenue effect, and the migration effect). Ingo Vogelsang "Review of Oxera's Report, Is a WACC uplift appropriate for UCLL and UBA?" 29 June 2015, para [12].

Figure 2: Factors affecting the link between a WACC uplift for UCLL/UBA and innovation benefits from a new service

For the signal sent by applying a WACC uplift for the UCLL and UBA services to have a material impact on the speed of deployment of innovative new telecommunications services in New Zealand, the following things would need to occur:



276. Each of the factors listed in Figure 2 above is subject to varying degrees of uncertainty. The provider of the new service will weigh these uncertainties in deciding whether to invest in that new service. It is not at all evident that the presence or absence of an uplift to WACC for UCLL/UBA would be the factor which determines whether and when the provider would decide to deploy the innovative new service. As such, the connection between a WACC uplift for UCLL and UBA and benefits from reducing the risk of delayed deployment of new telecommunications services in New Zealand is uncertain.

277. In contrast, the costs to consumers of a WACC uplift are relatively certain and material. For example, we estimate that increasing the allowed WACC by 50 basis points (from 5.56% to 6.06%) would increase the combined UCLL and basic UBA monthly rental prices in the first-year of the regulatory period by approximately $1.68, from $41.19 to $42.87.

278. We have also considered the potential role of a WACC uplift in promoting fibre unbundling, given that a requirement of the UFB deployment was to allow for layer 1 unbundling in the future. However, more direct tools are likely to be much more effective in promoting fibre unbundling than a WACC uplift for UCLL/UBA. The direct

amendment of any future regulated fibre bitstream price (through a relativity requirement), or refraining from regulating fibre bitstream services, are possible examples. In particular, directly amending fibre bitstream prices (rather than amending copper prices) would be expected to:

278.1 reduce the overall costs incurred by end-users associated with an uplift, as higher costs would be incurred on fibre bitstream services only; and

278.2 avoid any potential distortions to the incentives for unbundling on the existing copper network (which could potentially impact fibre uptake).

279. Overall, we consider that the link between a WACC uplift for UCLL and UBA under the TSLRIC pricing principle and benefits from earlier deployment of new services is too weak and uncertain to justify an uplift, when compared to the certain (and potentially very large) cost to consumers. Nothing contained in the submissions on the July 2015 further draft determinations has changed this view.

280. Therefore, our view is that a WACC uplift for UCLL and UBA would not best give effect to the section 18 purpose statement.

Quantitative evidence regarding the appropriate WACC percentile

281. We also explored quantitative evidence regarding the appropriate WACC percentile for UCLL and UBA, when determining that there is no reason to depart from the mid-point WACC estimate.

282. Although the quantitative models have been useful for exploring the question of whether a WACC uplift should be applied, we ultimately consider that they also suggest the connection between a WACC uplift for UCLL/UBA and increased incentives to invest in innovative new telecommunications services is too uncertain to justify an uplift (compared to the increased cost to consumers, which are relatively certain).

283. In particular, there is significant uncertainty associated with the potential benefits of an uplift. This uncertainty associated with measuring the potential benefits of a WACC uplift reflects:

283.1 the uncertain connection under a TSLRIC pricing principle between applying a WACC uplift for UCLL/UBA and incentives to invest in new telecommunications technologies more generally (as discussed in paragraphs 272 to 280 above); and

283.2 a lack of information about key relationships and input values when attempting quantitative modelling (eg, the impact of the allowed regulatory WACC on the timing of investment in new technologies, and yearly benefits to consumers associated with new telecommunications services).

284. The discussion below outlines:

284.1 the quantitative models considered when determining whether there is any reason to depart from the mid-point WACC estimate for UCLL and UBA (noting that submissions on the July 2015 further draft determinations focussed on the Oxera model);

284.2 a summary of Oxera's June 2015 model, and Professor Vogelsang's peer review of that model;

284.3 responses to the main submissions received regarding Oxera's quantitative modelling.[186]

Quantitative models for considering a WACC uplift for UCLL and UBA

285. In the July 2015 further draft determinations, we considered three main quantitative models regarding whether an uplift should be applied to the mid-point WACC estimate for UCLL and UBA:

285.1 the model discussed in Attachment C of our April 2015 paper, which we constructed by adapting the approach Oxera used during the 2014 Part 4 WACC percentile review;

285.2 the model submitted by CEG (for Chorus) in March 2015, which was based on an amended version of the model originally developed by Professor Ian Dobbs in 2011; and

285.3 the model developed by Oxera in its June 2015 report, based on an amended version of the framework used in our 2014 review of the WACC percentile for electricity lines and gas pipelines businesses;

286. Oxera considered our model (as described in Attachment C of our April 2015 paper) in its June 2015 report, noting that if comparable assumptions to those used in its own modelling are adopted, our model suggests that there is no rationale for applying a WACC uplift.[187] In the July 2015 further draft determinations we noted that further modifications and enhancements could potentially be made to the model, but fundamentally the link was too uncertain to justify an uplift so we did not intend to update this quantitative analysis.

287. CEG presented an amended version of the Dobbs model in March 2015.[188] This model sought to estimate the welfare effects of misestimating WACC. Following peer review from both Professor Dobbs and Professor Vogelsang, we considered that limited weight should be placed on the results of CEG's model.

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186 Attachment A contains more detailed responses to submissions regarding the more technical aspects of Oxera's modelling.

187 Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 39.

188 CEG "Welfare effects of UCLL and UBA uplift" March 2015.

288. These models were not addressed in any detail in submissions on the July 2015 further draft determinations, so we have not undertaken any significant further analysis of them for this final determination. Further discussion of these two models can be found in the July 2015 further draft determinations.[189]

289. Rather, submissions on the July 2015 further draft determinations focussed on the June 2015 Oxera model. Therefore, the discussion below focusses on the Oxera model, and the key submissions that commented on it.

Summary of Oxera's June 2015 model

290. Prior to the July 2015 further draft determinations, we commissioned Oxera to consider the case for an uplift to the mid-point WACC for UCLL and UBA, by developing an amended version of the framework used for electricity lines businesses.

291. In the context of electricity lines businesses, Oxera's analysis focussed on the potential benefits of a WACC uplift in reducing the risk of under-investment in network quality, leading to major supply outages.[190] In that case, Oxera concluded that some WACC premium for customers to reduce the risk of under-investment in network quality appears "reasonable and proportionate".[191]

292. Oxera's framework for UCLL and UBA, on the other hand, focusses on the potential benefits of a WACC uplift in accelerating the deployment of new telecommunications services in New Zealand. This reflects Oxera's view that "while it is unlikely that a WACC uplift for UCLL and UBA on its own will lead to the creation of significant user benefits from innovation, it could reasonably affect the time at which these benefits materialise".[192]

293. In summary, Oxera's approach for considering a WACC uplift for UCLL and UBA involves the following key steps.

    293.1 **Estimating the direct costs of a WACC uplift.** The price effect is approximated by multiplying the total asset values for UCLL and UBA by the increase in WACC, and assuming 100% pass-through to retail prices. The demand effect, and associated deadweight loss, is then estimated using a range of -0.5 to -1.5 for the own price elasticity for copper-based services.

    293.2 **Estimating the potential benefits of a WACC uplift**, resulting from accelerated deployment of new telecommunications services in New Zealand. Oxera's approach quantifies the benefits of investment in an innovation occurring immediately, against a counterfactual of an innovation being

189 Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, paras [285-305].

190 Oxera "Input methodologies: Review of the '75th percentile' approach" 23 June 2014.

191 Oxera "Input methodologies: Review of the '75th percentile' approach" 23 June 2014, p.6.

192 Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 9.

deployed with a delay.[193] To estimate the potential benefits associated with this "acceleration effect" Oxera:

293.2.1 considered relevant telecommunications innovations over the last 40 years, grouping these into four main categories: transmission, switching, mobile, and wireless. These innovations were then further categorised as either incremental or disruptive. By assessing the date that each technology was commercialised, Oxera found that there has been a disruptive innovation approximately every 20 years;

293.2.2 used academic literature to assess the likely benefits associated with telecommunications innovations. Oxera relied on two main studies: Alcatel-Lucent (2011) and Criterion (2003). These studies indicated annual benefits equivalent to approximately NZ$1.65 billion, but Oxera used a figure of NZ$1.5 billion to ensure it was capturing net benefits in its assessment;

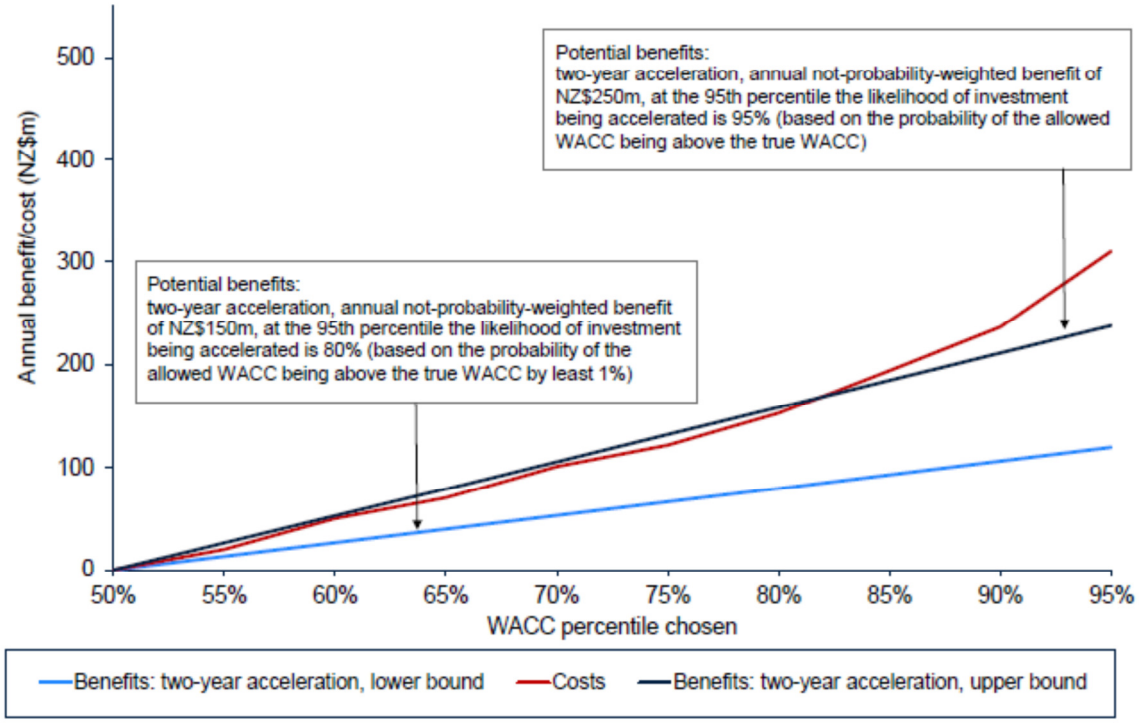
293.2.3 estimated the likely "acceleration effect" of a regime that rewards innovation, by assessing the time lag between early and late adopters of ADSL2+. Oxera assumes an acceleration effect of two years based on the results of this analysis, but also considers a five-year acceleration effect noting that more complex technologies might lead to a bigger delay; and

293.2.4 estimated the benefits of the acceleration effect, by calculating the difference in net present value of two 20-year benefit streams of $1.5 billion per annum (with one benefit stream occurring either two or five years earlier than the other, depending on the assumed length of the acceleration effect). Converting the estimated benefits into an annuity over a 20-year period resulted in a range of benefits from $150 million to $550 million per annum, depending on the assumed discount rate and timing delay.

293.3 **Comparing the costs and benefits of a WACC uplift**, to form a recommendation. Figure 3 and Figure 4 below summarise Oxera's findings, assuming a two-year and five-year delay respectively.

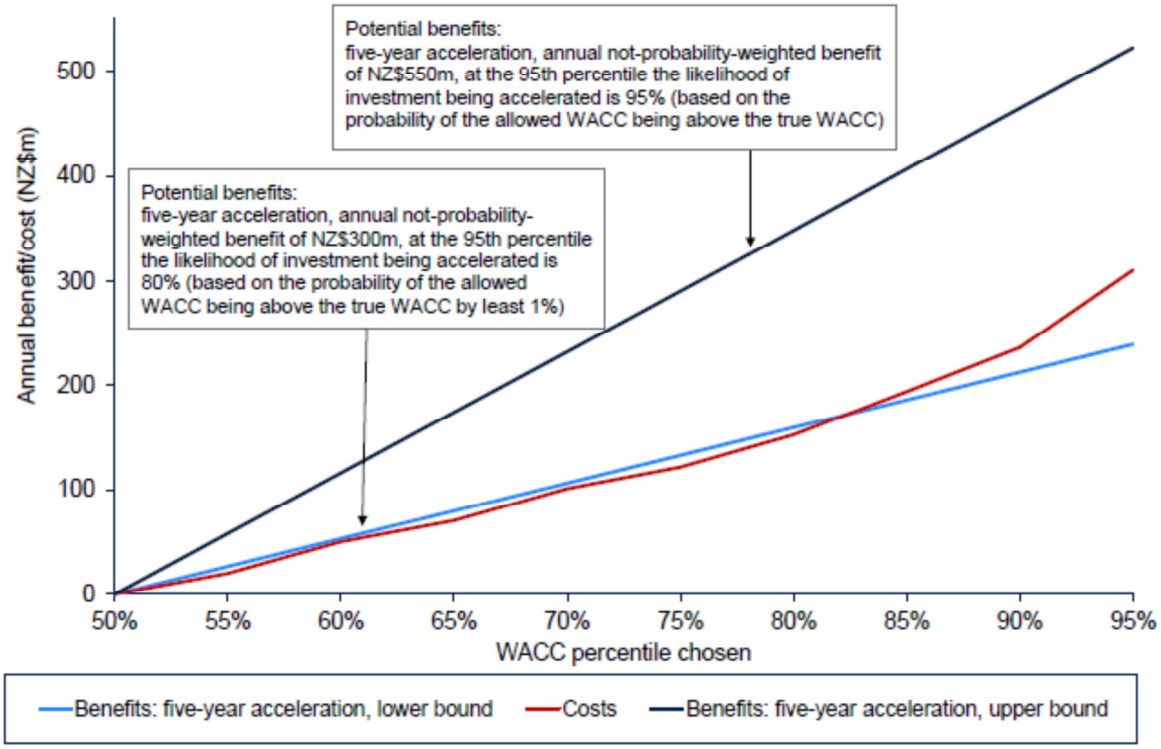
[193] This approach reflects Oxera's assumption that the benefits of the innovation are likely to be realised regardless, but a WACC uplift could help bring these benefits forward.

Figure 3: Oxera's assessment of benefits versus costs (two-year acceleration)



Source: Oxera[194]

Figure 4: Oxera's assessment of benefits versus costs (five-year acceleration)



Source: Oxera[195]

[194] Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, figure 6.1, p. 36.

294. Oxera concluded that, using plausible assumptions, either no uplift or a modest uplift could be justified. Specifically, Oxera stated:[196]

> All in all, the set of assumptions one would have to believe in order to conclude that a modest WACC uplift is justified seems quite plausible and can be used to inform the Commission's decision. At the same time, the evidence is not strong, and requires significant speculation about the nature and scale of benefits of future innovation, and, therefore, does not contradict the continued use of a midpoint WACC for UCLL/UBA.

295. We consider that, in the context of UCLL and UBA, it is reasonable to focus on the potential benefits of a WACC uplift in reducing the risk of delayed deployment of new technologies in New Zealand. As noted by Oxera:[197]

> While it is unlikely that a WACC uplift for UCLL and UBA on its own will lead to the creation of significant user benefits from innovation, it could reasonably affect the time at which these benefits materialise. For example, most major innovations in telecoms have typically been adopted in most developed countries, regardless of the original source of the innovation; however, the timing and speed of deployment has generally varied from country to country.

296. However, in the July 2015 further draft determinations, we stated that we consider the case for an uplift is likely to be even weaker than suggested by Oxera. We noted that:[198]

296.1 the link between WACC uplift and innovation benefits is assumed in Oxera's model, without any substantive supporting evidence;

296.2 there is no explicit allowance for other factors which may affect the strength of the link between a WACC uplift for UCLL and UBA and benefits from earlier deployment of new telecommunications services, such as those outlined in Figure 2 above; and

296.3 there is also considerable uncertainty associated with some of the other key inputs to the model (such as the estimate of annual benefits from innovative new services, and the length of the acceleration effect), which suggests caution is appropriate when considering whether a WACC uplift should be applied for UCLL and UBA.

297. We noted that the uncertainties referred to in paragraph 296 above reflect the inherent difficulties in attempting to undertake quantitative analysis of whether a WACC uplift should be applied for UCLL and UBA, due to a paucity of information regarding key relationships and input values. For example, innovation is difficult to

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195 Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, figure 6.2, p. 36.

196 Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 37.

197 Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 1.

198 Commerce Commisison "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, paras [277-281].

forecast, and the impact of a WACC uplift for UCLL/UBA on the level of investment in telecommunications innovations in New Zealand is unclear.[199]

298. We asked Professor Vogelsang to peer review Oxera's report on whether a WACC uplift should be applied for UCLL and UBA. Based on his review, Professor Vogelsang concluded that "…for the most likely scenarios the 50th percentile with no WACC uplift would be optimal".[200] Professor Vogelsang highlighted several concerns regarding Oxera's modelling, including the assumed strength of the relationship between a WACC uplift and innovation acceleration.

Submissions regarding Oxera's model

299. A range of submissions commented extensively on Oxera's report and model. In summary:

299.1 Sapere and CEG (for Chorus) stated that there are a number of modifications which would improve Oxera's modelling, and would further support the case for a WACC uplift.[201]

299.2 Network Strategies (for Vodafone and Spark) stated that the key assumptions underlying the benefits in Oxera's model (at best) have a large associated margin of error, so the evidence for an uplift is not strong and does not contradict the continued use of the mid-point.[202]

299.3 Both WIK-Consult and Wigley and Company submitted that no uplift should be applied. Although Wigley and Company welcomed Oxera's modelling, it outlined a number of issues, including that there has been no quantitative analysis or assessment of a downward price adjustment.[203] We discuss the possibility of a downwards adjustment below. WIK-Consult (for Vodafone and Spark) agreed that no uplift should be applied, but investment in innovative services from RSPs should be considered too.[204]

300. Many submissions were received on the technical aspects of Oxera's modelling. However, we consider that these submissions do not materially change the weight that should be placed on the quantitative modelling, or the conclusions derived from

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199 Commerce Commisison "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, para [282].

200 Ingo Vogelsang "Review of Oxera's Report, Is a WACC uplift appropriate for UCLL and UBA?" 29 June 2015, paras [31-34].

201 CEG "Response to the further draft determination" August 2015, p. 17, para [57]; Sapere "Economic Comment on UCLL and UBA Pricing Issues" 11 August 2015, p.6, para [29].

202 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 93

203 Wigley and Company "Submission on Further Draft Pricing Review UCLL and UBA Determinations" 13 August 2015, para [1.8].

204 WIK-Consult "Submission 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" 12 August 2015, p. 56, para [187].

it. This view is supported by Professor Vogelsang who, in examining Oxera's model, found the evidence for even a modest uplift not to be strong.[205]

301. The submissions on the technical aspects of Oxera's modelling are addressed in more detail in Attachment A.

302. Oxera has considered the submissions received on its June 2015 report, and provided a response.[206] In evaluating the submissions, Oxera found that no compelling evidence had been presented that would lead it to change the assumptions contained within the report published alongside the July 2015 further draft determinations, or its conclusion based on the model:[207]

> 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.

303. Professor Vogelsang also reviewed the submissions on Oxera modelling, focussing on the arguments presented by CEG and Sapere. While Professor Vogelsang agreed that the Oxera model probably overestimates the costs to consumers of a WACC uplift, he argued that the expected discounted benefits are also likely to be substantially lower.[208]

304. Professor Vogelsang concluded that "the case for a WACC uplift based on Sapere's and CEG's model adaptations is very weak indeed", once some of Oxera's "more dubious" assumptions (which Sapere and CEG accepted at face value) are considered. In particular, Professor Vogelsang noted that:[209]

    304.1 By concentrating on broadband innovation, Oxera has chosen an example for which the contribution to the long-term benefit of end-users has been particularly large. It is not clear at all whether even an innovation like UFB will generate a similarly large benefit.

    304.2 Oxera assumes that a certain excess of the allowed WACC over the true WACC will trigger a pre-specified innovation acceleration with probability one. This is assumed independent of the type of investor, the type of innovation and, most important, whether or not regulation will be imposed

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205 Professor Ingo Vogelsang "Review of Oxera's Report, Is a WACC uplift appropriate for UCLL and UBA?" 29 June 2015, para [9]; and Professor Ingo Vogelsang "Review of some Submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, para [61-71].

206 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015.

207 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015, p. 2.

208 Professor Ingo Vogelsang "Review of some Submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, para [26].

209 Professor Ingo Vogelsang "Review of some Submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, para [70].

on the new technology. However, Professor Vogelsang notes that "the assumption is very strong and may therefore lead to excessive uplift recommendations", and "…it is not clear at all that the incumbent from a higher allowed WACC receives a strong incentive to innovate … because the higher WACC for the old service increases the cannibalization argument".

304.3 In its March 2015 submission, CEG submitted that the innovation incentives from increasing the allowed WACC would be strong enough to easily yield net benefits, based on an amended version of the Dobbs/Frontier model. However, Professor Vogelsang noted that both he and Professor Dobbs have highlighted problems with this adapted model, and as a result it was not mentioned by CEG in its submission on the July 2015 further draft determinations.

304.4 The incentive argument for a higher WACC holds much more clearly for other firms as innovators, but those other firms would also require a high asset base.

304.5 As noted by Network Strategies, a major drastic innovation in the form of UFB is currently underway, which suggests Oxera's acceleration argument would apply to an innovation much further in the future, so the benefits would have to be discounted.

305. Overall, our final decision that the link between a WACC uplift and incentives to invest in innovative new telecommunications services is too uncertain to justify an uplift. We note that:

305.1 the Oxera model is indicative rather than deterministic. The model is used to inform, rather than point to a specific percentile choice;

305.2 any decision made should be based on evidence. In the July draft, we explained why the quantitative modelling showed too much uncertainty to justify an uplift. Submissions have not changed our view on this; and

305.3 as indicated above, Oxera acknowledges the limitations of its own model, especially regarding the evidence available on accelerated innovation investment.

CEG's alternative framework based on Oxera's model

306. CEG (for Chorus) presented their own framework for quantitative analysis, building on the Oxera model. Based on this analysis, CEG proposed an uplift between the 65th and 75th percentile.[210]

307. Key assumptions in the CEG model include:

307.1 The probability that the allowed WACC is greater than the true WACC at the mid-point is 50%, rather than 0% as assumed in the Oxera model.

[210] CEG "Response to the further draft determination" August 2015, paras [61 and 214-269].

307.2 For the probability of acceleration, CEG estimate the probability that the allowed WACC is both less than and greater than the true WACC by 0%, 0.5% and 1.0%.

307.3 For costs, CEG assume that the new capital investment is 60% of the existing asset base, and that this cost is incurred immediately.

307.4 The value of benefits is NZ$1.5bn per year, but will arrive after 2019.

307.5 Three states of the world are modelled:

307.5.1 95% broadband penetration is reached at the end of the fifth year at mid-point WACC (base case).

307.5.2 95% broadband penetration is reached at the end of the third year (i.e. a two-year acceleration) if the allowed WACC is greater than the true WACC by more than 1% (acceleration case).

307.5.3 50% broadband penetration is reached at the end of the fifth year if the WACC is less than the true WACC by more than 1% (delay case).

307.6 Future benefits are converted into an annuity over a 20-year period for these three scenarios.

308. Overall, we consider that the framework proposed by CEG does not clearly demonstrate the need for an uplift to the WACC, and is not able to overcome the limitations faced by Oxera in their quantitative analysis. We also note that:

308.1 a significant proportion of the benefits identified by CEG are from the difference between the base case and delay case, rather than the benefits from the acceleration case against the base case, as per the Oxera modelling;

308.2 the 50% penetration rate in the delay case is key to the conclusion arrived at by CEG, but is not supported by evidence;

308.3 assuming a 50% chance of acceleration from a WACC uplift at the mid-point WACC reduces benefits, relative to Oxera's assumption of 0% chance of acceleration at the mid-point;[211] and

308.4 the assumption that benefits do not arrive until 2019 is a further example of where the proposed change would reduce benefits from a WACC uplift relative to Oxera's analysis.

Role of international regulatory precedent

309. CEG's submission (for Chorus) on the July 2015 further draft determinations referred to international regulatory precedent regarding applying a WACC uplift, noting that:[212]

[211] See paragraphs 396 to 397 below for further discussion.

309.1 regulators in the UK have adopted WACC values above the mid-point of their estimated range in nearly all recent price control determinations, including Ofcom's 2011 decision on wholesale broadband access;

309.2 the Irish telecommunications regulator (ComReg) has applied an uplift to the WACC used to set fixed-line charges for Eircom, stating that this has been standard practice for regulators internationally; and

309.3 this view is supported by the report from Economic Insights, as part of the Commission's 2014 review of the WACC percentile for energy businesses.[213]

310. The context behind international regulatory decisions – including differences in regulatory regimes and other country-specific factors – will influence the extent to which they are relevant when considering an adjustment to the WACC for UCLL and UBA. For example, it is our understanding that ComReg also adjusted its model by adopting other modelling decisions that tend to produce a lower cost (for example, excluding high costs lines).[214]

311. Overall, in our view the CEG examples do not provide a compelling reason to change our conclusion that the benefits are too uncertain to justify applying a WACC uplift for UCLL and UBA.

Other contextual factors which reduce the need for a WACC uplift for UCLL and UBA

312. There are other contextual factors associated with the approach to setting UCLL and UBA prices that are likely to reduce the need for any uplift to the mid-point WACC estimate. These factors include the approach of modelling the costs of a new replacement network, and not including a performance adjustment.

313. Professor Vogelsang has advised against including a specific uplift to the mid-point WACC estimate for UCLL and UBA. His argument is that the TSLRIC price is likely to be sufficient to incentivise innovation and new investment, without the need for a further uplift.

314. Professor Vogelsang explained that his view is due to a number of factors, including:

314.1 we have modelled the costs of a new replacement network, consistent with the conventional concept of TSLRIC; and

314.2 the decision not to include a performance adjustment to reflect the different capabilities of the modern equivalent asset (MEA) compared to the UCLL network.

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212 CEG "Response to the further draft determination" August 2015, p. 87-88, paras [270-273].

213 Economic Insights "Regulatory Precedents for Setting the WACC within a Range" 16 June 2014.

214 TERA "TSLRIC price review determination for the Unbundled Copper Local Loop and Unbundled Bitstream Access services: International comparison of TSLRIC UCLL and UBA costs and prices" June 2015, p. 9-10.

315. As noted in our December 2014 draft determinations, Professor Vogelsang stated:[215]

> If the Commission sticks to its preliminary decisions to stay with the classical TSLRIC approach and therefore not to consider re-use of civil works and not to make a performance adjustment for the FTTH MEA, then as compared to application of the modified TSLRiC [sic] methodology being advocated by the EU the NZCC classical application results in a higher price. This would likely offset any efficiency argument (Alfred Kahn), investment risk or lumpiness that would go against the classical TSLRIC. It would also take care of any net positive externalities from incentivizing migration to UFB. Thus, there would, in my view, be no case to be made for an uplift to the WACC or for a generous approach to any other cost components.

316. Submissions for Chorus disagreed with Professor Vogelsang's view. For example, CEG submitted:[216]

> We disagree with the conclusions drawn by Vogelsang (2014), that an uplift is not warranted since the modelling adopted by the Commission has elements that already favour a higher price… We understand that the Commission's modelling choices:
>
> - were driven by the need to implement TSLRIC within the New Zealand legal framework; and
>
> - are not 'generous' in their implementation and would not be expected to provide compensation that would otherwise be taken into account when considering an uplift.

317. Network Strategies (for Spark and Vodafone), on the other hand, argued that a number of other model assumptions in our December 2014 draft determinations indicated that the calculated point estimates approach an upper bound rather than a mid-point estimate.[217]

318. In his response to submissions, Professor Vogelsang stated:[218]

> Chorus' main critique of my paper is that I state as factors of regulatory generosity towards the incumbent some items that follow naturally from the New Zealand statutes on the pricing principles. I agree that that this "generosity" only flows from the statute and cannot judge if the new developments of the TSLRIC concept in the EU and Switzerland would have been compatible with the New Zealand statutes. Nevertheless, the conservative approach taken by the Commission is generous relative to an alternative standard, under which prices would result that reflect re-use of equipment and would reflect performance adjustments. This is relevant, when it comes to the question of a WACC uplift/price increase for UCLL/UBA. For example, a UCLL/UBA price without performance adjustment distorts the resulting copper-based prices relative to UFB and will lead to faster migration. If one put a WACC uplift on top of that the distortion will be enhanced.

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215 Ingo Vogelsang "Current academic thinking about how to best implement TSLRIC in pricing telecommunications network services and the implications for pricing UCLL in New Zealand" 25 November 2014, paragraph [118].

216 CEG "Uplift asymmetries in the TSLRIC price" February 2015, paragraph [6].

217 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand – Review of issue from UCLL and UBA submissions – Cross submission for the UCLL and UBA Draft Determination" CONFIDENTIAL, 20 March 2015, p. 65.

218 Ingo Vogelsang "Reply to Comments on my November 25, 2014, paper "Current academic thinking about how best to implement TSLRIC in pricing telecommunications network services and the implications for pricing UCLL in New Zealand" 23 June 2015, paragraph [24].

319. Although the UCLL and UBA prices we have determined are our based on our best TSLRIC estimates, on balance we consider that Professor Vogelsang's analysis provides additional support to our position that we should not apply a WACC uplift (however, this is not a core part of our reasoning).

320. While the basis of the decisions referred to by Professor Vogelsang was not to be generous to Chorus (rather we have attempted to find the best estimate), and although other modelling decisions could have some offsetting effect, against this background we note that Chorus has presented no evidence to show that the proposed TSLRIC price would be insufficient to fund any required investment in the existing network.

Possible reasons for setting WACC below the mid-point estimate

321. We have also considered whether it would be appropriate to make a downwards adjustment to our mid-point estimate.

322. Wigley and Company submitted that the costs of an uplift substantially exceed any potential benefits, and this would point to assuming a lower percentile figure. Wigley and Company made several arguments, including that:[219]

    322.1 the idea of a single true TSLRIC price is misconceived, and if it is plausible to move up, it must be plausible to move down;

    322.2 the Commission's lack of quantitative analysis of a downwards adjustment gives an impressionistic approach;

    322.3 the net welfare position should be modelled to understand what happens when the TSLRIC or WACC is adjusted downwards;

    322.4 it does not follow that a downward movement means efficient costs will not be recovered, nor does it mean negative signals are sent to investors in new sectors; and

    322.5 from a process perspective, the Commission has not addressed in writing many of the points raised in their submissions from February to May 2015.

323. We have not explicitly modelled a move below our mid-point WACC estimate, as we consider that, in the current case, setting a regulated price below what we expect to be the TSLRIC of supplying the UCLL and UBA services is unlikely to best give effect to the section 18 purpose statement of the Act. Although setting such a regulated price would likely lead to lower prices for consumers in the short-term, it would not allow for the recovery of our best estimate of the efficient forward-looking costs of supplying the UCLL and UBA services. It is therefore likely to send a strong negative signal for investment in new network infrastructure in the future. In addition, setting a regulated price that is below our central estimate is likely to distort demand and slow migration to fibre.

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[219] Wigley and Company "Submission on further draft pricing review UCLL and UBA determinations", 13 August 2015, p. 13-15, para [5.12].

324. As indicated above, Wigley and Company disagree with our approach, arguing that we should consider a down movement in TSLRIC and WACC, and that "if there is room to move up, relative to the central estimate … there must be room to move down within a plausible range. But the Commission has always thought of this issue in terms of up not down movement."[220]

325. Our final decision is that reducing a regulated price below our best estimate of the likely efficient cost of supplying the regulated service would create a significant risk to the expectation of cost recovery by investors in the telecommunications sector and, potentially, more broadly.[221] While we recognise that such a TSLRIC exercise risks an over-estimation, we do not consider that it would promote competition for the long-term benefit of end-users of telecommunications services to set a price lower than what we consider most likely to be the efficient forward-looking cost of providing the service. Further, given the wide range of investments that would potentially be impacted by the negative signal referred to above, we consider there is little value in attempting to model the costs and benefits of a downwards adjustment.

326. We also note that according to Wigley and Company, "[i]n the apparent drive for prices to be increased, it seems little regard is had as to the real world in which Chorus operates, implying that there should readily be a downward price movement."[222] Wigley and Company claim that the section 18 consideration of a price adjustment is a "real world, fact-based analysis", which is distinct from the TSLRIC modelling "which is deliberately hypothetical. Concepts such as a price high enough to ensure 'the recovery of the efficient forward-looking costs' have no place in the section 18 analysis, as that is a real world analysis."[223]

327. We disagree with Wigley and Company's submission that having determined a TSLRIC price based on the efficient forward-looking costs of deploying a new network, we should then make a downward adjustment to reflect what Wigley and Company refers to as Chorus' prudent and efficient investment in copper. In our view, while such an approach might be appropriate where the regulated price is to be based on Chorus' actual costs, our framework is based on a hypothetical efficient operator. As noted by Wigley and Company elsewhere, there has been considerable

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220 Wigley and Company "Submission on Further Draft Pricing Review UCLL and UBA Determinations" 13 August 2015, para [5.12(e)].

221 Although we set a price below the mid-point of the voice benchmark set in the mobile termination access services standard terms determination, this was primarily due to comparability factors. In particular, we stated: "the 25th percentile of the voice benchmark set is appropriate as the price point as there are a range of comparability factors that suggest the efficiently incurred costs of providing the voice MTAS services in 2011 are below the median of the voice benchmark set". Commerce Commission "Standard Terms Determination for the designated services of the mobile termination access services (MTAS) fixed-to-mobile voice (FTM), mobile-to-mobile voice (MTM) and short messaging services (SMS)) - Decision 724" 5 May 2011, paragraph ix.

222 Wigley and Company "Submission on Further Draft Pricing Review UCLL and UBA Determinations" 13 August 2015, para [5.12(h)].

223 Wigley and Company "Submission on Further Draft Pricing Review UCLL and UBA Determinations" 13 August 2015, para[5.11(i)].

agreement amongst submitters on the framework for determining a TSLRIC-based price:[224]

> The one element of common ground between Chorus and our RSP and consumer representative clients is that "The historic costs of network deployment … are irrelevant in calculating a forward-looking long run incremental total cost of the service … forward-looking costs reflect the costs that a network operator would incur if it built a new network today using assets collectively referred to as the modern equivalent asset."

328. According to Wigley and Company, this framework "counts against" the use of Chorus' actual costs.[225] Spark and Vodafone agree that a TSLRIC model will inevitably depart from Chorus' actual investment and that the hypothetical efficient operator cannot be defined simply on the basis of Chorus' current position.[226]

329. In our view, adjusting down our central TSLRIC estimate for the reasons claimed by Wigley and Company would represent a departure from what we consider is a forward-looking TSLRIC-based price. Wigley and Company appears to acknowledge this, noting that "there is such a departure from using TSLRIC, using for example building blocks etc" for copper-based services.[227] It is not open to us to depart from TSLRIC pricing, as we are required to determine regulated prices for the UCLL and UBA services according to the FPP of TSLRIC.

330. Further discussion regarding Wigley and Company's submission that a downwards adjustment should be made to either our central TSLRIC estimate or mid-point WACC is contained in Chapter 5 of the UCLL and UBA FPP final determinations.[228]

Sapere's submission regarding time-inconsistency

331. Sapere (for Chorus) has submitted that applying the mid-point WACC estimate for UCLL and UBA would be time-inconsistent, stating that:[229]

> Time consistency issues in price regulation arise in situations where a regulator does not have mechanisms to commit to a policy through time, and finds itself wanting to change its policy after a regulated firm has made an irreversible investment decision.

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224 Wigley and Company "Cross-submission in relation to UCLL and UBA draft pricing review determinations" 24 September 2015, para [6.11].

225 Wigley and Company "Cross-submission in relation to UCLL and UBA draft pricing review determinations" 24 September 2015, para [6.11].

226 Spark "Further draft pricing review determination for Chorus' UBA and UCLL services" 24 September 2015, paragraph 21; and Vodafone "Submission to the New Zealand Commerce Commission on further draft pricing review determination for Chorus' unbundled copper local loop service and further draft pricing review determination for Chorus' unbundled bitstream access service" 13 August 2015, paragraph A4.2.

227 Wigley and Company "Submission on Further Draft Pricing Review UCLL and UBA Determinations" 13 August 2015, para [5.12(h)(v)].

228 Commerce Commission "Final pricing review determination for Chorus' unbundled cooper local loop service" 15 December 2015, Chapter 5 and Commerce Commission "Final pricing review determination for Chorus' unbundled bitstream access service" 15 December 2015, Chapter 5.

229 Sapere Research Group Limited "Report for Chorus - Economic Comment on UCLL and UBA Pricing Issues" 11 August 2015, p. 18, para [78].

332. Sapere submitted that the Commission's approach to setting prices in the July 2015 Draft Determination can be assessed as to whether or not it is time consistent by considering if the approach would be different if Chorus was at a different point in the investment cycle for UCLL and UBA services.[230]

333. When considering Sapere's submission, we have followed the two-step approach suggested by Professor Vogelsang:[231]

333.1 first, is the relevant behaviour actually time-inconsistent?; and

333.2 second, if the answer to the first question is yes, are there justifications that outweigh the violation of time consistency?

Is the relevant behaviour actually time-inconsistent?

334. Sapere argued that our decision to not apply a WACC uplift is time-inconsistent, stating that "…the Commission considers the stage of the investment cycle at which Chorus finds itself as one of the reasons to change from the approach it has used for many years of selecting a WACC above the midpoint estimate".[232]

335. We disagree that our approach is time-inconsistent, for the reasons explained below. Importantly, we have followed the same approach used when considering whether a WACC uplift should be applied as part of the 2014 IMs WACC percentile review. Although the approach is the same, the outcome is different, reflecting the different context and evidence in each case.

336. When previously conducting benchmarking under the IPP for UCLL and UBA, there was no clear approach of applying an uplift or adjusting pricing depending on the stage of the investment cycle. We also did not apply a WACC uplift as part of our telecommunications service obligations (TSO) net cost determinations. In particular:

336.1 the mid-point of the benchmark set was used for UCLL price benchmarking under the IPP in both 2007 and 2012;[233]

336.2 in the UBA IPP we set a price above the mid-point of the benchmark set due to concerns about the small sample size, and potential dynamic efficiency losses that could arise from incorrectly setting a price below the forward-

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230 Sapere Research Group Limited "Report for Chorus - Economic Comment on UCLL and UBA Pricing Issues" 11 August 2015, p. 22, para [90].

231 Professor Ingo Vogelsang "Review of some Submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, paragraph [46].

232 Sapere Research Group Limited "Report for Chorus - Economic Comment on UCLL and UBA Pricing Issues" 11 August 2015, p. 3, para [13].

233 Commerce Commission "Standard Terms Determination for the designated service Telecom's unbundled copper local loop network: Decision 609" 7 November 2007, paras [193-235]; and Commerce Commission "Final determination on the benchmarking review for the unbundled copper local loop service: Decision No. NZCC 37" 3 December 2012.

looking cost for the service. We also used the 75th percentile of a wider benchmark set, with relaxed comparability criteria, as a cross-check;[234] and

336.3 Wigley and Company previously submitted that the mid-point WACC is the relevant precedent for UCLL and UBA, as used in TSO net cost determinations and the draft PSTN TSLRIC determination.[235]

337. Although we currently use the 67th percentile WACC estimate for energy businesses regulated under Part 4 of the Commerce Act, this does not in any way suggest applying a different percentile for UCLL and UBA is time-inconsistent. The 67th percentile determined for energy businesses under the IMs reflected the specific context of that decision. That decision was made under different legislation, applied to different services to UCLL/UBA, and was based on the available evidence within that context.

338. We consider that consistency of approach is important, rather than consistency of outcome. Similarly, Wigley and Company submitted that time consistency involves making the same decision in the same or similar circumstances, noting that making potentially different decisions on the basis of different sets of evidence would not be time-inconsistent.[236]

339. As discussed in paragraphs 231 to 237 above, we have followed the same approach as the 2014 IMs WACC percentile review when determining the appropriate WACC percentile for UCLL and UBA. When deciding to apply the 67th percentile WACC under the IMs, we started at the 50th percentile, and considered whether there was any reason to depart from this point. This was consistent with the High Court's judgment on the IMs merits appeals, which suggested that strong evidence is required before departing from the mid-point.

340. We have considered the case for setting a WACC above or below the mid-point for UCLL and UBA, and ultimately determined that there is no reason to depart from the mid-point (for the reasons explained earlier in this section). This decision reflects our assessment of the likely costs and benefits of departing from the mid-point WACC, in the specific context of the UCLL and UBA services.

341. Similarly, in his review of the Sapere submission on time-inconsistency, Professor Vogelsang noted that:[237]

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234 Commerce Commission "Unbundled Bitstream Access Service Price Review: Decision [2013] NZCC 20" 5 November 2013.

235 Wigley and Company "Cross-submission to the Commerce Commission in response to the Commission's expert reports on the cost of capital for UCLL and UBA price reviews AND submission on the Part 4 review of WACC uplift" 4 August 2014, para [34(b)].

236 Wigley and Company "Cross-submission in relation to UCLL and UBA draft pricing review determinations" 24 September 2015, p. 51-52, paras [23.13, 23.14 and 23.16]. Wigley and Company also noted that the extent of concern about incentives to invest depend very much on the extent of investment that will be required, and therefore on the point on the investment cycle.

237 Professor Ingo Vogelsang "Review of some Submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, p. 6-9.

341.1 The use of TSLRIC is legally required for the FPP and thus not a choice over which the Commission would have discretion. Properly applying the TSLRIC approach already fulfils the Commission's commitment.

341.2 The Commission takes the mid-point WACC as the starting point, departing from which needs to be justified (based on section 18). In other words, the mid-point WACC predictably reflects correct TSLRIC measurement and therefore, in the Commission's opinion, does not violate time consistency. Deviations from this standard can be justified based on section 18, but this justification is dependent on the specific circumstances of the case.

341.3 Sapere particularly criticises as time-inconsistent the Commission's move from the 75th percentile WACC in the 2010 IMs to the 67th percentile in its 2014 decision on the regulation of energy networks, and its further move to the mid-point WACC in the current proceeding. However, the 2014 decision was the Commission's specific response to a request in a High Court decision which criticised the use of a one-size-fits-all 75th percentile approach under the IMs.[238] The High Court's judgment changed the basis for any time-inconsistency accusation.

341.4 In conclusion, the lack of a WACC uplift provides no case for the time-inconsistency argument.

342. For the reasons explained above, we consider that our decision to apply the mid-point WACC estimate for UCLL and UBA is not time-inconsistent, as suggested by Sapere.

Are there justifications that outweigh the violation of time consistency

343. Although we consider that our decision is not time-inconsistent, for completeness we have also considered whether there would be justification for taking a different approach depending on the stage of the investment cycle.

344. In his response to submissions, Professor Vogelsang concluded that Sapere is incorrect to say that our decision should be made as if it was at the beginning of the investment cycle. In particular, Professor Vogelsang noted that "The product cycle matters in the sense that the outcome of workable competition w.r.t. pricing noticeably differs between different stages of the product cycle".[239] We agree with Professor Vogelsang's assessment.

345. Further, we consider that the primary issue when considering any potential time-inconsistency is avoiding expropriation of sunk investments. Similarly, Wigley and Company submitted that for time consistency to be relevant, the decision would need to preclude Chorus from recovering the cost of its prudent and efficient past investment.

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238 Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" 30 October 2014.

239 Professor Ingo Vogelsang "Review of some Submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, para [14].

346. On the other hand, Sapere's definition of time-inconsistency differs from expropriation, and appears to include any changes in regulatory approach throughout the investment cycle – regardless of whether this led to expropriation of sunk investments.

347. Regarding expropriation, we note that if a regulator reduced prices at the end of the asset's life, or once the investment had been irreversibly committed, because there were expected to be no further short-term gains from additional investment, this would:

    347.1 signal to investors that they should be concerned that they cannot expect at least a normal profit from investments because the regulator will "renege" on the regulatory deal towards the end of the asset lives; and

    347.2 not promote competition for the long-term benefit of end-users of telecommunications services, as it would likely reduce incentives to invest in assets subject to, or potentially subject to, regulation.

348. In practice, the context of the current decision is that Chorus's copper assets are being overbuilt across a substantial part of New Zealand, and therefore could be considered to be nearing the end of their useful life. However, we note that:

    348.1 conceptually, we do not believe there will be expropriation when the mid-point WACC is used. The mid-point is our best estimate of WACC, and so should not create an expectation of expropriation of sunk investments; and

    348.2 setting price below the mid-point, on the other hand, could create an expectation of expropriation. This is part of the reason why we have not made a downwards adjustment to the WACC (as discussed in paragraphs 321 to 330 above).

Other submissions regarding time-inconsistency

349. In its submission, Sapere referred to a 2005 paper titled 'Utility Price Regulation and Time Inconsistency', written by Levine, Stern and Trillas.

350. In response, Dr Trillas (for Vodafone and Spark) explained that the paper he co-authored, was written in a different context to the current pricing review. In Dr Trillas' view, time-inconsistent behaviour by a regulator involves making a decision that could not have been predicted, and is the opposite of what had previously been decided, in circumstances where sunk investments had taken place based on the previous decision.[240]

351. Dr Trillas further stated that time-inconsistency can be addressed through a rules-based approach to regulation, or through delegation to an independent agency. He

[240] Dr Trillas on behalf of Vodafone and Spark "Time-inconsistency - the discussion in Levine, Stern and Trillas (2005) and applicability to the New Zealand UCLL & UBA pricing review" 20 September 2015, p. 2.

found that our procedures are transparent and minimise the risk of under-investment due to time-inconsistent regulation.[241]

352. Similarly, Professor Vogelsang noted the 1996 book edited by Levy and Spiller, which was also referenced by Sapere, was the result of a World Bank project which he participated in. Professor Vogelsang stated that the conclusions of this project were "not nearly as one-sided as Sapere's selected citations would make us believe", noting that:[242]

> While it became clear that time consistency (and regulatory commitment) was desirable, it was also clear that changing circumstances may require changing policies and that severe policy mistakes may have to be corrected by deviating from strict time consistency. Since the project was about country comparisons, the main question was about a country's institutions to be able to assure good policies. An essential recommendation was that countries with weak institutions should assure time consistency by limiting the discretion of their regulators, while countries with strong institutions could give their regulators more discretion. New Zealand certainly is among the countries with strong institutions and strong due process rules that shield market participants from capricious and opportunistic decisions.

353. Sapere also referenced a paper by Professor Ergas which contains discussion of time-inconsistent behaviour and expropriation of rents, in the context of a case study from Australian telecommunications.[243] Based on this case study, Professor Ergas concluded that regulatory opportunism (i.e. a lack of credible commitment to time consistent behaviour) can plausibly result in substantial welfare costs over time.

354. However, we note that in the Australian case referenced, there was low credibility to commit to full cost recovery given advances in wireless technology, and the regulator's inability under the statute to bind future regulatory decisions. Further, Professor Vogelsang stated that this example was based on a back-loading price path, and has little to do with the current regulatory proceeding.[244]

355. Overall, we disagree with Sapere that our decision to apply the mid-point WACC estimate is time-inconsistent. We also consider that when the literature reference by Sapere is read in context, its conclusions are not inconsistent with the approach we have taken.

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241 Dr Trillas on behalf of Vodafone and Spark "Time-inconsistency - the discussion in Levine, Stern and Trillas (2005) and applicability to the New Zealand UCLL & UBA pricing review" 20 September 2015, p. 4, 6.

242 Professor Ingo Vogelsang "Review of some submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, para [45].

243 Sapere Research Group Limited "Report for Chorus - Economic Comment on UCLL and UBA Pricing Issues" 11 August 2015, para [85].

244 Professor Ingo Vogelsang "Review of some submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, para [45].

Reasonableness checks

356. This section considers whether our WACC estimate for UCLL and UBA is reasonable, compared to other WACC estimates.

357. We previously set out our views as to why our estimate of WACC for UCLL/UBA was reasonable, in light of other information, in our December 2014 and July 2015 further draft determinations. Subsequent submissions have not changed our view.

358. This section explains why we have concluded our WACC estimate is reasonable, including discussion of:

    358.1 the reasonableness checks we conducted in the December 2014 and July 2015 further draft determinations;

    358.2 submissions received regarding reasonableness checks, following the July 2015 further draft determination; and

    358.3 our response to submissions on these reasonableness checks.

Reasonableness checks in the December 2014 and July 2015 draft determinations

359. In our December 2014 draft determination, we used the following information for assessing the reasonableness of our WACC estimate for UCLL and UBA:[245]

    359.1 estimates of WACC for the New Zealand market, on average. These were based on historic returns for the New Zealand market since 1900, the expected return using our CAPM, and an equity beta of 1; and

    359.2 independent WACC estimates for Chorus, provided to us by Chorus under a section 98 notice we issued.

360. We highlighted that care is required when comparing our WACC estimate for UCLL and UBA with other published estimates. For example, we noted that published WACC estimates for Chorus from research analysts employed by investment banks are likely to reflect risks not relevant to UCLL and UBA (such as execution risks associated with UFB). We also noted that international WACC estimates can be affected by a number of country-specific factors such as differences in tax regimes, monetary conditions, regulatory regimes, and investors' relative risk aversion.[246]

361. Although the available evidence was limited, we concluded that our WACC estimate for UCLL and UBA was reasonable. We noted that:[247]

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245 Commerce Commission "Cost of capital for the UCLL and UBA pricing review: Draft decision" 2 December 2014, para [259].

246 Commerce Commission "Cost of capital for the UCLL and UBA pricing review: Draft decision" 2 December 2014, paras [256-258].

247 Commerce Commission "Cost of capital for the UCLL and UBA pricing review: Draft decision" 2 December 2014, paras [261-267].

361.1 our WACC estimate for UCLL and UBA was below the available forward- and backward-looking estimates of the return on the New Zealand market, which is appropriate since the market average likely has greater exposure to systematic risk than regulated services like UCLL and UBA; and

361.2 although our WACC estimate for UCLL and UBA was lower than broker WACC estimates for Chorus (after adjusting for differences in risk-free rates), Chorus provides a range of services with greater risks than UCLL and UBA. Therefore, it is reasonable to expect that Chorus would have a higher WACC for its overall business than for UCLL and UBA.

362. Submissions from Chorus and investors on our December 2014 draft determination generally argued that our allowed WACC was too low.

363. In particular, CEG (for Chorus) undertook a comparison of allowed WACC premiums above the risk-free rate for fixed-line access telecommunications networks across different jurisdictions, including the proposed WACC in our December 2014 draft determination. CEG stated that the implied premium in our December 2014 draft determination was the lowest in a comparator group of 11 European jurisdictions, the US, and Australia.[248]

364. CEG used nominal vanilla WACC estimates based on recent regulatory decisions in each of the comparator jurisdictions to ensure that it was comparing across jurisdictions on a consistent basis. CEG's results are summarised in Table 6 below.[249]

Table 6: Summary of CEG's analysis of international WACC premium comparisons

Country	Date	Risk free rate from decision	Prevailing 5 year risk free rate	Pre-tax cost of debt	Post-tax cost of equity	Nominal vanilla WACC	WACC premium
New Zealand	Dec-14	4.19%	3.68%	6.33%*	9.09%	7.23%	3.56%
Australia	May-13	3.19%	2.76%	4.73%*	7.39%	6.33%	3.57%
Australia	Jul-11	5.16%	4.65%	7.30%*	9.36%	8.54%	3.89%
Netherlands	Mar-12	2.60%	0.88%	4.40%	5.0%	4.96%	4.08%
Denmark	Dec-14	2.08%	0.16%	3.58%	5.01%	4.44%	4.28%
Italy	Apr-10	3.90%	2.11%	5.61%	7.73%	6.67%	4.56%
Sweden	Dec-13	3.07%	1.69%	5.07%	9.08%	6.28%	4.59%
UK	Jun-14	4.5%	2.02%	5.5%	7.95%	7.17%	5.15%
Finland	May-14	1.94%	0.49%	3.90%	6.54%	5.75%	5.26%
Belgium	May-14	2.63%	0.49%	4.44%	7.63%	6.12%	5.63%
France	Jan-13	3.70%	0.60%	4.70%	7.70%	6.50%	5.90%
Ireland	Dec-14	3.63%	0.08%	5.08%	8.23%	6.97%	6.89%
Norway	Dec-14	6.16%	1.19%	7.66%	9.54%	8.79%	7.59%
Portugal	Dec-13	3.96%	0.84%	6.75%	10.49%	10.05%	9.22%

Notes: * Includes debt issuance costs and/or costs of executing interest rate swaps

248 CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, paras [12-14 and 139-169].

249 CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, table 8, p. 43.

365. In response in CEG's submission, we noted that we made several changes to our WACC estimate for UCLL and UBA between the December 2014 draft determinations and the July 2015 further draft determinations, which increased the post-tax WACC from 6.47% to 6.73% when keeping the risk-free rate and debt premium constant.[250]

366. Significantly, we noted that CEG's analysis regarding WACC premiums above risk-free rates ignored different approaches to estimating the regulatory cost of capital across jurisdictions. In particular:

366.1 we determine the allowed WACC using current interest rates when estimating the risk-free rate. This results in significant variations in WACC estimates over time, which is a direct and full reflection of volatility in domestic interest rates; and

366.2 in contrast, some other jurisdictions use long-term averages when estimating the risk-free rate. This results in a more stable WACC estimate over time.

367. During periods where domestic interest rates are relatively low in New Zealand, our WACC estimate for UCLL and UBA is likely to appear low compared to other jurisdictions. Conversely, during periods where New Zealand interest rates are high, our WACC estimate will appear relatively high compared to other jurisdictions. Over time, these approaches should tend to balance out, but in the short-term the comparability of the WACCs is affected.

368. To identify differences in WACC due to factors other than differences in risk-free rates, we compared the July 2015 further draft determination WACC estimate for UCLL and UBA to adjusted vanilla WACC estimates for CEG's comparator sample (which had been calculated by substituting in our risk-free rate, as at 1 April 2015, of 3.26%).[251] Adjusting CEG's analysis to normalise for differences in the risk-free rate across jurisdictions suggested that our WACC estimate for UCLL and UBA sat approximately in the middle of the international comparators.[252]

369. We have repeated this analysis below, using the risk-free rate for our final determination (2.74%), and updating the New Zealand WACC estimate to reflect the changes to parameter values since the July 2015 further draft determination.

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250 The WACC estimate for the December 2014 draft determination was determined as at 1 August 2014, and the WACC estimate for the July 2015 further draft determination was determined as at 1 April 2015. Domestic interest rates fell between 1 August 2014 and 1 April 2015, leading to a reduction in the risk-free rate and debt premium. Specifically, the risk-free rate had fallen from 4.19% to 3.26%, and the debt premium had fallen from 1.85% to 1.75%. The fall in interest rates between 1 August 2014 and 1 April 2015, and resulting impact on the risk-free rate and debt premium, led to a reduction in the overall mid-point post-tax WACC estimate from 6.47% to 6.03% between the December 2014 draft determinations and the July 2015 further draft determinations.

251 An alternative approach would have been to recalculate our WACC estimate for UCLL and UBA to incorporate risk-free rates used in other jurisdictions. Either way, we would be seeking to understand the impact of differences in parameter values other than the risk-free rate.

252 Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, p. 85, table 6.

Table 7: Adjusted version of CEG's analysis, with normalised risk-free rate

Country	Decision month	Vanilla WACC
Denmark	Dec-14	5.10%
Netherlands	Mar-12	5.10%
Norway	Dec-14	5.37%
United Kingdom	Jun-14	5.41%
Italy	Apr-10	5.51%
France	Jan-13	5.54%
Australia	May-13	5.88%
Sweden	Dec-13	5.95%
Ireland	Apr-14	6.08%
New Zealand	Dec-15	6.09%
Australia	Jul-11	6.12%
Belgium	May-14	6.23%
Finland	May-14	6.55%
Portugal	Dec-13	7.68%

370. The updated analysis in Table 7 above indicates that, after normalising for differences in risk-free rate, the allowed WACC we have determined for UCLL and UBA is above the median of the comparator sample used by CEG. We consider that this analysis supports the conclusion that our WACC estimate for UCLL and UBA is reasonable.

371. Further discussion on the reasonableness checks we conducted previously is contained in the December 2014 draft determinations and the July 2015 further draft determinations.[253]

Submissions received on our July 2015 further draft determinations

372. Submissions from Chorus and investors continued to argue that the allowed WACC for UCLL and UBA is too low.

373. In particular, investors commented on the approach used to set TSLRIC prices under the FPP, asymmetry of risk, uncertainty in the process, and market evidence for Chorus.

373.1 L1 Capital, Black Crane and Schroders argued that instability with TSLRIC modelling leads to higher risk, and therefore requires a higher return.[254] Black

[253] Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Draft decision" 2 December 2014, p. 58-60; and Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Further draft decision" 2 July 2015, p. 81-85.

[254] L1 Capital "Submission on the further draft pricing determination for Chorus' unbundled copper local loop and unbundled bitstream access services" 13 August 2015, p. 3; Black Crane Capital "Submission on UCLL and UBA pricing reviews" 12 August 2015, p. 1; and Schroders "Submission on draft determinations of the UCLL and UBA access service final pricing principles" 27 July 2015.

Crane, Allan Gray and Schroders also argued that uncertainty during the process has led to higher perceived risk.

373.2 L1 Capital further contended that a WACC uplift should be applied as other parameters are incorrectly estimated.[255] Schroders commented that this review has led to an asymmetry of risk.[256] Allan Gray disagreed that an regulated asset value of $6.6b, compared to an enterprise value for Chorus of $3.3b, provides comfort that a non-uplifted WACC figure would be appropriate.[257]

373.3 Black Crane pointed to a low EV/EBITDA multiple for Chorus (of around 7x, when typically monopoly regulated infrastructure assets trade on multiples of 10-12x), while Schroders referred to a small valuation premium for Chorus.[258] L1 Capital noted that capital rationing from Chorus suggests a WACC uplift should be applied.[259]

Response to submissions on July 2015 further draft determinations

374. Since the July 2015 further draft determination, we have made several changes to our WACC estimate for UCLL and UBA. Apart from changes to the risk-free rate and debt premium (which have been updated to reflect prevailing interest rates), we have:

374.1 increased leverage from 37% to 38%. The leverage assumed in December 2014 was 43%; and

374.2 decreased the asset beta from 0.45 to 0.43. The asset beta assumed in December 2014 was 0.40.

375. The final determination for these parameters sits between the December 2014 draft and July 2015 further draft decisions. Therefore, the reasonableness checks conducted in the December 2014 draft determinations and the July 2015 further draft determinations provide comfort that WACC we have determined is appropriate.

376. In terms of any uncertainty or instability associated with TSLRIC modelling, we are required under the legislation to adopt this pricing principle and do not consider that this suggests our cost of capital estimate is too low. We also consider that the risks of uncertainty/instability associated with the outcome of TSLRIC modelling are broadly symmetric, so no additional compensation is required.

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255 L1 Capital "Submission on the further draft pricing determination for Chorus' unbundled copper local loop and unbundled bitstream access services" 13 August 2015, p. 9.

256 Schroders "Submission on draft determinations of the UCLL and UBA access service final pricing principles" 27 July 2015, p. 1.

257 Allan Gray "Submission to UCLL and UBA FPP further draft determination" 12 August 2015, p. 1.

258 Black Crane Capital "Submission on UCLL and UBA pricing reviews" 12 August 2015, p. 1; and Schroders "Submission on draft determinations of the UCLL and UBA access service final pricing principles" 27 July 2015, p. 1.

259 L1 Capital "Submission on the further draft pricing determination for Chorus' unbundled copper local loop and unbundled bitstream access services" 13 August 2015, p. 10.

377. Submissions from investors pointed to other areas (outside of the WACC) where they believe our parameter estimates are too low, when arguing that a WACC uplift should be applied. However, we have responded to these submissions in the context of the relevant parameters (rather than the WACC).

378. As part of this determination, we are estimating TSLRIC prices based on the costs of a hypothetical efficient operator rather than Chorus. Therefore, while information on Chorus may be a useful reference point, this does not indicate that our WACC estimate is unreasonable.

379. Uncertainty during the current process should only be relevant to the beta term in that it leads to the expectation of increased systematic future risk. We believe that the asset beta captures the systematic risks faced by the hypothetical efficient operator.

380. Overall we are comfortable that the reasonableness checks we conducted previously remain valid, and that no further adjustment to our WACC estimate are required.

Attachment A: Response to technical submissions on Oxera's model

381. This attachment responds to submissions on the technical aspects of Oxera's modelling of the potential costs and benefits of applying a WACC uplift for the UCLL and UBA services. In particular, it addresses submissions regarding the:

381.1 costs of a WACC uplift in Oxera's modelling;

381.2 benefits of a WACC uplift in Oxera's modelling; and

381.3 Oxera's framework for comparing the costs and benefits.

Submissions on costs of uplift in Oxera's model

382. There were five main issues regarding the costs of an uplift raised in submissions, namely:

382.1 **The size of the asset base to which an uplift is applied**. Both Sapere and CEG (for Chorus) disputed the assumption that the new technology will have the same capital cost as the existing asset base. Sapere assumed that the new asset base is 50% of the existing asset base in their modelling, while CEG used 60%.[260]

382.2 **The costs of an uplift should be adjusted to reflect the probability of innovation**. CEG argued that the costs of an uplift should be adjusted based on the probability of the innovation occurring.[261] Network Strategies (for Spark and Vodafone) agreed with this approach in its cross submission.[262]

382.3 **The elasticity assumption used to estimate indirect costs.** CEG submitted that Oxera's estimate of indirect costs of an uplift is conservative (errs on the higher side) because constant elasticity is assumed for broadband services. CEG argued that in reality, the elasticity of demand for broadband would be expected to decline as broadband increasingly becomes a necessity.[263]

382.4 **The degree of pass-through into retail prices.** CEG argued that the assumed pass-through rate of 100% is too high, because full pass-through would only occur if the retail market was perfectly competitive.[264]

382.5 **The appropriate welfare standard to be used**. Sapere argued that a total welfare, rather than consumer welfare, standard should be applied.[265] The

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260 Sapere Research Group Limited "Report for Chorus - Economic Comment on UCLL and UBA Pricing Issues" 11 August 2015, para [143]; CEG "Response to the further draft determination" August 2015, paras [218-224, 251].

261 CEG "Response to the further draft determination" August 2015, para [225].

262 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Response to submissions on revised draft determination - Pricing review - UCLL and UBA Final Pricing Principle - Public version" 24 September 2015, p. 75.

263 CEG "Response to the further draft determination" August 2015, para [226].

264 CEG "Response to the further draft determination" August 2015, para [227].

265 Sapere Research Group Limited "Report for Chorus - Economic Comment on UCLL and UBA Pricing Issues" 11 August 2015, p. 8-16.

appropriate welfare standard is addressed in detail in paragraphs 238 to 253 above, so is not discussed further below.

383. In response to submissions regarding the size of the asset base and probability-weighting of costs, Oxera noted that:[266]

383.1 as would be expected, assuming a lower cost of new investment would reduce the net benefits of a WACC uplift, however, this would also raise the question of whether the benefits also need to be re-scaled to reflect the lower investment cost;

383.2 if there is an institutionalised policy of applying a WACC uplift, consumers will always bear the cost of an uplift on the new investment, regardless of whether the uplift is successful in accelerating the investment; and

383.3 given the limitations of such sensitivity analysis, and the materiality of other assumptions on the results (such as the assumed acceleration effect), changing these assumptions would not materially change their overall conclusion that the evidence is mixed and does not strongly support the case for an uplift.

384. Professor Vogelsang agreed with CEG and Sapere that doubling the asset base is likely to overestimate the costs of an uplift, but also pointed out some subtleties not discussed in Oxera's report (regarding whether/for how long the old asset base continues once the new product is launched, and adjusting the asset base for copper subscriber loss).[267]

385. In principle we agree with submissions that assuming the asset base for the new service is the same as for the existing service is likely to overstate the costs of an uplift, and that there is a case for probability-weighting the costs of the uplift for the new service. However, determining appropriate probability weightings and size of the new asset base would be challenging, given the assumptions that would need to be made about the nature of the new service, and lack of evidence on which these assumptions could be based. For example, the appropriate weightings and size of asset base would likely depend on whether the new service competes with UCLL/UBA, replaces UCLL/UBA, or operates in a separate market, which will be unknown until the new service eventuates.

386. Further, in practice we consider that the impact on Oxera's modelling is likely to be minimal, and would not affect our conclusions. This is because:

386.1 as noted by Oxera, the scale of the benefits from the new service is likely to depend on the size of its asset base. If the size of the asset base is reduced, then the estimated benefits may need to be re-scaled. Professor Vogelsang

[266] Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015, p. 3-6.

[267] Professor Ingo Vogelsang "Review of some Submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, para [62].

also queried the scale of the benefits estimated by Oxera, as noted in paragraph 304.1 above;

386.2 in Oxera's modelling the probability weighting would only affect the costs incurred on the new asset base for the two/five-year acceleration period. The costs for the existing asset base are assumed to be certain throughout the modelling, and the costs of uplift for the new asset beta will be certain after the acceleration period; and

386.3 regardlesss, as explained in paragraphs 272 to 280 above, we consider that the link between a WACC uplift and potential benefits from earlier deployment of new services is too weak and uncertain to justify the costs.

387. For the elasticity assumption, Oxera stated that given the uncertain nature of the exercise, it prefers to use conservative estimates where possible. Oxera also noted that this is not a critical assumption that drives the overall results, so where possible it seems appropriate to use input assumptions that can be reconciled to currently available empirical evidence.[268] We agree with Oxera's assessment.

388. Regarding the pass-through rate used in Oxera's model, in our view 100% is a sensible assumption given the retail market is relatively competitive, and no reliable evidence has been presented to support an alternative figure. Professors Cambini and Vogelsang have also previously agreed with this assumption.[269]

Submissions on benefits of uplift in Oxera's model

389. Three main issues regarding the benefits from a WACC uplift were discussed in submissions:

389.1 **The frequency of innovation.** Network Strategies (for Spark and Vodafone) proposed that only technologies that deliver regulated services, or services that may be regulated in future, should be considered for assessing the likely frequency of disruptive innovations.[270]

389.2 **Estimates of the benefits from innovation.** Network Strategies submitted that it is highly questionable whether the two studies relied on by Oxera (Criterion Economics and Alcatel-Lucent) deliver a reliable estimate for the consumer benefits of disruptive innovation.[271] CEG (for Chorus) noted that it

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268 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015, p.6.

269 Professor Carlo Cambini "Economics aspects of migration to fibre and potential welfare gains and losses from an uplift to copper prices" 16 March 2015, p. 5-6; and Professor Ingo Vogelsang "Review of Oxera's Report, Is a WACC uplift appropriate for UCLL and UBA?" 29 June 2015, para [5].

270 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 90-91.

271 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 92.

is unclear precisely how Oxera calculated the benefit estimates based on the US Criterion study.[272]

389.3 **The likelihood and strength of the acceleration effect.** Network Strategies submitted that Oxera's estimate of a two-year acceleration effect is highly speculative, and potentially irrelevant, as it is based on ADSL2+ launch dates for a small sample of operators in 14 countries. It argued that 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.[273]

390. In terms of the reliability of the benefits estimates, Oxera noted that they consider both the Alcatel-Lucent (2011) and Criterion (2003) studies to be relevant, and the fact that they produce similar results is reassuring.[274] Professor Vogelsang, on the other hand, suggested that focussing on studies regarding fixed-line broadband may overstate the benefits to end-users of telecommunications innovations more generally.[275]

391. We agree with Professor Vogelsang that the two studies relied on by Oxera are likely to overstate the long-term benefits to end-users associated with a generic future telecommunications innovation, given that these studies are based on broadband services where the benefits are particularly large. However, no alternative estimates have been presented in submissions. In the absence of any alternative information, we consider Oxera's approach to be reasonable.

392. Oxera disagreed with Network Strategies' submission regarding the frequency of innovation, stating that:[276]

392.1 the technology could be an input or part of a service or improvement – such as DSL equipment;

392.2 the length of a typical innovation cycle (in this case, 20 years) makes little difference to the results, because although a shorter cycle will reduce the overall net present value (NPV) benefit to consumers of accelerating investment, they will receive this benefit more often. Therefore, on an annualised basis, the length of the cycle is not a critical assumption; and

392.3 for the purpose of gauging plausible estimates of the frequency of disruptive innovations, using as wide a cross-section of examples as possible seems appropriate.

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272 CEG "Response to the further draft determination" August 2015, paras [229-232].

273 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 92-93.

274 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015, p. 8-9.

275 See paragraph 304.1 above.

276 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015, p. 7-8.

393. We agree with Oxera's conclusion on this point, for the above reasons.

394. Regarding the length of the acceleration effect, we agree with Network Strategies that ideally this would be estimated based on a wider sample of technologies, rather than focussing on ADSL2+ launch dates. However, in the absence of additional evidence, we consider that Oxera's approach of using a two-year acceleration effect, in combination with a five-year sensitivity, is reasonable.

Framework for comparing costs and benefits in Oxera's model

395. There were six main issues raised in submissions regarding the framework used by Oxera when comparing benefits and costs:

395.1 **Probability of acceleration at the mid-point WACC estimate.** CEG (for Chorus) submitted that the probability of acceleration at the mid-point WACC should be 50%, rather than 0% assumed by Oxera.

395.2 **The assumed shape of the benefits curve.** CEG submitted that the linear benefits curve is unlikely to be justified. Based on a Prelec utility function, CEG argued that the incentive for acceleration is felt most with modest values of the uplift.[277]

395.3 **The treatment of probability of under-investment in innovative services.** CEG proposed incorporating the probability of delay, as well as the probability of acceleration, in the modelling.[278]

395.4 **The impact on other investment incentives.** Sapere (for Chorus) submitted that the Oxera model fails to recognise that applying an uplift will: (i) provide Chorus an additional incentive to invest in the copper network to maintain reliability, provide augmentation and upgrades; and (ii) result in increased migration to UFB and associated positive externalities.[279] Chorus submitted that the cost of network outages cannot be dismissed, noting that whatever the value of reduced outages is, it is greater than zero.[280]

395.5 **Evidence of a causal relationship between acceleration and uplift.** Network Strategies (for Spark and Vodafone) submitted that the Oxera model has not demonstrated a causal link between a WACC uplift and incentivising investment and a WACC uplift.[281]

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277 CEG "Response to the further draft determination" August 2015, paras [233-244].

278 CEG "Response to the further draft determination" August 2015, paras [252-254].

279 Sapere Research Group Limited "Report for Chorus - Economic Comment on UCLL and UBA Pricing Issues" 11 August 2015, para [139].

280 Chorus "Submission for Chorus in response to Draft Pricing Review Determinations for Chorus' Unbundled Copper Local Loop and Unbundled Bitstream Access Services (2 July 2015)" 13 August 2015, paras [265-269].

281 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Revised draft determination for the UCLL and UBA price review" 13 August 2015, p. 89.

395.6 **Length of the modelling period.** Wigley and Company submitted that only benefits over the five-year regulatory period should be modelled.[282]

396. In response to CEG's submission regarding probability of acceleration at the mid-point, Oxera indicated that its framework is based on the impact of the signal, rather than mis-estimation of the WACC *per se*. Therefore, in its base case (at the 50th percentile), Oxera assumes that the investment is made at some optimal point in time, and there is no incentive to bring it forward. Oxera considers that assuming a 50% probability of acceleration at the mid-point would understate the incremental effect of applying an uplift.[283]

397. As indicated by Oxera, an assumption of 50% likelihood of acceleration at the mid-point would reduce the probability-weighted benefits of applying a WACC uplift (relative to the existing 0% assumption). Assuming a linear benefits curve, and a 95% probability of acceleration at the 95th percentile WACC estimate:

397.1 with a 0% chance of acceleration at the mid-point, at the 75th percentile WACC the probability of acceleration is 53%;

397.2 with a 50% chance of acceleration at the mid-point (as suggested by CEG), at the 75th percentile WACC the probability of acceleration is 75%; and

397.3 therefore, the incremental probability due to an uplift falls from 53% to 25% when adopting CEG's proposed approach. At the 75th percentile WACC estimate, this would mean that the expected benefits in the Oxera model would more than halve.

398. In terms of the proposed use of a Prelec utility function for the benefits curve, Oxera acknowledges that there is some merit in the argument that the acceleration probability is unlikely to increase linearly as the size of the WACC uplift increases. However:[284]

398.1 the CEG model indicates that the increase in incentive to bring forward investment is likely to be greatest for modest uplift values – CEG concludes that the 55th WACC percentile would yield the maximum benefit to consumers; and

398.2 it is questionable whether the empirical estimates from the academic paper provided by CEG can be relied on to produce a more robust approach – particularly in light of the conclusions from other studies referred to by Network Strategies, and uncertainty regarding whether the parameter values are appropriate in the current context.

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282 Wigley and Company "Supplementary Submission on Commission's 'Analytical Frameworks for Considering an Uplift to the TSLRIC Price and/or WACC'" 11 May 2015, p.18-19.

283 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015, p. 12-13.

284 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015, p. 12-13.

399. We agree with Oxera's assessment, particularly given that Network Strategies presented evidence suggesting there is no consensus on whether the Prelec function is the mostly widely used and accepted alternative to expected unity theory.[285]

400. In response to CEG's submission regarding the probability of under-investment in innovation, Oxera noted that the primary intention of a WACC uplift would be as a signal to accelerate innovation, and "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".[286] Further, Professor Vogelsang noted that using a combined acceleration/delay framework (as suggested by CEG) would reduce the appropriate length of the assumed "acceleration effect" in Oxera's modelling (from two years to one and a half years, based on the sample of countries used by Oxera).[287]

401. Regarding the impact of a WACC uplift on other investment incentives, Oxera notes that it focussed on innovation because it considers the potential costs from under-investment in other categories to be insufficient to warrant explicit modelling. We agree with Oxera's assessment, for the reasons explained in paragraphs 254 to 280 above. Potential positive externalities associated with increased migration to fibre are addressed in Chapter 5 of the UCLL and UBA FPP final determinations.[288]

402. Oxera accepts that a key weakness of its modelling is the absence of evidence regarding a causal link between a WACC uplift and acceleration of investment in disruptive technologies. Oxera notes that this uncertainty is one of the reasons why it interprets the results of its modelling with caution, concluding that the evidence overall is not strong.[289] We agree with Oxera's assessment – the lack evidence regarding a direct link between a WACC uplift and the timing of investment in innovative new services is one of the main reasons we have not applied an uplift for UCLL/UBA.

403. Further, we disagree with Wigley and Company's submission suggesting that a five-year modelling period should be used. Restricting the model to a five-year period would be unlikely to adequately capture long-term benefits to end-users, because the benefits from investment in long-lived assets that deliver innovative new services are likely to be realised over an extended time period.

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285 Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Response to submissions on revised draft determination - Pricing review - UCLL and UBA Final Pricing Principle" CONFIDENTIAL, 24 September 2015, p. 76-77.

286 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015, p. 14.

287 Professor Ingo Vogelsang "Review of some Submissions on the Commerce Commission's July 2, 2015, draft determination on UCLL/UBA pricing" 26 November 2015, para [24].

288 Commerce Commission "Final pricing review determination for Chorus' unbundled cooper local loop service" 15 December 2015, Chapter 5 and Commerce Commission "Final pricing review determination for Chorus' unbundled bitstream access service" 15 December 2015, Chapter 5.

289 Oxera "Review of expert submissions on further draft determinations for UCLL and UBA services: The case for a WACC uplift" November 2015, p. 15.