TELSTRA'S WEIGHTED AVERAGE COST OF CAPITAL FOR THE CAN-RELATED ASSETS USED IN THE PROVISION OF ULLS:

COMMENTS ON REPORTS OF OPTUS AND OVUM AND THE ACCC DRAFT DECISION

Prepared for Telstra

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EXECUTIVE SUMMARY

I have reviewed Telstra's proposed WACC for the CAN-related assets, the reports of Optus and Ovum and the Draft Decision of the ACCC. I discuss the input parameters to the estimation of WACC that are material and contentious. These parameters are the market risk premium, systematic risk, debt gearing and imputation credits. In my opinion, Telstra's estimates for each of these parameters are reasonable and appropriate for use with the CAN-related assets valued at 1 January 2008.

I also consider the estimates of appropriate ranges around each of the parameter estimates, which then leads me to a discussion of estimation error and framework error. The ACCC takes a position that there should be little or no range on these parameters. I discuss this position and find that there is in fact substantial estimation error. Further, the framework error associated with the models used in developing an estimate of WACC is substantial, although seldom expressed quantitatively.

In my opinion, considering all the evidence that I have reviewed and reference in this report, Telstra's proposed vanilla WACC, and the implied pre tax WACC based on Telstra's vanilla WACC parameters and proposed tax rate and gamma, are reasonable.

INTRODUCTION

1 I have been asked by Mallesons Stephen Jaques on behalf of Telstra Corporation Limited ("**Telstra**") to give my expert opinion on the reports of Optus[1] ("**Optus**") and Ovum Consulting[2] ("**Ovum**"). In the two reports, Optus and Ovum provide their opinions on the reasonableness of Telstra's Weighted Average Cost of Capital ("**WACC**") for its Customer Access Network ("**CAN**") related assets used in the provision of the Unconditioned Local Loop Service ("**ULLS**").

2 I have also been asked to give my expert opinion on the Australian Competition and Consumer Commission's ("**ACCC**") Draft Decision with respect to Telstra's Report ("**Draft Decision**").[3]

3 The range and point estimates of the WACC and its component parameters are developed in Telstra's report dated 4 April 2008, "Telstra Corporation Limited, ULLS Undertaking, Weighted Average Cost of Capital (WACC)" (the "**Report**"). The estimates are for assets valued at 1 January 2008 and for a period beginning on that date.

4 Telstra's WACC is to be used within the Telstra Efficient Access ("**TEA**") costing model.[4] I am instructed that the model has been designed for the purpose of estimating the efficient cost of the ULLS.

5 In forming my opinion on the reasonableness of Telstra's range and point estimates of WACC, I have taken into consideration the statutory criteria contained in Section 152CR, Part XIC of the *Trade Practices Act 1974* ("**TPA**").

6 My qualifications and experience have been set out in previous reports; most recently in "Report on Telstra's Weighted Average Cost of Capital for the CAN-related Assets Used in the Provision of ULLS" dated 30 July 2008.

2. WACC MODELS

7 Telstra estimates a nominal "vanilla" WACC. In the vanilla WACC the tax impact of interest expense is included in costs, rather than in the WACC formula. Thus it is a post-tax WACC. The model is shown algebraically in paragraph 31 of the Report. As inputs to the WACC model, the cost of debt

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1 "Optus Public Submission to Australian Competition and Consumer Commission on Telstra's Access Undertaking for the Unconditioned Local Loop Service Response to Discussion Paper" dated August 2008.

2 "Review of the economic principles, capital cost and expense calculation of the Telstra Efficient Access cost model: A Report to the ACCC" dated 6 August 2008.

3 "Assessment of Telstra's Unconditioned Local Loop Service Band 2 monthly charge undertaking: Draft Decision" dated November 2008.

4 The model is detailed in "Telstra Efficient Access (TEA) Model Overview" dated 21 December 2007 and lodged with Telstra's ULLS Undertaking dated 3 March 2008.

capital model is set out in paragraph 32, and the cost of equity capital is set out in paragraph 33.

8 The models for WACC and cost of debt have been accepted and used by the ACCC as well as virtually all other regulators and experts in Australia and by Optus and Ovum. The model for the cost of equity has been accepted by the ACCC, but it recently stated a preference to treat the equity issuance costs as a specific allowance in cash flows when there is an issue of equity.[5] It reiterated that position in its Draft Decision (paragraph B.7.1).

3. PARAMETER VALUES

9 The formulas, definitions and purposes of the various parameters incorporated in the calculation of WACC are set out in Telstra's Report and (briefly) in the ACCC's Draft Decision.

10 In the sections below, I set out my response and the basis for my views on the more important opinions expressed by Optus and Ovum and on the positions taken by the ACCC. This report is not a comprehensive response to every point raised by Optus and Ovum or given in the ACCC's Draft Decision, or to all issues relevant to a particular parameter value. Where I do not specifically address a point made in either of the reports or in the Draft Decision, it should not be inferred that I agree with the opinion expressed.

11 I have read and considered the WACC relevant portions of Telstra's responses to the three reports discussed here.[6] I agree with the WACC portions of Telstra's responses.

3.1 Market Risk Premium

12 The ACCC has used a market risk premium ("**MRP**") of 6% in its previous decisions, which is consistent with other regulators in Australia.

13 Telstra's Report provides a review of the available historical evidence on the MRP in Australia, which is shown to strongly support a rate of 7%. The wide range of estimates is also noted.

14 The Report also presents a benchmark approach based upon the estimated MRP in the USA and a country risk premium for Australia. This approach is justified because of the questionable relevance of historical data in Australia given the huge structural changes in the economy and markets that occurred with the wide sweeping deregulation of the 1980s. This approach yields an estimate of 7%.

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5 "Assessment of Telstra's ULLS Monthly Charge Undertakings, Draft Decision, Appendix D. Weighted Average Cost of Capital (WACC)" dated June 2006, para D.5.12.

6 Telstra's reports are; "Response to Access Seeker Submissions" (dated 18 November 2008), "Response to Ovum's Submissions" dated 5 December 2008, and "Response to the ACCC's Draft Decision" dated 23 December 2008.

15 The Report concludes (paragraphs 144-146) that the ACCC's estimate of 6% for the MRP is too low. An estimate of 7% is recommended.

16 In paragraphs 141-143 of the Report, Telstra discusses a range of sources of estimation error for MRP. It correctly notes that MRP is generally regarded as the most challenging and controversial parameter to estimate. It then cites reports of a standard error for historical MRP estimates of more than 2%. It concludes that a reasonable range is from 5.5% to 8%.

3.1.1 Measuring historical annual returns

17 The average annual market return that is realised over a number of years can be calculated as either arithmetic or geometric returns. Care must be taken not to confuse the two.

18 To the best of my knowledge, this distinction has not been extensively discussed in past deliberations of the ACCC. The implicit assumption appears to have been that arithmetic returns were the appropriate measure. The early compilations of historical market returns were based upon arithmetic returns and that measurement method has been perpetuated.

19 I note in section 3.1.4 that when choosing a measure of MRP from the research of Brailsford, Handley and Maheswaran (discussed below), the ACCC chooses an arithmetic measure.

20 The difference between the two measures has now become important because Ovum and the ACCC both cite data measured as geometric returns without any discussion or discernment about the measurement.

21 In the context of historical annual market returns, the arithmetic return is the simple average (mean) of the annual returns for the years. The geometric return is the compounded return that would have been realised over the period of years being analysed.[7]

22 The two measurement methods are both valid tools for measuring historical returns. The appropriate method to use in a given situation depends upon the context and purpose.

23 Consider an investor that plans to make an investment for only one year. If the historical returns are appropriate for estimating future returns, the investor should use the historical arithmetic return to express the annual return he or she would expect to earn over the one year period.

24 As an alternative investment possibility, consider an investor that intends to make an investment, reinvest all dividends, and liquidate the investment at the end of a number of years. If the historical returns are appropriate for

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7 More technical explanations of the two measurement methods, complete with equations, can be found in most textbooks on corporate finance. See for example, McKinsey & Company (T. Koller, M. Goedhart and D. Wessels), *Valuation: Measuring and Managing the Value of Companies*, 4th ed. (Hoboken, New Jersey: John Wiley & Sons, 2005), pages 304-306.

estimating future returns, the investor should use the historical geometric return to express the annual return he or she would expect to earn over the multi-year period. The key here is that all income from the investment is reinvested until the end of the investment period, thereby justifying the compounding approach.

25 We can also consider the same multi-year scenario except that at the end of each year, the investor adjusts the amount of the investment to the original amount invested.[8] In this case the investor should use the historical arithmetic return to express the annual return he or she would expect to earn over the multi-year period. As the amount invested is the same at each year, the arithmetic return applies.

26 The context of estimating WACC for Telstra's ULLS is somewhat different, but similar logic applies. The WACC is used to determine the appropriate rate of return on capital.

27 The context of estimating WACC is the same as the last scenario above where the amount invested remains constant. The asset base used in the pricing model is equivalent to the amount invested. Under the TEA model (or a TSLRIC model), which determines the asset base for the CAN, the asset value is not changed during the period of the undertaking. In fact, the net asset base actually reduces because of depreciation. This makes a geometric measure of returns even less appropriate.

28 The returns to the CAN-related assets are distributed to debtholders (as interest payments) and shareholders (primarily as dividends). The residual, if any, is deployed to other investments

29 Because returns in a given year are not reinvested (thereby maintaining a constant or decreasing amount of invested capital), the arithmetic return is the appropriate measurement.

30 This conclusion is supported in various well-known texts in finance. In its section on the MRP, Copeland, Weston and Shastri say:[9]

> *How do we interpret ex post data, when the definition of the risk premium is based on forward-looking expected returns ... Thus, while it is appropriate to use geometric averages when measuring historical portfolio performance, the asset pricing models are forward looking and therefore are based on arithmetic averages that are representative of expected returns.*

31 McKinsey & Company agree and say:[10]

> *To best measure the risk premium using historical data, follow these guidelines: ... Use an arithmetic average of longer-dated intervals.*

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8 This would be done by taking out any profit or further investing the amount of any loss over the year.

9 T. Copeland, J. Weston and K. Shastri, *Financial Theory and Corporate Policy*, 4th ed. (Boston: Pearson Addison Wesley, 2005), page 171-172.

10 op cit., page 304.

32 Brealey, Myers and Allen provide a numerical example of estimating the opportunity cost of capital from historical returns and conclude thus:[11]

> Moral: *If the cost of capital is estimated from historical returns or risk premiums, use arithmetic averages, not compound annual rates of return.*

33 In my opinion, for the purpose of estimating an appropriate cost of equity capital, historical returns of the MRP should be measured using arithmetic averaging. This is consistent with the dominant view in the corporate finance literature.[12]

34 A geometric average of a series of historical returns will be less than an arithmetic average of the same series of returns. By placing emphasis on geometric measures of the MRP, Ovum and the ACCC are biasing the estimate downward.

3.1.2 Optus' Report

35 Optus summarises regulatory precedents in Australia and recommends that the ACCC continue that position.

36 Optus makes no comment on any evidence submitted by Telstra in its Report.

37 Continuing the status quo for no other reason than that it is the status quo hardly seems a substantive basis for dismissing Telstra's MRP estimate.

3.1.3 Ovum's Report

38 Ovum discusses three empirical studies of historical MRPs - Dimson, Marsh and Staunton, Hathaway, and Brailsford, Handley and Maheswaran.

39 There is a fundamental problem with Ovum's discussion of these reports, being the distinction between geometric measures of historical returns and arithmetic measures of historical returns. Ovum presents data from the studies with both measurement methods, but does not explain the difference between the two.

40 The report that receives the most discussion from Ovum is by Dimson, Marsh and Staunton.[13] The data on MRP covers 1900-2005 for 17 countries including Australia. In the report, MRP is measured and reported using both arithmetic and geometric returns and with the risk free rate measured

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11 R. Brealey, S. Myers and F. Allen, *Corporate Finance*, 8th ed. (New York: McGraw-Hill/Irwin, 2006.

12 As can be inferred from the three illustrations above, the appropriate averaging method depends upon the purpose. For some applications in long-term investments such as superannuation fund performance, a geometric measurement may be preferred.

13 E. Dimson, P. Marsh and M. Staunton, "The Worldwide Equity Premium: A Smaller Puzzle," presented at the EFA 2006 Zurich Meetings.

using both short-term bills and long-term government bonds.[14] The data for Australia from Table 3 in the report is shown below.

	Arithmetic	Geometric
Relative to bills	8.49%	7.08%
Relative to bonds	7.81%	6.22%

41 Ovum makes a series of adjustments to the above data and concludes that the current MRP measured as geometric returns is 5.2% - 5.7% and measured as arithmetic returns is 6.8% - 7.3% (an average above 7%).

42 Ovum then proposes that the MRP is between 5.2% and 7.3% with a point estimate of 6.2%.

43 The arithmetic and geometric measurements are two alternative methods of measuring the same thing. Combining and then averaging across them is not sensible. It is comparable to saying that the average price of a fine ounce of gold in 2008 was US$880, or measured alternatively the price was A$1,044. Therefore, using this data to project forward, the expected price of gold is $962 (which is the average of the prices in US and Australian dollars).

44 I explained above that for purposes of establishing a cost of capital the appropriate measurement is arithmetic returns. Setting aside the efficacy of the various adjustments employed by Ovum, the evidence presented by Ovum provides very strong evidence to support Telstra's MRP estimate of 7%.

45 Ovum cites a study by Dr Hathaway[15] that supports a geometric MRP of 6%.[16] Using the difference between geometric and arithmetic returns from the table above (7.81% - 6.22%), the appropriate measurement of Dr Hathaway's evidence supports a MRP of about 7.6%. Again, the evidence presented by Ovum strongly supports a MRP of at least 7%.

46 A further paper[17] presented by Ovum is said to support a rate of 5.9% - 6.2%.

47 Before discussing this result, I note that the authors of the paper state (page 78):

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14 Because MRP is measured as $[E(R_m) - R_f]$, the measurement of R_f, the risk free rate, is also important.

15 N. Hathaway, "Australian Market Risk Premium," Capital Research, January 2005.

16 There are serious concerns about the evidence presented by Dr Hathaway in this study, and I do not accept that his analysis is appropriate. A similar view is taken and details provided in S. Gray and R. Officer, "A Review of the Market Risk Premium and Commentary on Two Recent Papers," 15 August 2005.

17 T. Brailsford, J. Handley and K. Maheswaran, "A Re-Examination of the Historical Equity Risk Premium in Australia," *Accounting and Finance*, March 2008, 73-97.

When past performance is being considered, the geometric mean is of most interest, whereas for forward-looking decisions the arithmetic mean is the appropriate measure.

48 The Brailsford et al. paper reports Australian returns data for a number of different periods extending as far back as 1883 and up through 2005. The contribution of the research is a series of adjustments and modifications to the basic data to correct for a range of purported deficiencies in the raw data. A careful review of the various corrections is beyond the scope of this report and not necessary in the circumstances.

49 Brailsford et al. state that their results indicate historical returns are "substantially less than widely cited historical studies would otherwise indicate." (page 73) Therefore, their results can be considered a lower bound on estimates of MRP from historical Australian data.

50 Ovum chooses to report the results for the period 1900-2000, relative to bonds and assuming that dividend imputation credits have no value to investors. There are problems with the MRP values chosen by Ovum.

51 The value of imputation credits will be discussed below, but Ovum supports a value of 0.5 (Ovum's Report, page 41). To be consistent, Ovum should use a measure of MRP assuming that imputation credits have that value.

52 As is discussed below, Telstra proposes a value of zero for imputation credits, and I consider this value to be appropriate. The problem here is that Ovum chooses a measure of MRP that is not consistent with its own view on the value of imputation credits. This artificially reduces the MRP.

53 Brailsford et al. state "there are sufficient question marks over the quality of data prior to 1958 to warrant any estimates based thereon to be treated with caution." (page 73) Yet Ovum reports results for the full 20th century.

54 In the spirit of the Brailsford et al. research it is appropriate to focus on the results for 1958-2005. To be consistent with its position on imputation credits, Ovum should adopt the historical MRP reported in Table 6 of the paper as 6.7%. Whilst this is marginally less than Telstra's estimate of 7%, it is a lower bound and is much closer to Telstra's view than to the 6% supported by Ovum and the ACCC.

55 Ovum puts forward three empirical studies in support of its position. These are discussed above. When the data in those studies are used properly for purposes of estimating the cost of capital for the ULLS, they suggest the MRP based upon historical returns should be 7.0%, 7.6% and 6.7% respectively. The average of these three studies, relied upon by Ovum, is 7.1%.

56 In my opinion, Ovum's evidence provides strong support for Telstra's MRP estimate of 7%.

3.1.4 ACCC's Draft Decision

57 The ACCC begins the section on its view concerning the MRP with statements about the use of domestic or international models for estimating cost of capital. It states (pages 99-100):

> *The ACCC has consistently used a domestic CAPM to estimate the cost of equity capital. Telstra has not presented any evidence to support an international CAPM or the use of an American domestic CAPM with country risk premium for Australia.*

58 The ACCC refuses to seriously address the approach of estimating MRP using a benchmark approach, even though it has been included in every submission of Telstra or report by me about MRP for many years. In this Draft Decision, it again refuses to confront the issues.

59 It is interesting that while ACCC refuses to discuss the benchmarking approach to estimating the MRP, it espouses the benchmarking approach when estimating beta (page 103).

> *The use of benchmark betas is prevalent among regulators and finance practitioners and the ACCC considers it appropriate to include some comparison with comparable operations.*

60 The ACCC raises the issue of whether the Capital Asset Pricing Model ("**CAPM**") should be an international or domestic version. In my opinion, this is not a relevant issue, and I will provide a brief explanation of why.

International or domestic CAPM

61 The ACCC discusses this issue as if it was as simple as which CAPM version to choose. In a sense that is true, but in a more important sense it ignores the real issue, which is the nature of the Australian capital markets.

62 Are the Australian markets international or domestic? Clearly they are open and international.

63 Some regulators have argued that if we are to consider the presence and influence of foreign investors in the capital markets, we should be using an international CAPM ("**ICAPM**") to determine the cost of equity capital, not a domestic CAPM. All parameters would then need to be specified in a global market context.

64 In fully integrated capital markets, an international version of the CAPM should be preferred to the standard CAPM. However, the available empirical evidence shows that the standard CAPM is only marginally different from a multi-factor ICAPM[18] in explaining historical returns.[19]

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18 The CAPM is a "single-factor" model where the only factor used to explain the returns of a company is the return on the market index. The single-factor ICAPM uses the returns on an international index of global markets. A multi-factor ICAPM uses additional factors, most

65 The evidence also indicates that the single-factor ICAPM is an inferior model for this purpose.

66 The relevant question to be addressed is - how do we best estimate a forward looking cost of equity, not how to best estimate historical returns.

67 To estimate the forward looking cost of equity requires reliable estimates of the variables in the model. In the single-factor ICAPM, that means we must be able to reliably estimate the world MRP. At the most we have 20 to 25 years of data for this purpose. To assume that world security returns were generated in an international market before the mid-1980s would be tenuous at best. It is well accepted that such a short period as 20 to 25 years is not sufficient for a reliable estimate of MRP.

68 Estimating MRP is always problematic. With respect to the ICAPM, the conclusion must be that we have no method of using historical returns to reliably estimate a world MRP.

69 Even if we overcome the problem of estimating a world MRP, the fact remains that the single-factor ICAPM does not provide an improvement over the standard CAPM.

70 To achieve a significant improvement it is necessary to apply an ICAPM that incorporates exchange rate risk. To achieve this we must estimate a firm's sensitivity to exchange rate risk across all countries in the world economy. We are far from having a reasonable basis for this estimation in practice.

71 Due to the problems associated with applying the ICAPM, we can conclude that the predictive properties of the standard CAPM should be at least as good as the ICAPM.

72 The Australian capital markets are international markets. However, the most effective way to estimate the cost of equity capital is to use the domestic CAPM. The application of the domestic CAPM serves as an appropriate proxy for an international CAPM. Excluding the influence of the international investors is both unrealistic and impractical.

Historical evidence

73 The ACCC acknowledges that historical measures of MRP are generally in excess of 6%.

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importantly, factors to capture the effect of exchange rate relationships across the global markets.

19 For examples of this research, see K. Koedijk, C. Kool, P. Schotman and M. van Dijk, "The Cost of Capital in International Financial Markets: Local or Global," *Journal of International Financial Markets and Finance*, 2002, v 21, pp 905-929; D. Mishra and T. O'Brien, "A Comparison of Cost of Equity Estimates of Local and Global CAPMs," *The Financial Review*, November 2001, v 36, pp 27-48; M. Dahlquist and T. Sällström, "An Evaluation of International Asset Pricing Models," 2002, Working Paper, Duke University.

74 It then cites the Brailsford et al. study as reporting an MRP for 1958-2005 of 6.3%. This excludes the value of imputation credits and is measured relative to bonds, but it is measured as arithmetic returns. As with Ovum, the ACCC supports a value of imputation credits of 0.5, so its estimate of MRP should be consistent with that position. Therefore, the correct MRP for the ACCC to extract from the Brailsford et al. study is 6.7%. As discussed above, this is a lower bound on an estimate of the historical MRP, but it provides more support for Telstra's position than for the ACCC's.

75 The ACCC then refers to a view espoused in the Dimson et al. study that high equity returns in the second half of the 20th century were a result of unique factors.[20] The ACCC then asserts that forward looking estimates of MRP could be expected to be lower than the values obtained from historical studies.

76 The factors mentioned by Dimson et al. are an attempt to rationalise higher returns in some international markets for the second half of the 20th century. Whether there were higher returns in Australia is an empirical question. An inspection of the data in Brailsford et al. provides very weak support for the high returns thesis.

77 Brailsford et al. report (their Table 4):

	MRP
1883-2005	6.2%
1883-1957	6.1%

78 Although the dates are not exact matches, the data indicates almost no difference between excess returns in the two periods.

79 The ACCC provides no information to indicate that the adjustments made in Dimson et al. are relevant to Australia, or for that matter that they are appropriate for other markets reported in Dimson et al.

3.1.5 My conclusion on the Market Risk Premium

80 In a number of prior submissions and reports by Telstra, including Telstra's Report, concern has been expressed about the relevance of Australian market data prior to the major restructuring of the economy in the 1980s. Because of this concern, an alternative approach has been undertaken whereby the MRP for the US has been estimated and then an appropriate premium over that benchmark has been estimated to reflect the higher risk of investment in Australia.

81 The ACCC has never undertaken a response to the points made with respect to that benchmarking approach. In my opinion, its unwillingness to

20 The factors cited are (1) unprecedented growth in productivity and efficiency, (2) a fall in the required rate of return because of decreased business and investment risk, and (3) a significant decrease in transaction and monitoring costs over time.

seriously address an approach that is established in the finance literature and that is carefully executed and documented indicates that it has no substantive response. I believe the evidence using the benchmark approach should be taken as having established its credibility.

82 In my opinion the evidence in the reports of Optus and Ovum and in the ACCC's Draft Decision, as discussed above, does not diminish the credibility and reasonableness of Telstra's estimate of 7% for the MRP.

3.2 Systematic Risk

83 The systematic risk of a company is the extent to which the changes in the returns from the company's stock are related to the changes in returns to the market as a whole. The measure of systematic risk in practice is referred to as beta (or β). It is the only risk factor incorporated in the CAPM.

84 The systematic risk of a company at a point in time is impacted by the company's financial leverage; the more leverage, the more volatility and the higher the systematic risk. The systematic risk of a company that includes the impact of leverage is referred to as its equity beta. For some purposes, it is useful to abstract from the leverage of a firm and estimate the systematic risk as if the company had no debt; that is, as if it were an all-equity firm. This is referred to as an asset beta.

3.2.1 Optus' Report

85 Optus puts forward four views to support its position that Telstra's beta estimate is too high: irrelevance of a Telstra-wide asset beta; irrelevance of regional Bell operating companies (RBOCs) as comparable companies; proposal to use Ofcom's view on BT's Openreach division; and proposal to use gas pipelines and electricity distribution network companies as comparables.

86 Optus states (paragraph 4.152) that Telstra "proposed use of a Telstra-wide asset beta estimate." This is not correct. My understanding is that Telstra presented information on the Telstra-wide beta because it provides a useful data point in developing an estimate of the asset beta of the CAN-related assets. It is not relied upon as the correct estimate, but it is considered as relevant to the determination of an appropriate estimate.

87 Optus then states that the ACCC should consider an approach applied by Ofcom whereby a company's beta is disaggregated into its component parts by businesses within the larger company. I agree with this approach in principle. However, Optus does not conduct any analysis along these lines other than to quote Ofcom's conclusion that BT's copper access network business would have an equity beta lower than BT Group's beta by 0.2.

88 Although disaggregating a diversified company into its component parts can be a valid exercise, including for the estimation of beta, careful analysis is needed before any conclusions can be reached. To be able to reach any

conclusion about an appropriate beta for the CAN-related assets of Telstra, there needs to be analysis of the component businesses. To simply quote Ofcom and imply that its analysis is valid for Telstra is not supported.

89 Optus rejects the use of the RBOC's as comparable companies for estimating beta. "RBOCs provide a range of services quite different and of a significantly different risk profile compared to providing access to a fixed-line customer access network." (paragraph 4.155) Optus then lists a number of services provided by RBOCs.

90 There is always a lack of precision in selecting listed companies to use as comparators, so it is to be expected that the RBOCs (or any other chosen comparator companies) will have differences to the ULLS. There are at least two shortcomings in Optus' discussion of RBOCs.

91 First, although the RBOCs are involved in a wide range of businesses, the relevance of that observation depends upon the systematic risks and magnitudes of the activities. Optus provides no such information.

92 Second, in comparing the ULLS business with the RBOCs, Optus does not consider the fact that the systematic risk of the ULLS will be determined almost entirely by the sources of its revenue and its operating leverage (which is acknowledge to be high). When this is considered, it is clear that the ULLS business depends heavily on a range of services including some of the services that Optus identified as being conducted by the RBOCs.

93 The third point of evidence provided by Optus concerns Openreach; a business of BT Group that provides access to a fixed-line customer access network. Ofcom has estimated its equity beta as in the range 0.7 to 0.8. Optus submits that this regulatory decision should be used as a comparator but does not provide evidence to support its validity as a comparator.

94 In addition, Optus submits that the ULLS services have substantially similar characteristics to natural monopolies such as gas pipelines and electricity distribution network companies. Optus cites a report of the Competition Economists Group ("CEG") on Australian regulators' decisions on equity beta. Based upon this information, Optus submits that the ULLS asset beta should be 0.45. In other words, Optus accepts a summary of regulatory decisions in Australia on gas pipelines and electricity distribution network companies for its estimate of an equity beta for the ULLS business. In my opinion that is inappropriate. The ULLS business is appreciably more competitive, and hence has more systematic risk, than the Australian gas pipeline and electricity distribution network businesses.

95 Telstra provides a thorough rebuttal of the comparability of the systematic risk of its ULLS business and gas pipelines and electricity distribution network companies in its response to Optus' report. I agree with that analysis.

96 In my opinion, to characterise the systematic risk of the ULLS business as being a natural monopoly indicates a lack of appreciation of the competitive environment of ULLS.

3.2.2 Ovum's Report

97 Ovum provides the results of its direct estimation of Telstra's equity beta. The data on equity betas are summarised in the following table (from Ovum's Table 3.10). Three different measurement intervals and two different time periods are used.

	18 months	5 years
Daily	0.587	0.556
Weekly	0.655	0.534
Monthly	0.553	0.394

98 Ovum notes that the ACCC has recommended beta estimates using five years of monthly data. I agree that this is a common and acceptable choice of time period and measurement interval. From this analysis, Ovum concludes that an equity beta of 0.394 "could" provide an appropriate estimate of Telstra's equity beta.

99 In justifying its choice, Ovum cites Copenhagen Economics as recommending against using daily data, but makes no comment on why weekly data would not be as useful as monthly data. There is considerable competing research about the advantages and disadvantages of various beta estimation periods, intervals and methods. A single reference to a Danish consulting company does not constitute an authoritative case.

100 It is obvious that the chosen estimate is considerably at odds with the other five estimates, which average 0.577. A statistical t-test indicates that there is less than a 1% probability that the observation chosen by Ovum is drawn from the same distribution as the other five observations.

101 It is also clear to those with substantial experience with estimating equity betas, that an estimate below 0.4 is unusually low. In my view this raises a concern that there is a problem with the data used to calculate the monthly, five year beta.

102 Ovum kindly provides its Figure 3.11, which shows the "scatter plot" of the observations used in the five-year, monthly estimate, as well as the results of the regression. The regression result indicates that the model that calculated beta explained less than 5% of the variability of Telstra's share price. This is indicated by the R^2 (0.0488 or 4.88%), or coefficient of determination. This statistic provides an indication of how well future outcomes are likely to be predicted by the model; in this case, how well the estimated beta predicts the forward looking beta. Predictability of less than 5% is very low and below what would generally be considered a reliable level of explanatory power for statistical purposes.

103 An appropriate question to ask is - why does the estimate have such low predictive ability? It is clear from the figure that one observation is an "outlier".[21] The outlier is the observation for the month of September 2005. Telstra returns were negative (-13.03%) while the market return was positive (+4.37%).

104 The observation is a valid observation of what occurred with Telstra's shares and in the market overall in that month. But the observation raises the question of whether there were events in that month that are not relevant to a forward looking estimate of systematic risk. The suspicion is that the dramatically negative return for Telstra indicates an unusual event in that month.

105 I am instructed that on 4 September 2005, a Sunday when the market was closed, Telstra announced revised earnings guidance to the market. It announced that it expected earnings before interest and taxes to decline by 7% to 10% for the fiscal year to end on 30 June 2006.[22] This was a substantial downward adjustment from the previous announcement on 11 August 2005 that earnings before interest and taxes were expected to decline.

106 I am instructed that most analysts issued negative commentary in response to the announcement.

107 The decline in share price on 5 September was the second worst daily decline in the five year period covered in Ovum's analysis (a total of 1265 days).[23]

108 It is then appropriate to ask what the beta estimation would be if this singularly unusual month was omitted. If the same regression procedure is used to estimate equity beta from the five years of monthly data but with the September 2005 observation omitted, the result is an equity beta of 0.52. This is still lower than the other five observations but is clearly not an outlier.

109 There is always a question of how to treat an outlier. In this case it is important to bear in mind the purpose of the calculation; that is to inform an estimate of a forward looking equity beta. In my opinion, the estimate without the outlier month of September 2005 is a more useful result than the outlier result proposed by Ovum.

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21 An outlier is an observation used in the analysis that is distant from the overall pattern of the dataset. The existence of an outlier indicates an econometric problem and results of analysis that include the outlier may be misleading.

22 The announcement attributed the worsening situation to an acceleration of the decline in its fixed line business, a softening of its mobile business and expected increases in costs.

23 The worst single day in the period was 15 November 2005, a day when the market index was also negative.

110 Although it cites other evidence indicating a much higher beta, Ovum chooses the lowest beta in its analysis, ignoring all others. It provides no explanation of this bias.

111 In a subsequent Advisory Note to the ACCC,[24] Ovum determines that its estimate of equity beta "needs to be further assessed in light of further information provided in the submissions to the ACCC." (page 17)

112 Ovum notes that the Australian Energy Regulator "argues that 'unrepresentative events' need to be removed from beta estimates." Ovum cites the technology bubble as an example, but one that does not impact on its analysis. In spite of openly recognising that unrepresentative events should be excluded from beta estimates, Ovum does not address this outlier in its data.

113 Ovum provides no comment on Telstra's analysis to support its estimate of an appropriate equity beta.

3.2.3 ACCC's Draft Decision

114 The ACCC begins the section on its views by stating on page 102 that "the use of three different methods for estimating beta by Telstra has exaggerated the size of the range of estimate for Telstra's asset and equity beta."

115 Taken on its own, that seems a peculiar statement. It is well-known in statistics that additional information, appropriate to the estimation task, improves the confidence in an estimate.

116 The ACCC provides no other information with respect to the range proposed by Telstra.

117 In my view, Telstra has chosen a range that its analysis indicates is approximately a one standard deviation range. A one standard deviation range is not exaggerated, and I regard it as conservative. Given all we know about the properties of beta estimation, I believe Telstra's range is smaller than that which may be reasonably justified.

Direct estimation method

118 The ACCC then discusses direct estimation of beta and cites the data presented in Ovum's report. The ACCC says (page 103), "Therefore, Ovum's estimate of Telstra's equity beta using this approach of 0.394 seems fair in this situation." This fails to take account of the clear outlier characteristic of the estimate.

119 The ACCC does not discuss any direct estimation data from Telstra's Report, but simply accepts Ovum's estimation.

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24 "Telstra Efficient Access cost model – economic issues" dated 5 February 2009.

The benchmarking approach

120 The result of international benchmarking conducted by the ACCC is reported to indicate an asset beta of 0.47. The benchmarking is said to include large telecommunications companies (with both fixed and mobile networks) from 26 countries. However, no further information is provided about the companies (identity, characteristics, etc.) or the results. I do not believe the benchmarking reported by the ACCC can be given any credence until substantially more detail is provided as to the characteristics of the relevant companies.

First principles estimation

121 Telstra includes some analysis from first principles in its consideration of an appropriate estimate of beta. This involves a fairly straight-forward application of economic thinking to the issue of how a company's equity value might vary with the economy (which is what beta is intended to capture). The objective is to add to the evidence to be considered in arriving at the final point estimate of beta.

122 "The ACCC does not consider first principles estimation as a valid way to estimate systematic risk." (page 103)

123 I do not understand how the ACCC can make that statement. First principles estimation is the application of economic logic to the task of estimating systematic risk. It contributes to the task; it is not purported by Telstra to provide the definitive estimation.

124 How can economic logic be invalid? It would be understandable if the ACCC were to accept the approach, but then contend that Telstra's use of economic logic was flawed and/or that there was superior economic logic available. The ACCC provides no explanation for its rejection of economic logic. It simply rejects it out of hand. In my opinion, this is unacceptable, and the first principles analysis of Telstra should be accepted.

Issues raised by Telstra

125 The ACCC rejects the validity of RBOCs as comparable companies for purposes of estimating beta. I have already discussed this issue above, and my points there apply with respect to the ACCC's comments.

126 The ACCC says that it relied upon a range of estimates to reduce any measurement uncertainty. This statement is contrary to the opening statement of its views that when Telstra used three approaches it exaggerated the range (i.e., uncertainty).

3.2.4 My conclusion on systematic risk

127 I find significant errors in the evidence provided by Optus, Ovum and the ACCC. Optus provides little other than reference to a compilation of previous regulatory decisions. Ovum relies on direct estimations that are

clearly flawed. A correction for outlier data provides support for Telstra's position.

128 Having regard to the evidence in the reports of Optus and Ovum and the Draft Decision of the ACCC, I believe the betas estimated by Telstra are fair and reasonable.

3.3 Debt Gearing

129 The debt and equity proportions, also referred to as leverage or gearing, are important to a number of measurement issues for WACC, in particular as the weights on the costs of debt and equity in calculating WACC (as in paragraph 31 of Telstra's Report).

130 Optus does not comment on Telstra's gearing.

3.3.1 Ovum's Report

131 Ovum states (page 38), "Based upon data for incumbent operators in a number of countries, sourced from regulatory decisions, we calculate an average gearing ratio of 32%." It shows the country and gearing ratio in its Figure 3.12 but provides no other information. To conduct any substantive review of this data, it would be necessary to have considerably more information, including names of companies, method of measuring gearing, taxation and regulatory environment. I also note that these are regulatory decisions, not measures of actual or optimal gearing of companies.

132 Ovum also reviews information from Telstra's accounts. Its Figure 3.13 summarises its information. It concludes that the actual gearing ratio is between 23% and 42%. "We consider that the average ratio of 34% (sic), supported by the benchmark, is an appropriate value for Telstra." (page 40)

133 I am unable to reconcile the data on debt with available information from Telstra's published accounts included in its 2007 Annual Report. In particular, Ovum does not explain what is meant by floor and ceiling "implied" values. A portion of Ovum's Figure 3.13 is shown below with the data as at 30 June 2007 and the amounts in A$millions.

	Book Value	"Implied" Market Value (floor)	"Implied" Market Value (ceiling)
Net debt	14,587	15,376	37,740
Total equity	12,580	52,087	52,087
Total capital	27,167	67,463	89,827
Gearing ratio	53.7%	23%	42%

134 Ovum does not explain how it arrives at the amounts for its two market values of debt. Generally the market value of debt increases when the

market interest rates are lower than the contractual interest rate on the debt. The values are complicated in Telstra's case as the borrowings are in at least eight different currencies. With the information publicly available on Telstra's debt, it is not clear to me whether the market value of debt would be higher or lower than the book value.

135 The market value of equity above is based upon 12,569 million shares outstanding as at 12 June 2007 and a share price of $4.144, which it reports as the average share price for the year ended 30 June 2007. Ovum does not explain why an average share price over a year is relevant to a gearing calculation that is to be applied at a specific point in time (i.e., 1 January 2008).

136 There is always a question of what should be included in "debt" for this purpose. It would be common practice for the "ceiling" on debt to include all liabilities. The "floor" is usually considered to include only interest bearing debt. I favour the latter position. The amount shown by Ovum as the floor is approximately equal to the interest bearing debt.

137 The table below provides information extracted from Telstra's Annual Report as of 30 June 2007.[25] The book value of debt is shown as both interest bearing debt and total liabilities. I assume here that the market value of debt equals the book value of debt.

138 To measure the market value of equity I use the number of shares outstanding at 30 June 2007 (12,443 million) and the share price at the same date ($4.59).[26]

	Book Value	Market Value (floor)	Market Value (ceiling)
Debt	14,362/25,818	14,362	25,295
Total equity	12,580	57,113	57,113
Total capital	26,942/38,398	71,475	82,408
Gearing ratio	53.3%/67.2%	20.1%	30.7%

139 The capital structure data shown above indicates a debt ratio between 20.1% and 30.7%, depending upon the liabilities classified as debt. In my view, the lower amount is most consistent with theory. However, even the ceiling amount is almost exactly the gearing estimated by Telstra.

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25 The semi-annual report at 31 December 2007 reports that total liabilities were $25,818 million, which is virtually identical to the total liabilities at 30 June 2007. I do not have data on interest bearing debt at 31 December 2007.

26 Telstra's 2008 Annual Report states that there was no change in the shares outstanding between 30 June 2007 and 2008. The Telstra share price was $4.69 at 31 December 2007, so using the 30 June data lowers the gearing ratio slightly.

140 In my opinion, the data put forward by Ovum, as corrected, supports Telstra's position.

3.3.2 ACCC's Draft Decision

141 The ACCC begins its "views" section (page 106) by saying that Telstra's benchmarking comparator firms have a debt proportion of 37.6%. Telstra's Report states that the average market value gearing of the comparator companies is 28.7%. The ACCC does not explain how it converts 28.7% to 37.6%.

142 In the same paragraph, the ACCC cites a report by Ovum of European fixed-line telecoms and states that it provides a gearing of 38.3%. I do not have access to this Ovum report, but the ACCC previously cited the result as being a gearing of 37.4%.[27]

143 Telstra has publicly announced that its target book gearing ratio is in the range 55% to 75% debt (paragraph 206 of the Report). The data in the table above supports this target book value gearing. The table also shows that this converts to the appropriate market gearing ratio of 30% or lower.

144 The ACCC continues to reference its approach based upon book values at the time of the initial privatisation of Telstra. The ACCC's rationalisation of this gearing assumption for Telstra businesses is not accepted practice. To the best of my knowledge, every textbook on the topic states that market values should be used. Also, the data cited is outdated by over a decade.

145 In its fourth and final point, the ACCC states:

> *the ACCC considers benchmarks of firm wide gearing to be conservative estimates of the benchmark debt gearing for the CAN assets and the ULLS as the CAN should be lower risk than Telstra's operation overall and should be able to service more debt in its efficient capital structure.*

146 This is a conclusion that has been put forward but not substantiated with evidence. The ULLS business has very high operating leverage, and the risk associated with its revenue sources is also relatively high.[28] Therefore, it should not be taken as given that the ULLS business has lower risk.

147 In considering the ACCC's contention, the first issue is whether or not the ULLS business has lower risk than other operations of Telstra. If that is established, and to the best of my knowledge it has not been, the second issue is to estimate the magnitude of the difference in risk.

148 If we assume that the ULLS business is lower risk than other Telstra businesses, it may still be the case that the difference between the two is

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27 "Assessment of Telstra's PSTN and LCS Undertaking: Final Decision" 29 November 2006, page 78.

28 The ULLS can be used to provide a range of telecommunications services, including traditional voice services and broadband internet access.

modest. Then the difference will have little impact on the estimation of gearing for the CAN-related assets.

3.3.4 My conclusion on debt gearing

149 Having considered the evidence put forward by Ovum and the ACCC, it remains my opinion that Telstra's gearing estimate of 30% is reasonable.

3.4 Imputation

150 As with the corporate tax rate, the only role for imputation in the vanilla form of the WACC is in the levering and de-levering of betas. However, as with the corporate tax rate, imputation is important in estimating cash flows in conjunction with the vanilla WACC.

151 Until this undertaking for the ULLS, Telstra has accepted the ACCC's use of 0.5 as the value of franking credits ("**gamma**"). In its earliest decisions on this parameter, the ACCC had adopted a value of 0.5 for gamma. Until such time as there was a clear weight of evidence to support a change, it was reasonable to maintain the use of that value.

152 Telstra has now adopted a value of zero for gamma. The weight of evidence with respect to the value of imputation credits is now sufficient to support a revision of the value to zero.

153 Optus does not comment on Telstra's estimate of the value of imputation credits.

3.4.1 Estimation of the value of imputation credits – what is relevant?[29]

154 There is an important misunderstanding of the empirical evidence concerning the value of imputation credits. The value of the credits that is relevant to the estimation of WACC is the value reflected in security prices. Whether or not certain investors receive value from the imputation credits is not of primary importance. There will be some investors that do receive value and others that do not.

155 Similarly, it is not of primary importance what the percentage split is between those that receive value and those that do not. Among other things, it will be the case that the percentage of each will vary across companies.

156 In an open equities market such as in Australia, share prices are set by the "marginal investors".[30] It is the valuation of imputation by the marginal

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29 For a more comprehensive discussion of this issue, see R. Bowman, C. Cliffe and F. Navissi, "Implications of Dividend Imputation for Equity Pricing in New Zealand," *New Zealand Economic Papers*, December 1992, 249-259.

30 The publishing company South-Western maintains an online glossary of finance terms. It defines the marginal investor as "A representative investor whose actions reflect the beliefs of

investor that is relevant for quantifying gamma in a WACC-related context. The marginal investor for most (if not all) Australian listed entities is highly likely to be an international investor, because Australian markets are open and international investors are active in the markets. Therefore, it is likely that the valuation of imputation credits by the marginal investor that establishes share prices is that of an international investor that cannot utilise these imputation credits and therefore attaches no value to them. This implies that the gamma should be zero.

157 This does not mean that imputation credits have no value to domestic shareholders. However, it does mean that the marginal investor determines the share price at which the relevant market clears, and also that domestic shareholders, who would have been prepared to pay a higher amount for those shares (reflecting the value they are able to derive from imputation credits), enjoy some consumer surplus (i.e., they will have a higher expected return than international investors).

158 A related question is whether there can be a mix of imputation credit values reflected in share prices. Put another way, could the share prices for some companies be set by international investors that derive no value from imputation credits and the share prices for other companies be set by investors that do derive value from imputation credits?

159 To have equilibrium in such a market, prices would have to be set so that the relationship between the risk of an investment and its expected return (including any benefit derived from imputation credits) was the same across all the shares.[31]

160 As there are no specific regulations or institutional structures that would maintain a separation of the market between Australian and international investors, we would not expect a segmented market to be sustainable. There would be a strong incentive for domestic investors to switch their investments to those whose prices are set by international investors. They would receive the higher expected return from dividends and capital appreciation and still be able to realise the benefit of the imputation credits. As domestic investors sold shares priced to reflect a value of imputation credits, the price of those shares would drop until there was no longer an incentive to make the exchange. At that point, equilibrium would be re-established and all shares would be priced to reflect the same risk-expected return reward from dividends and capital appreciation. Therefore, the value of imputation credits in security prices would be zero.

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those people who are currently trading a stock. It is the marginal investor who determines a stock's price." (http://www.swlearning.com/finance/glossary/glossary_m.html).

31 To illustrate, assume the imputation credits provided a 1% return to domestic investors, but no return to international investors, and investors require a 10% return. Internationally priced shares would have to be priced to provide that return through dividends and capital appreciation. Domestically priced shares could be priced to provide a 9% return through dividends and capital appreciation. The 1% return from imputation credits makes up the difference for the domestic investors. Clearly, international investors would not invest in shares priced by domestic investors.

3.4.2 Ovum's Report

161 Ovum mentions (page 40) a study done for the ACCC by wik-Consult that recommends that imputation credits should be assumed to have zero value.

162 Ovum quotes (page 41) a statement in a Telstra report that "... a percentage of the company's profits are paid through franked dividends, and therefore, the imputation factor should be higher than zero."

163 As I have set out in section 3.4.1 above, the payment of franked dividends has no bearing upon the value of imputation credits for the estimation of WACC. Ovum does not appear to consider the role of marginal investors and/or the working of equity markets.

3.4.3 ACCC's Draft Decision

164 The ACCC cites a dividend drop-off study by Beggs and Skeels and a study of tax office data by Handley and Mahaswaran. The first study was included in a detailed presentation of such studies and is not new to the process of estimating a WACC for the CAN-related assets. The ACCC should not focus upon a single study from many unless it can show that the study has some features that make it superior to other such studies. It has not done that. The second study is irrelevant as it does not address in any way the pricing of imputation credits in the market or the identity of the marginal investors.

165 The emergence of market share buyback schemes is then mentioned. The ACCC contends that this allows the "streaming" of imputation credits[32] and implies that the value should be reflected in share prices. The ACCC does not provide any evidence to support its contention. It is the case that there are provisions whereby market share buyback schemes may be able to stream imputation credits. However, in my opinion, share buyback schemes are costly, cumbersome and unlikely to have any enduring impact on share market prices.

166 If streaming of franking credits was unfettered, imputation credits would be priced at a value close to full value (i.e., gamma ≈ 1) because all imputation credits would be utilised to reduce taxes paid by investors. However, the Australian Taxation Office has vigorously moved to prevent such streaming.[33] Even if there is some streaming of imputation credits, that does not demonstrate that shares are priced to reflect the value of imputation credits. The ACCC's assertion in this regard appears to be no more than speculation.

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32 Streaming of imputation credits is where franked Australian source dividends are paid to Australian shareholders who can take advantage of the tax benefit of the imputation credit. Unfranked dividends are then paid to foreign shareholders that would not receive tax benefit, while maintaining the same total dividend payment to all shareholders.

33 A discussion of the Australian Taxation Office's anti-streaming provisions can be found at http://www.ato.gov.au/businesses/content.asp?doc=/Content/24069.htm&page=14&H14.

167 The ACCC suggests that since it adopts a domestic version of the CAPM, it should assume that all investors are Australian residents. It then contends that this supports its view that gamma should be significantly above zero.

168 It is correct that if all investors are Australian residents, gamma should be significantly above zero. However, not all investors are Australian residents.

3.4.4 My conclusion on imputation

169 I have considered the material put forward by Ovum and the ACCC. In my opinion they both miscalculated the relevant value of imputation credits for purposes of estimating WACC.

170 In my opinion, Telstra's estimate of zero for the value of imputation credits is reasonable.

3.5 Range of Telstra's Estimate of WACC

171 Telstra estimates ranges around most of its parameter estimates and around its proposed WACC estimate. The ranges are discussed on a parameter by parameter basis in its Report.

172 Telstra also makes an appropriate observation about WACC estimates more generally. Any estimate of a forward looking WACC will be subject to both estimation error and framework error. These two points are virtually universally accepted in the literature of finance and economics. In fact, they are unavoidable. I do not recall ever reading anyone, expert or not, suggest that these two factors were not both present in WACC estimates. But that is what the ACCC appears to suggest.

3.5.1 Existence of estimation error

173 Concerning Telstra's WACC estimate, on page 112 the ACCC says, "... a reasonable range (if one exists)." It then repeats that position on the same page.

> *As noted above, the ACCC considers that any reasonable range (if it exists) would be extremely narrow in a competitive capital market.*

174 To question whether a range exists around an estimate of WACC is peculiar. The mere use of the descriptor "estimate" identifies that there is necessarily a range of estimates. The ACCC acknowledges that the parameters are estimates. There are legitimate issues around the size of the range, but not about whether a range exists.

175 The indented quote above raises two issues, even if its parenthetical comment about existence of a range is ignored.

3.5.2 Magnitude of estimation error

176 The ACCC contends that a range would be "extremely narrow". It does not quantify "extremely". A reasonable interpretation would be that it means less than the smallest increment of range that is conventionally measured. In these estimations that would at least be less than 0.1% and perhaps even less than 0.01%.

177 I have been involved in estimates of cost of capital for over thirty years, in many capacities and for many purposes. I have never encountered an estimate of a range in estimating WACC that was nearly as small as even 0.1%, let alone 0.01%.

178 The ACCC makes a number of statements about Telstra's estimated ranges around its parameter estimates as well as its proposed WACC. I have addressed those ranges in a previous report.[34]

179 The ACCC's contentions about the range on WACC estimates are not supportable; in my opinion.

3.5.3 Relevance of competitive capital markets

180 The ACCC refers above to the range on WACC in a "competitive capital market." It does not explain the extent to which a link exists between a reasonable range on an estimate of WACC and competitive capital markets. The definition of a capital market needs to be clear. In its Glossary, the Reserve Bank of Australia defines a capital market as:[35]

> *A market for medium to long-term financial instruments. Financial instruments traded in the capital market include shares, and bonds issued by the Australian Government, State governments, corporate borrowers and financial institutions.*

181 For purposes of estimating a WACC for the CAN-related assets, only the risk free rate is determined directly from a capital market. It is standard to regard the market for government debt as a competitive market. Telstra estimates the risk free rate as the closing quote on the trading day immediately before the beginning of the regulatory period. Telstra proposes no range on the risk free rate.[36]

182 However, the ACCC that raises concerns about estimates of the risk free rate as observed in this highly competitive capital market.

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34 "Report on Telstra's Weighted Average Cost of Capital for the CAN-related Assets Used in the Provision of ULLS" dated 30 July 2008.

35 http://www.rba.gov.au/Glossary/detail.asp?term=capital%20market.

36 Notice however that there is in fact estimation. The closing quote (not an actual transaction) from one day is used as an estimate of the opening market yield on the following day. Furthermore, as is well known, government bonds are not completely risk free. We assume that the sovereign debt of Australia is free of default risk, however it is not free of interest rate risk. Also, the choice of the 10-year government bond to represent the risk free rate is a proxy. As I will discuss below, this is framework error, rather than estimation error.

183 The ACCC does not accept the rate-on-the day measurement preferred by Telstra. It chooses an averaging period "... to address day-to-day market volatility." (page 96) Clearly the ACCC is concerned about estimation error.

184 The estimation of WACC places some reliance upon data from capital markets in some indirect ways including estimating the debt risk premium, historical measures of the market risk premium, making direct estimates of equity beta, and measuring market value of equity. But none of these parameters are actually measured by data from competitive capital markets. Judgement is used.

185 The capital markets in virtually all developed economies, and even some developing economies, are widely regarded as competitive. There is nothing notable about the competitiveness of Australia's capital markets that would lead to a conclusion that the range would be "extremely narrow."

186 Certainly having data from competitive capital markets provides some comfort in relation to Telstra's estimates of WACC and some of its parameters. But it does not eliminate substantial uncertainty about the accuracy of the estimates.

3.5.4 Framework error

187 In addition to the estimation error discussed above, our estimates of WACC and its parameters are subject to framework error.

188 The estimation of WACC is accomplished through the application of a series of models. None of these models are assured to precisely capture the economic concept of the relationship between the risk and expected return of an investment.

189 The most obvious model is the WACC model itself. The economic concept is the opportunity cost of capital for the entity at issue, in this case the CAN-related assets of Telstra. The WACC model is the chosen method for operationalising and measuring this concept. Although there is relatively little controversy about this choice, it still may not be the appropriate framework.

190 The many models used in the process of estimating WACC include the choice to model amounts and returns in nominals (rather than reals), the model of the cost of debt, the model used to estimate the debt risk premium, using 10-year bonds for estimating the risk free rate, using the book value of debt to proxy for the market value of debt, the choice of what is included in our definition for measuring debt, the model used to estimate the market risk premium, the model chosen for removing (and then reinstating) the effect of leverage on the estimates of systematic risk, the decision to ignore all hybrid equity forms in measuring the market value of equity, and the models chosen to estimate the cost of issuing debt and equity.

191 In every case above, a model has been chosen. But we have no guarantee that any of them are correct models. And any model used that is not the correct model for capturing the economic concept at issue, will introduce error in the estimate of WACC.

192 There seems little to debate about the existence of framework error. However, I will discuss one model in brief detail.

193 The cost of equity is estimated using the CAPM, and there is considerable debate over whether this is the correct model.

194 There are quite a few alternative models (e.g., consumption CAPM, Arbitrage Pricing Theory model, Fama-French Three-Factor Model). Even if the CAPM is the correct model, there are differences about whether an international or domestic version should be chosen.

195 I note again that the ACCC has itself raised the issue of the appropriate version of the CAPM, thereby acknowledging the existence of framework error.

196 In responding to Telstra's discussion on the potential for framework error, the ACCC notes that Telstra chose to use the CAPM to measure the cost of equity capital and that it could have chosen a different model. This completely misses the point. Telstra is not saying that the CAPM is not the "best" model for the task. It may well be the best model from the alternatives. However, that does not mean that it is the "correct" model.

197 To say a model is the "best" model for a purpose is not the same as saying it is the "correct" model for the purpose. The use of the best model implies the potential for framework error.

198 Clearly there is the potential for framework error, and the magnitude of such error could be quite significant. This is not a trivial issue and it is relevant to the estimation of a range on the proposed WACC.

3.5.5 Multiple observations and estimation error

199 The ACCC makes statements more generally about a range on estimates of WACC.

200 The ACCC contradicts itself on how multiple observations impact on estimation error. It castigates Telstra for using multiple observations but claims that increasing the number of observations in its analysis reduces uncertainty. On page 102 it says, "The ACCC considers that the use of three different methods for estimating beta by Telstra has exaggerated the size of the range of estimates for Telstra's asset and equity beta." Yet on page 104, with respect to estimating the same parameter, it says, "the ACCC has relied on a wide range of estimates in order to reduce any measurement uncertainty."

3.5.6 The importance of the range

201 Setting a range is important for at least two reasons.

202 The important concept of "reasonableness" is best implemented within the context of an appropriate range on an estimate. Although this still begs an explicit definition of what constitutes an "appropriate range", common practice on assessing appropriate ranges does provide guidance for the task.

203 I have proposed that ranges should be set with the objective of reflecting a one standard deviation band about the parameter estimate. I have proposed this to the New Zealand Commerce Commission for application in setting WACC.[37] The recommendation has been accepted and applied.[38]

204 I have proposed this standardisation of range in previous reports which I have prepared.[39] However, the ACCC has not accepted the recommendation.

205 A range is also very useful for implementing an adjustment to the "best" estimate WACC to reflect the asymmetry in social consequences. Although I believe an upward adjustment to the best estimate WACC is appropriate, Telstra have not asked me to address this issue at this time.

3.5.6 My conclusion on Telstra's chosen ranges

206 As I have stated, in my opinion Telstra's chosen ranges are reasonable, but in some cases too narrow. Nothing in the reports of Optus, Ovum or the ACCC's Draft Decision has altered that opinion.

3.6 Conclusions on Telstra's Estimate of WACC

3.6.1 ACCC's conclusion on WACC

207 The ACCC states its conclusions on WACC on its pages 94-95.

> *The ACCC considers that Telstra's proposed vanilla WACC and the implied pre tax WACC based on Telstra's vanilla WACC parameters and proposed tax rate and gamma are not reasonable. In particular, the ACCC is of the view that Telstra's vanilla WACC and the pre tax WACC are significantly above the estimates that would be derived by common market practices.*
>
> *Further, the ACCC considers that Telstra has taken a speculative approach to estimating the WACC, using a range of alternative arguments resulting in the WACC being abnormally high.*

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37 "Response to WACC Issues in Commerce Commission's Draft Report on the Gas Control Inquiry" dated June 2004.

38 New Zealand Commerce Commission's "Gas Control Inquiry Final Report" dated 29 November 2004.

39 For example, see my "Report on the Appropriate Weighted Average Cost of Capital for the CAN" dated May 2007.

In this regard, the ACCC's draft view is to reject Telstra's proposed WACC as unreasonable.

208 The ACCC states that its conclusion is not attributable to individual parameters. However, it presumably is the result of the cumulative impact of its interpretation of the individual parameter values chosen by Telstra. Therefore, if the ACCC's positions with respect to individual parameters are in error or deficient, it follows that its conclusion will be in error.

3.6.2 My conclusion on WACC

209 In the sections above I address key points with respect to most of the WACC parameters and all of those that have a material impact on estimating WACC. I find significant errors in analysis and interpretation relevant to each of these parameters. I do not agree with the ACCC that Telstra's estimates of parameters are unreasonable.

210 The ACCC suggests that Telstra (page 95) takes a "speculative approach to estimating the WACC, using a range of alternate arguments resulting in the WACC being abnormally high." The ACCC does not explain what it means by a "speculative" approach.

211 In my opinion, none of the parameter estimates of Telstra are derived from a speculative approach.

"Genuine" attempts to estimate WACC

212 As the first paragraph in its section stating its views on the reasonableness of Telstra's estimate of WACC, the ACCC states (page 112):

> *The ACCC considers that normally there is a best point estimate for each given WACC input parameter. The ACCC considers that rarely will two parties who genuinely attempt to come up with a broadly accepted value for a WACC input parameter for the Australian market differ significantly in their estimates. ... Overall, even if there is some room for disagreement on the overall WACC, the ACCC considers that this should be relatively small in magnitude.*

213 The ACCC then concludes that Telstra's estimates are not appropriate.

214 The ACCC seems to imply that Telstra has not "genuinely" attempted to estimate reasonable values. At least two issues are relevant to this assertion by the ACCC.

215 Firstly, the ACCC asserts that genuine attempts, presumably by people with appropriate expertise, will only differ by a small magnitude. This assertion is related to its conclusion that there should be little or no estimation error in WACC. I discussed this position above and showed that there is substantial estimation error. As there is substantial estimation error, there is no reason to be alarmed if two qualified people reach conclusions on WACC that are different by more than a trivial amount.

216 Secondly, given that the WACC estimates of Telstra and the ACCC differ by more than a trivial amount, the ACCC concludes that Telstra's estimate is not genuine. As this is clearly an assertion, it would be just as reasonable to conclude that the ACCC's estimate is not genuine.

217 There is some evidence to support a conclusion that the ACCC has not made a genuine attempt to evaluate Telstra's estimates. The ACCC has chosen to:

- ignore a well established approach to estimating market risk premium (i.e., benchmarking);
- make no attempt to clarify the very important and significant difference between measuring historical market returns with arithmetic averaging or geometric averaging;
- judge that Ovum's systematic risk estimate "seems fair" when it was an extreme outlier that was easily identified and with basic investigation is shown to be the result of unusual events in a single month;
- reject with no explanation a straight forward exercise in economic logic to enlighten the estimate of systematic risk (i.e., first principles analysis);
- continue to rely upon a book value measure of gearing that is over a decade old to determine a reasonable forward looking, market value gearing; and
- continue to present and endorse evidence on the value of imputation credits that ignores the role of marginal investors in setting security prices and hence determining the market value of the credits.

Ovum's review of its WACC discussion[40]

218 Ovum has revisited its discussion of WACC and its parameters in an Advisory Note to the ACCC. With respect to the four input parameters that I discuss in this report, Ovum decides that its earlier positions with respect to the parameters do not require adjustment.[41]

219 I have reviewed the WACC portion of the report. There is nothing in the report that I regard as warranting a change in my discussion above on the various parameters. Similarly, there is nothing that leads me to modify my conclusion that Telstra's estimated WACC for the CAN-related assets is reasonable.

International benchmarking

40 "Telstra Efficient Access cost model – economic issues" dated 5 February 2009.

41 Ovum clings to its view that the effective tax rate should be used rather than the statutory tax rate but revises its estimate up from 20% to 24%.

220 Ovum has prepared an Advisory Note to the ACCC[42] on benchmarking Telstra's WACC estimate against international comparisons. The note extends Ovum's previous analysis on the topic and takes comments of Telstra into consideration. A series of adjustment are made to the WACCs to reflect differences across countries in tax rates, issuance costs, risk free rates, market risk premiums and debt risk premiums. Ovum concludes:

> *Telstra's adjusted WACC value is still the highest among the other operators in European countries but the WACC value this time is reasonably close to the international benchmarks.*

221 In the context of the ACCC's review of Telstra's undertaking, Ovum's conclusion that Telstra's WACC is "reasonably" close to international benchmarks is important.

222 Ovum provides a graph (Figure 2.7) of its final comparisons across the countries. The precise amounts are not given, but can be approximated. It is statistically clear that Telstra's WACC is not significantly different from the other countries. Therefore, the international benchmarking strongly supports a conclusion that Telstra's WACC is reasonable.

Summary

223 Considering both the point estimate of an appropriate WACC for the CAN-related assets and the appropriate range for that estimate, I believe the Telstra proposals are reasonable.

3.7 Events Subsequent to the WACC Start Date

224 A Global Financial Crisis has developed, with the beginning of its manifestation being in mid-2008, subsequent to the 1 January 2008 beginning date for measurement of this WACC. This has been characterised by plummeting share markets, bankruptcies (particularly in the financial sector), a global disappearance of the liquidity that seemed to be in excess, declining interest rates and significant involvement of governments in an attempt to avoid a melt-down of the financial systems.

225 The Global Financial Crisis has impacted significantly upon Australia on many dimensions and has implications for the determination of the cost of capital of all businesses. Parameters affected would be the risk free rate, debt risk premium, issuance costs of debt and equity, gearing, market risk premium and systematic risk.

226 The crisis has certainly increased risk and volatility in Australia as well as worldwide. I agree with the Office of Communications (UK).[43]

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42 "Telstra Efficient Access cost model – International WACC benchmark" dated 28 January 2009.

43 Office of Communications (UK), "A New Pricing Framework for Openreach" dated 5 December 2008, paragraph A12.3.

The financial turmoil has increased uncertainty in markets, both equity and credit. This has resulted in rapid, material changes to cost of capital inputs, some of which may be short-term and some of which may be more structural.

227 The WACC estimate for the CAN-related assets is for assets valued as of 1 January 2008. This is before the Global Financial Crisis began to unfold, and hence the crisis is irrelevant to the estimation of WACC for this undertaking.

4. Declaration

228 I have made all the enquiries which I believe are desirable and appropriate, and no matters of significance which I regard as relevant have, to my knowledge, been withheld from this report.

DATED: 17 March 2009

ROBERT GERALD BOWMAN