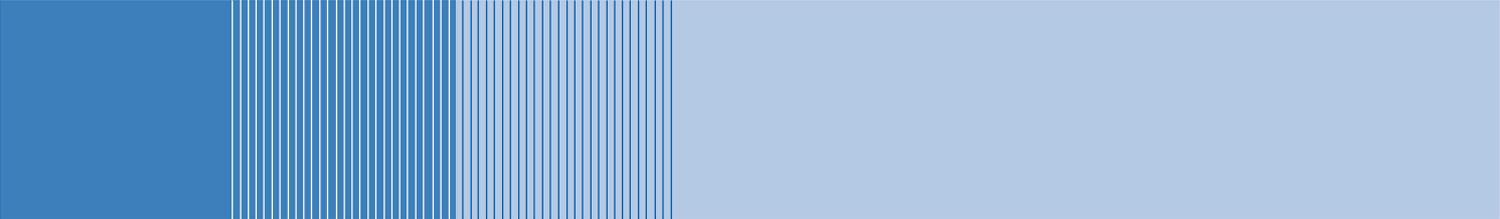


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Critique of OXERA's Report for the NMa on the Cost of Capital A Report for Gas Transport Services



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1. Introduction

Gas Transport Services (GTS) has asked NERA to comment on work on the cost of capital applicable to Dutch energy networks produced by OXERA in February 2010 and published by the NMa.¹ In practice, OXERA's work refers back to "the methodology established in previous decisions"² which is based on earlier work, undertaken for the Raad in 2005, by Frontier Economics.³

OXERA's work sets out a range of estimates of the cost of capital, defined by the upper and lower bound permitted by a particular methodology. GTS asked NERA to review the methodology that OXERA used to calculate this range.

In this report we review the methodology used in OXERA's report. Overall, we find that OXERA's WACC report for the Raad contains recommendations that are not consistent with good regulatory practice, and are likely to cause a downward bias in the cost of capital estimated for Dutch energy networks. Some of these recommendations are not consistent with earlier reports by OXERA on the cost of capital. We identify a number of problems with OXERA's methodology and calculate the range of estimates of the cost of capital that would emerge if these problems were rectified.

Our criticisms of OXERA's methodology can be grouped under three distinct headings:

(1) Theoretical and Methodological Errors:

- Adjusting for past inflation, instead of future inflation;
- Taking input data from inconsistent datasets;
- Over-stating the extent to which companies can take on cheap debt;

(2) Arbitrary and Indefensible Choices of Methods and Parameters:

- Taking input data from a "peer group" of companies that is not in fact comparable with Dutch energy networks;
- Using short term data on stock markets that is biased by temporary effects;
- Selecting methods that are more subjective than those used in OXERA's previous work on the WACC; and
- Selecting values for input data that are inconsistent with OXERA's previous work on the WACC, in particular with respect to the ERP;

(3) Biased Outcomes:

- Selecting input data from the low end of the plausible range on the grounds that Dutch methods of regulation are "low risk", despite reporting evidence to the contrary;

¹ OXERA (2010a), "Updating the WACC for energy networks – Quantitative Analysis", 5 Feb 2010 and OXERA (2010b), "Updating the WACC for energy networks – Methodology Paper", 2 Feb 2010

² OXERA (2010a), page 1.

³ Frontier Economics (2005), "The cost of capital for Regional Distribution Networks, A Report For DTe", December 2005.

- Setting a WACC at the mid-point of the plausible range, after previous OXERA reports gave reasons for taking a WACC from the upper end of the plausible range.

We discuss theoretical and methodological errors in section 2, arbitrary and indefensible choices of methods and parameters in section 3 and biased outcomes in section 4. Section 5 summarises our conclusions.

Our review of OXERA's reports indicates that GTS's cost of capital lies at or above the upper end of the range that OXERA has provided. OXERA cites a range for the real pre-tax cost of capital of energy networks between 5.3% and 6.9%. The NMa instructed OXERA to update parameters "based on the methodology established in previous decisions".⁴ Given that instruction, OXERA's report does not represent an independent expert opinion and should not be treated as such.

Correcting OXERA's errors, inconsistencies and biases leads to a higher range of estimates between 6.6% and 7.8% real pre-tax. OXERA has repeatedly presented reasons for choosing a cost of capital towards the top end of any range. We believe therefore a consistent approach by OXERA would have set the real, pre-tax cost of capital for GTS around 7.5%.

⁴ OXERA (2010a), page 1.

2. Theoretical and Methodological Errors

In a number of places, OXERA has made errors in the method of calculation, which bias the resulting answers, in many cases to an extent that can be quantified. The three most important errors are:

- § Inconsistent Datasets;
- § Inconsistency between Gearing and Cost of Debt Assumptions; and
- § Incorrect Inflation Assumptions.

We discuss these errors in turn.

2.1. Inconsistent Datasets

OXERA has used a mixture of different datasets to estimate the risk free rate (item “A” in the CAPM formula given above) and the equity risk premium or “ERP” (item “C” in the CAPM formula given above). For the risk free rate, it has placed most emphasis on rates over the two-year period from January 2008 to December 2009. OXERA has not placed the same emphasis on that period when estimating the ERP. The result is a combination of parameters that are inconsistent.

This is a significant error, given the strong evidence during 2008/09 that the risk free rate was lower than normal – and the Eurozone ERP was higher than normal – due to the financial crisis and macroeconomic uncertainty. OXERA’s method captured the low risk free rate, but not the high ERP. Instead OXERA concludes that for the whole period 2005-2009, “*there does not seem to be any sufficient basis for departing from the ERP range used at the last determinations*” (which pre-date the financial crisis).

This statement directly contradicts a number of other public statements made by OXERA. For example, when estimating the cost of capital on behalf of BT Openreach, OXERA argued in August 2008 that “*there have been clear and significant negative developments in capital markets over the past year, which have resulted in [...] an increase in the cost of raising capital and a re-pricing of risks.*”⁵ This “re-pricing of risks” would imply a higher debt premium in the cost of debt and a higher equity risk premium (ERP) in the cost of equity.

OXERA does not discuss this earlier conclusion in the work for the Raad and instead uses a long-run historic estimate of the ERP combined with a short run ‘current’ estimate for the risk-free rate. Hence, OXERA’s mid-point estimate of the CAPM is based on two inconsistent datasets. The overall WACC estimate derived by OXERA is therefore not robust. This error is all the more remarkable given what OXERA stated in its report for Openreach:

“There is clear evidence, supported by theoretical and empirical research in corporate finance, that higher forward-looking uncertainty is likely to be

⁵ OXERA (Aug 08): Impact of market turmoil on the cost of capital for BT – Prepared for Openreach., available at: <http://stakeholders.ofcom.org.uk/binaries/consultations/openreach/responses/openreachc.pdf>. Emphasis added

associated with a higher ERP. [...] It should be noted that the determination of the ERP should be consistent with the risk-free rate."⁶

Moreover, in its 2008 report for KPN, OXERA argued for a total market return in the Netherlands (the sum of risk free rate and equity risk premium) that is around 200 basis points higher than the figure stated in its report for the Raad for *the same variable at the same point in time.*⁷

These variables are general market parameters that apply equally to all estimates of the cost of capital. We agree with OXERA that the financial crisis had the effect of increasing risk premiums during 2008/09. OXERA's change of approach in its report for the Raad is therefore indefensible.

We estimate that this methodological error results in a downward bias of *at least* 40 basis points in the estimated real pre-tax WACC (see section 3.2).

2.2. Inconsistency between Gearing and Cost of Debt Assumptions

When estimating the networks' cost of debt, OXERA assumes that all debt has a rating of "single A". This debt rating defines the debt premium to be added to the risk free rate.

OXERA states in the methodology paper that "a gearing of 50% to 60% could be consistent with a credit rating within the 'A' range."⁸ On the basis of this assertion, it only considers evidence on the cost of debt for companies in the "A range", i.e., an average of companies rated A+, A and A-. There is a wealth of evidence that suggests that 60% gearing is more consistent with a rating of A- or even the next rating down, BBB+, rather than with a rating of A:

§ Moody's indicates that a gearing level of 60% (when measured as net debt to RAB) is on the borderline between broad rating classes A and BBB.⁹ As such, the yield on the debt of a regulated gas network would likely be somewhere between broad rating classes A and BBB. OXERA does not consider debt with a BBB rating at all.

§ OXERA's approach is also inconsistent with its own past practice. In 2007, OXERA estimated the cost of debt for the UK gas distribution networks at a level of gearing of 60% based on a mix of debt rated A and BBB.¹⁰ OXERA does not explain why it thinks that the financial crisis has apparently lowered debt premiums for Dutch gas distribution networks, when compared to UK distribution networks before the financial crisis.

⁶ OXERA (Aug 08): Impact of market turmoil on the cost of capital for BT, pp. 34 & 35 Emphasis added.

⁷ see OXERA (Dec 08): Cost of Capital of KPN

⁸ OXERA (2010b), p.29

⁹ Moody's (Aug 2009): Moody's Global Infrastructure Finance – Regulated Electric and Gas Networks

¹⁰ See OXERA (Aug 2007): Recent market evidence on the common WACC/CAPM parameters, Note prepared for Gas DNs, available at: http://www.ofgem.gov.uk/Networks/GasDistr/GDPCR7-13/Documents1/Oxera%20WACC_August%2031st.pdf

- § OXERA’s analysis of the link between gearing and credit rating¹¹ also confirms the fallacy inherent in its approach by showing that the actual level of gearing for a company in the A range is only 48% on average (consistent with the lower end of the gearing range). OXERA’s upper estimate of gearing, at 60%, lies above the actual average level of gearing even for companies in the BBB range.
- § OXERA’s own analysis of actual debt-to-RAB ratios and associated credit ratings for mostly UK companies does not easily transfer to the Dutch framework as another key rating factor considered by Moody’s is the stability of the regulatory system (assigned a weight of 15% compared to 15% for net debt to RAV). The UK system has to be considered far more stable than the Dutch system, which was recently overturned by a court decision.

Consequently, a Dutch network operator with 60% gearing is very unlikely to be able to obtain a credit rating of “single A” and is more likely to have a rating of A- or even BBB+. The lower debt rating requires a higher debt premium.

OXERA’s method is very likely to understate the top end of the range for the cost of debt, and thus also the mid point – which determines the allowed cost of debt under the Raad’s methodology. Evidence suggests that OXERA underestimates the top end of the range for the cost of debt, but calculates the bottom end of the range correctly. OXERA finds that a gearing of 48% is consistent with a rating of A. Moody’s¹² confirms this estimate, quoting a range from 45-60% for companies with a rating of A (rather than A+ or A-).

In Table 2.1, we calculate the debt premium for companies in the BBB range and the implied premium for companies on the borderline between ratings of A and BBB. The latter assumption is consistent with OXERA’s top end gearing assumption of 60%.

Table 2.1
Correct Determination of the Debt Premium

	A	A/BBB	BBB
2Y Average	158	216	274
5Y Average	103	135	167

Source: NERA Analysis of Iboxx data, spreads are calculated over Dutch government bonds of the same maturity as Iboxx indices. Cut-Off: 31 Dec 2009. A/BBB figures calculated as average of A and BBB values.

Using the methodology of the Raad/OXERA, of considering historic two year and five year evidence, we calculate a best estimate of 103-158 bps, before allowing for transaction costs, as the debt premium for companies in the A range. For the reasons stated above, we also consider the debt premium for companies on the borderline between rating categories A and BBB and for companies in this class, we calculate a range of 135 to 216 bps. Thus, our final

¹¹ See OXERA (2010b), Fig. 3.8. Note that OXERA’s analysis of debt to book equity ratios is of limited use in the context of incentive regulated companies where the whole point of the incentive system is to encourage outperformance against the regulatory contract, thereby adding to the value of market equity compared to book equity. The observed book values for equities are therefore no indicator of how investors value the ability of the company to generate returns to service the obligations from debt.

¹² Moody’s op cit.

range is 103-216 bps, taking into account evidence on both A and “A/BBB” rated debt, which is consistent with the wide range of gearing levels considered by OXERA.

OXERA calculates a debt premium of only 100-170 bps before transaction costs by considering companies in the single A range only. This error leads to a downward bias in the top end debt premium of nearly 50 basis points. As a result, the mid point estimate of the real pre-tax cost of capital is biased downward by around 15 basis points.

2.3. Incorrect Inflation Assumptions

OXERA derives a real risk free rate (Item “A” in the CAPM formula given above) based on *actual outturn* inflation from the *past* five years and forecast inflation for the year 2010. OXERA calculates two estimates, one consisting of the average for the years 2008, 2009 and 2010 (forecast) and the other consisting of outturn inflation for 2005-2009 and the forecast for 2010. Consequently OXERA’s measure of the *expected* risk-free rate over the next five years is based only on past inflation and short-term forecasts not extending beyond one year.

The use of (mostly) historic inflation instead of expected inflation is incorrect for the purpose of determining the level of inflation priced into the yields of bonds that are due to mature ten or more years *in the future*. The inflation that is relevant to the investor is the expected rate of inflation over the life of the bond, a fact which OXERA acknowledges.

*“in principle the inflation estimate is seeking to capture investors’ expectations for a ten-year horizon over the past five years”*¹³

OXERA states that this ideal measure of inflation expectations cannot be observed and chooses to rely on past inflation as a proxy.¹⁴ However, theory and evidence suggest that investors do not regard past inflation as the best predictor of inflation in the future, especially in the short and medium term at a time of heightened financial market volatility. Moreover, a number of forecasters such as Consensus Economics and the ECB publish inflation forecasts for up to ten years. These forecasts are publicly available to the investment community and, in the case of Consensus Economics, based on surveys of a large number of individual forecasters. However, OXERA dismisses this type of source because *“the selection of a particular source involves a degree of judgement”*¹⁵ even though Consensus Economics’ data gives exactly the kind of independent information that OXERA identifies as the ideal estimate of inflation (i.e. expectations for a ten-year horizon that can be calculated for each year).

Table 2.2 shows Consensus Economics inflation forecasts for one to ten years ahead for the Netherlands as published annually. Based on the information in Table 2.2, we calculate Consensus Economics forecasts of the average inflation over the next ten years for each of the years from 2005 to 2009 (final column).

¹³ See OXERA (2010b): “Updating the WACC for energy networks – Methodology Paper”, 2 Feb 2010, p.14

¹⁴ OXERA (2010b), p.14

¹⁵ OXERA (2010b), p.12

Table 2.2
Correct Determination of Expected Inflation

	Year ahead Forecasts						
	1Y	2Y	3Y	4Y	5Y	6-10Y	10Y Avg
Forecasts 2005-2015	1.3	1.6	1.6	1.6	1.7	1.8	1.7
Forecasts 2006-2016	2.0	2.0	1.8	1.8	2.0	1.9	1.9
Forecasts 2007-2017	2.2	2.3	1.9	1.7	2.0	1.9	2.0
Forecasts 2008-2018	2.2	1.7	1.7	2.0	2.3	2.2	2.1
Forecasts 2009-2019	1.0	1.3	1.2	1.6	1.6	1.6	1.5
2Y Average							1.78
5Y Average							1.82

Source: Consensus Forecasts, various publications

The risk-free rate is based on the nominal yield on 10-year maturity bonds over the past two years or past five years. The relevant expectation of inflation for calculating the real yield has to be based on the same time frames. Using this time frame, we calculate a forecast of 1.78% on average for the two years of 2008 and 2009 and an estimate of 1.82% on average for the five years up to the end of 2009.

OXERA used a range from 1.6-1.7% based on (mostly) actual past inflation. This error leads to an upward bias of 20-30 basis points in OXERA's estimate of the real pre-tax cost of capital.¹⁶ On the other hand if past inflation had been *higher* than expected inflation, OXERA's estimate would lead to a downwardly biased estimate of the real, pre-tax WACC. The size and direction of this bias is therefore unpredictable.

2.4. Summary: Methodological Errors

In this section we have identified three major methodological errors in OXERA's estimate of the real, pre-tax WACC, two of which lead to a downward bias, one of which leads to an upward bias. On aggregate, the impact of the inconsistency between data sets, the incorrect determination of the cost of debt and the use of an incorrect assumption about inflation leads to a downward bias in the real-pre tax WACC of 70 or 80 basis points, at the bottom and top of OXERA's range respectively. This downward bias affects the mid-point by 75 basis points.

¹⁶ The bias will be even larger when the Raad's updated numbers from the final determinations for Tennet and the regional gas networks are used.

3. Arbitrary and Indefensible Choices of Methods and Parameters

In a number of places, OXERA estimates input parameters in a way which cannot be defended, either because the results are demonstrably inconsistent with other information or because the method lacks transparency when the data is open to different interpretations.

3.1. Opaque and Inconsistent Inputs and Methodology for Calculating Betas

The value of GTS's beta (item "B" in the CAPM formula given above) must be estimated from stock market data for a "peer group" of other companies. OXERA has simply taken the list of comparator companies used in the Frontier report, rejected some companies over data issues, and added some companies it deems suitable. However, OXERA has not indicated how it selected the companies it added, or which companies would have been included in a new peer group compiled by common criteria. As a result, some types of company may be over-represented in the peer group, leading to a biased estimate of beta.

3.1.1. Opaque and inconsistent inputs

OXERA has included three additional US companies in the comparator set for betas. The result is that there are now more US companies in the sample set than from any other country. This selection is inappropriate since the regulatory regime and type of activities undertaken generally differ between the US and Europe.

Alexander et al. (1996)¹⁷ showed empirically that high-powered regulation (i.e., incentive regulation) has a tendency to increase a company's systematic risk compared to a company in a cost-of-service regulatory system. Alexander et al. (2000) confirmed these results for a number of sectors in a more recent study.¹⁸

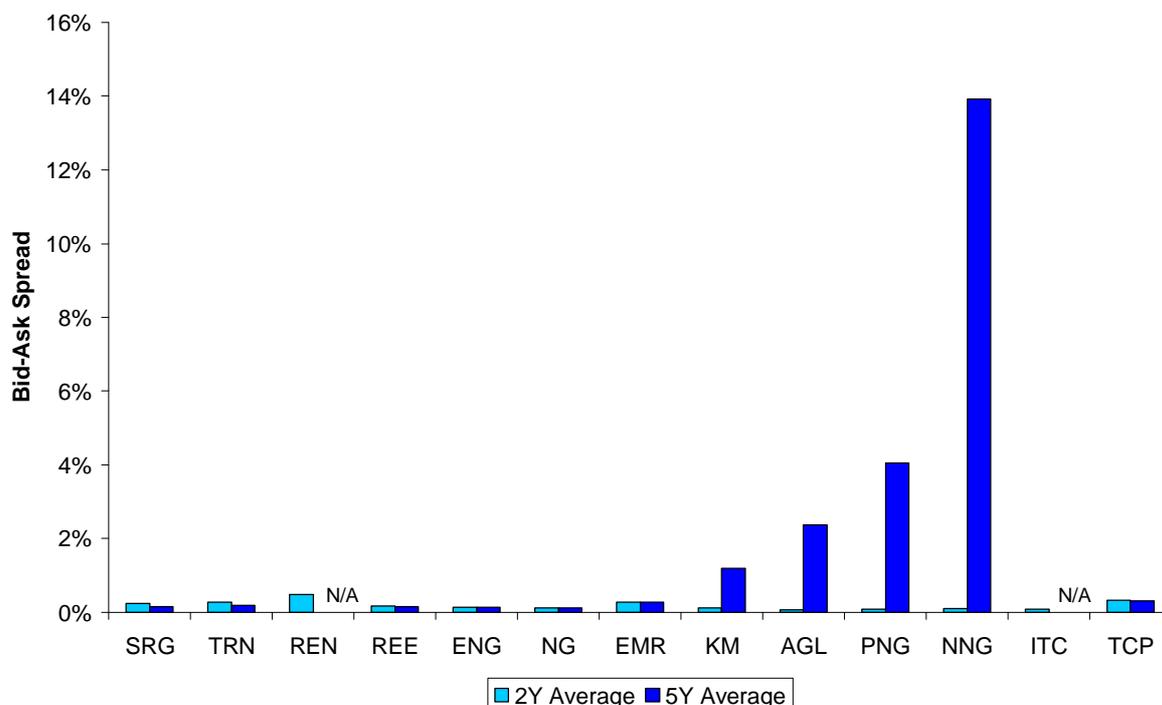
In addition to including betas from companies with theoretically quite different risk profiles, OXERA does not check the liquidity of the stocks concerned. Our analysis of bid-ask spreads illustrated in Figure 3.1 shows that OXERA has included a number of illiquid stocks in its analysis. The use of illiquid stocks can lead to a downward bias in estimates of beta because the price of such stocks only reacts to large general movements in the market and with a delay. The observed betas for illiquid companies should be viewed as lower bounds for the true betas of these companies.

¹⁷ Alexander, Ian, Mayer, Colin and Weeds, Helen F.: Regulatory Structure and Risk and Infrastructure Firms: An International Comparison (30 November 1999). World Bank Policy Research Working Paper No. 1698.

¹⁸ The results of Alexander, Estache, Oliveri (2000): "A few things transport regulators should know about risk and the cost of capital," *Utilities Policy*, Elsevier, vol. 9(1), pages 1-13, March, confirm additional findings from Gandolfi, Jenkinson and Mayer (1996), which confirm the theoretical idea that companies in incentive regulated systems exhibit higher systematic risk and thus have higher capital costs than companies under cost of service regulation.

The UK Competition Commission has in the past allowed for an “uplift” within the cost of equity to account for the fact that the observed beta of a company whose stock is traded in an illiquid fashion does not reflect the company’s true cost of equity.¹⁹

Figure 3.1
OXERA includes Illiquid Stocks



Source: NERA Analysis of Bloomberg data. Abbreviations: SRG = Snam Rete Gas, TRN= Terna, REE = Red Electrica, ENG = Enagas, NG = National Grid, EMR = Emera, KM = Kinder Morgan, AGL = AGL Resources, PNG = Piedmont Nat. Gas, NNG = Northwest Natural Gas, ITC = ITC Holdings, TCP = TC Pipelines.

Moreover, OXERA claims to report five-year betas for REN and ITC Holdings. According to the companies’ websites, these companies only started being listed in 2007 and May 2005, respectively, i.e. less than five years before the date of the report. It is therefore unclear how OXERA calculated five-year betas for these companies.

OXERA’s method of calculating betas based on two-year time frames exacerbates the impact of outliers, such as Snam Rete Gas (SRG) in 2009. The beta measures how closely a company’s share price is tied to movements in the stock market as a whole (i.e. to the stock market index). SRG’s beta was affected by a €3.4 billion capital increase and the price review carried out in 2009, both of which appear to have led to SRG’s share price decoupling temporarily from the stock market index. The distortion introduced by such temporary decoupling is particularly severe when estimating the beta over a short period.

¹⁹ See e.g. UK Competition Commission (2000): Mid Kent Water Plc: A report on the references under sections 12 and 14 of the Water Industry Act 1991 available at: http://www.competition-commission.org.uk/rep_pub/reports/2000/fulltext/444c8.pdf

3.1.2. Inconsistent methodology

Over any short period, stock market data suffers from certain statistical biases, which affect the estimate of beta. It is therefore standard practice to adjust “raw” betas (i.e. those betas obtained directly from the regression of the company’s stocks against the market index) for estimation error and differences in financial leverage.

There are two well-known methods of adjusting for these biases, namely the Blume and Vasicek adjustments. In the report for the Raad, OXERA used a method known as the “Vasicek” adjustment, following the methodology previously used by Frontier Economics. In contrast, OXERA generally uses the Blume adjustment in other reports on WACC.²⁰ OXERA did not explain why it has now adopted the Vasicek adjustment.

The Blume adjustment is computationally simple and all its input parameters are known to all market participants. The formula shifts the estimated beta for company, \hat{b}_j , one third of the way towards a “prior estimate” of the equity beta using the following formula:

$$b_j^{ADJ} = (0.33 * 1.0) + (0.67 * \hat{b}_j),$$

The “prior estimate” of 1.0 is the market average. The weighting of 0.33 given to a “prior estimate” reflects the observed tendency of equity betas to approach average over time, e.g. because companies with low business risk and lower than average equity betas, such as gas transport companies, tend to increase their gearing, which increases the equity beta.

In contrast, the Vasicek adjustment allows the analyst two different ways of influencing the final beta value through the adjustment procedure. The Vasicek formula is as follows:

$$b_j^{ADJ} = (w * b_j^p) + (1 - w) * \hat{b}_j,$$

First, this formula can accept different prior estimates for the prior estimate of the beta, b_j^p (defined as 1.0 in the Blume formula). Second, the weight “w” given to the prior estimate (defined as 0.33 in the Blume formula) is calculated as the importance of the variance of the estimate $s^2(\hat{b}_j)$ relative to the ‘true’ variance of the prior beta, s_p^2 , using the following formula:

$$w_j = \frac{s^2(\hat{b}_j)}{s_p^2 + s^2(\hat{b}_j)}$$

Thus, the Vasicek adjustment is more flexible in taking account of the quality of the regression. However, it requires the arbitrary specification of **two** parameters, namely the variance of beta in the population s_p^2 and the prior expectation of beta, b_j^p . There is no

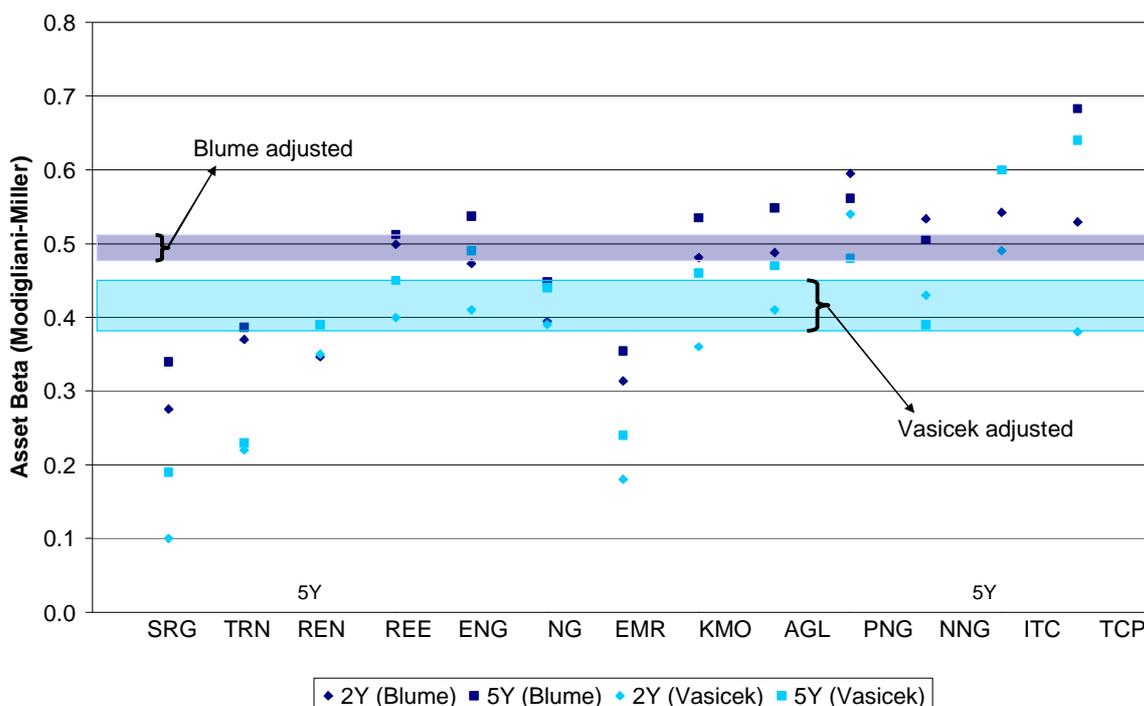
²⁰ See e.g. OXERA (Dec 2008): Cost of Capital of KPN, p.40 and TRA of Bahrain (Nov 09): Cost of Capital Determination, p. 59. Note that the TRA states explicitly that its decision is based on OXERA analysis – see footnote 1

objective way of estimating s_p^2 and neither the Raad nor OXERA explain what value they use or how they choose it, nor do they explain their choice for the prior for beta.

Given avoidance of arbitrarily chosen parameters (which are based instead on a piece of empirical work), the Blume adjustment reduces regulatory risk. OXERA appears to agree with this argument in other reports, including work for the TRA of Bahrain carried out at roughly the same time, in which OXERA uses the Blume adjustment.²¹ OXERA gives no explanation for its difference in approach to work carried out at approximately the same time in Bahrain and in the Netherlands.

In Figure 3.2, we illustrate the impact of OXERA’s inconsistent choice of adjustment method. We show the range for asset betas based on the median values for OXERA’s sample based on two-year (2Y) daily and five-year (5Y) weekly data.

Figure 3.2
Impact of inconsistent OXERA Adjustment Choice



Source: NERA Analysis of Bloomberg data and OXERA (2010a). Ranges based on medians.

Using OXERA’s peer group and two year and five year averaging approach, we calculate a range from 0.48 to 0.51, based on median asset betas calculated according with the Blume adjustment formula used in other recent OXERA reports.^{22,23}

²¹ see e.g. OXERA (Dec 08): Cost of Capital of KPN, p.40 and TRA of Bahrain (Nov 09): Cost of Capital Determination, p. 59. Note that the TRA states explicitly that its decision is based on OXERA analysis – see footnote 1

²² OXERA (Dec 2008): Cost of Capital of KPN and TRA of Bahrain (Nov 2009): Cost of Capital Determination

In contrast, OXERA calculates a range for the asset beta from 0.39 to 0.45 based on the Vasicek adjustment, which represents a departure from its standard approach and which increases regulatory risk. This inconsistency reduces the top and bottom ends of OXERA's range for the real pre-tax cost of capital by 40 basis points.²⁴ Consequently, the effect on the mid-point estimate of the real pre-tax WACC is also to reduce it by 40 basis points.

3.2. Selective Interpretation of Evidence on Equity Risk Premium

OXERA does not appear to have a set methodology for deriving the equity risk premium. OXERA merely discusses various pieces of evidence (arithmetic means of historic evidence, surveys, volatility data and UK regulatory precedent) before concluding that "*at this stage there does not seem to be any sufficient basis for departing from the range.*"²⁵

In addition to not offering a clear strategy for sourcing and using evidence on the equity risk premium, OXERA appears to adopt a selective interpretation of the evidence on the equity risk premium ("C"), to support the Raad's previous estimate of 4-6%.

It is impossible to reconcile this statement with OXERA (Aug 2008), which argues on behalf of BT Openreach that "*there have been clear and significant negative developments in capital markets over the past year, which have resulted in [...] an increase in the cost of raising capital and a re-pricing of risks.*"²⁶

OXERA's opinion expressed in the report for Openreach is also reflected in its other work in the Netherlands. For example, in 2008, OXERA concluded on a much higher estimate of the ERP in the Netherlands when working for KPN. In this report, OXERA estimated an ERP of 6% for the Netherlands in June 2007. As the ERP is a general market parameter, a consultant's conclusions for one sector read across to other sectors.

OXERA further states that "*there is robust academic and empirical evidence that higher implied market volatility leads to a higher ERP.*"²⁷ It supports this argument with numerous references in OXERA (2010a)²⁸ to papers including those by Graham and Harvey (2007)²⁹ and Banerjee et al. (2007)³⁰, which find empirical support for a positive link between

²³ Note that these betas are calculated according to the Modigliani-Miller (MM) formula to account for financial leverage. NERA normally calculate asset betas according to the Miller formula but for comparability with OXERA we report betas according to MM. When correctly re-levered both approaches lead to similar results in almost all cases.

²⁴ We derive this estimate by using the Blume-adjusted median range of 0.48-0.51 instead. All other parameters are unchanged from the OXERA ranges for this calculation. If we were to account for the implausible ERP range at the same time the impact would be even larger because the error is multiplied by a higher ERP.

²⁵ OXERA (2010a), p.22

²⁶ OXERA (Aug 08): Impact of market turmoil on the cost of capital for BT – Prepared for Openreach., p. i, available at: <http://stakeholders.ofcom.org.uk/binaries/consultations/openreach/responses/openreachc.pdf>. Emphasis added

²⁷ see OXERA (Dec 2008): Cost of Capital of KPN, p. iv

²⁸ see OXERA (2010a), Box 4.2

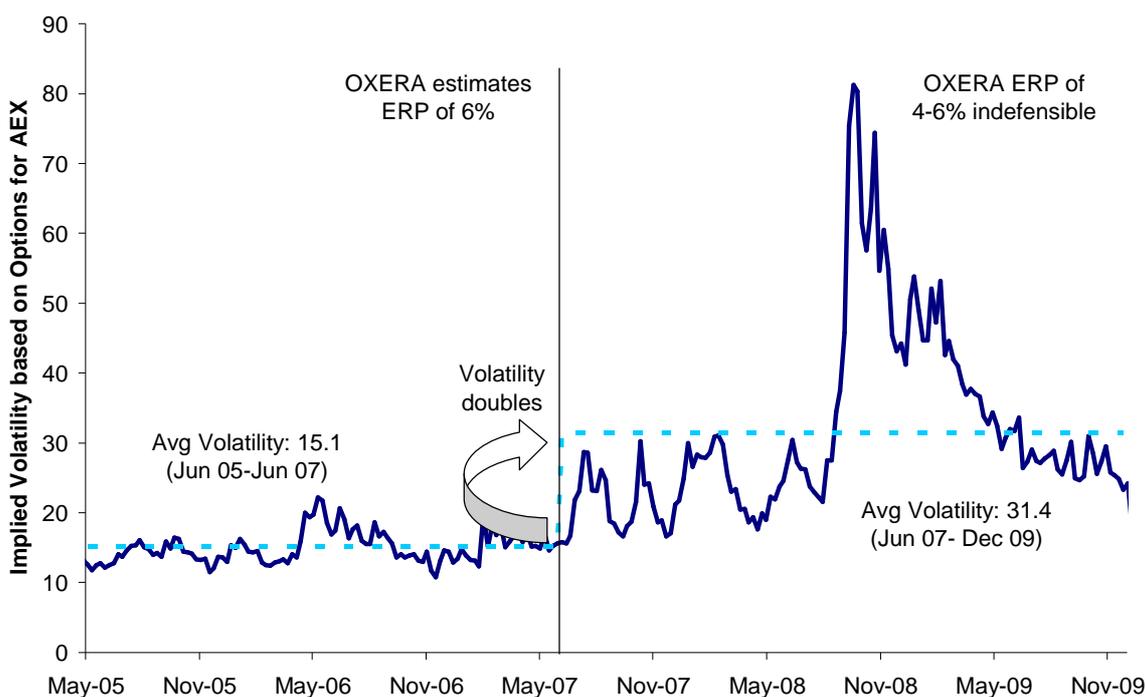
²⁹ Graham, J. and Harvey, C.R. (2008) "The Equity Risk Premium in 2008: Evidence from the Global CFO Outlook Survey", SSRN Working Paper

³⁰ Banerjee, P. Doran, J. and Peterson, D. (2007): Implied Volatility and Future Portfolio Returns, Journal of Banking & Finance.

volatility and the ERP. Figure 3.3 shows the implied volatility of the Dutch stock market backed out from option prices.

Figure 3.3 shows that the average implied volatility of the AEX was 15.1 in June 2007 when OXERA concluded on an ERP of 6.0% for the Netherlands. The average implied volatility between June 2007 and December 2009, the cut-off point of OXERA’s analysis, is 31.4, i.e., more than double the value that led OXERA to conclude on a point estimate of 6%. A similar picture results from using OXERA’s approach of considering “2Y” and “5Y” averages of implied volatility (34.1 and 23.1, respectively). It is clear from this figure that OXERA’s assertion that there is insufficient evidence to depart from the previous ERP range of 4-6% cannot be upheld. Even OXERA does not make any attempt to reconcile how the current substantially higher volatility than that in June 2007 is consistent with a range that has the June 2007 value as its maximum.

Figure 3.3
OXERA ERP Range indefensible in the Light of Volatility of AEX



Source: NERA analysis of Bloomberg data

Below we consider what would be a reasonable conclusion for the current ERP based on the data presented by OXERA and their previous public statements.

We note that in 2007 there was consensus between NERA (who advised OPTA) and OXERA (who advised KPN) on the long-run ERP estimate for the Netherlands, which both sides estimated at 6%.³¹

A small increase in the ERP is consistent with the survey evidence quoted by OXERA, although we note that the read across from surveys and regulatory precedent in other markets (i.e., the UK) is necessarily limited by national factors and the difference in reference markets. The inclusion of a small increase is consistent with OXERA's approach for KPN, where it includes a 25bp increase in the ERP (to 6.25%) compared to OXERA's long-run ERP estimate of 6% for the Netherlands.

In other reports OXERA has argued for even higher uplifts. E.g. in Bahrain OXERA advocated a 50bp uplift to account for the financial crisis.³² A 50 bps uplift certainly looks conservative in the light of the Banerjee et al (2007) findings OXERA quotes in its work for Openreach. According to their findings, there is a roughly linear relationship between increases in market volatility and the ERP, which could arguably lead to an ERP as high as 12%.³³

On the basis of the aforementioned considerations and the data presented by OXERA, we use a range of 6.0-6.5% as a conservative estimate of the ERP for the Netherlands for the observation period of the OXERA study. OXERA's range of 4.0-6.0% is indefensible in the light of the evidence and OXERA's previous estimates.

This error leads to a downward bias of the bottom end of the ERP range of 200bps and a downward bias of 50bps for the top end. As a result, the mid-point estimate of the real pre-tax cost of capital is biased downward by around 60 basis points.

³¹ cf. OXERA (Dec 2008): Cost of Capital of KPN, p. 31

³² TRA of Bahrain (Nov 2009): Cost of Capital Determination, p. 52. Note that the TRA states explicitly that its decision is based on OXERA analysis – see footnote 1

³³ OXERA (Aug 2008): Impact of market turmoil on the cost of capital for BT, pp. 39-40.

4. Biased Outcomes

In some cases, OXERA and/or the Raad seem to have deliberately adopted a methodology that downwardly biases the final estimate of the WACC.

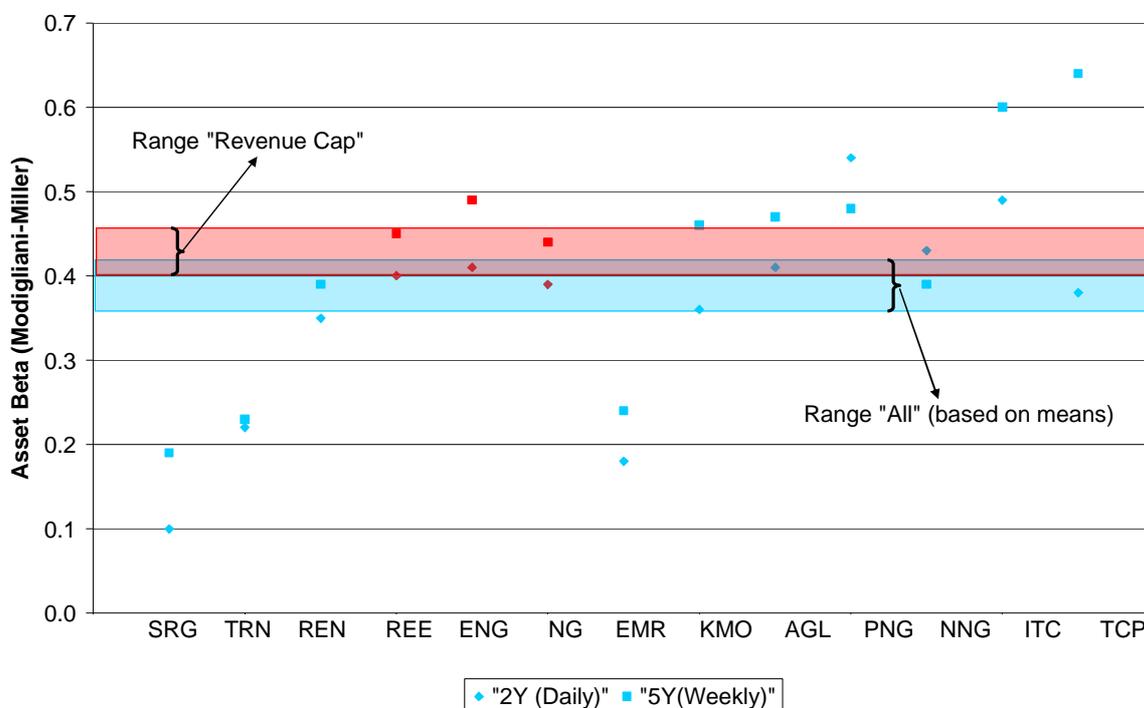
4.1. Biased Selection of Beta Estimates

OXERA states that the Raad selects a beta value (item “B” in the CAPM formula) from the lower end of the range for the peer group of comparator companies, when setting the cost of capital for energy networks whose total revenue is capped. OXERA says that this decision is based on the assumption that companies operating under a revenue cap exhibit lower risk than companies operating under other forms of regulation

OXERA should have noted that the majority of companies within the peer group operate under “Cost of Service regulation”, which allows regulated firms to apply for higher tariffs if rising costs or falling sales drive their profits below the cost of capital. This regime is widely acknowledged³⁴ to be lower risk than a regime of “incentive regulation”, such as a price cap, which requires the regulated firm to bear any rise in costs or fall in sales until the end of a regulatory period. As a result, there is no theoretical justification for choosing a beta for a company operating under a revenue cap from the lower end of the range. This observation is confirmed empirically by OXERA’s own analysis, which shows that the average beta of companies operating under a revenue cap is *higher* (0.40-0.46) than the average beta for the whole sample (0.36-0.42).

³⁴ see e.g. Alexander, Ian, Mayer, Colin and Weeds, Helen F.: Regulatory Structure and Risk and Infrastructure Firms: An International Comparison (30 November 1999). World Bank Policy Research Working Paper No. 1698.

Figure 4.1
Downward Bias Caused by the Raad’s Unjustified Adjustment
for Revenue Cap Regulation



Source: NERA Analysis of Bloomberg data and OXERA (2010a).

Figure 4.1 shows the ranges bounded by the “2Y” and “5Y” averages for the full sample and the sample of revenue-capped companies. From this figure it is obvious that there is no empirical basis for selecting a beta at the bottom end of the sample range.

Given that there is no theoretical or empirical evidence that the beta for a company under a revenue cap is lower than OXERA’s estimate, the beta adjustment undertaken by the Raad appears entirely arbitrary and unjustified.

Even before accounting for other errors in the beta calculation, this error leads to a downward bias of 40 basis points at the top end of OXERA’s range for the real pre-tax cost of capital.³⁵ Consequently, the mid-point estimate is biased downward by 20 basis points.

4.2. Biased Choice of WACC “Spot Estimate”

In selecting a final estimate of the WACC, the Raad chooses the mid-point of OXERA’s range. This approach is also inconsistent with OXERA’s methodology in previous reports, where OXERA has argued in favour of selecting a WACC at the upper end of the range, because the consequences of setting a WACC that is too low are far worse than the

³⁵ We derive this estimate by using OXERA’s full range of 0.39-0.45 instead of a single point estimate of 0.39. All other parameters are unchanged from the OXERA ranges for this calculation. If we were to account for the implausible ERP range at the same time the impact would be even larger because the error is multiplied by a higher ERP.

consequences of setting a WACC that is too high. This argument has also been recognised by the UK Competition Commission.³⁶

OXERA does not make this point in its work for the Raad and offers no explanation as to why this asymmetry would not apply in this case.

³⁶ see UK Competition Commission (2008): Stansted Airport Ltd - Q5 price control review, page L27, available at: <http://www.caa.co.uk/docs/5/ergdocs/ccstanstedl.pdf>

5. Summary

We have reviewed work on the cost of capital applicable to Dutch energy networks produced by OXERA in February 2010 and published by the NMa.³⁷ We find that OXERA's WACC reports for the Raad contain numerous recommendations that are not consistent with good regulatory practice, and will likely lead to a downwardly biased estimate of WACC for Dutch energy networks. These recommendations are not consistent with other reports written by OXERA on the cost of capital.

In particular, we find that OXERA does not set out clearly defined criteria for assessing the key inputs into the CAPM formula, so that the results rely heavily on the judgement of the authors. We also find that OXERA uses evidence and regulatory precedent in a selective and biased manner to support its conclusions.

OXERA's failure to estimate the WACC in a robust way is all the more remarkable given that OXERA did not commit the same mistakes in previous reports. OXERA's WACC methodology, as presented in its two reports for the Raad, is a significant departure from the methodology it uses in other cases, notably when calculating the cost of capital for KPN or the UK gas DNs, regulated companies operating in the same country and sector, respectively.

Many of the conclusions in OXERA's report for the Raad directly contradict research findings in earlier OXERA reports,³⁸ without any form of explanation. The report says that the Raad instructed OXERA to follow the methodology that Frontier used in 2005, but in that case OXERA should have stated that its estimates do not represent its independent opinion.

Table 5.1 shows that the departure from OXERA's previous approach leads to a significant downward bias in the parameter values recommended to the Raad.

³⁷ OXERA (2010a), "Updating the WACC for energy networks – Quantitative Analysis", 5 Feb 2010 and OXERA (2010b), "Updating the WACC for energy networks – Methodology Paper", 2 Feb 2010

³⁸ see e.g. OXERA (Dec 2008): Cost of Capital of KPN, available at: www.opta.nl/nl/download/bijlage/?id=484

Table 5.1
Recent OXERA Recommendations on WACC as of December 2009

WACC Component	OXERA Report for the Raad		Other OXERA (KPN, Gas DN's)		Basis of other Recommended Approach
	Low	High	Low	High	
A Risk-free Rate (nominal)	3.9	4.0	3.9	4.0	<i>Unchanged</i>
B Debt Premium	1.1	1.9	1.1	2.4	A and BBB rated debt (Gas DN, p.14)
C Cost of Debt (pre-tax, nominal)	5.0	5.9	5.0	6.4	= A+B
D ERP	4.0	6.0	6.0	6.5	Pre-crisis ERP plus a premium for recent volatility (KPN, p.32)
E Asset Beta (MM)	0.39	0.45	0.48	0.51	Blume adjustment (KPN, p.40)
F Equity Beta	0.68	0.95	0.84	1.08	= $E * (1+(1-J)*(H/(1+H)))$
G Cost of Equity (post-tax, nominal)	6.6	9.7	8.9	11.0	= $A+(D \times F)$
H Gearing	50	60	50	60	<i>Unchanged</i>
J Tax	25.5	25.5	25.5	25.5	<i>Unchanged</i>
K Pre-Tax WACC (nominal)	6.9	8.8	8.5	9.8	= $(C \times H) + (G \times (1-H) / (1-J))$
L Inflation	1.6	1.7	1.8	1.8	Investor Expectations (OXERA 2010b), p. 14
M Pre-Tax WACC (real)	5.3	6.9	6.6	7.8	= $(1+K)/(1+L) - 1$
N Difference			+1.3	+0.9	

Source: NERA Calculation based on statements in various OXERA reports and Bloomberg data

In Table 5.1, we calculate the WACC range that OXERA is likely to have calculated if it had stuck to its own methodology, as presented in other reports. In particular, we focus on its report for KPN³⁹ as this report also related to a regulated Dutch regulated company. Where there are differences between sectors (i.e. on gearing, cost of debt or beta), we have relied on previous OXERA work in the gas sector.⁴⁰ Had OXERA calculated the WACC in line with other published OXERA reports on WACC produced around the same time, we believe the range for the pre-tax real WACC would have been substantially higher – between 6.6% and 7.8% instead of between 5.3% and 6.9%.

OXERA has argued previously for the selection of a WACC at the top of the plausible range, to allow for the asymmetric consequences of setting a WACC too low rather than too high. Applying these lessons to the range given above implies that the annual (pre-tax real) WACC for Dutch energy networks, and for GTS in particular, is around 7.5% per annum.

³⁹ OXERA (Dec 2008): Cost of Capital of KPN

⁴⁰ OXERA (Aug 2007): Recent market evidence on the common WACC/CAPM parameters, Note prepared for Gas DN's

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