

Reply to Comments on my June 12, 2014, paper “On the economic effects of allowing a WACC above the midpoint”

Prepared for the New Zealand Commerce Commission

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I. Introduction

1. The New Zealand Commerce Commission (in the following: NZCC or “the Commission”) has asked me to reply to submissions relating to my June 12, 2014, paper “On the economic effects of allowing a WACC above the midpoint”. In particular, I should answer, if these comments change my view in any way, if so how, and if not why not.
2. According to the Commission the key points from the submissions that need to be addressed are:
 - **“Vector (page 5 and paragraphs 44-46):** Professor Vogelsang’s comments regarding the impact of changes on investment are not supported by economic theory, decision-making in practice or by observed outcomes. As the Commission does not know whether current investment levels are optimal, the Commission would be on more solid ground to follow the established and accepted analysis on this issue.
 - **Sapere (page 6 and section 6 – pages 31-34):** In support of its draft decision, the Commission refers to Professor Vogelsang’s advice that if investment at the margin is optimal, the impact of changes in investment are likely to be relatively minor. The Commission admits it does not know if investment levels at the margin are optimal. Economic theory suggests that it is highly unlikely that investment at the margin is optimal, where a single entity is providing a common service to multiple customers, as is the case with electricity and gas networks. This theoretical finding (I.V.: based on Spence, 1975) accords with evidence describing decision-making in practice and anecdotal evidence on the welfare impact of investments at the margin. We are not aware of any empirical evidence provided to the Commission that would suggest a reduction in investment would have other than an asymmetric impact on consumer welfare.
 - **Incenta (pages 3 and 13):** There is no reason to assume (as Professor Vogelsang suggests) that if current investment is optimal that a change in investment cannot have a materially negative impact on reliability. The current level of investment is there to meet current requirements and cannot address future requirements that will arise as assets age and deteriorate and as demand changes. If the WACC does not motivate new investment to meet future needs this can have material impacts on reliability and create large costs.
 - **Powerco (paragraph 7.8(c) and paragraphs 70-78):** there is no evidence that current investment levels are at or above ‘optimal’ levels, and in fact no observations about investment levels have been presented that are relevant to this percentile decision. In any event, Professor Vogelsang’s hypothesis as to consumer harm from regulatory mistakes in

this situation is inconsistent with economic theory and with the general consensus of views expressed throughout the Commission's consultation.

- **HoustonKemp (section 6, pages 33-34):** Economic theory provides only limited support for Professor Vogelsang's underlying premise that there will be no significant effects on welfare from misspecifying the WACC because, at the optimal investment level, the costs and benefits are balanced. Such an equivalency can only be said to apply at the margin. Thus, such equivalency can only be assumed for very small deviations in investment from optimal levels.
- **PwC (paragraph 28):** One of the pieces of evidence stated as being most persuasive was Vogelsang's finding that only large changes in the WACC will have material effects on investment. However, as Vogelsang notes, this finding is conditional on the slopes of the marginal cost and benefit curves being relatively flat. In fact, Oxera and Sapere suggests that the marginal cost curve up to a small distance below the true WACC is likely to be relatively steep. The marginal cost curve could easily be relatively steep over the scope of WACC change that the Commission is proposing. This criticism of Vogelsang's finding appears to have been given limited if any weight in the WACC Paper.
- **NZ Airports Association (paragraphs 82-83):** there are flaws in Professor Vogelsang's "insight" and analysis that provide an additional hurdle."

II. My main statements referred to in the submissions

3. The starting point of my analysis (in paragraph 1)¹ was that "any attempt at empirical investigation will ... produce highly uncertain results that may suggest more precision than attainable. The question therefore is if approaches exist that allow one to circumvent such detailed estimations and produce more satisfactory results." Hence, the purpose of the exercise was not to come up with new empirical information but rather to find ways to deal with the very limited information available. In order to do so, I used very simple theoretical insights. The criticisms of my conclusions contained in some of the submissions related partially to my theoretical statements, partially to empirical statements that I made in the paper and partially to empirical statements by the NZCC related to my theoretical statements. I will try to address all three of these.
4. My main theoretical statements can very briefly be summarized as follows:
 - (1)(a) If investment is currently at the optimal level from consumers' perspective and if the allowed WACC is currently at the 75th percentile then a small to moderate reduction in investment associated with a reduction in the allowed WACC is likely to make consumers no worse off. The reason is that the reduction in investment generates a *second-order* consumer welfare effect, while the reduction in WACC (that applies to the whole RAB) has a *first-order* effect on consumer welfare.

¹ Unless noted otherwise, in the following "paragraph" always refers to my June 12 paper.

- (1)(b) I noted that the investment-related consumer surplus reduction might be greater if (i) either the marginal benefits function or the marginal cost function of investments is very steep in the environment of the optimum (paragraphs 8 and 9) or if (ii) the investment reduction from the decrease in the allowed WACC is large (paragraph 5).
- (2) If current investment is below the optimal level then the negative consumer welfare effect from an investment reduction is itself of first-order magnitude so that it could outweigh the price-reducing effect of the WACC reduction.
- 5. None of the above submissions has made me change my view of these statements. The challenges to these statements contained in the submissions largely refer only to the empirical weight given to the various parts of my statements.

III. Response to submissions on statement (1)(a)

- 6. Most of the above submissions question the premise of statement (1)(a), which is that current investment levels (under the 75th percentile) are optimal. Thus, they question the empirical relevance of this first statement.
- 7. While I introduced it as “an admittedly extreme case” (paragraph 5), my first statement (1)(a) does have empirical relevance. An allowed WACC at the 75th percentile level is substantially more likely than not to be above the firm’s actual cost of capital. Thus, the firm will in the majority of cases, where the allowed WACC is above the actual cost of capital, have an incentive to over-invest rather than under-invest (Averch-Johnson effect). The HoustonKemp submission (section 3.3.3), in particular, notes that New Zealand has policies in place to avoid over-investment. Given the information asymmetry between regulators and firms such policies can never be perfect. Which regulator will prevent excessive reliability investment? Also, policies on reliability and adherence to technical standards will help prevent potential under-investment that could conceivably occur, although the cost of capital is below the allowed WACC.
- 8. Even at the 75th percentile there is a small chance that the allowed WACC will be below the actual cost of capital. In that case under-investment could occur. Given policies and standards in place on reliability such under-investment will likely occur first and foremost for discretionary investments.
- 9. Submissions by Vector (paragraph 45) and Sapere (pp. 6 and 32) suggest that investments in quality will be at sub-optimal levels because of the famous arguments by Spence (1975). According to Spence firms with market power generally under-invest in quality and this holds, in particular, under price regulation.² The argument is basically that profit-maximizing firms adjust their quality of service to the quality valuation of the marginal consumer, while the welfare optimum is determined by the quality valuation of all consumers. If, as is plausible, the marginal quality valuation is lower than the average quality valuation and if quality of service is investment-dependent the profit-maximizing monopolist will under-invest in quality. This source of under-investment could go away through an excessive allowed WACC (via the Averch-

² Sappington (2005, p.136) in his literature review of quality-of-service aspects of regulation finds the effects of incentive regulation on quality to be mixed.

Johnson effect) if quality is capital-consuming. While some aspects of quality are generally capital-consuming (for example, congestion reduction), others are less so (for example, the reliability of distribution networks).

10. The Spence paper was published forty years ago and has heavily influenced economic thinking and policy practice. As a result, in regulated sectors with specific quality concerns quality is today regulated along with price. The Spence model does not take into consideration such specific quality-related policies. Thus, the Spence model is unlikely to apply to the current situation of the New Zealand electricity sector. This comes out most clearly in the Sapere submission. Their major empirical argument is based on their Appendix 3 (itself based on a statement by Ryno Verster), where they show that investment in the New Zealand electricity networks is not driven by average consumer valuation for quality. While reading this statement my first reaction was that Sapere was now going to show that such investment was rather driven by marginal quality valuation, as the Spence model postulates. However, it turns out that the driving forces were policies and technical standards that induce the firms to invest for reliability and security purposes and for linking up new customers and new geographic areas. From the consumer welfare perspective these are the most important quality-related investments, because they assure the availability of the service. There is not the slightest indication that any of the quality investments mentioned by Sapere are driven by the marginal customer valuations. Thus, Sapere themselves prove that the Spence model is not applicable.
11. Overall, I find that investment at the 75th percentile may well be at the optimal level and certainly will not be much below the optimum, unless the main quality-related policies fail.³ This is in line with my statement that “if ... the correction of market failures were left to other regulations then the starting point for an analysis of the allowed WACC would naturally be the welfare-optimal investment” (paragraph 3). It is also in line with the Commission’s softer empirical hypothesis (their paragraphs x20.5 and 6.38.3), which is based on several observations about investment behavior in the last few years. It may, however, be viewed as contradicting the Commission’s use of the 75th percentile as an upper bound. This contradiction could be resolved through the observation that this optimum is achieved at a high price for consumers, who pay for the 75th WACC percentile. Thus, there would not have to be excessive investment going along the high WACC percentile to make it an upper bound for policy considerations.
12. While the other submissions emphasize that there can be no over investment, Incenta (p. 13) notes that over investment can have positive effects on consumers by, for example, increasing reliability or decreasing congestion. If these positive effects were absent the net benefit function of investment would be highly asymmetric such that the net cost of over investment to consumers would be much higher than the net costs to consumers of under investment.⁴

³ Ter-Martirosyan and Kwoka (2010) find empirically for U.S. electricity distribution networks that reliability-related policies and standards do correct for any reliability reductions that arise due to the use of incentive regulation.

⁴ Since the cost of investment increases in the size of investment, the investment optimum has to occur in the range where gross benefits of investment are still increasing and where the slope of the benefits function equals the slope of the cost function. Thus, the absence of consumer benefits from over investment would require a kink in the benefits function at the optimum.

13. A major reason why most of the submissions doubt that current investments are at the optimal level is that the submissions take a total welfare rather than a consumer welfare approach. Under the total surplus approach the investment-related welfare effects tend to dominate the price-related consumer welfare effects from the reduction in the allowed WACC. While I have pointed out this property of a total surplus approach (paragraph 13), the total surplus approach is not the one taken by the NZCC. So, this argument would not be relevant. Thus, arguments, such as those by HoustonKemp (p. 34) about my analysis only applying at the margin and for small deviations from the optimum, which could hold under the total surplus approach, fail under the consumer welfare standard.

IV. Response to submissions on statement (1)(b)

14. The Incenta submission, in particular, leans towards the second part of the first statement, arguing that even if current investment levels were optimal a reduction in the allowed WACC would reduce investment substantially (sequentially or cumulatively) so that the reduction in the allowed WACC would generate a first-order investment effect on consumer welfare. Incenta (p. 3) notes that “The current level of investment is there to meet current requirements and cannot address future requirements that will arise as assets age and deteriorate and as demand changes.” And, “irrespective of current levels of investment, a failure to make those future investments, be they replacements or augmentations, will nonetheless have serious impacts on reliability and create large losses” (p. 13). These quotes point to an aspect that so far has received little attention in this proceeding. It is the differentiation between the stock of assets and the flow of investments. Consumers derive benefits from the stock of assets, not from the ongoing investments. However, the ongoing investments increase the stock of assets, while without investments the passage of time and the ongoing use decrease the stock of assets. Thus, the effect of a reduction in investment on consumer welfare depends on the amount of the investment reduction and on the time during which investment was lowered. A small reduction in investment will generally have a substantive effect only if it persists for a long time, while a large reduction will already have sizable effects after a moderate amount of time. Incenta considers investment reductions as irreversible. This is true to the extent that investments take a long time to materialize. Otherwise, the effects of too low investments show up and can be corrected in due course. Overall, because long-lived assets change much more slowly than investments, Incenta’s emphasis on the flow aspect of investments most likely reduces rather than increases the severity of investment shortfalls relative to the stock approach taken in most of this proceeding.
15. Based on Sapere and my June 12 paper Vector (paragraph 45) points out that “innovative investments and lumpy network augmentation investments are likely to require a higher WACC.” I agree. However, this would relate to the midpoint WACC as the starting point. Again the question arises, how much higher than the midpoint?
16. PwC (paragraph 28) notes that Sapere finds steep slopes for severe under estimation (cited in the Commission’s paper, footnote 132). This would again caution against substantial reductions in the allowed WACC percentile from the 75% mark.

V. Response to submissions on my statement (2)

17. As far as I could see, only the Sapere submission (p. 32) refers to my second above statement, which they characterize as a “likely...better conceptual representation of the effects of any under investment”. As explained in paragraph 8 above, a starting point of current investment under the 75th percentile approach as being below the optimal investment level is possible, although in my opinion quite unlikely. In that case the effect of a further reduction in investment due to a reduction in the allowed WACC would in fact have a first-order effect on consumer welfare. This first-order effect would have to be weighed against the first-order effect of the consumer welfare reduction from the price increase. This would caution against a too large reduction in the allowed WACC but not necessarily rule out a small reduction, unless the under investment is already substantial.
18. As explained above, under investment in the current situation is very unlikely for reliability, security and expansion investments, but it is possible for innovative and other discretionary investments. Some indication of the value of these investments for consumers is given in the submission of Castalia (section 3). This value is substantially smaller than the consumer surplus reduction from the across-the-board price increase from a higher WACC. The question then is to what extent an uplift on the allowed WACC should be used for incentivizing such discretionary investments. If the uplift were for those investments only it could be rather large but if it were blended in with the uplift for all the other investments it would have to be some weighted average (paragraph 15).

VI. Response to other issues raised in the submissions

19. NZ Airports Association (paragraph 83 (c)(i)) claims that I use the wrong legal and regulatory tests because contrary to my views “the WACC “uplift” is not being used as a “major tool” to *increase* investment or to remedy deviation of investment from the welfare optimum or to correct market failures. It is, in the Commission’s view of the problem definition, to increase the probability that the WACC estimate will allow for the expectation of a normal return consistent with the purpose statement.” NZ Airports Association does not specify, where they see the main difference between the investment objective and purpose statement. If anything it would be the LTBEU, which in the absence of the investment and innovation aspects would ordinarily call for a midpoint WACC, because at the midpoint the probability of deviations from a normal return would be minimized. Hence, I am unclear about the point NZ Airports Association wants to raise here, which was raised in no other submission.
20. NZ Airports Association (paragraph 83 (c)(ii)) faults me for asserting that the proposed 67 percentile WACC would provide the firms with a return that makes them whole (Vogelsang, 31 July Review, paragraph 2). They are right that uncertainty is involved so that I should have expressed this claim an expectation rather than as a fact.

VII. References

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