The cost of capital input methodologies for fibre

Prepared for Chorus

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Glossary

Abbreviation	Stands for
ACCC	Australian Competition and Consumer Commission
CFH	Crown Fibre Holdings (now CIP)
CGS	(Australian) Commonwealth government securities
CIP	Crown Infrastructure Partners (previously CFH)
DRP	Debt risk premium
FFLAS	Fibre fixed line access services
FPP	Final Pricing Principle
FTTP	Fibre to the premises
GPS	Government Policy Statement
ID	Information disclosure
IM	Input methodologies
LFC	Local fibre companies
MAR	Maximum allowable revenue
NSS	Nelson-Siegel-Svensson
PQ regulation	Price quality regulation
RAB	Regulatory asset base
RP	Fibre Input Methodologies Draft Reasons Paper
RSP	Retail service provider
TAMRP	Tax adjusted market risk premium
TCSD	Term credit spread differential
UFB	Ultra fast broadband
WACC	Weighted average cost of capital

Executive summary

1. This report provides commentary and analysis on selected aspects of the estimation of WACC for FFLAS. Key conclusions drawn are outlined below.

Financial loss period, pre-implementation of Part 6

2. The financial loss period prior to implementation of PQ regulation should be viewed as the economic equivalent of a single regulatory period commencing in May 2011 and running through to the implementation date. It is not the case that there was no regulation of FFLAS pre-implementation. Rather the regime was not the 'utility-style' regulation that is familiar from Part 4 and which will be implemented in 2022. In 2011, the regulatory package included an element of Crown control in exchange for investment; CFH contracted prices with obligations to provide specified services at contracted price and non-price terms; open access deeds of undertaking (enforced by the Commerce Commission); and an information disclosure regime to ensure that the Commission had access to relevant information.

3. To establish the value of the losses that regulated providers incurred in the pre-implementation period, we should consider the rational expectations of investors at the time that tenders were bid and contracts signed in 2011. At that time, investors were committing to a long term investment in fibre with known, fixed price and quality obligations over the period to 2020. In this context, a rational investor could be expected to consider whether they expected to make an acceptable (normal) return given their expectations about cost and risk over the period of their obligations.

4. The extension of the pre-implementation period to 2022 allowed no material changes to the services, prices and quality requirements on fibre providers. As such, this extended the period over which the WACC (determined in 2011) applies.

5. The WACC for the period should be based on expectations held at 1 May 2011 and thus allowed revenue should reflect the risks Chorus would have expected to be subject to from May 2011. In particular, those risks should be reflected in the estimate of asset beta, application of a WACC uplift, and allowance for Type II asymmetric risk.

6. The risk-free rate should be the rate estimated to apply as at 1 May 2011, and the term should match the expected term of the period, that is to 31 December 2019 (8.7 years).

7. The debt premium should be based on the simple average of annual debt premium estimates for five year bonds with a TCSD allowance for Chorus that assumes it issues 50% of its debt for a ten year term. The premium should reflect Chorus' BBB credit rating. This also would be consistent with the risk applied in calculation of the avoided financing cost building block and the credit rating proposed for the post-implementation period.

8. Asset beta for the period should exceed the asset beta for the post-implementation period to reflect the higher levels of income elasticity of demand and operating leverage. Given our estimate of 0.60 for the post-implementation period, we propose 0.65 for the pre-implementation period.

9. We propose financial leverage of 40%.

10. Given that Chorus should be compensated for risk whether it materialises or not, the allowance estimated by the Commission for stranding risk in the post-implementation period should also apply to the pre-implementation period.

11. We support an uplift to the "75th percentile" to reduce the probability of underestimation of WACC to 25% and to align with reasonable expectations as at May 2011 of there being an uplift.

Alternative approach pre-implementation

12. If the Commission does not accept that the period prior to implementation of Part 6 should be treated as equivalent to a regulatory period, then our view is that it should amend its approach to estimating the WACC parameters as follows:

    a) If the pre-implementation period is not a regulatory period then there is no regulatory term and the term of the risk-free rate in each WACC estimate should be 10 years, consistent with common commercial practice and its recent decision in the study into the retail fuel market.

    b) The debt premium for each year should be estimated based on the five year historical average of BBB rated bonds, with a TCSD allowance for Chorus that assumes Chorus issues 50% of its debt for a ten-year term.

    c) The increase in the TAMRP from the 2015 estimate of 7.0% to 7.5% from 2020 justifies application of an estimate of 7.25% from 2017 to 2019.

    d) The value of other parameters described above should also apply, specifically: asset beta of 0.65, leverage of 40%, and an uplift to the 75th percentile, at least until 2014, when expectations may have moderated to the 67th percentile.

    e) Stranding risk should be compensated in the same way as in the post-implementation period.

Post-implementation period

13. The Commission's proposal to estimate a debt premium based on a BBB+ credit rating is inconsistent with estimation of the avoided financing cost building block, the leverage level adopted in the estimation of equity beta. Furthermore, it is inconsistent with the financial management choice made by Chorus, which presumably is efficient in terms of the required return on equity by shareholders. We propose a credit rating of BBB.

14. Debt issuance costs should include an additional allowance for issuing bonds in foreign markets, with consequential adjustment to the TCSD debt issuance adjustment.

15. Using the large sample approach for estimation of asset beta leads us to propose an asset beta of 0.60. This value is supported in the current proposal by Ofcom (UK) which implies a revenue-weighted asset beta for Chorus of 0.63. It is also consistent with decomposition of Chorus' overall asset beta, which implies a fibre beta of 0.61.

16. To reduce the probability of underestimation of WACC, we propose an uplift of 0.44 standard deviations to reduce the probability of underestimation to less than 33%.

Introduction

17. Chorus has asked us to:

    a) Provide our opinion on the following matters in relation to the Commerce Commission's (the Commission's) recent Fibre Input Methodologies (IM) Draft Decision - Reasons Paper (RP):

        i) The pre-implementation WACC used in the calculation of the annual values of the financial loss (unrecovered returns), including the determination of the appropriate risk-free rate, the asset beta, debt premium, TAMRP, credit rating, and leverage

        ii) The post-implementation WACC used to calculate the MAR, including the determination of the appropriate risk-free rate, the asset beta, debt premium, TAMRP, credit rating and leverage

    b) Review the Commission's (Draft) Fibre Input Methodologies (IM) Determination 2020 and propose changes to the Draft IMs in marked up form and provide reasons for the proposed changes in an accompanying table.

18. WACC is a key input to building block regulation and the IMs set out the method that the Commission is proposing to use in relation to FFLAS services.

Before the implementation of Part 6

19. The Telecommunications Act (the Act) requires the Commission to determine the financial losses incurred by providers in providing FFLAS under the UFB initiative for the period from 1 December 2011 to the day before the implementation of the new regulatory framework under Part 6. These losses are to be capitalised and treated as an asset in the post-implementation RAB.

20. The Commission is proposing to use a building blocks approach to calculate the financial loss. Its proposed approach can be summarised as the difference between revenue that was earned and costs:[1]

$$UFB\ revenue_t - UFB\ costs_t$$

Where

$$UFB\ costs_t = return\ on\ opening\ non\ loss\ RAB_t + depreciation_t + opex_t + tax_t - benefit\ of\ Crown\ financing_t$$

21. Chorus has asked us to provide our opinion about the appropriate method to calculate the cost of capital during the financial loss or pre-implementation period.

22. The Commission notes that it is required to make an estimate of the unobservable cost of capital "that is reasonable and commercially realistic given investors' exposure to risk at the time. This ensures expectations are for a real rate of return consistent with s162 [of the Act] and with the principle of FCM that we are proposing to adopt for the IMs relating to the supply of regulated FFLAS." (paragraph 5.66). We agree with this description of the task.

23. The initial question then is when did investors form their expectations, and at what time should their risk exposure be assessed and compensated?

24. It is our view, based on the material that we have reviewed, that FFLAS providers, by virtue of entering contracts with Crown Fibre Holdings[2] and providing enforceable deeds of undertaking to the Crown, formed expectations about the return on their investment in 2011 and accepted a level of risk exposure at that time. These contracts and undertakings fixed the services, prices and quality to be provided to 31 December 2019 (and beyond in some cases). As such, these instruments formed the regulatory framework for fibre during this period.

25. The implication of this is that the relevant cost of capital for the pre-implementation period should be estimated from the perspective of UFB bidders in May 2011. When the UFB contracts were tendered, there was an expectation from bidders that they would be able to achieve a normal return on investment. It is important not to superimpose what is known now, or became

[1] This description is drawn from paragraph 3.89 of the Reasons Paper with the addition of a term for the benefit of concessionary financing (see paragraph 3.96). We note that this formula omits the return on commissioned assets and the term credit spread differential allowance as well as an allowance for stranding risk. In our view, these elements should be included in UFB costs.

[2] CFH, now called Crown Infrastructure Partners or CIP.

clear during the period since 2011, on the question. While there was uncertainty in 2011 about the form of the future regulatory regime this uncertainty does not disturb this fundamental conclusion that the perspective should be taken from May 2011.

The pre-implementation period is equivalent to a regulatory period

26. It is our view that the effect of the framework of undertakings and agreements between the Crown and fibre providers from 2011 was economically equivalent to a regulatory period. The framework placed constraints on price, quality and service provision that continue to apply until the implementation of the new regulatory framework (and beyond).

27. A regulatory period in the context of economic regulation of firms is a period, usually of pre-determined length, during which the parameters comprising the regulatory framework within which the firm is operating are fixed. The parameters may include limits on revenue or prices, minimum quality standards, and obligations to serve particular groups of customers or a specific geographic area. There may be limited opportunity to amend these parameters during the regulatory period if extreme events or conditions occur.

28. The Government established the Ultrafast Broadband Initiative with the purpose of accelerating investment in optical fibre infrastructure. The Initiative was directed to open-access infrastructure and supported by a $1.35 billion investment by Government through its UFB partners. This objective influenced the structure of the regulatory framework.

29. The deeds of open access undertakings and the commercial agreements established service obligations, technical standards and price caps for the period to 31 December 2019. In November 2018, these obligations were extended by legislation until 31 December 2021. The amendment made no substantive change to the initial contracts and undertakings including the price caps. Therefore, we consider this to be an extension of the regulatory period.

30. The Commission describes the structure of the 2011 framework of contracts and undertakings in its consultation document on the "new regulatory framework". This description demonstrates the scope of the parameters that were fixed in 2011 for the pre-implementation period (Commerce Commission, 2018, original paragraph numbering shown, footnotes omitted):

> 2.24 In keeping with the 2011 amendments to the Act, Chorus and the other LFCs entered into deeds of open access undertakings with the Crown. These enforceable undertakings gave effect to key aspects of how the Act required the UFB initiative to be implemented and are enforced by the Commission.
>
> 2.25 These deeds continue to have effect after 1 January 2020 and require the fibre service providers to:
>
> > 2.25.1 supply unbundled layer 1 services on all parts of their fibre-to-the-premises (FTTP) access networks (as defined in s 156AD of the Act) from 1 January 2020;

2.25.2 supply those unbundled layer 1 services on an equivalence basis, so that they offer the same input services, systems and processes to all access seekers, themselves and related parties;

2.25.3 supply all wholesale services that are provided using, or that provide access to unbundled elements of, their FTTP access networks on a non-discriminatory basis, so that the providers are obliged not to discriminate in how they treat access seekers, related parties and themselves; and

2.25.4 comply with certain obligations concerning annual reporting to us, self-reporting of breaches, and handling of complaints.

2.26 CIP also entered into a series of commercial agreements with Chorus, the other LFCs and the UFB partners in order to implement the UFB initiative. These agreements are comprehensive, and include:

2.26.1 price caps for specified services;

2.26.2 financial funding through a public-private partnership model;

2.26.3 sharing of upside and downside risk, such as risk during the build phase and demand risk;

2.26.4 lines of business restriction for the UFB network to a wholesale-only model;

2.26.5 technical requirements for providing unbundled layer 1 services from January 2020;

2.26.6 expectations around the timing of the network build; and

2.26.7 expectations for the service levels to be provided to RSPs and by implication to end-users.

31. The focus of the framework in 2011 was directed to achieving the Government's objective of accelerating investment in and enabling access to fibre infrastructure. The opportunity for Chorus (and LFCs) to revisit prices was extremely limited. As such, investors accepted the commercial risk exposure associated with the agreements when they were reached in May 2011

(Chorus, 2011).[3] The test for varying the price caps involved demonstrating a benefit to users as well as the industry and consultation was expected (Adams & English, c. 2012):

> The Chorus price caps are set out in its contract with CFH….If Chorus were to seek a variation increasing price caps, the Government has made it clear that it would expect CFH to seek the views of the Minister for Communications and Information Technology and shareholding Ministers on any such variation proposal, given this was one of the key foundations on which the commercial deal with the Government was based.
>
> The Government's position is that the current price caps are vital to achieving the Government's UFB objectives, and as stated above, are a key foundation of the UFB contracts. As a consequence the Government is most unlikely to support any increase in UFB price caps up to 2020.
>
> The only situation where an increase may be considered would be in an extreme circumstance where Chorus faced severe financial consequences from failure to adjust the price caps, and where, as a consequence, the UFB initiative and the objectives it is seeking to achieve would be significantly damaged. In such a circumstance there would need to be demonstrable benefits, not just to Chorus, but for the broader sector and the public in accepting the variation.
>
> This would be an extremely high threshold, and the Government would expect a range of other measures to be taken before the any [sic] variation to price caps would be considered.
>
> Should Chorus seek a variation of this kind, we will expect CFH and Government officials to consult with industry…

The cost of capital should be determined as at May 2011

32. The parameters in the WACC for determining the losses in the pre-implementation period should be set from the perspective of what "the market's view of the cost of capital for providing regulated FFLAS" (paragraph X.44) was in May 2011. Investors would have had a clear expectation in 2011 that prices were fixed for the period until 2020. This period is therefore the economic equivalent of a regulatory period.

33. We note that HoustonKemp suggest that the date of estimation be "immediately prior to the UFB tender in May 2011" (HoustonKemp, 2019a, p. iii). We agree that this is likely to have been when investors formed their final expectations for the period to 2020, and on that basis

[3] A number of business risks specific to Chorus are outlined in the demerger scheme booklet (Chorus and Telecom, 2011, pp. 202-207)

consider it sound to make the date for the WACC estimate for the pre-implementation period 1 May 2011.

34. At the time the UFB tender was being undertaken the Government took action to "make it more explicit that the Commerce Commission and the Minister must consider investment and innovation in new markets when considering price regulation" (New Zealand Government, 2011). This action included issuing a Government Policy Statement (GPS) concerning incentives to invest in UFB (New Zealand Government, 2011). This demonstrates the Government's commitment in 2011 to ensuring that investors were able to achieve a normal return on the investment to which they were committing. The GPS states the Government's economic policy objective that:

> businesses have incentives to innovate and invest in new or upgraded ultra-fast broadband infrastructure for the long term benefit of end users. The Government considers that this objective will be achieved by:
>
> 1. regulatory stability, transparency and predictability giving businesses the confidence to make long-life investments;
>
> 2. regulation taking full account of the long-term risks to consumers of under-investment in new or upgraded ultra-fast broadband infrastructure.
>
> 3. ensuring that any price regulation proposed under Schedule 3 of the Telecommunications Act 2001, that may occur in the future, recognises that revenues, over the life of the assets, are sufficient to cover efficient operating costs and a normal return on, and recovery of, capital invested; and
>
> 4. ensuring any price regulation proposed under Schedule 3 of the Telecommunications Act 2001 takes into account the start-up risks associated with introduction of new technology.

35. The Government's economic policy was designed to provide UFB bidders with confidence that they would have the opportunity to recover sufficient revenue over the life of their investment to achieve a normal return, that is maintain their financial capital. It emphasises the risk to consumers of under-investment (asymmetric cost of under-investment) and ensuring sufficiency of revenue to account for risks associated with new technology. At the time, the Government's concern was to assure investors that they would achieve a normal return given the risks to which they were exposed in 2011, in rolling out a new technology.

36. Setting the WACC for the pre-implementation period at the ex ante 2011 rate would therefore be consistent with the Commission's discussion of the framework it applied to determining the regulatory WACC in Attachment F (RP, paragraph 5.70):

> The methodology for determining the regulatory WACC component of the financial loss asset must ensure that the

expected returns from investing in regulated FFLAS are similar to other investments of comparable risk, so regulated providers have incentives to innovate and invest, and are limited in their ability to extract excessive profits.

Pre-implementation WACC

37. Our view is that the pre-implementation period should be treated as a regulatory period and therefore, for consistency, the Commission should adopt the same approach to determining WACC for application during the pre-implementation period as for the post-implementation period.

38. The Commission typically assumes that expectations around the WACC are reset at the start of each regulatory period and therefore that the market forms expectations for the duration of the regulatory period.

39. For the pre-implementation period, the Commission applies this practice by setting the end of the period to be the implementation date. In other words, it assumes that expectations are reset at the implementation date. However, the Commission proposes annual re-estimation of WACC during the pre-implementation period. This implies that it considers expectations to have been reset at the start of each year of the period. Thus, in our view the Commission errs in its consideration of when expectations would have been formed in the pre-implementation period.

40. While we do not in all cases agree with the Commission's methodology for estimation of WACC, much of the approach might be considered settled practice from the period of application in Part 4.

41. The Commission may determine to undertake an annual re-estimation of the WACC contrary to our view that the pre-implementation period is economically equivalent to a regulatory period. For this reason, we have provided an alternative approach for each parameter where required for annual re-estimation of the WACC during the pre-implementation period.

Risk-free rate

42. We agree with the recommendation previously made by HoustonKemp that it is appropriate to use 1 May 2011 as the estimation date for the WACC, as the contracts were negotiated and signed later that month. It is normal practice for WACC to be estimated several months before the start of the regulatory period in which it is applied.

43. The risk-free rate should thus be the prevailing rate in the three months prior to the signing of the contracts in May 2011. The term of the rate should match the expected term of the pre-implementation period, that is, to 31 December 2019. This is a term of 8.7 years. This rate should apply throughout the pre-implementation period as the price caps were extended without variation (except for inflation adjustment) by legislation.

44. Dr Lally does not discuss the need to estimate a WACC to calculate annual losses. (An omission that ultimately leads to a circularity in his proposed approach.) He says that "this regulatory scenario [setting allowed revenues or prices] has no relevance to the current exercise" and that "the current exercise involves compounding forward the losses in this period" (pages 5-6).

45. In fact, the "usual regulatory scenario" that Dr Lally describes is apt: "setting allowed revenues or prices (and hence a cost of capital) at the beginning of each regulatory period so that

…NPV=0…It follows from this that the allowed risk-free rate must be that prevailing at the beginning of the regulatory period, and for a term equal to that of the regulatory period." (page 5)

46. The Commission considers that since prices were not set in the pre-implementation period by reference to expected costs, then Chorus is not exposed to the risk that actual costs differ from expected costs (RP, Attachment F, paragraph 5.90). In the Commission's view, this means that it can set the risk-free rate each year rather than based on the expected risk-free rate at the start of the period. CFH's description of how the contracts were negotiated does not support the view that prices were set without reference to costs.

47. CFH's role was to select commercial partners and manage the investment in the government's ultra-fast broadband initiative (UFB initiative). It developed the product specifications and service level agreements that bids had to comply with and technical requirements for the networks. It describes the process by which prices were determined (Finance and Expenditure Select Committee, 2011):

> Competitive wholesale prices and price caps are set through the competitive tender process with rankings of bidders based on the most competitive prices bid. (page 2)
>
> Essentially, the boundaries to which prices are set is that they need to be competitive or below current wholesale prices but above the cost to provide such services. To achieve this, CFH established prices that were competitive to current wholesale prices and then negotiated on costs to ensure they were reduced to enable such prices. The prices are capped in the contract between CFH and the LFC partner during [the pre-implementation period] (page 11)

48. An investor signing a contract with a price specified for a long period decides whether or not to enter the contract on the basis of their expectation of the costs that they would face over the period of the contract. Officer and Bishop (2012, paragraph 12) note that an approach of "setting a constant WACC for the life of the asset will 'tend to' set prices but the varying costs of capital (reflecting economic conditions) will be reflected in changing values of the business (assets) so that producers absorb these economic risks."

49. It seems likely that the intention was that FFLAS providers bear the risks of varying costs of capital (an approach common to the Commission's regulatory processes). That some (and not all) of the risks have turned out in the providers' favour is not now a reason to abandon the 'rules of the game' (see paragraph 53).

Comment on the NBN Co precedent

50. The Commission cites a decision by the ACCC in approving a Special Access Undertaking from NBN Co to adopt a WACC based on the ten-year risk-free rate determined for each financial year plus a margin of 350 basis points. The Commission implies that the reason for setting the WACC in this way related to the expectation of losses during what was the first regulatory

period for NBN Co. The ACCC does not make this link. The problem the ACCC was solving was a lack of suitable benchmarks or information to set the WACC parameters in a CAPM or similar model. The ACCC adopted the rate of return estimate as an interim measure, with the intention of estimating a WACC following defined WACC principles at the start of each subsequent regulatory period.

51. In its draft decision, the ACCC said (Australian Competition and Consumer Commission, 2013a, p. 152):

> NBN Co is a new company that is proposed to operate under a unique regulatory regime and that finds itself facing a somewhat exceptional set of circumstances, making it difficult to undertake a traditional WACC analysis.
>
> Firstly, the WACC for NBN Co cannot be estimated in accordance with observable parameters for NBN Co – for example, it is difficult to determine the appropriate credit rating for a firm such as NBN Co, particularly as it currently does not issue any of its own debt. Further it is unclear what gearing ratio NBN Co will adopt during Module 1 [the first regulatory period] – indeed its financing structure is likely to change significantly over the term of Module 1.
>
> Secondly, while the ACCC and the AER would typically estimate the WACC by assessing the different WACC parameters against appropriate benchmarks, appropriate benchmarks are unlikely to exist for the rate of return for the NBN investment.
>
> In these circumstances, the ACCC considers that these factors justify adopting a different approach to determining the rate of return and that the proposed Officer and Bishop approach of setting the rate of return as a risk-free rate plus a risk premium is reasonable. The ACCC notes though that this approach is unlikely to be reasonable if suitable benchmarks existed that would allow an estimation of each WACC parameter, or actual information about each parameter, for the NBN investment.

52. In terms of the decision to reset the prevailing risk-free rate each year, this was proposed by the provider, and the ACCC said (Australian Competition and Consumer Commission, 2013c, pp. 108-109):

> In the current context, the ACCC is willing to accept NBN Co's proposed approach of updating its regulated rate of return annually, based on contemporary rates of ten-year CGS, and is not proposing any variations in relation to the methodology in the draft notice.
>
> The ACCC considers that possible alternatives (such as 'locking in' for ten years a ten-year CGS rate based on current levels, or 'locking in' for ten years the average rate over the past ten years of ten-year CGS, or annually re-estimating the 350 basis

> point risk margin in addition to annually re-estimating the ten-year CGS rate) are not in this context sufficiently robust to adopt.
>
> Importantly, the ACCC is not satisfied, based on NBN Co's submissions and expert report and our own analysis, that the traditional theoretical framework for estimating an appropriate cost of capital can be applied robustly in assessing NBN Co's proposed approach....NBN Co's proposed methodology is accepted as a practical approach to establishing a reasonable rate of return given unique circumstances and should not be taken as being reflective of an approach the ACCC would adopt in circumstances where appropriate benchmarks and/or observable risk premium were available.
>
> To reflect this, the ACCC is proposing that references in the SAU to the "nominal vanilla WACC" in Module 1 be replaced with a "rate of return". This reflects the fact that NBN Co's approach to determining the regulated rate of return diverges from the approach generally adopted in a regulatory context to estimating the regulated rate of return — that is, the approach does not determine the weighted average of a return on debt and a return on equity (that is, a 'Weighted Average Cost of Capital').

53. Critically, the ACCC decision set the rate of return methodology prior to the start of the regulatory period. Bishop and Officer make clear that this is fundamental (2012, paragraph 33, emphasis added):

> [O]ur view is that it is reasonable to propose a nominal, post tax plain vanilla WACC for each year, i.e. the current long term government bond rate (r_f) plus a fixed real rate such as the 350 basis points as proposed, **providing the 'rules of the game' are clear to investors (and customers).**

54. In the current situation, the Commission is proposing to adopt a novel approach ex post that is inconsistent with the likely expectations of investors (and customers) at the start of the pre-implementation period.

Debt risk premium

55. In our view, the debt risk premium for the pre-implementation period should be estimated based on the methodology the Commission proposes for the post-implementation period. That is, based on the simple historical average of annual debt premium estimates for corporate bonds issues in New Zealand.

56. We consider that the appropriate credit rating for these bonds is BBB; we understand that this was Chorus' actual credit rating in 2011. The Commission's intention (Commerce Commission, 2019b) is to set a notional credit rating that reflects what it considers to be an appropriate level of default risk (paragraph 3.853.2). In our view, the best way to determine what an appropriate

level of default risk is, is to consider the approach adopted by comparable firms. This includes consideration of the actual credit rating of Chorus itself, firms in the comparator sample, and the rating adopted in other jurisdictions. We discuss our rationale for recommending BBB in more detail in a separate section.

57. The Commission's usual approach to determining the term of bonds is to assume a five-year term and allow a term credit spread differential for longer dated bonds where the provider actually issues longer term debt. The Commission makes a number of relevant points in discussing the approach it adopts for the post-implementation period (Commerce Commission, 2019b):

    a) The debt premium increases with the term of debt so the benchmark term matters (paragraph 3.752).

    b) Issuing bonds with a term longer than five years can be an efficient way of funding assets with long economic lives (paragraph 3.756).

    c) In a 2010 survey of other regulated sectors by the Commission, the value-weighted average original period to maturity was 7.4 years (paragraph 3.754.2).

    d) In the same survey large suppliers generally issued debt with a maturity longer than five years while small suppliers did not (paragraph 3.754.2).

    e) A term of 7 years was used in the FPP for Chorus' UCLL/UBA services in 2015 (paragraph 3.754.4).

58. Following the Commission's line of argument an average term to maturity for Chorus of 7 to 7.5 years would be appropriate. This would be consistent with the observed practice of other large suppliers in regulated sectors in 2011 (from the 2010 survey). It would also be consistent with the decision made for the FPP which was based on that survey and advice from Dr Lally.

59. Since the WACC methodology is sector-wide, this could be operationalised by allowing a five-year term for the debt premium, with a TCSD allowance that assumes Chorus issues 50% of its debt for a ten year term. As smaller firms, the LFCs may have a shorter appropriate tenor of bonds; we have not considered this issue in detail.

60. HoustonKemp suggest transitioning to a trailing average over the initial five years of the period. While this may have merit in terms of reflecting the way a debt portfolio would have been constructed by Chorus, it is not consistent with the principle that the pre-implementation period is equivalent to a regulatory period. As such we consider that benchmarking the debt premium to the five-year historical average of NZ issued BBB rated bonds is more consistent with the overall approach. The premium can be estimated from a range of corporate bonds of the relevant rating even though Chorus had yet to issue bonds.

Tax adjusted market risk premium

61. While we have concerns about the subjectivity of and approximations in the estimation method for the TAMRP, the method is firmly established in the Part 4 IMs.

62. For consistency, we consider that the TAMRP for the pre-implementation regulatory period should be set at 7.0%, which was the rate prevailing in 2011.

Asset beta

63. In this section we focus on the case for an asset beta for the pre-implementation period that is higher than for the post-implementation period. Comment on the Commission's estimate of the asset beta for the post-implementation period is provided in our review of the estimation of WACC for the post-implementation period (starting at paragraph 108).

64. The Commission proposes to use for the pre-implementation period its estimate of asset beta derived for the post-implementation period and argues that the compensation for losses offsets arguments for a higher asset beta.

65. Lally (April 2019, pages 8-9) acknowledges that there are systematic risks during the pre-implementation period that are different to the risks post-implementation. He expresses the view that there is unlikely to be a suitable comparator sample for regulated providers prior to implementation. He infers that this means that "the choice must be between a beta estimate of zero and that for the regulatory situation" (page 9) and prefers the latter on the basis that it would yield a smaller estimation error.

66. The Commission argues that any adjustment would be arbitrary and difficult to quantify. This is not a reasonable or compelling justification: the Commission is called on to use its judgement all the time and relies on it in other parts of its decision. We have provided below some estimates on which its judgement could be based.

67. We do not agree with Lally's argument that the only available options for the asset beta for the pre-implementation period are zero or the post-implementation estimate. and we provide below some alternative estimates. We would also note that if no estimate were available, an (equity) beta of one is a more intuitive assumption (than zero); this means adopting the average market risk.

68. Asset beta is a measure of the association between a company's returns and market returns. Asset beta thus varies with a range of factors that include:

    a) The nature of the company's products (industry), and the extent to which demand for the products varies with the strength of the economy (the income elasticity of the demand for the company's products). The more demand varies with economic activity, the higher the beta.

    b) The extent to which the company's costs vary with demand (operating leverage). The greater the proportion of costs that are fixed, the greater the variation in the company's profits with changes in demand, and thus the higher the beta.

69. Previous submissions by Chorus have argued that systematic risk is higher in the early construction phase. This view is supported by Oxera in its conclusion to a review of the impact of income elasticity of demand and operating leverage on asset beta during the pre-implementation period (Oxera, July 2019). CEPA acknowledge the impact of operating leverage on asset beta in the pre-implementation period. However, the focus of the CEPA analysis is on

determining an asset beta for the post-implementation period. In dismissing the operating leverage argument for higher beta than the comparator sample CEPA notes that "by the time the regulatory framework comes into effect in 2022, a large portion of the investment associated with the UFB network will already have taken place." (2019a, page 28). This argument does not apply to the pre-implementation period.

70. The income elasticity and operating leverage arguments imply a higher beta for FFLAS during the early period compared to during later periods. While there is some empirical evidence linking higher income elasticity of demand and operating leverage to higher asset beta, there are no established analytical relationships specifying such linkages. Thus it is not possible to say precisely how much the asset beta for a company would increase given higher income elasticity of demand or higher operating leverage.

71. The Brattle Group (2016) and Oxera (2019) argue that fibre has a longer expected useful life than copper assets and merits a higher beta. The rationale is that longer-lived assets are exposed to greater systematic risks than shorter-lived assets as the cash flow extends further into the uncertain future. We consider this argument more compelling than CEPA's argument that parts of a copper network could be redeployed in another capacity and the network owner could invest in new assets. The very description of these as "legacy" assets suggests they are becoming obsolete. We note that the wash-up mechanism, whereby recovery of costs is delayed, exacerbates this risk exposure.

72. One available source of estimates of the asset beta for the pre-implementation period is from Crown Fibre Holdings (CFH).[4] In March 2011, CFH estimated a WACC for FFLAS providers using an asset beta between 0.50 and 0.65 (Finance and Expenditure Select Committee, 2011, p. 4).[5] CFH also cites asset beta estimates of 0.50 to 0.65 for NBN Co (Australia) in 2010 and 0.52 to 0.65 for Open Reach (UK) in 2009.

73. Another approach is provided by Oxera which interpolates an asset beta of approximately 0.95 in 2011 from asset betas of 0.83 and 0.65 in 2014 and 2018 respectively (Oxera, 2019, p. 21).

74. Given the estimate of asset beta of 0.6 that we suggest following our review of the estimation of the asset beta for the post implementation period and the range of estimates above, it seems reasonable to conclude on an estimate of 0.65 for the asset beta for the pre-implementation period.

Leverage

75. The Commission proposes to use for the pre-implementation period the same average leverage as calculated for the post-implementation period (that is, as derived from the asset beta

[4] CFH became Crown Infrastructure Partners in 2017 when its remit was widened beyond UFB.
[5] CFH makes reference to two possible industry structures "TCNZ Co-op" and "TCNZ Compete". We have presented the estimate for the "Co-Op" structure which Chorus has indicated likely represents the option of structural separation of Telecom. The "Compete" structure is believed to be an option where Telecom did not participate in the initiative and LFCs (in partnership with the Crown) competed with it.

comparator sample). It argues that the arguments presented for a higher leverage during the construction period, are offset by arguments for a lower leverage due to the compensation for losses.

76. Compensation for losses is compensation for actual revenue being less than allowed (expected) costs during the build period. It is not apparent why an arrangement under which there is postponement of recovery of revenue would necessarily result in a lower leverage during the initial construction period.

77. Information from CFH suggests that the expected leverage for fibre providers was 41% to 44% (Finance and Expenditure Select Committee, 2011, p. 4). Along with its estimated asset beta of 0.5 to 0.65, this leverage was consistent with the equity beta range recommended at the time by Professor Answath Damodaran of 0.8 to 1.0.[6]

78. Given this evidence, it is reasonable to use a leverage of 40% for the pre-implementation period with the proposed asset beta of 0.65.

Stranding risk

79. The Commission says (Commerce Commission, 2019a, Attachment F, paragraph 5.105):

> We note that we have proposed to apply ex-ante compensation for future stranding in the IMs in return for the prospect of asset redundancy at some future date. However, we do not consider it appropriate to compensate for stranding risk ex-post when there has not been an explicit arrangement put in place ex-ante for this to happen. We are not aware of any ex-ante compensation for stranding risk was incorporated [sic] into the price caps of the regulated providers during the pre-implementation period.

80. The Commission's analysis does not recognise that if Chorus has taken a risk during the pre-implementation phase it should be compensated for that risk *even if it has not materialised*. This is relevant to consideration of a higher asset beta and also compensation for asymmetric type II risk during the network roll out.

81. The argument the Commission provides around the ex ante compensation for stranding risk is not consistent with its argument that the provider is compensated for losses. If there is a risk of stranding then that is a cost, for which the provider should be compensated. The Commission recognises this in a different part of the draft decision: "The expectation of a stranding event requires an amount to be provided akin to the probability adjusted stranding cost. As such, this amount should not be refunded if the stranding event does not happen. If it is refunded, the regulated fibre service provider has not had the **risk** of the asset stranding compensated." (Commerce Commission, 2019a, paragraph 3.1361, emphasis in the original)

[6] Damodaran is Professor of Finance at Stern School of Business at New York University.

82. The Commission's argument for the pre-implementation period seems to be that if any actual asset stranding occurred in the pre-implementation period the associated losses would be recovered in the post-implementation period via the financial loss asset (and if economic stranding had occurred, the costs wouldn't be recoverable in any form). This is not consistent with the approach that the Commission is adopting for the post-implementation period of providing an ex ante allowance for asset stranding of 0.1% of the RAB.[7]

Uplift

83. The Commission proposes no uplift to their WACC estimate, consistent with their proposed decision for the post-implementation WACC. We discuss the post-implementation and general issues in the relevant section below.

84. The Commission argues that its draft decision is consistent with the requirements of the Act and that the practice of an uplift to estimated WACC in other sectors is irrelevant. However, in our view the appropriate perspective is the expectations of investors in 2011. At that time, it would have been reasonable for providers to have held an expectation that there would be a WACC uplift. An uplift is consistent with Government policy and regulatory practice at the time:

    a) The UFB initiative was expressly intended to accelerate investment, and the 2011 GPS focused on mitigating concern about the potential costs to consumers of under-investment and lack of innovation.

    b) A WACC uplift to the 75th percentile applied to energy and airport companies in 2011.

85. Given the lack of any other relevant benchmarks, we consider an uplift to the 75th percentile would be consistent with the reasonable expectations of investors.

Alternative: annual WACC estimates

86. In this section, we outline our view on the estimate of each WACC parameter if the Commission does not accept that the period prior to implementation of Part 6 should be considered equivalent to a regulatory period and instead determines annual estimates of WACC.

Risk-free rate

87. The Commission is proposing to reset the risk-free rate each year with the term as the number of years until the implementation date. If the Commission determines that the pre-implementation period is not economically equivalent to a regulatory period then there is less justification for setting the term of the risk free rate at the length of the pre-implementation period. In the recent study into the retail fuel market, the Commission said (Commerce Commission, 2019a):

[7] While we have not made this adjustment in Appendix A, the ex ante allowance for asset stranding should be included in the calculation of the financial loss in the IMs, clause 2.2.3.

> Generally, the rate of return varies with the term of the investment. In regulatory contexts we choose a term of the risk-free rate that matches the length of the regulatory period. In the context of a market study there is no regulatory term, so we choose a term of 10 years, consistent with common commercial practice. (paragraph B13)

88. If the Commission determines that the pre-implementation period is not a regulatory period, there is no regulatory term, and the term of the risk-free rate in each WACC estimate should be 10 years, consistent with common commercial practice and its recent decision.

Debt premium

89. The Commission's proposal is to use the DRP "prevailing at the beginning of the year in which the median loss is incurred, with the term equal to the remaining years until the implementation date." (Attachment F, paragraph 5.111)

90. The Commission's proposed approach:

    a) appears to be focused on the opportunity cost of funds, rather than the estimate of the annual unrecovered returns on investment

    b) is circular, in that the WACC is required to determine the year in which the median loss occurs, which is intended to be an input to estimating the WACC

    c) is an unnecessary approximation, since it is possible to calculate the actual debt risk premium with relatively little effort

    d) is based on drawing a link between two unrelated values: the annual loss and the debt premium.

91. Should the Commission decide to re-estimate WACC every year, our view is that it should estimate the debt risk premium for each year based on the five-year historical average of BBB rated bonds with a TCSD allowance for Chorus that assumes Chorus issues 50% of its debt for a ten-year term.

TAMRP

92. If the Commission determines to estimate the WACC annually, then the question of timing of the change in TAMRP arises. The Commission is proposing to use 7.0% until the IMs are determined in 2020 and thereafter 7.5%. The higher rate results from the Commission adopting the re-estimation provided in Lally (2019a) from the earlier estimation provided in Lally (2015). Since there have been no exceptional economic events during the four-year period that would have significantly affected the TAMRP, it can be argued that the TAMRP is unlikely to have instantaneously shifted from 7.0% to 7.5% just before the re-estimation in 2019. Hence, it seems reasonable to adopt an estimate of 7.25% for the TAMRP from 2017 and apply that value in estimating annual WACC from then. Similarly, there is no obvious argument for waiting to apply the known 2019 estimate of 7.5% for TAMRP until 2020 and we thus consider that the TAMRP

of 7.5% should be applied to annual estimates of WACC from the TAMRP estimation date rather than the IM determination date.

Other parameters

93. Our comments on other parameters in the pre-implementation period also apply to annual re-estimation, that is:

- asset beta of 0.65 and leverage of 40% are appropriate for the construction phase.
- an uplift to the 75th percentile is consistent with government policy in relation to the UFB initiative, and regulatory practice at least until late 2014 when the Commission amended the percentile for EDBs/GPBs to the 67th percentile (Commerce Commission, 2014).
- stranding risk should be compensated in the same way as in the post-implementation period.

Post-implementation WACC

94. Under PQ regulation (in Part 4 of the Commerce Act and Part 6 of the Telecommunications Act) the Commission applies FCM on an ex-ante basis (RP, paragraph 2.174). This means that a regulated provider has the opportunity but not the guarantee of normal returns at the beginning of the regulatory period; the Commission explains that providing this expectation maintains incentives to invest (RP, paragraph 2.162.1).

95. The Commission has proposed to adopt the post-tax form of the CAPM[8] to calculate a single service-wide ex ante cost of capital for FFLAS providers for post-implementation regulatory periods. We reiterate that our view is that the methodology adopted for estimation of WACC should be consistent across the pre- and post-implementation periods.

Risk-free rate and debt risk premium

96. The Commission's proposed approach for estimation of the risk-free rate and debt risk premium is consistent with its established regulatory practice and as such we make no comment. However, it is our view that the Commission should make an estimate of the debt risk premium for corporate bonds with a BBB rating rather than its proposed BBB+ rating. We address this point in the next section.

Credit rating

97. The Commission is proposing a 'notional target credit rating' of BBB+. It considers that a notional credit rating is preferable to using the actual credit rating of the regulated provider because it encourages the provider to maintain an "appropriate" credit rating and avoid adverse implications for end-users (increased risk of credit default and a higher cost of capital). The Commission considers BBB+ is a "sufficient margin above the minimum required for investment grade" (paragraph 3.841). This is the same credit rating that is used for regulated energy businesses.

98. While the Commission focuses on BBB+ being two notches above an investment grade rating, we note that at BBB a provider would have to be downgraded twice to be below an investment grade rating. This provides a slightly different perspective on the Commission's proposal and illustrates that there is a buffer above investment grade at BBB.

99. The Commission says that provided the credit rating is achievable it will have provided for FCM. Given this proposed test, the Commission underweights its consideration of the actual BBB credit rating of Chorus and many of the relevant comparator sample companies and BT in the UK (as determined by Ofcom). The actual management choices and consistency with other inputs to the WACC estimate are a key guide to what can be considered to be achievable by FFLAS providers.

[8] The Commission refers to this form of the CAPM as the Simplified Brennan-Lally CAPM (SBL-CAPM).

a) The financial management choice made by Chorus is presumably efficient in terms of the required return on equity by shareholders – who would also be concerned to avoid financial distress. Chorus' actual credit rating is BBB and CEPA's analysis suggests this is consistent with average leverage of 31%, which the Commission has adopted.

b) Expert advisers to the European Commission (The Brattle Group, 2016) and the UK's Ofgem (PricewaterhouseCoopers, 2009) recommend estimating the target credit rating from the target leverage or vice versa. This ensures that the estimated cost of debt is consistent with the asset beta and leverage assumptions. CEPA agrees with this: "To achieve a given credit rating, service providers with a lower asset beta would therefore be able to support a higher level of leverage relative to those with a high asset beta, other factors held constant. This implies that if we consider the average asset beta and average leverage of the comparator sample to be appropriate for the fibre providers, the average long-term credit rating of the sample would be consistent with this." (CEPA, 2019a, p. 45) Ofcom's recent proposal for wholesale fixed services also adopts a BBB rating.

c) The Commission has indicated that it does not consider regulatory practice in other jurisdictions relevant (paragraph 3.857). This is somewhat unusual and on the face of it at odds with the approach in the 2010 IMs for energy and airport companies (Commerce Commission, 2010b, pp. 456-459) (Commerce Commission, 2010a, pp. 244-247).

100. Critically, the BBB+ proposed notional rating is also inconsistent with the approach to calculating the avoided financing cost building block. The avoided financing cost (or the benefit of Crown financing) will be calculated as the product of the Crown financing amount and the avoided debt cost rate as determined by the Commission. The Commission proposes that for Chorus the rate should be based on the company's actual credit rating of BBB as the Crown debt is a substitute for company debt that would reflect that credit rating. The Commission takes support for this position from s177(3)(b) of the Act which refers to "actual financing costs". However, the Commission's proposal means that the compensation for company debt in the WACC would be at the lower cost associated with a BBB+ rating. The benefit that Chorus is supposed to have received from Crown financing is based on a higher debt cost rate than the debt cost that they are to be allowed (or assumed to have incurred) in the Commission's proposal.

101. The Commission proposes in its draft decision to have regard to the debt premium estimated from applying the Nelson-Siegel-Svensson approach. It has provided some analysis based on this approach in Attachment G of the Reasons Paper. However, it is not clear what regard it has given to the analysis. It is our view that the NSS curve illustrated in Attachment G has a poor fit and should be given no regard.

TCSD

102. The Commission proposes to use the TCSD adjustment premium values calculated for EDBs, GPBs and Transpower which were estimated for BBB+ bonds. This should be adjusted to match the credit rating of BBB for FFLAS.

Debt issuance costs

103. The Commission proposes to allow for 0.2% debt issuance costs for a five-year regulatory term, 0.25% for a four-year regulatory period and 0.33% for a three-year regulatory period. A breakdown of the allowance for a five-year regulatory period is provided:

    - debt issuance costs 9-10 bps pa
    - swap transaction costs 3-4 bps pa
    - 'potential' additional costs associated with brokerage, new issue premium, committed facilities/ cost of carry, forward starting swaps 7-9 bps pa

104. Chorus has provided an estimate, based on its experience, of the additional costs of issuing a foreign bond of approximately 3bps. These costs arise from higher legal costs (1-2 bps for a 5 year transaction) and credit charges associated with cross currency swaps (2 bps for a 5 year transaction, although it notes that these vary depending on the currency and may be materially higher).

105. We consider that the New Zealand market is unlikely to be able to support bond issuances of the size required by Chorus and as such it is reasonable to include the additional costs of a foreign issuance. The Commission assumes a linear relationship between the tenor of debt and the issuance costs. This is a reasonable assumption if issuance costs are fixed and are therefore amortised over a shorter period for shorter tenor debt.

106. Including these additional costs, a five-year period would have costs of 0.22% to 0.27%, giving a mid point of 0.25%. The adjusted value for a four-year regulatory period is 0.31% and 0.42% for a three-year period.

107. This would also result in a minor change to the TCSD debt issuance adjustment, as shown in Table 1 below (which follows the Commission's method in Table 3.3 of the RP (paragraph 3.836).

Table 1 Debt issuance costs and associated TCSD adjustment

Tenor	5	6	7	8	9	10
Issuance costs	0.25%	0.21%	0.18%	0.16%	0.14%	0.13%
TCSD debt issuance adjustment	0.00%	-0.04%	-0.07%	-0.09%	-0.11%	-0.13%

Asset beta

108. The Commission proposes to:

    a) adopt CEPA's comparator sample

    b) include firms that have equity beta and leverage data

    c) weight all firms in the sample equally

d) use five yearly estimates for 2014-2019 and 2009 to 2014, based on weekly and four-weekly data

e) take the mean of the resulting estimates

109. Since the Commission adopts the CEPA comparator sample we focus primarily on the CEPA analysis in our comments below.

110. CEPA advised the Commission to use a range of 0.41 to 0.49. At the low end, this is the average beta for wholesale companies (providing tower and satellite services to mobile network operators and broadcasters). At the high end it is the average beta for integrated service providers. The description of the calculation is that the average is the midpoint of the highest and lowest asset betas for each set.

111. The Commission does not adopt CEPA's method, and uses a simple mean of all the asset betas in the comparator sample. CEPA's method places greater weight on the wholesale companies than the Commission's approach. The Commission proposes to apply a service-wide cost of capital and the asset beta is therefore common to all providers and for both PQ and ID regulation.

Comment

112. The value assigned to asset beta is of significant importance to regulated entities and consumers as the partial derivative of WACC with respect to asset beta is equal to the TAMRP. Hence, other things being equal, with TAMRP of 7.5% a variation of 0.1 in the estimate of asset beta impacts the estimate of WACC by 0.75%.

113. Asset beta is a measure of the association between a company's returns and market returns. Asset beta thus varies with factors such as income elasticity of demand and operating leverage, as already discussed above. However, other determining factors commonly mentioned in the finance literature are expected asset lifetimes, regulatory and contractual pricing arrangements, degree of market power, growth opportunities, and real options.

114. While it can easily be argued that asset beta varies with the factors mentioned, there are no established analytical relationships that can be employed to determine the degree of influence of any of the factors. Selection of the appropriate companies to form a comparator sample thus requires simultaneous judgments of comparability on these fundamental economic factors without knowledge of either the absolute or relative degree of impact of the factors. Furthermore, among the companies that are judged to be comparable in terms of the specified factors some may be unsuitable for selection because of issues such as their size, product and geographic diversification, or low frequency of share trading. Selection of the set of comparable companies for estimation of asset beta is therefore among the most challenging of the tasks involved in the estimation of WACC.

115. CEPA, on behalf of the Commission, attempted to make the difficult judgments and thus develop a comparable set of companies (CEPA, May 2019). Submitters on the Commission's Emerging Views consultation paper critiqued the CEPA result and suggested additions and deletions from the sample. The final sample developed by CEPA (CEPA, October 2019) has

been adopted by the Commission for its estimation of asset beta. The Commission describes the CEPA sample as comprising 10 wholesalers and 53 integrated companies, a total of 63 companies. However, data is not available for the whole period and for the 2014-19 (2009-14) estimation period, there were 6 (5) wholesalers and 45 (39) integrated companies, giving a total of just 51 (44) companies.

116. Oxera, commenting on behalf of Chorus, proposed additions and deletions to the initial sample proposed by CEPA on the basis of comparability to a sole FFLAS provider and application of a different set of filters. Oxera followed the same analytical process that it used in 2014 and 2015 when it was advising the Commission on the beta and gearing for UCLL and UBA. If the Commission determines to follow this process of filtering to obtain a sample, then it would be desirable to use consistent filtering criteria as in its earlier decision, that is, those that Oxera applied. This would promote regulatory predictability.

117. The degree of difficulty in developing a suitable comparator sample is well illustrated by the dissonance between the sample initially selected by CEPA and Oxera's preferred sample. CEPA's sample numbered 52 companies but only 38 of the companies were also included in Oxera's sample. Thus 14 (27%) of the CEPA companies were not included in the Oxera sample and 5 (12%) of the Oxera companies were not included in the CEPA sample.

118. In relation to the 6 wholesalers included by CEPA for the 2014-19 period, Oxera did not include Chorus and proposed deletion of the 2 satellite operators as the majority of their revenue came from satellite services. Again, in relation to the 6 wholesalers, other submitters suggested deletion of the three tower companies as these companies do not own fibre lines and are more in the nature of real estate companies (CEPA, October 2019, pp10-11). Acceptance of all these suggestions would have eliminated the complete set of wholesalers from the CEPA sample and the impact on the averages reported by the Commission in Table 5.3 would have been as follows:

Table 2 Commission's asset beta estimates with and without wholesalers

	Including wholesalers	Excluding wholesalers
Average 2009 - 14	0.49	0.50
Average 2014 - 19	0.48	0.50
Average for both 5 year periods	0.49	0.50

119. Thus, despite the significant number of comments on the place of the wholesale companies in the sample, the impact is actually relatively small.

120. The CEPA sample is constructed from Bloomberg industry classifications with various criteria or filters applied to "refine" the sample. The intention of the refinements is to remove companies that might have anomalous beta estimates because of poor data or for operational reasons. This approach implicitly assumes that the sample of companies undertake a similar business to the regulated provider. In this case, the Commission is determining an appropriate beta for a pure-play FFLAS provider. It is generally acknowledged that there are no suitable FFLAS-only providers to sample, and in fact the comparator sample is of companies providing a range of

telecommunications and other services. Because of the differences between the companies in the proposed sample and a pure-play FFLAS provider, we consider other evidence should be considered. We consider an alternative sampling approach, based on a large sample and public data, and two possible methods of deriving a FFLAS-specific beta: first by decomposing Chorus' beta estimate and second by building up an estimate from Ofcom's recent consultation paper.

121. An alternative approach to engaging in the detailed analysis conducted by CEPA (and Oxera) is to identify a sample of comparable companies as the basis for the estimate of asset beta, is to take a larger set of companies that are broadly related to the entity in focus and to estimate the asset betas for that large set without detailed checking for comparability. Proceeding in this way assumes that any lack of comparability for particular companies included in the sample will average out across the sample. This approach was followed by the Commission in earlier years. For example, it was used in the 2010 and 2016 Input Methodologies Reviews using Bloomberg classifications of industry groups relevant to gas and electricity on the basis that using a broad sample of (74) companies would avoid " ... the need to make subjective judgement calls regarding whether each of the 74 companies from the draft comparator sample should be included ..." as had been suggested by a number of submitters at the time (Commerce Commission, 2016, para 277.1, p62).

122. We set out below the results of the large sample approach to estimation of the asset beta for Chorus by using the data on Professor Aswath Damodaran's website[9]. Professor Damodaran reports information from which estimates of asset beta can be obtained for three industry groups related to telecommunications: Telecom Wireless, Telecom Equipment, and Telecom Services. The information relates to a global set of companies, with a geographic breakdown to US companies, European companies, Japan companies, Australia, New Zealand and Canada companies, and Emerging market companies.

123. We checked the CEPA final sample of 51 companies for the period 2014-2019 against the list of companies covered by Damodaran across the three industry groups in 2018 and found the following: of the wholesalers, none were included (other than Chorus which was included in the Telecom Services industry group); of the integrated companies, 13 were included in the Telecom Wireless group, 30 were included in the Telecom Services group, and 8 were not included in any of the three industry groups. This result reinforces the exclusion of the wholesalers from estimation of asset beta (as above) and indicates that only Damodaran's Telecom Wireless and Telecom Services groups are relevant to the estimation of the asset beta for Chorus.

124. Damodaran reports the annual rolling average equity beta for each industry group formed by regressing weekly returns for each company against the market for 2 year and 5 years of data and weighting the two sets of results 2/3 for the two year betas and 1/3 for the 5 year betas.[10] The average equity beta for the group is de-levered to an asset beta by application of the ratio of total debt to total equity for the group as the estimate of leverage and using the Hamada

[9] http://pages.stern.nyu.edu/~adamodar/

[10] The data for each year is added to the website in early January of the following year.

(1972) de-levering formula. Damodaran's aggregate rather than individual company de-levering is designed to avoid the impact of extreme values for leverage, but given the size of the data sets it is unlikely to provide a materially different result from individual de-levering followed by averaging. In earlier years, the Commission also applied the Hamada formula for de-levering but since the 2010 Input Methodologies Review it has used the tax neutral formula for de-levering, which is also used for re-levering. The results reported in Table 3 below have been derived using the tax neutral formula. Appendix B provides the annual beta values and the number of companies in each industry group.

Table 3 Average asset beta based on Damodaran data, 2012-2019

	Developed country companies		Global companies	
	Mean	Median	Mean	Median
Telecom Wireless	0.65	0.64	0.73	0.74
Telecom Services	0.54	0.54	0.60	0.60
Telecom Wireless & Services	0.56	0.57	0.63	0.62

125. Table 3 shows, for both the developed country set of companies[11] and the global set of companies, the mean and median of the rolling annual average asset beta from 2012 to 2019 for each of the Telecom Wireless and Telecom Services groups and also for the combination of these two groups. The mean and median of the averages for the developed country set of companies (global set of companies) across the years indicate a range of 0.54 to 0.65 (0.60 to 0.74). Table 5 (Appendix B) shows that the values of the asset beta for the individual years are in all cases greater than or equal to the Commission's estimate of 0.49 for asset beta. For the Telecom Wireless group for developed country set of companies (global set of companies) the values range from 0.52 to 0.85 (0.61 to 0.84), for Telecom Services from 0.49 to 0.63 (0.54 to 0.65), and for the combined group from 0.50 to 0.65 (0.60 to 0.70).

126. The Commission provides a sample of market analysts estimates of Chorus' asset beta in Table 3.7. The Commission notes that most of these estimates are 0.5. Chorus has reviewed these analyst assessments and notes that all but one are for Chorus overall, rather than FFLAS.[12] Chorus also notes that the Commission's table duplicates the estimate of Jarden (as also being for Credit Suisse) and omits the estimate of one analyst (New Street Research). New Street Research estimates Chorus' beta is 0.7; we note that this provides the upper end of the range (0.5-0.7) referred to by the Commission in paragraph 3.930. If we adopt the low end of this range for Chorus' asset beta, 0.50, and adopt 0.43 as the asset beta for copper (Commerce Commission, 2015, p. 7) then depending on the assumed beta for 'other' revenue, we obtain a

[11] That is, the Global set of companies less the companies from the Emerging markets group.
[12] While UBS applies their estimate of 0.5 to fibre, we consider that the method and description of the asset beta show that it is for all of Chorus rather than a fibre specific value (UBS, 2019).

range of 0.58 to 0.64 for the asset beta of Chorus' fibre business (see Table 4). Based on discussion with Chorus, we consider that it is reasonable to use the group beta as the estimate for the 'other' revenue component. This implies a beta estimate for fibre of 0.61.[13]

Table 4 Decomposition of Chorus' asset beta[14]

	Revenue mix	Asset beta, other = copper	Asset beta, other = group	Asset beta, other = fibre
Fibre	33%	0.64	0.61	0.58
Copper	54%	0.43	0.43	0.43
Other	14%	0.43	0.50	0.58
Chorus 'group'	100%	0.50	0.50	0.50

127. Ofcom's recent consultation paper proposes asset betas of 0.57 and 0.65 respectively for the Openreach and Other UK Telecoms components of BT Group (Ofcom, 2020). Application of the proportions of revenue that Chorus obtained from its relevant FFLAS services to Ofcom's proposed asset betas for Openreach and Other UK Telecoms implies an asset beta for Chorus, as a FFLAS provider, of 0.63.[15]

128. The results of analysis of the Damodaran samples, together with the Oxera estimate of 0.53[16], the estimate of 0.61 from the decomposition of Chorus' asset beta, and the estimate of 0.63 implied by the Ofcom proposal, lead us to propose an asset beta of 0.60. This is significantly higher than the Commission's point estimate of 0.49 based on the limited sample developed by CEPA. However, our proposed estimate is in concordance with the Damodaran results and the decomposition of Chorus' asset beta consistent with the Commission's earlier determinations, and is near the midpoint of the range of estimates formed by, at the lower end, the Oxera estimate, and at the upper end, the estimate implied by the Ofcom proposal.

Leverage

129. The Commission proposes, as is its practice, to adopt the average leverage of the asset beta comparator sample based on the same time periods and averaging as the asset beta proposal. The Commission's proposed leverage is 31%. This proposed leverage is consistent with a credit

[13] If we adopt the mean of the analysts' estimates (excluding the Forsyth Barr estimate, which we understand is for fibre access only) as Chorus' asset beta, viz, 0.56, a similar analysis results in an asset beta for FFLAS of 0.77.
[14] Revenue data in Table 4 is from Chorus' annual report and is the average for 2018 and 2019. We have used the average on the basis that the estimates of Chorus' group beta were undertaken prior to the 2019 revenue data becoming public.
[15] Chorus' annual report provides separate revenue figures for P2P and GPON services (Chorus, 2019, p. 21). Based on our discussion with Chorus, we understand that P2P revenue relates to dark fibre and other services that Ofcom may attribute to either Openreach or Other UK Telecoms. Taking a conservative approach, we have assumed that all Chorus' P2P services are services Ofcom attributes to Openreach. GPON services are among the services categorised by Ofcom as Other UK Telecoms. Using 2019 revenue weights, the calculation is therefore: 20% x 0.57 + 80% x 0.65.
[16] The mean of Oxera's weekly and monthly estimates for the two five-year periods 2009-2014 and 2014-2019.

rating of BBB in the comparator sample (CEPA, 2019b, p. 44). A higher level of leverage (34%) would be consistent with the Commission's proposed credit rating for estimating the debt premium.

Uplift

130. Estimation of the cost of equity proceeds by substituting into the post-tax CAPM equation point estimates of the beta and market risk premium parameters. Estimation of the cost of debt includes adding to the risk-free rate a point estimate of the debt premium. The uncertainty that exists regarding each of these parameter point estimates carries through to the point estimate of WACC as there is an algebraic relationship between the parameters and WACC. The processes of generating the estimates of the parameters can be thought of as stochastic processes that throw up a different value each time an estimate is made. Thus the estimator of WACC is also stochastic, that is, there is a probability distribution for the estimator of WACC.

131. If it is assumed that the estimator is unbiased (that is, the mean is equal to the true fixed but unknown WACC)[17] and that the estimator is normally distributed, then it can be stated, for example, that there is a 50% probability that the estimate of WACC lies below the true WACC, or that there is a 16% probability that the estimate lies more than 1 standard deviation below the true WACC. The practice of adding a margin to the estimate made for WACC has the effect of reducing these probabilities. For example, if a margin equal to 0.44 standard deviations is added to the estimate, then the 50% probability of being below the true WACC reduces to 33%, and if a margin equal to 1.5 standard deviations is added to the estimate, the probability of being below the true WACC reduces to 7%. Thus, if there is concern to avoid under-estimation of the true WACC, adding a margin to the point estimate of WACC is an effective way of reducing the probability of under-estimation.

132. The Commission has to date adopted a different concept of the estimation of WACC. It assumes that the true WACC is a normally distributed variable, and assumes that the point estimate is the mean of the distribution. Hence it refers to the estimate made as being the "mid-point estimate" or the "50th percentile estimate" and describes this as being such that there is a probability of 50% that the true WACC is greater than this estimate. Similarly, it describes the 67th percentile estimate (as in the IM for EDBs) as being such that there is a 33% probability that the true WACC is greater than this estimate.

133. The Commission's concept of the estimation might appear to be similar in effect to the approach described above where it is the estimator that is the variable. However, the difference is significant as the Commission's concept results in an uplift being described as setting the estimate "above the mid-point". This language is seductive to concluding that the point estimate is a value that would be obtained on average, and that an uplift is a concession that

[17] There are two kinds of error in estimation of WACC: estimation error and model error. Providing an uplift is intended to mitigate estimation error. Model error arises from the CAPM being based on assumptions that are high level abstractions from real world financial markets and thus provides an estimator for WACC which is likely to be biased. The Commission's proposal to provide an allowance for Type II asymmetric risk is effectively an attempt to correct for a particular form of (negative) bias in the estimator.

takes the WACC to a value above that average. In fact, the estimate is not an average, it is a single value and this is evident from the act of estimating a WACC range. Thus, an uplift is a concession, but it is a concession to reducing the probability of underestimation of the true WACC.

134. The Commission makes statements such as "we do not consider that the potential benefits that would flow to end-users from a higher than mid-point WACC outweigh the certain costs they would face" (RP, paragraph 3.1076). Note the word "potential" used in relation to benefits while "certain" is used in relation to costs. An uplift does increase the price paid by end-users but that price may still represent a bargain as the estimate of WACC plus uplift may still under-estimate true WACC and have negative longer term consequences for end-users in terms of resilience and quality of FFLAS. Furthermore, the Commission states that "…the starting point is the mid-point of the WACC which provides for an expectation of a normal return over time. As such it adequately compensates investors for placing their capital at risk…" (RP, paragraph 3.1101). Similarly, the Commission states "If the expected losses from the WACC being mis-estimated are symmetric, then we should choose the mid-point estimate of WACC. Doing so would provide regulated providers with an expectation that they will be able to earn a normal return. Doing so, would also minimise the expected losses to end users." (RP, paragraph 3.1119). These statements are without any basis other than the Commission's unfounded view that the estimate of the true WACC follows a probability distribution and that the point estimate made is the mean of this distribution.

135. We propose that an uplift (margin) of 0.44 standard deviations be applied to the estimate of WACC so as to reduce the probability of underestimation of the true WACC to 33%. This is currently applied in estimation of WACC for gas pipelines and electricity distribution companies.

Reasonableness checks

WACC

136. The Commission has presented comparative information as a check on the reasonableness of its estimate of the WACC and the asset beta. The Commission argues (paragraph 3.1239):

> If our draft decision produces reasonable WACC estimates as at 1 September 2019, we consider they will also produce reasonable estimates at other dates since we propose that the risk-free rate will be linked to prevailing market rates.

137. We have reviewed the Commission's diagrams at Figures 3.7 and 3.8 of the Reasons Paper and a spreadsheet that the Commission subsequently provided to Chorus with some source information. There are a number of errors in the Commission's analysis:

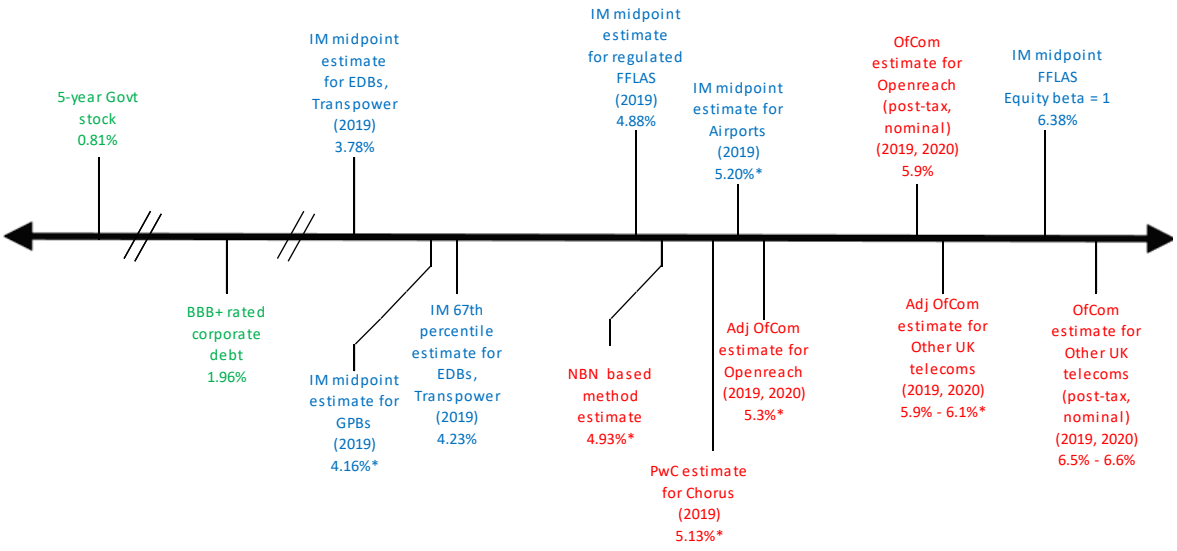
a) The Commission has used a risk-free rate as at 1 September 2019 of 1.12%. This is its estimate of the five-year government bond rate (Commerce Commission, 2019). However, the Commission uses 1.00% for the five-year Government stock and associated corporate debt rate.

b) The Commission has described "historic and forecast estimates of the returns achieved by New Zealand investors on an investment of average risk". In fact, this is an estimate of the FFLAS WACC (using the Commission's model and assumptions), except that it sets the equity beta at 1. The Commission comments that "regulated FFLAS have much lower exposure to risk than the average New Zealand firm" (paragraph 3.1251.1.1); there is no evidence presented for this view. In any case, the comparison shown is not with "the average New Zealand firm".

c) The Commission has presented estimates that it says are the (nominal) post-tax WACC for recent regulatory decisions by Ofcom in the UK and for fibre services provided by the NBN in Australia (paragraph 3.1241.3). However, it has mistakenly used real vanilla WACC estimates for the UK. The Australian figure presented is an estimate of Telstra's WACC, not NBN's.

138. We have presented the Commission's diagram below with these errors corrected, and appropriate re-labelling as required.

Figure 1 WACC reasonableness check diagram for FFLAS



Notes: Estimates marked * have had a normalisation adjustment applied following the Commission's approach (for details of the Ofcom adjustment, see footnote 18).

139. For the UK, we have not included the 2018 Ofcom WACC estimates for BT as there are more recent estimates available (Ofcom, 2019 and Ofcom, 2020). We have included a normalisation adjustment that is, in principle, similar to that made by the Commission, that is, an adjustment for differences between the risk-free rates in the two countries but allowing for Ofcom's use of the conventional CAPM rather than the after-tax version used by the Commission.[18] We have also shown the unadjusted post-tax nominal WACC as arguably the risk-free rate is an integral component of the economic environment and regulatory regime in the UK. We note that,

[18] The normalisation adjustment is (-nominal risk free rate$_{UK}$ *(1-tax$_{UK}$*leverage) + nominal risk free rate$_{NZ}$ *(1-tax$_{NZ}$)). The Commission applied its assumed New Zealand tax rate of 28% in adjusting the Ofcom estimates of WACC. In fact, Ofcom applies a tax rate of 17%.

contrary to the Commission's comment at paragraph 3.1251.2, "other" UK telecoms is the more relevant business line to compare to FFLAS in New Zealand (see footnote 15).

140. For a comparison with fibre services in Australia, we have shown an estimate of the 10-year New Zealand government bond yield (for three months to 1 September 2019) plus a margin of 350 basis points. We understand that this reflects the method the ACCC adopted for NBN (Australian Competition and Consumer Commission, 2013b, p. 98).

141. We have not included any broker estimates on this diagram. While the Commission notes that the average broker estimate is 5.40%, there are some problems with the sample used (see paragraph 126) and we do not have sufficient information to re-estimate the average.

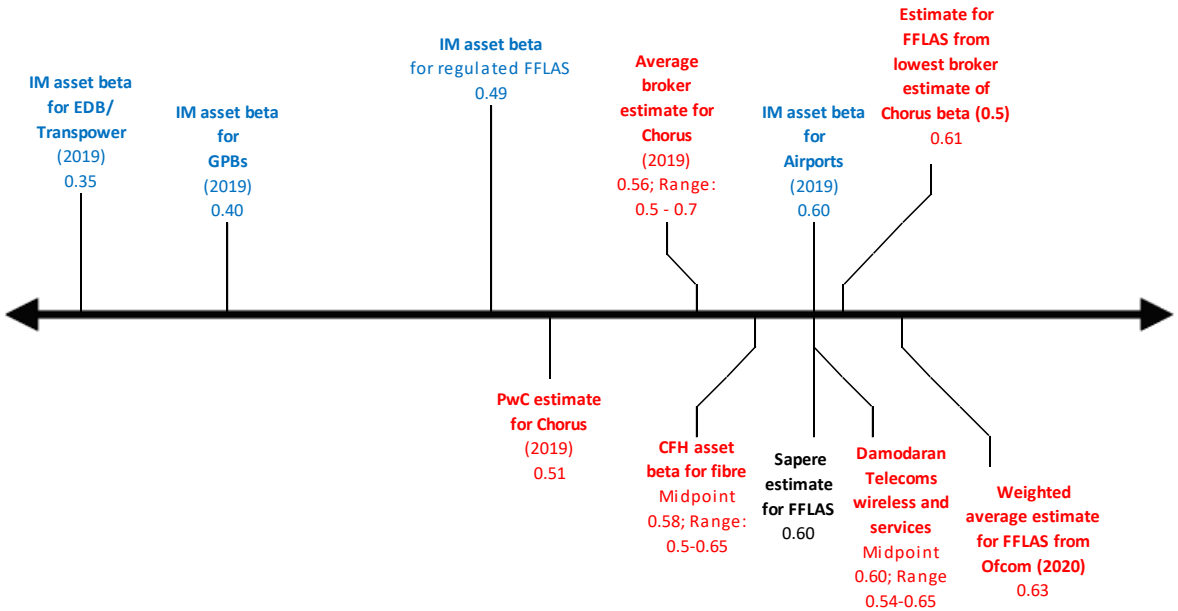
142. Figure 1 shows that the Commission's estimate of WACC for FFLAS lies below all other estimates of the cost of capital for fibre providers. Based on this comparative information, we consider that the Commission's WACC estimates are not reasonable.

Asset beta

143. The Commission also presents a diagram of comparators for asset beta. We have redrawn this diagram to include the asset beta estimates we have discussed above. We have also corrected the asset beta estimate based on PwC's report (PwC, 2019). We estimated this to be 0.51 based on the relationship between equity beta (1.1) and leverage (54%). The Commission appears to have adopted PwC's stated "floor" value for asset beta of 0.4.

144. This diagram supports our view that the Commission is underestimating beta.

Figure 2 Asset beta reasonableness checks diagram for FFLAS



References

Adams, A., & English, B. (c. 2012). Letter from Minister of Communications and Minister of Finance to the Telecommunications Forum on Crown Infrastructure Partners' role in the UFB programme. Retrieved from https://www.mbie.govt.nz/assets/17f6ea68c5/letter-from-ministers-crown-fibre-holdings-role-clarity.pdf

Australian Competition and Consumer Commission. (2013a). *ACCC Draft Decision on the Special Access Undertaking lodged by NBN Co on 18 December 2012*.

Australian Competition and Consumer Commission. (2013b). *NBN Co Special Access Undertaking: Final Decision*.

Australian Competition and Consumer Commission. (2013c). *Variation of NBN Co Special Access Undertaking - response to submissions*.

CEPA. (2019a). *Cost of capital for regulated fibre telecommunication services in New Zealand: Asset beta, leverage, and credit rating*.

CEPA. (2019b). *Cost of capital for regulated fibre telecommunication services in New Zealand: Asset beta, leverage, and credit rating - Response to submissions*.

Chorus. (2011, May 24). *Media release: Chorus selected as cornerstone of UFB initiative*. Retrieved from NZX website: https://www.nzx.com/announcements/209428

Chorus. (2019). *Annual report*.

Chorus and Telecom. (2011). *Scheme booklet relating to demerger of Chorus by Telecom Corporation of New Zealand Limited*.

Commerce Commission. (2010a). *Input Methodologies (Airport Services)*.

Commerce Commission. (2010b). *Input Methodologies (electricity distribution and gas pipeline services): Reasons paper*.

Commerce Commission. (2014). *Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper*.

Commerce Commission. (2015). *Cost of capital for the UCLL and UBA pricing reviews: final decision*.

Commerce Commission. (2016). *Input methodologies review decisions Topic paper 4: Cost of capital issues*.

Commerce Commission. (2018). *New regulatory framework for fibre: invitation to comment on our proposed approach*.

Commerce Commission. (2019). *Cost of capital determination for electricity distribution businesses' 2020-2025 default price-quality paths and Transpower New Zealand Limited's 2020-2025 individual price-quality path*.

Commerce Commission. (2019a). *Market study into the retail fuel sector: Final report*.

Commerce Commission. (2019b). *Fibre input methodologies: Draft decision - reasons paper.*

Commerce Commission. (2019c). *Fibre regulation emerging views: technical paper.* Wellington.

Finance and Expenditure Select Committee. (2011). *CFH Response to Select Committee questions.* NZ Government.

Hamada, R. S. (1972). The effect of the firm's capital structure on the systematic risk of common stocks. *Journal of finance, 27*(2), pp. 435-452.

HoustonKemp. (2019a). *Risk free rate, debt premium and TAMRP.*

HoustonKemp. (2019b). *WACC uplift - asymmetric consequences of under-investment.*

Lally, M. (2015). *Review of submissions on the risk free rate and the TAMRP for UCLL and UBA services,.*

Lally, M. (2019a). *Estimation of the TAMRP.* Capital Financial Consultants Ltd.

Lally, M. (2019b). *Review of submissions on the cost of capital for fibre network losses.* Capital Financial Consultants Ltd.

Lally, M. (2019c). *The cost of capital for fibre network losses.* Wellington: Capital Financial Consultants Ltd.

New Zealand Government. (2011, May 18). *Releases: Regulatory forbearance to be replaced*. Retrieved from The official website of the New Zealand Government: https://www.beehive.govt.nz/release/regulatory-forbearance-be-replaced

New Zealand Government. (2011, October 12). Statement to the Commerce Commission concerning incentives for businesses to invest in ultra-fast broadband infrastructure. *New Zealand Gazette(No 155, page 4440), Notice No 7120*.

Ofcom. (2019). *Promoting compeition and investment in fibre networks: review of the physical infrastructure and business connectivity markets: Annexes 1-25 of 26.*

Ofcom. (2020). *Consultation: Promoting investment and competition in fibre networks – Wholesale Fixed Telecoms Market Review 2021-26.*

Officer, B. a. (2012). *Report on WACC component of NBN Co's Special Access Undertaking.* Adelaide: Value Adviser Associates.

Oxera. (2014). *Review of the beta and gearing for UCLL and UBA services.*

Oxera. (2015). *Third review of submissions on the WACC for UCLL/UBA.*

Oxera. (2019). *Compensation for systematic risks.*

PricewaterhouseCoopers. (2009). *Advice on the cost of capital analysis for DPCR5.* Office of Gas and Electricity Markets.

PwC. (2019). *The PwC cost of capital report.*

Rosenberg, B., & Guy, J. (1995, January/February). Prediction of beta from investment fundamentals. *Financial Analysts Journal*, 101-110.

The Brattle Group. (2016). *Review of approaches to estimate a reasonable rate of return for investments in telecoms networks in regulatory proceedings and options for EU harmonization.* European Commission Directorate-General for Communications Networks, Content and Technology.

UBS. (2019). *Market analyst report: Chorus.*

Appendix A: Fibre IMs Determination

Clause	Change	Rationale
1.1.4(2)	~~**30 June 2012 WACC** has the meaning specified in clause 2.4.10(2);~~ ~~**30 June 2013 WACC** has the meaning specified in clause 2.4.10(2);~~ ~~**30 June 2014 WACC** has the meaning specified in clause 2.4.10(2);~~ ~~**30 June 2015 WACC** has the meaning specified in clause 2.4.10(2);~~ ~~**30 June 2016 WACC** has the meaning specified in clause 2.4.10(2);~~ ~~**30 June 2017 WACC** has the meaning specified in clause 2.4.10(2);~~ ~~**30 June 2018 WACC** has the meaning specified in clause 2.4.10(2);~~ ~~**30 June 2019 WACC** has the meaning specified in clause 2.4.10(2);~~ ~~**30 June 2020 WACC** has the meaning specified in clause 2.4.10(2);~~ ~~**30 June 2021 WACC** has the meaning specified in clause 2.4.10(2);~~ ~~**30 November 2011 WACC** has the meaning specified in clause 2.4.10(2);~~	Delete these and replace with "financial loss WACC" (below) to enable a single WACC value for the financial loss period.
1.1.4(2)	**50th percentile estimate of WACC** means for the purpose of (a) Part 2, the 50th percentile estimate of post-tax **WACC**, determined in accordance with clause 2.4.5(1);	Replaces the 50th percentile definitions with definitions for the 67th percentile consistent with clause 3.4.5

	(b) Part 2, the 50th percentile estimate of vanilla **WACC**, determined in accordance with clause 2.4.5(1); ~~(c) Part 3, the 50th percentile estimate of post-tax **WACC**, determined in accordance with clause 3.4.5(2);~~ ~~(d) Part 3, the 50th percentile estimate of vanilla **WACC**, determined in accordance with clause 3.4.5(1);~~ ~~**(e)**~~	
1.1.4(2)	**67th percentile estimate of WACC** means for the purpose of (a) Part 3, the 67th percentile estimate of post-tax **WACC**, determined in accordance with clause 3.4.5(2); (b) Part 3, the 67th percentile estimate of vanilla **WACC**, determined in accordance with clause 3.4.5(1);	Replaces the 50th percentile definitions with definitions for the 67th percentile consistent with clause 3.4.5
1.1.4(2)	**Debt premium reference year** means a 12-month period ending on ~~31 August~~ 30 November	We understand that fibre providers' disclosure year ends on 30 June. 30 November is seven months prior to the end of this disclosure year. This is consistent with the Commission's use of a 31 August date for EDBs which operate to a disclosure year ending 31 March.
1.1.4(2)	**Financial loss WACC** has the meaning specified in clause 2.4.10(2)	Insert new definition to enable single WACC value for the financial loss period
1.1.4(2)	**Leverage** means the ratio of debt capital to total capital ~~and is 31%~~	Leverage has a different value pre- and post-implementation.
1.1.4(2)	~~**Nelson-Siegel-Svensson approach** means a method for modelling yield curves and term structures of interest rates which establishes a relationship between terms to maturity and the **debt premium**, where a curve is generated by changing the parameters of a yield curve's functional form to minimise the squared deviation between estimated and observed values;~~	We recommend removing reference to the Nelson-Siegel-Svensson (NSS) approach from the IMs. The NSS curve illustrated in Attachment G has a poor fit and should be given no regard.

2.2.3(14)-(22)	'Compounding factor for financial loss year 2012' means **compounding factor for financial loss year 2013 X ~~30 June 2012 WACC~~** (1 + **financial loss WACC**) 'Compounding factor for financial loss year 2013' means **compounding factor for financial loss year 2014 X ~~30 June 2013 WACC~~** (1 + **financial loss WACC**) etc	Replace all references to individual WACC years with "financial loss WACC" as all these WACC values are the same. Correct compounding formula to use (1+r) Note this could also be achieved by using a compounding formula rather than writing out each year separately.
2.2.3(23)	'Compounding formula for financial loss year 2021' means **~~compounding factor for financial loss year 2022 X 30 June 2021 WACC~~** (1 + **financial loss WACC**)$^{184/365}$	Correct formula for final half year WACC adjustment compounding financial loss from 30 June 2021 to 31 December 2021.
2.2.3(24)	~~'Compounding formula for financial loss year 2021' means 1.~~	This subclause is not needed.
2.2.3(27)	*closing UFB asset base value* means, in respect of **financial loss year** 2012, the amount calculated in accordance with the following formula: **opening UFB asset base value** as of 1 December 2011 + the **sum of value of commissioned assets** -**sum of disposed assets** ~~+~~ - *depreciation*; *closing UFB asset base value* means, in respect of **financial loss year** 2013 and a **financial loss year** thereafter, the amount calculated in accordance with the following formula: **opening UFB asset base value** for the **financial loss year** + the **sum of value of commissioned assets** - **sum of disposed assets** ~~+~~ - *depreciation*	Depreciation should be subtracted from the opening asset value to calculate the closing asset value.
2.4.1(4)(a)	the average investor tax rate, the equity beta, the debt issuance costs, the average corporate tax rate ~~and~~ the tax-adjusted market	Add leverage to the fixed parameters specified in 2.4.2.

	risk premium and the leverage are the amounts specified in or determined in accordance with clause 2.4.2; and	
2.4.2(4)	The 'Equity beta' is ~~0.71~~ 0.87	Equity beta of 0.87 is consistent with an asset beta of 0.60 and leverage of 31%.
2.4.2(5)	'Debt issuance costs' are determined by the term of the **regulatory period**, where- (c) for a five year **regulatory period**, this is 0.25%; (d) for a four year **regulatory period**, this is 0.~~25~~31%; and (e) for a three year **regulatory period**, this is 0.~~33~~42%.	The debt issuance costs are the mid-point of the range of costs including an allowance for the higher cost of a foreign bond issuance.
2.4.2(7)	[new clause] **Leverage** is 31%	For information disclosure post-implementation, leverage of 31% is consistent with a BBB rated fibre provider.
2.4.4 (5) and (6)	has **a qualifying rating** of grade BBB~~+~~;	All references to BBB+ changed to BBB to reflect the appropriate credit rating for a FFLAS provider.
	The **Commission** will determine an estimate of an amount for the **average debt premium**- (a) for each **disclosure year**; and (b) within 1 month of the start of each **disclosure year**.	For clarity
2.4.4(5)(d)	subject to subclause (6), estimating, by taking account of the average spreads identified in accordance with paragraph (c) ~~and having regard to the debt premium estimated from applying the **Nelson-Siegel-Svensson approach**~~, the average spread that would reasonably be expected to apply to a **vanilla NZ$ denominated bond** that	Remove reference to the NSS, the curve has a poor fit and should be given no regard.
2.4.8(4)	For the purpose of subclause (3)(a), 'debt issuance cost re-adjustment' is the amount determined in accordance with the	Adjusts the formula for debt issuance costs of 0.25% p.a. for debt with a five year term.

	formula (which, for the avoidance of doubt, will be a negative number)- (0.0125 ÷ *original tenor of the* **qualifying debt** – 0.0025) × *book value in New Zealand dollars of the* **qualifying debt** *at its date of issue.*	
EITHER		
2.4.10-2.4.13	Delete clauses in draft. Replace with: 2.4.10 For the purposes of clause 2.2.3, the **financial loss WACC** is [value]	We are of the view that there the financial loss period should be treated as a regulatory period and as such it would be possible to include the value for the financial loss WACC in the IMs rather than a method for determining the value.
OR		
2.4.10(1)	Before the **implementation date**, the **Commission** will determine estimates of vanilla **financial loss WACC** for the purposes of clause 2.2.3 in respect of the **financial loss period**~~, where the estimates of **30 November 2011 WACC**, **30 June 2012 WACC**, **30 June 2013 WACC**, **30 June 2014 WACC**, **30 June 2015 WACC**, **30 June 2016 WACC**, **30 June 2017 WACC**, **30 June 2018 WACC**, **30 June 2019 WACC**, **30 June 2020 WACC** and **30 June 2021 WACC** are determined~~ in accordance with the formula~~s~~ specified in subclause (2)	Specifies a single WACC for the financial loss period
2.4.10(2)	For the purpose of subclause (1), ~~"30 November 2011 WACC", "30 June 2012 WACC", "30 June 2013 WACC", "30 June 2014 WACC", "30 June 2015 WACC", "30 June 2016 WACC", "30 June 2017 WACC", "30 June 2018 WACC", "30 June 2019 WACC", "30 June 2020 WACC" and "30 June 2021 WACC" are~~ **financial loss WACC** is determined in accordance with the formula:	Specifies a single WACC for the financial loss period. Adds an adjustment to the 75th percentile to allow for the reasonable expectations of investors in 2011.

	$r_d L + r_e(1 - L) +. 0.674 x s$	
2.4.10(3)	*[Add to the end of the clause]* *s is the standard error*	Defines s in the equation in 2.4.10(2)
2.4.10(4)(a)	the investor tax rate, the equity beta, the debt issuance costs ~~and~~ the tax-adjusted market risk premium and the standard error are the amounts specified in or determined in accordance with clause 2.4.11	Enables specification of standard error
2.4.10(5)	'Cost of capital' in clause 2.2.3(27) means the value determined under subclauses (1)-(4) ~~for~~ applied to each~~the~~ **financial loss year**~~, which -~~ ~~(a) for the **financial loss year** 2012 is **30 November 2011 WACC**;~~ ~~(b) for the **financial loss year** 2013 is **30 June 2012 WACC**;~~ ~~(c) for the **financial loss year** 2014 is **30 June 2013 WACC**;~~ ~~(d) for the **financial loss year** 2015 is **30 June 2014 WACC**;~~ ~~(e) for the **financial loss year** 2016 is **30 June 2015 WACC**;~~ ~~(f) for the **financial loss year** 2017 is **30 June 2016 WACC**;~~ ~~(g) for the **financial loss year** 2018 is **30 June 2017 WACC**;~~ ~~(h) for the **financial loss year** 2019 is **30 June 2018 WACC**;~~ ~~(i) for the **financial loss year** 2020 is **30 June 2019 WACC**;~~ ~~(j) for the **financial loss year** 2021 is **30 June 2020 WACC**; and~~ ~~(k) for the **financial loss year** 2022 is **30 June 2021 WACC**.~~	The suggested changes clarify the related clause which uses this definition and is consistent with a single WACC for the financial loss period
2.4.11(2)	For the purpose of clause 2.4.10, the 'Equity beta' is ~~0.71~~1.08	Equity beta of 1.08 is consistent with an asset beta of 0.65 and leverage of 40%.
2.4.11(3)	For the purpose of clause 2.4.10, 'debt issuance costs' are 0.25%.	The debt issuance costs are the mid-point of the range of costs including an allowance for the higher cost of a foreign bond issuance.

2.4.11(4)	For the purpose of clause 2.4.10, 'tax-adjusted market risk premium' is 7.0% ~~(a) in respect of the period starting on 1 December 2011 and ending on the last day before the commencement date of this determination as specified in clause 1.1.3, 7.0%; and~~ ~~(b) in respect of the period starting on the commencement date of this determination as specified in clause 1.1.3 and ending on the close of the day immediately before implementation date, 7.5%.~~	Consistent with a single WACC for the financial loss period and an estimation date of 1 May 2011
2.4.11(5)	[new clause] For the purpose of clause 2.4.10, **leverage** is 40%	For the pre-implementation period, leverage is 40%
2.4.11(6)	[new clause] For the purpose of clause 2.4.10, 'standard error' is 0.0124	Defines the standard error
2.4.12(1)	For the purpose of clause 2.4.10, the **Commission** will estimate a risk-free rate~~s~~ for~~-~~ ~~(a) that apply to each **financial loss year** of~~ the **financial loss period**~~;~~ - (b~~a~~) which establishes a term of the risk-free rate of 8.7 years~~, where:~~ ~~(i) for the **30 November 2011 WACC**, this is 10.1 years;~~ ~~(ii) for the **30 June 2012 WACC**, this is 9.5 years;~~ ~~(iii) for the **30 June 2013 WACC**, this is 8.5 years;~~ ~~(iv) for the **30 June 2014 WACC**, this is 7.5 years;~~ ~~(v) for the **30 June 2015 WACC**, this is 6.5 years;~~ ~~(vi) for the **30 June 2016 WACC**, this is 5.5 years;~~ ~~(vii) for the **30 June 2017 WACC**, this is 4.5 years;~~ ~~(viii) for the **30 June 2018 WACC**, this is 3.5 years;~~ ~~(ix) for the **30 June 2019 WACC**, this is 2.5 years;~~ ~~(x) for the **30 June 2020 WACC**, this is 1.5 years; and~~ (xi) ~~for the **30 June 2021 WACC**, this is 0.5 years;~~	Consistent with a single WACC for the financial loss period and an estimation date of 1 May 2011

	(~~c~~b) by obtaining, for notional benchmark New Zealand government New Zealand dollar denominated nominal bonds, the wholesale market linearly-interpolated bid yield to maturity for a residual period to maturity equal to the term specified in paragraph (~~b~~a) on each business day in the 3 months preceding ~~the start of the financial loss year~~ 1 May 2011	
2.4.13(1)	For the purpose of clause 2.4.10, the **Commission** will determine an estimate of an amount for the **debt premium** that applies to the **financial loss period** by- using the debt risk premium prevailing at ~~the beginning of the year in the **financial loss period** which the median loss occurred~~1 May 2011; and establishing a term for the debt risk premium that is the ~~number of years remaining in the **financial loss period**~~ term of the risk-free rate in clause 2.4.12.	Consistent with a single WACC for the financial loss period and an estimation date of 1 May 2011
2.4.13(2) and 2.4.13(3)	have **a qualifying rating** of grade BBB~~+~~;	All references to BBB+ changed to BBB to reflect the appropriate credit rating for a FFLAS provider.
2.4.13(3)	…for each **business day** in the 12 months preceding ~~the start of the year in the **financial loss period** in which the median loss occurred~~1 May 2011	Consistent with a single WACC for the financial loss period and an estimation date of 1 May 2011 The period of 12 months is consistent with the other WACC IMs.
2.4.13(3)(d)	subject to subclause (4), estimating, by taking account of the average spreads identified in accordance with paragraph (c) ~~and having regard to the debt premium estimated from applying the **Nelson-Siegel-Svensson approach**~~, the average spread that would reasonably be expected to apply to a **vanilla NZ$ denominated bond** that	Remove reference to the NSS, the curve has a poor fit and should be given no regard.

Part 3		
3.4.1(4)(b)	the average investor tax rate, the equity beta, the debt issuance costs, the average corporate tax rate ~~and~~ the tax-adjusted market risk premium and the leverage are the amounts specified in or determined in accordance with clause 3.4.2; and	Add leverage to the fixed parameters specified in 3.4.2.
3.4.2(4)	The 'Equity beta' is ~~0.71~~0.87	Equity beta of 0.87 is consistent with asset beta of 0.60 and leverage of 31%.
3.4.2(5)	'Debt issuance costs' are determined by the term of the **regulatory period**, where- (f) for a five year **regulatory period**, this is 0.25%; (g) for a four year **regulatory period**, this is 0.~~25~~31%; and (h) for a three year **regulatory period**, this is 0.~~33~~42%.	The debt issuance costs are the mid-point of the range of costs including an allowance for the higher cost of a foreign bond issuance.
3.4.2(7)	[new clause] **Leverage** is 31%	For PQ regulation in the post-implementation period, leverage is 31% consistent with BBB rated providers.
3.4.4(4), (5) and (6)	have **a qualifying rating** of grade BBB~~+~~;	All references to BBB+ changed to BBB to reflect the appropriate credit rating for a FFLAS provider.
3.4.4(5)(d)	subject to subclause (6), estimating, by taking account of the average spreads identified in accordance with paragraph (c) ~~and having regard to the debt premium estimated from applying the **Nelson-Siegel-Svensson approach**~~, the average spread that would reasonably be expected to apply to a **vanilla NZ$ denominated bond** that	Remove reference to the NSS, the curve has a poor fit and should be given no regard.
3.4.5	Methodology for estimating the ~~50~~67th percentile estimate of WACC The **Commission** will determine a 67~~50~~th percentile estimate of vanilla **WACC**- (a) for each regulatory period; and	This clause is amended to reflect the use of the 67th percentile estimate of WACC in a PQ determination.

	(b) no later than 6 months prior to the start of each regulatory period. The **Commission** will determine a 67~~50~~th percentile estimate of post-tax **WACC**- (a) for each **regulatory period**; and (b) no later than 6 months prior to the start of each **regulatory period**. For the purposes of subclause (1) or (2), (a) the 67th percentile must be determined in accordance with the formula- mid-point estimate of WACC + 0.440 x standard error ~~the mid-point estimate of WACC must be treated as the 50th percentile~~ (b) where the standard error of the mid-point estimate of WACC is 0.0124; and (c) the relevant **mid-point estimate of WACC** must be treated as the 50th percentile	
3.4.7(1)	Where the **Commission** takes into account the cost of capital in making a **PQ determination**, the **Commission** will use the 67~~50~~th percentile estimate of WACC determined in accordance with clause 3.4.5(1) and most recently published in accordance with clause 3.4.6.	This clause is amended to reflect the use of the 67th percentile estimate of WACC in a PQ determination.
3.4.7(2)	*a* means the sum of the **term credit spread differentials** calculated in accordance with clause 3.4.10(~~3~~1) for the **base year** *b* means the sum of: (a) the ~~sum of~~ forecast **opening RAB values** for all **core fibre assets** and the forecast **opening RAB value** for the **financial loss asset** for the **regulatory year** in question; and	There is no clause 3.4.10(3). A minor change in syntax for clarity.

	(b) the ~~sum of~~ forecast **value of commissioned assets** for all **core fibre assets** for the **regulatory year** in question;	
3.4.10(2)	For the purpose of subclause (3)(a), 'debt issuance cost re-adjustment' is the amount determined in accordance with the formula (which, for the avoidance of doubt, will be a negative number)- (0.0125 ÷ *original tenor of the* **qualifying debt** – 0.0025) × *book value in New Zealand dollars of the* **qualifying debt** *at its date of issue.*	Adjusts the formula for debt issuance costs of 0.25% p.a. for debt with a five year term.

Appendix B: Asset beta analysis using Damodaran data, 2012-2019

Table 5 Annual average asset beta, Telecom. Wireless and Telecom. Services, 2012-2019

	2012		2013		2014		2015		2016		2017		2018		2019	
	No.	**Beta**	**No.**	**Beta**	**No.**	**Beta**	**No.**	**Beta**	**No.**	**Beta**	**No.**	**Beta**	**No.**	**Beta**	**No.**	**Beta**
Developed countries																
Telecom. Wireless	50	0.85	55	0.64	50	0.75	48	0.75	44	0.53	44	0.63	47	0.52	45	0.55
Telecom. Services	206	0.52	200	0.49	198	0.63	178	0.55	181	0.53	174	0.56	189	0.49	185	0.55
Telecom Wireless & Services	256	0.58	255	0.52	248	0.65	226	0.59	225	0.53	218	0.58	236	0.50	230	0.55
Global																
Telecom. Wireless	117	0.77	116	0.72	117	0,84	110	0.79	106	0.66	106	0.80	107	0.62	103	0.61
Telecom Services	325	0.60	317	0.54	308	0.65	292	0.60	297	0.58	289	0.63	317	0.59	317	0.59
Telecom. Wireless & Services	442	0.64	433	0.59	425	0.70	402	0.65	403	0.60	395	0.68	424	0.60	420	0.60

Appendix C: About the authors

Vhari McWha is an experienced economist and advises on public policy and regulation, including developing pricing methodologies for natural monopolies. She has provided advice and modelling for pricing methods in relation to electricity and gas distribution, airports, air navigation services, wastewater, border charges and house insurance. She has extensive skills in quantitative analysis, including cost benefit, modelling and forecasting work. She has advised on a wide range of complex issues across the New Zealand economy and has particular experience in the energy sector.

Tony van Zijl provides consulting advice and litigation support on financial reporting, financial management, capital markets, cost of capital and valuation. He has given expert evidence on these matters in High Court proceedings, Commerce Commission hearings, and arbitrations. He is a lay member of the New Zealand High Court. Tony is Professor of Accounting and Financial Management and Director of the Centre for Accounting, Governance and Taxation Research at Victoria University of Wellington. He holds a PhD in Finance, is a Certified Securities Analyst Professional, a Fellow Chartered Accountant, and a Life member of both Accounting and Finance Association of Australia and New Zealand and Chartered Accountants Australia and New Zealand.

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Sapere Research Group is one of the largest expert consulting firms in Australasia, and a leader in the provision of independent economic, forensic accounting and public policy services. We provide independent expert testimony, strategic advisory services, data analytics and other advice to Australasia's private sector corporate clients, major law firms, government agencies, and regulatory bodies.

'Sapere' comes from Latin (to be wise) and the phrase 'sapere aude' (dare to be wise). The phrase is associated with German philosopher Immanuel Kant, who promoted the use of reason as a tool of thought; an approach that underpins all Sapere's practice groups.

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