COMPETITION ECONOMISTS GROUP

Cross submission
UBA/UCLL cost of capital

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COMPETITION ECONOMISTS GROUP

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Executive summary

1. This report surveys areas of agreement and disagreement between myself and other respondents (Telecom, PwC and Network Strategies) to the Lally and Oxera reports on the WACC for UCLL/UBA services.

2. There is common ground between myself and some submitters on some key issues.

   - The assumed term for the cost of debt should match the term of debt issued by similar businesses – not the term of the regulatory period (common ground with Telecom (p. 4)); and
   - It is inappropriate to give too much emphasis to the single observation for Chorus and regard should be had for the wider sample identified by both Dr Hird and Oxera (common ground for all submitters).

3. However, in other areas I disagree with criticisms made of the Lally and Oxera reports by submitters. In particular, I consider:

   - The PwC's criticism of Oxera for having regard to beta estimates from before the last 5 years should be disregarded, because:
     - it is inconsistent with the Commission's reasoning for selecting a relevant data period in the Input Methodologies, and would, if applied consistently, result in all data being rejected as unusable (including the last 5 years); and
     - there is no reliable evidence betas measured over the last five years provide better estimates of systematic risk than beta's measured over earlier periods.
   - I disagree with PwC's view that Oxera's use of debt betas is inappropriate; and
   - The criticism by Network Strategies of Professor Lally's proposal to adopt a term for the cost of debt in excess of the regulatory period is inappropriate. Network Strategies argues that a new entrant would raise all of its debt in one period and for a term equal to the regulatory period. I disagree, but, in any event, consider that if this approach to a 'new entrant' standard was consistently applied it would result in a much higher cost of debt and overall WACC than otherwise.

4. In relation to the assessment of the asset beta, there are two main issues of contention between submitters:

   - Whether fixed line fibre-only businesses should be included or excluded (excluded explicitly in the Oxera and Network Strategies Reports, and implicitly in the PwC Report);
   - The weight to be given to betas estimated from data pre-April 2009.

5. PwC implicitly accepts the exclusion of fibre businesses although provides no explicit rationale for this. Network Strategies explicitly argues that fibre businesses should be excluded on the grounds that

> *"…they are very different to Chorus, in particular: … some had fibre-only networks and operated in only metropolitan areas."*

6. In my view this is not a basis to exclude fibre only businesses. I note that the Commission's draft decision is to model the costs for a fibre business – which would suggest that operating a fibre only network is, if anything, a basis for giving these firms more weight rather than less weight. Further, it is not obvious why operating only in metropolitan areas should affect asset beta. I further note that Network Strategies' argumentation in relation to the need to model the cost of debt for a new entrant, would suggest, if anything, more weight be given to these relatively new fibre entrants.

7. In terms of the weight given to different periods of beta estimates I note the IM process used an average across up to 20 years of data. This process actually gives most weight to the periods in which the most observations exist. In the current process (and in the IM process) this involves giving more weight to the most recent periods which tend to have the largest number of observations for the relevant comparators. In the current process this involves giving around five times as much weight to the most recent five year period as the most distant five year period.

8. Despite language suggesting that the most recent five year period is the *most* relevant and that the previous 15 years is *less* relevant, PwC's estimate of asset beta is generated by giving *no weight* at all to data beyond the most recent five year interval. This is not consistent with PwC's reasoning, which implies only that lesser weight should be applied to the older data.

9. This results in an unreasonably low estimate of the asset beta as is demonstrated in Figure 5 below – which shows a time series of 6 month betas, calculated daily, over non-overlapping intervals in June and December of each year. I note that an estimate of beta calculated based on 6 months of daily data uses about 130 observations, which is a about twice as many as 5 years of monthly data.

Figure 1: Average comparator 6 month daily betas

Source: Bloomberg, CEG analysis

10. It is apparent from this figure that the downward trend identified by Oxera in its Figure 3.2,[1] and commented on by Network Strategies, is absent from the above figure. What we do see is as follows (all numbers are based on the Oxera sample (a similar but less pronounced pattern exists for the CEG sample as can be seen from the chart)):

    - average betas of 0.54 in the five years prior to January 1999;
    - substantially higher betas in the 2.5 year period January 1999 to June 2001;
    - a return to average betas of 0.54 in the seven year period July 2001 to December 2008;
    - unprecedentedly low betas, averaging 0.32, in the period January 2009 to June 2012; and
    - an upward 'trend' in betas from July 2012 to June 2014 – with the "*most recent*" estimate at 0.43 (0.5 for the full CEG sample).

[1] It is not obvious to me what the chart in Figure 3.2 of the Oxera report is actually showing. It states that two year betas have been estimated but covers a period of around 18 years (1997 to 2014) with only four beta estimates – when the data would allow at least 8 non-overlapping betas to be estimated. Oxera appears to have shown only half of the two year betas that the data could provide.

11. In my view it is highly speculative to claim, as PwC implicitly does, that there is a fundamental downward trend in measured betas that justifies choosing a beta estimate that essentially reflects the very lowest period for beta estimates over the last 20 years.

1 Introduction

12. I have been asked by Chorus to review and comment on submissions made in response to the expert reports by Lally and Oxera in the UCLL/UBA proceedings. These submissions are made by Telecom (including PwC on behalf of Telecom) and Network Strategies (on behalf of Vodafone). Each section of the remainder of this report summarises areas of agreement and disagreement between myself and the other submitters. The sections are as follows:

    - Section 2 addresses the definition of the benchmark debt management strategy.
    - Section 3 addresses the estimation of the asset beta.
    - Section 4 addresses the selection of a comparator sample.
    - Section 5 addresses the relevance of regulatory precedent.
    - Section 6 addresses the benchmark credit rating.
    - Section 7 addresses the use of foreign currency bonds and curve fitting to estimate the cost of debt.

2 Defining a benchmark debt management strategy

2.1 Term of the cost of debt

13. PwC and I both agree with Lally that the appropriate term of the cost of debt should be the term of debt actually issued by similar regulated businesses – not the term of the regulatory period. Telecom states that it endorses Lally's Option A because it is consistent with past submissions by PwC on its behalf. However, neither Telecom nor PwC (in past submissions) have provided any consideration or analysis of the relative merits of options B and C, which are my recommended options.

14. Network Strategies disagrees with Lally's view on the term of debt, arguing that it should match the term of the regulatory period. Network Strategies makes this clear in the highlighted section of the below quote from page 8.

> *We broadly agree with Lally's recommendation, but for differing reasons to those presented by Lally,* ***and with the exception of using a term matching the average borrowing term rather than the regulatory period for the DRP calculation****. In the context of a TSLRIC assessment the regulator seeks to establish the forward-looking cost for a hypothetical efficient operator to provide the regulated service. Therefore the key criterion from Lally's list is incentives for new entrants. As Lally implicitly identifies, the approaches that encompass the historical averages may not deliver efficient incentives for new entrants. Indeed, an approach that encapsulates historical debt costs may in fact preclude new entry, where the new entrant raising all its debt at the commencement of the regulatory period is faced with a current cost of debt above the historical average. The impact on the regulated firm of the regulatory debt policy is only important to the extent that the legislation allows for regulatory consideration of the actual circumstances of the firm. The risk of bankruptcy for a particular firm falls into the same category.* (Emphasis added.)

15. In the quote above Network Strategies appears to disagree with estimating the cost of debt allowance on the observed efficient practice of existing businesses, as Lally and I recommend. Instead, Network Strategies appears to be arguing that the concept of TSLRIC requires that the cost of debt be based on the cost of debt for a new entrant and that, furthermore, a new entrant would:

- raise all of its debt at the beginning of the regulatory period; and
- issue debt for a term that matches the regulatory period.

16. I do not find Network Strategies' position to be compelling. Firstly, even a new entrant would have a long build time for a national telecommunications network. This build time would be many years, possibly more than a decade. In order to be in a position to provide the UCLL/UBA services the new entrant would have financing costs that were spread across this build time – and likely be weighted towards the beginning of the build.[2]

17. It is also the case that a new entrant would likely have significantly higher financing costs than an incumbent. However, all of the discussion around asset betas, cost of debt and credit ratings to date involve benchmarking these against information from businesses that have been established for some time – and in many cases for decades.

18. If we were to truly attempt to estimate the financing costs of a new entrant these would be higher than those for incumbents. I discuss why this is the case in subsequent sections where it is relevant (e.g., in relation to credit rating and asset beta). It is also likely that a new entrant would have significantly higher transaction costs associated with raising equity and debt capital than an incumbent – although such transaction costs have not been the subject of analysis in proceedings to date.

19. Network Strategies appears to have in mind not a hypothetical new entrant, constrained by real world technology and economics, but a "magical new entrant" (MNE) who is able to finance and construct a multibillion dollar investment more or less overnight. In my view, it is not appropriate to attempt to estimate the cost of debt for such an entity. Such an entity does not exist and could not exist. It is therefore not possible to meaningfully estimate a cost of debt or equity for such an entity.

20. However, even if one were to accept that a new entrant could enter 'overnight' at the beginning of the regulatory period it still does not follow that they would issue debt with a term equal to the regulatory period. The natural presumption would be that a MNE would issue debt with the same term as otherwise similar real world businesses do. Network Strategies does not provide any basis for concluding that they would instead issue debt with a term equal to the regulatory period.

21. Possibly Network Strategies is speculating that the MNE would enter at the beginning of the regulatory period in the knowledge of the existence of the regulatory regime and would attempt to align its debt refinancing with the regulatory period. But this is in direct contravention with the evidence that Lally, PwC and I all accept – namely that regulated firms do not respond to regulation in this way.

[2] Noting that prudent conduct faced with a large and uncertain expenditure program would be to largely establish availability of funding prior to embarking on that program.

22. If real world businesses do not respond to regulation by issuing debt with the same term as the regulatory period it is difficult to imagine why a new entrant would behave differently. Network Strategies does not provide a reason why this would be the case.

2.2 Use of historical data

23. As discussed in the previous section, both Lally and I argue that efficient debt financing inevitably involves the staggered issuance of debt. Consequently, at any given time a firm's efficient debt costs will reflect a trailing average of historical market conditions (either in terms of DRP or the total cost of debt).

24. Network Strategies states on page 5:

> *It appears that Lally (in arguing that even when the regulatory term matches the prudent borrowing term allowances would still be required for staggered debt) implicitly accepts the following CEG interpretation of forward-looking as reflecting an existing operator with existing assets assets[8], rather than a new or hypothetical operator.*

25. Network Strategies goes onto argue on page 5:

> *A true forward-looking approach would not take into account historical debt associated with existing assets, but would consider only the efficient issue of new debt. The emphasis placed by CEG on historical information and CEG's cited 'regulatory precedents' relate not to TSLRIC-based models but to top-down building block models (used in the electricity and gas industries in Australia).*
>
> ...
>
> *If Lally and / or the Commission consider that particular adjustments to the cost of debt are necessary based on Chorus' actual debt holdings, then this should be made explicit with reasons, given that such a course of action would be inconsistent with the TSLRIC pricing principle. Further discussion of these issues follows in Section 2.3.*

26. In the previous section I have already provided my reasons for not assuming that an efficient provider would raise all of their debt in a short period before the regulatory period. However, in this section I consider the consequences of making the assumption that they do this for the cost of debt. That is, I assume that Network Strategies is correct and we must assume that 100% of all debt is raised at the beginning of the regulatory period.

27. If this was the case then I think that the first point to make is that an entity pursuing such a policy would almost certainly have a non-investment grade credit rating. I

base this conclusion on the analysis I presented in section 5.3.3.2 of my March 2014 report. This was informed by advice from ratings specialist Kanangra and the impossibility of meeting rating agency demands for liquidity if 100% of all debt needed to be refinanced over 12-24 month period (let alone all in the same month).

28. I also note that Network Strategies states on page 7:

> *As Lally implicitly identifies, the approaches that encompass the historical averages may not deliver efficient incentives for new entrants. Indeed, an approach that encapsulates historical debt costs may in fact preclude new entry,* ***where the new entrant raising all its debt at the commencement of the regulatory period*** *is faced with a current cost of debt above the historical average.* ***The impact on the regulated firm of the regulatory debt policy is only important to the extent that the legislation allows for regulatory consideration of the actual circumstances of the firm. The risk of bankruptcy for a particular firm falls into the same category.***

29. This statement is followed immediately by the following statement:

> *We also agree with Lally that the practicality and ease of implementation of the proposed approach to setting the cost of debt must be considered. For example, an approach which requires regular updating of parameters introduces additional costs to the regulatory process,* ***together with uncertainty for affected parties.***

30. These two statements appear inconsistent. In the first paragraph Network Strategies suggests that, under the legislation, it need not be important what bankruptcy risk Chorus, as the regulated firm, faces. In the next paragraph Network Strategies appears to suggest that creating *uncertainty for affected parties* is undesirable. Assuming that the regulated firm is an affected party, the risk of bankruptcy would seem to me to be an important symptom of uncertainty for such a party.

3 Estimating beta

31. My previous expert report estimated asset beta using the methodology used in the Commission's IM process which was upheld on appeal to the High Court. I have reviewed whether there are any telecommunications specific reasons for not following the same methodology and I concluded that there is not. However, Oxera has departed from the Commission's IM methodology in a number of ways – some of which are supported by submitters and others are not. I deal with each issue in turn.

3.1 Use of a broad sample rather than a single firm

32. The IM process used the average beta for a wide sample of international comparators in the IM process. It did not focus on the narrow sample of listed New Zealand energy and airport businesses.

33. PwC and Network Strategies agree with me that Oxera should, consistent with Commission IM precedent, focus on the beta for the wider sample (not the beta for Chorus).

3.2 Debt betas and the use of the same sample to determine gearing (as used to determine asset beta)

34. The IM process adopted the same gearing as existed in its asset beta sample when setting the benchmark gearing. The reason provided in that process was that if one adopts a benchmark leverage that is different to the average leverage of the sample used to estimate asset beta then it is necessary to rely on an assumed debt beta and leverage formula to estimate how changes in leverage affect equity beta.

35. By contrast, if the sample average leverage is retained as the benchmark leverage then the assumed debt beta/leverage formula is relatively less important – because the same gearing assumption (on average) is being employed to de-lever and re-lever the sample equity beta. Consequently, the effect of choosing a given debt beta/leverage formula tends to 'wash out' in the process.

36. The Commission summarises this point as follows:

> *It is not appropriate to use actual leverage for any regulated supplier as this would introduce the same technical issues into the estimation of the cost of capital that PwC identified with the issue of notional leverage across different services.*[938] *That is, using any leverage assumption other*

> *than that of the comparative firm sample for estimating the asset beta, would bias the estimate of the cost of capital.*[3]

37. PwC, in its review of the Oxera paper, makes the same point:

> *It is desirable, from a technical perspective, that the leverage assumption adopted be consistent with the asset beta estimate. Providing this is the case, then an assumption of zero debt betas in deleveraging the comparator company equity betas and in re-leveraging to assess the equity beta for the company of interest should have negligible net effect on the final WACC estimate. If this is not the case then the issue of debt betas needs to be considered (discussed further below). (Page 9).*
>
> *While Chorus may have higher gearing than the average of Oxera's comparator sets of companies, other companies in those sets have lower gearing. Accordingly, some of the comparator companies may have higher than average debt betas (perhaps including Chorus), while others will have lower than average debt betas.* ***Providing the notional UCLL and UBA service provider has similar leverage to the average of these comparator companies****, which Oxera recommends be the case, there should be minimal, if any, difference to the UCLL and UBA WACC analysis from either ignoring debt betas or allowing for them comprehensively throughout the analysis. On this basis the simplest approach is simply to ignore debt betas. (Page 11)*

38. In situations where the range of gearing and debt beta across the sample is relatively small the above statement will be true. However, where some firms have materially higher gearing and debt betas than others and, especially where debt beta increases non-linearly with gearing, this will not be true. In these situations, the process that PwC describes can lead to a material downward bias in the average asset beta estimated by assuming a debt beta of zero.

39. For this reason I consider that Oxera's approach described in Figure 5.2 and Table 5.1 on 50 of the Oxera report is appropriate and PwC's criticism is unfounded.

40. The bias that I am describing can be illustrated by a simple example. Let the debt beta be zero at levels of gearing below 40% (as assumed by Oxera) but rise as gearing goes above 40% and is 0.2 at 60% gearing. Now, consider two otherwise identical firms both with an asset beta of 0.50 but one with gearing of zero and another with a gearing of 60%. Using the standard leverage formula adopted by Oxera the observed equity betas for these firms will, putting aside measurement error, be 0.50 and 0.95.

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3 Commerce Commission, Input Methodologies (EDBs & GPBs), Final Reasons Paper, December 2010. p. 433.

41. If we estimate the asset beta assuming a zero debt beta for both firms then the first firm's asset beta will be correctly estimated at 0.5 but the second firm's asset beta will be underestimated at 0.38 (i.e., underestimated by 0.12). That is, the asset beta associated with the highly geared firm is underestimated but there is not offsetting overestimate of the lowly geared firm's beta. Consequently, the average asset beta is underestimated by 0.06 and this is not corrected by re-levering using a zero debt beta to 30%.[4]

42. PwC also states:

> *In conclusion, Oxera's analysis and the practical convenience of being able to ignore debt betas points to using a leverage estimate of 47%, the average leverage of the refined comparator set. However, the broader comparator set also provides support for adopting the 40% figure recommended by Oxera, with debt beta considerations likely to be minimal for such a small change in the leverage assumption (i.e. from 47% to 40%).* (Page 9)

43. Here, PwC is saying that the correct answer is 47% (based on the gearing of the sample PwC uses to arrive at an asset beta estimate) but that 47% is not very different from Oxera's 40% and so it is a reasonable approximation: "*with debt beta considerations likely to be minimal for such a small change in the leverage assumption (i.e. from 47% to 40%).*"

44. I am not as sanguine as PwC appears to be about this approximation. We simply do not know with certainty the appropriate debt beta to use for these businesses and neither do we know with certainty the appropriate leverage formula. In this context, the correct leverage is to use 47% if, as PwC does, you base your asset beta estimate on the Oxera sample over the last 5 years. (Once more, it is also appropriate to perform the kind of analysis that Oxera does in Figure 5.2 and Table 5.1 on page 50 to examine the potential for variability in gearing and debt betas to bias such an approach.)

45. I also consider that PwC's criticisms, in paragraphs 55a and 55b, of Oxera's approach are unfounded. In 55a PwC appears to imply that Oxera's approach of:

- using a positive debt beta to de-lever the Chorus equity beta from >60% gearing to an asset beta (0% gearing); and
- then to re-lever the asset beta up to a 40% geared equity beta using a zero debt beta is problematic.

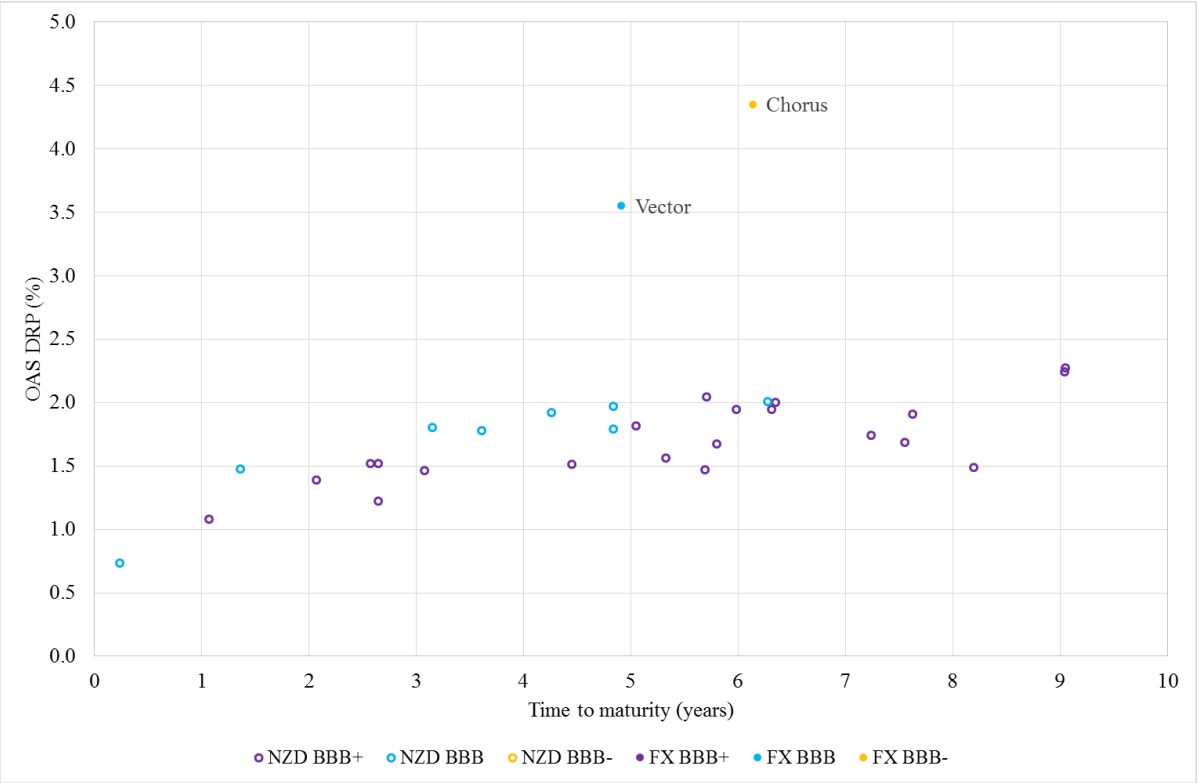
[4] The average asset beta will be 0.44 and the average gearing will be 30% - with an associated debt beta of zero. Using the average gearing and average asset beta will result in an estimated equity beta of 0.63 (=0.44/(1-0.3). However, the correct equity beta at 30% gearing would be 0.71 (= 0.5/(1-.3)).

46. In my view, Oxera's approach is logical based on the assumption that the level of debt beta increases with gearing and is zero up to a gearing of 40% but is positive at higher gearing (such as Chorus' actual gearing of greater than 60%). PwC's main criticism appears to not actually relate to Oxera's use of debt betas but Oxera's focus on Chorus' beta.

47. In paragraph 55b PwC criticises the magnitude of the debt beta (0.05 to 1.0) used by Oxera for Chorus (assuming >60% gearing) as being too high. The basis for this is work by PwC on generic debt betas for BBB rated companies. However, I consider that the Oxera debt beta is almost certainly too low for Chorus. I base this opinion on the fact that Chorus' debt has a much higher debt premium than other BBB rated companies – consistent with this debt having greater systematic risk.

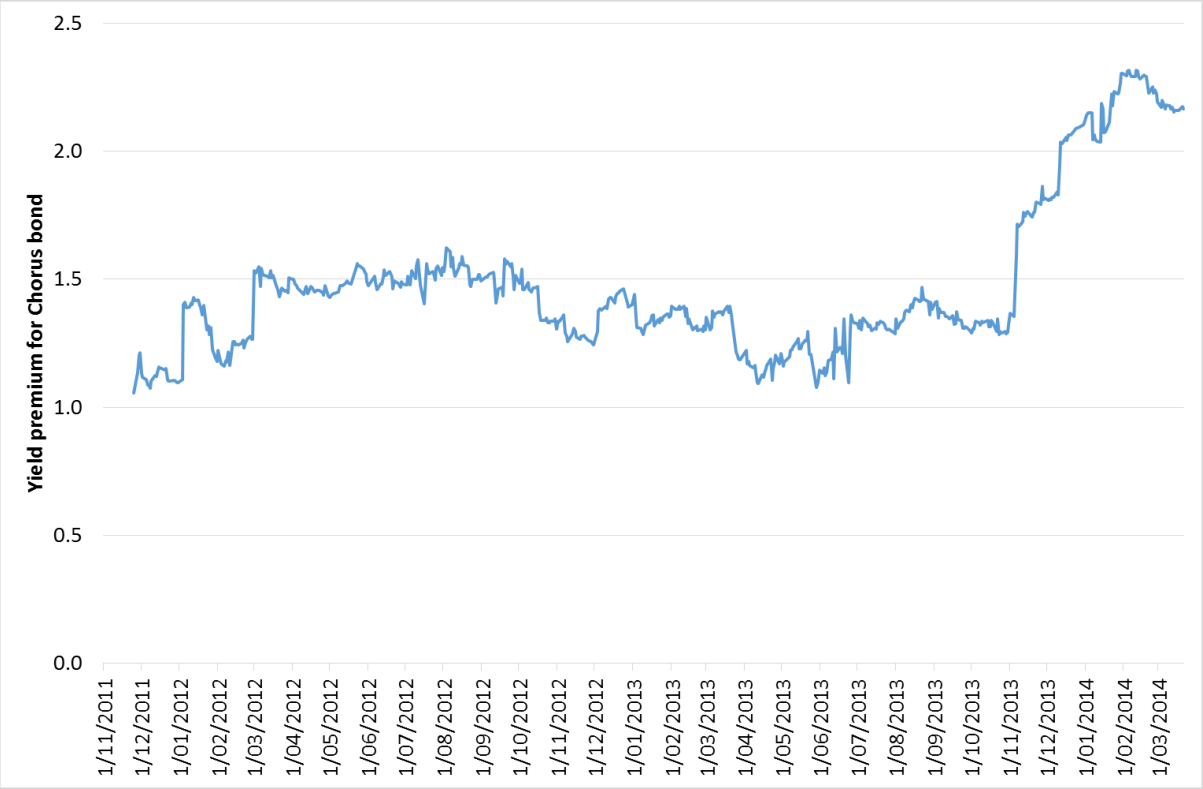
48. In this regard I note the data I have already presented in Figures 1 and 2 of my March 2014 report reproduced below.

Figure 2: Bonds issued by New Zealand issuers



Source: Bloomberg, CEG analysis

Figure 3: Yield premium for Chorus bond against (UK) utilities benchmark



Source: Bloomberg, CEG analysis

49. The dramatic increase in the risk premium on Chorus debt (relative to other utilities) in November 2013 coincided with what the market viewed as a negative regulatory decision for Chorus. I also note that Chorus' gearing in the period since this regulatory decision has averaged 69% - 11% higher than average Chorus gearing up to that point (since demerger).

50. This evidence suggests that the appropriate debt beta for Chorus in the period post November 2011 will be materially higher than other BBB businesses. How much higher is difficult to estimate. However, at a spread to the government bond rate of over 4.5% (Figure 2 is expressed as a spread to swap) it is offering a higher promised risk premium than would be associated with Oxera's midpoint asset beta (0.42) and Lally's proposed TAMRP (7.0%) (0.42*7.0%=2.92%). Even if we assume that only half of the promised risk premium is attributable to the debt beta then the implied debt beta is 0.32.

51. Such ca Input Methodologies (EDBs & GPBs) lculations are speculative but demonstrate an important point. Namely, that the level of uncertainty associated with using Chorus data post November 2013 is dramatically increased. Attempting to estimate asset betas from this period is compromised by this uncertainty and will certainly underestimate the asset beta unless a much higher than 'normal' debt beta is used.

In my view, the only safe course of action is to estimate asset betas using data prior to the dramatic increase in Chorus' debt risk premium (i.e., prior to November 2013).

52. When I do this, using all available data up to November 2013, I estimate a (daily) equity beta for Chorus of 1.12 associated with a gearing of 58%. This is associated with an asset beta of 0.50 to 0.53 using Oxera's assumed debt betas of 0.05 to 0.10 (which may be more appropriate at this lower gearing and debt risk premium level but still may be too low given Chorus higher gearing and debt risk premium compared to other utilities).

53. This is consistent with both regulatory precedent as cited by Oxera (0.50) and the average of the Oxera estimates for the Oxera sample over the full time period (0.48). It is lower than the average over the full sample of comparators identified by me (0.54 using Oxera estimates).

54. However, I reiterate my opinion that undue weight should not be given to this Chorus estimate. As noted in section 3.1, beta estimates are inherently noisy and a sample of one firm is not a reliable basis for estimating a benchmark beta. Moreover, using a Chorus beta for this purpose is especially problematic because of the short time period for which data is available and the problems described above associated with accounting accurately for the debt beta.

55. However, to the extent that a focus on Chorus as the "anchor" of Oxera's observations is retained I consider that Chorus average gearing must be used as the benchmark gearing for the reasons described earlier in this section. In this regard, I consider that PwC and I are in agreement.

3.3 Give weight to a long time series

56. PwC endorses Oxera's view that the most relevant time period is the last five years:

> *In our view the primary weight of the UCLL and UBA beta analysis should be placed on Oxera's international telecommunications company sample, with the main focus being on the most recent five year weekly and monthly betas for these companies.*

57. PwC further states that previous five year periods might be less relevant because the:

    a) *five years to 2009 affected by the 2007-08 Global Financial Crisis;*

    b) *five years to 2004 affected by the 2000 internet boom / bust (the "tech wreck"); and*

58. c) five years to 1999 affected by the run up to the 2000 internet boom / bust. [5]Consequently, PwC finds that due to economic events, only the last 5 of the most recent 20 years are relevant to benchmarking an asset beta for a provider of UCLL and UBA services.

59. The net effect of these conclusions is that PwC alights on an asset beta point estimate of 0.34 (with a range from 0.33 to 0.36). This is 0.08 lower than Oxera's point estimate of 0.42 and much lower than the top end of Oxera's range.

3.3.1 Exclusive weight given to last five years

60. Despite language suggesting that the most recent five year period is the *most* relevant and that the previous 15 years is *less* relevant, PwC's estimate of asset beta is generated by giving *no weight* at all to data beyond the most recent five year interval._This is not consistent with PwC's reasoning, which implies only that lesser weight should be applied to the older data.

61. In this regard, PwC's conclusions go further than Oxera's or Network Strategies. Oxera's asset beta range from comparators encompasses 0.45, which is based on long term averages. Moreover, the top end of PwC's range is materially lower than the average asset beta for both the refined and all comparators group in every other 5 year period.

62. Network Strategies, in my view correctly, states that it is difficult to conclude that observed movements in estimated betas reflect a fundamental change in asymmetric risk as opposed to simply noise in the estimation process (and the imperfect nature of historical betas as a proxy for investors' expectations). Network Strategies states in response to Oxera analysis suggesting falling asset betas:

> *The implicit assumption for this method is that there is some underlying long run average for the asset beta. In reality the values vary over time, which is demonstrated most clearly by examining the trends in the individual companies' asset betas.* (Page 22)

63. As discussed in detail in my previous report, the reasons provided by PwC for estimating an asset beta based on the last five years were considered and rejected by the Commission in its IMs Final Reasons Paper – and subsequently the High Court on appeal.

64. Applying the IM methodology to Oxera's preferred sample and using Oxera's beta estimates, the average asset beta is 0.48. (Over the full sample, still using the IM methodology, the average is 0.54).

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5 PwC report, page 5.

65. It should be noted, contrary to the statement by Network Strategies,[6] that the IM methodology gives most weight to periods that have the most observations. This means that the most recent five year period receives four to five times as much weight as the five year period ending 1999.[7] Similarly, the most recent period receives twice as much weight as the period ending 2004. In other words, the IM methodology already gives substantially more weight to the most recent periods. PwC's proposal simply gives 100% weight to one period of data that happens to be unusually low compared to all other available data.

66. PwC's exclusion of 15 years of financial data in determining asset beta for the UCLL and UBA provider is in my opinion unreasonable. If one formed an opinion that the 2000/01 period was unrepresentative due to the rise and fall of 'tech stocks' and that, consequently, that period should be excluded from consideration, then, in my view, the appropriate response to this view would be to give it less weight (which the

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6 Network Strategies states on page 23:

> *Furthermore, we find that the estimation method used by Oxera and CEG actually introduces a bias into the result, placing equal weight on each of the time periods. This means that a time period with relatively few datapoints – and thus having a large standard error, in addition to being affected by any influential datapoints – is given the same weighting as a time period with a much larger sample of companies.*

This is not a correct description of the CEG methodology, which, following the Commission's IM methodology, periods with fewer observations are given less weight (in proportion to the relative number of observations). Oxera do quote an "average of averages" figure in their text (that would have the potential problem identified) but

7 The IM methodology takes an average of each firm's asset betas over each of the sampling periods and then takes an average of these averages. This means that a firm that has asset betas in each of the four periods examined by Oxera will have an asset beta that gives equal weight to each of the periods. However, a firm that only has an asset beta in the most recent period will have an asset beta that gives 100% weight to the most recent period. If these were the only two firms in the sample then the average asset beta calculated following the IM methodology would give five 8^{ths} weight to the most recent period and only one 8^{ths} weight to the most distant period (i.e., five times as much weight). Applying this approach with the Oxera sample gives around 5 times the weight to the most recent period as the most distant period.

An alternative but similar approach is to take the average of all individual observations (rather than to take the average of each firm and then average those averages). This approach is, in my view, likely to give a better estimate on the assumption that each firm in the sample has the same underlying asset beta and that variations between firms and through time are due to measurement error. I have used this method when reporting averages across sample periods. This approach gives 3.3 times the weight to the most recent period as the most distant period (there are 6 observations from the most distant period and 20 in the most recent period).

However, I note that both approached give very similar results. For example, using 5 year betas reported by Oxera (and giving equal weight to daily/weekly/monthly betas) the strict IM weighting scheme results in a 0.47 beta for the Oxera sample compared to 0.48 for the alternative weighting approach. For the CEG sample the strict IM weighting gives an asset beta of 0.55 while the alternative gives an asset beta of 0.54.

IM methodology already does) or exclude *only* the affected period. PwC's approach of excluding 10 years of data (two five year periods) due to a belief that 2 or so years of that period were 'unrepresentative' is not an appropriate or efficient use of data in my opinion.

3.3.2 PwC's presumption that the last 5 years are representative of the future is unfounded

67. PwC finds specific reasons to exclude asset betas calculated within each of the three previous five year periods prior to the most recent period. I do not consider this approach to be a reasonable or efficient use of the available data.

68. At a principled level I consider that there may be good reasons to give certain periods more weight than others. The asset beta that is being estimated is to be used in a forward-looking costing exercise. Estimates of asset beta in the one period (be that a recent or distant period) may have been associated with economic conditions that are not expected to occur (or may occur only with low probability) in the future. With good knowledge of expected future economic conditions, one could assess which periods in the past experienced similar conditions and apply most weight to betas sourced from these periods.

69. In practice, however, knowledge of future economic conditions will always be uncertain and determining reasonable weights contentious. Average betas calculated over a sampling period which is long enough to include a wide range of economic conditions[8] and a sample of comparable firms which is large enough to reduce sampling error may be preferable as a default estimation technique.

70. Moreover, if this practice of excluding entire five year periods because of economic events was justified, then in my opinion it would be equally reasonable to exclude the most recent five year period. This is because:

- the effects of the global financial crisis were not limited to 2007-08 (as implicitly claimed by PwC) but persisted well beyond that. In this regard, I note that the global stock market nadir occurred in March 2009 and the recovery from this nadir is as much a function of the crisis as the fall in stock prices; and
- the Eurozone crisis was, in effect, an extension of the crisis that manifested itself in 2008/09 and has severely affected financial and product markets globally but especially in Europe.

71. These events are clearly very significant and 'unusual'. To the extent that data from 2007 and 2008 was considered to be unrepresentative (as suggested by PwC) the same would have to be true of data from 2009 to 2012. In awarding the European

[8] I consider that 20 years is long enough in this context.

Central Bank President Mario Draghi the "person of the year", the Financial Times describes 2012 in the following manner:

> Europe's single currency was disintegrating amid soaring borrowing costs in Greece, Spain and Mr Draghi's native Italy. Speculation that the Eurozone was heading for a break-up, with incalculable financial and political consequences, was rampant. It was time to draw a line in the crisis. [9]

72. Figure 4 below shows an indexed time series for stock market valuations for the United States, United Kingdom, France, Germany and Spain. Figure 4 demonstrates:

- the effects of the global financial crisis (GFC) were ongoing into 2009 (as noted above the nadir of the stock market in this crisis period was March 2009);
- the Eurozone crisis, which had its origins in the financial crisis of 2008/09 materially affected equity markets in Europe especially over 2011 and 2012 as fears of default and/or exit from the Euro area by Sovereign governments threatened the financial system.
  - Notably, the German DAX suffered a 31.0% fall over the five weeks beginning 26 July 2011. This was larger than any fall in valuations in 2008/09 crisis period (measured over the same time frame). Indeed, it is larger than any fall in the DAX over a 5 week period since January 1990[10] with the exception of (marginally) larger falls in in August 2001 and August 2002.
  - In July 2012. The Spanish and French equity markets fell to a level at or below their March 2009 lows.

9 Financial Times: FT Person of the Year: Mario Drahgi, December 13 2012. Available at: http://www.ft.com/cms/s/0/8fca75b8-4535-11e2-838f-00144feabdc0.html#ixzz390i7RpOm

10 Being the beginning of the period for which data is available on Bloomberg.

Figure 4: World share market movements since January 1990

Source: Bloomberg, CEG analysis
Note: Indexed, with average 2006=100

73. The variation in average asset betas over time can be shown with greater granularity by examining betas estimated over much shorter intervals than 5 years.

74. Figure 5 below shows a time series of 6 month betas, calculated daily, over non-overlapping intervals ending on 27 June and 27 December of each year. I note that an estimate of beta calculated based on 6 month of daily data uses about 130 observations, which is a about twice as many as 5 years of monthly data.

Figure 5: Average comparator 6 month daily betas

Source: Bloomberg, CEG analysis

75. The downward trend identified by Oxera in its Figure 3.2,[11] and commented on by Network Strategies, is absent from the above figure. What we do see is as follows (all numbers are based on the Oxera sample (a similar but less pronounced pattern exists for the CEG sample as can be seen from the chart)):

- average betas of 0.54 in the five years prior to January 1999;
- substantially higher betas in the 2.5 year period January 1999 to June 2001;
- a return to average betas of 0.54 in the seven year period July 2001 to December 2008;
- unprecedentedly low betas, averaging 0.32, in the period January 2009 to June 2012; and
- an upward 'trend' in betas from July 2012 to June 2014 – with the "*most recent*" estimate at 0.43 (0.50 for the full CEG sample).

76. In my view it is highly speculative to claim, as PwC implicitly does, that there is a fundamental downward trend in measured betas that justifies choosing a beta

[11] It is not obvious to me what the chart in Figure 3.2 of the Oxera report is actually showing. It states that two year betas have been estimated but covers a period of around 18 years (1997 to 2014) with only four beta estimates – when the data would allow at least 8 non-overlapping betas to be estimated. Oxera appears to have shown only half of the two year betas that the data could provide.

estimate that essentially reflects the very lowest period for beta estimates over the last 20 years.

77. Figure 5 shows a pattern of stability in the beta estimates with the exception of:

- the technology bubble and bust over the period 1999 to 2001 where asset betas were elevated relative to their long term average of around 0.5; and
- the four years from 2009 to 2012 when asset betas were depressed relative to their long-term average. Notably, in 2013 and 2014 the asset betas for telecom companies in both samples have increased back towards their long term average.

78. While noting that explaining the unusual trough in betas from 2009 to 2012 is speculative, these years were dominated by the global financial crisis and the subsequent Eurozone crisis.

79. This suggests that giving most weight to the 5 year asset betas based on the most recent period (which the IM methodology does) may give too much weight to a period that has produced unusually low asset betas on an historical basis. Of course, giving sole weight to this period (which the PwC estimate does) will certainly do so.

4 Comparator selection

80. PwC and Network Strategies comment on the selection of the sample of comparators that is used for estimating asset beta. In this section I discuss:

- fibre businesses and why in my view they remain very relevant comparators for determining the asset beta for the UCLL and UBA provider; and
- the proposed exclusion of Deutsche Telekom from the sample of comparators.

4.1 Excluding fibre businesses

81. Oxera has excluded fibre only businesses from its 'refined' sample on the basis that:[12]

> *"Nature of network—comparators with no copper network assets were excluded. This represents a fundamental difference in the core assets of the comparator firm, and therefore in the nature of the business risk."*

82. PwC has not explicitly endorsed this exclusion but implicitly does so by using Oxera's 'refined' sample as the basis of its own estimates. PwC simply states that:13

> *Issues of comparability of the activities of these companies to those of a UCLL or UBA service provider can be, and have been (by Oxera), partially addressed by refining the comparator set.*

83. In this passage PwC implies that Oxera has done this reasonably without going into any detail why. However, ambiguity remains in the interpretation of PwC's actual view. PwC does not state that fibre companies should be excluded nor provide any rationale for their exclusion. However, PwC adopts the betas from the refined set – which is an implicit endorsement of this exclusion.

84. Network Strategies explicitly agrees with Oxera's exclusion of the fibre businesses on the basis that they are *"less reliable as comparators for Chorus"*.14

85. Network Strategies notes that some of the fibre businesses only operate in metropolitan areas.[15] I agree that this is a point of difference between the network that would be modelled by the Commission and these networks. However, it is far from clear that this is a difference that is relevant to an assessment of beta, the

[12] Oxera, *Review of the beta and gearing for UCLL and UBA services*, June 2014, p. 25

[13] PwC, *Review of the beta and gearing for UCLL and UBA services*, July 2014, p. 5

[14] Network Strategies, *Expert reports on WACC for UCLL and UBA FPP,* July 2014, p. 22

[15] Network Strategies, *Expert reports on WACC for UCLL and UBA FPP,* July 2014, p. 21

systematic risk of the network. Network Strategies does not provide any evidence of such a relationship.

86. To the extent that it is relevant to focus on the density of the networks operated by comparator businesses, it would also be relevant to note that the networks operated by most European businesses tend to operate in much more densely populated areas than New Zealand. This was discussed extensively in the Initial Pricing Principle processes for UCLL and UBA. If Network Strategies considers that the fibre businesses are not comparable on these grounds then consistent application of the same principle could exclude fixed line businesses from other countries such as Belgium on account of their greater density. However, I do not believe that there are clear reasons to exclude beta estimates in the basis of the service area of a comparator's networks.

87. The exclusion of fibre businesses also appears to be an internally inconsistent approach to the cost of equity and debt where, in relation to the latter, Network Strategies explicitly argues that it is a new entrant's cost of debt that is relevant and not the cost of debt for an existing business such as Chorus.

88. In my view, the Commission's preliminary decision to model the costs of a fibre network (and potentially to revalue assets every 5 years based on hypothetically efficient technology (assuming that the provider starts with a 'blank sheet' in terms of network design) and to assume that efficient costs are based on serving a materially different customer base to Chorus) suggests that, in the context of the Commission's consultation paper, rather than being the worst, the fibre only businesses are likely to be the best comparators. This is for two reasons:

- they match the modelling assumption made, as a preliminary decision, by the Commission about the technology that would be deployed by a provider of UCLL – namely the use of fibre; and
- in comparison to most of the businesses in the comparator sample which are fixed line businesses with a long period of incumbency, the five fibre businesses are recent builders of fixed line networks.

89. The average daily five year asset beta calculated across the five fibre businesses is 0.73, and the equivalent weekly figure varies between 0.71 and 0.97 depend upon which weekday it is measured to. To the extent that the Commission pursues a modelling approach using costs that are unrelated to Chorus' actual circumstances and using hypothetically efficient technologies then the case for adopting an asset beta based on this "new entrant" logic is strengthened.

4.2 Exclusion of Deutsche Telecom

90. Network Strategies notes that strict application of Oxera's own criteria for the inclusion of comparator businesses should result in the exclusion of Deutsche

Telekom.[16] Oxera's criterion is to exclude comparators "with a majority of revenues from overseas operations". Oxera cited the exposure to exchange rate risks and various regulatory regimes as the rationale behind this.

91. Oxera found that 42% of Deutsche Telekom's revenues were earned in Germany, but the sum of German and other Eurozone revenues was "well over" 50%.[17] Deutsche Telekom's 2013 annual report provides figures[18] that suggests that suggests that, of revenues that are characterised by geography, 41% are earned in Germany and 34% are earned in the US. The remaining 25% are earned elsewhere mostly in "Europe".

92. However, Europe is not restricted to the Eurozone countries and Deutsche Telekom has significant operations outside Eurozone countries (including Poland, Romania, Hungary, Czech Republic, Croatia, Bulgaria, Macedonia and Montenegro). A breakdown of European revenue provided elsewhere[19] suggests that most of this is from non-Eurozone areas. Using that breakdown I estimate that only 52% of revenue is earned from within the Eurozone.

93. However, these estimates do not include the revenues that Deutsche Telekom earns by virtue of its UK joint venture with Orange (EverythingEverywhere). These net revenues are 3.8bn euros.[20] Including these as non-Eurozone revenues makes the percentage of Eurozone revenues fall to less than 49%.

94. Oxera's inclusion of Deutsche Telekom is clearly on the borderline of consistency with its stated rationale for its criterion. My best estimate is that it should be excluded based on the criteria set out by Oxera.

95. Deutsche Telekom's average 5 year daily beta over time is, based on Oxera's estimates, approximately 0.35. This is materially below the average of 0.48 (0.54 based on my preferred sample) using Oxera's estimates. I also note, that Deutsche Telekom has one of the lowest betas in the sample over the last five years (averaging 0.21 vs 0.35 using Oxera's estimates).

16 Network Strategies, *Expert reports on WACC for UCLL and UBA FPP,* July 2014, p. 22

17 See notes to table 3.2 on page 26 of Oxera's report.

18 See page 79 of the Deutsche Telekom 2013 Annual Report.

19 See page 100 of the Deutsche Telekom 2013 Annual Report.

20 See page 107 of the Deutsche Telekom 2013 Annual Report.

5 Role of regulatory precedent in determining beta

96. PwC argues that regulatory precedent of a beta of 0.5 is irrelevant. We agree that it is not sound to simply base an estimate on regulatory precedent. However, where regulatory precedent is consistent with a well-grounded empirical estimate it does provide material support for that estimate. Similarly, where regulatory precedent is dramatically different from an empirical estimate it suggests that the basis of that estimate needs to be carefully reconsidered and scrutinised.

    - I have estimated an asset beta of 0.57 for my sample of comparators using the IM methodology. (Following the same methodology but using the betas reported by Oxera the average asset beta 0.54.) This is very close to regulatory precedent; and
    - PwC has estimated an asset beta of 0.34. Regulatory precedent of 0.50 represents 1.47% of PwC's estimate.

97. PwC's estimate is so dramatically different from regulatory precedent to suggest it requires significant examination.

6 Credit rating

98. I was critical of Oxera's attempt to derive a benchmark credit rating by starting first at Chorus' credit rating and then speculating about how much higher this would be if gearing were lower. In section 3.2.2 of my July report in response to the Oxera report I explained that such an exercise was highly problematic as it required an understanding of the drivers of Chorus' credit rating other than gearing which Oxera had not undertaken. It also required adjustments for the fact that some of these drivers would not necessarily be present for the benchmark firm (such as Chorus' contract with Crown Fibre Holdings and the subsidised debt and equity funding available under that contract).

99. In section 3.2.2 of my July report in response to the Oxera report I have proposed that the benchmark credit rating should reflect the observed average credit rating for the same sample of firms used to determine the benchmark asset beta (and gearing). This is BBB- whether the Oxera or CEG sample is used.

100. Following what appears to be similar logic to me, PwC states:

> *Oxera has not provided any analysis of the credit ratings of the companies in its comparator set. This would have been useful, particularly for those comparator companies with leverage near the level of 40% recommended by Oxera for the UCLL or UBA service provider. Chorus' own, current credit rating should not be accorded any particular significance, other than to the extent it is a member of the comparator company sets used to assess asset beta and leverage for a notional UCLL and UBA service provider.*

101. Nonetheless, PwC goes onto state:

> *Despite the limited analysis provided by Oxera, its conclusion that a suitable target credit rating for a notional UCLL or UBA service provider with leverage of 40% is in the range A- to BBB+ does not appear unreasonable.*

102. It is unclear what PwC's view would be were it aware that the benchmarking of actual businesses gives rise to a BBB- credit rating.

103. Network Strategies states:

> *Oxera concludes that on balance a target credit rating of A-/BBB+ is appropriate but that A- should be used as the base case. On the basis of Oxera's own analysis it would appear that A- would be most suitable and we agree that the Commission should apply this as its base case assumption.* (Page 25).

104. As already stated, I do not consider that Oxera's analysis is an appropriate way to establish the benchmark credit rating.

7 Foreign currency bonds and curve fitting

105. I have argued that the cost of debt at any time should be estimated having regard to the widest set of available evidence and be based on the actual efficient practice of a similar businesses. I noted that it is common practice for large regulated businesses to issue debt in foreign currency and, consequently, the presumption must exist that this is efficient. On this basis I have argued that bonds issued by businesses in foreign currency should be used in the estimation of benchmark yields on debt of the relevant credit rating.

106. I have also argued that statistical 'curve fitting' techniques should be used to inform estimates of the cost of debt at any given maturity and credit rating. The use of statistical techniques is, in my view, the best way to process relevant information from a wide range of data points.

107. Lally argued that the Commission could reasonably have regard to both curve fitting and simpler 'averaging' methods for estimating the cost of debt.

108. Network Strategies argued against having regard to foreign currency bonds because:

> *"with no systematic bias in the difference between DRPs on local currency bonds versus foreign currency denominated bonds there is no justification for including the latter in the DRP calculation."*

109. Then, in relation to curve fitting Network Strategies state:

> *Without sufficient data to support the analysis, a curve-fitting approach may be misleading and provide little value.*

110. I view these statements as potentially inconsistent. The first statement argues for the exclusion of some data points because they should give the same answer as other data points. The second statement argues that, because of a lack of data points, we should not perform curve fitting.

111. Ultimately, the second statement from Network Strategies explains why the first statement is not correct. It is correct that adding more data that is unbiased will not affect the expected estimate from the analysis– it will still be an unbiased estimate of the true cost of debt. However, it will affect the accuracy of the estimate. In the same way that the expected proportion of heads from a series of coin tosses is 50% whether the coin is tossed 10 versus 1,000 times. However, the standard error around the observed proportion is much lower with the larger number of observations.

112. Telecom says foreign currency bonds are a relevant source of efficient finance and could potentially be used by the regulator but:

> *We consider that the problems associated with the inclusion of debt margin data from thinly traded foreign currency bonds in a cost of debt analysis on an otherwise un-weighted basis likely outweigh the benefits of including them in the Commission's analysis.*

113. This repeats Lally's assertion that these bonds are more thinly traded than domestic bonds. However, Lally provides no justification for that view and neither does Telecom.

114. I note that the Commission has previously, based on the advice of Professor Lally, used linear regression techniques (more simplistic than those that I have previously presented) using much smaller datasets than are available .

> *For the 2006/2007 TSO period the Commission has chosen to estimate the debt premium using the two regression approaches outlined in Dr Lally's 25 June and 17 August papers.*[21]

[21] Commerce Commission, 2006/2007 Final TSO Cost Calculation Determination p. 38