Cost of capital for the UCLL and UBA pricing reviews

Further draft decision

Date: 2 July 2015

Table of contents

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
LTE	Long term evolution
MRP	Market risk premium
ORC	Optimised replacement cost
OTT	Over-the-top
PIE	Portfolio investment entities
RAB	Regulatory asset base
RBI	Rural broadband initiative
RSP	Retail service provider
S&P	Standard and Poor's
STD	Standard terms determination
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 further draft 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 further draft 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 6.03% for the further draft UCLL and UBA pricing reviews.[2] Given the similarities between the two pricing reviews, this draft decision covers WACC for both the UCLL and UBA services.

Our mid-point post-tax WACC estimate for UCLL and UBA is 6.03%

4. The parameters used to generate our mid-point post-tax WACC estimate of 6.03% for UCLL and UBA are summarised in Table 1 below. The risk-free rate and debt premium are estimated as at 1 April 2015, which is approximately three months prior to the date of the further draft UCLL and UBA pricing review determinations. This was necessary to enable us to complete modelling and other work prior to finalising our further draft decision.

5. For ease of comparison, Table 1 also includes the parameters used to generate the mid-point post-tax WACC estimate of 6.47% contained in the December 2014 draft decision. The risk-free rate and debt premium for the December 2014 draft were estimated as at 1 August 2014.

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[1] Commerce Commission "Further draft pricing review determination for Chorus' unbundled copper local loop service" 2 July 2015; and Commerce Commission "Further draft pricing review determination for Chorus' unbundled bitstream access service" 2 July 2015.

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

Table 1: UCLL and UBA WACC estimates

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

6.   We propose to again update the risk-free rate and debt premium for the final decision, so that these parameters are determined as close as practicable to the date of the final decision. We intend to estimate the risk-free rate and debt premium for the final decision as at 1 September 2015 (using data for the month of August 2015), which is approximately three months prior to the expected release date of the final decision.

Our estimate of the cost of debt is 5.34%

7.   We have estimated a pre-tax cost of debt, including associated costs, for UCLL and UBA of 5.34%. Our estimate of the cost of debt comprises four components:

7.1   A risk-free rate of 3.26%, 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 1.75%, 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 proposed length of the regulatory period for the UCLL and UBA pricing reviews. This is consistent with the approach used in the December 2014 draft determination papers and the cost of capital input methodologies (IMs) set under Part 4 of the Commerce Act 1986.[3]

9. Compared to the December 2014 draft determination papers:

   9.1 the risk-free rate has reduced from 4.19% to 3.26%, and the debt premium has reduced from 1.85% to 1.75%, to reflect current interest rates on government and corporate bonds as at 1 April 2015; and

   9.2 we have doubled the allowance for interest rate swap costs from 0.04% to 0.08%, reflecting the cost of executing two swaps rather than one.

Our estimate of the cost of equity is 7.32%

10. We have estimated a cost of equity for UCLL and UBA of 7.32%. Under the simplified Brennan-Lally capital asset pricing model (CAPM), our estimate of the cost of equity comprises four main components:[4]

    10.1 A risk-free rate of 3.26%, 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 0.45, estimated using Oxera's refined sample of comparator firms; and

    10.4 A TAMRP of 7.0%, as recommended by Dr Lally.

11. Since the December 2014 draft determination papers, we have increased the asset beta from 0.40 to 0.45. Our increased asset beta estimate reflects further analysis of asset beta estimates for Oxera's refined comparator sample, including data through to March 2015, and a decision by Oxera to revise upwards the top end of its recommended range for asset beta.

We have used notional leverage of 37%

12. We have used a notional leverage of 37% 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.[5]

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[3] The IMs apply to electricity lines businesses, gas pipeline businesses and specified airport services.
[4] The simplified Brennan-Lally CAPM is described in more detail in paragraphs 133 to 140 below.
[5] 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

13. Since the December 2014 draft determination papers, 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 a decrease in leverage from 43% to 37%.[6]

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

14. We have not applied an uplift to the mid-point WACC estimate for UCLL and UBA. In reaching this view, we considered whether there is 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 telecommunications services more generally, potentially leading to a reduced risk of delayed deployment of new telecommunications services in New Zealand.

16. We commissioned Oxera to consider the case for applying an uplift to our mid-point WACC estimating, focussing on potential benefits associated with investment in innovative new telecommunications services.[7] We also considered other available quantitative models for assessing whether a WACC uplift should be applied, including the model submitted by CEG (based on an amended version of the Dobbs (2011) model), and the model discussed in our April 2015 paper released in advance of the conference.[8]

17. However, we consider that the available evidence demonstrates that the link between a WACC uplift for the UCLL and UBA services, and the benefits associated with reducing the risk of delayed deployment of new telecommunications technologies in New Zealand, is too uncertain to justify the higher costs to consumers. Therefore, we consider that the mid-point WACC estimate is the most appropriate and best gives effect to the section 18 purpose.

We invite submissions on our approach to estimating WACC for UCLL and UBA

18. In response to this draft decision, we invite submissions, supported by evidence, on:

    18.1 our approach to estimating WACC for the UCLL and UBA pricing reviews, including our estimates for each of the parameters; and

    18.2 the independent expert reports prepared by Oxera, Professor Dobbs and Professor Vogelsang, released at the same time as this draft decision.

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set at zero, or at a level to make the estimated cost of capital invariant to leverage (or any level in between).

[6] The leverage of 43% in the December 2014 draft was based solely on the average leverage for Oxera's refined comparator sample for the five year period ending in 2014.

[7] Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015.

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

19. Submissions are due by 5pm, 13 August 2015. Please email submissions to telco@comcom.govt.nz, with the subject line "Submission on WACC for UCLL and UBA pricing reviews".

Introduction

20. This draft decision sets out our WACC estimate for the further draft 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 further draft determinations for the UCLL and UBA pricing reviews, which have been published at the same time as this draft decision.[9]

21. The UCLL and UBA pricing reviews are conducted under the Telecommunications Act 2001 (the Act).[10] The Act requires us to set forward-looking cost-based access prices for UCLL and UBA using a TSLRIC methodology.

22. 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 financial return investors require

23. The cost of capital is the 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 rate of return.

24. 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.

25. 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.[11]

Approach to estimating WACC for UCLL and UBA

26. 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 strong investment-grade credit ratings) above that paid by the Government.

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[9]   Commerce Commission "Further draft pricing review determination for Chorus' unbundled copper local loop service" 2 July 2015; and Commerce Commission "Further draft pricing review determination for Chorus' unbundled bitstream access service" 2 July 2015.

[10] For further information see http://www.comcom.govt.nz/regulated-industries/telecommunications/standard-terms-determinations/unbundled-bitstream-access-service/uba-final-pricing-principle-price-review/.

[11] This point is discussed further in our IM reasons paper. That discussion is in the context of workably competitive market standard, rather than the hypothetical efficient operator test under the Telecommunications Act. However, in our view, similar logic applies.

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

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

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

27.2   the riskiness of the particular investment relative to the riskiness of the total market, multiplied by the return expected on the market portfolio (all risky stocks).

28.   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
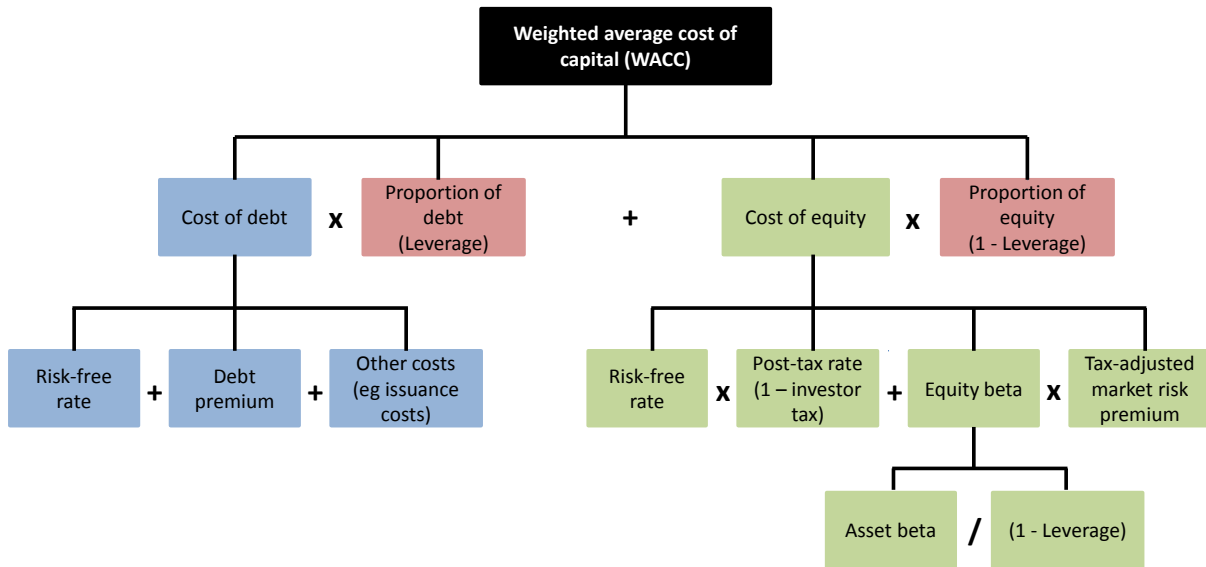
29.   When setting prices for UCLL and UBA, we seek an estimate of WACC relating to these services only. This is important as investors may seek a higher or lower return on capital from providing other telecommunications services, due to differences in perceived riskiness. As such, our WACC estimate 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).

30.   Given the similarities between the pricing reviews for UCLL and UBA, this draft decision covers WACC for both services.

31.   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 the assumptions of the TERA model.[12]

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

32.   We have estimated a WACC for these further draft determinations generally following the same approach that we used for the December 2014 draft determination papers. 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).

33.   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.[13]

34.   On 7 March 2014 we released a consultation paper on the cost of capital for the UCLL and UBA pricing reviews.[14] That paper proposed using the IMs as a starting point for estimating the WACC for UCLL and UBA. Submissions have generally supported this approach, while noting that consideration also needs to be given to service-specific factors.[15]

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[12]   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.

[13]   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.

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

[15]   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, paragraph 288; Telecom "Submission on Process and issues paper for determining a TSLRIC UCLL price" 14 February 2014, p. 49, paragraph 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, paragraph 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, paragraph 174.

35. 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.[16]

Differences between the Part 4 and telecommunications regulatory regimes affect WACC

36. 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:

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

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

37. Different services may have different risks and, therefore, a different required return. This is reflected in the beta estimate for each service.[17] If beta differs between services, the resulting WACC estimates will also differ.

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

39. 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.

40. However, the different purpose statements and price setting methodologies are relevant when deciding whether to apply an uplift 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.

41. 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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[16]   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.

[17]   See paragraphs 146-187 below for further discussion on beta for the UCLL and UBA services.

Process for estimating the cost of capital for UCLL and UBA

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

    42.1 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.[18]

    42.2 On 7 March 2014 we released a consultation paper on WACC for the UCLL and UBA pricing reviews.[19] Amongst other things this paper proposed to:

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

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

        42.2.3 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.

    42.3 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.

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

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

    42.6 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.

    42.7 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.[20]

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[18] 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.

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

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

42.9 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.

42.10 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.[21] We received written submissions on that paper on 11 May 2015.

42.11 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.

42.12 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 this draft decision.

Structure of this draft decision

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

43.1 our approach to estimating the cost of debt;

43.2 our approach to estimating the cost of equity;

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

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

43.5 whether an uplift should be applied to our mid-point WACC estimate; and

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

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[20] 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.

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

Approach to estimating the cost of debt

44.   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.

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

   45.1   The risk-free rate;

   45.2   The debt premium;

   45.3   Debt issuance costs; and

   45.4   An allowance for swap costs.

Risk-free rate

46.   In this section, we:

   46.1   introduce the risk-free rate, noting that we have used the return on New Zealand Government bonds to estimate the risk-free rate;

   46.2   explain why we use a five-year term of the risk-free rate; and

   46.3   provide our estimate of the risk-free rate for a five-year term.

Our estimate of the risk-free rate is 3.26%

47.   We have estimated a risk-free rate of 3.26% for the further draft UCLL and UBA pricing reviews. This risk-free rate is estimated as at 1 April 2015, using data for the month of March 2015.

48.   We have used the same methodology to estimate the risk-free rate for UCLL and UBA as was used for the December 2014 draft determination papers. We have used current interest rates, rather than long-term averages.

49.   We used a risk-free rate of 4.19% for the December 2014 draft determination papers because we estimated it as at 1 August 2014, approximately four months prior to that decision.

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 the risk-free rate as this, and the estimate of WACC, are inputs into the UCLL and UBA prices. For the purposes of this decision, we have estimated the risk-free rate (and the WACC as a whole) as at 1 April 2015 (approximately three months prior to the date of the further draft decision).

52.   We estimated the risk-free rate by averaging the observed market yields on government bonds over one calendar month (March 2015) prior to when the cost of capital is being estimated (1 April 2015). This is the same approach as we use in the IMs. We consider this provides a suitable balance between reducing the degree of volatility which can affect 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. We require an estimate of the benchmark cost of capital for such a provider. 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 further draft UCLL and UBA pricing reviews.

54.   The level of the risk-free rate varies with the term of the investment. Sometimes, the yield increases with term, other times it declines.

55.   When prices are reset for each regulatory period, and those prices reflect the then 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.   We have set the length of the regulatory period for the UCLL and UBA pricing reviews at five years.[22] 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:[23]

> 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.

57.   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

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[22]   Commerce Commission "Further draft pricing review determination for Chorus' unbundled copper local loop service" 2 July 2015, Chapter 1; and Commerce Commission "Further draft pricing review determination for Chorus' unbundled bitstream access service" 2 July 2015, Chapter 1.

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

period avoids under- or over- compensating suppliers of regulated services because, as we explained in the IMs, they can:[24]

> …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.

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".[25]

59. Suppliers of regulated services should not be compensated for risks that they are not exposed to, and therefore do not bear. By matching the term of the risk-free rate to the term of the regulatory period, we ensure that the supplier of the service is compensated for the risk it is exposed to during the regulatory period and that it is able to have the expectation of earning a normal return in the long-run.[26]

60. In its submission on the UCLL FPP process and issues paper, Chorus proposed using a 10-year term for the risk-free rate, matching its proposed length of the regulatory period.[27] However, for the reasons discussed in the further draft UCLL and UBA pricing review determinations, we have continued to use a five-year term of the regulatory period.[28]

61. In its most recent submission, Chorus argued that we have not taken into account the risk of significant changes in the risk-free rate.[29] It claims that the risk-free rate should be estimated based on average values for different time periods, from spot-rate to five year average, consistent with our 2009 standard terms determination (STD) for sub-loop services.[30]

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

[25] 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.

[26] More precisely, the term of the risk-free rate should match the period for which the WACC is fixed (ie, the time period before the WACC will be reset).

[27] 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.62, paragraph 301.

[28] Commerce Commission "Further draft pricing review determination for Chorus' unbundled copper local loop service" 2 July 2015, Chapter 1; and Commerce Commission "Further draft pricing review determination for Chorus' unbundled bitstream access service" 2 July 2015, Chapter 1.

[29] Chorus "Submission for Chorus in response to Draft Ricing 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" 20 February 2015, paragraphs 597-608.

[30] Commerce Commission "Standard Terms Determination for the designated services of Telecom's unbundled copper local loop network service (Sub-loop UCLL), Telecom's unbundled copper local loop network colocation service (Sub-loop Co-location) and Telecom's unbundled copper local loop network backhaul service (Sub-loop Backhaul)" 18 June 2009.

62. The context for the sub-loop STD was different to the current UCLL and UBA pricing reviews. The prices for sub-loop services in 2009 were set under the initial pricing principle (IPP), which was based on international benchmarking and had an indefinite expiry date. Under the FPPs for UCLL and UBA, on the other hand, we are required to set TSLRIC prices, and have determined that a five year regulatory period is appropriate.

63. CEG's cross submission (for Chorus) also argued that we should set an averaging period for the risk-free rate that is more representative of normal market conditions, such as December 2014, because New Zealand Government bond yields are currently at "unprecedentedly low levels".[31]

64. We disagree with CEG's claim that the risk-free rate is at unprecedentedly low levels post-December 2014. Figure 2 below shows the five-year risk-free rate determined in each of the WACC determinations we have made under the cost of capital IMs, over the period from September 2009 to April 2015. The lowest risk-free rate over this period was 2.78%, determined as at 1 July 2012.[32]

Figure 2: Five year risk-free rate estimates under the cost of capital IMs
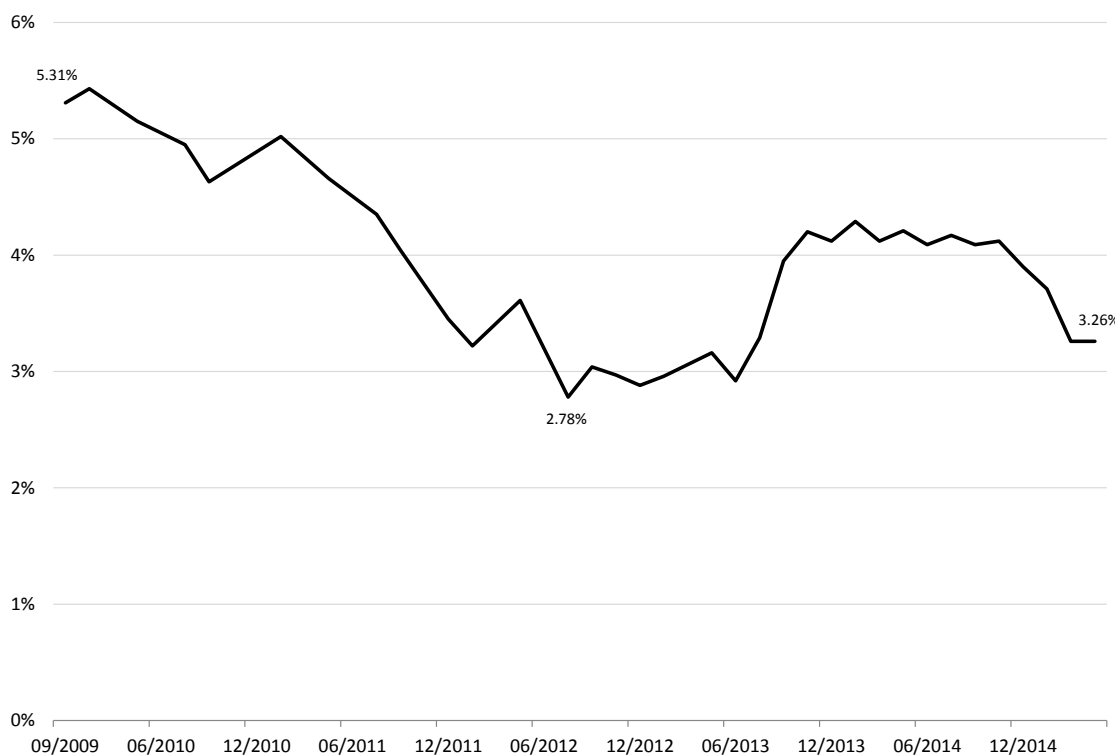
65. We have continued to follow the approach in the December 2014 draft determination papers (and the IMs) of using prevailing interest rates. This is because we consider using current interest rates leads to a WACC estimate that more closely

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[31] CEG "Issues from submissions UCLL and UBA" March 2015, paragraphs 79-87.
[32] Further, CEG's own analysis of international comparisons shows that other countries have prevailing five year risk-free rates much lower than 3.26%. See Table 5 on p. 83 below.

reflects changes in financial markets and therefore, provides better signals for new investment.

66. CEG also submitted that if we decide to set the WACC at a single point in time, prices should be calculated at the beginning of the period prices are to be backdated to, in order to satisfy the NPV=0 rule.[33] However, given we have decided not to backdate, we have estimated the WACC (and therefore, the risk-free rate) at the closest practicable date to the start of the regulatory period.[34]

67. We intend to update the risk-free rate again for the final decision, taking into account timing constraints associated with finalising the TSLRIC models. Our intention is to estimate the risk-free rate (and debt premium) for the final decision as at 1 September 2015, which is approximately three months prior to the expected release date.

68. However, we also invite further submissions on whether we should use a long-term average, rather than the prevailing rate, when estimating the risk-free rate for the final determinations.

Debt premium

69. In this section we:

69.1 introduce the debt premium;

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

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

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

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

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

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

70. Using the same approach as the December 2014 draft determination papers, we have estimated a debt premium of 1.75% (as at 1 April 2015), based on a seven year term and BBB+ S&P long-term credit rating. This debt premium estimate does not

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[33] CEG "Issues from submissions UCLL and UBA" March 2015, paragraphs 75-78.
[34] Discussion regarding the approach to estimating the risk-free rate if backdating is applied is contained in Attachment C of this draft WACC decision, and in Chapter 6 of the further draft determinations for UCLL and UBA.

include allowances for debt issuance costs and swap costs, which are addressed separately in paragraphs 119 to 131 below.

71.   We estimated a debt premium of 1.85% for the December 2014 draft determination papers following the same approach, but using current interest rates as at 1 August 2014.

What is the debt premium?

72.   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

73.   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:

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

73.2   have a S&P long-term credit rating of BBB+ (or equivalent rating from Moody's or Fitch).[35] The target long-term credit rating is discussed in paragraphs 100 to 107 below.

74.   We 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. This is consistent with the IMs for energy utilities.[36]

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

76.   In the December 2014 draft determination papers we placed little weight on the Genesis, Mighty River Power, and Meridian bonds, noting that these were likely to be anomalous due to the NZ Power proposal.

77.   CEG (for Chorus) argued in its latest submission that Genesis, Mighty River Power and Meridian bonds should be included, because the regulatory risk faced by these companies due to the NZ Power proposal is relevant to an access provider facing

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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 issue, 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 "Cost of capital for the UCLL and UBA pricing reviews – WACC spreadsheet for the further draft determinations" 2 July 2015.

TSLRIC regulation. Therefore, CEG argued that the debt premium estimate should be increased by between 0.07% and 0.16%.[38]

78. The Genesis, Mighty River Power and Meridian bonds are no longer clearly anomalous, post-election, so we have included them in the benchmark sample when estimating the debt premium. However, these bonds are given less weight as they are majority owned by the Crown and as such are likely to have lower credit risk than the hypothetical efficient operator.

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

79. We have estimated the debt premium from estimates observed around the start of the period, rather than using a long-term average of the observed debt premium.

80. This is consistent with our approach in the December 2014 draft determination papers, and 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 reasonably reliable way by estimating the yields on a range of publicly-traded, New Zealand corporate bonds. Given the availability of such information, we do not need to look at, for example, historic averages of the debt premium to estimate the debt premium.

81. Using historical rates reflects long-term average actual rates and 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.

82. 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.

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

83. As we did in the December 2014 draft determination papers, 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 long terms, thereby reducing re-financing risk. Available evidence, discussed below, suggests seven years is a reasonable estimate of term of borrowing for large New Zealand corporates.

84. Under the cost of capital IMs the term of the debt premium matches the length of the relevant regulatory periods (and the term of the risk-free rate). This is generally five years.[39]

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[38] CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, paragraph 611.

85.   Before setting the IMs 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.

86.   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.

87.   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.

88.   Only firms which 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]

89.   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.

90.   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, our TCSD, and CEG's submission that the term of the debt premium should be 10 years.

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[39]   In some specific circumstances under Part 4, the regulatory period can be three or four years, rather than five.

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

91.   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.

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

93.   We are required to establish the WACC for a hypothetical efficient operator. We
consider such a firm would issue 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 regulated infrastructure services.

94.   In its latest submission, CEG (for Chorus) suggested that we should use a 10 year
debt term to be consistent with the comparator sample used for asset beta.[42]

95.   However, we note that the 10 year term recommended by CEG is based on the
average debt term for international comparators, so does not reflect New Zealand
conditions. Network Strategies' cross submission demonstrated regional differences
in borrowing term across CEG's sample (for example, the European average was 8.96
years, and the US average was 13.55 years).[43] Further, as shown in Attachment A,
there is no strong relationship between original debt tenor and asset beta.

96.   Network Strategies, for Vodafone and Spark, recommended that we consider
updating the IMs debt survey, as efficient debt management practices may change
over time.[44]

97.   In response to this, we looked specifically at telecommunications data by analysing
publicly available information on Spark's and Chorus' debt, sourced from Bloomberg,
to assist in determining whether a seven year term of the debt premium is
reasonable for the UCLL and UBA pricing reviews. This information is summarised in
Attachment A.

98.   We estimate that the weighted average original debt tenor for Spark is 7.77 years,
and the weighted average original debt tenor for Chorus is 6.31 years. This data, in

[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]   CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, paragraphs 110-116.

[43]   Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand – Review of issues
from UCLL and UBA submissions" 20 March 2015, p. 29-30.

[44]   Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Commerce
Commission draft determination for UCLL and UBA" 20 February 2015, p. 65.

addition to the IMs debt survey, suggests that a seven year term of the debt premium is reasonable.

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

> 99.1 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);

> 99.2 included an allowance for swap costs, which the TCSD also does; and

> 99.3 made consistent assumptions around annual issuance costs.

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

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

101. 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+:[45]

> 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 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.

102. Chorus argued in its latest submission that a credit rating of BBB- should be used, based on the CEG comparator group and practice of ACCC and Ofcom. According to Chorus, a recent report from Moody's shows that the higher the credit rating of a telecommunications firm, the lower its debt/book capitalisation.[46]

103. However, in its latest report, Oxera does not believe that Chorus has provided any compelling evidence that BBB- is more appropriate than BBB+. Oxera compared the book debt to capital ratio for the comparator firms with the latest Moody's credit ratings and found that the inverse relationship referred to by Chorus was not apparent.[47]

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[45]　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.

[46]　Chorus "Submission for Chorus in response to Draft Ricing 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" 20 February 2015, paragraphs 609-610.

[47]　Oxera "Second review of expert submissions on the WACC for UCLL/UBA" 15 May 2015, p.23-24.

104. We also note that Chorus' current S&P credit rating of BBB was affirmed on 4 December 2014, and the outlook was revised from negative to stable.[48]

105. 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 a strong 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 a strong investment-grade credit rating so as to provide it with a margin of safety.

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

    106.1 satisfies the criteria in paragraph 105 above (and does so better than alternative credit ratings such as the BBB- proposed by CEG (for Chorus);

    106.2 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

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

107. We also note that BBB+ is consistent with the credit rating we assume for estimating the debt premium for electricity lines businesses and gas pipeline businesses under Part 4.

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

108. As in our December 2014 draft determination papers, we have:

    108.1 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, and advice from Dr Lally; and

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

109. 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 determination.[49]

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[48] 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

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

Our estimate of the current debt premium

110.   Using this methodology, we have estimated a debt premium of 1.75% as at
1 April 2015, based on a seven year term and a S&P long-term credit rating of BBB+.

111.   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 draft decision.[50]

112.   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.

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 April 2015)

	Industry	Rating	Remaining Term to Maturity	Debt premium	
Determined Debt Premium	Telecommunications	BBB+	7.0	1.75	

Issuer	Industry	Rating	Remaining Term to Maturity	Debt premium	Comment
Non-majority owned by Crown/local authority:					
Fonterra[1]	Other	A	6.9	1.27	BBB+ and 7 year debt premium would be higher.
Spark[2]	Telecommunications	A-	7.0	1.41	BBB+ debt premium would be higher.
AIAL[3]	Other	A-	6.2	1.21	BBB+ and 7 year debt premium would be higher.
WIAL[4]	Other	BBB+	6.1	1.65	7 year debt premium would be higher.
Powerco[5]	Other	BBB	0.2	0.91	BBB+ debt premium would be lower, but 7 year debt premium would be significantly higher.
Contact[6]	Other	BBB	5.2	1.60	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	1.12	
CIAL[8]	Other	BBB+	6.5	1.59	
Genesis Energy[9]	Other	BBB+	7.0	1.66	
MRP[10]	Other	BBB+	7.0	1.80	
Meridian[11]	Other	BBB+	2.0	1.03	

Notes on bonds analysed:
1   Fonterra 5.9% bond maturing 25/02/2022.
2   Spark 4.5% bond maturing 25/03/2022.
3   AIAL 5.52% bond maturing 28/05/2021.
4   WIAL 6.25% bond maturing 15/05/2021.
5   Powerco 6.53% bond maturing 29/06/2015.
6   Contact Energy 5.277% bond maturing 27/05/2020.
7   Transpower 6.95% bond maturing 10/06/2020; 5.448% bond maturing 15/03/2023.
8   CIAL 6.25% bond maturing 4/10/2021.
9   Genesis Energy 8.3% bond maturing 23/06/2020; 5.81% bond maturing 8/03/2023.
10   MRP 8.21% bond maturing 11/02/2020; 5.793% bond maturing 6/03/2023.
11   Meridian 7.55% bond maturing 16/03/2017.

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[50]   Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews – WACC spreadsheet for the further draft determinations" 2 July 2015.

113. 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 a remaining term to maturity of 6.1 years.

114. 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 7 year term to maturity. The WIAL bond is the only bond with a BBB+ credit rating that is not majority owned by the Crown or a local authority.

115. As at 1 April 2015, the debt premium on the WIAL bond was estimated at 1.65%. However, this bond has a remaining term to maturity of 6.1 years, which is less than the 7 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 7 years would be slightly higher than 1.65% (approximately 1.75%).[51]

116. We have also had regard to the estimated debt premium on bonds from a range of other issuers, including Fonterra (1.27%, 6.9 years, rated A), Spark (1.41%, 7 years, rated A-), Auckland International Airport (AIAL) (1.21%, 6.2 years, rated A-), Powerco (0.91%, 0.2 years, rated BBB), and Contact Energy (1.60%, 5.2 years, rated BBB). Although these bonds are all issued by entities that are not majority owned by the Crown or a local authority, they were 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% for a BBB+ rated bond with a 7 year term to maturity.

117. The estimated debt premiums on the Transpower bonds (1.12%, 7 years, rated AA-), the Christchurch International Airport (CIAL) bond (1.59%, 6.5 years, rated BBB+), the Genesis Energy bonds (1.66%, 7 years, rated BBB+), the Mighty River Power bonds (1.80%, 7 years, rated BBB+), and the Meridian bond (1.03%, 2 years, rated BBB+) were given less weight. Taking into account the likely impact of government ownership, the premiums on these bonds generally support the view that the estimate of the debt premium we use should be between approximately 1.65% and 1.85%.

118. Placing primary weight on the estimated debt premium on the WIAL bond (which has a term slightly 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 1.75% for UCLL and UBA.

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[51] While we have not attempted to precisely estimate the impact on the debt premium of an additional 0.9 years term to maturity, allowing a 10 basis point increase above the WIAL bond would lead to an estimate of 1.75%.

Debt issuance costs

119.   As in the December 2014 draft determination papers, we have included an allowance for debt issuance costs of 0.25% per annum in our cost of debt.

120.   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.) which assumes the issue of publicly-traded bonds and is consistent with how we have estimated the debt premium. This was based on amortising the debt issuance costs over the same period as the term of the debt premium (ie, five years).

121.   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 the 35 basis points by the five years and then divided by our seven year debt premium term, 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 to cover these costs.

122.   It its latest submission CEG, for Chorus, suggested that the cost of capital should be used to amortise upfront issuance costs over time. CEG argued that we should use debt issuance costs of 0.35% if we use a seven year debt term.[52]

123.   However, neither CEG nor Chorus has produced data on Chorus' actual debt issuance costs. Available evidence from the IMs confidential debt survey indicates that our allowance of 0.25% is not an underestimate.

124.   In addition to this, CEG's analysis implicitly considers only a single debt issue, and overlooks that efficient suppliers typically issue some debt each year.

124.1   For a portfolio with an average tenor of seven years, around one seventh of the total amount of debt will be incurred each year, and around one seventh of the total debt issuance costs incurred in a seven year period will be incurred each year.

124.2   Our allowance for debt issuance costs spreads the total issuance costs in respect of the total debt portfolio over seven years, and as this will be a similar amount to the costs incurred each year from issuing one seventh of the total debt each year, there is therefore no need for a present value adjustment.

Swap costs

125.   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

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[52]   Chorus "Submission for Chorus in response to Draft Ricing 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" 20 February 2015, paragraph 76-87.

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.

126.   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.

127.   In the December 2014 draft determination papers 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.[53]

128.   In its latest submission, CEG (for Chorus) argued that a reasonable estimate for swap costs is between 10 and 13 basis points, reflecting:[54]

   128.1   two swap costs are required rather than one; and

   128.2   information on swap costs in recently regulatory proceedings in Australia.

129.   Network Strategies, for Vodafone and Spark, submitted that the number of swaps required will depend on the nature of hedging, and that any estimate for swap costs should be based on New Zealand data, rather than Australian data.[55]

130.   We agree with Network Strategies that the number of swaps required will depend on the nature of hedging.

   130.1   If the supplier currently issues floating rate debt, then it will only need to enter into one swap to align the risk-free component of its debt to the regulatory period.

   130.2   However, if the supplier currently issues fixed rate debt, then it will need to enter into two swaps. The fixed rate would first need to be swapped to a floating rate, and the floating rate would then need to be swapped to a fixed rate.

131.   We understand that it is more common for New Zealand firms to issue fixed rate debt than floating rate debt, and therefore, two swaps will generally be required to switch interest rate exposure from the seven year debt term, to match the five year regulatory period (ie, fixed to floating, and then floating to fixed). Therefore, we

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[53]   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, H6.14.

[54]   Chorus "Submission for Chorus in response to Draft Ricing 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" 20 February 2015, paragraphs 117-138.

[55]   Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand – Review of issues from UCLL and UBA submissions" 20 March 2015, p. 36-37.

have doubled the allowance for swap costs contained in the December 2014 draft decision, from four basis points to eight basis points.

Approach to estimating the cost of equity

132.   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:

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

132.2   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

133.   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.[56]

134.   The CAPM was developed by Sharpe, Lintner and Mossin during the early 1960s. The classical version of the CAPM assumes that all forms of investment income are equally taxed, and therefore that both dividends and capital gains are not taxed more favourably than interest.

135.   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.

136.   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.

137.   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.

138.   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:

138.1   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

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

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 simplified Brennan-Lally CAPM when it had a tax imputation regime that was similar to New Zealand's;[57]

138.2 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

138.3 during the IMs, the continued use of the simplified Brennan-Lally CAPM was strongly supported at the cost of capital workshop.[58]

139. Submissions during the UCLL and UBA pricing reviews have also generally supported using the simplified Brennan-Lally CAPM.[59] For example, Spark submitted:[60]

> 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.

140. 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 199 to 218 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.[61]

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

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

141.1 the risk-free rate;

141.2 the investor tax rate;

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

[58] 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.

[59] 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, paragraph 303; Frontier Economics "Determining a TSLRIC price for Chorus' UCLL service" February 2014, p. 32-33.

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

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

141.3   asset beta;[62] and

141.4   the TAMRP.

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

Risk-free rate

143.   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 in both cases. 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.[63]

Investor tax rate

144.   As in the December 2014 draft determination papers, 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 these rates to determine the investor tax rate.[64]

145.   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.[65] 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 determination papers and the IMs.

Asset beta

146.   We have estimated an asset beta of 0.45 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 (which includes an additional year of data, compared to that available for our December 2014 draft determination papers). The estimate of 0.45 is an increase on the 0.40 proposed in the December 2014 draft decision.

147.   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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[62]   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).

[63]   See paragraphs 46 to 68 above for further discussion on the risk-free rate.

[64]   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%.

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

147.1 If an investment had no systematic risk (ie, it showed no correlation with returns on the market), its equity beta would be zero.[66]

147.2 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).

148. 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).

149. Beta is estimated empirically. 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.

150. 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.

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

151.1 Chorus, to our knowledge, is the only vertically separated telecommunications network business; and

151.2 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

152. As in the December 2014 draft determination papers, we have continued to base our asset beta estimate on Oxera's refined comparator sample.

153. 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:[67]

> 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.

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[66] We are not aware of any company that has a beta of zero.
[67] 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.

154. 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 beta estimate, and the Chorus estimate is based on less than three years of trading data. For example, PricewaterhouseCoopers (PwC) submitted:[68]

> …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.

155. Similarly, CEG submitted:[69]

> Having regard to only a single observation for Chorus' beta may be unbiased but is likely to provide a very imprecise estimate. Beta estimates for a single firm exhibit significant variability depending on the vagaries of the data. Random movements in a firms' share price on days of particularly large market shifts may have significant effects on its estimated beta. Using Chorus' empirically estimated beta as the 'focal point' gives it significantly more weight than individual observations from international benchmarking. In my opinion reliance to this extent on the results from less than three years of trading data on a single firm is unreasonable.

156. We acknowledge that the Chorus estimate may be the closest comparator to the hypothetical efficient operator that we are modelling. However, we agree with submissions that a comparator sample is needed to minimise the risks of estimation error associated with basing the asset beta on a single firm. Accordingly, we have not based our asset beta estimate for UCLL and UBA on the observed asset beta for Chorus. We have however used this estimate as a cross-check on our estimate of beta.

157. Instead of estimating asset beta solely by relying on data on Chorus, we have continued to use a sample of comparator firms. This approach:

    157.1 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

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

Firms included in the comparator sample for UCLL and UBA

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

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

[69] CEG "Review of Lally and Oxera reports on the cost of capital" July 2014, p.9.

159.   Oxera has updated its analysis to include more recent data and address the points raised in submissions on its last report. Oxera's latest report has been released at the same time as the further draft determinations for UCLL and UBA.[70]

160.   Oxera was not persuaded by any submissions that it needed to alter the sample in its latest report. In particular, Oxera noted that it previously addressed Network Strategies' submission regarding Deutsche Telekom in its November 2014 report, and no new arguments have been raised.[71]

161.   However, in Oxera's latest report it has updated its refined comparator sample to remove Portugal Telecom, which has undergone "a significant financial restructuring and experienced a period of dramatic stock price decline" which "may give rise to unreliable recent beta estimates".[72]

162.   Further discussion of previous submissions regarding the comparator sample for UCLL and UBA, including our responses, is contained in our December 2014 draft decision.[73] Those comments still represent our views.

Time period and frequency of data for estimating asset beta

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

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

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

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

164.   This approach is generally consistent with our December 2014 draft decision, where we placed greatest weight on the most recent five year period (but also considered the preceding five year period). In our December 2014 draft we disagreed with CEG's submission that we should base our asset beta estimate on data of the last 20 years.[74]

165.   In its submission on the December 2014 draft decision, CEG submitted that an asset beta of 0.50 (rather than 0.40) should be used, based on data over the past 20 years, as well as the most recent observations of beta. CEG noted that:[75]

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[70]   The latest Oxera report can be found on the FPP webpage: http://www.comcom.govt.nz/regulated-industries/telecommunications/standard-terms-determinations/unbundled-bitstream-access-service/uba-final-pricing-principle-price-review/.

[71]   Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, footnote 7, p.6.

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

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

[74]   Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Draft decision" 2 December 2014, paragraphs 151-157.

[75]   CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, paragraphs 3-6 and 18-22.

165.1 asset betas estimated over the past five years have been depressed due to the effects of the GFC and the European sovereign debt crisis, arguing that there was an inverse relationship between telecommunications and finance sector betas during this period; and

165.2 asset betas measured over periods that do not include the effects of these crises have recently recovered from these lower levels and have returned to levels previously experienced prior to 2008.

166. CEG submitted that the most recent beta estimates have returned to pre-GFC levels, based on analysis of six-monthly betas as shown in Figure 3 below.[76]

Figure 3: CEG analysis of six-monthly beta estimates
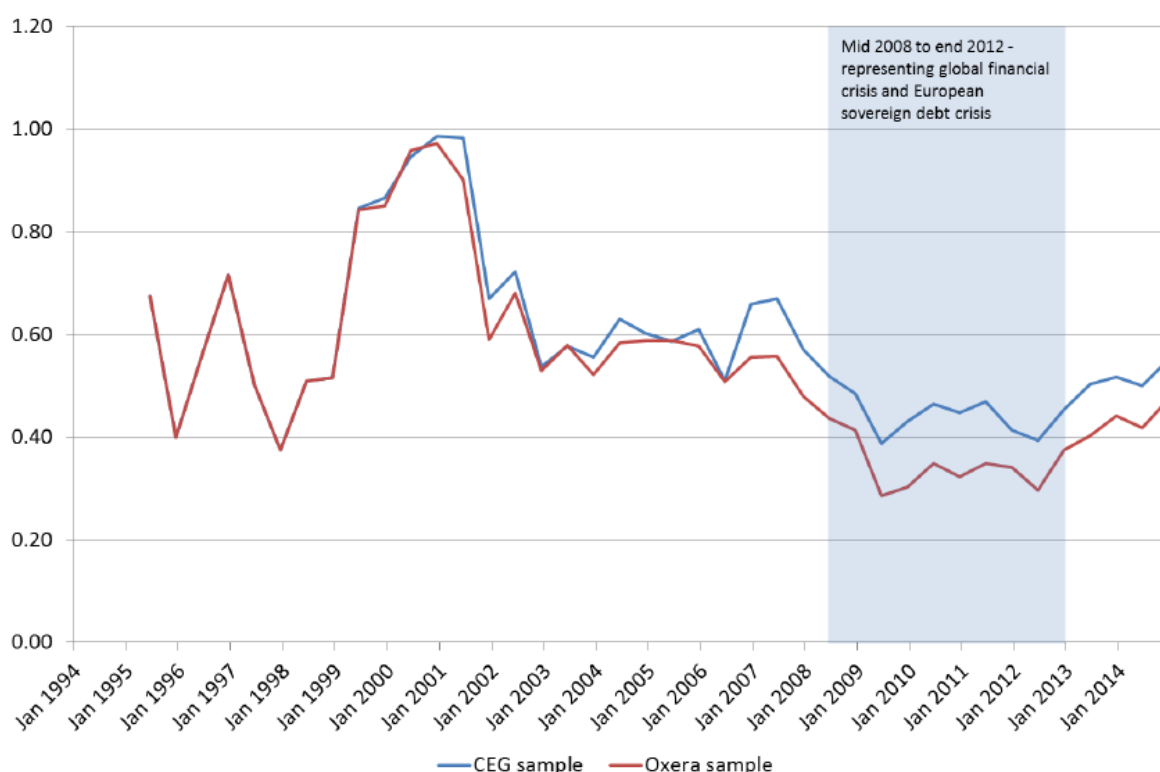
167. Similarly, L1 Capital argued that the 2009-2014 has "in every way been as exceptional as the preceding 14 year period considered by Oxera" because:[77]

167.1 the GFC ushered in an extraordinary period of near zero interest rates, extreme liquidity and a chase for global yield as returns on fixed income assets compressed returns;

167.2 as large, liquid telecommunication companies offering higher than average dividends and predictable revenues, the equities in the Oxera comparator set benefited from a reduction in the required rate of return as investors sought fixed income proxies; and

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[76] CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, figure 1, p. 9.
[77] L1 Capital submission, 20 February 2015, p. 9-11.

167.3 this chase for yield and the contraction in asset betas is not typical and we should see a reversion to higher risk premia and higher asset betas for the Oxera comparator set once global growth normalises.

168. Network Strategies, on the other hand, submitted that:[78]

168.1 CEG's underlying premise is that there exists a long-run beta for telecommunications businesses, and that the beta estimate used by the Commission should reflect this value rather than being influenced by short- to medium-term volatility;

168.2 this ignores that telecommunications is a dynamic industry and there have been significant underlying changes over the past two decades. These factors, which are not aligned with economic cycles or shocks, will affect the risk associated with the business; and

168.3 the older data suggested by CEG would not be particularly relevant for determining a forward-looking beta. Therefore, CEG's discussion of the European sovereign debt crisis and its comparison of European finance and telecommunications betas is essentially irrelevant.

169. We asked Oxera to consider these submissions. In summary, Oxera concluded that:[79]

While there were some interesting points raised by respondents, Oxera does not consider any of the points to be sufficiently well-evidenced and is not persuaded to fundamentally change its approach to estimating asset betas.

170. Oxera also noted that:[80]

170.1 CEG's approach of using six-monthly daily betas (as shown in Figure 3 above) contradicts its reasoning elsewhere, where it has argued for consistency with the IMs (where five year monthly/weekly beta estimates were used). Given the volatility in estimating asset betas, Oxera stated that two and five year periods are more suitable.

170.2 As noted in Oxera's previous report, there are several valid reasons for excluding older time periods of the analysis when estimating asset betas from the comparator sample, including the small sample size in the initial years of the analysis.

170.3 There is no unambiguous and well-evidenced relationship in support of telecommunications betas being depressed due to movements in the financial sector. The argument that there is an inverse relationship between the systematic risk of finance and telecommunications is not consistently

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[78] 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, pp. 19-20.

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

[80] Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, pp. 13-19.

demonstrated across the world. While it may hold in Europe, Oxera's assessment of the evidence in the US and New Zealand markets suggests no such distortive effect on telecommunications betas.

170.4 The evidence suggesting that the European sovereign debt crisis has a depressive effect on the asset risk for telecommunications firms is inconclusive. Recent movements observed in asset betas for European telecommunications firms, combined with developments in sovereign creditworthiness, suggest that the impact of the crisis is not as straightforward as suggested by CEG.

171. We agree with Oxera that greater weight should be placed on more recent asset beta estimates, rather than relying on a 20 year period as suggested by Oxera. We have continued to focus on asset betas for the most recent 10 years when estimating the asset beta for UCLL and UBA.

Our view of the appropriate beta for UCLL and UBA

172. When determining our asset beta estimate for UCLL and UBA, we have used a similar approach to that which we used in the IMs. For the December 2014 draft determination papers we started with the estimate of beta determined by Oxera from the most recent five-year period, using monthly sampling, for the refined comparator sample.

173. 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. We used estimates from the last year 10 years (that is, periods after the impacts of the dot-com boom and bust had passed).

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

175. In response to submissions, Oxera has included an extra 11 months' worth of data in its latest report.[81] Oxera noted that "the average for the refined comparator set has increased for all time-periods and frequencies since April 2014".[82] As a result, Oxera increased its recommended range for asset beta, from 0.30-0.45 to 0.30-0.50.[83]

176. Table 3 below shows the average asset beta estimates for Oxera's refined comparator sample, for the five years to 2009 and the five years to 2015.[84]

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[81] Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p.7-12.
[82] Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p.11.
[83] Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p.19.
[84] Data for the five years to 2015 excludes Portugal Telecom, for the reasons explained by Oxera. Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p. 6, 43-44.

Table 3: Summary of average asset beta estimates from Oxera's refined comparator sample

	Five years to 2009	Five years to 2015
Mean using monthly data	0.50	0.41
Mean using weekly data	0.47	0.39

177. Table 3 shows that the monthly and weekly estimates for the same periods are again generally very close to each other.[85] This gives us confidence that the choice of monthly or weekly data will not materially affect our choice of beta estimate.

178. The average asset beta estimates for the five years to 2015 for both the monthly and weekly estimates have increased from the equivalent five year averages to 2014 that we used for the December 2014 draft determination papers. The average monthly estimate has increased from 0.33 to 0.41 and the average weekly estimate has increased from 0.36 to 0.39.

179. There remain quite significant differences between the estimates for the five years to 2009 and the five years to 2015 (and the five years to 2014 reported in our previous draft decision). In particular, estimates drawn from the five years to 2015 are consistently lower than those in the preceding five-year period.[86] Given the absence of a simple explanation for these differences between adjacent time periods, if we were to simply adopt the most recent estimate, we might be using an asset beta that was too low.

180. Instead, we have also placed weight on estimates from the period to 2009 (in addition to those for the period to 2015). Doing so, we determined an asset beta of 0.45. This falls near the mid-point of the estimates reported in Table 3.

181. Oxera's latest report also includes rolling average asset betas for its refined comparator sample. Figure 4, below, is reproduced from Oxera's report and shows an increase in the average asset beta (in all frequencies) in the last year.[87] The average of five year monthly rolling asset beta estimates for the 10 year period from 2006-2015 is 0.45, which supports our updated estimate.[88]

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[85] Typically within 0.03.

[86] This is in contrast to the corresponding analysis for the beta of the electricity lines services during development of the IMs. In that context, of older time periods and higher frequency sampling (particularly weekly data) strongly supported the appropriateness of our initial estimate.

[87] Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, figure 2.6, page 12. The 2015 numbers exclude Portugal Telecom. The cut-off date for the analysis is 10 April in each relevant year of the analysis and 16 March for 2015.

[88] In the December 2014 draft decision, we placed greatest weight on five year asset beta derived from monthly observations. Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Draft decision" 2 December 2014, paragraph 151.

Figure 4: Average asset beta values for the refined comparator set (1999-2015)
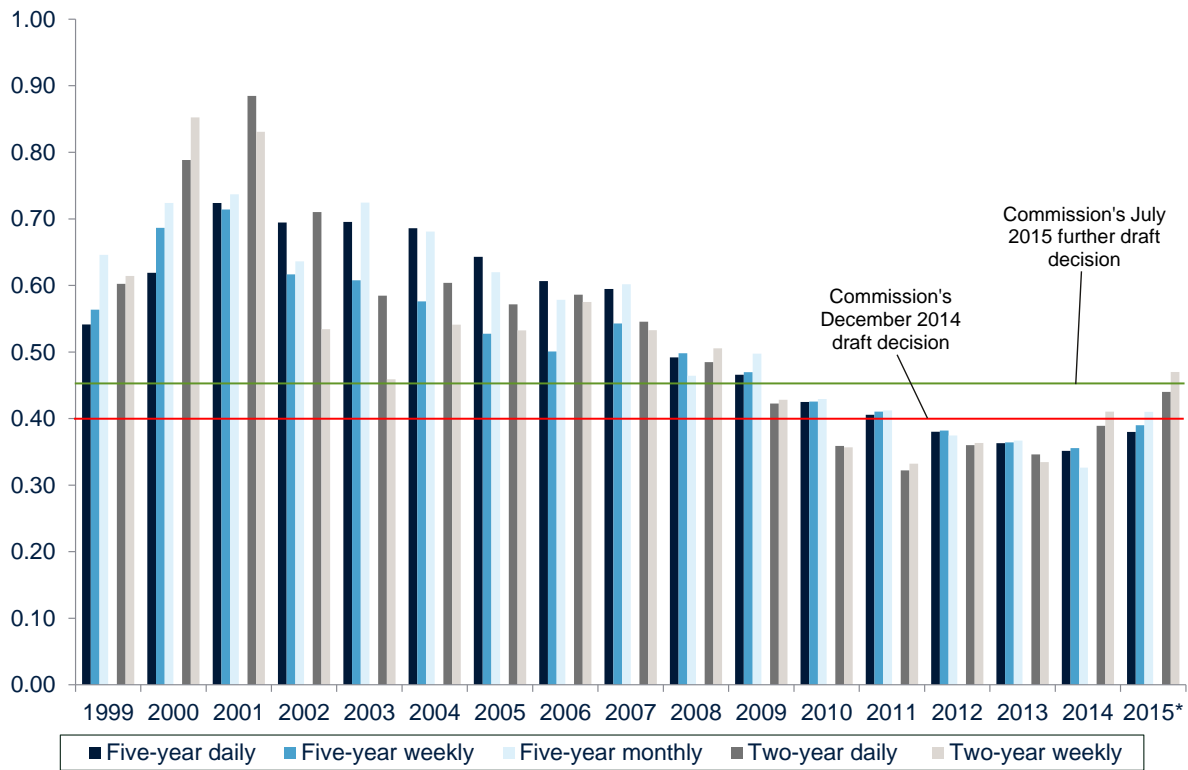
182. We also checked our estimate against other information to ensure it was reasonable. In particular, we note that an asset beta of 0.45:

    182.1   is close to the estimates reported by Oxera for the refined comparator sample using daily data ending in 2009 and 2015 and estimates of beta from two year-long sampling periods;[89]

    182.2   is within the range of asset beta estimates observed for Chorus. Oxera notes that, in March 2015, the two year daily asset beta for Chorus was 0.30, and the two year weekly estimate was 0.49. Oxera also estimated volatility-adjusted asset beta estimates for Chorus, noting that this results in a two year weekly estimate of 0.37;[90]

    182.3   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 from other services and technologies for those services, relative to electricity lines services;[91] and

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[89]   Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p.7-12.
[90]   Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p.2-6.
[91]   We also note that our asset beta estimate of 0.45 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).

182.4 sits near the middle of Oxera's updated range of international regulatory precedent for asset beta determinations in the telecommunications sector (0.38-0.60) and is very near the average (0.47).[92]

We have used the same asset beta for UCLL and UBA

183. 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:

   183.1 these are closely related services; and

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

184. In Oxera's initial report it recommended that we use the same asset beta for UCLL and UBA:[93]

   …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.

185. 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.

186. Submissions 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:[94]

   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.

187. Network Strategies also agreed that there is no evidence to suggest that there should be different estimates of beta for the two services:[95]

   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

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

[93] 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.

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

[95] 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.

comparator companies, we agree that there is no compelling evidence to suggest that there should be separate betas.

Tax-adjusted market risk premium

188. We have used a TAMRP of 7.0%. This is based on advice from Dr Lally, and is the same value used in December 2014 draft determination papers and the cost of capital IMs.

189. 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).

190. 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.

191. In its March 2015 cross submission, CEG 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, as it argues it is now.[96]

192. However, CEG's submission is inconsistent with available empirical evidence from Dimson, Marsh and Staunton of low equity returns post 2000.[97]

    192.1 Based on empirical analysis of 113 years of data, across more than 20 countries, Dimson, Marsh and Staunton concluded that "…there is a strong association between low real interest rates and low subsequent equity returns".[98]

    192.2 CEG, on the other hand, effectively argues that when current interest rates are low equity returns should be high. CEG's submission contradicts the empirical findings of Dimson, Marsh and Staunton.

193. Therefore, we have decided to use the same TAMRP of 7% that we used in the December 2014 draft determination papers and the IMs.

Approaches for estimating the TAMRP

194. 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:

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[96] CEG, "Issues from submissions UCLL and UBA" March 2015, paragraphs 69-74.
[97] Dimson, Marsh, Staunton "The low-return world" *Credit Suisse Global Investment Returns Yearbook 2013*.
[98] Dimson, Marsh, Staunton "The low-return world" *Credit Suisse Global Investment Returns Yearbook 2013*, p.15.

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

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

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

195. 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. Our TAMRP estimate is based on multiple methods, as recommended by Dr Lally.

196. In its March 2014 submission, CEG used a dividend growth model (DGM) analysis of the return on equity required on the New Zealand stock market over time to estimate the value of TAMRP. Based on this analysis, CEG submitted that current estimates of the TAMRP are elevated and above 8%, relative to the current risk-free rate.

197. For our December 2014 draft determination papers, Dr Lally advised us that we should use a TAMRP of 7% based on a number of methods. We continue to agree with his recommendations and further details of his approach, and his response to previous submissions, can be found in the TAMRP section of the December 2014 WACC draft determination.[99]

198. We have continued to use a TAMRP estimate of 7% for the following reasons:[100]

198.1 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;

198.2 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;

198.3 we are sceptical that movements in the current TAMRP can be reliably estimated and, for the reasons discussed in Dr Lally's paper, we are not

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[99] Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews" 2 December 2014, paragraphs 172-180.

[100] 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.

persuaded that CEG's DGM provides better estimates of the New Zealand TAMRP than our established approach;[101]

198.4 we consider historic estimates of equity returns are useful indicators of 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; and

198.5 we understand that an estimate of TAMRP of 7% remains more consistent with the estimates used by New Zealand investment banks (and a TAMRP of 8%, as suggested by CEG, does not).[102]

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[101] We note this is consistent with the view of the Australian Competition Tribunal. See: Application by WA Gas Networks Pty Ltd (No 3) [2012] ACompT 12 (8 June 2012), from paragraph 88. We note Dr Lally identifies a wide range of MRP estimates in the academic paper which CEG relies upon p.28-29.

[102] The TAMRP used by major New Zealand investment banks was set out in the IM Reasons paper, 22 December 2010, paragraph H7.75 and Table H11. Since then we are aware only that First NZ Capital has adjusted its rate (from 7.25% back to 7%), to reflect its long-term view of the TAMRP, post the global financial crisis. CEG provides no evidence that other analysts of New Zealand financial markets currently use estimates at or near 8%.

Leverage

199. We have used a notional leverage of 37% for the further draft UCLL and UBA pricing reviews, which is the average leverage of the refined comparator sample used to estimate asset beta. We have also assumed a debt beta of zero.

200. In the December 2014 draft determination papers we used a notional leverage of 43%. This was based on the average five-year leverage for the comparator sample in 2014.[103]

201. However, as with asset beta, Oxera has updated the data set to include an additional year of data, and has provided rolling averages of the refined comparator sample leverage over a longer time period.

202. We believe that it is important for us to treat leverage consistently with asset beta because we are using the same refined comparator sample. As we have considered rolling averages for asset beta over a 10 year period from 2006-2015, we have now used the same period for leverage. The average leverage of the refined comparator sample over that period is 37% – we consider this to be the most appropriate estimate of leverage for our further draft UCLL and UBA pricing reviews.[104]

The leverage anomaly and debt beta

203. 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.

204. 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.[105] This is because interest costs are tax deductible to the firm but dividends are not.

205. 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.

206. 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.[106] This well-known

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[103] Oxera "Review of expert submissions on the WACC for UCLL/UBA" 4 November 2014, p.17.

[104] Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p.27-28.

[105] 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.

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

counterintuitive characteristic of the simplified Brennan-Lally CAPM (ie, WACC increasing with higher leverage) is referred to as the 'leverage anomaly'.

207. 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.[107] This anomaly is created by the analytical models used to estimate the WACC, rather than simply reflecting unusual market conditions.

208. 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.

209. 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.

210. 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.[108] PwC submitted that:[109]

> 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.

211. 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.[110] 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

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[107] 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.

[108] 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.

[109] 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.

[110] 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.

or eliminate the extent to which the post-tax WACC estimate for each service varies with leverage.

212. 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.[111] Further, there are practical difficulties in accurately estimating debt betas. Those challenges to the use of non-zero debt betas remain.

213. 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 BBB+/A-). 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.

214. By contrast, we do not place primary weight on Chorus' beta, and Chorus' leverage has a much lesser influence on our analysis (which uses a sample of comparator companies with average leverage much lower than Chorus), than it does on Oxera's analysis of beta (which focused on Chorus).

215. 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.

216. Accordingly, we do not think there is any need for us to estimate an appropriate value for debt beta if we adopt the average leverage of the revised comparator sample (37%).

217. 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.[112] Chorus suggested that this approach is used by the ACCC, Ofcom, and most of the European regulators.[113]

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[111]   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, paragraphs 88-90 28 September 2007, pp. F21-F28. Ofcom, "Fixed Access Market Reviews: Draft Statement" 19 May 2014, Annex A14.109-A14.121.

[112]   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, paragraphs 581-595.

[113]   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.

218. However, our view is 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:

218.1 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);[114]

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

218.3 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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[114] See paragraphs 203 to 216 above for discussion on the leverage anomaly.

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

219.   Overall, we have estimated a mid-point post-tax WACC of 6.03%, as at 1 April 2015, for the further draft UCLL and UBA pricing reviews. The parameters used to generate our WACC estimate for UCLL and UBA are summarised in Table 4 below.

220.   For ease of comparison, Table 4 also includes the parameter values used to estimate the mid-point post-tax WACC of 6.47% contained in our December 2014 draft decision (which was estimated as at 1 August 2014).

Table 4: UCLL and UBA WACC estimates

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

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 uplift be applied to the mid-point WACC estimate?

221. This section considers whether an uplift should be applied to our central estimate of WACC for the UCLL and UBA services.

222. 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.[115] However, 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), because:

    222.1 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 regulatory asset base (RAB);

    222.2 there is a reduced need for further investment in the copper access network for most parts of New Zealand, given the deployment of UFB and RBI; and

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

223. 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.

    223.1 Applying a WACC uplift for UCLL and UBA could potentially send a signal to investors in that new innovative service 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.

    223.2 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.

224. However, we consider that the evidence demonstrates that the link between a WACC uplift for the UCLL and UBA services, and the benefits associated with reducing the risk of delayed deployment of new telecommunications technologies in New Zealand, is too uncertain to justify the certain higher costs to consumers. Therefore, we consider that the mid-point WACC estimate is the most appropriate and best gives effect to the section 18 purpose.

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

225. 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 we commissioned on this subject, the model discussed in our April 2015 pre-conference paper, and a model submitted by CEG (based on an amended version of the Dobbs (2011) model). These quantitative models have provided valuable insights, by enabling analysis of the potential costs and benefits of a WACC uplift for UCLL and UBA under plausible assumptions.

226. However, we consider that these models ultimately support the conclusion that the link between a WACC uplift for UCLL/UBA 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:[116]

> …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.

227. 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:

227.1 our framework for considering whether to depart from the mid-point WACC estimate;

227.2 Chorus' incentives for additional investment in the UCLL and UBA services under TSLRIC pricing, compared to a RAB-based approach;

227.3 the potential role of a WACC uplift across different categories of investment, including investment in the existing copper network and investment in innovative new telecommunications services;

227.4 the available quantitative evidence, including the models developed by Oxera and CEG, and the model described in our April 2015 pre-conference paper;

227.5 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; and

227.6 possible reasons for setting WACC below the mid-point estimate.

Framework for considering whether to depart from the mid-point WACC estimate

228. 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:[117]

228.1 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)?

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[116] Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 37.
[117] 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, paragraph 2.6.

228.2 If so, what is the most appropriate percentile?

229. 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.

230. 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).[118]

230.1 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.

230.2 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.[119]

231. 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.

232. 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 during the WACC percentile review for electricity lines and gas pipelines, Oxera, noted that:[120]

232.1 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

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[118] 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, paragraphs 3.6-3.10.

[119] 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, paragraphs 5.53-5.77.

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

232.2 some WACC premium for customers to reduce the risk of under-investment in network quality appears "reasonable and proportionate".[121]

233. We have considered possible sources of asymmetry from under- and over-estimating the WACC for UCLL and UBA. However, for the reasons discussed below, we consider that there is no strong justification for departing from the mid-point WACC estimate.

234. As indicated in paragraph 225 above, we have explored available quantitative evidence regarding whether a WACC uplift should be applied for UCLL and UBA, and consider that this evidence supports our view that no uplift should be applied. Submissions on our December 2014 draft determination papers argued that robust empirical evidence is needed to support any uplift to the mid-point WACC estimate, particularly in light of the work we undertook on the WACC for electricity lines and gas pipelines businesses last year.[122]

We have considered both consumer and total welfare approaches

235. 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.

236. The outcome of the quantitative analysis will differ depending on whether a total welfare or consumer welfare standard is used. Some mix of the two approaches could also be applied—ie, where some weighting is assigned to the results of both approaches.

236.1 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.

236.2 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.

237. CEG for Chorus submitted that total welfare, rather than consumer welfare, is the appropriate standard. CEG stated:[123]

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[121] As discussed in paragraphs 242 to 248 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.

[122] For example: Wigley and Company "Submission on draft pricing review determination for UBA and UCLL services" 20 February 2015, paragraph 10.42; Spark "UBA and UCLL FPP pricing review draft decision" 20 February 2015, paragraphs 347 and 371.

[123] CEG "Welfare effects of UCLL and UBA uplift" March 2015, paragraph 98.

…in our view, the LTBEU would direct an economist to a total welfare standard, not a consumer welfare standard. A static consumer welfare analysis would potentially indicate that prices should be reduced to marginal cost, and the loss to producers of pricing below cost would ignored. However, as the Commission itself recognises this would not be in the LTBEU. This is because any firm that fails to recover its costs of production, including a normal risk-adjusted return on capital, will exit the market over the longer term by redeploying its capital elsewhere.

238. Professor Hausman's submission (also for Chorus) on our December 2014 draft determination papers, on the other hand, stated that "economists have determined that consumer welfare should be the goal of regulation".[124] Professor Hausman clarified his position in a subsequent submission, stating that:[125]

> While my view is that the consumer welfare standard is the correct standard to evaluate telecommunications policy and regulation, it is crucial to understand the correct time frame for the evaluation of consumer welfare. Over time, increases in consumer welfare will not occur unless significant investment occurs. And since most investment in telecommunications is sunk cost investment, the investment is riskier that much other investment. Thus, regulation must create correct economic incentives to encourage firms and investors to commit funds to investment.
>
> In my view in 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 into account a period long enough so that the capital stock changes, and is not fixed, as it is in the short-term.
> …
> What I, and other economists mean, is consumer welfare over the "long-term" when the welfare increasing effects of investment and innovation have been taken into account.

239. We broadly agree with Professor Hausman's approach to considering the appropriate welfare standard, as outlined in the quote above. We consider this to be consistent with the approach we adopted when assessing the WACC percentile for electricity lines and gas pipelines businesses (regulated under Part 4 of the Commerce Act) last year.[126] In the context of that decision we concluded:[127]

239.1 The use of a consumer welfare approach in any loss analysis is in principle more consistent with the overriding Part 4 purpose statement (section 52A) than a total welfare approach. Section 52A does not restrict the relevant benefits to consumers from limiting the ability of suppliers to extract excessive profits, and from associated lower prices, to the efficiency effects only. The direct financial benefits to consumers from those lower prices (ie, the distributional effects) are also relevant. These combined efficiency and

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[124] Professor Hausman "Report by Professor Jerry A. Hausman Response to the Commerce Commission's Draft Determination on Uplift" paragraph 16.

[125] 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, paragraphs 4-7.

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

[127] Commerce Commission "Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" 30 October 2014, paragraphs 2.35-2.37.

distributional effects are typically represented in theoretical or analytical economic models by consumer surplus.

239.2　It is not necessarily inconsistent with section 52A to give some weight to producer surplus, as represented or quantified in such an economic model, because 'consumer surplus' is not directly equivalent to the 'long-term benefit to consumers'. In particular, there are limitations to the extent to which any theoretical representation or analytical model of *static* consumer surplus can adequately take into account all the relevant efficiency and distributional benefits to consumers over the long-term, such as dynamic efficiency benefits from innovation or improvements to service quality, as well as all relevant inter-temporal effects.

239.3　Therefore, notwithstanding our in principle view that using the consumer welfare standard is more consistent with an overall objective of the long-term benefit to consumers, 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.

240.　We consider that similar conclusions apply in the context of considering a WACC uplift for UCLL and UBA. In the long-term, section 18 directs us to consider consumer welfare, through reference to the "long-term benefit of end-users". However, in our view, total welfare may also be relevant where it incorporates long-term benefits to end-users not otherwise captured.

241.　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.

Chorus' incentives for additional investment in UCLL/UBA under TSLRIC pricing

242.　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.

243.　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.

243.1　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.

243.2 Under TSLRIC, 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.

244. 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 is materially less likely to promote competition for the long-term benefit of end-users.

245. 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). Further, an objective of TSLRIC pricing is to set efficient build/buy signals, which will depend on the allowed WACC.

246. 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.[128] He referred to the following (2006) quote from Telstra's Regulatory Affairs Manager:[129]

> …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.

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[128] 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".

[129] 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.

247. 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:[130]

> 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.

248. 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). 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 summary, applying a WACC uplift would:

248.1 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

248.2 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.[131]

The potential role of a WACC uplift across different categories of investment

249. 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. The main categories we considered are:

249.1 investment in maintaining, upgrading and expanding the copper network; and

249.2 investment in new telecommunications services.

Investment in maintaining, upgrading and expanding the copper network

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

251. As a general comment, we agree with submissions which argue that there is a reduced need for further investment in the copper access network for most parts of New Zealand, given the deployment of UFB and RBI. For example, WIK-Consult noted that applying an uplift to help foster innovation in copper will be counter-productive

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[130] 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 17.

[131] However, for the reasons explained in paragraph 245 above, this does not mean TSLRIC prices are unable to incentivise additional investment in UCLL and UBA.

for fibre migration, and incentivising bypass investment will be inefficient given UFB and RBI deployment.[132]

252. In terms of maintenance expenditure for the copper network (and the risks of network outages resulting from under-investment), we noted in the December 2014 draft determination papers that there is no strong case for applying a WACC uplift because:[133]

    252.1 in the Part 4 context, the WACC uplift is intended to mitigate the risks of under-investment in electricity lines and gas pipelines networks, which will continue to serve consumers for the foreseeable future;

    252.2 the costs to end-users of outages for UCLL and UBA are likely to be significantly less than for electricity lines services, partly due to the presence of substitutes for fixed-line telecommunications services (such as mobile networks) whereas there are no alternate services for most electricity consumers; and

    252.3 there are required service levels under the STDs for UCLL and UBA, including associated performance penalties.

253. In response, Houston Kemp (for Chorus) submitted that while there are substitutes for fixed-line telecommunications services, it is important to bear in mind that:[134]

    253.1 critical services rely primarily on fixed-line services;

    253.2 mobile networks are themselves often dependent on fixed-line services; and

    253.3 the wider economy (including most financial transactions and business interactions) also relies heavily on fixed-line access services.

254. Houston Kemp referred to several examples of telecommunications network outages, including a November 2012 fire in Telstra's Warrnambool exchange, which resulted in an outage cutting off 65,000 telephone services (and lasted for 20 days).[135]

255. Our view remains that the impact of outages for the UCLL and UBA services is likely to be significantly lower than for electricity lines services, limiting the case for a WACC uplift. This is because:

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[132] WIK-Consult "Submission on the Commerce Commission's analytical frameworks for considering an uplift to the TSLRIC price and/or WACC" 8 May 2015, paragraph 4.

[133] Commerce Commission "Cost of capital for the UCLL and UBA pricing reviews: Draft decision" 2 December 2014, paragraphs 222-225.

[134] 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.

[135] 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. 34.

255.1 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 out of scope for the current reviews.

255.2 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 by Houston Kemp), this dependency relates to backhaul/transmission services rather than the UCLL and UBA access services.

255.3 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).

256. 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 will 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.

257. As discussed elsewhere in this draft decision, there are also other factors which suggest there is limited need for a WACC uplift to incentivise investment in the existing copper network:

257.1 under TSLRIC pricing, new investment undertaken by Chorus does not affect the regulated price-caps, which suggests that a WACC uplift is unlikely to materially affect Chorus' incentives to invest in UCLL/UBA;[136]

257.2 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".[137] Although we consider this is due to features of the TSLRIC pricing approach more generally, rather than specific modelling choices we have made, on balance we support Professor Vogelsang's conclusion;[138] and

257.3 in any event, geographic averaging means that the TSLRIC prices for UCLL and UBA are unlikely to be sufficient to incentivise further investment in copper in higher cost areas not covered by the UFB deployment, without applying a very significant uplift.[139]

258. For these reasons, we consider that there is no strong justification for a WACC uplift to incentivise investment in maintaining, upgrading, or expanding the existing copper

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[136] See paragraphs 242 to 248 above.

[137] 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 110.

[138] See paragraphs 307 to 314 below for further discussion.

[139] See paragraph 315 below.

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

259.   Submissions for Chorus have highlighted the importance of investment in new technologies. We agree that this is an important consideration, due to the rate of technological development in the telecommunications industry and potential benefits to consumers associated with investment in innovative new services.[140]

260.   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.[141]

261.   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. Therefore, as discussed in paragraphs 271 to 284 below, we asked Oxera to develop a quantitative framework for assessing the potential costs and benefits of applying a WACC uplift for UCLL and UBA.

262.   However, based on our analysis, we consider that the link between a WACC uplift for UCLL and UBA and innovation benefits relating to different services is highly uncertain. Factors that are likely to influence the strength of this link are described in Figure 5 below.[142]

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[140]   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.

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

[142]   Professor Vogelsang notes 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, paragraph 12.

Figure 5: 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:

1	**There is the prospect of a new technology, with sufficient demand to be commercially viable in New Zealand.**
	This seems highly likely, given the pace of technological development in the telecommunications industry.

2	**There is a chance that the new technology, if deployed, will end up being subject to regulation.**
	For regulation to be likely, the new service will need to either: (a) displace an existing regulated service; or (b) create a new bottleneck service.

3	**Applying a WACC uplift for UCLL and UBA will provide a credible commitment, such that investors are confident any future telecommunications services which are regulated in NZ will receive a similar uplift.**
	The strength of this commitment, in the context of regulation of future services, is likely to depend on various factors (including the need to consider regulation of each service on its merits).

4	**The investor's expectations regarding the allowed WACC, should the new service be regulated, are material to its decision regarding whether to deploy the new service in NZ.**
	Factors other than the regulatory WACC may play a more important role in the investment decision. For example: (a) development, build, marketing, and support costs will be subject to considerable uncertainty; (b) consumer willingness to pay and uptake may be hard to predict; and (c) actual or potential competitors may invest in the new technology (or an alternative new technology).

263. Each of the factors listed in Figure 5 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.

264. 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 6.03% to 6.53%) would increase the combined UCLL and basic UBA monthly rental prices in the first year of the regulatory period by approximately $1.51, from $37.89 to $39.40.

265. In addition, WIK-Consult (for Spark and Vodafone) has submitted that consideration needs to be given to which innovative investments should be further incentivised through a WACC uplift for UCLL and UBA. WIK-Consult argued that:[143]

    265.1   fostering innovation in the legacy copper network will be counter-productive for fostering fibre migration;

    265.2   there is no need to incentivise UFB 1 investments because they are committed and contracted already;

    265.3   the decision for UFB 2 investment will mainly be driven by the subsidy scheme and not by the UCLL WACC;

    265.4   incentivising bypass investment (eg, duplicate fibre networks or expansion of Vodafone's cable network) will not be coherent with prevailing economies of scale in New Zealand (including government subsidies), and would in the end be inefficient; and

    265.5   innovation, investment and prices in mobile markets will mainly be driven by competition in the mobile market.

266. Therefore, WIK-Consult concluded that "in the structurally separated market structure of New Zealand most of the service innovation making the use of fibre networks attractive to users are not conducted by Chorus or the LFCs but by the RSPs and OTT players".[144]

267. We agree with much of WIK-Consult's analysis as summarised in paragraphs 265 and 266 above, and consider that this further suggests caution should be taken when considering applying a WACC uplift for UCLL and UBA.

268. Professor Vogelsang undertook similar analysis when considering the submission from Professor Hausman, which argued that a WACC uplift/price increase for UCLL and UBA will result in increased innovations. In terms of Chorus' investment incentives, Professor Vogelsang concluded that "…there are likely to be very few if any innovation incentives for Chorus from a WACC uplift/price increase in UCLL/UBA", noting that:[145]

    268.1   Since Chorus is investing in UFB anyhow (which implies virtually zero forward-looking costs), there would be hardly any business case for other innovations in Chorus' UFB regions.

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[143]   WIK-Consult "Submission on the Commerce Commission's analytical frameworks for considering an uplift to the TSLRIC price and/or WACC" 8 May 2015, paragraph 4.

[144]   WIK-Consult "Submission on the Commerce Commission's analytical frameworks for considering an uplift to the TSLRIC price and/or WACC" 8 May 2015, paragraph 58.

[145]   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 5.

268.2 In LFC regions the incentives for Chorus to switch to VDSL from a WACC uplift/price increase in UCLL/UBA are ambivalent, because both regular copper-based services and new cooper-based products are affected by copper-to-UFB migration.

268.3 In cable TV regions Chorus will likely be price constrained by competition so that a WACC uplift/price increase in UCLL/UBA is unlikely to have any major effect on product innovations.

268.4 In non-UFB regions with DSL competition from LTE could factor in, leading to a calculation similar to the one in LFC regions.

268.5 In non-DSL regions the WACC uplift/price increase for UCLL/UBA plays little or no role for innovation incentives.

269. Overall, we consider that the link between a WACC uplift for UCLL and UBA 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. Therefore, our view is that a WACC uplift for UCLL and UBA would not best achieve the section 18 purpose. This view is supported by analysis based on the available quantitative models for considering a WACC uplift, which is discussed in detail in paragraphs 270 to 305 below.

Quantitative evidence regarding the appropriate WACC percentile

270. Three main quantitative models are available for considering whether an uplift should be applied to the mid-point WACC estimate for UCLL and UBA:

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

270.2 the model discussed in Attachment C of our April 2015 paper, which we constructed by adapting the approach Oxera used during last year's Part 4 WACC percentile review; and

270.3 the model submitted by CEG (for Chorus), which is based on an amended version of the model originally developed by Professor Ian Dobbs in 2011.

Oxera's model

271. 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.

272. 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.[146] In that case, Oxera concluded

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

that some WACC premium for customers to reduce the risk of under-investment in network quality appears "reasonable and proportionate".[147]

273. 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".[148]

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

274.1 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.[149] 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.

274.2 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 deployed with a delay.[150] To estimate the potential benefits associated with this 'acceleration effect' Oxera:

274.2.1 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;

274.2.2 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;

274.2.3 estimated the likely 'acceleration effect' of a regime that rewards innovation, by assessing the time lag between early and late adopters

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

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

[149] As an input to its analysis, Oxera required an estimate of the standard error of the WACC for UCLL and UBA. Attachment B explains how we calculated the estimate used by Oxera.

[150] 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.

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

274.2.4 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.

274.3 Comparing the costs and benefits of a WACC uplift, to form a recommendation. Figure 6 and Figure 7 below summarise Oxera's findings, assuming a two year and five year delay respectively.
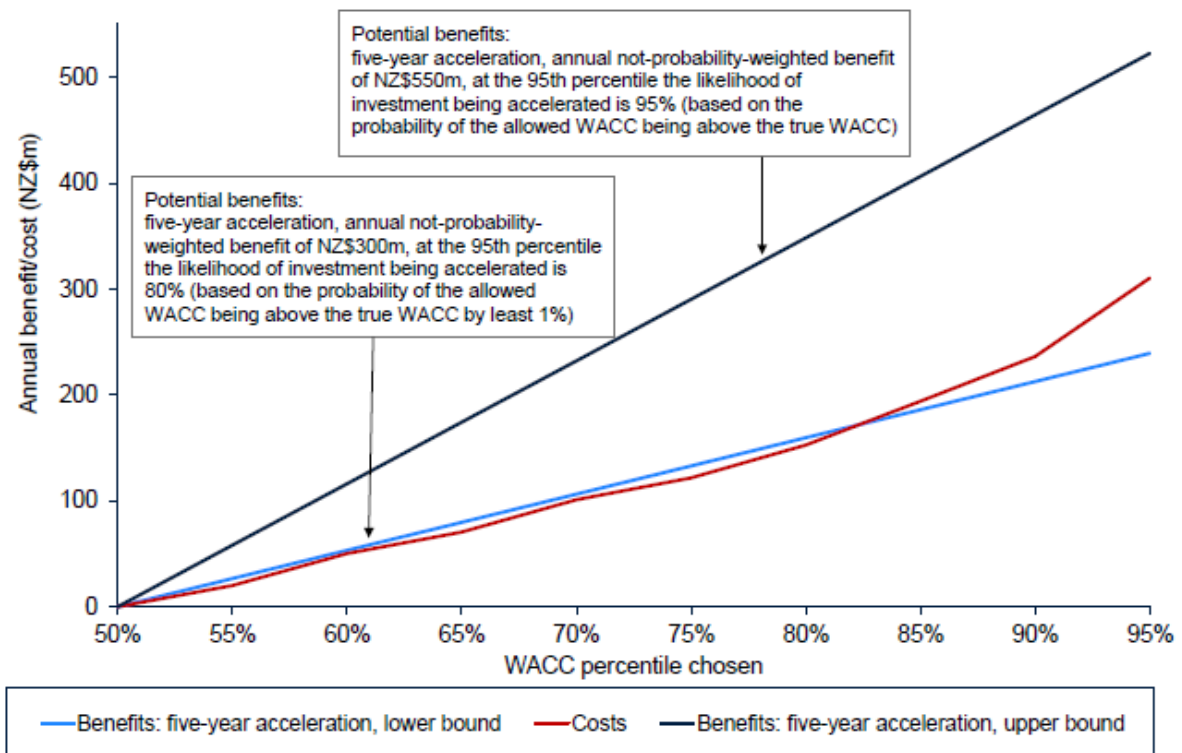
Figure 6: Oxera's assessment of benefits versus costs (two year acceleration)
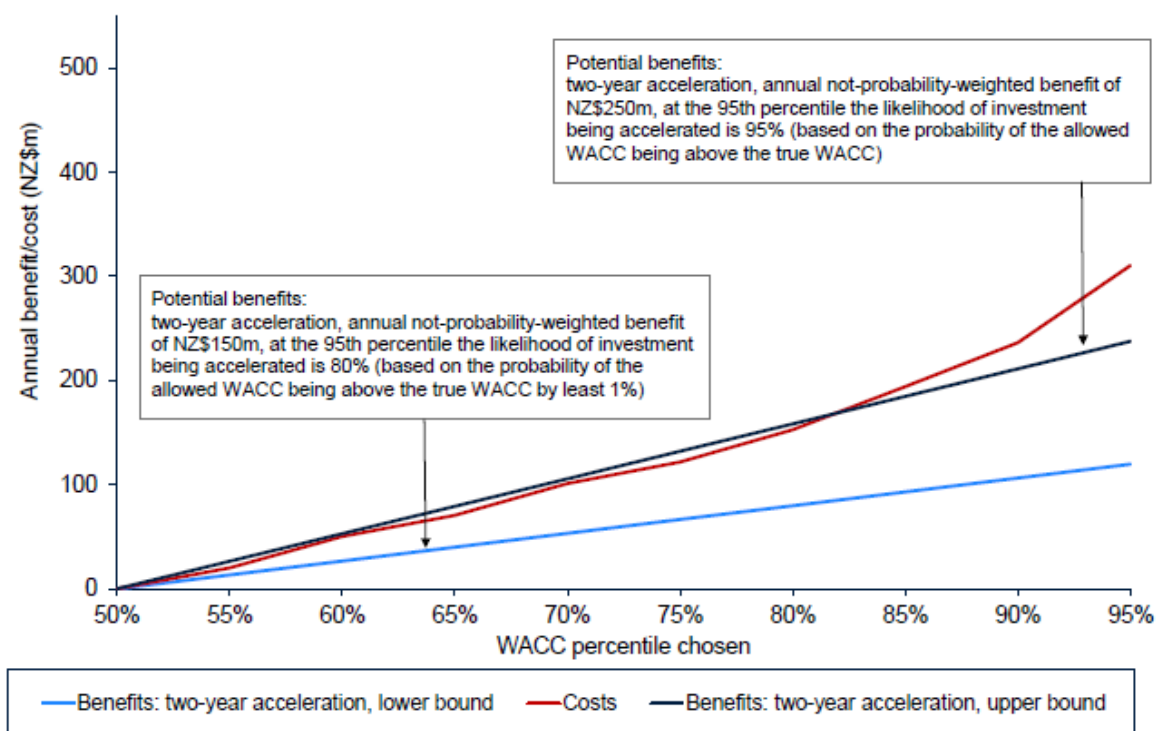
Source: Oxera[151]

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

Figure 7: Oxera's assessment of benefits versus costs (five year acceleration)

Source: Oxera[152]

275.   Oxera concluded that, using plausible assumptions, either no uplift or a modest uplift could be justified. Specifically, Oxera stated:[153]

> 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.

276.   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:[154]

> 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.

277.   However, in our view, the case for an uplift is likely to be even weaker than suggested by Oxera.

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[152]   Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, figure 6.2, p. 36.
[153]   Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 37.
[154]   Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 1.

278. In particular, the link between WACC uplift and innovation benefits is assumed in Oxera's model, without any substantive supporting evidence. Oxera acknowledges the uncertainty associated with this link, stating:[155]

> The analysis and the framework presented in this report cannot provide complete assurance that a particular uplift (if any) is most appropriate, as the strength of the signalling mechanism of the uplift on the investment incentives across the value chain are not known with certainty.

279. Despite this uncertainty, the model appears to assume a direct link between a WACC uplift for UCLL and UBA and accelerated deployment of new telecommunications services in New Zealand.

280. Under Oxera's model, the probability of the benefits being realised is based on the probability that the allowed WACC is greater than the true WACC (including sensitivities with a 0.5% and 1% margin). 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 5 above. For example, the model effectively assumes innovative new services are regulated with 100% probability.

281. In our view there is also considerable uncertainty associated with some of the other key inputs to the model, which suggests caution is appropriate when considering whether a WACC uplift should be applied for UCLL and UBA. For example:

  281.1 The estimate of annual benefits from innovative new services is based on a sample of only two studies, both of which relate to fixed-line broadband (rather than telecommunications innovations more generally).

  281.2 The two year acceleration effect is based only on evidence regarding the time of ADSL2+ deployment across developed countries.

282. The uncertainties referred to 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 forecast, and the impact of a WACC uplift for UCLL/UBA on the level of investment in telecommunications innovations in New Zealand is unclear.

283. 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". Professor Vogelsang also noted that:[156]

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[155] Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 34.
[156] Ingo Vogelsang "Review of Oxera's Report, Is a WACC uplift appropriate for UCLL and UBA?" 29 June 2015, paragraphs 31 to 34.

283.1 Oxera provides an insightful quantitative analysis of the relationship between different levels of WACC uplift and the expected benefits and costs of such uplifts for consumers;

283.2 the report is vague about the incentives for innovation associated with a WACC uplift. This void could at least partially be filled from the literature but the results from the literature may need some adjustment for the specifics of the New Zealand context. Whether the result will back the assumed strong relationships between WACC uplift and innovation acceleration remains doubtful;

283.3 by choosing a 20-year cycle Oxera may underestimate the frequency of disruptive innovations but overestimate the potential value (by choosing a very valuable innovation as the basis for consumer welfare contributions); and

283.4 although he did not agree with all points of Oxera's methodology, his estimates based on the Oxera (2014) approach come to very similar results.

284. Overall, we consider that Oxera's modelling further emphasises the uncertainties regarding the link between a WACC uplift for UCLL and UBA and the speed of deployment of new technologies described in paragraphs 259 to 269 above.

Model in our April 2015 paper

285. Our April 2015 paper, released prior to the conference (and discussed at the conference), described a possible quantitative framework for considering the extent of any uplift to be applied to the mid-point WACC estimate for UCLL and UBA.[157] This framework was based on a mathematical model we developed, reflecting the analysis undertaken by Oxera during our review of the WACC uplift for electricity lines businesses in 2014.

286. This model focussed on the potential benefits to consumers, resulting from increased investment in new technologies, that could result from a WACC uplift. The model traded off:

286.1 the costs to consumers of a WACC uplift, in terms of higher prices; against

286.2 the expected benefits to consumers associated with reducing the risk that investment in innovative new technologies will not occur because the allowed WACC is under-estimated.

287. We noted that the optimal WACC could be solved for by minimising the cost function in Equation 1 below.[158] However, we also noted that the ultimate decision regarding

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whether a WACC uplift should be applied will depend on judgement regarding key inputs to the model (and other factors not captured by the model).[159]

Equation 1

$$Min \rightarrow f(w) = RAB * (w - w_0) + p * [RAB * (w - w_0) + c * (1 - CDF(w))]$$

Where: *RAB* is the total asset value for the existing network, which is the same asset value as for the new network/service

w is the allowed WACC

w_0 is the mid-point WACC estimate, which is treated as a constant

p is the combined probability that there is a major innovative new technology in prospect, when it might occur, and whether it would be regulated in way that made the allowed WACC for UCLL and UBA influential to investment in the new technology

c is the annualised foregone benefit to consumers if investment in the new network/service does not occur because the allowed WACC is too low

CDF(w) is the cumulative distribution function of the WACC

288. Oxera considered our model in its report, noting that if comparable assumptions to those used by Oxera are adopted, this model suggests that there is no rationale for applying a WACC uplift.[160]

289. Submissions for Chorus generally appeared to support the broad framework used in Equation 1 above, but noted that estimating the key parameters will be a substantial exercise. For example, Houston Kemp submitted:[161]

We agree with the fundamental premise the Commission is grappling with … however, the Commission's proposed framework does not represent a complete model. Developing appropriate estimates of the p and BCR will be a sizeable modelling exercise in its own right.

290. WIK-Consult, on the other hand, noted that the model is formulated in a "very reduced and stylised way" and referred to several "objectionable" features of the model. WIK-Consult submitted:[162]

…the cost c to consumers due to under-investment is multiplied by the term (1-CDF(w)). Why this is done completely unintelligible. According to the description of the problem in plain English (as opposed to in the equation), the probability-weighted annualised cost to consumers of under-investment is due to a regulatory asset base, RAB, that is too low because of too low a WACC. If this is to be transformed into a mathematical expression, then

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[159] Commerce Commission "Agenda and topics for the conference on the UCLL and UBA pricing reviews" 2 April 2015, paragraph 114.
[160] Oxera "Is a WACC uplift appropriate for UCLL and UBA?" June 2015, p. 39.
[161] 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. 29.
[162] WIK-Consult "Submission on the Commerce Commission's analytical frameworks for considering an uplift to the TSLRIC price and/or WACC" 8 May 2015, paragraph 37.

RAB must be made to depend positively on (w-w0) – positively, because with higher w, RAB would supposedly increase – and c to depend negatively on RAB – negatively, because with higher RAB, under-investment would decrease and with it its cost to consumers. If one wanted to bring in a probability that there is a major innovative new technology in prospect, this could be included by multiplying the additional RAB that would be necessary to bring forward the corresponding services, by a parameter p that expresses that probability.

291. To address these concerns, WIK-Consult proposed a reformulation of the model.[163] However, more generally, WIK-Consult highlighted the difficulties in attempting to quantitatively model the potential costs and benefits of a WACC uplift (emphasis added):

> They must not only show that there are prospects for innovations that would be brought about by a WACC uplift, but also that the resulting benefits to consumers are higher than the cost caused by them, in particular the additional cost due to the WACC uplift also being imposed on the legacy regulatory asset base.
>
> As mentioned before, this would have to involve the demonstration of such effects in terms of a market model, showing the expected demand for services due to innovations, the concrete conditions of their supply and the consumer surplus created by them. **We have grave doubts that the information and data for such a demonstration are available and would presume that any corresponding estimate would be ridden by great uncertainty**. In this respect we would second the comments by Professor Vogelsang cited by the Commission to the effect that there is no empirical analysis to draw on and that any such analysis would be difficult and subject to considerable uncertainty.

292. While we agree with WIK-Consult that there are significant difficulties and uncertainties associated with attempting to quantitatively model the potential costs and benefits of a WACC uplift, exploring possible approaches/frameworks for quantitative modelling (including the Oxera and CEG models) has been useful for informing our decision on whether a WACC uplift should be applied. In particular, conducting sensitivity analysis using different values for key inputs to the available models, using plausible assumptions, can help give a sense of scale of the potential costs and benefits of a WACC uplift.

293. Although further modifications and enhancements could potentially be made to the model outlined in Attachment C of our April 2015 paper, such as those suggested by WIK-Consult, in our view the available evidence suggests that the link between a WACC uplift for UCLL and UBA and benefits associated with investment in innovative new telecommunications services is uncertain. Fundamentally, we consider that this link is too weak and uncertain to justify applying a WACC uplift for UCLL and UBA, for the reasons discussed in paragraphs 259 to 269 above.

CEG's amended version of the Dobbs model

294. Following our December 2014 draft decision, CEG (for Chorus) submitted a quantitative model assessing the welfare effects of misestimating UCLL and UBA

WIK-Consult "Submission on the Commerce Commission's analytical frameworks for considering an uplift to the TSLRIC price and/or WACC" 8 May 2015, paragraphs 34-43.

prices, arguing that this supports an uplift to the mid-point WACC estimate for UCLL and UBA.[164]

295. CEG's quantitative model is based on an amended version of the loss simulation model submitted by Frontier Economics (for Transpower) during our 2014 review of the WACC percentile for electricity lines and gas pipelines businesses.[165] In turn, the Frontier Economics model was based on an amended version of a model originally developed by Professor Ian Dobbs, described in a paper published in 2011.[166]

296. The Dobbs model was originally developed for use in the telecommunications context.[167] It focusses on whether a WACC uplift could improve economic total welfare by incentivising investment in new innovative services. The model defines three categories of investment:[168]

296.1 Category 1: existing network (ie, sunk investment). The model assumes that service quality standards will ensure that the existing network is maintained regardless of the allowed WACC.

296.2 Category 2: new optional and non-deferrable investment.

296.3 Category 3: new optional and deferrable investment.

297. CEG amended the Frontier-Dobbs model, adopting input parameters that it considered appropriate for the context of the UCLL and UBA pricing reviews. CEG stated that the large investments in new fibre and wireless infrastructure that Chorus and other parties are currently making in New Zealand are particularly relevant within the Frontier-Dobbs framework.[169]

298. Based on its analysis, CEG argued that the 75th percentile is likely to be a lower bound for the appropriate uplift, having regard to both consumer and total welfare standards. CEG stated:[170]

> We find that with reasonable assumptions the Dobbs model indicates an uplift in the cost of capital for the UCLL and UBA in the range of 56th to 88th percentile based on a consumer welfare standard and above the 95th percentile on a total welfare standard.

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[164] CEG "Welfare effects of UCLL and UBA uplift" March 2015.

[165] Frontier Economics "Application of a loss function simulation model to New Zealand: A Report Prepared for Transpower" August 2014.

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

[167] Ian Dobbs "Proposed amendment to the WACC percentile for the Allowed Rate of Return: Comments on the Application of the Dobbs [2011] model" 17 September 2014, paragraph 8.

[168] Category 1 is required non-deferrable investments that are assumed to take place independent of the allowed WACC. Category 2 requires a 'now or never' decision that is moderately sensitive to the allowed WACC. Category 3 involves a 'real option' to delay investment which is highly sensitive to the allowed WACC.

[169] CEG "Welfare effects of UCLL and UBA uplift" March 2015, paragraph 52.

[170] CEG "Welfare effects of UCLL and UBA uplift" March 2015, paragraph 4.

299.   We asked Professor Dobbs to review CEG's report. Although Professor Dobbs noted that in principle there is a case for a WACC uplift, he identified some issues with CEG's approach. In particular:

299.1   There appear to be errors in the CEG calculations of truncation prices (the assessment of maximum willingness to pay), although the impact on the optimal percentile from correcting these is relatively modest.[171]

299.2   More importantly, CEG's model assumes a zero cross-price elasticity between the existing and the new services. Professor Dobbs noted that, in the context of CEG's model, the two services are economic substitutes, and when new services come on stream there is likely to be a significant negative impact on the demand for old services. However, this effect is not adequately addressed in CEG's model.[172]

300.   Overall, Professor Dobbs concluded:[173]

> …it is very unclear whether or not there is a need for additional uplift in UCLL/UBA price caps, over and above current estimates of TSLRIC. In my view, the 'devil is necessarily in the detail'.

301.   Professor Vogelsang also highlighted his concerns regarding CEG's treatment of cross-elasticity between the existing and new services in his review of submissions. Professor Vogelsang stated:[174]

> Unfortunately, the Frontier-Dobbs model has a major drawback for the telecommunications application that both Dobbs (2015) and CEG (paragraph 14) acknowledge. It is that the model addresses three (in the current implementation two) markets that are completely separate. In the model they have totally independent costs and demands. CEG tries to overcome this lack of cross-elasticities on the demand side by using more elastic own demands for the "new" product than for the old product, but does not solve the real problem, which is the resulting zero diversion ratio.

302.   We agree with Professor Dobbs and Professor Vogelsang that the main issue with CEG's approach is that the new service is modelled as independent of the existing service. We consider that this over-estimates the surpluses generated by a WACC uplift, and the ability of an uplift to bring forward investment by the supplier. As Professor Vogelsang notes, under CEG's model:[175]

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[171]   Ian Dobbs "Welfare effects of UCLL and UBA uplift: Comments on the Application of the Dobbs 2011 model" 29 May 2015, paragraph 6.

[172]   Ian Dobbs "Welfare effects of UCLL and UBA uplift: Comments on the Application of the Dobbs 2011 model" 29 May 2015, paragraph 7.

[173]   Ian Dobbs "Welfare effects of UCLL and UBA uplift: Comments on the Application of the Dobbs 2011 model" 29 May 2015, paragraph 10.

[174]   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 113.

[175]   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 115.

302.1 A WACC uplift will lead to the same price increase in both markets. Under the diversion ratio of zero assumed by CEG, the profitability in both markets will be increased. This increases the probability that the investment in the new product will occur, and therefore the price increase stimulates innovation.

302.2 At the same time consumer surplus in the new market will be created and added to the consumer surplus of the old product. There will be some reduction in consumer surplus due to the price increases in both markets, but that is small relative to the newly created consumer surplus (unless one assumes an elastic linear demand curve for the new product).

303. We also have additional concerns regarding the CEG model, as listed below.

303.1 It is difficult to assess the appropriate WACC percentile under a consumer welfare approach. We have previously noted total welfare is useful where there are benefits that are difficult to quantify are not captured using a consumer welfare approach.[176] However, in the context of CEG's model, the difference between the consumer and total welfare approaches largely reflects the treatment of wealth transfers from consumers to producers. The CEG model directly models the benefits to consumers of new services, but fails to address the expropriation of sunk costs when reporting consumer welfare results.

303.2 CEG's scenario analysis suggests that the results vary between the 1st percentile under a consumer welfare approach and over the 96th percentile under a total welfare approach.[177]

304. Submissions also raised similar concerns regarding CEG's model. For example, Network Strategies submitted that the results of this model should be disregarded because:[178]

304.1 in the context of the UCLL and UBA pricing reviews, the Dobbs model can only be relevant to existing sunk copper investment and new copper investment. The Dobbs construct cannot apply to fibre pricing in New Zealand as fibre prices have been set in commercial contracts.

304.2 the Dobbs model is based on the premise that firms respond to incentives, but Chorus cannot defer or decline to undertake its existing UFB contract.

304.3 CEG fails to introduce appropriate adjustments where Dobbs' assumptions are inappropriate for the current context. For example, the Dobbs model does not allow for demand cross-elasticity between sunk and new investment.

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

[177] CEG "Welfare effects of UCLL and UBA uplift" March 2015, table 2, p. 22.

[178] Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Examining welfare effects of UCLL and UBA uplift - A review of the CEG submission dated March 2015" PUBLIC, 11 May 2015, pp. i-ii.

304.4   The Dobbs model is highly sensitive to assumptions (including the assumed welfare standard) and many of the assumptions used are incorrect or inappropriate for the UCLL and UBA process.

304.5   CEG ignores the fact that even if additional fibre demand is generated, the addressable market for fibre may be limited in the UFB deployment stage in the short- to medium-term and for some New Zealand consumers fibre will remain unattainable in the long-term.

305.   For the reasons discussed above, we consider that limited weight should be placed on the results of CEG's model when considering whether a WACC uplift should be applied for the UCLL and UBA services. Like the conclusions reached on the other models discussed above, we consider that the link between a WACC uplift for UCLL/UBA, and benefits from investment in innovative new services, is too uncertain to justify applying an uplift.

Other contextual factors which reduce the need for a WACC uplift for UCLL and UBA

306.   There are other contextual factors associated with the approach to setting UCLL and UBA prices, which are likely to reduce the need for any uplift to the mid-point WACC estimate. In particular, these factors include:

306.1   the approach of modelling the costs of a new replacement network, and not including a performance adjustment; and

306.2   the requirement to set geographically averaged prices.

307.   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.

308.   Professor Vogelsang's view is due to a number of factors, including:

308.1   we have modelled the costs of a new replacement network, consistent with the conventional concept of TSLRIC; and

308.2   the decision not to include a performance adjustment to reflect the different capabilities of the modern equivalent asset (MEA) compared to the UCLL network.

309.   As noted in our December 2014 draft determination, Professor Vogelsang stated:[179]

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 methodology being advocated by the EU the NZCC classical application results in a higher

179   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.

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.

310.   Submissions for Chorus disagreed with Professor Vogelsang's view. For example, CEG submitted:[180]

> 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.

311.   Network Strategies, on the other hand, argued that a number of other model assumptions in our December 2014 draft determination papers indicate that the calculated point estimates approach an upper bound rather than a mid-point estimate.[181]

312.   In his response to submissions, Professor Vogelsang stated:[182]

> 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.

313.   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. We also note that:

313.1   TERA has estimated the impact of allowing re-use, based on information supplied by Chorus in response to a section 98 request. This indicates that

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[180]   CEG "Uplift asymmetries in the TSLRIC price" February 2015, paragraph 6.

[181]   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.

[182]   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.

allowing for re-use of existing ducts could reduce the UCLL price from $26.31 per month to $23.84 per month, a 9% reduction; and

313.2 the asset values for UCLL and UBA used in our further draft determinations total approximately $6.6 billion, which is significantly greater than Chorus' enterprise value (ie, the value placed by the market on all of Chorus' business activities). Chorus' total enterprise value (including services not covered by UCLL/UBA regulation, such as UFB) is approximately $3.3 billion.[183]

314. However, as we noted in the December 2014 draft determination papers, the basis of the decisions referred to by Professor Vogelsang was not to be generous to Chorus (ie, not to specifically err on the high side).[184] Rather, we consider that a feature of TSLRIC pricing is that it is intended to incentivise efficient investment from by the access provider and access seekers, including sending efficient "build/buy" signals. Further, other modelling decisions that we have taken could arguably have some offsetting effect.

315. In addition, the requirement to set a geographically averaged TSLRIC price is relevant when considering investment incentives in the context of UCLL and UBA prices.

315.1 Any new network investment is more likely to target densely populated urban areas, where costs will typically be relatively low. There is likely to be a margin between a geographically averaged TSLRIC price and urban costs, limiting the need for any further uplift to help incentivise investment in these areas.

315.2 Conversely, in sparsely populated areas, the geographically averaged TSLRIC price is likely to be below cost, suggesting that a WACC uplift would be unlikely to have a material impact on incentivising further network investment in these areas.

Possible reasons for setting WACC below the mid-point estimate

316. In its 20 February 2015 submission, Wigley and Company referred to arguments for setting the WACC for UCLL and UBA below the mid-point. Wigley and Company stated that:[185]

316.1 previous submissions noted the limited future need for copper investment;

316.2 Professor Vogelsang's reasoning suggests that uplifts may not be effective because, even with an above cost TSLRIC price, geographic averaging could

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[183] Chorus' enterprise value is calculated as the sum of market capitalisation and net debt. Chorus' market capitalisation is approximately $1.2 billion (at a share price of $3.00, as at 22 June 2015), and net debt is approximately $2.2 billion. Source: NZX for market capitalisation, and Chorus' half year report for the six months ended 31 December 2014 for net debt. Net debt is calculated as debt + finance lease payable + CFH debt securities + Crown funding – cash and call deposits.

[184] Commerce Commission "Draft pricing review determination for Chorus' unbundled copper local loop service" 2 December 2014, paragraph 421.

[185] Wigley and Company "Submission on draft pricing review determination for UBA and UCLL services" 20 February 2015, paragraphs 10.4 to 10.6.

mean that the TSLRIC price is not sufficient to incentivise investment in higher cost rural areas where the bulk of any future copper investment would be needed; and

316.3 Dobbs' 45th percentile for sunk costs provides the most relevant assessment of the appropriate WACC percentile for UCLL and UBA services that has been provided so far.

317. As described in paragraph 230 above, when determining whether to depart from the mid-point WACC estimate, consideration should be given to whether there is an asymmetry in terms of the expected losses from under- and over- estimating WACC. Within this framework, setting the WACC below the mid-point estimate would only be appropriate if we believed that the expected losses from over-estimating WACC were greater than the expected losses from under-estimating WACC.

318. Although we agree with Wigley and Company regarding the limited need for future investment in copper and the implications of geographic averaging, we do not expect the expected losses from over-estimating WACC to be greater than the expected losses from under-estimating WACC. In particular, setting the allowed WACC below the mid-point would:

318.1 likely hinder any incentives to invest, which we consider is inconsistent with promoting competition for the long-term benefit of end-users;

318.2 send a strong negative signal to investors in new telecommunications services which may be subject to regulation in the future;

318.3 be unlikely to have any material impact on the level of competition in the retail market, because the resulting price decrease would apply to all RSPs; and

318.4 potentially slow migration from copper to fibre below the efficient level, by effectively encouraging consumers to remain on copper for a longer period (due to reduced prices resulting from a WACC below the mid-point). Further discussion of the migration from copper to fibre is contained in paragraphs Chapter 4 of the UCLL pricing review further draft determination.[186]

319. Further, the 45th percentile WACC estimate for existing assets (as suggested by Wigley and Company, based on the results of the Dobbs model) is driven by lower prices increasing the model's estimates of consumer welfare. However, the Dobbs model does not quantify our concerns listed in paragraph 318 above. In our judgement, these factors are material, and affect the potential long-term benefits to end-users.[187]

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[186] Commerce Commission "Further draft pricing review determination for Chorus' unbundled copper local loop service" 2 July 2015, Chapter 4.

[187] We also have additional concerns with CEG's adaptation of the Dobbs model, as discussed in paragraphs 294 to 305 above.

320.   For these reasons, our view is that there is no strong case for applying a WACC below the mid-point estimate.

Reasonableness checks

321. This section considers whether our WACC estimate for UCLL and UBA is reasonable, compared to other WACC estimates.

322. We set our views as to why our estimate of WACC for UCLL/UBA was reasonable, in light of other information, in our previous draft decision. We have not seen anything subsequent to that draft view that has caused us to reconsider our view that our WACC estimate is reasonable. This section explains why we have reached this view, including discussion of:

    322.1 the reasonableness checks we conducted in the December 2014 draft determination;

    322.2 changes we have made to our WACC estimate since the December 2014 draft determination, which have the effect of increasing the WACC estimate (for a given risk-free rate and debt premium); and

    322.3 our response to submissions on the reasonableness checks contained in our December 2014 draft determination.

Reasonableness checks in the December 2014 draft determination

323. In our December 2014 draft determination, we used the following information for assessing the reasonableness of our WACC estimate for UCLL and UBA:[188]

    323.1 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

    323.2 Independent WACC estimates for Chorus, provided to us by Chorus under a section 98 notice we issued.

324. 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.[189]

325. Although the available evidence was limited, we concluded that our WACC estimate for UCLL and UBA was reasonable. We noted that:[190]

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[188] Commerce Commission "Cost of capital for the UCLL and UBA pricing review: Draft decision" 2 December 2014, paragraph 259.

[189] Commerce Commission "Cost of capital for the UCLL and UBA pricing review: Draft decision" 2 December 2014, paragraphs 256-258.

[190] Commerce Commission "Cost of capital for the UCLL and UBA pricing review: Draft decision" 2 December 2014, paragraphs 261-267.

325.1 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

325.2 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.

Changes since our December 2014 draft determination

326. As described earlier in this report, we have made several changes to our WACC estimate for UCLL and UBA since the December 2014 draft determination. In combination, these changes have the effect of increasing the WACC estimate, when keeping the risk-free rate and debt premium constant. Specifically, we have:

326.1 increased our asset beta estimate from 0.40 to 0.45;

326.2 decreased leverage from 43% to 37%; and

326.3 increased the allowance for interest rate swap costs from 0.04% to 0.08%.

327. Using the risk-free rate and debt premium from our December 2014 draft determination (of 4.19% and 1.85% respectively), in combination with the changes listed above, results in a mid-point post-tax WACC estimate of 6.73%. This is an increase of 26 basis points compared to the mid-point post-tax WACC of 6.47% contained in the December 2014 draft.

328. However, as discussed earlier in this report, our approach is to use prevailing interest rates when estimating the risk-free rate and debt premium.

329. The WACC estimate for the December 2014 draft determination was determined as at 1 August 2014, and the WACC estimate for this further draft determination is 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 has fallen from 4.19% to 3.26%, and the debt premium has fallen from 1.85% to 1.75%.

330. The fall in interest rates between 1 August 2014 and 1 April 2015, and resulting impact on the risk-free rate and debt premium, has led to the reduction in our overall mid-point post-tax WACC estimate from 6.47% to 6.03%.

Response to submissions received on our December 2014 draft determination

331. Submissions from Chorus and investors generally argued that our allowed WACC is too low.

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332. 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.[191]

333. CEG used nominal vanilla WACC estimates based on recent regulatory decisions in each of the comparator jurisdictions to ensure that it is comparing across jurisdictions on a consistent basis. CEG's results are summarised in Table 5 below.[192]

Table 5: 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

334. In terms of submissions from investors:

334.1 IML stated that the proposed WACC of 6.47% is insufficient for any infrastructure project. It noted that the proposed WACC is lower than the December 2014 WACC determination for Vector and GasNet, which seems perverse given that telecommunications investors face greater threats from substitution and technological change than other infrastructure assets.[193]

334.2 Allan Gray stated that the post-tax WACC of 6.47% is the lowest it has seen in determinations across a variety of companies and industries, and is lower than used by other LFCs in New Zealand. It argued that the proposed WACC

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[191] CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, paragraphs 12-14 and 139-169.
[192] CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, table 8, p. 43.
[193] IML submission, 20 February 2015, pp. 1-2.

underestimates the risks facing an investor, such as asset stranding and technological change.[194]

334.3 L1 Capital stated that the WACC in our December 2014 draft determination paper is considerably lower than what it, and other public market investors, use to value infrastructure and utility companies. It argued that the proposed WACC was lower than the allowed WACC used by the ACCC and NZCC for a range of regulated utility and infrastructure providers in Australia and New Zealand.[195]

335. Vodafone and Network Strategies, on the other hand, noted that:

335.1 the ACCC's most recent draft decision on WACC for wholesale fixed access charges is 2.9% (real) or 5.4% (nominal);[196] and

335.2 there are inherent difficulties in making international comparisons of regulatory WACCs, and as such, so it is difficult to draw any meaningful conclusions from CEG's results.[197]

336. In response to CEG's submission regarding WACC premiums above risk-free rates, we note that CEG's analysis ignores different approaches to estimating the regulatory cost of capital across jurisdictions. In particular:

336.1 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

336.2 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.

337. 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.

338. To identify differences in WACC due to factors other than differences in risk-free rates, we have compared our updated WACC estimate for UCLL and UBA to adjusted WACC estimates for CEG's comparator sample (which have been calculated by

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[194] Allan Gray "Submission to UCLL and UBA FPP draft determination" 16 February 2015, p. 2.

[195] L1 Capital submission, 20 February 2015, p. 9.

[196] Vodafone "Cross Submission to the New Zealand commerce commission on submissions to the process paper and draft pricing review determinations for chorus' unbundled copper local loop and unbundled bitstream access services (excluding TSO boundary considerations)" 20 March 2015, paragraph K1.4.

[197] 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, pp. 37-38.

substituting in our risk-free rate, as at 1 April 2015, of 3.26%).[198] The results are shown in Table 6 below.

Table 6: Adjusted version of CEG's analysis, with normalised risk-free rate

Country	Decision month	Vanilla WACC
Denmark	Dec-14	5.62%
Netherlands	Mar-12	5.62%
Norway	Dec-14	5.89%
United Kingdom	Jun-14	5.93%
Italy	Apr-10	6.03%
France	Jan-13	6.06%
Australia	May-13	6.40%
New Zealand	Jul-15	6.59%
Sweden	Dec-13	6.47%
Ireland	Apr-14	6.60%
Australia	Jul-11	6.64%
Belgium	May-14	6.75%
Finland	May-14	7.07%
Portugal	Dec-13	9.28%

339. Adjusting CEG's analysis to normalise for differences in the risk-free rate across jurisdictions suggests that our WACC estimate for UCLL and UBA sits approximately in the middle of the international comparators. We consider that this analysis supports the conclusion in our December 2014 draft determination that our WACC estimate for UCLL and UBA is reasonable.

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[198] An alternative approach would be 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.

Attachment A: Further analysis regarding term of the debt premium

Purpose of this attachment

340. This attachment discusses further analysis we have undertaken regarding the term of the debt premium, including:

340.1 analysis of the relationship between original debt tenor and asset beta, in response to a submission from CEG; and

340.2 analysis of the weighted average original debt tenor for Spark and Chorus.

Relationship between original debt tenor and asset beta

341. CEG has argued that we should use a 10 year term of the debt premium, based on the average original tenor for the sample of comparator firms used to estimate asset beta.[199] CEG submitted that especially important to rely on the telecommunications comparator sample when determining the term of the debt premium, because "…it is reasonable to believe that the maturity profile of debt issuance is an influence on asset beta".[200]

342. However, as demonstrated in Figure 8 below, there is no strong relationship between asset beta and original debt tenor for firms in the comparator sample. Therefore, we consider we are justified in using the asset beta observed for the comparator sample, without any allowance for differences in the tenor of debt between the hypothetical efficient operator and the sample.

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[199] CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, paragraphs 10 and 110-116.
[200] CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, paragraph 115.

Figure 8: Average original debt tenor vs asset beta for the comparator sample
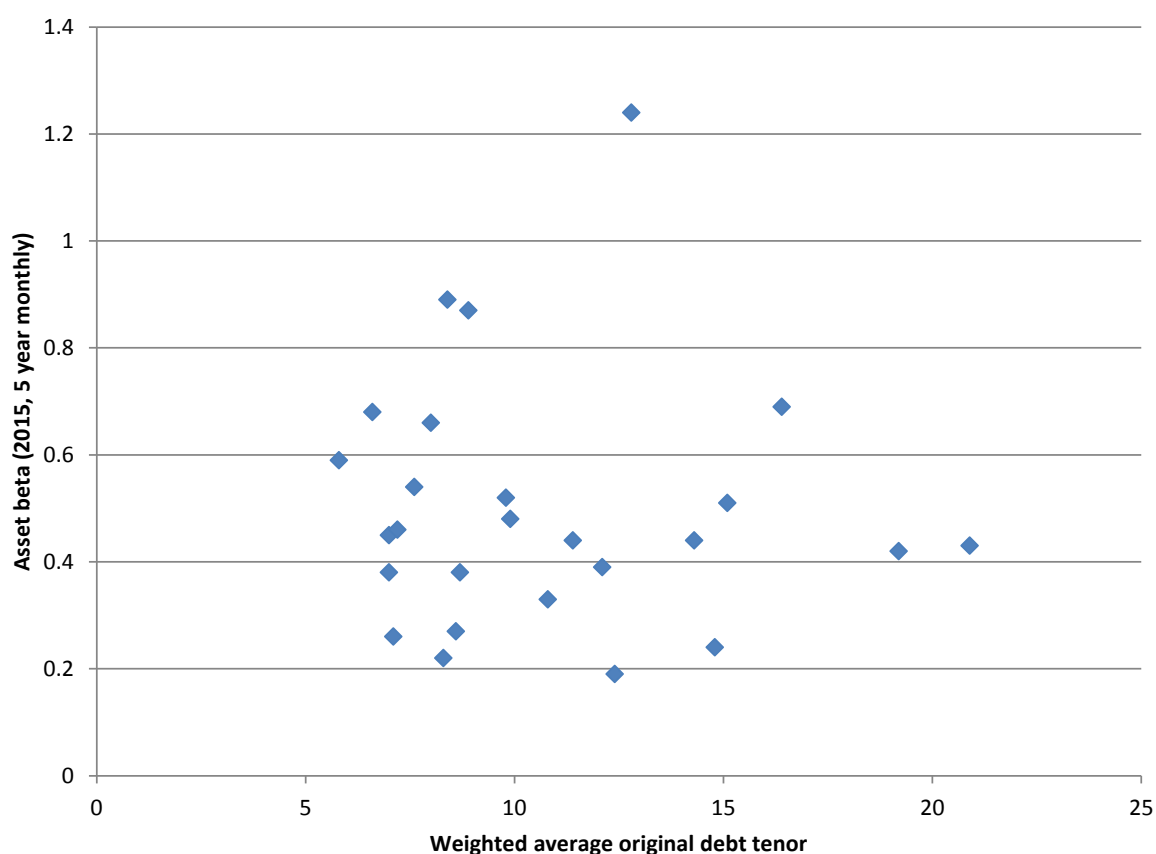
Source: Commission analysis based on asset beta estimates reported by Oxera, and weighted average original debt tenor reported by CEG.[201]

Analysis of debt tenor for Spark and Chorus

343.   As noted in paragraphs 83 to 99 above, we have used a seven year term of the debt premium for UCLL and UBA, based on the results of a debt survey conducted during development of the cost of capital IMs. Submissions raised some concerns with this approach, for example:

343.1   Network Strategies submitted that we should consider updating the IMs debt survey used to determine the seven year term of the debt premium.[202]

343.2   CEG submitted that it is appropriate to rely on the telecommunications sample used to estimate asset beta when determining the term of the debt premium, rather than relying on evidence from gas, electricity and airport businesses.[203]

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[201]   Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, table 2.1, pp. 7-8; and CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, table 6, p. 32.

[202]   Network Strategies "Final report for Spark New Zealand and Vodafone New Zealand - Commerce Commission draft determination for UCLL and UBA" 20 February 2015, p. 65.

[203]   CEG "WACC parameters in the UCLL and UBA draft decision" February 2015, paragraph 115.

344. Although we have not updated the IMs debt survey, we have considered available information on Spark and Chorus' debt, sourced from Bloomberg, to assist in determining whether a seven year term of the debt premium is reasonable for the UCLL and UBA pricing reviews.

345. We estimate that the weighted average original tenor across the combined debt portfolios of Spark and Chorus is 6.78 years, which suggests that a seven year term of the debt premium is appropriate. Further details are contained below.[204]

Debt tenor for Spark

346. Our estimate of the weighted average original debt tenor for Spark is 7.77 years, as shown in Table 7 below.

Table 7: Weighted average original tenor of Spark's debt

Domestic bonds

Security description	Amount issued	Amount outstanding	Issue date	Maturity date	Original tenor (years)
SPKNZ 7.04 03/22/16	$150,000,000	$150,000,000	22/03/2006	22/03/2016	10.0
SPKNZ 8.65 06/15/15	$54,710,000	$54,710,000	27/06/2008	15/06/2015	7.0
SPKNZ 8.35 06/15/15	$18,272,500	$18,272,500	14/08/2008	15/06/2015	6.8
SPKNZ 5 1/4 10/25/19	$250,000,000	$250,000,000	25/10/2012	25/10/2019	7.0
SPKNZ 4 1/2 03/25/22	$100,000,000	$100,000,000	25/03/2015	25/03/2022	7.0

Foreign bonds

Security description	Amount issued	Amount outstanding	Issue date	Maturity date	Original tenor (years)
SPKNZ 5 5/8 05/14/18	$250,000,000	$44,838,000	14/05/2003	14/05/2018	15.0
SPKNZ 5 3/4 04/06/20	$300,000,000	$35,516,000	6/04/2005	6/04/2020	15.0

Bank loans

Security description	Tranche size	Amount outstanding	Issue date	Maturity date	Original tenor (years)
SPKNZ REV GUAR NZD	$100,000,000	$100,000,000	15/03/2013	15/03/2018	5.0
SPKNZ REV GUAR NZD	$300,000,000	$65,000,000	19/06/2012	19/06/2015	3.0
SPKNZ STANDBY-REV A GUAR NZD	$200,000,000	$0	24/04/2013	13/04/2018	5.0

Weighted average original tenor				**7.77**	years

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[204] A NZD/GBP exchange rate of 0.50 (as at April 2015) was used when converting debt reported in British Pounds to New Zealand Dollars.

Debt tenor for Chorus

347.   Our estimate of the weighted average original debt tenor for Chorus is 6.31 years, as shown in Table 8 below.

Table 8: Weighted average original tenor of Chorus' debt

Foreign bonds

Security description	Amount issued	Amount outstanding	Issue date	Maturity date	Original tenor (years)
CNUNZ 6 3/4 04/06/20	$519,646,000	$519,646,000	30/11/2011	6/04/2020	8.4

Bank loans

Security description	Tranche size	Amount outstanding	Issue date	Maturity date	Original tenor (years)
CNUNZ REV GUAR NZD	$675,000,000	$440,000,000	24/11/2011	23/11/2017	6.0
CNUNZ REV GUAR NZD	$575,000,000	$500,000,000	24/11/2011	31/07/2016	4.7
CNUNZ REV GUAR NZD	$250,000,000	$250,000,000	2/08/2013	31/05/2019	5.8

Weighted average original tenor				**6.31**	years

Attachment B: Estimate of the standard error of the WACC for UCLL and UBA

Purpose of this attachment

348.	This attachment describes our approach to estimating the standard error of the WACC for UCLL and UBA. Although we have applied the mid-point WACC estimate in this determination, the standard error of the WACC is relevant when considering whether an uplift should be applied (specifically, the appropriate magnitude of any uplift). The standard error of the WACC is also an input to Oxera's report on whether a WACC uplift should be applied for UCLL and UBA.

Summary of approach to estimating the standard error of the WACC for UCLL and UBA

349.	We have followed the approach specified in the cost of capital IMs when estimating the standard error of the WACC for UCLL and UBA. Specifically, we have used a standard error of the:

349.1	TAMRP of 0.015, given that we are using a value for the TAMRP of 7.0% (which is consistent with the IMs);

349.2	debt premium of 0.0015, given that we are broadly following the IMs approach when estimating the debt premium for UCLL and UBA; and

349.3	asset beta of 0.015, which is estimated based on the refined comparator sample used to derive our asset beta estimate for UCLL and UBA.

350.	Consistent with the IMs, our approach to estimating the standard error of the asset beta and the standard error of the overall WACC estimate is based on Lally (2008).[205]

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[205]	Martin Lally "The weighted average cost of capital for gas pipeline businesses" 28 October 2008, see equation 14 and Appendix 3. Our calculations are shown in the cost of capital spreadsheet released with this determination.

351. The resulting standard errors of the WACC for UCLL and UBA, estimated as at 1 August 2014 and 1 April 2015, are shown in Table 9 below.

Table 9: UCLL and UBA WACC estimates, including standard errors

Parameter	1 August 2014 (December 2014 draft decision)		1 April 2015 (July 2015 draft decision)	
	Value	Standard error	Value	Standard error
Risk-free rate	4.19%		3.26%	
Debt premium	1.85%	0.0015	1.75%	0.0015
Leverage	43%		37%	
Asset beta	0.40	0.15	0.45	0.15
Debt beta	0.00		0.00	
TAMRP	7.0%	0.015	7.0%	0.015
Corporate tax rate	28.0%		28.0%	
Investor tax rate	28.0%		28.0%	
Debt issuance costs	0.25%		0.25%	
Cost of executing interest rate swap	0.04%		0.08%	
Equity beta	0.70		0.71	
Cost of equity	7.92%		7.32%	
Cost of debt	6.33%		5.34%	
Vanilla WACC (mid-point)	7.24%	0.012	6.59%	0.013
Post-tax WACC (mid-point)	**6.47%**	0.012	**6.03%**	0.013

352. The difference in the standard error of the WACC as at 1 August 2014 and 1 April 2015 reflects the use of different parameter values for the debt premium, asset beta, TAMRP, and leverage.

Approach to estimating the standard error of the WACC in the IMs

353. Under the IMs, we use estimates of the standard error for certain components of the WACC (specifically, the TAMRP, debt premium, and asset beta) to estimate a standard error of the overall WACC estimate. The standard errors we use for each sector are summarised in Table 10 below.

Table 10: Standard errors used in the cost of capital IMs

Parameter	Standard error		
	Electricity distribution and Transpower	Gas pipelines	Airports
TAMRP	0.015	0.015	0.015
Debt premium[206]	0.0015	0.0015	0.0015
Asset beta	0.13	0.14	0.16
Overall WACC	*0.011*	*0.012*	*0.015*

354.   Only the standard error of the asset beta differs by sector. All parameters other than the TAMRP, debt premium, and asset beta are assumed to have a standard error of zero.

Estimate of the standard error of the asset beta for UCLL and UBA

355.   Oxera has provided us with data on the standard error of the asset beta for each of the individual firms in its comparator sample, over the period from 1995-2015.[207]

356.   Using the data supplied by Oxera, we have followed the Lally (2008) methodology to estimate a standard error of the asset beta across the entire sample.[208] The results are summarised in Table 11 and Table 12 below.[209]

Table 11: Standard errors for five year asset beta estimates

	1999	2004	2009	2014	2015	2009 and 2014 average
Daily	0.3651	0.3182	0.1496	0.1001	0.1149	0.1249
Weekly	0.2767	0.2914	0.1566	0.1125	0.1147	0.1346
Monthly	0.3352	0.3151	0.2269	0.1234	0.1338	0.1751

Table 12: Standard errors for two year asset beta estimates

	1999	2004	2009	2014	2015	2009 and 2014 average
Daily	0.4131	0.2587	0.1378	0.1342	0.1549	0.1360
Weekly	0.3425	0.2831	0.1317	0.1341	0.1357	0.1329

357.   Giving weight to the averages for the 10 year period from 2005-2014 suggests that a standard error of the asset beta somewhere in the range from 0.125 and 0.175 is

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[206]   0.0015 is the minimum standard error of the debt premium under the IMs, but in practice this value has been used in all of our IMs WACC determinations.

[207]   Oxera provided standard error estimates for the two and five year periods ending in 1999, 2004, 2009, 2014, and 2015.

[208]   Dr Lally's approach to estimating the standard error of the asset beta is described in detail in Appendix 3 of "The weighted average cost of capital for gas pipeline businesses" (28 October 2008).

[209]   Portugal Telecom is excluded from the 2015 standard error calculations, for the reasons explained by Oxera. Oxera "Second review of submissions on the WACC for UCLL/UBA" 15 May 2015, p. 6, 43-44.

likely to be appropriate.[210] Consistent with the approach to estimating asset beta, we have given primary weight to the standard errors for five year asset beta estimates. However, the standard errors for two year asset beta estimates over this 10 year period are also consistent with this range.

358.   Based on this data, our estimate of the standard error of the asset beta is 0.15, which is the mid-point of the range referred to in paragraph 357 above. This compares to standard errors of the asset beta under the IMs of 0.13 for electricity lines businesses, 0.14 for gas pipelines businesses, and 0.16 for airports.

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[210]   The 2011-2015 standard errors have not been included when calculating the 10 year averages, given the significant overlap between the 2010-2014 and 2011-2015 periods.

Attachment C: WACC estimates for backdating

Purpose of this attachment

359.   This attachment sets out the parameter values used to estimate the proposed WACC estimates for UCLL and UBA, if prices were to be backdated to 1 December 2014. The backdating chapters of the further draft determinations for the UCLL and UBA pricing reviews discuss our proposed approach to estimating WACC, if prices are to be backdated, in more detail.[211]

WACC estimates for backdating

360.   In the context of backdating we propose to use separate WACC estimates for the first year of the regulatory period, and the remaining four years of the regulatory period. As discussed in the backdating chapters, we propose to use:

360.1   a mid-point post-tax WACC of 6.26% for the year from 1 December 2014, based on a one year risk-free rate of 3.62%; and

360.2   a mid-point post-tax WACC for the remaining four years of the regulatory period of 6.00%, based on a four year risk-free rate of 3.22% as at 1 April 2015. (1 April 2015 is currently used as a proxy, given that we propose to estimate the WACC for the final determination as at 1 September 2015).

361.   Table 13 below shows the parameter values used to generate the proposed WACC estimates for backdating. These WACC estimates are based on the parameter values contained in this further draft decision, with amendments to the risk-free rate and debt premium (to reflect the relevant start date and term of the WACC).

362.   The WACC estimates contained in our December 2014 draft decision (estimated as at 1 August 2014) and this further draft decision (estimated as at 1 April 2015), which are both based on five year risk-free rates, are also included Table 13 below for ease of reference.

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[211]   Commerce Commission "Further draft pricing review determination for Chorus' unbundled copper local loop service" 2 July 2015, Chapter 6; and Commerce Commission "Further draft pricing review determination for Chorus' unbundled bitstream access service" 2 July 2015, Chapter 6.

Table 13: Proposed WACC estimates for backdating

Parameter	Estimate for December 2014 draft	Estimate for July 2015 draft	Estimate for backdating (first year)	Estimate for backdating (remaining four years)
Description	*5 yr risk-free rate and 7 yr debt premium, as at 1 August 2014*	*5 yr risk-free rate and 7 yr debt premium, as at 1 April 2015*	*1 yr risk-free rate and 7 yr debt premium, as at 1 December 2014[212]*	*4 yr risk-free rate and 7 yr debt premium, as at 1 April 2015*
Risk-free rate	4.19%	3.26%	3.62%	3.22%
Debt premium	1.85%	1.75%	1.65%	1.75%
Leverage	43%	37%	37%	37%
Asset beta	0.40	0.45	0.45	0.45
Debt beta	0.00	0.00	0.00	0.00
TAMRP	7.0%	7.0%	7.0%	7.0%
Corporate tax rate	28.0%	28.0%	28.0%	28.0%
Investor tax rate	28.0%	28.0%	28.0%	28.0%
Debt issuance costs	0.25%	0.25%	0.25%	0.25%
Cost of executing interest rate swaps	0.04%	0.08%	0.08%	0.08%
Equity beta	0.70	0.71	0.71	0.71
Cost of equity	7.92%	7.32%	7.58%	7.29%
Cost of debt	6.33%	5.34%	5.60%	5.30%
Post-tax WACC (mid-point)	**6.47%**	**6.03%**	**6.26%**	**6.00%**

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[212] The one year risk-free rate and seven year debt premium as at 1 December 2014 are estimated using data accompanying our December 2014 input methodologies WACC determination, but adjusting for the relevant terms. Commerce Commission "Cost of capital determination for customised price-quality path proposals made by Vector Limited and GasNet Limited for gas distribution and gas transmission services [2014] NZCC 41", 19 December 2014, table 2, p. 6.