

Oxera response to CEG's cross-submission: the debt beta for gas pipeline businesses

Note prepared for First Gas

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1 Introduction

In its report on behalf of the Electricity Networks Association, the Competition Economics Group ('CEG') argued that, in order to compare asset betas across the Commission's gas and electricity sub-samples, adjustments would need to be made for gearing and the debt beta.¹ In particular:

- CEG observed that there is a strong negative relationship between the gearing levels and asset betas of firms (estimated assuming zero debt beta), and asserted that the differences in measured asset betas is largely explained by the failure to account for the impact of debt betas;²
- in order to remove the effect of the zero debt beta assumption, CEG assumed that debt beta is zero when average gearing is 30%, whereas firms with gearing of 50% and above have a debt beta of 0.30. Based on these assumptions, CEG estimates a differential of 0.07–0.09 between gas and electricity beta (based on daily, weekly, 4-weekly estimates) over 2011–16.³

In principle, we agree that asset betas should be adjusted for debt betas in order to ensure comparability among firms with differing levels of gearing. However CEG's analysis has a number of drawbacks that materially undermine its conclusions. This note presents Oxera's response to CEG's arguments, and presents an alternative analysis to examine the effect of non-zero debt beta assumptions on assessing the difference between gas and electricity betas. Our

¹ CEG (2016), 'Asset betas for gas versus electricity businesses in the Commission's sample', August.

² CEG (2016), 'Asset betas for gas versus electricity businesses in the Commission's sample', August, paras 24–26.

³ CEG (2016), 'Asset betas for gas versus electricity businesses in the Commission's sample', August, paras 29–39.

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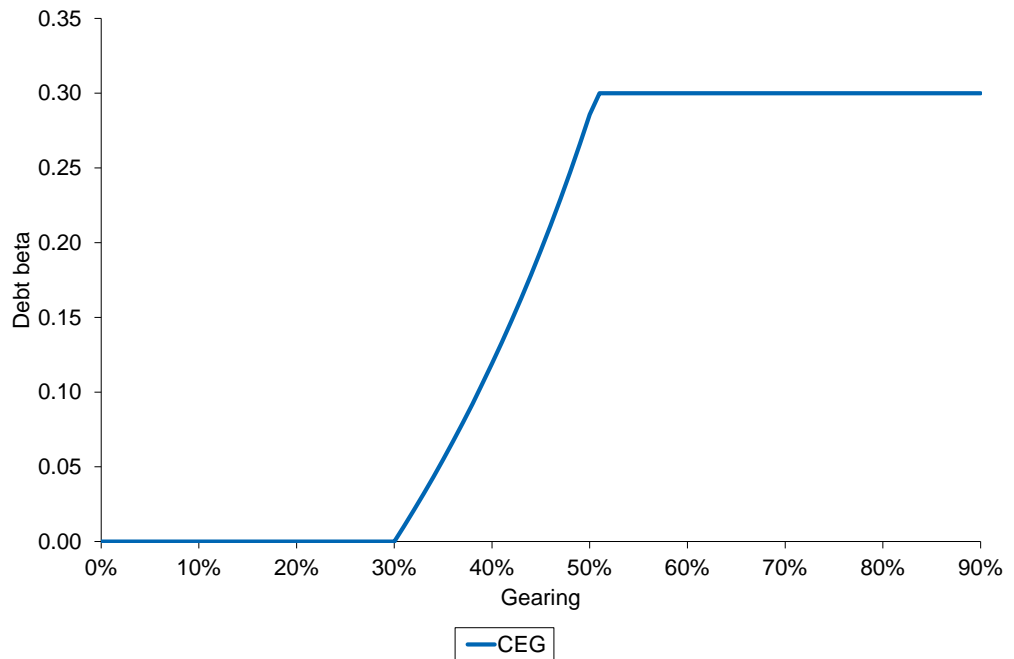
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analysis points to only a small change in the differential between gas and electricity betas if non-zero debt betas are assumed.

2 The appropriate range of non-zero debt betas

As shown in Figure 2.1, CEG assumed zero debt beta for firms with less than 30% gearing, and debt betas increasing to a maximum of 0.3 for firms with gearing of 50% and above.⁴

Figure 2.1 CEG's debt beta assumptions



Source: CEG (2016), 'Asset betas for gas versus electricity businesses in the Commission's sample', August.

For the reasons outlined below, CEG's assumptions for non-zero debt betas are implausible:

- the maximum level of debt beta (i.e. 0.30) that CEG presumes prevails in the market is implausibly high for electricity networks and gas pipeline businesses in New Zealand;
- CEG's assumes an implausibly steep increase in debt betas for firms with gearing levels of 30–50%—under this assumption, increasing gearing from 50% to 90% would not increase the debt beta of a firm.

Academic evidence and regulatory precedents support much lower debt betas than those assumed by CEG. In its draft decision, the Commission assumed a long-term credit rating of BBB+ for electricity networks and gas pipeline businesses.⁵ Evidence in relation to debt betas of entities with similar credit ratings are presented below.

⁴ CEG (2016), 'Asset betas for gas versus electricity businesses in the Commission's sample', August, para. 29.

⁵ Commerce Commission New Zealand (2016), 'Input methodologies review draft decisions', Topic paper 4: Cost of capital issues, 16 June, para. 164. Based on data from Bloomberg, the companies included in the Commission's sample have credit ratings ranging from BBB to A+. Out of the 74 companies in the Commission's sample, no credit ratings were available for APA Group, Jersey Electric Ltd., New Jersey Renewables, and Spark Infrastructure.

- Companies with lower credit ratings (and therefore higher gearing) tend to have positive debt betas, and the size of the positive debt betas tends to increase as credit quality declines.⁶ While Brealey and Myers (2012) state that large firms would typically have a debt beta of 0.1–0.3, it is likely that a debt beta of 0.3 is applicable only for firms with low credit rating.⁷
- Regulatory precedents support either zero, or much lower debt betas in the range of 0.1–0.15 for energy networks with investment-grade credit ratings. In the UK, Ofgem determined a debt beta of 0.10 for electricity distribution companies, with a notional gearing level of 65% and an assumed credit rating of A–BBB.⁸ The UK Competition and Markets Authority (formerly the Competition Commission) determined a debt beta of 0.05 for Northern Ireland Electricity Limited, which had a notional gearing of 45% and an assumed credit rating of BBB–BBB+.⁹ Most regulators disregard debt beta entirely, implicitly assuming that debt beta is zero.
- In a report prepared for the Commission in relation to Chorus' access services, Oxera estimated the betas of corporate bond indices for companies with different credit ratings, relative to the comparable equity market indices (i.e. European corporate bond indices and European equity market indices).¹⁰ We found that for BBB rated bonds, the average debt beta was around 0.05.¹¹

Therefore, the high end of the debt betas adopted by CEG is wholly implausible for electricity networks and gas pipeline businesses in New Zealand. As discussed in section 4, if more realistic assumptions of debt beta were adopted, this would not materially affect the overall conclusions that the gas asset beta is higher than electricity asset beta. Oxera has undertaken alternative analysis based on assumptions that are different to CEG, but nonetheless aggressive (i.e. high) with regards to the levels of debt beta, given the above evidence. For the purpose of illustration, Oxera has assumed that debt beta varies linearly between 0 and 0.2 for firms with gearing of 0% to 90%.

Figure 2.1 shows how debt betas assumed by Oxera and CEG vary with gearing. As shown in Figure 2.1, CEG's assumption leads to a steep increase in the debt betas for firms with gearing levels of 30–50%, whereas Oxera's assumes a more gradual increase in debt betas with gearing.

⁶ Schaefer, S. and Strebulaev, I. (2008), 'Structural models of credit risk are useful: Evidence from hedge ratios on corporate bonds', *Journal of Financial Economics*, 90:1, pp. 1–19.

⁷ Brealey, R. A., Myers, S. C., Allen, F., & Mohanty, P. (2012). *Principles of corporate finance*. Tata McGraw-Hill Education.

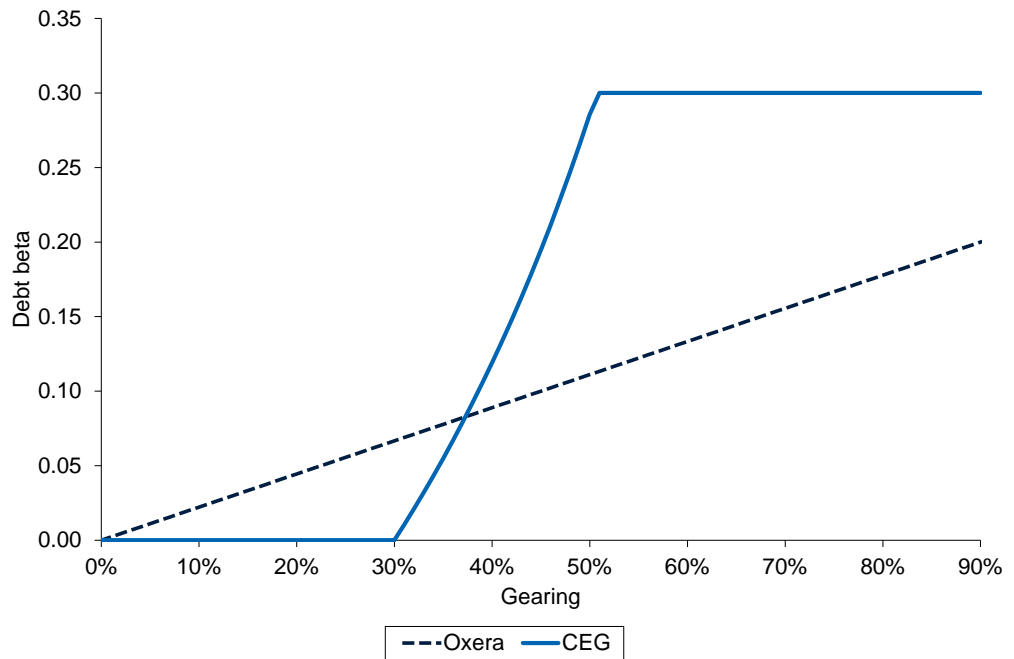
⁸ Ofgem (2014), 'RIIO-ED1: Final determinations for the slow-track electricity distribution companies –Overview', 28 November, p. 40

⁹ Competition Commission (2014), 'Northern Ireland Electricity Limited price determination', Final determination, 26 March.

¹⁰ Oxera (2014), 'Review of the beta and gearing for UCLL and UBA services', June, pp 48–49.

¹¹ Oxera (2014), 'Review of the beta and gearing for UCLL and UBA services', June, pp 48–49.

Figure 2.2 Non-zero debt beta assumptions adopted by Oxera and CEG



Source: Oxera; CEG (2016), 'Asset betas for gas versus electricity businesses in the Commission's sample', August.

3 Relationship between asset betas and gearing

In its report, CEG go on to suggest that its analysis of debt betas is supported by the emergent relationship observed between asset betas and gearing. In particular, CEG asserts that the relationship between asset betas and gearing should be flat.

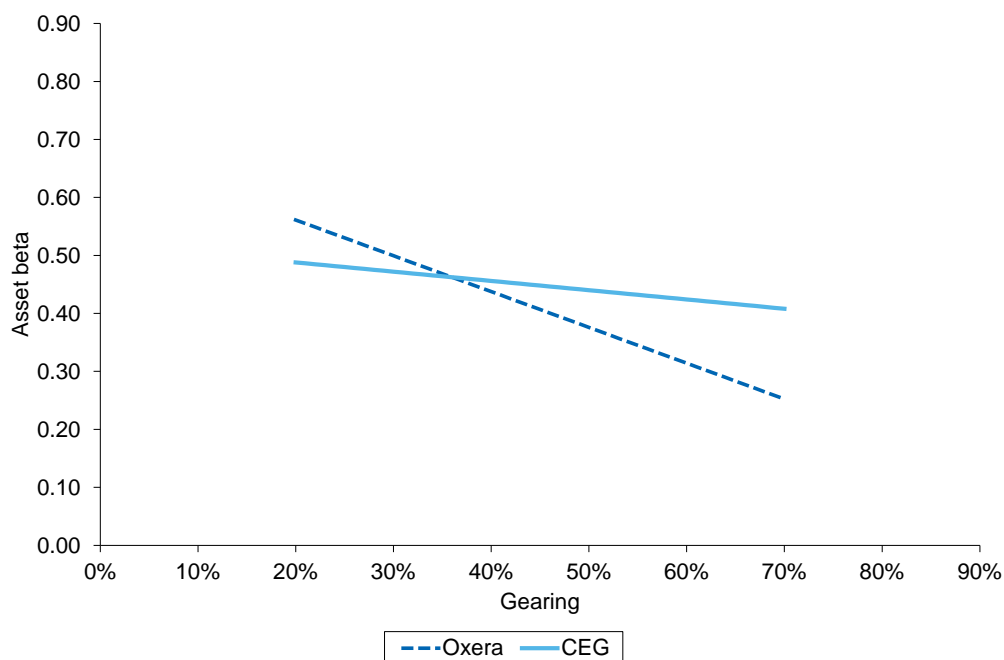
Of course, there should be **no relationship between asset beta and gearing** because asset beta is, by definition, estimated in order to remove the impact of differences in gearing across businesses.¹² [emphasis added]

Figure 3.1 presents the estimated linear relationship between asset betas, de-levered using non-zero debt beta assumptions adopted by Oxera and CEG, and gearing. As shown in Figure 3.1, there is a negative relationship between asset beta and gearing based on Oxera's non-zero debt beta assumptions.¹³

¹² CEG (2016), 'Asset betas for gas versus electricity businesses in the Commission's sample', August, para. 25.

¹³ Under Oxera's non-zero debt beta assumptions, the negative relationship between asset beta and gearing is reduced in comparison to the Commission's analysis based on zero debt beta.

Figure 3.1 Asset beta estimated with non-zero debt betas and gearing (daily estimates over 2011–16)



Note: Jersey Electricity (JEL LN Equity) is excluded from this figure due to multiple missing data points.

Source: Oxera analysis, based on the Commission's asset beta spreadsheet.

We agree that under finance theory (i.e. Modigliani–Miller), two identical firms would have the same asset beta irrespective of their gearing levels. In other words, a change in gearing does not (of itself) change the asset beta of a firm. However, we disagree that there should be no relationship between asset beta and gearing across firms. For different firms that have different risk profiles, and consequently, different levels of gearing, asset beta and gearing is expected to be negatively correlated. In particular,

- the optimal gearing of a firm will tend to vary with its level of risk—i.e. low risk firms tend to have high gearing, whereas high risk firms tend to have low gearing;
- firms that have high risk profiles generally also face higher systematic risks, although some firms may have high proportion of idiosyncratic risks;
- therefore, firms with low gearing (in this instance, gas companies) would tend to have higher systematic risk and higher asset betas, and vice versa.

4 Sensitivity analysis using non-zero debt beta assumption

Oxera's analysis shows that, if realistic assumptions of debt beta were adopted (e.g. debt betas ranging from 0–0.2 with a gradual increase with gearing), this would not materially affect the overall conclusions that the gas beta is higher than electricity beta. In its report, CEG go on to suggest that its analysis of the debt beta leads to the differential between the gas and electricity asset betas

being reduced by around 60%, from 0.10 to 0.04.¹⁴ In contrast, Oxera's analysis of debt betas shows that the differential in the asset betas of gas pipeline businesses and electricity networks would reduce only marginally, by around 0.01–0.02.

Table 4.1 presents the differential between the gas and electricity or energy asset betas based on Oxera's assumption of non-zero debt betas. As shown in Table 4.1, the differential between gas and electricity asset betas based on the Commission's sub-samples is 0.15–0.17, with a point estimate of 0.09 under the Commission's approach of using two five-year periods.

Table 4.1 Difference in asset betas based on the Commission's sample

	Assuming zero debt beta		Assuming non-zero debt beta	
	Range (daily, weekly, four-weekly estimates over 2011–16)	Average of weekly and four-weekly estimates over 2006–11 and 2011–16	Range (daily, weekly, four-weekly estimates over 2011–16)	Average of weekly and four-weekly estimates over 2006–11 and 2011–16
Difference between gas and electricity	0.16–0.18	0.10	0.15–0.17	0.09
Difference between gas and energy	0.11–0.14	0.09	0.09–0.13	0.07

Note: The cut-off date is set to 31 March 2016, consistent with the Commission's analysis.

Source: Oxera analysis, based on the Commission's asset beta spreadsheet.

In previous submissions, Oxera has refined the Commission's sample based on quantitative filters for liquidity and excessive gearing.¹⁵ In addition, Oxera provided estimates of the asset beta for gas pipelines based on further refinement of the gas sub-sample, using Thomson Reuters Business Classification.¹⁶ As shown in Table 4.2, the differential between gas and electricity asset betas based on Oxera's refined sample with Thomson Reuters Business Classification is 0.07–0.13, with a point estimate of 0.06 under the Commission's approach of using two-five year periods.

¹⁴ The differential is calculated based on the Commission's approach of deriving a point estimate. The commission derived a point estimate of the asset beta based on an average of the weekly and 4-weekly asset beta estimates over 2006–11, and 2011–16.

¹⁵ Oxera (2016), 'Asset beta for gas pipelines in New Zealand', prepared for First Gas, 3 August.

¹⁶ First Gas (2016), 'Cross-submission on Input Methodologies Review Draft Decisions: Cost of Capital Issues', August, pp. 5–6.

Table 4.2 Difference in asset betas based on the refined sample based on the Thomson Reuters Business Classification

	Zero debt beta		Positive debt beta	
	Range (daily, weekly, four-weekly estimates over 2011–16)	Average of weekly and four-weekly estimates over 2006–11 and 2011–16	Range (daily, weekly, four-weekly estimates over 2011–16)	Average of weekly and four-weekly estimates over 2006–11 and 2011–16
Difference between gas and electricity	0.08–0.15	0.08	0.07–0.13	0.06
Difference between gas and energy	0.07–0.11	0.08	0.06–0.10	0.06

Note: The cut-off date is set to 31 March 2016, consistent with the Commission’s analysis.

Source: Oxera analysis, based on the Commission’s asset beta spreadsheet.

Therefore, the maximum change to the Commission’s analysis of assuming non-zero debt betas in terms of the differential in the asset betas of gas pipeline businesses and electricity networks is 0.01–0.02. Even under the assumptions of non-zero debt betas, the results would support a regulatory allowed asset beta of at least 0.40 for gas pipeline businesses.

5 Conclusion

As shown above, the assumptions in relation to debt betas adopted by CEG are implausible. Therefore, the results presented by CEG based on these assumptions are not reliable. Adopting more realistic assumptions of non-zero debt betas have an immaterial impact on the differential between gas and electricity asset betas. Furthermore, based on assumptions of non-zero debt betas, the overall conclusions that gas pipeline businesses have higher asset betas than electricity networks remain unaffected. Even under the assumptions of non-zero debt betas, the results support a regulatory allowed asset beta of at least 0.40 for gas pipeline businesses.