Report for Chorus Limited

Economic Comment on UCLL and UBA Pricing Issues

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Executive summary

1. Within the context of the Commerce Commission's further draft determination on unbundled copper local loop (UCLL) and unbundled bitstream access (UBA) prices (Draft Determination), Chorus requested we provide economic comment on two issues:

   - from what date should the price determinations apply
   - the approach taken to estimate the Weighted Average Cost of Capital (WACC).

2. To address these two issues we first provide context by way of an economic interpretation of section 18 and the relationship of TSLRIC[1] to that interpretation, and the importance (from a section 18 perspective) of time consistency in regulatory decision making.

An economic interpretation of s.18 and TSLRIC

3. When exercising its discretion in deciding various issues under Part 2 of the Telecommunications Act (the Act), the Commission must consider the purpose set out in section 18. Section 18 therefore sets the compass for the Commission's decisions under Part 2.

4. We apply an economic lens to section 18. We explain why a total welfare, or economic efficiency, interpretation of section 18 provides an internally consistent interpretation of Part 2. However, section 18 does not provide an economic basis for making the allocative choices required under a consumer welfare standard.

5. The different outcomes from interpreting section 18 as a consumer benefit standard relative to a total welfare standard are vivid in the modelling done for the Commission by Oxera. For the Commission to conclude that "section 18 directs us to consider consumer welfare, through reference to the 'long-term benefit of end-users'",[2] it must be convinced that Parliament charged it with making everyone in society worse off by $80 million to $170 million in order to transfer around $50 million from one commercial entity, Chorus, to several other commercial entities. There is no obvious economic rationale for why Parliament would set the Commission on that path.

6. In an expert paper for the Commission, Professor Ingo Vogelsang sets out the rationale for and design of TSLRIC, with particular emphasis on implications for pricing UCLL in New Zealand. We agree with Professor Vogelsang's description of

[1] Total service long run incremental cost

[2] Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, (2 July 2015), paragraph 240.

classical (or orthodox using the Commission's language) TSLRIC and that it is fit for purpose for this price determination given the statutory requirements.

7. We explain, from an economic perspective why we consider the Schedule 1 description of TSLRIC supports the use of classical TSLRIC and we do not consider the Schedule 1 description suggests that any modification to classical TSLRIC is required. Further, we also note that at times the potential shortcomings in TSLRIC have induced legislators and regulators to specifically include investment incentives. In the case of TSLRIC pricing under the Act however, subsections 18(2) and 18(2A) provide guidance when addressing uncertainty in the TSLRIC exercise.

The importance of time-consistent regulatory decision making

8. Time consistency issues in price regulation arise in situations where a regulator does not have mechanisms to commit to a policy through time, and finds itself wanting to change its policy after a regulated firm has made an irreversible investment decision. Telecommunications services are accepted as challenging contexts for regulators to maintain time-consistent decisions:[3]

> *"For utility services like telecoms there is a classic time inconsistency problem: these services require large volumes of investment which, once installed become 'sunk assets' in the sense that most or all of them cannot be removed and used elsewhere or sold on second-hand markets at their original cost. In consequence, private investors are at risk of opportunistic behaviour by governments, particularly over prices, once the investments have been installed; and awareness by private investors of this regulatory risk drives up the required rate of return and the cost of capital. The latter dramatically reduces investment as has been seen in many countries…"*

9. Where a price regulator has the opportunity to act in a time inconsistent manner, the regulator's reputation for not acting so is particularly important to maintain efficient investment incentives in the sector.

10. Time consistency is a component of regulatory predictability and the Commission has attached (rightly) importance to predictability, particularly in relation to how predictability affects investment.

11. The Commission's approaches to setting prices in the Draft Determination can be assessed as to whether or not they are time consistent by assessing if they would be different if Chorus was at a different point in the investment cycle. For example, would the Commission's reasoning for particular approaches change if Chorus had yet to invest in the network and equipment required to supply the UCLL and UBA services?

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[3] Levine P, J Stern and F Trillas (2005) "*Utility Price Regulation and Time Inconsistency: Comparisons with Monetary Policy.*" Oxford Economic Papers 57 (3), pp.447-478.

12. In relation to determining the date from which the FPP[4] price determination will apply, the Commission refers to the stage at which Chorus finds itself in its investment cycle as a reason to not apply this determination from the date from which the IPP[5] applied.

13. Similarly, in relation to estimating WACC, the Commission considers the stage of the investment cycle at which Chorus finds itself as one of the reasons to change from the approach it has used for many years of selecting a WACC above the midpoint estimate.

14. These examples imply the Commission would have come to a different view if Chorus faced a large future investment requirement to provide the UCLL and UBA services. They suggest this price determination can be treated as a regulatory "end game", as opposed to a stage in a repeated game. That is, the Commission appears to consider that it is able to make time inconsistent decisions that have no future effects for investment decision making in telecommunications services in New Zealand. We consider the Commission is under-estimating the on-going importance of its reputation to act in a time consistent manner.

15. For as long as the Commission is involved in regulatory price setting in the telecommunications sector, time consistency in its regulatory decision-making will continue to be to the long-term benefit of end-users.

From what date should the FPP determination apply?

16. The majority position in the Draft Determinations would apply the FPP determinations for UCLL and UBA from a date shortly after they are determined. The minority view would apply them from 1 December 2014.

17. We understand the economic rationale for having the dual IPP and FPP pricing regime for telecommunications services to be:

- the IPP method provides a relatively low cost and quick method to establish prices for the relevant service; and
- the FPP method (which requires TSLRIC to be used) provides all affected parties the assurance that prices can and will be set using TSLRIC, should any affected party be sufficiently dissatisfied with the result of the IPP to call for the FPP.

18. The assurance function provided by the FPP is critical from the perspective of an investor in the regulated service, and for RSPs,[6] as it sets out the pricing method they are able to rely on if they are not satisfied with the outcome of the IPP method.

[4] Final pricing principle.

[5] Initial pricing principle.

[6] Retail service providers.

For this assurance function to be credible and effective from the perspective of affected parties they need to have confidence that the FPP prices will, in practice, be used in the supply of the regulated services, if requested. To be complete this assurance function therefore requires that the FPP determination, and the resulting prices, apply from the same date as the IPP determinations apply.

19. We note this timing requirement is not addressed, from an assurance perspective, by the regulator assuming that the supplier of the regulated service will view as symmetric the probability of an IPP being above or below the FPP. The supplier (or potential investor) may have a very different view of these probabilities, and it is the views of the investor that drive investment incentives, not the assumptions of the regulator.

20. If the FPP determinations do not apply from the same point in time as the relevant IPP determinations, the intended assurance function of the FPP would be eroded; that is, affected parties would not be able to be confident that the relevant services will be priced by the TSLRIC method required under the FPP (if requested). We note the delay in timing of the UCLL FPP determination relative to the point in time from which the IPP price applied will be three years (if the Commission's timetable in the Draft Determination is adhered to), which is not a trivial period.

21. The minority view supports the view that the FPP provides an assurance function, and the related need to apply the FPP from the date at which the IPP prices apply. After allowing for particular circumstances related to UCLL, the minority view considers the regulatory periods should apply from December 2014.

22. The reasoning in the majority view to not commence the FPP regulatory periods from December 2014 places little weight on the assurance function of the FPP, and by implication on the investment incentive implications of this delay. This is based on the view that Chorus faces only limited future investment requirements to supply the UCLL and UBA services, that Chorus is able to cover its costs, and that the IPP/FPP pricing method is unlikely to be applied in the future to major new bottleneck investments.

23. This reasoning implies that if Chorus' circumstances were different - that is, if it was at an early stage in the investment cycle for UCLL and UBA services, or if Chorus was not able to cover its costs, or if the IPP/FPP pricing was expected to be applied in the future to major new bottleneck investments - then investment incentive implications would be given more weight.

24. We interpret this line of reasoning to be a version of a regulatory "end-game", with the Commission appearing to hold the view that this pricing determination will have no effect on future investment in the telecommunications sector, and therefore it can act in a time inconsistent (or opportunistic) manner at no cost to the long-term benefit of end-users. As mentioned above, we consider the Commission is under-estimating the on-going importance of its reputation to act in a time consistent manner.

25. The Commission's concerns about the competition effects arising from the price profile (that is the level of prices throughout the regulatory period) within the FPP regulatory period can be addressed, if needed, within a FPP regulatory period that

commences from (at least) December 2014. Issues relating to the profile of prices are not considerations that need to be addressed by the date from when the regulatory period commences, but rather can be addressed by determining the price profile (within the regulatory period) that best gives, or is likely to best give, effect to section 18. Thus we consider the assurance function of the FPP demands the regulatory period commences from the same date as the IPP, and any price profile issues are able to be addressed within a regulatory period commencing at that date.

26. Relevant considerations when determining an appropriate price profile (as opposed to determining from when the FPP regulatory period should commence) include:

- *The extent to which the difference between the IPP and FPP prices has been anticipated by the RSPs.* It appears that at least the larger RSPs anticipated the change in the difference between IPP and FPP prices as set out in the initial draft determination. We note that the differences in prices in the initial draft determination were not moderated by decreases in the non-recurring charges as proposed in the Draft Determination, so RSPs may have in practice over-anticipated the degree of overall price change (depending on the final FPP prices). In any event, the greater it appears RSPs did anticipate the final FPP prices the stronger the reason to apply that difference to the price profile from December 2014, with the difference between the IPP and FPP prices being identified as a lump sum payable to Chorus. We note the payment of this lump sum could be spread over time, if need be for RSP cashflow reasons, with the amount maintained in net present value terms.
- *The extent to which deferring the price profile increases volume forecast risk carried by Chorus, thereby eroding the assurance function of the FPP.* The price profile developed in the Draft Determination is dependent on volume forecasts for the regulatory period. The more the price increases (relative to the IPP) are deferred to the latter years of the regulatory period, the greater are the risks to the supplier that its overall revenue requirement (as per the TSLRIC models) will not be met, which would erode the assurance function of the FPP. The volumes for the period from December 2014 to date are known and therefore it would be preferable, from a revenue risk perspective, for those volumes to be matched against the FPP prices and a lump sum amount identified that is payable to Chorus.
- *The extent to which the price profile will hinder or foster competition for the long-term benefit of end-users.* We consider the Commission's concerns about possible competition effects arising from a price profile that incorporates "clawback" is unlikely to be a significant issue, due to the relatively small amounts involved relative to the averaging of costs inherent in TSLRIC modelling and to meet the legislative requirement to have a single New Zealand price for UCLL and UBA. If the Commission continues to consider these competition effects to be an issue it could address them by adjusting the price profile within regulatory periods that commence from December 2014.

27. We note that none of the above issues relate to determining the date from which the FPP regulatory periods should commence, but rather relate to determining the price profile within FPP regulatory periods that commence from December 2014.

28. If it is accepted that the FPP regulatory periods should commence from December 2014, it follows that the supporting TSLRIC modelling should also be calibrated to December 2014. It is conventional regulatory practice to calibrate all modelling components, inclusive of WACC, to the period immediately preceding the commencement of the regulatory period. The Draft Determination adopts this convention for the regulatory periods proposed to commence in December 2015. We see no reason to depart from this convention if the regulatory periods commence in December 2014.

Estimating WACC

29. In the Draft Determination the Commission has taken the view that there is no need for a margin for parameter error when estimating the allowed WACC. We recommend that the Commission reconsider this proposal as, in our view, there are reasonable grounds for including a margin for parameter error. Time consistency considerations indicate that there should be a margin. Chorus needs incentives to innovate and invest in respect of the copper network. A broad view of the results of the Oxera model, with improved presentation and modifications, indicate the likelihood of significant net benefits from the signal that a medium range margin would provide in spurring investors to accelerate investment in new technology.

1. Introduction

30. The Commerce Commission has issued its further draft price determination for UCLL and UBA services.[7] Chorus has requested we respond from an economic perspective to the Draft Determination on two issues:

- from what date should the price determination apply
- the approach taken to estimate the weighted average cost of capital (WACC).

31. To address these two issues we first address the context within which the Commission is undertaking this determination, resulting in a report structure as follows:

- Section 2 provides an economic interpretation of section 18 of the Telecommunications Act 2001 and the conceptual guidance this provides for decisions in relation to Total Service Long Run Incremental Cost (TSLRIC) and Weighted Average Cost of Capital (WACC) modelling.
- Section 3 identifies from the economic literature and practice the importance of "time consistency" in regulator decision making, and the relevance of that quality for this price determination.
- Section 4 addresses the issue of from what date the price determination should apply to best give, or likely to best give, effect to section 18.
- Section 5 addresses the approach taken by the Commission to estimate WACC and identifies ways in which that approach could be improved to best give, or be likely to best give, effect to section 18.

Code of conduct

32. The authors of this report have read the Code of Conduct for expert witnesses and have complied with its requirements when completing this report.

[7] Commerce Commission, Further draft pricing review determination for Chorus' unbundled copper local loop service: under section 47 of the Telecommunications Act 2001, Further Draft Determination, 2 July, 2015; Commerce Commission, Further draft pricing review determination for Chorus' unbundled bitstream access service: under section 47 of the Telecommunications Act 2001, Further Draft Determination, 2 July, 2015.

2. Economic interpretation of section 18

Consumer benefit or total welfare test?

33. When exercising its discretion in deciding various issues under Part 2 of the Act, the Commission must consider the purpose set out in section 18. The Commission must make the determination, or decision, it considers best gives, or is likely to best give, effect to the section 18 purpose.[8] Section 18 therefore sets the compass for the Commission's decisions under Part 2.

34. Consistent with this analogy of a compass direction, the Commission explains that it considers section 18 throughout the cost modelling process and before making its overall price decision.[9] However, the Draft Determination does not explain how the Commission interprets section 18; there is no explicit statement as to the direction the Commission had in mind when it assessed aspects of the modelling and its overall price decision against section 18.

35. The Commission does set out its interpretation of section 18 in the accompanying paper, 'Cost of capital for the UCLL and UBA pricing reviews'.[10] The Commission takes the view that "similar conclusions apply in the context of considering a WACC uplift for UCLL and UBA" as it "adopted when assessing the WACC percentile for electricity lines and gas pipelines businesses (regulated under Part 4 of the Commerce Act) last year.[11] Although not explicitly stated by the Commission, we anticipate the Commission applied these same conclusions, as to the meaning of section 18, when it evaluated the TSLRIC modelling.

36. The conclusions, from its work last year with regard to the WACC percentile, cited by the Commission as applying in considering the WACC uplift for UCLL and UBA, are:[12]

    - the use of a consumer welfare approach in any loss analysis is more consistent with the overriding Part 4 purpose statement[13]

8 Section 19 of the Telecommunications Act 2001.

9 Commerce Commission, Further draft pricing review determination for Chorus' unbundled copper local loop service: under section 47 of the Telecommunications Act 2001, Further Draft Determination, 2 July, 2015, paragraphs 141 – 166.

10 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, Further Draft Determination, 2 July, 2015

11 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, paragraphs 239 and 240.

12 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, paragraph 239.

13 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, paragraph 239.1

- the requirement under section 52A to limit the ability of suppliers to extract excessive profits is not restricted to efficiency effects and includes the direct financial benefits to consumers of lower prices[14]
- distributional effects are typically represented in theoretical or analytical economic models by consumer surplus, but consumer surplus is not directly equivalent to 'the long-term benefit to consumers'[15]
- because consumer surplus is not directly equivalent to the long-term benefit to consumers, it is not inconsistent with section 52A to give some weight to producer surplus where producer surplus is a proxy for incentives to invest and dynamic efficiency from innovation. [16]

37. In this section of our report, we apply an economic lens to assess these conclusions in interpreting section 18. We briefly review how the Commission interprets the words "long term benefit", and assess from an economic perspective whether a total welfare, or a consumer welfare, standard provides an internally consistent interpretation of section 18.

Long-term benefit

Legislative history

38. We understand that the legislative history shows that section 18 intentionally mirrors the wording in section 1A of the Commerce Act; that is, the words 'long-term benefit of end users" was directly adopted from section 1 A of the Commerce Act.[17] Section 18 adopts the phrase "end-users" whereas section 1A refers to "consumers". We are not aware of any interpretation which suggests that these different phrases alter the meaning of long-term benefit, though it is possible that "end-user" is a broader term than consumer.

39. Our understanding of the case law on section 1A is that the wording "long-term benefit of end-users" is interpreted as a total welfare standard.[18] For example, the High Court observed that:[19]

> *We are satisfied that the introduction of s 1A should not disturb the Commission's established practice of treating as neutral any wealth transfers between New Zealand consumers and producers … It is the balancing of … real resource impacts on the economy that best serves the long-term interests of consumers.*

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14 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, paragraph 239.1

15 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, paragraph 239.2

16 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, paragraph 239.3

17 Chorus, Submission in response to the Commerce Commission's Proposed Analytical Framework for Considering an Uplift to the TSLRIC Price and/or WACC (2 April 2015), paragraphs 32 – 34.

18 Hampton, L. And Scott, P. (2013). Guide to Competition Law. LexisNexis NZ Ltd. Wellington. At 1.2.1.

19 Air New Zealand v Commerce Commission (No 6) (2004) 11 TCLR 347 at [241].

Commission's interpretation of long-term benefit

40. The Commerce Commission has historically taken a similar interpretation of section 1A as the Courts. Speaking shortly after the enactment of the new purpose statement, the then Chair of the Commission said that "an efficiency-based approach to the analysis of agreements and business acquisitions is consistent with the objectives of the Act."[20]

41. Promoting competition encourages rivalry and innovation and thereby increases total economic wellbeing, which is in the best interests of New Zealand consumers. This view of the objectives of competition policy is widely accepted by economists and others with an interest in antitrust, as Judge Posner observed:[21]

> *Almost everyone professionally involved in antitrust today— whether as a litigator, prosecutor, judge, academic, or informed observer— … agrees that the only goal of the antitrust laws should be to promote economic welfare…*

42. Applying a "total welfare" standard to competition analysis is said to:[22]

> *harmonize immediate consumer interests with the overall welfare of society by subordinating consumer interests to aggregate social interest. However, it does so only temporarily. This approach is based on the idea that efficiency gains that are not of immediate benefit to consumers should nevertheless be considered as welcome because in the long run producers' innovation and efficiency gains will benefit consumers.*

43. A total welfare standard allows a competition regulator to focus on improving total economic welfare, leaving the government to address distributional issues through other regulatory institutions (e.g.tax and welfare). As Louis Kaplow observed, using competition law to redistribute income (a consumer welfare objective) would involve adopting:[23]

> *less efficient rules (ones that fail to maximize total welfare) because of their more favorable distributive consequences— [which] is an inefficient means to redistribution. Accomplishing the same degree of redistribution through the tax and transfer system allows the redistribution to be achieved at lower cost, which means that both producers and consumers can be made better off. Thus, if the purpose is to help consumers as a whole, using a means to help them less hardly makes sense.*

44. The Commission did not redefine its 'total welfare' interpretation of 'long term benefit' when it set out its interpretation of the section 52A purpose statement in its December 2010 Reasons Paper. Rather, it observed that the objectives in paragraphs

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[20] The Commission's Approach Across its Responsibilities. A speech by John Belgrave to the Competition Law and Policy Institute of New Zealand (August 2002).

[21] Richard A Posner, Antitrust Law ix (2d ed, 2001)

[22] Cseres, K. (2007), The Controversies of the Consumer Welfare Standard. The Competition Law Review. March 2007. Retrieved from: http://www.clasf.org/CompLRev/Issues/Vol3Issue2Art1Cseres.pdf

[23] Louis Kaplow, On the Choice of Welfare Standards in Competition Law 2 (The Harvard John M. Olin Discussion Paper Series, Discussion Paper No. 693, May 2011),

52A(1) (a) to (d) reflect the key areas of supplier performance in workably competitive markets that it is to promote for the long-term benefit of consumers.[24] In doing so, the Commission must balance the "natural tension between providing suppliers with incentives to invest and limiting their ability to extract excessive profits".[25]

45. It is this reasoning that led the Commission to the view that a consumer welfare approach in any loss analysis (for estimating the WACC percentile) is more consistent with the overriding Part 4 purpose statement. It is more consistent, the Commission concluded, because a consumer welfare approach reflects the section 52A (1)(d) requirement to limit the ability of suppliers to extract excessive profits, and this requirement is not restricted to efficiency effects and includes the direct financial benefits to consumers of lower prices.[26]

46. However section 18 of the Telecommunications Act does not include an explicit provision to limit the ability of suppliers to extract excessive profits; it simply refers to the long-term benefit of end users. Viewed through an economic lens, there is no reason to interpret the words "for the long-term benefit of end users" in section 18 to mean something different than the words "for the long-term benefit of consumers" used in section 1A of the Commerce Act. We therefore assess from an economic perspective whether a total welfare, or a consumer welfare, standard provides an internally consistent interpretation of section 18, beginning with the total welfare standard.

Section 18 – interpreted as a total welfare standard

47. In this section we apply an economic lens to assess whether a total welfare interpretation of section 18 provides an internally consistent interpretation of the provisions of Part 2 when applied to regulatory interventions in telecommunication markets:

- which are workably competitive
- where competition is not expected to emerge in the near to medium term.

Long term benefits from regulating to promote competition – workably competitive markets

48. In markets which are workably competitive, the causal link between promoting competition within a total welfare standard and long-term benefits to end-users is

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[24] Commerce Commission (2010) *Input methodologies (electricity distribution and gas pipeline services): reasons paper.* (Reasons Paper) December 2010, paragraph 2.4.6.

[25] Commerce Commission (2010) *Input methodologies (electricity distribution and gas pipeline services): reasons paper.* December 2010, paragraph 2.4.7.

[26] Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, paragraph 239.1

well accepted in the economic literature. As put succinctly by the current deputy chair of the Commission (prior to her tenure at the Commission):[27]

> *"economists would generally agree that a market would promote long-term consumer welfare if it maximised the sum of producer and consumer surplus over time. Consumers gain when producers, spurred by the prospect of earning profits, enter markets, undertake investments and innovate to produce the goods and services that consumers want."*

49. The phrase 'long-term' recognises that an intervention to promote competition may not immediately benefit end-users, but that competitive processes over time will lead to benefits for consumers.

50. The Commission can therefore be confident applying a total welfare standard in workably competitive markets will promote the long-term benefit of end-users.

Long term benefits from regulating to promote competition in markets not currently workably competitive

51. The application of a total welfare standard also provides consistent and practical guidance for the Commission when making decisions to regulate the supply of telecommunication services in markets in which competition is not expected to emerge in the near to medium term.

52. For the same reasons as outlined above, the Commission can be confident that applying a total welfare test to guide its analysis, when it regulates a service to promote competition in downstream markets, would lead to long-term benefits to end users. For example, a regulatory intervention which amended access terms for upstream services to create conditions for increased competition between downstream suppliers could be expected to lead to long-term benefits for end users. Such an intervention may involve creating the conditions or environment for improved competition relative to what it would be otherwise. As the Australian Competition Tribunal observes:[28]

> *The Tribunal does not consider that the notion of "promoting" competition in s 44H(4)(a) requires it to be satisfied that there would be an advance in competition in the sense that competition would be increased. Rather, the Tribunal considers that the notion of "promoting" competition in s44H(4)(a) involves the idea of creating the conditions or environment for improving competition from what it would be otherwise. That is to say, the opportunities and environment for competition given declaration, will be better than they would be without declaration.*

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[27] Competition Law at the Turn of the Century. A New Zealand Perspective. Mark N Berry & Lewis T Evans. Goals of Antitrust Policy and the Commerce Act. Susan Begg and Bryce Wilkinson. Page 78

[28] *Re Sydney International Airport* [2000] ACompT 1 (1 March 2000), paragraph 106.

53. The more challenging issue is whether, and how, the total welfare standard would guide the Commission in regulating prices charged by suppliers of services in markets in which competition is not expected to emerge in the near to medium term.

54. The concern should not be that the Commission would intentionally set prices too low so as to expropriate fixed and particularly sunk investment for the benefit of end users.[29] Both the consumer benefit and total welfare standards would emphasise that consumers can be harmed as a result of the regulator setting prices too low. Under-pricing can harm consumers by discouraging investment and innovation over the longer-term and possibly may reduce service standards in the short-term.

55. The distinction between the consumer welfare test, and the total welfare test, is better illustrated when the Commission considers whether to regulate to transfer 'economic rent' from the owner of assets to end users. There may be some (comparatively small) economic efficiency gain in transferring such rents, as the reduction in prices, to the extent they are transferred to end-user markets, may result in a demand response giving rise to allocative efficiency benefits.

56. Under a total welfare test, the Commission would seek these allocative efficiency gains up until the point at which the costs of its intervention begin to exceed the allocative efficiency gain. This guidance is provided by section 18(2) in reminding the Commission to consider the efficiencies that will result from its act or omission (with no distinction between existing or new telecommunications services).

57. As dynamic efficiency associated with new investment is, in most cases, likely to be of an order of magnitude more important than allocative efficiency concerns, section 18 (2A) stresses, for the avoidance of doubt, that the Commission must consider the "incentives to innovate that exist for, and risks faced by, investors in new telecommunications services that involve significant capital investment and that offer capabilities not available from established services." Read from this economic perspective, section 18(2) would also seem to warn against misallocating limited regulatory resources to address pricing practices that injure allocative efficiency at the cost of less effort in promoting dynamic efficiency.

58. To consider the incentives for investors to invest and the risks they face requires the Commission to include producer surplus as it is expected producer surplus that provides the incentive to invest and reward for risk. To be effective such considerations need to extend to the regulation of any services that substitute in whole or in part for "new telecommunications services that involve significant capital investment and that offer capabilities not available from established services" to avoid undermining such investments.

59. Thus, as a total surplus test section 18 would provide for the transfer of rents from producers of bottleneck services to end-users where it is efficient to do so, taking into account the costs of such regulation. However, section 18 would not task the Commission to identify and transfer economic rents from producers to the firms

[29] In the following section, we identify aspects of the time inconsistency of the Commission's decisions that may give rise to this concern.

purchasing the services with the objective of benefiting end-users.[30] A total welfare standard is conceptually straight forward to apply as equal gains yield equal increases in utility and these gains have equal effects on social welfare; as almost all New Zealanders are end-uses of the relevant services there is no requirement to distinguish and track the channels by which these benefits flow to New Zealanders.

Section 18 not tractable as a consumer benefit test

60. Interpreting section 18 through the lens of a consumer benefit standard (as opposed to a total welfare test), would give rise to a number of difficulties which are not readily addressed by the wording of section 18.

61. The first difficulty is that the term consumer welfare has several interpretations and it has often been misinterpreted or misunderstood. As Professor Joseph Brodley observed, "consumer welfare is the most abused term in modern antitrust analysis".[31] We agree with the Commission's observation that 'consumer surplus' is not directly equivalent to the 'long-term benefit to consumers'.[32] In economics, the term "consumer welfare" means the buyer's well-being. The Marshallian concept of "consumer surplus" represents a more limited concept and defines the difference between the amount a buyer is willing to pay for a good and the amount actually paid.[33]

62. The economic literature identifies a range of circumstances in which a change in consumer surplus is not synonymous with an improvement in consumer well-being over time, including:

- consumer surplus calculations assume a dichotomy between consumers and firms; however section 18 refers to end users, which include commercial and industrial firms, as well as residential consumers[34]
- consumer surplus can provide a very poor approximation to a welfare measure that weights impacts using ordinary notions of distributional preferences; rich and poor consumers may be differentially affected by the regulatory decision

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30 A practical example of this distinction is the Commission's recommendation under the former Part IV of the Commerce Act to price regulate airports because the regulation would produce a benefit to consumers (the former Part IV required the Commission to apply a consumer benefit test). The Government declined to proceed with the regulation as the costs of regulating were not justified on economic efficiency grounds.

31 Brodley, JF, 'The economic goals of antitrust: efficiency, consumer welfare, and technological progress', (1987) 62 NYUniv LR 1020, p 1032.

32 Commerce Commission, Amendment to the WACC percentile for price-quality regulation for electricity lines services and gas pipeline services: Reasons paper" 30 October 2014, paragraph 2.36.

33 Alfred Marshall, Principles of Economics 199 (4th ed. 1898).

34 Telecommunications Act 2001, section 5 defines end-user in relation to telecommunications services to mean "a person who is the ultimate recipient of that service or of another service whose provision is dependent on that service".

and distributional concerns would suggest weighing the impact on the poor more heavily, but a consumer surplus standard counts each equally

- potential loss of dynamic efficiency benefits from innovation or improvements to service quality
- inter-temporal effects as consumers that benefit from lower prices in one period may not be the same consumers that suffer from lower service quality or delayed innovation in subsequent periods
- low prices for some goods may in some circumstances hurt consumer well-being (e.g., tobacco products) or for status goods.

63. Because not all gains are equal under a consumer benefit standard, a regulator applying a consumer benefit standard needs to choose an allocation of economic surplus which reflects society's preferences on income distribution. The standard discriminates between individuals in different interest groups and disregards the fact that gains to sellers, producers and shareholders can be socially positive. However, section 18 provides no guidance to the Commission on how it is to discriminate in this way.

64. As the consumer welfare approach considers wealth transfers from consumers to producers as being harmful rather than neutral, it is more critical of efficiency claims. Interpreting section 18 as a consumer benefit standard would entail endorsing the view that in promoting competition for the long term benefit of end users, it is sometimes best to make everyone in society worse off.[35] From an economic perspective, this would be a very different (and odd) interpretation of long term benefit.

Section 18 and estimating WACC percentile

65. The different outcomes from interpreting section 18 as a consumer benefit standard relative to a total welfare standard are vivid in the modelling done for the Commission by Oxera. Oxera estimates that reducing the increment to WACC from, for example, the 70th percentile to the 50th, would produce a transfer from Chorus to retailers of about $50 million per year.[36]

66. If section 18 is interpreted as requiring a consumer welfare (applied as a consumer surplus standard in the Oxera model[37]), the Oxera model would estimate that this transfer to consumers would have a net benefit of around $20 million, if the lower WACC only results in a two year delay in adoption of new technology, but a net economic cost of around $70 million if the delay is assumed to be five years.[38]

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35 This phrasing is adapted from Louis Kaplow & Steven Shavell, *Fairness versus Welfare*, 403-64 (2002).

36 Oxera, *Is a WACC uplift appropriate for UCLL and UBA?*, June 2015, table 3.1, page 15.

37 Oxera, page 15, Ibid.

38 These probability weighted net benefit estimates are shown in the tables in appendix 1 to this report, and there estimation is discussed further below.

67. However, if a total welfare standard is applied, the Oxera model would estimate that the $50 million per year transfer to retailers would come at a net economic cost of around $80 million, assuming a two year delay in the adoption of new technology and a total welfare loss of about $170 million if new technology is delayed for five years.

68. Hence, for the Commission to conclude that "section 18 directs us to consider consumer welfare, through reference to the 'long-term benefit of end-users'",[39] it must be convinced that Parliament charged it with making everyone in society worse off by $80 million to $170 million in order to transfer around $50 million from one commercial entity, Chorus, to several other commercial entities.[40] There is no obvious economic rationale for why Parliament would set the Commission on that path.

TSLRIC and section 18

TSLRIC

69. In an expert paper for the Commission, Professor Ingo Vogelsang sets out the rationale for and design of TSLRIC, with particular emphasis on implications for pricing UCLL in New Zealand.[41] We agree with Professor Vogelsang's description of classical (or orthodox using the Commission's language) TSLRIC and that it is fit for purpose for this price determination.

70. From an economic perspective we consider the Schedule 1 description of TSLRIC supports the use of classical TSLRIC as described by Professor Vogelsang and we do not consider the Schedule 1 description suggests that any modification to classical TSLRIC is required. Further, we consider classical TSLRIC is consistent with section 18 and again we do not consider section 18 suggests any modification is required to classical TSLRIC. We explain these views below.

71. The Court of Appeal recently commented on TSLRIC as follows:[42]

> *The TSLRIC model provides an estimate of the costs of an efficient access provider over a sufficient period of time (long run), on a "forward-looking" basis (reflecting the notional costs to an operator if it built a new network) rather than of Chorus's actual costs.*

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39 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, paragraph 240.

40 These figures assume no change to the Oxera analysis. As noted further below, the Oxera analysis assumes that new technology will have the same capital cost as the copper network. As discussed below, history indicates that superior new technology tends to come at a lower capital cost, and hence the Oxera model under-estimates the efficiency cost of the wealth transfer.

41 Vogelsang I (2014) *"Current academic thinking about how best to implement TSLRIC in pricing telecommunications network services and the implications for pricing UCLL in New Zealand."* Paper prepared for the New Zealand Commerce Commission, 25 November.

42 Chorus v Commerce Commission, [2014] NCA 440 at [30].

72. The classical form of TSLRIC as described by Professor Vogelsang (paragraphs 37 – 41) is consistent with both the Schedule 1 description and the Court of Appeal comment on that description. Thus we see no tension between classical TSLRIC and the legal requirement on the Commission to implement TSLRIC as set out in Schedule 1.

Guidance from section 18

73. Professor Vogelsang describes the way in which TSLRIC is fit for purpose to promote competition *in* the market and *for* the market (paragraphs 46 – 51). While he recognises TSLRIC has its limits in responding to particular market requirements (e.g. short term demand levels, or location-specific pricing), these shortcomings relate to the inability of regulated pricing in general to respond to such matters due to limits on the regulator of time, cost and access to the relevant information. These limits are not specific to TSLRIC.

74. Section 18 also requires the Commission to consider the efficiencies that will result, or will be likely to result, from its actions or omissions (as discussed in the section above). Professor Vogelsang describes the ability of TSLRIC to address allocative and productive efficiency issues (paragraph 52 – 56) but notes its potential shortcomings with respect to investment incentives and dynamic efficiency (paragraphs 57 – 66). Professor Vogelsang notes that these potential shortcomings have induced legislators and regulators to specifically include investment incentives in TSLRIC arrangements. In our view this is what sub-sections 18 (2) and (2A) provide for, and these sub-sections point to the way in which TSLRIC needs to be implemented, and provide guidance to the Commission when faced with uncertainty in its estimates when populating the TSLRIC model.

75. Professor Vogelsang identifies the importance of predictability of regulatory decision-making to support efficient investment incentives, and notes (at paragraph 4):

> *As long as TSLRIC provides the legal basis for wholesale input prices and as long as there is common understanding of the TSLRIC concept this predictability is assured.*

76. From an economic perspective, predictability of regulatory decision-making provides a stable basis on which investors are able to assess their investment options, with confidence that those assessments will not be unexpectedly altered due to unpredicted regulatory decision-making. In our view predictability can be best served in this determination by the Commission adopting the classical form of TSLRIC, as that form is consistent with the Schedule 1 description of TSLRIC and is consistent with section 18.

3. The importance of time consistency

Time consistency promotes predictability and efficiency

77. Time consistency is recognised in public policy as a major issue, with implications for the design of institutions and rules ranging from monetary policy to utility regulation.[43] Time consistency issues arise in: [44]

> *"…situations where a policy that is optimal (from the point of view of the policymaker) ex ante turns out not to be the optimal policy ex post. If the policymaker cannot commit to a policy, it may then find itself wanting to change its policy ex post (say, after a regulated firm has made an irreversible investment decision), regardless of what it promised ex ante. Such an approach to policy is said to be time inconsistent."*

78. Time consistency issues in price regulation arise in situations where a regulator does not have mechanisms to commit to a policy through time, and finds itself wanting to change its policy after a regulated firm has made an irreversible investment decision. Telecommunications services are accepted as challenging contexts for regulators to maintain time consistent decisions:[45]

> *"For utility services like telecoms there is a classic time inconsistency problem: these services require large volumes of investment which, once installed become 'sunk assets' in the sense that most or all of them cannot be removed and used elsewhere or sold on second-hand markets at their original cost. In consequence, private investors are at risk of opportunistic behaviour by governments, particularly over prices, once the investments have been installed; and awareness by private investors of this regulatory risk drives up the required rate of return and the cost of capital. The latter dramatically reduces investment as has been seen in many countries (see Levy and Spiller, 1996).*[46]

79. Where a price regulator has the opportunity to act in a time inconsistent manner and there are not mechanisms in place to provide credible commitments to investors that

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43 Introduction and analysis of the notion of time consistency was a major plank in the awarding to Finn Kydland and Edward Prescott the 2004 Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel (i.e. the "Nobel Prize in Economics").

44 Ergas H (2009) *"Time Consistency and Regulatory Price Setting: An Australian Case Study."* Review of Network Economics 8 (2), p.153.

45 Levine P, J Stern and F Trillas (2005) "*Utility Price Regulation and Time Inconsistency: Comparisons with Monetary Policy."* Oxford Economic Papers 57 (3), pp.447-478.

46 Levy B and P Spiller, eds (1996) *"Regulations, Institutions and Commitment."* Cambridge University Press, Cambridge.

the regulator will not do so, the cost of capital for the regulated service will rise, leading to under-investment or higher prices, contrary to the long-term benefit of end-users.[47] The key observation is:[48]

> *A regulator lacking a commitment mechanism who puts the same or lower weight on producer surplus as consumer surplus will hold up the investing firm and lower the regulated price after investment has been sunk. As a consequence there will be no investment and the time consistent regulatory price will rise indefinitely at a rate that increases with the growth of customers plus the depreciation rate.*

80. The monetary policy equivalent of time consistency relates policy decisions of the monetary authority to inflation and employment, where the authority prefers full employment to unemployment and zero inflation to positive or negative inflation. In any one period, wage (and hence employment) levels are set given monetary authority announcements and the rational expectations of workers, their representatives and employers. However, in a future time period, the monetary authority could be tempted to renege on its inflation commitment in order to boost employment. The mechanism available to it is "surprise inflation" which lowers the real wage rate (while the nominal wage rate remains fixed having been set in the previous period) and thereby increases demand for labour. As this process occurs repeatedly over time, workers realise that the monetary authority commitments are not credible and for as long as it retains the opportunity to deliver "surprise inflation", the price of doing so gets higher each period, ultimately resulting in inefficiently high inflation but no reduction in the unemployment rate.

81. As for the price regulation problem (which effectively trades off consumer and producer surplus or consumer prices and investment), the key is the extent to which the regulator is able to commit credibly to a pricing method that is implemented in a consistent manner over the entire investment cycle for the regulated service, versus exercising discretion through time as to how the pricing method is implemented depending on the stage of the investment cycle.

82. The implications of governmental or regulatory time inconsistency are well established in the economic literature, and this form of decision making is often referred to as "opportunistic" behaviour.[49] Spiller (2011) notes that investors facing the risk of governmental or regulator opportunism will either not invest, or demand up-front compensation for that risk or stronger safeguards when dealing with the state than they would in contracts with others that can be bound by credible commitments, for example with private agents.[50]

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47 Levy B and P Spiller, eds (1996) *"Regulations, Institutions and Commitment."* Cambridge University Press, Cambridge.

48 Levine et al (2005) Op cit. p.454.

49 The seminal article is Levy B and p Spiller (1994) *"The Institutional Foundations of Regulatory Commitment: A Comparative Analysis of Telecommunications Regulation."*

50 Spiller P (2011) *"Transaction Cost Regulation."* National Bureau of Economic Research working paper 16735. Available at: www.nber.org/papers/w16735

83. A range of measures have been proposed in the economic literature to deal with the issues of time inconsistency, through the design of various forms of commitment to time consistent behaviour. These include policy rules that remove discretion[51] and the delegation of responsibility to authorities independent of political influence.[52] Levine et al (2005) describe the similar rationale for an independent utility regulator and an independent central bank: [53]

> *If the main purpose of independent central banks is to eliminate the temptation to engage in surprise inflation, the main purpose of independent regulatory agencies is to solve the hold-up problem and eliminate the temptation to engage in a surprise cut in the regulated price, thereby supporting investment.*

84. The empirical literature provides evidence that regulatory independence (as a means of ensuring commitment and raising credibility) has a positive impact on investment.[54] Levine et al (2005) acknowledge that regulators need to balance their role in supporting investment with their role of protecting consumers against monopolistic exploitation, before further cautioning against time inconsistent behaviour:[55]

> *…the risks to ensuring the majority of citizens fail to have access to such services more often than not comes from over-protection of current consumers relative to future consumers and investors.*

85. Ergas (2009)[56] used telecommunications regulation as a case study of time inconsistency in regulatory price setting in Australia. He assumes that the regulator has an interest in ensuring that efficient network investments are undertaken, and where investment is voluntary, that will only happen if investors expect full recovery of, and return to capital. As a result, the optimal policy *ex ante* is to offer full cost recovery for such investments, though incentive regulation schemes may result in costs being under or over-recovered *ex post*. However, once the investment is sunk, reneging on that promise and lowering prices toward short-run marginal costs may be optimal for a regulator that wishes to maximise short-run consumer welfare, or to maximise its popularity (if gains to consumers are weighted more heavily than losses to investors).

86. In this example, Ergas examines the actions of the Australian Competition and Consumer Commission (ACCC) in setting access charges for a range of telecommunications services. He concludes in this case study that regulatory

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51 Kydland F and E Prescott (1977) *"Rules Rather than Discretion: the Inconsistency of Optimal Plans."* Journal of Political Economy 85 (3), pp.473-491.

52 Rogoff K (1985) *'The Optimal Degree of Commitment to an Intermediate Monetary Target."* The Quarterly Journal of Economics 100 (4), pp.1169-1189.

53 Levine et al (2005) *Op. cit.*p.463.

54 Ibid. p. 472.

55 *Ibid*, p.471.

56 Ergas H (2009), Op. cit, p. 157-161.

opportunism (i.e. a lack of credible commitment to time consistent behaviour) can plausibly result in substantial welfare costs over time.

Predictability

87. Time consistency is a component of regulatory predictability. The Commission attaches importance to predictability, and particularly in relation to how predictability affects investment. In its Draft Determination the Commission stated:[57]

> *We value predictability in the implementation of TSLRIC. That is, we are concerned with giving a greater weighting to predictability of approach.*

and:[58]

> *This can be particularly true for regulated industries where the assets are sunk and long-lived, as is the case for many telecommunications assets. The "sunkness" of the assets makes it difficult for the regulated firm to exit the market should those rules change, while their long-lived nature means that their costs must be recovered over multiple regulatory periods. The risk of unpredictable changes in the regulatory environment can harm regulated firms' investment incentives. For example, it might lead to a reluctance of regulated firms to invest in the first place, or lead to socially sub-optimal investment behaviour such as under-investment, investment delay or sequential investment when an immediate or single large investment might be preferable from a social welfare perspective.*

88. In reaching this view, the Commission relied on a paper by Guthrie.[59] This paper and others make it clear that *"…regulatory opportunism or time-inconsistency will generally defer otherwise efficient investment."*[60] The need to take an inter-temporal view (i.e. one based on the complete investment cycle, rather than a particular point in the cycle, or in time) in order to be time consistent is highlighted by Guthrie as follows:[61]

> *I analyse the problem backwards through time, since the behaviour of firms prior to the first investment in infrastructure will depend on what they anticipate will happen after investment.*

89. In the Draft Determination the Commission notes the consistency between predictability and section 18 and its relevance to the long-term benefit of end-users via investment incentives:[62]

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57 Commerce Commission (2014) "Draft pricing review determination for Chorus' unbundled copper local loop service" p.38, paragraph 128.

58 Ibid, paragraph 130.

59 See footnote 67 of the draft determination for UCLL services, dated 2 December 2014 which cites Guthrie G (2006) *"Regulating Infrastructure: The Impact on Risk and Investment"*, Journal of Economic Literature, 44(4), pp.925-972.

60 Ergas (2009) *Op cit.* p.161.

61 Guthrie G (2006) *Op cit.* p.42.

62 Commerce Commission (2014), *Op cit.*, paragraph 137.

Moreover, we remain of the view that regulatory predictability is consistent with the section 18 purpose statement. Where there is regulatory uncertainty, there is the potential for firms' incentives to invest and innovate to be undermined. As noted in our December 2014 UCLL and UBA draft determination papers, investment and innovation is generally beneficial to end-users. Providing a predictable regulatory environment that supports firms' incentives to invest is therefore important for the promotion of competition in telecommunication markets for the long-term benefit of end-users, and we consider that this is consistent with the section 18 purpose statement.

The Commission has not been time consistent

90. The Commission's approach to setting prices in the Draft Determination can be assessed as to whether or not it is time consistent by assessing if the approach would be different if Chorus was at a different point in the investment cycle for UCLL and UBA services. For example, would the Commission's reasoning for particular choices change if Chorus had yet to invest in the network and equipment required to supply the UCLL and UBA services?

91. In relation to determining the date from which this price determination will apply, the Commission refers to the stage at which Chorus finds itself in its investment cycle as a reason to not apply this determination from the date at which the IPP applied:[63]

In this case, backdating would only have an effect where there is new investment and/or where some investment would be subject to regulation. Here we are not regulating a new investment and nor is it clear that a major new bottleneck investment would be regulated by way of an IPP/FPP. Accordingly, in the current case, it is not clear to us that backdating would have any material effect on investment. In any event, we note that the IPP/FPP error is symmetric and non-systematic so we do not see it as clearly adding undiversifiable risk to any future Chorus investment.

Further, there is no evidence before us that not backdating will in fact mean that Chorus is not able to cover its actual costs. In particular:

Chorus will inevitably be limiting its further investment in much of its copper network as it overbuilds the Government subsidised fibre network;

Chorus can, and does, seek capital contributions from end-users where it is building out the boundaries of its copper network.

92. In relation to estimating WACC, the Commission also identifies the stage of the investment cycle at which Chorus finds itself as one of the reasons to change from

63 Ibid, paragraphs 886.6 and 886.7.

the approach it has used for many years of selecting a WACC above its midpoint estimate:[64]

> *When determining whether there is any reason to depart from the mid-point WACC estimate, we have considered the potential role of a WACC uplift across different categories of investment. The main categories we considered are:*
>
> - *investment in maintaining, upgrading and expanding the copper network; and*
> - *investment in new telecommunications services.*
>
> *Our view is that there is limited justification for a WACC uplift to incentivise further investment in Chorus' copper network.*
>
> *In terms of upgrading the copper network, we agree with submissions which argue that there is a reduced need for further investment in the copper access network for most parts of New Zealand, given the deployment of UFB and RBI.314.*
>
> *Regarding maintenance of the copper network (and the risks of network outages resulting from under-investment), we note that the impact of outages is likely to be significantly reduced relative to electricity lines services.*

93. The above examples reflect time inconsistent decision-making. They imply the Commission would have come to a different view if Chorus faced a large investment requirement to provide the UCLL and UBA services. This approach to decision-making is what the economic literature outlined above refers to as "regulatory opportunism" and which leads to under-investment, or increased costs, which are not to the long-term benefit of end-users.

94. The above examples suggest this price determination can be treated as a regulatory "end game", as opposed to a stage in a repeated game. That is, the Commission appears to consider that its reputation as a regulator will have no future effects for investment decision-making in telecommunications services in New Zealand. We consider the Commission under-estimates the on-going importance of its reputation for acting in a time consistent manner.

95. The telecommunications sector is dynamic and is characterised by large intermittent investments. It seems improbable to us that no future telecommunications investments will be subject to the Commission's regulatory oversight. The Commission's reputation for time consistent decision making is not restricted to the IPP/FPP pricing method. Rather, this reputation is relevant and important whenever the Commission has discretion in price determinations to act in a time inconsistent manner. For example, although the outcome of the 2016 regulatory review is unknown, it seems to us unlikely that the review will result in the Commission having no involvement in future regulatory price setting, inclusive of oversight of new (and at this stage unknown) future investments. It is probable that

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64 Ibid, paragraph 512.

any such roles will involve discretion that allows for potentially time inconsistent approaches.

96. For as long as the Commission is involved in regulatory price setting in the telecommunications sector, time consistency in its regulatory decision-making will continue to be to the long-term benefit of end-users.

4. From what date should the FPP determination apply?

97. The majority position in the Draft Determinations would apply the FPP determination for UCLL and UBA from a date shortly after they are determined. The minority view would apply them from 1 December 2014. In this section we consider, from an economic perspective, from what date they should apply.

Context

98. The FPP can be invoked by any affected party within 25 working days of the publication of an IPP determination.

99. The IPP prices for UCLL applied from December 2012, which was when the final IPP determination for those services was published.

100. The IPP prices for UBA applied from December 2014, consistent with the relevant legislative requirement that these prices would not take effect prior to that date.

101. The IPP for both UCLL and UBA employs international benchmarking while the FPP for both services requires a TSLRIC cost study to be undertaken.

102. In this context, we understand the economic rationale for this dual IPP and FPP pricing regime to be:

- the IPP method provides a relatively low cost and quick method to establish prices for the relevant service; and
- the FPP method (which requires TSLRIC to be used) provides all affected parties the assurance that prices can and will be set using TSLRIC, should any affected party be sufficiently dissatisfied with the result of the IPP to call for the FPP.

103. Thus we consider the FPP method is best viewed in economic terms as providing assurance to affected parties that prices will reflect the TSLRIC pricing method if requested, within a wider regulatory design that attempts to lower the cost of regulation by way of an initial benchmarking approach under the IPP.

104. The assurance function provided by the FPP is critical from the perspective of an investor in the regulated service, and for RSPs, as it sets out the pricing method they are able to rely on if they are not satisfied with the outcome of the IPP method. For this assurance function to be credible and effective from the perspective of affected parties they need to have confidence that the FPP prices will in practice be used in the supply of the regulated services, if requested. To be complete this assurance function therefore requires that the FPP determination, and the resulting prices, apply from the same date as the IPP determinations apply. We note this timing requirement is not addressed, from an assurance perspective, by the regulator assuming that the supplier of the regulated service will view as symmetric the probability of an IPP being above or below the FPP. The supplier (or potential

investor) may have a very different view of these probabilities, and it is the views of the investor that drives investment incentives, not the assumptions of the regulator.

105. If the FPP determination does not apply from the same point in time as the relevant IPP determination, the intended assurance function of the FPP is eroded, that is affected parties would not be confident that the relevant services will be priced by the TSLRIC method required under the FPP (if requested). We note the delay in timing of this FPP determination relative to the point in time from which the UCLL IPP price applied will be three years (if the Commission's timetable in the Draft Determination is adhered to), which is not a trivial period. This lag (and potential lags in future determinations) in the application of the FPP relative to the IPP determination will erode investment incentives, as it will leave investors unsure as to the extent to which they are in practice able to rely on the FPP if the IPP is found to be inadequate. Such erosion of investment incentives will have efficiency implications that are contrary to the long-term benefit of end-users.

106. Time consistency argues that the Commission should approach the UCLL and UBA FPP determinations in the same way as it would approach a price determination where the supplier of the regulated service had not yet invested in the necessary network and equipment.

107. Commissioner Duignan, in the minority view, appears to share a similar view to that expressed above that the economic role of the FPP is to provide affected parties assurance that services will be priced using the TSLRIC method, if requested, with the concomitant need to apply the FPP from the date at which the IPP prices apply, as follows (paragraph 899):

> *An earlier start date will also: ….*
>
> *Reassure investors that they need not be reliant on less accurate benchmarking process at any point.*

108. We consider the above economic reasoning in relation to ensuring the FPP provides a credible and effective assurance function leads to framing the question of timing as "from what date should the FPP determination apply?" This is subtly but importantly different from framing this question as to whether the FPP prices should be backdated, as appears in the Draft Determination. The former question aims to identify the appropriate timing relationship between IPP and FPP regulatory periods (and thereby establishes the default position), while the latter considers whether a price established at the date of the final determination should apply to an earlier period (suggesting that any "backdating" differs to the default position).

109. Our reasoning above suggests that the FPP determination for UCLL should apply from December 2012, which is from when the relevant IPP prices applied, and from December 2014 for UBA. The minority view in the Draft Determination would have both the UCLL and UBA FPP prices apply from December 2014. While we consider our reasoning for determining the commencement of the FPP regulatory periods argues for a December 2012 commencement for UCLL (to align with the IPP period), we concentrate below on FPP regulatory periods for UCLL and UBA (inclusive of non-recurring charges) that commence in December 2014. Section 18

considerations should then be assessed to design an appropriate method of implementation (which we discuss below).

Majority view relies on reasons that are not time consistent

110. The majority view reasons to not apply FPP prices from Dec 2014 include the following (paragraphs 886.5 – 886.7, and we discuss the other points in paragraph 886 in the implementation section below):

> *886.5 Notwithstanding that backdating does not resolve past distortions, we have also considered whether backdating could be justified on the basis that it would promote investment which in turn would promote competition for the long-term benefit of end-users.*
>
> *886.6 In this case, backdating would only have an effect where there is new investment and/or where some investment would be subject to regulation. Here we are not regulating a new investment and nor is it clear that a major new bottleneck investment would be regulated by way of an IPP/FPP. Accordingly, in the current case, it is not clear to us that backdating would have any material effect on investment. In any event, we note that the IPP/FPP error is symmetric and non-systematic so we do not see it as clearly adding undiversifiable risk to any future Chorus investment.*[426]
>
> *886.7 Further, there is no evidence before us that not backdating will in fact mean that Chorus is not able to cover its actual costs. In particular:*
>
> > *886.7.1 Chorus will inevitably be limiting its further investment in much of its copper network as it overbuilds the Government subsidised fibre network;*
> >
> > *886.7.2 Chorus can, and does, seek capital contributions from end-users where it is building out the boundaries of its copper network.*

111. The logic of 886.5 and 886.6 is that backdating of FPP prices may be required to provide efficient investment incentives, but in the circumstance of UCLL and UBA no significant new investment is expected to deliver these services, and therefore such incentives need not be considered. Furthermore, the IPP/FPP approach to pricing is not expected to apply to any major new bottleneck investment and that in this context the majority view considers it need not take into account the investment incentive effects of this determination.

112. Paragraph 886.7 refers to the view that Chorus has sufficient cashflow to cover its operating costs (our interpretation of the phrase "not able to cover its actual costs"), and that it will not face significant capital outlays to provide these services, and that these observations are somehow relevant to the backdating decision (without explaining why or how they are relevant).

113. As described in section 3, the above approach to regulatory decision making is not time consistent as it results in different pricing methods (and thereby different pricing outcomes) depending on the point in the investment cycle the supplier finds itself when the price determination is being made. To illustrate, the above reasoning

implies that if Chorus faced significant investment to provide the UCLL or UBA services, or if the IPP/FPP pricing were expected to be applied to major new bottleneck investments, or if Chorus could demonstrate it could not cover its actual costs, then the majority view would factor into its decision the implications its decisions has for investment incentives, compared to the current circumstances where it need not.

114. The above line of reasoning appears to be a version of a regulatory "end-game", where the regulator holds the view its approach to pricing will have no effect on future investment and therefore it can act in a time inconsistent (or opportunistic) manner at no cost to the long-term benefit of end-users.

115. The economic literature we reference in section 3 finds that regulatory decision making that is time inconsistent is contrary to the long-term benefit of end-users. For as long as the Commission is involved in the price regulation of telecommunications services, its reputation for making time consistent decisions (i.e. not acting opportunistically) will matter to investors, and acting in a time inconsistent manner will be contrary to the long-term benefit of end-users. This is the case regardless of whether the particular pricing method is based on TSLRIC or on a regulatory asset based method as used in New Zealand in the electricity and gas sectors. It appears implausible to us that this FPP determination is the last time the Commission's reputation for time consistent decision making will affect investment incentives in the telecommunications sector.

116. Lastly, in our view the final sentence in paragraph 886.6 in relation to whether the IPP/FPP error is symmetric or non-systematic is not the key point when considering this issue of timing. Investors will be sensitive and responsive to time inconsistency and the cashflow effects of such inconsistency, which is the issue at stake in this timing issue.

Implementation issues

Price profile

117. When this timing issue is viewed as a question of from what date the FPP regulatory period should apply, and given our view as set out above that it should apply from December 2014, implementation is then able to be considered within the wider context of determining the appropriate inter-temporal price profile within the regulatory period (that is the level of prices throughout the regulatory period) to best give, or likely to best give, effect to section 18.

118. Price profile issues are discussed in Chapter 3 of the Draft Determination and the associated attachments. The Commission proposes to move away from its proposed approach in its initial draft determination to set "levelised" prices (constant nominal prices) to a price profile that increases through the regulatory period (paragraphs 433-442). This shift in approach was in response to some RSP submitters that preferred an increasing price profile relative to constant prices, for perceived competition reasons and to mitigate the level of the price step in the early years (paragraph 436).

119. The Commission's concerns about the competition effects arising from the price profile within the FPP regulatory period can be addressed, if needed, within a FPP regulatory period that commences from December 2014. Issues related to the profile of prices are not considerations that need to be addressed by the date from when the regulatory period commences, but rather can be addressed by determining the price profile (within the regulatory period) that best gives, or is likely to best give, effect to section 18. Thus we consider the assurance function of the FPP demands the regulatory period commences from the same date as the IPP, and any price profile issues are able to be addressed within a regulatory period commencing at that date.

120. Relevant considerations when determining an appropriate price profile (as opposed to determining from when the FPP regulatory period should commence) include:

- *The extent to which the difference between the IPP and FPP has been anticipated by the RSPs.* It appears that at least the larger RSPs anticipated the change in the difference between IPP and FPP prices as set out in the initial draft determination.[65] We note that the differences in prices in the initial draft determination were not moderated by decreases in the non-recurring charges as proposed in the Draft Determination, so RSPs may have in practice over-anticipated the degree of overall price change (depending on the final FPP prices). In any event, the greater it appears RSPs did anticipate the final FPP prices the stronger the reason to apply that difference to the price profile from December 2014, with the difference between the IPP and FPP prices being identified as a lump sum payable to Chorus. We note payment of this lump sum could be spread over time, if needed for RSP cashflow reasons, provided the amount is maintained in net present value terms.
- *The extent to which deferring the price profile increases volume forecast risk carried by the supplier, thereby eroding the assurance function of the FPP.* The price profile developed in the Draft Determination is dependent on volume forecasts for the regulatory period. The more the price increases (relative to the IPP) are deferred to the latter years of the regulatory period the greater are the risks to the supplier that its overall revenue requirement (as per the TSLRIC models) will not be met, which would erode the assurance function of the FPP. The volumes for the period from December 2014 to date are known and therefore it would be preferable, from a revenue risk perspective, for those volumes to be matched against the FPP prices and a lump sum amount identified that is payable to Chorus.
- *The extent to which the price profile will hinder or foster competition for the long-term benefit to end-users.* We discuss this below in relation to the Commission's comments on this matter.

121. We note none of the above issues relate to determining the date from which the FPP regulatory periods should commence, but rather they relate to determining the price profile within FPP regulatory periods that commence from December 2014.

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[65] See pages 247, 249,251,258 and 259 in the transcript of "UCLL and UBA Final Pricing Principle Conference Held on 15-17 April 2015."

Competition effects

122. The majority view was concerned with the potential distortion of workably competitive retail markets by any "clawback" method, as follows (paragraph 886.1 – 886.4):

> *886 To explain:*
>
> *886.1 We consider that the RSP market can generally be regarded as "workably competitive". Accordingly, any past "error" in prices should have been largely passed through to end-users. For this reason, we would propose that any backdating should only be implemented by way of a claw-back mechanism.*
>
> *886.2 Accepting that claw-back is less damaging to RSPs than lump sum backdating, we are not convinced that it would promote competition for the long-term benefit of end-users.*
>
> *886.3 In particular, if the prices have been "wrong" since the IPP, then we accept that RSPs' and end-users' levels of investment and consumption may have been distorted to some degree over this period. However, in our view there is nothing to be gained by reversing that "error" by increasing future prices above our central TSLRIC estimate. Specifically, that previous distortion cannot be undone and any forward-looking increase would only introduce a different distortion.*
>
> *886.4 For these reasons we find it hard to see backdating as promoting competition for the long-term benefit of end-users.*

123. The above competition concern in our view is incorrectly focused on trying to (implicitly) identify the date from which the FPP regulatory period should commence. Any price profile issues that have competition effects can be addressed by adjusting the price profile within a FPP regulatory period that commences in December 2104. That is we consider any concern about competition effects arising from the inter-temporal price profiles for UCLL and UBA can and should be addressed separately from determining the date from which the FPP regulatory period commences. Any such competition effects can be addressed by adjusting the price profile within a regulatory period that commences December 2014.

124. The Commission appears to assume the regulatory period should commence from the date of the final determination, and then considers if there are competition reasons to backdate the FPP price. We consider an approach more consistent with section 18 is to commence the FPP regulatory period from December 2014, in order to support the assurance function of the FPP, and to then consider competition effects when setting the price profile within that regulatory period.

125. To put into context potential detrimental competition effects, we note that the Commission's concerns seem to be premised on the belief that the FPP prices are a reliable reflection of the long term marginal cost of supply of the regulated service in all locations and markets, and therefore their precise level is critical to the efficient functioning of those markets. While the TSLRIC method aims to estimate the long run marginal cost of supply, it needs to be remembered that in practice the modelling

of these costs rely on average costs (not marginal costs) over a number of dimensions. In this determination these costs are averaged over the whole of the country in a context where the modelling indicates the marginal cost of supply varies greatly,[66] common costs are allocated to products with no sensitivity to variations in the price elasticity of demand across markets, and the weighted "aggregation" of SLU and UCLL costs results in averaging (paragraph 417). This averaging is a way of simplifying what remains a very complex task, plus in the case of a single country average price this is mandated by legislation.

126. The shift in prices to take account of "clawback" (if desired) appears to be relatively modest (as illustrated in Box 1 of pages 169-170). That illustration indicates that for every $1 of monthly price change (for the sum of UCLL and UBA, and for the year December 2014 to December 2015) that is clawed back over the following four years, the price in the latter years would need to rise by about 30c per month, which is about 0.9% (less than 1%) of the combined IPP prices (of $34).

127. In this context, competition effects (if any) from the small shifts in the price profile to accommodate the FPP regulatory period commencing in December 2014 are likely to be out-weighed overall by competition effects arising from averaging. For example, it seems probable that higher prices than otherwise in the early years of the regulatory period would result in prices closer to the true marginal cost in high cost locations (e.g. in rural and where there are long distances to the exchange), and prices further from true marginal costs in low cost locations (e.g. in urban environments), and then lower relative prices toward the end of the regulatory period would have the opposite effect. Conversely higher prices in the early years of the regulatory period would reverse this pattern, and "levelised" prices would be neutral with respect to this pattern.

128. We consider the Commission's concern about possible competition effects arising from any "clawback" of FPP pricing:

- is unlikely to be a significant issue, due to the reasonably small amounts involved relative to the averaging of costs inherent in TSLRIC modelling and the legislative requirement to have a single New Zealand price for UCLL and UBA.
- is able to be addressed, if the Commission continues to consider it to be an issue, by adjusting the price profiles within regulatory periods that commence in December 2014.

[66] Paragraph 521 of the Further Draft Determination states that while the current draft geographically averaged TSLRIC price is $26.31 for the UCLL service, the urban TSLRIC price is $17.90 per month. This is a difference of around 47 per cent.

Date at which WACC and other TSLRIC components are determined

129. We have described above why we consider the timing issue for FPP prices is best framed as the question, "from what date should FPP prices apply?" in contrast to the question of whether prices should be backdated.

130. If it is accepted that the FPP regulatory periods should commence from December 2014, it follows that the supporting TSLRIC modelling should also be calibrated to December 2014. It is conventional regulatory practice (e.g. in the electricity and gas sectors in New Zealand and similarly in Australia) to calibrate all modelling components, inclusive of WACC, to the period immediately preceding the commencement of the regulatory period. The Draft Determination adopts this convention for the regulatory periods proposed to commence in December 2015. We see no reason to depart from this convention if the regulatory periods commence in December 2014. Thus, if the periods do commence from December 2014 we recommend the TSLRIC modelling for the FPP determinations, inclusive of WACC, be calibrated to the period immediately preceding December 2014.

5. Estimating WACC

131. In this section we comment on:

- the Commission's approach to parameter error in setting WACC
- the quantification or modelling of the effects of error in setting WACC

The Commission's changing approach to parameter error

132. The Commission's process of estimation of WACC by use of the after tax form of the CAPM to estimate the cost of equity and use of market evidence on the cost of debt is subject to model error and parameter error. The Commission has to date not allowed for model error in estimation of the WACC for any type of utility sector but the Commission has allowed for parameter error. The allowance for parameter error has been in the form of a margin added to the point estimate resulting from the estimation process.

133. Until last year the Commission set the allowed WACC for electricity and gas networks at a margin above the point estimate such that the probability of the allowed WACC being less than the true WACC was 0.25 – the so called 75th percentile estimate. However, the Commission's 2014 review of the 75th percentile resulted in the margin being decreased to reflect the 67th percentile and the probability of the allowed WACC being below the true WACC thus increased to 0.33.

134. In the Commission's December 2014 Draft and the Draft Determinations on cost of capital for the pricing of Chorus' UCLL and UBA services,[67] the Commission considered the question of setting the allowed WACC at a margin above the point estimate of WACC but has taken the view that for Chorus' services there is no need for a margin. As noted above, this proposal departs from established practice. Furthermore, as noted above, the decision appears to reflect Chorus' stage in the technology/investment cycle in respect of the copper network. The departure from established practice and the time inconsistency will add significantly to regulatory uncertainty for investors in telecommunications services.

Estimating the increment to WACC

135. If the allowed WACC is set without the addition of a margin to the point estimate there is a 50% probability that the allowed WACC will fall below the true WACC

[67] Commerce Commission, *Cost of capital for the UCLL and UBA pricing reviews. Further draft decision*, 2 December 2014; Commerce Commission, *Cost of capital for the UCLL and UBA pricing reviews. Further draft decision*, 2 July 2015.

and a 50% probability that it is above the true WACC.[68] The degree of the difference, or error, from the true WACC can be spelt out in probability terms but it is not possible to specify the size of the error in any particular case of setting the allowed WACC. Recognition of this potential for error, and that underestimation is the greater concern, led the Commission to set the allowed WACC at a margin above the point estimate. The choice of the 75th percentile level reduced the probability of underestimation from 50% to 25%.[69] That decision was based on careful consideration of the relevant issues but ultimately relied on informal judgment to guide the choice of 75% as opposed to some other percentile (above 50).

136. The Commission's decision in the 2014 review (in relation to the electricity and gas networks) to decrease the allowed WACC from the 75th percentile to the 67th percentile was guided by a model developed by Oxera which considered the effect of a margin on the risks of underinvestment and resulting electricity system outages.[70] Although the model was at best indicative rather than determinative of the choice of percentile, Oxera nevertheless recommended that the percentile should be set in the 60 to 70 range. Experts submitting on behalf of the utility companies disagreed with the Commission's inferences drawn from the model.

137. Oxera has also produced a model for consideration of the choice of percentile in the present Chorus pricing review.[71] The model considers the effect of a WACC margin on the timing of investment in new technologies. As with the model produced for the 2014 review, it is also indicative rather than determinative, but Oxera's conclusion in the present case is weaker in that the model is regarded as providing a plausible basis for a modest margin to be added but that it does not contradict setting the margin at zero. The Commission obtained a review of the Oxera model from Professor Ingo Vogelsang, which was negative (but misses a key assumption in the Oxera model, that the probability of investment in the new technology being accelerated is an increasing function of the margin added to the point estimate of WACC, which we discuss below).[72]

138. Perhaps Professor Vogelsang's review, combined with Oxera's confusing presentation of their results, explain the Commission's view that the link between

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68 The Commission refers to the point estimate of the true WACC that results from the estimation process as the 'mid-point' estimate. However, in terms of the framework for estimation the point estimate is actually just a point on a normal probability distribution of which the mean (mid-point) is the true WACC. The point estimate may be above the true WACC or below the true WACC. Therefore, if it is adopted as the allowed WACC then there will be a 50% probability that the allowed WACC is below the true WACC and a 50% probability that it is above the true WACC. As noted, the size of the error can be spelt out in probability terms but it is unknown in any particular case of estimation. It is thus inaccurate to refer to the point estimate as a mid-point estimate and it is certainly unhelpful as it likely to leave confidence in the estimate that it is without any basis. The same comment can be made of the Commission's practice of referring to the point estimate of TSLRIC as being a 'central estimate'.

69 Commerce Commission (2010) *Input methodologies (electricity distribution and gas pipeline services): reasons paper.* (Reasons Paper) December 2010

70 Oxera, *Input methodologies, Review of the 75th percentile approach*, 23 June 2014.

71 Oxera, *Is a WACC uplift appropriate for UCLL and UBA?*, June 2015.

72 Ingo Vogelsang, *Review of Oxera's report, Is a WACC uplift appropriate for UCLL and UBA?,* 29 June 2015.

reduction in the risk of delayed adoption of new technology is too uncertain relative to the costs.[73] Therefore, while the Commission earlier seemed willing to make a judgment on the appropriate allowance for parameter error, the 2014 review seems to have left the view that a strong formal model is required to guide the choice of percentile and in the absence of that guidance the best estimate of the margin is zero.[74]

139. In our view the Oxera model provides a useful starting point for consideration of the issues relevant to the choice of the percentile. In particular, we view reduced risk of delay in adoption of new technology as a key variable determining the choice of percentile. However, the model omits certain important factors relevant to the choice of percentile. In particular, there is no recognition that by adding a margin:

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

140. Furthermore, the Oxera model adopts a consumer welfare approach. As explained above, our view is that section 18 of the Act requires a total welfare standard. Therefore the only cost that should be taken into account in respect of the increase in the UCLL/UBA price is the deadweight loss.

141. The Oxera model assumes that the new technology will have the same capital cost as the copper network. This is described as being a conservative assumption. However, in our view this assumption is more appropriately described as unrealistic as history indicates that superior new telecommunications technology tend to come at a lower capital cost.

Probability weighted net results of Oxera model

142. Oxera present their results in Figures 6.1 and 6.2 and Table 6.1 of their report but in a less than helpful manner. Their Figures 6.1 and 6.2 purport to show the annual, not probability weighted, benefits of accelerated adoption but in fact the benefits shown are probability weighted. The last three columns of Table 6.1 are described as probabilities of the benefits being realised at the 95th percentile when the probabilities are the estimated probabilities of the benefits being realised across all the tabled percentiles.

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73 Commerce Commission, *Cost of capital for the UCLL and UBA pricing reviews. Further draft decision*, 2 July 2015.

74 The Commission has also presented a model for determination of the percentile (Commerce Commission: *Agenda and topics for the conference on the UCLL and UBA pricing reviews*, 2 April 2015) but the structure has the unrealistic assumption that the size of the margin affects whether investment in the new technology takes place at all. In contrast the Oxea model makes the realistic assumption that the new technology will be introduced and that the size of the margin determines the timing of investment in the new technology.

143. We present alternatives to the Oxera analysis in three tables in Appendix 1:

- in Table 1 we provide the information given in Oxera's Table 6.1 but along with the probability weighted results on a net basis
- in Table 2 we show the results based on the cost of the new technology being set at the more realistic level of 50% of the existing technology
- in Table 3 we present the results again but this time on a total welfare basis but with the capital cost of the new technology still set equal to the cost of the existing technology

144. To keep each of the tables manageable on a single page we present the benefits at the midpoints of the ranges for the two year and five year delays rather than for the extremes of the two ranges. Presenting the results from the Oxera model in this way shows that:

- if a consumer benefit standard is applied, and a two year delay is assumed in the adoption of new technology, the best strategy is to set a low percentile; however, if a five year delay is assumed, the best strategy is to set a high percentile (table 1)
- if a consumer benefit standard is applied, but a more realistic assumption for the capital cost of the new technology is adopted, for a two year delay the best strategy is to select a medium level percentile and for five year delay a medium to high percentile should be selected (table 2)
- Table 3 shows that with a total welfare approach the best strategy is to select a high percentile for both durations of delay

145. A broad view of these results is that a medium percentile is easily justified. And this holds even without giving recognition to the factors omitted from the model.

146. Professor Vogelsang in his review substitutes for Oxera's estimated probabilities of the benefits being realised the probabilities of the allowed WACC exceeding the WACC by 0, 0.5% and 1%. This misses a key point of the Oxera model, that is the probability of investment in the new technology being accelerated is an increasing function of the margin added to the point estimate of WACC.

Appendix 1 Tables for WACC section

Table 1 Summary of the Oxera Analysis

Percentile	Total costs	Potential Annual Benefits		Probability of the benefits being realised			Probability weighted net benefits Two year delay			Probability weighted net benefits Five year delay		
		Two year delay	Five year delay	Based on P(allowed WACC > True WACC)	Based on P(allowed WACC > True WACC by more than 0.5%)	Based on P(allowed WACC > True WACC by more than 1%)	Based on P(allowed WACC > True WACC)	Based on P(allowed WACC > True WACC by more than 0.5%)	Based on P(allowed WACC > True WACC by more than 1%)	Based on P(allowed WACC > True WACC)	Based on P(allowed WACC > True WACC by more than 0.5%)	Based on P(allowed WACC > True WACC by more than 1%)
50	0	200	425	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0
55	20	200	425	0.11	0.10	0.09	2.0	0.0	-2.0	26.8	22.5	18.3
60	50	200	425	0.21	0.20	0.18	-8.0	-10.0	-14.0	39.3	35.0	26.5
65	70	200	425	0.32	0.30	0.27	-6.0	-10.0	-16.0	66.0	57.5	44.8
70	100	200	425	0.42	0.40	0.35	-16.0	-20.0	-30.0	78.5	70.0	48.8
75	120	200	425	0.53	0.50	0.44	-14.0	-20.0	-32.0	105.3	92.5	67.0
80	160	200	425	0.63	0.59	0.53	-34.0	-42.0	-54.0	107.8	90.8	65.3
85	200	200	425	0.74	0.69	0.62	-52.0	-62.0	-76.0	114.5	93.3	63.5
90	240	200	425	0.84	0.79	0.71	-72.0	-82.0	-98.0	117.0	95.8	61.8
95	320	200	425	0.95	0.89	0.80	-130.0	-142.0	-160.0	83.8	58.3	20.0

Table 2 Summary of the Oxera Analysis

Percentile	Total costs	Potential Annual Benefits		Probability of the benefits being realised			Probability weighted net benefits Two year delay			Probability weighted net benefits Five year delay		
		Two year delay	Five year delay	Based on P(allowed WACC > True WACC)	Based on P(allowed WACC > True WACC by more than 0.5%)	Based on P(allowed WACC > True WACC by more than 1%)	Based on P(allowed WACC > True WACC)	Based on P(allowed WACC > True WACC by more than 0.5%)	Based on P(allowed WACC > True WACC by more than 1%)	Based on P(allowed WACC > True WACC)	Based on P(allowed WACC > True WACC by more than 0.5%)	Based on P(allowed WACC > True WACC by more than 1%)
50	0	200	425	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0
55	15	200	425	0.11	0.10	0.09	7.0	5.0	3.0	31.8	27.5	23.3
60	40	200	425	0.21	0.20	0.18	2.0	0.0	-4.0	49.3	45.0	36.5
65	55	200	425	0.32	0.30	0.27	9.0	5.0	-1.0	81.0	72.5	59.8
70	75	200	425	0.42	0.40	0.35	9.0	5.0	-5.0	103.5	95.0	73.8
75	90	200	425	0.53	0.50	0.44	16.0	10.0	-2.0	135.3	122.5	97.0
80	120	200	425	0.63	0.59	0.53	6.0	-2.0	-14.0	147.8	130.8	105.3
85	150	200	425	0.74	0.69	0.62	-2.0	-12.0	-26.0	164.5	143.3	113.5
90	180	200	425	0.84	0.79	0.71	-12.0	-22.0	-38.0	177.0	155.8	121.8
95	240	200	425	0.95	0.89	0.80	-50.0	-62.0	-80.0	163.8	138.3	100.0

Table 3 Summary of the Oxera Analysis

Percentile	Total costs	Potential Annual Benefits		Probability of the benefits being realised			Probability weighted net benefits Two year delay			Probability weighted net benefits Five year delay		
		Two year delay	**Five year** delay	**Based on P(allowed WACC >** True WACC)	**Based on P(allowed WACC > True WACC by more** than 0.5%)	**Based on P(allowed WACC > True WACC by more** than 1%)	**Based on P(allowed WACC >** True WACC)	**Based on P(allowed WACC > True WACC by more** than 0.5%)	**Based on P(allowed WACC > True WACC by more** than 1%)	**Based on P(allowed WACC >** True WACC)	**Based on P(allowed WACC > True WACC by more** than 0.5%)	**Based on P(allowed WACC > True WACC by more** than 1%)
50	0	200	425	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0
55	0	200	425	0.11	0.10	0.09	22.0	20.0	18.0	46.8	42.5	38.3
60	0	200	425	0.21	0.20	0.18	42.0	40.0	36.0	89.3	85.0	76.5
65	0	200	425	0.32	0.30	0.27	64.0	60.0	54.0	136.0	127.5	114.8
70	0	200	425	0.42	0.40	0.35	84.0	80.0	70.0	178.5	170.0	148.8
75	5	200	425	0.53	0.50	0.44	101.0	95.0	83.0	220.3	207.5	182.0
80	5	200	425	0.63	0.59	0.53	121.0	113.0	101.0	262.8	245.8	220.3
85	10	200	425	0.74	0.69	0.62	138.0	128.0	114.0	304.5	283.3	253.5
90	10	200	425	0.84	0.79	0.71	158.0	148.0	132.0	347.0	325.8	291.8
95	20	200	425	0.95	0.89	0.80	170.0	158.0	140.0	383.8	358.3	320.0