

Compensation for asymmetric type 2 risks

Applying the fair bet principle in the new regulatory framework for fibre in New Zealand

Prepared for
Chorus

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Contents

Executive summary	1
1 Introduction	4
1A Overview of themes covered in this report and our instructions	4
1B Structure of the report	6
2 The fair bet principle: a practical approach to compensate investors for type 2 asymmetric risks	7
2A The history and role of the fair bet principle applied by Ofcom in the UK	7
2B The economic and finance building blocks of the fair bet principle	9
3 Specific features of the regulatory regime for FFLAS in New Zealand and their impact on the fair bet principle	14
3A Different tranches of investment	14
3B Regulatory resets	15
3C Anchor prices	19
3D Geographically consistent pricing	19
3E Wash-up mechanism	20
3F Treatment of accumulated losses in the RAB	21
3G Treatment and impact of Crown financing	22
4 Initial quantification of the magnitude of the fair bet uplift for Chorus	25
4A Quantification of the fair bet uplift based on CFH information on the 'raw' business plan	25
5 Concluding remarks and recommendations for the Commission	30
5A Recommended next steps for the Commission	31
A1 Mathematical derivation of the level of capped returns consistent with a fair bet	34

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Figures and tables

Figure 2.1	If expected returns equal the cost of capital, any price control would breach the fair bet	10
Figure 2.2	If expected returns are greater than cost of capital, a price cap might be appropriate	11
Figure 2.3	Identifying the critical level of returns (Y)	12
Figure 4.1	UFB1 business case IRRs under different scenarios	26
Figure 4.2	Minimum level of capped returns for a WACC of 9%, expected returns of 10% and standard deviation of 2.5%	27
Figure 4.3	Minimum level of capped returns for a WACC of 9%, expected returns of 10% and standard deviation of 5%	28
Table 4.1	Sensitivity analysis on the level of cap (Y) and delta (Δ)	29

Executive summary

Oxera has been asked to prepare two expert reports on behalf of Chorus New Zealand Limited ('Chorus') in response to the New Zealand Commerce Commission's ('the Commission') emerging views on the future regulatory framework for fibre services.

This expert report focuses on asymmetric type 2 risks, and how such risks can be quantified and compensated for in the new regulatory regime for fibre fixed line access services (FFLAS) in New Zealand.

Oxera's instructions were to answer four specific questions in relation to asymmetric type 2 risks.

1. Do regulatory authorities in other jurisdictions provide a premium for non-systematic risk associated with investments in FFLAS and, if so, how?
2. Is Chorus' investment in providing FFLAS subject to type 2 asymmetric risks? What form do these risks take?
3. What approach should the Commission take to providing compensation for any type 2 asymmetric risk?
4. What is the magnitude of any type 2 asymmetric risks that you identify above? Is the magnitude of these risks likely to be different between the pre-implementation period and the post-implementation period?

In relation to question 1, our report explains that Ofcom's approach to regulating risky investments is founded on the fair bet principle, which shares the same objective of the Commission's core financial capital maintenance (FCM) principle of providing investors with an opportunity to make returns equal to the cost of capital, in expected terms. In the presence of downside risks (a term that encompasses type 2 asymmetric risks), this means allowing the investor to earn returns in excess of the cost of capital in upside scenarios. While we are aware that other regulators in Europe have also explicitly provided a 'premium' above weighted average cost of capital (WACC) for investments in next generation access (NGA) networks, the rationale for such premiums is not always founded on robust economic and finance principles, sometimes conflating the need to provide an uplift to compensate for risk with the objective of incentivising investment. Ofcom's approach, on the other hand, does not suffer from this drawback. A more detailed discussion of the relationship between type 2

asymmetric risks, the FCM principle and Ofcom's fair bet principle can be found in sections 1 and 2A.

In relation to question 2, we have reviewed contemporaneous evidence from before the start of the UFB1 investment, including Chorus' Business Plan from December 2011 and responses by Crown Fibre Holdings (CFH) to the New Zealand Parliament Select Committee. This evidence shows that investment in fibre was subject to considerable demand uncertainty regarding take-up rates and pricing. Furthermore, the expected (average) returns were only slightly above the cost of capital, without any guarantees of making a positive return on investment. This is clear evidence that this first tranche of fibre investment was subject to significant type 2 asymmetric risks. To the extent that demand risks persist in the future, future tranches of investment would also be subject to asymmetric type 2 risks requiring compensation. This contemporaneous evidence is presented and discussed in section 3B.

In relation to question 3, this report provides a practical framework to allow the Commission to estimate the magnitude of type 2 asymmetric risks and compensate fibre investors for them. This framework is based on the Oxera fair bet framework developed for Openreach, and adopted by Ofcom, to assess whether proposals by Ofcom in 2017 to set price caps on BT's fibre-to-the-cabinet (FTTC) wholesale access products would be consistent with the need to ensure that BT had been given a fair bet on its investment. With estimates of the ex ante WACC of the asset, the expected return of the investment and the distribution of possible outcomes around this expected return (prior to the investment taking place), the framework described in this report can be used to estimate the magnitude of the uplift above WACC required to appropriately compensate investors for type 2 asymmetric risks. This is described in further detail in section 2B.

In relation to question 4, this report provides initial estimates of the uplift above WACC needed to honour the fair bet principle for the UFB1 programme tranche of investment. Our initial estimates suggest that a range of 1.0% to 3.5% above the WACC would be required to do so. We note, however, that these are indicative estimates and further work would be needed to estimate the appropriate uplift for UFB1 and subsequent tranches. This quantification is explained in further detail in section 4.

Finally, in relation to whether the magnitude of these risks is likely to be different between the pre-implementation period and the post-implementation period, we explain in this report that when the project involves multiple tranches of investment, each with their own risk characteristics, the fair bet exercise needs to be conducted for each tranche individually. In other words, this would involve estimating a different cost of capital for each tranche, assessing the risks of these investments as they existed at the time at which the investments took place, and deriving a separate 'delta' uplift for each. This is explained further in section 3A.

If the Commission agrees that the framework presented in this report is a practical approach to estimating the magnitude of compensation for type 2 asymmetric risks within the new regulatory regime for fibre services in New Zealand, there are a series of workstreams that it would need to take forward as next steps. These recommended next steps are explained in further detail in section 5A. In addition, section 3 contains a discussion on a number of specific features of the proposed new regulatory regime for fibre services in New Zealand and their interactions with, and implications for, applying the fair bet principle.

1 Introduction

- 1.1 Oxera has been asked to prepare two expert reports on behalf of Chorus in response to the Commission's emerging views on the future regulatory framework for fibre services.
- 1.2 The two expert reports deal with the overarching question of how the Commission can ensure that Chorus and the local fibre companies (LFCs) are given a fair opportunity to earn a 'normal' rate of return? In particular, how should the Commission compensate fibre investors for risk?
- 1.3 Each expert report deals with separate categories of risk. The focus of this report is on **asymmetric type 2 risks**, and how such risks can be quantified and compensated for in a revenue cap, such as the one being considered by the Commission for FFLAS.
- 1.4 The focus of the companion report is on **systematic risks**, which can be compensated through an appropriately calculated asset beta for fibre services that feeds into the WACC calculation.

1A Overview of themes covered in this report and our instructions

- 1.5 Having established an appropriately calculated WACC for FFLAS, the question that emerges is whether fibre investors require compensation for any additional sources of risk. Evidence provided in this report suggests that they do.
- 1.6 In addition to the higher level of systematic risk (reflected through an appropriately calculated asset beta), full fibre networks are exposed to a number of risks that are not fully reflected in the asset beta, which, if not properly accounted for in the regulatory framework, could sufficiently impede investment and/or result in a regulatory failure to allow investors the opportunity to earn a 'normal return'.
- 1.7 Giving investors the opportunity to earn a normal return is what underpins the principle of real FCM, which is one of the Commission's core principles when considering cost of capital and risk issues.
- 1.8 Under this principle, investors are provided with an ex ante expectation of earning returns equal to the cost of capital while the real financial value of their capital is maintained.¹ When applying the FCM principle to projects where risk

¹ This means that returns are measured only after allowance has been made for changes in the real value of assets. One way in which this may be done is through indexing the RAB. However, indexing the RAB compensates only for general inflation and does not by itself guarantee FCM. The principle of FCM is

is present, a project may be deemed to offer an adequate remuneration for risk, as long as its ex ante expected net present value (NPV) is non-negative.² Alternatively, this could be expressed as the expected ex ante internal rate of return (IRR) being at least as high as the WACC for the investment.

- 1.9 The FCM principle is not a guarantee of returns, but rather, an expectation that returns will be no less than the WACC. Actual returns may be lower or higher, as long as the average outcome is cost recovery.
- 1.10 In the case of traditional utilities, a building blocks approach to price regulation with returns set at the WACC may indeed satisfy the FCM principle in expectation if the regulated company is allowed to keep the profits from beating the revenue cap while also bearing the losses from under-performance. Furthermore, the presence of asymmetric type 2 risks or asset-stranding—for example, as a result of competition or technological risk—is typically not that large for traditional utilities and could be compensated for in a revenue cap through other means (e.g. retention of stranded assets in the RAB or accelerated depreciation).
- 1.11 However, in the case of FFLAS, the Commission has recognised that the greater speed of technological progress and competition from alternative technologies (e.g. fixed wireless) means that adjusting regulatory cash flows may not work as a compensation approach.³ The Commission has therefore stated that compensation for asset-stranding risks may need to be provided through other means, for example, through an ex ante compensation via a WACC uplift, although it notes the significant challenge in quantifying the magnitude of any uplift.^{4,5}
- 1.12 In this report, we provide a practical framework for the Commission to estimate the magnitude of this uplift, as well as providing an initial quantification for it. The report also provides answers to specific questions that Chorus instructed Oxera to address:

recognised in Accounting Standards, and FCM is one version of Current Cost Accounting (CCA). The key point with the FCM version of CCA is that changes in asset values count as income, unlike under the Operating Capability Maintenance (OCM) version of CCA.

² Cave, M. and Vogelsang, I. (2019), 'Financial capital maintenance and its role in fibre regulation in New Zealand', 21 May, para. 1.7. In this context, 'expected NPV' means a probability-weighted average NPV across all the scenarios.

³ Commerce Commission (2019), 'Fibre regulation emerging views: technical paper', May, paras 587 and 588.

⁴ Ibid., para. 591.

⁵ We also note that a proportion of competition risk from alternative technologies is likely to be systematic in nature. This is further discussed in the accompanying report: Oxera (2019), 'Compensating for systematic risks', 15 July.

1. Do regulatory authorities in other jurisdictions provide a premium for non-systematic risk associated with investments in FFLAS and, if so, how?
2. Is Chorus' investment in providing FFLAS subject to type 2 asymmetric risks? What form do these risks take?
3. What approach should the Commission take to providing compensation for any type 2 asymmetric risk?
4. What is the magnitude of any type 2 asymmetric risks that you identify above? Is the magnitude of these risks likely to be different between the pre-implementation period and the post-implementation period?

1B Structure of the report

- Section 2 describes a practical approach to quantifying the magnitude of the uplift that the Commission could implement in New Zealand to compensate for type 2 asymmetric risks. This is based on the fair bet principle implemented by Ofcom in the UK, which is conceptually linked to the FCM principle, as the aim of the fair bet is to provide expected returns that achieve FCM.
- Section 3 considers the specific features of the New Zealand regime for FFLAS that need to be taken into account when implementing this approach, such as the effect of different Ultra-Fast Broadband (UFB) tranches of investment; regulatory resets; the existence of anchor prices; the requirement for geographically consistent pricing; the treatment of accumulated losses; the operation of the wash-up mechanism; and the treatment of Crown financing.
- Section 4 presents a preliminary assessment of the magnitude of the required uplift for Chorus, based on the approach described above.
- Section 5 summarises the key conclusions of this report, as well as providing recommendations to the Commission on the required next steps to implement this framework in the new regulatory regime for fibre services in New Zealand.

2 The fair bet principle: a practical approach to compensate investors for type 2 asymmetric risks

- 2.1 When discussing the FCM principle, the Commission's advisers (Cave and Vogelsang) noted that some regulators have expressly sought to apply a 'fair bet' principle: in other words, they try to arrange things so that the ex ante probability-weighted average of the universe of possible outcomes satisfies the FCM condition, i.e. an NPV = 0 (or IRR = WACC).⁶
- 2.2 The fair bet principle was implemented by Ofcom in the UK when regulating the investment made by BT in upgrading its copper network to FTTC in 2008. The principle continues to be at the centre of regulation as the new regulatory framework for full fibre is being developed in the UK.
- 2.3 In section 2A we first describe the history and role of the fair bet principle in Ofcom's regulatory regime for fibre investments. In section 2B we explain in more detail the economic and financial underpinnings of this principle and its relevance as a framework to quantify the required compensation for type 2 asymmetric risks.

2A The history and role of the fair bet principle applied by Ofcom in the UK

- 2.4 One of the first mentions of the 'fair bet' in an Ofcom document can be found in a 2005 statement on 'Ofcom's approach to risk in the assessment of the cost of capital'.⁷ When discussing how to take account of risk within an NPV framework, Ofcom noted:⁸

... when assessing cash flows on an ex post basis, it should be recognised that there may be a discrepancy between the cash flows that are realised on an ex post basis and those that were expected on an ex ante basis. **High cash flows that are realised on an ex post basis may partly reflect a reward for ex ante uncertainty, and, if correctly applied, the NPV framework offers investors a "fair bet"**, in which the rewards from successful investments within the portfolio are expected to be sufficient to pay for the losses associated with unsuccessful investments, and additionally to allow an adequate return overall across the diversified set of investments. (emphasis added)

- 2.5 Subsequently, as BT announced its plans to upgrade its copper infrastructure with an FTTC network, Ofcom issued a policy document consulting on the future approach to regulating such NGA networks. In that document, Ofcom

⁶ Cave and Vogelsang (2019), op. cit., para. 1.11.

⁷ Ofcom (2005), 'Ofcom's approach to risk in the assessment of the cost of capital: Final statement', August, https://www.ofcom.org.uk/__data/assets/pdf_file/0021/41970/final.pdf.

⁸ Ibid., para. 3.14.

noted that NGA investments would be taking place under uncertainty and therefore:⁹

regulatory intervention mandating access at a specific price may result in an **asymmetric risk** borne by investors and a change to the prospective returns for an investing firm. (...) [Hence] **a straight-forward application of the standard cost plus pricing approach may result in lower incentives to invest**. This approach would cap the total returns that the firm could make if demand turned out to be high but force the firm to bear all of the losses in the event that there was virtually no demand. (emphasis added)

2.6 BT's FTTC investment programme kicked off in 2008/09, hitting peak levels of investment in 2011/12. When Ofcom undertook a review of the fixed access market in 2011 and 2014, Ofcom decided not to impose price controls on FTTC access products in order to maintain BT's investment incentives and allow it to experiment with pricing.¹⁰ However, in the 2014 fixed access market review it noted that it would revisit the decision not to impose a price control in the subsequent market review of 2017 'in light of circumstances prevailing at the time'.¹¹

2.7 When the 2017 fixed access market review came around, one of Ofcom's key objectives in its decision on whether to impose a price cap on BT's FTTC wholesale access services (and if so, at what level it should be set) was defined as:¹²

Preserving the investment incentives faced by BT, by applying the 'fair bet' principle, [which] recognises that **the investing firm needs to benefit from sufficient upside potential from any investment to offset the downside risk of failure**. (emphasis added).

2.8 Ofcom noted that assessing whether the fair bet principle had been observed meant assessing 'whether BT has had a fair opportunity to earn a reasonable return on its original FTTC investments, taking account of the risks at the time the investment was made.'¹³ This was consistent with a framework developed

⁹ Ofcom (2007), 'Future broadband: Policy approach to next generation access', paras 5.14–5.16, https://www.ofcom.org.uk/__data/assets/pdf_file/0023/47750/future_broadband_nga.pdf.

¹⁰ Although BT was subject to the obligation to provide virtual unbundled local loop access (VULA) on fair and reasonable terms and, from 2015, to a VULA ex ante margin squeeze test. See Ofcom (2015), 'Fixed Access Market Reviews: Approach to VULA margin', 19 March, https://www.ofcom.org.uk/__data/assets/pdf_file/0015/72420/vula_margin_final_statement.pdf.

¹¹ Ofcom (2014), 'Fixed access market reviews: wholesale local access, wholesale fixed analogue exchange lines, ISDN2 and ISDN30 – Volume 1: Statements on the markets, market power determinations and remedies', June, para. 12.151, https://www.ofcom.org.uk/__data/assets/pdf_file/0032/78863/volume1.pdf.

¹² Ofcom (2018), 'Wholesale Local Access Market Review: Statement – Volume 1, Markets, market power determinations and remedies', March, para. 9.10. Available at:

https://www.ofcom.org.uk/__data/assets/pdf_file/0020/112475/wla-statement-vol-1.pdf.

¹³ Ibid., para. 9.19.

by Oxera on behalf of Openreach to assess whether Ofcom had indeed honoured the fair bet principle.¹⁴

- 2.9 Ofcom undertook a detailed analysis based on the Oxera framework which allowed it to conclude that its proposals would ensure that BT's actual returns over the life of the investment (including the effect of the proposed price caps) would be sufficiently high to provide a fair bet.¹⁵

2B The economic and finance building blocks of the fair bet principle

- 2.10 A fair bet means that an investor can expect to earn a return that covers its cost of capital. For a risky investment to be a fair bet, the investor should be allowed to enjoy some of the upside benefit when demand turns out to be high or costs low (i.e. be allowed returns higher than the cost of capital) in order to balance the probability that it will earn returns below the cost of capital if demand turns out to be low or costs high.
- 2.11 Below, we describe in more detail the implications of the fair bet principle and its relevance as a framework to quantify the required compensation for type 2 asymmetric risks, in particular when the regulator intends to impose a price cap.¹⁶
- 2.12 We start with a basic but fundamental observation: if the ex ante expected returns over the life of the project (the expected IRR) were equal to the project-specific cost of capital (WACC), then imposing price controls on this asset at any point in its lifetime would not be consistent with a fair bet (or the FCM principle). This is because any cap on total project returns would necessarily shift the expected project IRR to a level below the project-specific WACC.
- 2.13 This is illustrated in Figure 2.1, where the project's possible outcomes are described as a normal distribution of returns with different probabilities attached to each outcome, centred around the average or expected IRR ($E(IRR)$).¹⁷

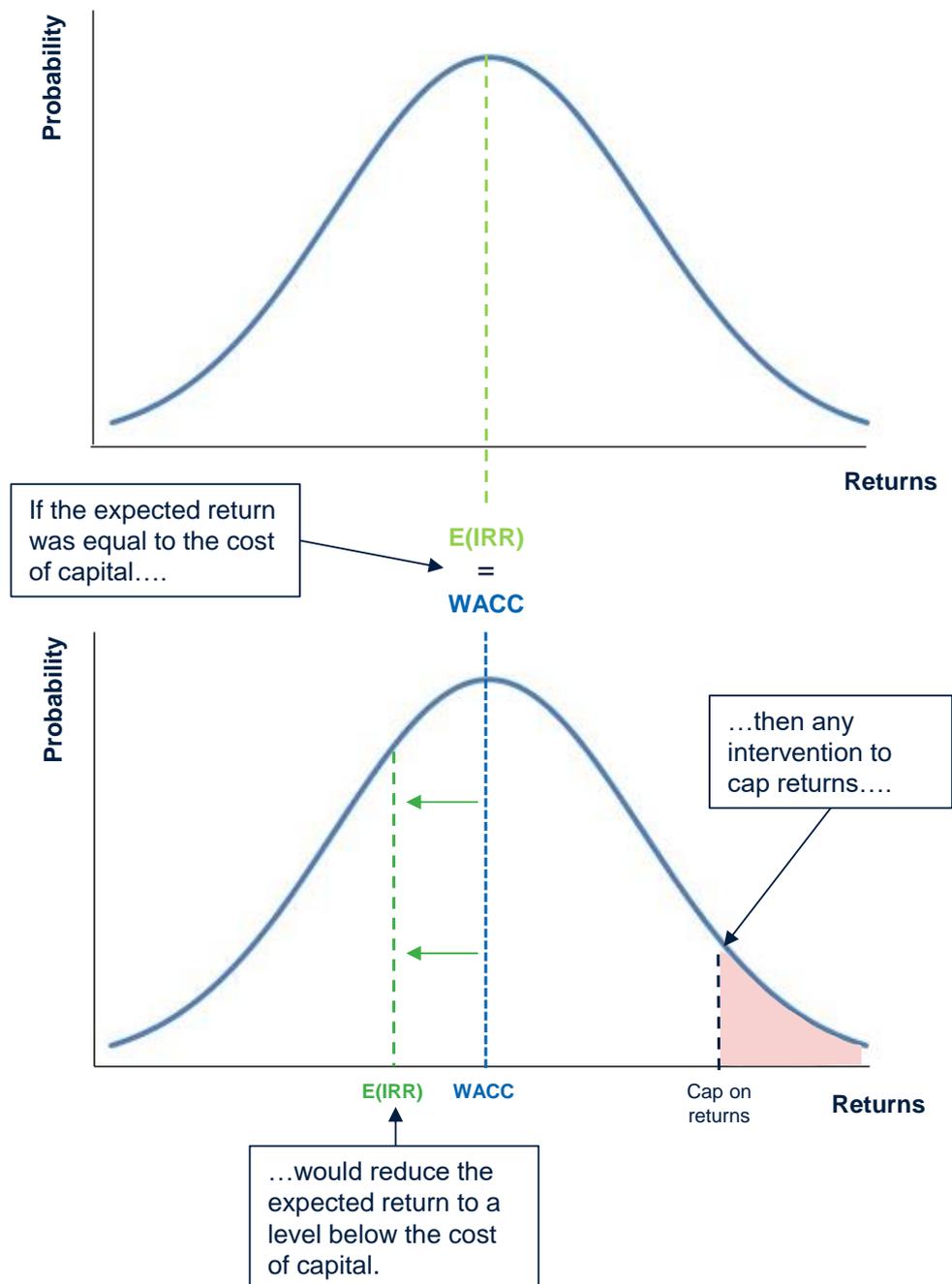
¹⁴ Oxera (2017), 'Does Ofcom's approach in the WLA market review honour the fair bet principle?', June, https://www.ofcom.org.uk/__data/assets/pdf_file/0016/105019/Openreach-vol-1-annex-3-Oxera-report.pdf. Openreach is the legally separate wholesale infrastructure division owned by BT Group.

¹⁵ Ofcom (2018), op. cit., para. 9.127 and Annex 6, https://www.ofcom.org.uk/__data/assets/pdf_file/0021/112476/wla-statement-annexes-1-9.pdf.

¹⁶ The remainder of this section is based on section 2.2 of the Oxera (2017) report for Openreach.

¹⁷ A normal or standard distribution of returns is shown here for convenience. The precise shape of the distribution of returns does not affect the framework of analysis. The key insights described below are valid for any shape of the distribution of returns.

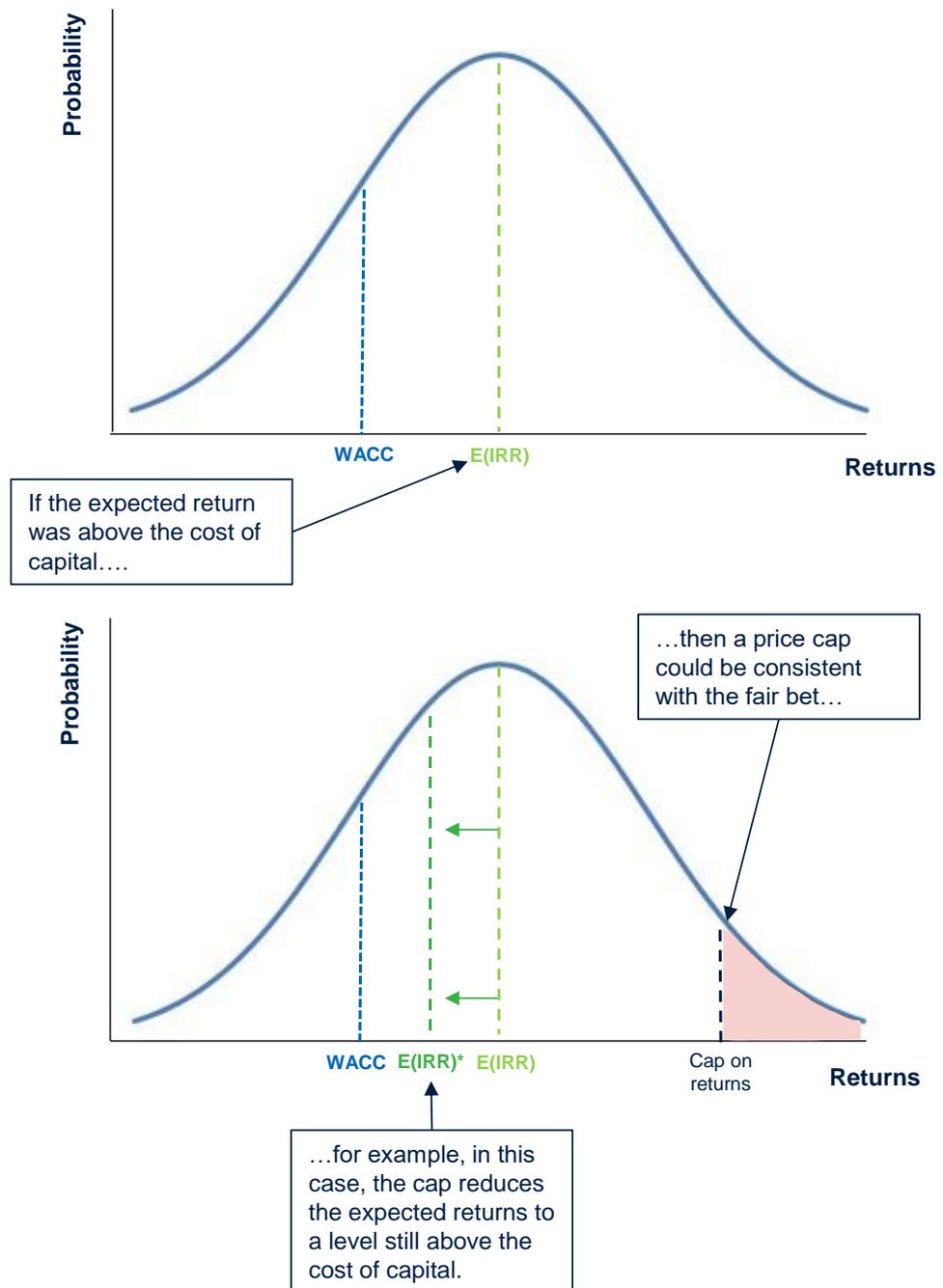
Figure 2.1 If expected returns equal the cost of capital, any price control would breach the fair bet



Source: Oxera analysis.

- 2.14 The only scenario in which a future price cap intervention can be considered is when the expected project IRR at inception is greater than the project-specific WACC, as illustrated below.

Figure 2.2 If expected returns are greater than cost of capital, a price cap might be appropriate



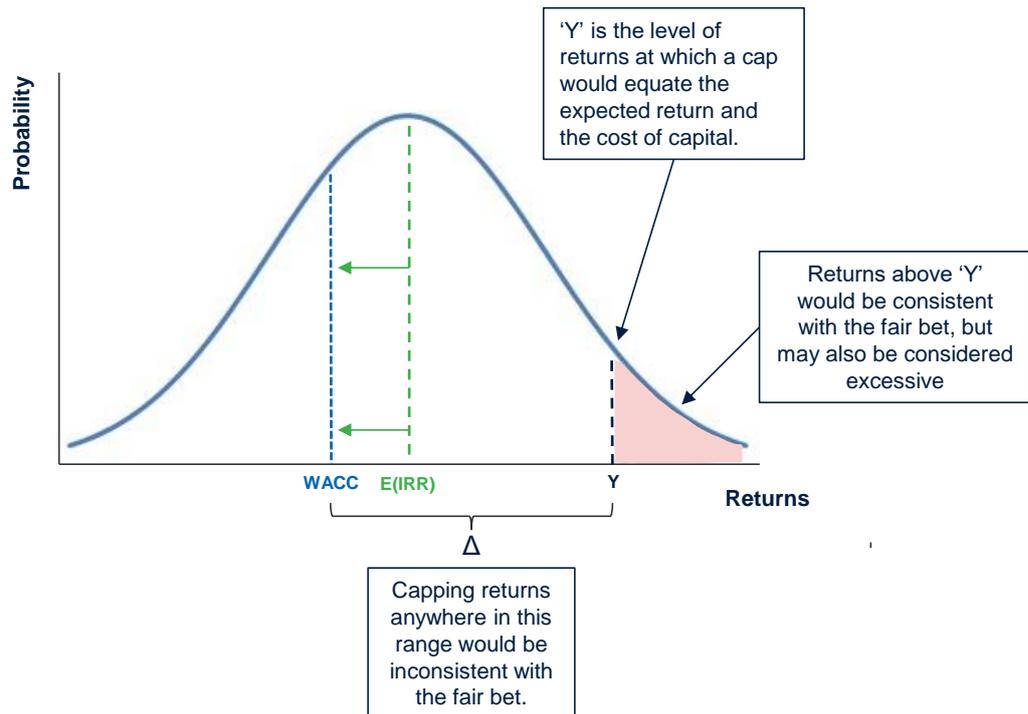
Source: Oxera analysis.

- 2.15 In this case, regulatory intervention to constrain the returns that an investor can earn might be deemed necessary. The question is, what is the appropriate level of cap on returns that would be consistent with a fair bet?
- 2.16 In other words, what is the minimum level of returns that an investor requires in a successful scenario in order to guarantee that the investment is a fair bet.

Let's call this critical level of returns 'Y', where Y equals the project-specific WACC plus a 'delta' (Δ).

- 2.17 Since any cap on returns will necessarily lower the expected return of the investment, for 'Y' to be consistent with the fair bet principle described above it must be the case that a regulatory cap on returns equal to 'Y' should ensure that the new (truncated) distribution of returns has an expected project IRR equal to the project-specific WACC. This is illustrated in Figure 2.3.

Figure 2.3 Identifying the critical level of returns (Y)



Source: Oxera analysis.

- 2.18 To apply the fair bet framework described above, the following parameters need to be identified. Consistent with the fair bet (and FCM) principle, the value of these parameters needs to be established ex ante (i.e. at project inception):
- the project-specific cost of capital, taking account of the systematic risks of the project;
 - the expected returns (E(IRR)) over the lifetime of the project, taking account of probabilities of different upside and downside scenarios;
 - the shape of the distribution of returns, taking account of how wide or narrow the potential returns of this investment are, based on the underlying sources of cash-flow risk (e.g. volumes, prices, costs).

- 2.19 After estimating these parameters, it would be possible to calculate the level of 'delta' (Δ) above the WACC that would be consistent with the fair bet principle. In this regard, the 'delta' can be considered as the appropriate level of compensation or uplift above the WACC to compensate for asymmetric type 2 risks, as considered by the Commission in its emerging views document.
- 2.20 Indeed, in the framework described above, the downside scenarios in the distribution of returns would capture a wide range of cash-flow risks arising from partial stranding of assets as a result of competition from alternative technologies and any pricing constraints caused by other elements of the regulatory regime itself, such as anchor pricing or copper services regulation.
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3 Specific features of the regulatory regime for FFLAS in New Zealand and their impact on the fair bet principle

3.1 There are a number of specific features of the regulatory regime for FFLAS that will have an effect on the application of the fair bet principle. For example:

- different UFB tranches of investment;
- regulatory resets (i.e. changes in the regulatory regime in the pre- and post-implementation periods);
- the existence of anchor prices;
- the requirement to have geographically consistent pricing;
- the operation of the wash-up mechanism in the revenue cap;
- the treatment of accumulated losses in the RAB; and
- the treatment of Crown financing.

3.2 Each of these is discussed in turn below.

3A Different tranches of investment

3.3 When the project involves a single tranche of investment, the calculation of the 'delta' uplift to compensate for a fair bet is a (relatively) straightforward exercise: it would involve an estimation of a single 'delta' uplift and 'Y' parameter that would apply throughout the lifetime of the project (unless an explicit regulatory reset had been considered, as discussed below).

3.4 However, when the project involves multiple tranches of investment, each with their own risk characteristics, the exercise described above needs to be conducted for each tranche individually. In the case of Chorus, this would require undertaking separate assessments for UFB1, UFB2 and probably other commercial investments outside of these two programmes. In other words, this would involve estimating a different cost of capital for each of these tranches, assessing the risks of these investments as they existed at the time at which the investments took place, and deriving a separate 'delta' uplift for each.

3.5 In order to implement this approach in a revenue cap with a RAB that aggregates the investments from all the different tranches, a single combined 'delta' (or more precisely, a single combined 'Y' parameter representing the overall allowed return of the fibre network over its lifetime) would need to be

estimated, based on a weighted average of the different 'Y' parameters for each tranche. In this case, the weighting could correspond to the contribution that each tranche makes to the RAB at the start of each regulatory period.

- 3.6 Note that under this approach, the size of the 'Y' parameter allowance will change over time as the RAB composition changes due to the cumulative depreciation of assets from earlier tranches and as new investments from more recent tranches are added.

3B Regulatory resets

- 3.7 The discussion so far has assumed that an investment (or a series of investments) is taking place within a constant regulatory framework that fixes the revenue allowance for the whole duration of the asset life.
- 3.8 However, in the case of FFLAS in New Zealand, investments have taken place (and will take place in the future) under different regulatory conditions. Between 2012 and the new regulatory framework for FFLAS, price paths were determined in a contract between Chorus and CFH, later renamed as Crown Infrastructure Partners (CIP). From January 2022 onwards a new regulatory framework for fibre will apply, based on a revenue cap building blocks model. The revenue cap may be periodically reset in each regulatory period (expected to be between 3 and 5 years, according to Part 6 of the amended Telecommunications Act).
- 3.9 Resets could alleviate some risks faced by the fibre provider, to the extent that they allow the regulatory allowance to change in line with the market conditions. For instance, with no reset, the regulated entity may face the risk of having to raise new debt at rates higher than those envisaged during the setting of the allowance. In contrast, if the cost of debt allowance is adjusted with the actual rates faced by the regulated entity, the entity becomes indemnified from the interest rate risk.
- 3.10 However, for the purposes of the fair bet, a regulatory reset which has the effect of reducing the WACC and therefore the overall allowance of returns as a result of changes in market conditions (such as a reduction in the risk free rate) may result in a breach of the fair bet principle. This could be the case if the new market conditions provide for returns on assets that are substantially lower than those that the investor understood it would be allowed to earn over the lifetime of the investment.
-

- 3.11 Whether this is the case will be affected by what was the explicit or implicit regulatory contract at the time of the investment. If the investor understood that it would be rewarded over the lifetime of the investment at a level consistent with the risk and market conditions present at the time of the investment, a regulatory reset which has the effect of lowering the allowed returns to take account of new (and potentially less risky) market conditions could be seen as being inconsistent with the fair bet principle.
- 3.12 In order to assess what investors understood the regulatory contract to be at the time of entering into the agreement with CFH, we have reviewed contemporaneous documents that shed light on this issue. This includes the Chorus Business Plan presented to the Board in December 2011,¹⁸ developed against the backdrop of negotiations with the New Zealand Government in relation to the UFB and Rural Broadband Initiative (RBI), as well as responses by CFH to questions and requests for information on the UFB initiative by the New Zealand Parliament's Finance and Expenditure Select Committee ('the Select Committee') from 15 March 2011,¹⁹ 23 March 2011²⁰ and 20 April 2011.²¹

3A.1 Chorus Business Plan from December 2011

- 3.13 This document was prepared for the incoming Board of Chorus and the management of Chorus in order to agree and review the objectives of the business. The Business Plan was also intended to provide a framework for CFH to input into the planning process and to confirm alignment with the Government's UFB objectives.
- 3.14 In relation to the key regulatory risks that Chorus identified at the time, the Business Plan noted that after the contractual agreement with CFH ended, 'there is no certainty regarding the pricing framework that will apply to fibre-based products and services after 31 December 2019.'²² However, the Business Plan also recognised that the new regulatory regime would:²³

need to facilitate the fibre future [and] achieving this necessitates a fundamental shift to the regulatory regime that recognises the significant risk and investment

¹⁸ Chorus (2011), 'Chorus Business Plan', December.

¹⁹ Ministry of Economic Development, UFB Group (2011), 'Select Committee: Requests for further information', https://www.parliament.nz/resource/en-NZ/49SCFE_ADV_00DBHOH_BILL10470_1_A177147/1a44b7350594c3530bcb01c89ee5cebfcfba43c8.

²⁰ 'CFH Response to Select Committee Questions', <https://www.parliament.nz/resource/0000164729>.

²¹ 'Select Committee: requests for information', 29 April 2011, https://www.parliament.nz/resource/en-NZ/49SCFE_ADV_00DBHOH_BILL10470_1_A183968/3487902d4804f606e0ed5a88dfefde0a72ab272b.

²² Chorus (2011), op. cit., p. 120.

²³ Chorus (2011), op. cit., p. 145.

required and **the need to achieve a fair return over the life of that investment.**
(emphasis added)

- 3.15 The Business Plan also noted that the Telecommunications Amendment Act of 2011 ('TAA') provided for a review of the telecommunications regulatory framework to be completed by 31 March 2019 which, among other things, would need to consider the most effective means to:²⁴

encourage efficient investment by **providing investors with an expectation of a reasonable return on investment** and providing sufficient regulatory stability, transparency and certainty (emphasis added)

3A.2 CFH responses to Select Committee questions

- 3.16 On 15 March 2011 the Select Committee asked CFH to answer the following question: 'What factors were weighed up in the selection of the 10 year forbearance period, and why do we think consumers will, or will not, end up paying more due to regulatory forbearance?'
- 3.17 In response to this question, CFH explained that the 10-year forbearance period was intended to 'provide regulatory certainty to bidders, to maximise the number of bidders, and minimise prices.' CFH also explained that this had introduced 'real competitive tension' in the UFB tender process, which had allowed it to negotiate prices which were well below the 'price book' it had developed based on the: 'Financial Capital Maintenance pricing methodology for cost-based pricing.' (emphasis added)
- 3.18 Subsequently, on 23 March 2011, the Select Committee asked CFH the following question: 'What are CFH's organisational objectives and by what means will CFH ensure that rollout is done at the lowest price to consumers?'
- 3.19 In response to this question, CFH explained that prices were being negotiated with bidders in order to be 'competitive or below current wholesale prices but above the cost to provide such services.' CFH then explained that prices were capped during the forbearance period and subject to biennial pricing reviews at CFH's discretion, and that the purpose of those reviews was 'to ensure that the [Local Fibre Company] is moving to a pricing model on financial capital maintenance'. (emphasis added)
- 3.20 In response to that same question, CFH explained what it meant by financial capital maintenance as follows:

²⁴ Chorus (2011), op. cit., p. 148.

Financial capital maintenance means the capital of a company is only maintained if the financial or monetary amount of its net assets at the end of a financial period is equal to or exceeds the financial or monetary amount of its net assets at the beginning of the period, excluding any distributions to, or contributions from, the owners.

- 3.21 On 29 April 2011, the Select Committee asked CFH the following question: 'Please provide information on the 'raw' business case for potential private investors in the UFB (including upfront investment and ongoing tranches of investment) taking into account any guaranteed revenue streams from priority users.'
- 3.22 In response to this question, CFH provided information on a range of IRR scenarios, which we will examine in greater detail in section 4 below, as well as noting that the LFC partners were:

required in UFB contracts to commit to funding their entire part of the network build – this means that they need to borrow or raise funds based on the entire build period. This re-introduces significant risk for the partner. It involves predicting likely demand, which is challenging in a nascent market. The PCM also does not protect partners from the risk of end users churning off the network, or from other business or regulatory risks. Bidders reported that these risks remained very substantial.

3A.3 Conclusion on investor expectations regarding the effect of regulatory resets

- 3.23 These contemporaneous documents show that, despite the significant uncertainty that existed at the time regarding the basis of regulation that would apply after the contractual period, there was a clear understanding on the part of Chorus that it would be given the opportunity to earn a fair return over the lifetime of the investment.
- 3.24 This expectation is confirmed by the CFH responses to the Select Committee in which the need to move towards pricing consistent with the FCM principle was clearly emphasised.
- 3.25 For the purposes of implementing the fair bet principle in the new regime for fibre services, this evidence strongly suggests that Chorus and other LFC investors need to be remunerated on the investments made under UFB1 at the WACC and fair bet 'delta' allowance consistent with systematic and cash-flow risks that prevailed at the time of making those commitments. This is confirmed by the fact that Chorus and the LFCs were contractually required to raise funds for the entire build period and were therefore constrained in their ability to phase or delay investments in response to demand conditions.
-

3C Anchor prices

- 3.26 Anchor services are considered in the TAA to be services whose purpose is: (a) to ensure baseband equivalent voice and basic broadband services are provided to end-users at reasonable prices; and (b) to act as an appropriate constraint on the price and quality of other fibre fixed line access services.
- 3.27 The basic broadband service is expected to be determined as a 100/20 Mbps broadband product. At least for the initial regulatory period of three years, the prices for anchor services (both basic broadband and baseband equivalent voice) will be set at currently contracted prices plus an annual CPI adjustment. After the initial regulatory period, and before the start of each regulatory period, the Commission can make a recommendation to change these prices only if the new recommended maximum prices are cost-based prices.
- 3.28 Notwithstanding the fact that anchor prices are intended to be cost-based beyond the first regulatory period and respect the FCM principle (thereby in theory providing the investor with an expectation of earning normal returns), the existence of anchor prices for certain entry-level products could have a constraining effect on the take-up of higher speed services.
- 3.29 Hence, within a fair bet framework there is a significant risk that even if the Commission wanted to compensate Chorus for type 2 asymmetric risks via a fair bet 'delta' on WACC, the constraining effects of anchor price regulation will limit the effectiveness of this compensation. In other words, allowed revenues may be notionally increased through an uplift, but if Chorus is unable to earn revenues up to this level because of other regulatory constraints, the fair bet principle may not be honoured.

3D Geographically consistent pricing

- 3.30 The TAA imposes on Chorus the obligation to charge the same price for fibre services regardless of the geographic location of the access seeker or end-user.
- 3.31 The effect of this requirement will be that the prices charged by Chorus will not reflect the underlying costs of provision insofar as the cost of providing access services vary by geography (which is typically the case, in particular between urban and rural areas due to differences in user density across areas).

- 3.32 As noted by the Commission in its submission to the New Zealand Parliament on 2 February 2018,²⁵ geographic pricing consistency is likely to result in distortionary price signals for competitive technologies (such as fixed wireless connections), resulting in the risk of over-build and greater network competition in urban areas, and the opposite effect in rural areas.
- 3.33 Given that network competition is likely to be greater in urban areas and that Chorus derives a larger proportion of its revenues from these areas, it is likely that the net effect of the requirement to have geographically consistent pricing will be to increase Chorus' overall demand risk for FFLAS. Furthermore, this risk would be compounded if the requirement were expanded to include all FFLAS services provided by Chorus anywhere in New Zealand, including outside its own UFB area where Chorus is competing against other LFCs for greenfield projects.
- 3.34 From the perspective of fair bet framework, the effect of this requirement would be to increase cash-flow risks and lower the expected return of the investment, which would feed into a higher required 'delta'.

3E Wash-up mechanism

- 3.35 It is our understanding that the revenue cap model for FFLAS will contain a wash-up mechanism addressing any over- or under-recovery of revenues. It has been suggested (for example by CEPA) that such a mechanism may reduce the risk faced by the regulated company, since it knows that any shortfall will be compensated for by the regulator in the following period.²⁶
- 3.36 However, there are several reasons why the wash-up mechanism will not insulate Chorus from type 2 asymmetric risks, and is therefore not a substitute for the provision of an adequate compensation for such risks.
- 3.37 First, the wash-up mechanism provides for the opportunity to recover losses in one period in subsequent periods, but it does not determine the rate of return at which such losses can be recovered. In other words, if the wash-up mechanism allows losses to be added to the RAB and recovered at the WACC,

²⁵ Commerce Commission New Zealand (2018), 'Submission on the Telecommunications (New Regulatory Framework) Amendment Bill', letter from Stephen Gale, Telecommunications Commissioner to Jonathan Young, Economic Development, Science and Innovation Committee, https://www.parliament.nz/resource/en-NZ/52SCED_EVI_74818_417/cfd31f6703174119dfa8111d98be0439f30b4ab4.

²⁶ CEPA (2019), 'Cost of capital for regulated fibre telecommunication services in New Zealand: Asset beta, leverage, and credit rating', pp. 25–26.

no fair bet 'delta' would have been accounted for, and therefore, the fair bet might fail to be honoured.

- 3.38 Second, a wash-up mechanism may be ineffective at insulating the regulated company from risk if the reason for the shortfall in the first period was caused by low demand for fibre products as a result of competition. In this case, the ability to charge a higher price in subsequent periods will not help to recover the losses, since higher prices may just accelerate migration to competitive networks. Alternatively, the losses may be caused by anchor prices which are too attractive to customers to allow returns to be made on the premium fibre services and if Chorus continues to be subject to similar anchor price regulation in subsequent regulatory periods, a wash-up mechanism may also be ineffective at addressing under-recovery.
- 3.39 Third, the existence of a wash-up may itself create asymmetric risks for the regulated company. Indeed, the wash-up mechanism is envisaged to operate for both losses and profits. Therefore, in the event that Chorus is able to beat the revenue cap, this upside will be taken away from it in subsequent regulatory periods and unlike the wash-up for losses, which may not be effective, the wash-up for profits will be fully effective as prices will have to be lowered immediately, directly affecting the bottom line.

3F Treatment of accumulated losses in the RAB

- 3.40 The new regulatory regime for FFLAS provides for any accumulated losses in the pre-implementation period to be included in the RAB at the start of the new regulatory regime. This gives rise to two key questions: (a) what rate of return should be used for the calculation of the losses?; and (b) how to uplift it to the present value in order to be incorporated into the RAB.
- 3.41 In response to both questions, the Commission has proposed that the relevant rate at which losses will be calculated and uplifted will be the WACC used in the post-implementation period.
- 3.42 We consider, however, that this approach runs a high risk of being inconsistent with the FCM and fair bet principles.
- 3.43 The fair bet principle requires giving investors the ex ante opportunity to earn the cost of capital. As explained above, the relevant cost of capital in this assessment is the cost of capital that prevailed at the start of the fibre investment programme. Due to the higher systematic risks of fibre that
-

prevailed at the start of the fibre investment programme, the appropriate asset beta for fibre services in 2011 would be higher than the asset beta estimated today.²⁷ The higher systematic risks for fibre in the past would, all else equal, translate into a cost of capital for the calculation of losses in the pre-implementation period which would be higher than today's cost of capital.²⁸

- 3.44 Furthermore, the fair bet principle also requires that the investor is allowed to earn returns in good scenarios at a 'delta' above the cost of capital, which implies that both the calculation of losses and the uplifting of losses to present value must also include an allowance for the fair bet 'delta'. Failure to do so will, by definition, prevent the investor from earning returns consistent with the fair bet if the good (high uptake) scenarios materialise.

3G Treatment and impact of Crown financing

- 3.45 The TAA requires that 'actual' financing costs to be taken into account when calculating losses in the pre-implementation period, as well as more generally, when determining the maximum revenues or the maximum prices for a price-quality path.²⁹
- 3.46 The Commission's proposal to implement this requirement is to assume that Chorus bears no financing cost in relation to Crown-funded amounts 'because no interest or dividends are payable by providers on the debt or equity instruments.'³⁰ Based on this assumption, the Commission's proposed method to deal with this in the building blocks approach consists of 'subtracting the face value of Crown finance from the accumulated cost of UFB assets when applying the required rate of return for the relevant year.'³¹
- 3.47 It is clear from the Commission's emerging views that this approach will be applied for the calculation of losses up until the implementation date; however, it is not clear whether the Commission intends to stick with this approach during all subsequent regulatory periods, including after the dates by when Chorus is required to redeem the debt securities and commence dividend payments on equity securities provided by Crown (i.e. 30 June 2025).

²⁷ This issue is examined in further detail in the accompanying Oxera expert report. Oxera (2019), 'Compensating for Systematic Risks', 15 July.

²⁸ This will depend on the level of all other cost of capital parameters in 2011 compared with their levels in 2019.

²⁹ Telecommunications Act 2001, Sections 171(2) and 177(3).

³⁰ Commerce Commission (2018), 'New regulatory framework for fibre: Invitation to comment on our proposed approach', November, para. 7.72.

³¹ Commerce Commission (2019), op. cit., para. 208.2.

- 3.48 What the Commission does say is that ‘any fees and additional costs that are considered to be associated with Crown financing could be incorporated into the operating expenditure allowance.’³² Absent further clarification, we assume that this means that the Commission intends to continue with the assumption that financing costs are nil in all subsequent regulatory periods for the purposes of estimating a return on capital under a building blocks approach, and that the actual financing costs incurred as a result of the repayment schedule will be treated as operating expenditure (OPEX) as and when these payments arise.
- 3.49 The question that emerges is the following: how does the approach described above affect the application of the fair bet framework? In principle, subject to one adjustment, we consider that the approach outlined above has the potential to result in allowed revenues that would be consistent with the fair bet framework.
- 3.50 The adjustment is that the Commission should estimate the residual risk that Chorus is faced with in respect of Crown finance, notwithstanding the fact that no interest or dividend payments are due until 2025. We understand that Chorus has commissioned an expert report on this issue, which concludes that because the risk absorbed by the Crown is principally debt-like, Chorus does bear residual risk in relation to the Crown-funded investments. Oxera has reviewed this report and in principle agrees with this conclusion.³³
- 3.51 This would mean that, when estimating losses in the pre-implementation period, as well as allowed revenues in the post-implementation period, the calculation of the return on capital allowance would need to have two components: one based on the portion of RAB financed privately by Chorus, which would attract a rate of return equal to the project WACC *plus* the fair bet ‘delta’; and another based on the portion of the RAB financed by the Crown, which would attract a rate of return equal to the residual risk borne by Chorus *plus* a corresponding fraction (in proportion to the residual risk borne by Chorus) of the fair bet ‘delta’.³⁴

³² Commerce Commission (2019), op. cit., para. 541.

³³ However, we note that we have not undertaken a peer review of the report’s calculations and the magnitude of the residual risk borne by Chorus.

³⁴ As an example, consider an investment of 100 that had been financed 50:50 between Chorus and Crown. If the WACC + delta for the entire project was 12% (composed of a WACC of 9% and a delta of 3%) and the residual risk borne by Chorus for Crown finance was 2%, then the return on capital calculation would be as follows: $(50 \times 12\%) + (50 \times [2\% + 0.66\%])$, where the 0.66% is the corresponding fraction of the fair bet delta applied to the Crown finance portion, calculated as $(2\% / 9\%) \times 3\%$.

3.52 Whereas we consider that this approach would in principle result in an expected NPV equal to zero, we note that the way in which this would be achieved would have an effect on the profile of prices over time that may affect the Commission's ability to honour the fair bet principle. In effect, this approach will result in prices that are lower than they otherwise would be up until 2025 as a result of Crown finance not requiring a full return on capital plus fair bet 'delta', with the possibility that prices would then rise from 2025 onwards as dividend payments and debt redemptions are incorporated into the OPEX allowance.

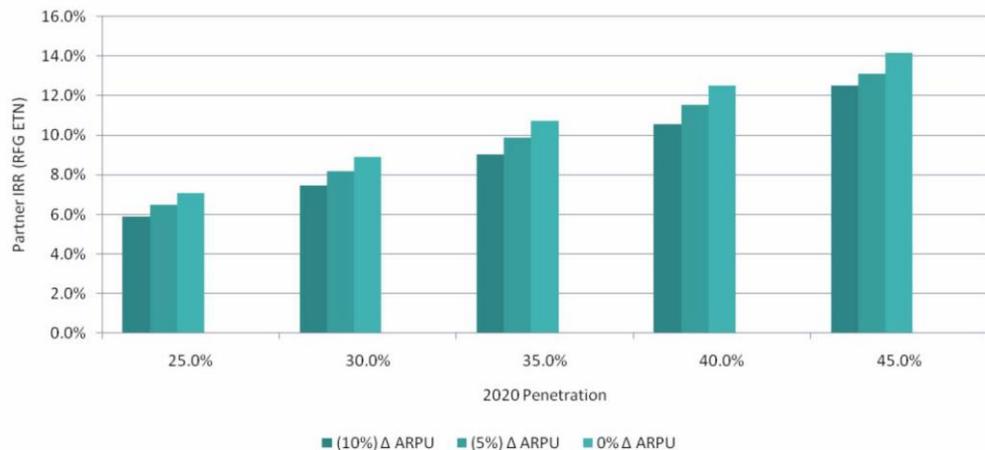
4 Initial quantification of the magnitude of the fair bet uplift for Chorus

- 4.1 In this section, we provide an initial quantification of the allowed returns, including the 'delta' above the WACC, required to compensate Chorus for the non-systematic (type 2 asymmetric) risks associated with the UFB1 investment.
- 4.2 As explained in section 2, three key parameters are needed to implement the fair bet framework: the ex ante WACC, the expected IRR of the investment, and the shape of the distribution of returns.
- 4.3 The ideal approach would involve having access to the original Excel business plan model used by CFH and/or Chorus to directly derive the E(IRR) and the shape of the distribution of returns. This was the approach Oxera used in 2017 in a follow-on report commissioned by Openreach and submitted to Ofcom during the wholesale local access market review.³⁵
- 4.4 Oxera has been unable to get access to the business plan models, which we understand were developed prior to the separation of Telecom into two stand-alone companies: Chorus and Spark.
- 4.5 However, based on the information provided by CFH in response to the Select Committee questions of March and April 2011, we have been able to re-create what the distribution of returns for the business plan actually looked like before the start of the investment. This has allowed us to apply the fair bet framework described in section 2.
- 4A Quantification of the fair bet uplift based on CFH information on the 'raw' business plan**
- 4.6 Under this approach, we have relied on information provided by CFH in response to the Select Committee questions of March and April 2011.
- 4.7 Regarding the ex ante WACC, in response to Question 3 of the Select Committee's questions of 23 March 2011 CFH provided a WACC calculation that ranged between 8% and 10% depending on different assumptions, with a central value of 9%.

³⁵ Oxera (2017), 'Assessing the anticipated shape and distribution of BT's FTTC returns', October, https://www.ofcom.org.uk/__data/assets/pdf_file/0009/111402/BT-commissioned-Oxera-report-assessing-the-anticipated-shape-and-distribution-of-BTs-FTTC-returns.pdf.

- 4.8 Regarding the expected returns of the investment and the shape of the distribution of returns, CFH's response to Question 7 on 29 April 2011 provides very useful information. In response to that question, CFH presented the diagram below summarising the business case IRRs under different penetration rates in 2020 and different levels of price reductions that might be required to generate fibre take-up.

Figure 4.1 UFB1 business case IRRs under different scenarios



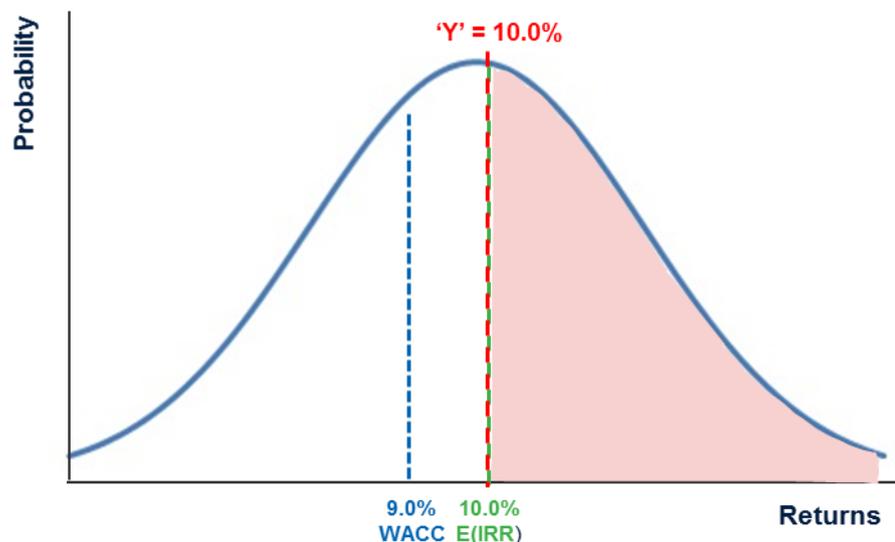
Source: CFH response to Select Committee questions of 29 April 2011.

- 4.9 In response to Question 1 of the Select Committee's questions of 15 March 2011 CFH noted that 'given that the fibre prices will be at such a low level (in order to compete with copper prices), it will take significant time before UFB partners will obtain sufficient uptake to receive a real return on their investment, and that period extends beyond the 10 year build period.' We therefore interpret that the IRRs reported in the figure above correspond to rates of return that extend beyond 2020 and can therefore be considered 'lifetime' IRRs, as required by the fair bet framework.
- 4.10 The central estimate in Figure 4.1 is an IRR of around 10% (corresponding to a 2020 expected penetration rate). We therefore take this 10% IRR figure as the expected IRR of the investment for the purposes of the fair bet analysis.
- 4.11 [X]
- 4.12 One way to deal with this uncertainty is to assume a range of plausible scenarios for the shape of the distribution of returns. For example, if we assume a 'normal' distribution with an average (mean) of 10%, corresponding

to the expected IRR, the width of the distribution would be given by an assumed standard deviation.³⁶

- 4.13 Given the information presented in Figure 4.1, a reasonable range for a standard deviation assumption would be between 2.5% and 5%. A 2.5% standard deviation would mean that 95% of outcomes lie between a 5% and 15% IRR, whereas a 5% standard deviation would correspond to 95% of outcomes between 0% and 20% IRR.³⁷
- 4.14 This now provides us with all the parameters needed to estimate the fair bet allowance.³⁸ Figures 4.2 and 4.3 show the results for a WACC of 9%, E(IRR) of 10% and standard deviations of 2.5% and 5%, respectively.

Figure 4.2 Minimum level of capped returns for a WACC of 9%, expected returns of 10% and standard deviation of 2.5%



Notes: Standard deviation is assumed to be 2.5%.

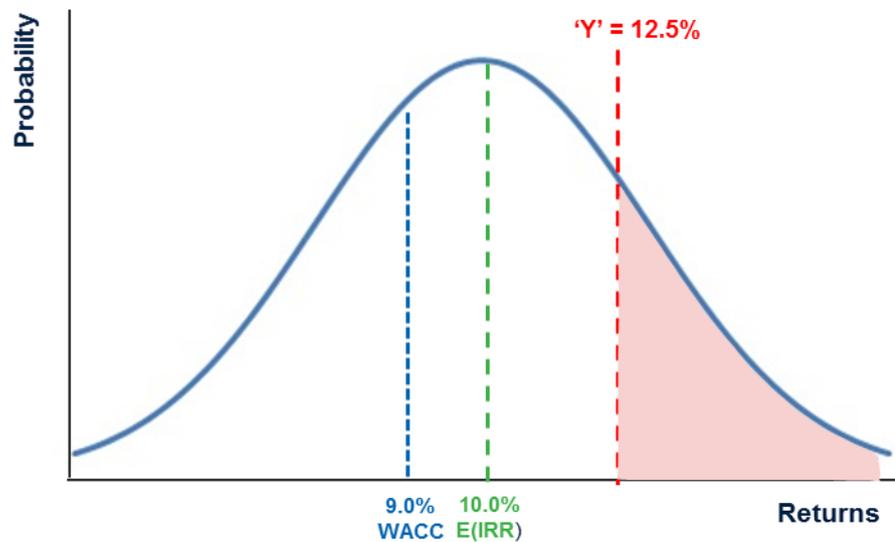
Source: Oxera analysis.

³⁶ In statistics, the standard deviation (SD, also represented by the lower case Greek letter sigma σ) is a measure that is used to quantify the amount of variation or dispersion of a set of data values.

³⁷ One of the key properties of the normal distribution curve is that the range of plausible outcomes is determined by the standard deviation, with 68% of outcomes lying between \pm one standard deviation, 95% between \pm two standard deviations, and 99.7% between \pm three standard deviations.

³⁸ Appendix 1 describes how the fair bet allowance (parameter 'Y') can be estimated using the three key parameters.

Figure 4.3 Minimum level of capped returns for a WACC of 9%, expected returns of 10% and standard deviation of 5%



Notes: Standard deviation is assumed to be 5%.

Source: Oxera analysis.

- 4.15 These results show that a 'delta' above the WACC of between 1.0% and 3.5% (i.e. 'Y' parameters of 10.0% and 12.5%) would be required in order to allow UFB1 investors to have a fair bet on their investments.
- 4.16 We note that the magnitude of these 'deltas' is comparable to the results that Ofcom obtained when it applied the Oxera framework to BT's FTTC investments. In that case, Ofcom analysis reported 'deltas' in the range of 1–3%.³⁹
- 4.17 Furthermore, we note that these are indicative estimates, which may change as certain parameters are estimated more accurately. For example, the analysis has taken the WACC calculated by CFH at face value. If, however, a higher WACC was instead more appropriate (perhaps because CFH had not appropriately accounted for the significantly greater operational risks faced by the LFCs that were committed to raising funds for the entire programme in anticipation of demand), the required return to honour a fair bet would be significantly higher. To illustrate this, consider that if a WACC of 9.5% had been used (just 0.5% higher than CFH's central estimate), the range of 'deltas'

³⁹ See Ofcom (2018), op. cit. Annex 6, Table A6.8 reporting critical threshold 'Y' for different scenario assumptions. When this is compared with the assumed WACC in each scenario, the deltas are in the range of 1% to 3%.

would increase to 1.7% to 5.0%, keeping all other assumptions constant. This is illustrated in the sensitivity analysis of Table 4.1.

Table 4.1 Sensitivity analysis on the level of cap (Y) and delta (Δ)

		WACC				
		8%	8.5%	9%	9.5%	10% ¹
St dev		Cap (Y)				
2.5%		8.4%	9.1%	10.0%	11.2%	no cap
3.5%		8.9%	9.8%	10.9%	12.4%	no cap
5.0%		10.0%	11.1%	12.5%	14.5%	no cap
St dev		Delta (Δ)				
2.5%		0.4%	0.6%	1.0%	1.7%	n/a
3.5%		0.9%	1.3%	1.9%	2.9%	n/a
5.0%		2.0%	2.6%	3.5%	5.0%	n/a

Note: ¹ Given that this analysis is based on an ex ante expected IRR of 10%, if the WACC for this investment were also 10%, any level of cap would result in an expected IRR of less than 10%. Consistent with the fair bet framework described in section 2, no cap should be imposed on this investment.

Source: Oxera analysis.

5 Concluding remarks and recommendations for the Commission

- 5.1 In this expert report we have focused on asymmetric type 2 risks, and how such risks can be quantified and compensated for in the new regulatory regime for FFLAS in New Zealand.
- 5.2 Oxera's instructions were to answer four specific questions in relation to asymmetric type 2 risks.
1. Do regulatory authorities in other jurisdictions provide a premium for non-systematic risk associated with investments in FFLAS and, if so, how?
 2. Is Chorus' investment in providing FFLAS subject to type 2 asymmetric risks? What form do these risks take?
 3. What approach should the Commission take to providing compensation for any type 2 asymmetric risk?
 4. What is the magnitude of any type 2 asymmetric risks that you identify above? Is the magnitude of these risks likely to be different between the pre-implementation period and the post-implementation period?
- 5.3 In relation to question 1, our report has explained that Ofcom's approach to regulating risky investments is founded on the fair bet principle, which shares the same objective of the Commission's core FCM principle of providing investors with an opportunity to make returns equal to the cost of capital, in expected terms. In the presence of downside risks (a term that encompasses type 2 asymmetric risks), this means allowing the firm to earn returns in excess of the cost of capital in upside scenarios. Oxera is aware of other regulators in Europe that have also explicitly provided a 'premium' above WACC for investments in NGA networks.⁴⁰ However, the rationale for such premiums is not always founded on robust economic and finance principles, sometimes conflating the need to provide an uplift to compensate for risk with the objective of incentivising investment. Ofcom's approach, on the other hand, does not suffer from this drawback.
- 5.4 In relation to question 2, we have reviewed contemporaneous evidence from 2011 (at the start of the UFB1 programme) which shows that investment in

⁴⁰ For a summary of these approaches see: 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', pp. 100–103 and Table 3.

fibre was subject to considerable demand uncertainty regarding take-up rates and pricing. Furthermore, the expected (average) returns were only slightly above the cost of capital, without any guarantees of making a positive return on investment. This is clear evidence that this first tranche of fibre investment was subject to significant type 2 asymmetric risks. To the extent that demand risks persist in the future, future tranches of investment would also be subject to asymmetric type 2 risks requiring compensation.

- 5.5 In relation to question 3, this report has provided a practical framework to allow the Commission to estimate the magnitude of these risks and compensate fibre investors for them. This framework is based on the Oxera fair bet framework developed for Openreach, and adopted by Ofcom, to assess whether proposals by Ofcom in 2017 to set price caps on BT's FTTC wholesale access products would be consistent with the need to ensure that BT had been given a fair bet on its investment. This report has shown that if the Commission can estimate the ex ante WACC of the asset, the expected return of the investment and the distribution of possible outcomes around this expected return (prior to the investment taking place), the framework described in this report can be used to estimate the magnitude of the uplift above WACC required to appropriately compensate investors for type 2 asymmetric risks.
- 5.6 In relation to question 4, this report has provided initial estimates of the uplift above WACC needed to honour the fair bet principle for the UFB1 programme tranche of investment. Our initial estimates suggested that a range of 1.0% to 3.5% above the WACC would be required to do so. We note, however, that these are indicative estimates and further work would be needed to estimate the appropriate uplift for UFB1 and subsequent tranches. In relation to whether the magnitude of these risks is likely to be different between the pre-implementation period and the post-implementation period, this report has explained that when the project involves multiple tranches of investment, each with their own risk characteristics, the fair bet exercise described above needs to be conducted for each tranche individually. In other words, this would involve estimating a different cost of capital for each tranche, assessing the risks of these investments as they existed at the time in which the investments took place, and deriving a separate 'delta' uplift for each.
- 5A Recommended next steps for the Commission**
- 5.7 If the Commission agrees that the framework presented in this report is a practical approach to estimating the magnitude of compensation for type 2

asymmetric risks, the next steps required to implement the framework within the new regulatory regime for fibre would be as follows.

- **Identify the different tranches of investment.** UFB1 is an obvious candidate to be considered a separate tranche. The question is whether UFB2 and subsequent investments should be treated as a single tranche, or two or more separate tranches. The answer to this question is ultimately a matter of judgement for the Commission, balancing precision against practicality, but can be informed by assessing whether there are material differences in the cash-flow risk between these tranches of investment. To the extent that risk does not materially vary for tranches other than UFB1, a practical approach may be to treat them as being all part of the same tranche.
- **Fair bet analysis for each tranche.** Having identified the number of tranches, it will be necessary to estimate separate ex ante WACCs, 'deltas' and 'Y' parameters for each, by applying the fair bet framework described in this report.
- **Calculation and treatment of losses in RAB.** Once the WACC + 'delta' estimate has been obtained for each tranche, it will be necessary to calculate losses in the pre-implementation consistent with a notional revenue allowance estimated using the relevant 'WACC + delta' required return, and then uplifting the calculated losses for incorporation into the RAB using the same rate of return.
- **Application of the appropriate 'WACC + delta' allowance in each regulatory period.** To calculate the revenue cap in each regulatory period, the 'WACC + delta' allowance needs to be appropriately weighted by the contribution of each tranche to the RAB, taking account of the accumulated depreciation of each tranche and the addition of new CAPEX. This will require creating and maintaining a RAB asset register and associating each entry with the relevant tranche and the corresponding 'WACC + delta'.
- **Monitor the lifetime return of the investment to ensure that the fair bet is being honoured.** This will require the Commission to create and regularly update a model of the actual lifetime returns of the investment. The model would estimate the year-by-year flow of actual returns earned in the past plus a forecast of returns in the future, where the latter includes the future effect of the Commission's revenue cap proposals, as well as future repayments of Crown finance. One way in which the model could then be used would be to

estimate the lifetime NPV of the investment from a 2011 perspective, by discounting losses or profits in each year by the corresponding 'WACC + delta' allowance required in each year to honour the fair bet.⁴¹ If the resulting NPV from this calculation is less than zero, this can give the Commission an indication that the fair bet is not being honoured. However, further analysis would be necessary to rule out the possibility that the reason for the NPV being less than zero is the result of being in a low demand scenario, as opposed to the effect of the regulatory regime that is constraining revenues. It is only when the investment has been successful (i.e. we are in a high demand scenario) and regulation prevents the investor from earning returns consistent with 'WACC + delta', that we can conclude that it would be necessary to loosen the revenue cap in future regulatory periods.

- **Re-examine the role of the wash-up mechanism.** Once the Commission has developed and regularly updates the model described above, the wash-up mechanism may become redundant. This is because what matters to compensate investors for risk, including asymmetric type 2 risks, is the lifetime returns of the investment, rather than notional profits or losses earned over a 3- to 5-year regulatory period. Regularly adding or subtracting amounts to the RAB to compensate for this may add an unnecessary element of complexity to the regime.

⁴¹ This would be the same 'WACC + delta' over the lifetime of the investment where there is a single tranche, or the weighted average 'WACC + delta' when there is more than one tranche. In addition, the discount rate would need to be adjusted to account for the treatment of Crown finance. As discussed in section 3G, this adjustment would take account of the fact that the Crown-funded portion of the asset base would require a lower rate of return corresponding to the residual risk borne by Chorus, plus a proportionate fraction of the fair bet delta.

A1 Mathematical derivation of the level of capped returns consistent with a fair bet

A1.1 This technical appendix describes the mathematical formulae used to estimate the magnitude of fair bet uplift in section 4.

A1.2 We denote the ex ante uncapped distribution of returns as $p(x)$. We have assumed that p is a normal distribution, but the derivation of the capped return does not depend on that assumption:

A1.3 The expected return from this distribution can be written as:

$$E(X) = E(X|x < Y) \cdot P(x < Y) + E(X|x > Y) \cdot P(x > Y)$$

A1.4 If the Commission were to cap returns at Y , then the 'new' (truncated) ex ante expected return is:

$$E(X^*) = E(X|x < y) \cdot P(x < Y) + Y \cdot P(x > Y)$$

A1.5 In order for the cap Y to be consistent with the fair bet, it must be the case that $E(X^*) \geq w$ where w is the WACC:

$$E(X|x < y) \cdot P(x < Y) + Y \cdot P(x > Y) \geq w$$

A1.6 Converting these expressions into integrals reflecting the areas under the distribution of returns curve, gives:

$$\int_{-\infty}^Y xp(x) dx + Y \int_Y^{\infty} p(x) dx \geq w$$

A1.7 With knowledge of the relevant WACC (w), the shape and location of the uncapped distribution of returns p ; this expression can be solved for Y (the critical level of the price cap) using standard mathematics software.

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