

RIO-T1 and GD1 Initial Proposals

Financial issues

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Executive summary

This report was commissioned by the Energy Networks Association as a response to the Initial Proposals for National Grid Electricity Transmission plc (NGET), National Grid Gas plc (NGGT) and the gas distribution networks (GDNs) as part of the next transmission (electricity and gas) and gas distribution price controls (RIIO-T1 and GD1 respectively).¹

In arriving at the proposed allowance for return on equity, Ofgem has adopted a number of tools, including the capital asset pricing model (CAPM), relative risk analysis and alternative sense-checks. The toolkit proposed by Ofgem is consistent with standard regulatory practice, and demonstrates an appreciation of the difficulties of relying too heavily on one approach, especially in the context of elevated capital market uncertainty.

The proposed allowance for the cost of debt will be updated annually based on movements in the simple ten-year trailing average of Ofgem's chosen measure for the market cost of debt. Ofgem is the first UK regulator to introduce cost of debt indexation under the new RIIO (Revenue = Incentives + Innovation + Outputs) regulatory framework, with the intention to reduce the risk of error in the estimate of the cost of debt, and thereby lessen the likelihood of setting the 'wrong' cost of capital.

This report reviews how the principles for setting the allowed return have been applied in practice in the Initial Proposals, and to what extent the Proposals achieve the stated objectives of the RIIO framework and ensure that efficient financing costs are recoverable in RIIO-T1/GD1.

Risk-free rate and equity risk premium

Ofgem proposes to use a risk-free rate of 2.0% and an equity risk premium of 5.25%. These values are broadly consistent with recent comparable regulatory determinations. Moreover, the approach and the values proposed are appropriate in the context of the RIIO framework.

Mitigating the risk of an under-investment problem and ensuring companies are able to finance their functions is especially important given the focus of RIIO on investment, innovation and strong incentives. Noting the divergence between short-term and long-term estimates of the CAPM components, Ofgem decided that it was 'appropriate to focus on longer-term estimates, particularly as [Ofgem] are setting controls for an eight-year period'.²

Consistent with taking a longer-term view of the CAPM components, the RIIO-T1/GD1 strategy decisions do not constrain Ofgem to a mechanical update of the cost of equity parameters if capital market conditions change before the Final Proposals. Indeed, the consistency of such an update with taking a long-term view of the CAPM parameters would need to be considered carefully.

Relative risk analysis

The proposals for equity beta and notional gearing are intended to reflect a key principle of the RIIO framework of ensuring consistency between the allowed return and business risk. In

¹ Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', July 27th; and Ofgem (2012), 'RIIO-GD1: Initial Proposals', July 27th.

² Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', July 27th, p. 19; and Ofgem (2012), 'RIIO-GD1: Initial Proposals', July 27th, p. 18.

particular, 'where there are material differences in cash flow risk, the allowed return may be different across and within sectors'.³

Assessing business risk is most reliable and transparent when undertaken at the level of the asset beta, focusing on the risk characteristics of a company's assets independently from the financial risk that arises from capital structure choices. Provided there is robust evidence of material differences in business risk—either across time or between companies—setting different allowed returns for individual companies would be appropriate.

The proposed cost of equity and notional gearing assumptions in the Initial Proposals, when translated into asset betas, imply material business risk differentials both across time and between companies.

- The implied asset betas of all the networks have decreased compared to the previous price controls (TPCR4 and GDPCR1). The reductions are 5%, 15% and 16% for NGET, NGGT and the GDNs respectively.
- There is material variation in the implied asset betas for individual companies across the sectors. Relative to the fast-tracked electricity transmission networks, the implied asset betas are 11%, 20% and 26% lower for NGET, NGGT and the GDNs respectively.

The changes in the cost of equity and notional gearing assumptions appear to be justified by Ofgem on the basis of differences in the relative scale of investment (measured by the ratio of capital expenditure (CAPEX) to Regulatory Asset Value (RAV)). Even assuming that the CAPEX to RAV ratio is the most relevant risk factor, the differences in the asset beta appear large compared to relatively small differences in the CAPEX to RAV ratios. More importantly, the weight placed on the CAPEX to RAV ratio in the assessment of risk in the Initial Proposals is disproportionately large compared to the relatively small weight placed on this factor by the credit rating agencies.

Analysis of a broader range of factors suggests that on balance the evidence does not support the implied differences in business risk, and in particular, the reductions relative to previous price controls. A number of factors, such as increased length of the price control and increased cash-flow duration (in electricity transmission) suggest that risk will increase relative to TPCR4 and GDPCR1. This suggests that in the absence of a clear framework for weighting the conflicting evidence, it would be appropriate to either increase or, at a minimum, leave the asset betas for all companies unchanged from TPCR4 and GDPCR1.

The following measures should be considered as ways to address the issues raised by this analysis of relative risk:

- Increasing the equity betas and therefore the cost of equity for each company such that the implied asset betas are not reduced relative to TPCR4 and GDPCR1.
- Modifying the equity betas to reduce the implied differences in asset betas between the sectors, including the fast-tracked electricity transmission networks.
- Setting gearing for NGGT and the GDNs no higher than the previous price controls.

Indexation of the cost of debt

Regulators have tended to regard the costs of overestimating the cost of capital (over-charging consumers) to be smaller than the costs of underestimating the cost of capital (creating an under-investment problem). To recognise the asymmetric consequences of the companies' cost of capital deviating from the regulatory allowance during the price control

³ Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', July 27th, p. 10; and Ofgem (2012), 'RIIO-GD1: Initial Proposals', July 27th, p. 11.

period, UK regulators, including Ofgem, have tended to set the cost of capital allowance slightly above the central estimate derived from market data.

Ofgem's proposals for cost of debt indexation are intended to reduce the risk of error in the estimate of the efficient cost of debt over the price control period, and thus reduce the need to set the allowance above the central estimate of the efficient cost of debt.

However, the ability of indexation to reduce the risk of error will be different for each company, and in some cases indexation can actually increase the risk of error compared to a fixed cost of debt allowance.

- As no company issues debt on a frequent and uniform basis, all companies are exposed to the risk that their issuance yields differ from the average of daily yields that goes into Ofgem's calculation of the ten-year trailing average. If the historical level of intra-year volatility in yields persists or increases then all companies will still have significant continued exposure to the risk that their actual cost of debt deviates from the regulatory allowance.
- As no company issues all debt in an inflation-linked form, their nominal bond yields will contain a premium as compensation for inflation risk. Ofgem's index only guarantees that companies will recover the inflation risk premium if at all times there is an equal and offsetting liquidity risk premium in inflation-linked bond yields. Companies are therefore exposed to the risk that the inflation risk premium is unusually large on the dates when the company issues debt, and that the debt index will not remunerate companies for an efficiently incurred component of their nominal debt costs.
- For the GDNs in particular, moving from a fixed allowance to indexation of the allowed cost of debt is likely to increase, rather than reduce, the risk of error in estimating the cost of debt. Low RAV growth and relatively small asset bases mean that the actual profile of debt issuance will bear almost no resemblance to the frequent and uniform assumption underlying the debt index.

Ofgem's duty to allow companies to finance their functions suggests that these risks of error between the allowed and actual cost of debt cannot be disregarded. Therefore, for the Final Proposals, it is important that the risk of error in the cost of debt is reflected either in the allowed return or, where appropriate, through supplementing the debt index with a mechanism to avoid undue exposure to risk. An example of such a mechanism is a cap and a floor, which in some cases would reduce the risk of under-recovery of efficiently incurred debt costs, and increase the probability that companies are able to finance their functions.

Additionally, under the RIIO-T1/GD1 debt indexation proposals, debt issuance costs are assumed to be funded through network companies continuing to achieve lower issuance yields relative to the iBoxx corporate index. Recent evidence suggests that the difference between the iBoxx index and issuance yields has narrowed. In addition, regulatory changes such as Solvency II and changes to the composition of the iBoxx index are expected to make it more challenging to achieve lower issuance yields relative to the index in the future. In the Final Proposals, an explicit allowance for debt issuance costs should be considered as a means to ensure that these costs continue to be recoverable during RIIO-T1/GD1, rather than assuming that the difference between the iBoxx index and issuance yields will provide adequate cover for issuance costs.

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1 Introduction

This report was commissioned by the Energy Networks Association as a response to the Initial Proposals for National Grid Electricity Transmission plc (NGET), National Grid Gas plc (NGGT) and the gas distribution networks (GDNs) as part of the next transmission (electricity and gas) and gas distribution price controls (RIIO-T1 and GD1 respectively).⁴

In arriving at the proposed allowance for return on equity, Ofgem has adopted a number of tools, including the capital asset pricing model (CAPM), relative risk analysis and alternative sense-checks. The toolkit proposed by Ofgem is consistent with standard regulatory practice, and demonstrates an appreciation of the difficulties of relying too heavily on one approach, especially in the context of elevated capital market uncertainty.

The proposed allowance for the cost of debt will be updated annually based on movements in the simple ten-year trailing average of Ofgem's chosen measure for the market cost of debt. Ofgem is the first UK regulator to introduce cost of debt indexation under the new RIIO (Revenue = Incentives + Innovation + Outputs) regulatory framework, with the intention to reduce the risk of error in the estimate of the cost of debt, and thereby lessen the likelihood of setting the 'wrong' cost of capital.

This report reviews how the principles for setting the allowed return have been applied in practice in the Initial Proposals, and to what extent the Proposals achieve the stated objectives of the RIIO framework and ensure that efficient financing costs are recoverable in RIIO-T1/GD1.

The rest of this report is structured as follows:

- section 2 considers the approach to the risk-free rate and the equity risk premium;
- section 3 examines the key issues in the relative risk analysis;
- section 4 reviews the impact of debt indexation proposals.

⁴ Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', July 27th; and Ofgem (2012), 'RIIO-GD1: Initial Proposals', July 27th.

2 Risk-free rate and equity risk premium

In the Initial Proposals, the risk-free rate and equity risk premium (ERP) estimates that underpin the allowance for return on equity reflect a long-term view of the capital market data. This is an appropriate approach in the context of the RIIO framework. Mitigating the risk of an under-investment problem and ensuring companies are able to finance their functions is especially important given the focus of RIIO on investment, innovation, and strong incentives.

The proposed values for the risk-free rate and the ERP of 2% and 5.25% respectively are consistent with taking a longer-term view of the capital market evidence, and are in line with recent regulatory precedent.

Consistent with taking a longer-term view of the CAPM components, the RIIO-T1/GD1 strategy decisions do not constrain Ofgem to a mechanical update of the cost of equity parameters if capital market conditions change before the Final Proposals. Indeed, the consistency of such an update with taking a long-term view of the CAPM parameters would need to be carefully considered.

2.1 Overall approach

The application of the CAPM to current capital market data is unusually difficult. A number of factors contribute to this:

- the aftermath of the most severe financial crisis in recent decades, with capital markets continuing to go through periods of high volatility;
- loose monetary policy on an unprecedented scale, including several rounds of Quantitative Easing (QE) by the Bank of England;
- increased uncertainty around key economic fundamentals, such as output and inflation;
- continuing concerns about the fiscal sustainability of a number of governments around the world, particularly in the eurozone.

These factors have led to a marked divergence between short-term estimates of the CAPM market parameters—namely, the risk-free rate and the ERP—and longer-term estimates. This means that interpreting current market evidence is very challenging, especially in a context where the regulator needs to forecast key market parameters for the duration of the price control.

In the Initial Proposals, Ofgem proposes to use a risk-free rate of 2.0% and an ERP of 5.25%. Noting the divergence between short-term and long-term estimates of the CAPM components, Ofgem decided that it was ‘appropriate to focus on longer-term estimates, particularly as [Ofgem] are setting controls for an eight-year period’.⁵ Taking a longer-term view is consistent with Ofgem’s approach adopted in previous reviews.⁶

Our experience from previous price controls shows that looking beyond short-term volatility is a prudent approach to take when setting the cost of equity assumption for network companies.

⁵ Ofgem (2012), ‘RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc’, July 27th, p. 19; and Ofgem (2012), ‘RIIO-GD1: Initial Proposals’, July 27th, p. 18.

⁶ Ofgem (2012), ‘RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc’, July 27th, p. 19; and Ofgem (2012), ‘RIIO-GD1: Initial Proposals’, July 27th, p. 18.

Ofgem is not constrained to update its parameters mechanically to account for market developments between Initial and Final Proposals, and, indeed, the consistency of such an update with taking a long-term view of the CAPM parameters would need to be carefully considered.

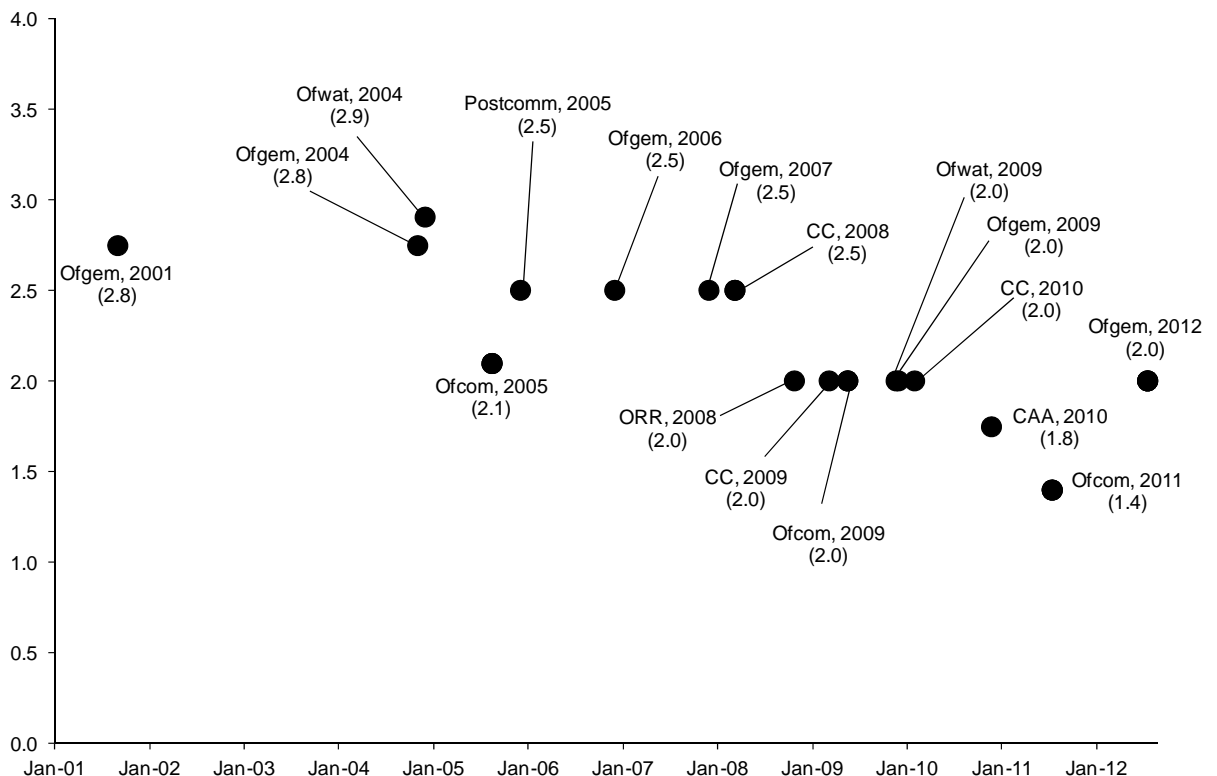
2.2 Risk-free rate

The risk-free rate allowance proposed in the Initial Proposals is higher than spot yields on index-linked gilts. In the regulatory context, it is appropriate to set the regulatory allowance for the risk-free rate higher than the spot yield to reflect the uncertainty over future levels of the risk-free rate, and hence the required return on equity.

- This can be viewed as the ‘insurance premium’ that a company requires for bearing the risk of a variable cost of equity relative to a fixed allowance.
- Additionally, setting the regulatory allowance above the spot yield can reflect a view that the costs of overestimating the risk-free rate (over-charging consumers) are smaller than the costs of underestimation (creating an underinvestment problem).

As shown in Figure 2.1, a risk-free rate allowance of 2% is generally in line with recent regulatory precedent. Regulators have typically looked beyond short-term market fluctuations in order to achieve a degree of regulatory consistency across price reviews and ensure that their decisions are not unduly influenced by very short-term market movements. This is prudent, especially when faced with unusual market conditions, such as have prevailed since the start of the financial crisis in 2007.

Figure 2.1 Real risk-free rate regulatory determinations



Note: CC, Competition Commission. To facilitate comparability of regulatory precedents across parameters, in determinations where a nominal rate of return is applied, as in telecoms, a real risk-free rate was estimated using inflation assumptions.

Source: regulatory determinations and Oxera analysis.

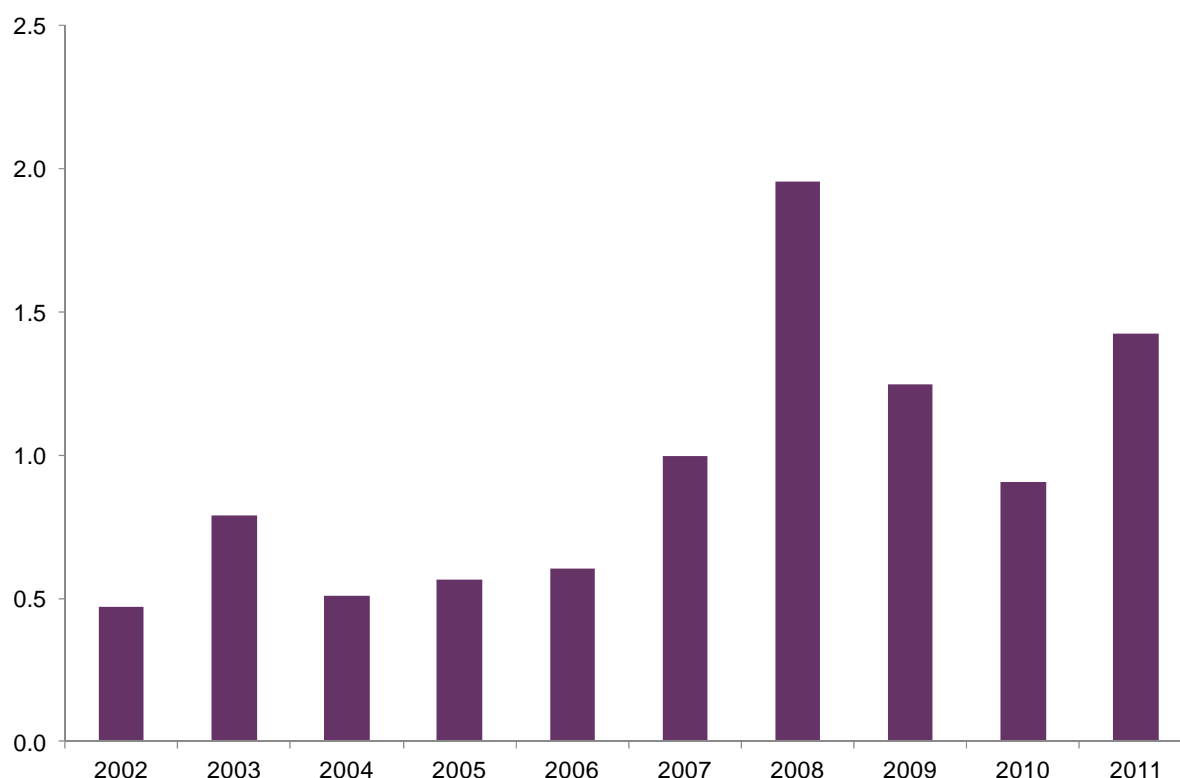
The only regulator recently to adopt a materially lower risk-free rate than 2% is Ofcom.⁷ However, the relevance of Ofcom's decision in the current context is limited by the following factors.

- Ofcom's determination applies to a three-year rather than an eight-year price control, suggesting that the risk of error in the cost of capital estimate is significantly lower.
- Unlike other regulators, Ofcom does not have an explicit financing duty,⁸ suggesting that the risk of underinvestment might play a slightly lesser role in setting financial parameters of a price control.

For RIIO-T1/GD1, it is appropriate to set the regulatory allowance for the risk-free rate higher relative to spot yields than in the past.

- A move from a five- to an eight-year price control exposes companies to greater capital market uncertainty than in previous controls and in comparison to other sectors.
- Measures of the risk-free rate continue to be more volatile in the context of elevated capital market uncertainty than in the past (see Figure 2.2 below).
- Spot yields are at historically low levels, suggesting that the potential for further declines is limited, whereas there is potential for large increases.

Figure 2.2 Difference between maximum and minimum of daily ten-year index-linked gilt yield by calendar year (%)



Source: Datastream, Oxera.

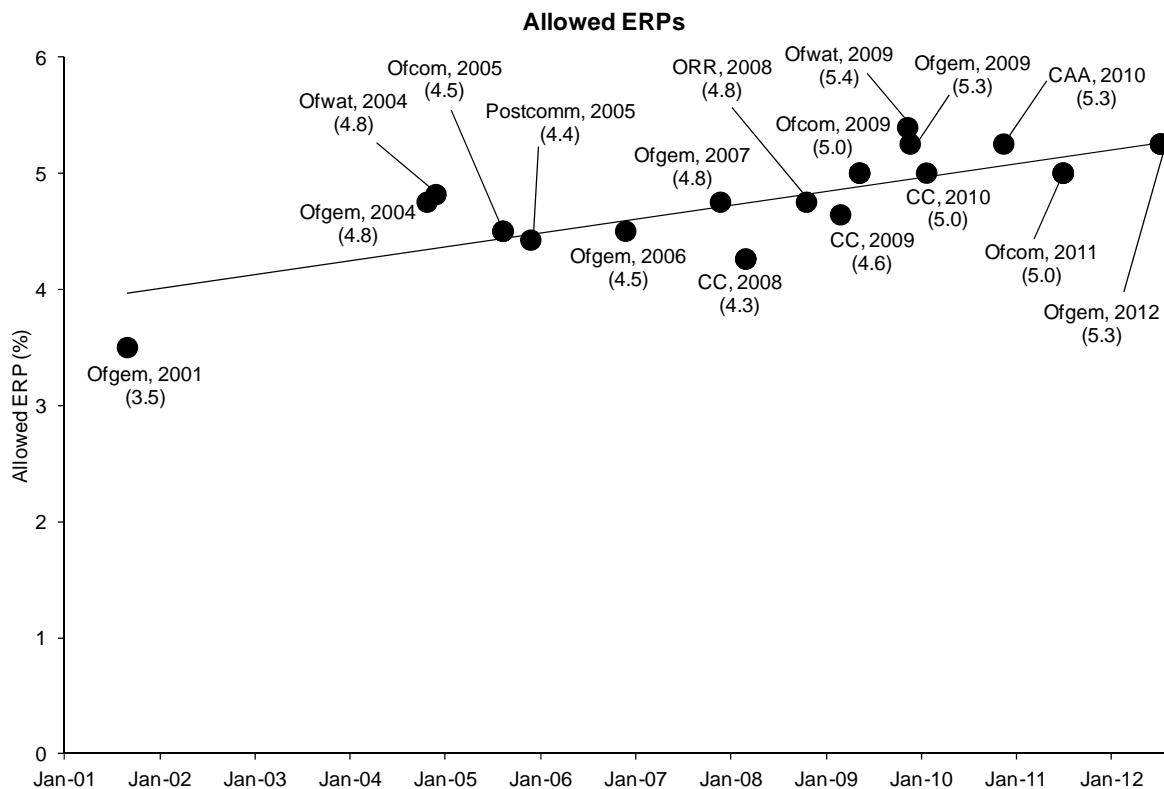
⁷ Since the RIIO-T1 and GD1 strategy decision, Ofcom has made two risk-free rate determinations: one in July 2011 and one in April 2012. The decision in April 2012 was based on the value used in July 2011 and did not consider new evidence since that decision. Ofcom (2011), 'WBA charge control. Charge control framework for WBA Market 1 services', July; Ofcom (2012), 'Wholesale ISDN30 Price Control', April.

⁸ Communications Act 2003, Section 3 (1).

2.3 Equity risk premium

The ERP is not directly observable, and setting a regulatory allowance for the ERP also requires a degree of judgement. The allowance of 5.25% in the Initial Proposals is generally in line with recent regulatory precedent. As shown in Figure 2.3, regulatory determinations for the ERP have generally followed an upward trend in recent years, partially to reflect the impact of the financial crisis.

Figure 2.3 ERP regulatory determinations

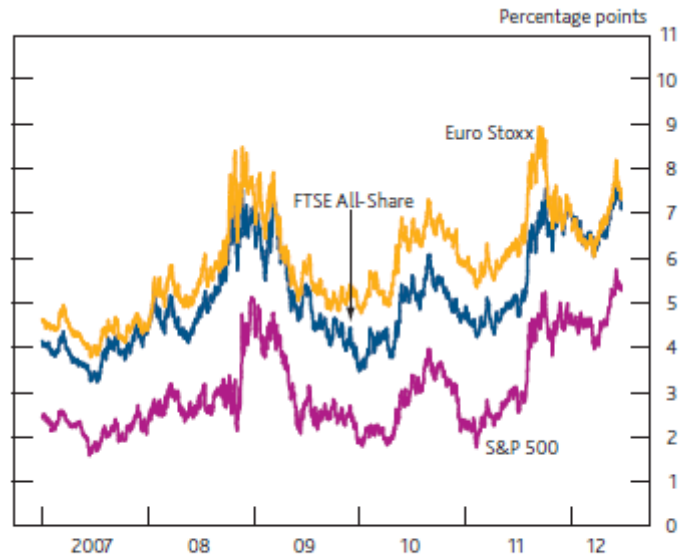


Source: Various regulatory determinations.

Based on forward-looking measures of the ERP (see Figure 2.4 below), an allowance higher than 5.25% could be supported. The estimates of the ERP produced by the Bank of England have:

- trended upwards since 2007;
- stabilised at about 7% in the past 18 months;
- risen above 7% on three occasions in the past five years.

Figure 2.4 Bank of England estimates of the ERP



Sources: Bloomberg, Thomson Reuters Datastream and Bank calculations.

(a) As implied by a multi-stage dividend discount model.

Source: Bank of England (2012), 'Financial Stability Report', p. 10, Chart 1.11, June.

In other words, an allowance of 5.25% is considerably lower than most recent forward-looking estimates. However, consistent with the overall approach of taking a longer-term view and a risk-free rate allowance that is set above spot yields, an allowance of 5.25% appears appropriate.

3 Relative risk analysis

The proposals for equity beta and notional gearing are intended to reflect a key principle of the RIIO framework of ensuring consistency between the allowed return and business risk. In particular, 'where there are material differences in cash flow risk, the allowed return may be different across and within sectors'.⁹ Provided there is robust evidence of material differences in business risk—either across time or between companies—setting different allowed returns for individual companies would be appropriate.

The proposed cost of equity and notional gearing assumptions in the Initial Proposals, when translated into an asset beta—the most reliable and transparent measure of business risk—imply a material business risk differential both across time and between companies (see Table 3.1 below).

- The implied asset betas of all the networks have decreased compared to the previous price controls (TPCR4 and GDPCR1). The reductions are 5%, 15% and 16% for NGET, NGGT and the GDNs respectively.
- There is material variation in the implied asset betas for individual companies across the sectors. Relative to the fast-tracked electricity transmission networks (SHETL and SPTL), the implied asset betas are 11%, 20% and 26% lower for NGET, NGGT and the GDNs respectively.

The changes in the asset beta appear to be justified by Ofgem on the basis of differences in the relative scale of investment (measured by the ratio of capital expenditure (CAPEX) to regulatory asset value (RAV)). Even assuming that the CAPEX to RAV ratio is the most relevant risk factor, the differences in the asset beta appear large compared to relatively small differences in the CAPEX to RAV ratios. Given the absence of a robust theoretical framework that links CAPEX to RAV ratios to asset betas, these differences appear disproportionate.

More importantly, the weight placed on the CAPEX to RAV ratio in the assessment of risk in the Initial Proposals is disproportionately large compared to the relatively small weight placed on this factor by the credit rating agencies.

When a broader range of factors is considered, on balance the evidence does not suggest that business risk has decreased over time. A number of factors, such as increased length of the price control and increased cash-flow duration (in electricity transmission) suggest that risk will increase relative to TPCR4 and GDPCR1. This suggests that in the absence of a clear framework for weighting the conflicting evidence, it would be appropriate to either increase or, at a minimum, leave the asset betas for all companies unchanged from TPCR4 and GDPCR1.

Similarly, on balance the evidence does not strongly support an assessment that the business risk of NGET, NGGT and the GDNs is significantly lower than of the fast-tracked transmission networks. For example, the efficiency incentive rates of NGET and NGGT are similar to those for SHETL and SPTL, and are higher for the GDNs. This lends further support to the conclusion that it would be appropriate to either increase or, at a minimum, leave the asset betas unchanged from TPCR4 and GDPCR1, which would reduce the gap between the asset betas set for each company relative to SHETL and SPTL.

⁹ Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', July 27th, p. 10; and Ofgem (2012), 'RIIO-GD1: Initial Proposals', July 27th, p. 11.

In summary, the following measures should be considered as ways to address the issues raised by this analysis of relative risk:

- Increasing the equity betas and therefore the cost of equity for each company such that the implied asset betas are not reduced relative to TPCR4 and GDPCR1.
- Modifying the equity betas to reduce the implied differences in asset betas between the sectors, including the fast-tracked electricity transmission networks.
- Setting gearing for NGGT and the GDNs no higher than the previous price controls.

Table 3.1 Asset betas implied by the Initial Proposals

| | Electricity transmission | | Gas transmission | Gas distribution |
|---------------------|--------------------------|------|------------------|------------------|
| | SHETL and SPTL | NGET | NGGT | GDNs (Industry) |
| RIIO-T1/GD1 | | | | |
| Equity beta | 0.95 | 0.95 | 0.91 | 0.90 |
| Gearing (%) | 55 | 60 | 62.5 | 65 |
| Asset beta | 0.43 | 0.38 | 0.34 | 0.32 |
| TPCR4/GDPCR1 | | | | |
| Equity beta | 1.00 | 1.00 | 1.00 | 1.00 |
| Gearing (%) | 60 | 60 | 60 | 62.5 |
| Asset beta | 0.40 | 0.40 | 0.40 | 0.38 |

Note: Asset betas are derived from Ofgem’s assumptions on equity beta (β_{equity}), gearing (g), and a debt beta (β_{debt}) of zero, using the formula: $\beta_{asset} = (1 - g) * \beta_{equity} + g * \beta_{debt}$

Source: Ofgem (2012), ‘RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc’, finance supporting document, July 27th; and Ofgem (2012), ‘RIIO-GD1: Initial Proposals’, finance and uncertainty supporting document, July 27th.

3.1 Assessing risk at asset beta level

The vanilla cost of capital is a function of the underlying business risk of a company. Business risk reflects the fundamental operating characteristics of the company which are independent of the financial risk that arises from capital structure choices.

In the CAPM framework, the proportion of total business risk that is systematic (ie, cannot be diversified away) is measured by the asset beta. A change in business risk may translate into a change in asset beta and the weighted average cost of capital (WACC)—ie, a change in the costs of both debt and equity.

Credit rating agencies have stated that higher business risk will increase the thresholds for achieving a given credit rating. For example, Standard & Poor’s notes that:¹⁰

[a]n increase in business risk could translate into higher ratio guidance at the same rating level.

This is consistent with the expectation that an increase in business risk would increase the cost of debt component of the cost of capital. The allowed cost of debt in RIIO-T1/GD1 will be indexed to a general corporate bond index. Therefore, the only way to reflect a change in business risk in the regulatory allowance for the WACC is through a change in the cost of equity, holding the cost of debt constant.

¹⁰ See, for example, Standard & Poor’s (2012), ‘How Ofgem’s Latest RIIO Proposals Could Increase Credit Risk For National Grid And Gas Networks In England And Wales’, July 25th, p. 3.

Most importantly, this requires translating changes in business risk into changes in the asset beta. The gearing ratio can also be adjusted to reflect changes in business risk, but this is of secondary importance and reflects a transfer of risk between debt and equity.¹¹

Assessing the change in asset beta requires:

- identification of a suitable starting measure of business risk;
- identification and analysis of key factors that may affect business risk;
- translation of the results of the analysis into an asset beta assumption.

Assuming that the TPCR4 and GDPCR1 asset betas of 0.40 and 0.38 respectively were an appropriate reflection of the business risk of the sectors (and the individual companies within the sectors) at the time, these asset beta assumptions would seem to reflect an appropriate starting point.

Changes to the asset beta assumptions for the individual companies in RIIO-T1/GD1 need to be based on robust evidence of changes in the risk profile of these companies since the last price reviews. This requires identifying key risk factors affecting the networks, and how the exposure to these risk factors has changed over time.

The key factors that are likely to contribute to differences in risk in RIIO-T1/GD1 in relation to previous price reviews, as well as within sectors, include the following (the impact of these factors on risk is discussed in section 3.2):

- scale of investment;
- increased length of the price control;
- efficiency incentive rate;
- increase in cash-flow duration.

Finally, one way to translate changes in business risk into a change in the cost of equity is to change the asset (or the WACC) risk premium—measured as the difference between the vanilla WACC and the risk-free rate—in proportion to changes in business risk.

The asset risk premium updated for changes in business risk (holding all other WACC components at TPCR4/GDPCR1 values) gives an estimate of RIIO-T1/GD1 WACC. The updated WACC can then be used to back out the updated cost of equity that would be appropriate if the other WACC components were unchanged from TPCR4/GDPCR1 values.

The difference between the updated cost of equity and the TPCR4/GDPCR1 cost of equity is the change in the cost of equity that is required solely due to changes in business risk. To estimate the RIIO-T1/GD1 cost of equity, this change needs to be combined with updated evidence on other parameters of the cost of capital (the risk-free rate, equity risk premium, gearing and cost of debt).

To show how the updating of the asset risk premium could work, suppose the risk modelling shows that there is a 10% increase in asset risk. In TPCR4, the implied asset risk premium was 2.55% (based on a vanilla WACC of 5.05% and a risk-free rate of 2.5%). Therefore, the asset risk premium in RIIO-T1 increases to approximately 2.80%. Assuming the same risk-free rate as in TPCR4 (ie, 2.5%), this would imply an updated WACC of 5.3%. This is equivalent to a 63bp increase in the cost of equity, assuming the same capital market conditions as in TPCR4 (ie, the same risk-free rate, equity risk premium, cost of debt and gearing), which in turn is equivalent to a 0.06 increase in the asset beta compared to TPCR4 (as demonstrated in Table 3.2 below).

¹¹ For a given asset beta, changes in gearing will result in changes to the equity and debt betas, as can be observed from the following relationship: $\beta_{asset} = (1 - gearing) * \beta_{equity} + gearing * \beta_{debt}$

**Table 3.2 Translating asset risk changes into asset beta changes—
using an illustrative assumption of a 10% increase in asset risk**

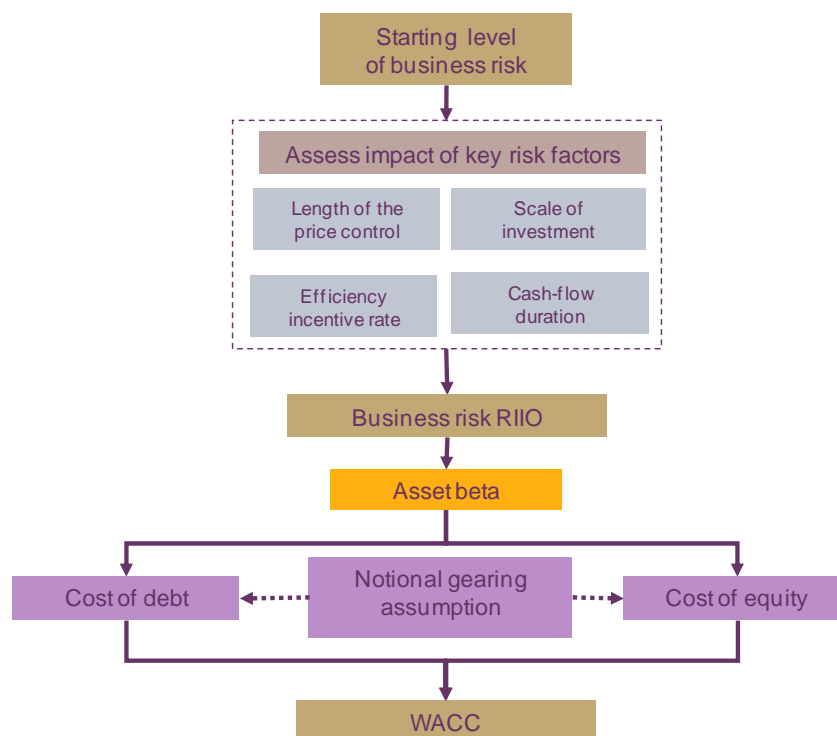
| | TPCR4 | RIIO-T1 | Change |
|-------------------------------------|-------------|-------------|-------------|
| Risk-free rate (%) | 2.5 | 2.5 | - |
| Equity risk premium (%) | 4.5 | 4.5 | - |
| Equity beta | 1.00 | 1.14 | 0.15 |
| Gearing (%) | 60 | 60 | - |
| Asset beta | 0.40 | 0.46 | 0.06 |
| Cost of equity, post-tax (%) | 7.00 | 7.63 | 0.63 |
| Cost of debt, pre-tax (%) | 3.75 | 3.75 | - |
| Vanilla WACC (%) | 5.05 | 5.30 | 0.25 |
| Asset risk premium (%) | 2.55 | 2.80 | 0.25 |

Source: Oxera. Ofgem (2006), 'Transmission Price Control Review: Final Proposals', December. The risk-free rate, equity risk premium and equity beta assumption underlying the TPCR4 cost of equity were provided by Ofgem in Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', July 27th, Table 3.5.

By considering relative changes rather than absolute levels of business risk (eg, as measured by the standard deviation of the return on assets), this approach implicitly assumes that the proportion of total business risk that is systematic stays constant between price control periods. Assuming that the starting asset beta assumption appropriately reflects the proportion of total business risk that is systematic, and in the absence of strong reasons why the ratio of systematic to total risk should change in RIIO-T1/GD1 compared with TPCR4/GDPCR1, the results are likely to provide an appropriate estimate of the change in systematic risk.

The overall framework is summarised in Figure 3.1.

Figure 3.1 Relative risk assessment



Source: Oxera.

3.2 Key risk factors

The rest of this section reviews the impact of changes in key factors on the business risk of NGET, NGGT and the GDNs, and examines the conclusions of the relative risk assessment in the Initial Proposals in light of this analysis.

3.2.1 Scale of investment

Significant changes in the scale of investment between two price control periods could affect business risk.

- An increase in the scale of investment is likely to magnify the effects of cost shocks on net cash flows.
- An increase in the scale of investment increases the proportion of new assets relative to existing assets, hence the average ‘age’ of the asset base decreases. This means that a larger proportion of initial investment will be recovered in future regulatory periods. Since regulators are unable to write ‘complete’ regulatory contracts covering all eventualities, there is inherent uncertainty around the recovery of cash flows that fall outside the current regulatory period. Some of this impact will be mitigated by a longer price control.
- An increase in the scale of investment could increase unit price risk, if the increase is sufficiently large such that it puts pressure on capacity on the supply side to deliver the projects. Given a number of other infrastructure initiatives in the UK, this risk could be material.

The Initial Proposals consider the scale of investment across companies and across price control periods using the CAPEX to RAV ratio. The choice of the ratio appears to be partially informed by the approach taken by credit rating agencies.¹²

Indeed, in assessing credit risk, Moody’s places some weight on the relative scale of investment, as measured by the CAPEX to RAV ratio.¹³ However, it should be noted that the scale and complexity of investment account for only 4% of the overall credit score in Moody’s methodology.

Standard & Poor’s, on the other hand, appears to place some weight on the absolute levels of CAPEX. For example, in relation to the scale of NGET’s and NGGT’s CAPEX programmes, Standard & Poor’s notes that high absolute levels of CAPEX could also increase risk:¹⁴

the total expenditure for National Grid’s electricity and gas transmission networks is in relative terms less than, but in our view still as daunting, as that approved for the Scottish transmission grids earlier in the year. We associate large capex with a high degree of execution risk and massive funding requirements, partly mitigated by the promise of higher returns in the future.

This suggests that both measures have some relevance to the relative risk assessment. However, neither measure is likely to be a significant factor, for example, as illustrated by the relatively small weight attached to it by Moody’s.

¹² Ofgem (2012), ‘RIIO-T1: Initial Proposals for SP Transmission Ltd and Scottish Hydro Electric Transmission Ltd’, Supporting document, February 7th, p. 43.

¹³ Moody’s (2009), ‘Regulated Electric and Gas Networks’, August 13th.

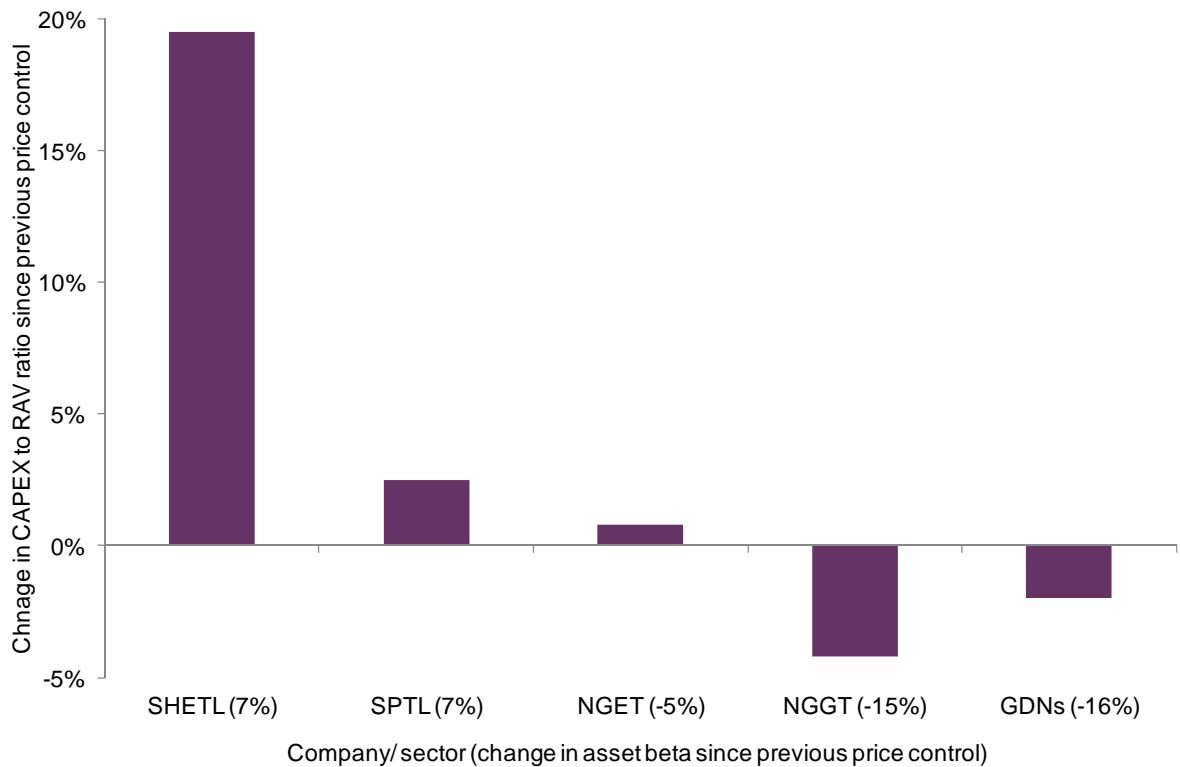
¹⁴ Standard & Poor’s (2012), ‘How Ofgem’s Latest RIIO Proposals Could Increase Credit Risk For National Grid And Gas Networks In England And Wales’, July 25th, p. 6.

Nevertheless, the Initial Proposals single out the CAPEX to RAV ratio ‘as the most significant differentiator of risk affecting both the asset beta (and, therefore, the cost of equity) and the appropriate level of notional gearing’.¹⁵

Assuming that the CAPEX to RAV ratio is indeed the most relevant metric in assessing business risk, the asset beta assumptions do not appear to reflect the analysis of the data.

- The decrease in NGET’s asset beta relative to TPCR4 (–5%) appears inconsistent with the increase in the CAPEX to RAV ratio (see Figure 3.2).
- The decrease in GDNs’ asset beta relative to GDPCR1 (–16%) appears large in comparison to the increase in SPTL’s and SHETL’s asset betas relative to TPCR4 (7%) based on changes in CAPEX to RAV ratios across time (see Figure 3.2).
- The differences in the asset betas across companies appear large given the differences in the CAPEX to RAV ratios, especially relative to the fast-tracked networks (see Figure 3.3). For example, NGET’s CAPEX to RAV ratio is only 2% lower than SPTL’s, yet NGET’s asset beta is 11% lower.

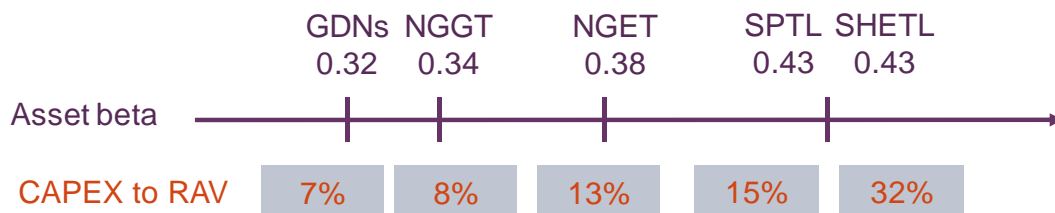
Figure 3.2 RIIO-T1 and GD1 CAPEX to RAV ratios and asset betas—changes over time



Note: The CAPEX to RAV ratios were inferred from Figure 3.1 in the Initial Proposals.
Source: Oxera, Ofgem.

¹⁵ Ofgem (2012), ‘RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc’, finance supporting document, July 27th, p. 11; Ofgem (2012), ‘RIIO-GD1: Initial Proposals’, finance and uncertainty supporting document, July 27th, p. 11.

Figure 3.3 RIIO-T1 and GD1 CAPEX to RAV ratios and asset betas—variation across companies



Note: The CAPEX to RAV ratios were inferred from Figure 3.1 in the Initial Proposals. SHETL has a much higher CAPEX to RAV ratio, both compared to TPCR4 and compared to other companies, including SPTL. However, the allowed return on equity for SHETL is the same as for SPTL. This is because, according to Ofgem, some of SHETL's exposure to cash-flow risk is mitigated through uncertainty mechanisms (a large proportion of SHETL's CAPEX is part of Strategic Wider Works) and through allowing SHETL a bespoke cost of debt index.

Source: Oxera, Ofgem.

Overall, the differences in asset beta assumptions both across time and across companies appear large in the context of relatively small differences in the CAPEX to RAV ratios.

Furthermore, the relationship between business risk and CAPEX is likely to be relatively complex, and a single metric may not capture it fully. In addition to the scale of CAPEX, business risk is likely to be affected by the CAPEX mix and the nature of cost shocks affecting the expenditure. As explained in the Initial Proposals, expenditure can be split roughly into three categories:

- **base TOTEX:** both unit cost and volume allowances are set ex ante;
- **volume drivers:** only unit cost allowances are set ex ante; volume allowances are set when the need arises during the price control period;
- **within-period determinations** (such as Strategic Wider Works (SWW) in transmission): both unit cost and volume allowances are set when the need arises during the price control period.

With base TOTEX, networks are exposed to both unit cost and volume risk, suggesting that variations in base TOTEX relative to ex ante allowances are likely to have the greatest impact on the variance of outcomes relative to allowances.

TOTEX allowances under volume drivers provide additional protection against volume risk, which should reduce the impact on variations in outcomes relative to allowances compared to base TOTEX. However, as noted in the Initial Proposals, in many cases base TOTEX also has a degree of volume protection, suggesting that, from the risk perspective, base TOTEX and volume drivers could be similar.¹⁶

With within-period determinations, networks have the least exposure to unit cost and volume risk, suggesting that the networks are least exposed to variations in outcomes relative to allowances compared to other TOTEX categories.

Excluding CAPEX allowed as part of within-period determinations (SWW), the CAPEX to RAV ratios across all of the companies look relatively similar, and do not suggest a material difference in business risk (see Table 3.3 below).¹⁷ In particular, the evidence does not support the conclusion that the asset betas of NGET, NGGT and the GDNs should be materially lower than for the fast-tracked networks.

¹⁶ Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', finance supporting document, July 27th, p. 12; Ofgem (2012), 'RIIO-GD1: Initial Proposals', finance and uncertainty supporting document, July 27th, p. 11.

¹⁷ The same breakdown of CAPEX to RAV ratios is not applicable in the gas distribution sector.

Table 3.3 CAPEX to RAV ratios

| | SHETL | SPTL | NGET | NGGT | GDNs |
|---|-------|------|------|------|------|
| CAPEX to RAV total (%) | 32 | 15 | 13 | 8 | 7 |
| CAPEX to RAV excluding SWW in transmission(%) | 9 | 12 | 11 | 8 | 7 |

Note: The CAPEX to RAV ratios were inferred from Figure 3.1 in the Initial Proposals.
Source: Oxera, Ofgem.

Therefore, even if the CAPEX to RAV ratio is the most relevant metric of business risk, an analysis of the underlying data suggests that the material differences in the asset beta implied in the Initial Proposals are not fully supported by the evidence presented. Relatively small differences in CAPEX to RAV ratios appear to be associated with relatively large differences in the asset beta, particularly on the downside.

Overall, the relationship between business risk and the scale of investment is likely to be more complex than can be measured by a single metric such as the CAPEX to RAV ratio. The choice of the metric to assess the scale of investment, the nature of investment, and how it is treated within the regulatory framework, are all factors that are likely to affect this relationship. Whilst the scale of investment is important it is not the only factor affecting business risk. This is reflected in the relatively small weight placed on this factor by the credit rating agencies.

3.2.2 Increased length of the price control

The RIIO-T1 and GD1 price controls will cover an eight-year rather than a five-year period. A key reason for increasing the length of the price control is to strengthen efficiency incentives by allowing companies to keep the benefits of out-performance for longer. However, allowing greater scope for out-performance also means there is a greater risk of under-performance. In other words, a longer price control will lead to greater variance of outcomes relative to allowances.

The potential for higher risk exposure under a longer price control has been recognised by Ofgem and its consultants:¹⁸

If there are any cost or revenue shocks that materially affect the network companies, a longer period will elapse before the price control can be reset. This may increase the volatility of potential returns over the price control period...we agree in principle that this may increase the level of risk faced by network companies.

The overall impact on risk will depend on the extent to which a longer price control increases the variance of outcomes versus allowances, which is a function of:

- exposure of the networks to variance of costs relative to allowances;
- the package of uncertainty mechanisms;
- a potential change in regulatory risk exposure.

Increased variance of costs relative to allowances

The regulatory regime largely protects the energy networks from demand risk over the medium term. The main driver of business risk is therefore cost uncertainty. On the costs side, a longer price control increases the exposure to cost over- and under-spends over the period. The extent to which this increases business risk depends on the nature of the shock.

- **Persistent shocks**—some cost shocks would be expected to persist throughout the price control period, which would tend to increase the deviations of outturn costs relative to allowances. An unexpected increase in input prices might reasonably be expected to

¹⁸ FTI Consulting (2012), 'Cost of capital study for the RIIO-T1 and GD1 price controls', July 24th, para 6.8.

- persist for longer than one year, as prices tend to be sticky, at least in the short term. For example, labour contracts would be renegotiated only periodically. Similarly, material costs might be fixed by supply contracts. Therefore, the effect of higher input prices would compound over time, increasing variance of costs relative to allowances.
- **One-off shocks**—even if the unexpected shock to costs is a one-off occurrence, there is still a greater probability of a company being exposed to more one-off cost shocks over a longer price control period, increasing volatility of costs relative to allowances. However, the impact of a longer price control on business risk from one-off shocks is likely to be less pronounced than the impact on risk from persistent shocks.
 - **Asymmetry of cost shocks**—it is plausible that costs are stickier on the downside than on the upside. One example is labour costs. Negotiating nominal wage decreases in a deflationary environment is likely to be more challenging than allowing for nominal wage growth in an inflationary environment. In addition, implementing a redundancy programme could be difficult and, in some cases, undesirable, if the costs of re-training specialist staff are material. This suggests that the impact on variance of costs relative to allowances could be asymmetric with greater risk on the downside.
 - **Investment requirements**—uncertainty around the future energy mix in GB, and in particular, the role of gas in that mix, exposes the energy networks to uncertainty over their investment needs. This uncertainty is greater under a longer price control, which could contribute to greater variance of costs relative to allowances.

Taken together, a longer price control will increase the variance of costs relative to regulatory allowances, and hence increase business risk.

Uncertainty mechanisms

In the Initial Proposals, Ofgem notes that the risk that regulatory assumptions might prove incorrect can be effectively mitigated through uncertainty mechanisms.¹⁹ In principle, uncertainty mechanisms may mitigate some of the forecasting error risk, but it is important to analyse the net impact on business risk on a company-specific basis.

The Initial Proposals do not include explicit analysis demonstrating that the uncertainty mechanisms proposed by the networks are sufficient to mitigate the increase in risk from a longer price control. Rather, the uncertainty mechanisms proposed by NGGT are judged to offer a similar level of protection to TPCR4.²⁰ However, combined with higher exposure to variance of costs relative to allowances, this suggests that a longer price control will still result in a net increase in risk.

Furthermore, a number of the proposed uncertainty mechanisms are in the form of tightly defined re-openers which can only be triggered once or twice during the price control period and which will need to pass a materiality threshold before an adjustment to cost allowances is made. This means that the networks will still be exposed to significant residual uncertainty once the cumulative impact of all materiality thresholds is accounted for.

One specific uncertainty mechanism that is intended to reduce risk is a move to annual rather than end-of-the-price-control revenue adjustments. These adjustments will cover changes to revenues arising as the result of the TOTEX incentive mechanism, revenue drivers, and cost of debt indexation, among others.

Under the TOTEX incentive mechanism, revenues will be adjusted for a proportion of cost over- and under-spends (with the proportion depending on the efficiency incentive rate).

¹⁹ Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', finance supporting document, July 27th, p. 10.

²⁰ Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', finance supporting document, July 27th, p. 17.

Making these adjustments more frequently may act to mitigate some of the increase in risk by bringing forward the cash flows, but it will not eliminate the exposure to greater variance of outcomes relative to allowances. This is because, first, the potential for greater forecasting error under a longer price control will mean that the base allowances against which the adjustments are made are more likely to prove incorrect.²¹ Second, the proportion of the under- or over-spend that is borne by the company is unaffected by the timing of revenue adjustments, but will be affected by the increased variance of costs relative to allowances under a longer price control. Therefore, annual revenue adjustments will not eliminate the increase in business risk from a longer price control.

Overall, under the RIIO framework, uncertainty mechanisms are targeted at specific risks and are unlikely to mitigate much of the increased variability of costs relative to regulatory allowances as a result of a longer price control period.

Regulatory risk

Ofgem notes that a longer price control may reduce regulatory risk, by reducing the number of price controls.

By providing certainty over revenue allowances for a longer period of time, a longer price control does reduce the uncertainty around the levels of regulatory allowances, including the allowance for the regulated return. If this reduces the risk of unfavourable regulatory outcomes, this would be desirable from an investor perspective, and would therefore reduce their perceptions of regulatory risk. However, stability of the regulatory regime and consistent decision-making are also factors that affect regulatory risk perceptions.

The impact of a longer price control on increasing the variance of costs relative to allowances has a direct impact on business risk, and therefore has a more direct link to the cost of capital than regulatory risk. Taken together with the absence of a robust framework for estimating the impact of regulatory risk on the required rate of return, it is difficult to demonstrate that any reduction in risk from having fewer price controls will offset the increase in risk due to increased dispersion of outcomes around the regulated allowance.

Overall impact

Taking all of the above considerations into account, the net impact of a longer price control is likely to be an increase risk, which would lead to an increase in the required rate of return for all energy networks subject to RIIO-T1 and GD1 reviews.

- A longer price control exposes energy networks to increased variance of costs relative to allowances, which increases risk. This implication would seem consistent with the intention of RIIO to provide stronger efficiency incentives.
- Uncertainty mechanisms are unlikely to be sufficient to mitigate fully the exposure to increased variance of costs relative to allowances. In fact, eliminating the increase in risk could be inconsistent with the intention of RIIO to strengthen incentives.
- A longer price control reduces regulatory risk insofar as it provides greater certainty around the level of the allowance for the regulated return. However, the framework linking regulatory risk and the cost of capital is not well-defined compared to the link between exposure to cost over- or under-spends and the cost of capital. Therefore, it is difficult to demonstrate that any reduction in risk from having fewer price controls will offset the increase in risk due to increased dispersion of outcomes around the regulated allowance.

²¹ See also FTI Consulting (2012), 'Cost of capital study for the RIIO-T1 and GD1 price controls', July 24th, para 6.19.

3.2.3 Efficiency incentive rate

An increase in the efficiency incentive rate exposes the company to a greater share of cost variances, which would increase the variance of outcomes relative to allowances.

Analysing changes in business risk as a result of changes in the incentive rate is an important step in the relative risk assessment. There are no compelling reasons to place less weight on this factor, compared, for example, to the scale of investment.

In comparison to previous price controls, the Initial Proposals make the following observations.

Adjusting for the tax effects, the incentive rate for NGET is slightly higher than in TPCR4 but broadly the same for NGGT.²²

For all GDNs, the pre-tax incentive rate is broadly the same as the effective incentive rate in GDPCR1. We are proposing to set the incentive rate of a post-tax basis, but as most GDNs did not pay tax in GDPCR1 this change does not have a material impact on the relative position.²³

Firstly, these statements suggest that on the basis of changes in the efficiency incentives rates as reported by Ofgem, the asset betas should at a minimum be unchanged from TPCR4 and GDPCR1.

However, the efficiency incentive rate will be applied on a post-tax basis in RIIO-T1/GD1 compared to a pre-tax basis in TPCR4 and GDPCR1, which appears to increase the effective pre-tax incentive rate for NGGT in RIIO-T1.²⁴ This would be expected to increase the risk of NGGT relative to TPCR4. The switch from pre-tax to post-tax efficiency incentive rates may also change risk for NGET and the GDNs, relative to TPCR4 and GDPCR1.

Secondly, the comparison of the post-tax efficiency incentive rates across companies also does not support the variation in the proposed asset beta assumptions:

- the efficiency incentive rate for NGET and NGGT is similar to that for the fast-tracked companies, yet their betas are 11% and 20% lower;
- the average post-tax efficiency incentive rate for the GDNs (63%) is considerably higher than for the fast-tracked networks (50%), yet their asset beta is 26% lower.²⁵

3.2.4 Increase in cash-flow duration

The RIIO framework includes a number of changes to the profiling of cash flows. In the electricity transmission sector, regulatory asset lives on new assets will be extended from 20 to 45 years.²⁶ This represents a departure from the current approach of using accelerated depreciation profiles.

This change has the effect of increasing the duration of cash flows. For a single cash flow, duration is simply the time to realisation of that cash flow. For cash flows at multiple points in time, duration is the money-weighted average time to realisation.

²² Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', finance supporting document, July 27th, p. 13.

²³ Ofgem (2012), 'RIIO-GD1: Initial Proposals', finance and uncertainty supporting document, July 27th, p. 14.

²⁴ Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', finance supporting document, July 27th, p. 13.

²⁵ The average efficiency incentive rate for the sectors is calculated as a simple average of company incentive rates. Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', July 27th, p. 13; Ofgem (2012), 'RIIO-GD1: Initial Proposals', finance and uncertainty supporting document, July 27th, p. 14.

²⁶ Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', July 27th, p. 3.

The Initial Proposals allow NGET to transition to this new approach over the next price control period, which will initially offset some of the increase in cash-flow duration. However, compared to the status quo, the net effect will still be an increase in cash-flow duration.

There is a relationship between cash-flow duration and returns required by investors. By construction, the CAPM is a one-period model which cannot capture how changes in cash flow duration affect the cost of capital. The effect of cash flow duration has to be analysed in a more general framework—the inter-temporal CAPM.

Oxera has previously produced a range of theoretical and empirical evidence that supports the relationship between cash-flow duration and required returns, and that predicts that an increase in cash-flow duration for regulated energy networks is likely to lead to an increase in the cost of capital.²⁷

In summary, cash-flow duration has at least two effects on the required rate of return:

- a ‘term premium’ effect as returns become more sensitive to changes in the risk-free rate;
- a ‘beta’ effect as returns become more sensitive to changes in market-wide expected returns.

In addition, the net present value of longer-duration cash flows is more exposed to regulatory risk, as a larger share of the total net present value falls outside of the current regulatory period. However, this would be partially mitigated by a longer price control.

Increase in cash-flow duration in electricity transmission suggests that the cost of capital will increase over the course of RIIO-T1 as the transitional mechanism unwinds, and that it would be appropriate for this to be reflected in the regulatory determination of the asset beta.

3.2.5 Other factors

The summary of the relative risk assessment presented in the Initial Proposals also discusses a number of other factors that ‘may affect risk but to a lesser extent’:²⁸

- complexity of investment;
- TOTEX approach;
- focus on outputs;
- uncertainty mechanisms;
- incentives;
- pension costs;
- cost of debt approach;
- timing of revenue adjustments.

Out of this list, uncertainty mechanisms and the timing of revenue adjustments were discussed in sub-section 3.1.1 in the context of a longer price control. If these factors are taken into account when forming a view on the impact of a longer price control on risk, it is important to ensure that there is no duplication of the effect of these factors in the final assessment.

The impact of cost of debt indexation on risk is discussed separately in section 4. In that section it will be demonstrated that the reduction in risk will vary by company and that, in some cases, debt indexation will increase rather than reduce risk. This will need to be

²⁷ Oxera (2010), ‘What is the impact of financeability on the cost of capital and gearing capacity?’, report prepared for Energy Networks Association, June 9th; Oxera (2011), ‘What is the cost of equity for RIIO-T1 and RIIO-GD1?’, report prepared for Energy Networks Association, February 4th; Oxera (2011), ‘The impact of longer asset lives on the cost of equity: estimating cash flow betas’, July.

²⁸ Ofgem (2012), ‘RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc’, finance supporting document, July 27th, p. 16. Ofgem (2012), ‘RIIO-GD1: Initial Proposals’, finance and uncertainty supporting document, July 27th, p. 15.

appropriately reflected in the allowed return in the Final Proposals, or through supplementary mechanisms to reduce risk.

Out of the remaining factors, according to Ofgem, the changes in the approaches to incentives and pension costs are two factors that are likely to increase risk; and the TOTEX approach and the focus on outputs are two that are likely to reduce risk. Based on this assessment the impact of these additional factors would appear to be neutral on risk. However, the mechanisms by which the changes to the TOTEX approach and the focus on outputs are expected to reduce risk are not presented in the Initial Proposals at a level of detail sufficient to support the assessment that these factors reduce risk. Therefore, taking into account the likely increase in risk from the changes in approaches to incentives and pension costs, the net impact of other factors could in fact increase risk.

All in all, these additional factors (excluding cost of debt indexation, which is dealt with separately in section 4) do not clearly indicate either a reduction in business risk over time or a significant difference in business risk across companies.

4 Indexation of the cost of debt

The Initial Proposals outline that the allowance for the cost of debt will be updated annually based on movements in the simple ten-year trailing average of Ofgem's chosen measure for the market cost of debt. The practical calculation of the allowance will remain broadly unchanged from the RIIO-T1/GD1 strategy decisions, bar one minor technical change in how the index is calculated.²⁹

To recognise the asymmetric consequences of the companies' cost of capital being either above or below the regulatory allowance during the price control period, UK regulators, including Ofgem, have tended to set the fixed cost of capital allowance above the central estimate of the cost of capital derived from market data.

Cost of debt indexation is intended to reduce the risk of error in the estimate of the efficient cost of debt over the price control period, and thus lessen the likelihood of setting the 'wrong' cost of capital and reduce the need to set the allowance above the central estimate of the efficient cost of debt.

However, the ability of indexation to reduce the risk of error will be different for each company, and in some cases indexation can actually increase the risk of error compared to a fixed cost of debt allowance.

- As no company issues debt on a frequent and uniform basis, all companies are exposed to the risk that their issuance yields differ from the average of daily yields that goes into Ofgem's calculation of the ten-year trailing average. If the historical level of intra-year volatility in yields persists or increases then all companies will still have significant continued exposure to the risk that their actual cost of debt deviates from the regulatory allowance.
- As no company issues all debt in an inflation-linked form, their nominal bond yields will contain a premium as compensation for inflation risk. Ofgem's index only guarantees that companies will recover the inflation risk premium if at all times there is an equal and offsetting liquidity risk premium in inflation-linked bond yields. Companies are therefore exposed to the risk that the inflation risk premium is unusually large on the dates when the company issues debt, and that the debt index will not remunerate companies for an efficiently incurred component of their nominal debt costs.
- For the GDNs in particular, moving from a fixed allowance to indexation of the allowed cost of debt is likely to increase, rather than reduce, the risk of error in estimating the cost of debt. This is due to very low RAV growth and relatively small asset bases, which mean that it would be inefficient to access capital markets as frequently as would be required to match the index.

For the Final Proposals, it is important that the residual uncertainty in the cost of debt is reflected either in the allowed return or, where appropriate, through supplementing the debt index with a mechanism to avoid undue exposure to risk. An example of such a mechanism could be a cap and a floor, which in some cases would reduce the risk of under-recovery of efficiently incurred debt costs, and increase the probability that companies are able to finance their functions.

²⁹ The break-even inflation used to deflate nominal yields on the iBoxx indices will be derived using the Fisher equation, rather than the Fisher approximation currently used by the Bank of England. Ofgem (2012), 'RIIO-GD1: Initial Proposals', finance and uncertainty, July 27th, Appendix 2; Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission Ltd and National Grid Gas Transmission Ltd', finance, July 27th, Appendix 2.

Additionally, under the RIIO-T1/GD1 debt indexation proposals, debt issuance costs are assumed to be funded through network companies continuing to achieve lower issuance yields relative to the iBoxx corporate index. Recent evidence suggests that the difference to the iBoxx index has narrowed. In addition, regulatory changes such as Solvency II and changes to the composition of the iBoxx index are expected to make it more challenging to achieve lower issuance yields relative to the index in the future. An explicit allowance for debt issuance costs should be considered as a means to ensure that these costs continue to be recoverable during RIIO-T1/GD1, rather than assuming that the difference between the iBoxx index and issuance yields will provide adequate cover for issuance costs.

4.1 Impact of debt indexation on risk and financeability

In setting a fixed cost of capital allowance for the duration of the price control period, there is a risk due to forecasting uncertainty that the allowance will under- or overestimate the cost of capital that will prevail during the price control period. UK regulators have tended to regard the costs of underestimating the cost of capital as greater than the costs of overestimating it. This is because an increase in the cost of capital during the price control period could make equity investment a negative net present value decision, and hence create an underinvestment problem.

To recognise the asymmetric consequences of the companies' cost of capital being either above or below the regulatory allowance during the price control period, UK regulators, including Ofgem, have tended to set the fixed cost of capital allowance above the central estimate of the cost of capital derived from market data. For example, in choosing a point estimate for the WACC in the last price review for Stansted, the Competition Commission (CC) noted that one of the main considerations was:³⁰

asymmetric consequences from setting returns too high and too low. Specifically, there was a significant detriment to users if Stansted was deterred by inadequate financial returns from investing in new facilities which more than outweighed the costs of setting returns too high and asking users to pay higher charges than strictly necessary.

This argument influenced the CC's recommendation to the Civil Aviation Authority (CAA) to choose a point estimate at the 81st percentile of the range.³¹

Since this approach is applied to the WACC, this means that, for the cost of debt, this has generally led to a fixed cost of debt allowance that is slightly above the central estimate of the efficient cost of debt for the price control period, after allowing for debt issuance costs.

Any difference between the allowed cost of debt and actual cost of debt as a result of error in the cost of debt estimate is borne by equity holders. By allowing a margin between the allowed cost of debt and the central estimate of the efficient cost of debt, equity investors are compensated for bearing the cost of debt risk. In other words, this margin can be considered as a form of insurance premium for equity investors.

Ofgem is the first UK regulator to introduce a cost of debt allowance that will be updated annually. Cost of debt indexation is meant to be a signal of stronger regulatory commitment to funding efficiently incurred debt costs than a fixed cost of debt allowance, which should bring long-term financeability benefits.³²

Our approach, under the RIIO model, is to extend the concept of regulatory commitment to the estimation of the cost of debt. We believe that if there is a commitment to remunerating efficiently incurred debt costs, it will facilitate a greater role for equity in

³⁰ Competition Commission (2008), 'Stansted Airport Ltd, Q5 price control review', Appendix L 'Cost of capital', October 23rd, p. L27.

³¹ The CAA used the CC's recommendation on the WACC in its final decision.

³² Ofgem (2010), 'Handbook for implementing the RIIO model', October 4th, p. 108.

the capital structure of regulated companies going forward. We also believe that such an approach will mean a higher likelihood of getting the WACC 'right' thus leading to better investment decisions by companies.

In other words, debt indexation is intended to reduce the risk of error in the estimate of the cost of debt, and hence reduce the gap between the allowance and the central estimate of the cost of debt.

For a typical company, debt indexation will not reduce the risk of error in the estimate of the cost of debt to zero. This is acknowledged by Ofgem and its consultants.³³

The extent to which the indexed allowance reflects the actual cost of debt of a typical energy network is a function of several factors. As noted in the Initial Proposals, these include the timing and frequency of debt issuance, the coupon on the bonds relative to the market cost of debt, average maturity, and the credit rating.³⁴

This means that, should indexation reduce risk, the insurance premium in the allowed return will need to be correspondingly lower, but it will not be zero. Allowing a margin of appropriate magnitude in the allowed return will not duplicate protection against changes in the cost of debt in cases where the company has some residual exposure to cost of debt risk under indexation.

In some cases, debt indexation may actually increase the exposure to cost of debt risk compared to a fixed cost of debt allowance. For example, for companies whose debt costs are largely fixed over the price control period, annual updating of the cost of debt allowance will introduce additional uncertainty around the difference between the allowed and the actual cost of debt. In these cases a fixed allowance would seem more appropriate. In the absence of a fixed allowance, mechanisms to supplement the debt index—such as a collar mechanism—should be considered as a means of ensuring that companies can finance their functions, with residual uncertainty on the cost of debt being compensated through the allowed return.

4.1.1 Change in risk for all companies

First, as no company issues debt on a frequent and uniform basis, all companies are exposed to the risk that their issuance yields differ from the average of daily yields that goes into Ofgem's calculation of the ten-year trailing average.

The cost of debt allowance is effectively set based on the ten-year average of annual averages of daily yields. On any particular day of the year, the value of the index can exceed the annual average of yields for that year. Assuming no out-performance relative to the market cost of debt, even if companies issue debt more frequently than once a year, there is still a reasonable chance that the average cost of new debt issued in that year exceeds the annual average.

If the historical level of intra-year volatility in yields persists or increases,³⁵ all companies will still have significant exposure to the risk that their actual cost of debt deviates from the regulatory allowance.

Second, as no company issues all debt in an inflation-linked form, all companies have to issue some proportion of their debt in nominal form. Companies compensate their nominal bond investors by paying a yield that includes: the real yield; expected inflation; and the inflation risk premium. Ofgem's debt index calculates a real cost of debt by subtracting an

³³ See FTI Consulting (2012), 'Cost of capital study for the RIIO-T1 and GD1 price controls', July 24th, para 8.27.

³⁴ Ofgem (2012), 'RIIO-T1: Initial Proposals for National Grid Electricity Transmission plc and National Grid gas plc', finance supporting document, July 27th, p. 21; and Ofgem (2012), 'RIIO-GD1: Initial Proposals', finance and uncertainty supporting document, July 27th, p. 19.

³⁵ See Figure 2.2.

estimate of UK break-even inflation from nominal corporate bond yields.³⁶ As this estimate of break-even inflation will also include any inflation risk premium, this approach will not remunerate companies for the inflation risk premium due to nominal bond investors.

Ofgem's consultants reviewed the recent evidence on the inflation risk premium (that acts to increase yields on nominal bonds relative to equivalent inflation-linked bonds) and also the liquidity risk premium (that acts to increase yields on inflation-linked bonds relative to equivalent nominal bonds).

We find that there is enough evidence to presume the existence of an inflation risk premium and the possible existence of a liquidity risk premium. These premia will both impact Ofgem's calculated inflation estimate but with one offsetting (to a greater or lesser extent) the other's effect. The net effect of the two premia is unclear. Although it seems likely that the inflation risk premium is larger than the liquidity premium.³⁷

Importantly, the relative sizes of the inflation and liquidity risk premia are likely to change over time. Companies are therefore exposed to the risk that the inflation risk premium is unusually large on the dates when the company issues debt, and that the debt index will not remunerate companies for an efficiently incurred component of their nominal debt costs.

It is important that the allowed returns for all companies in the Final Proposals appropriately reflect the risk due to intra-year volatility in yields and the risk due to a time-varying inflation risk premium.

4.1.2 Change in risk for RIIO-GD1

Some of the specific characteristics of the GDNs mean that debt indexation, in its proposed current form, increases rather than reduces the risk of error in the estimate of the cost of debt compared with a fixed cost of debt allowance.

These characteristics include very low RAV growth and relatively small asset bases, which mean that it would be inefficient to access capital markets as frequently as would be required to ensure that debt indexation indeed reduces the mismatch between actual and allowed costs of debt.

The scope for adjusting existing financing strategies to reduce residual exposure to cost of debt risk is relatively limited in RIIO-GD1. Real RAV for the industry is forecast to grow by only 1% in RIIO-GD1,³⁸ which means that new debt will be primarily required to re-finance existing debt, rather than to finance new investment.

The average projected opening RAV at the start of RIIO-GD1 will be about £2 billion (in nominal terms).³⁹ Even assuming no constraints under the existing financing arrangements, to improve the match between the index and the actual cost of debt would require issuing bonds of around £130m annually in RIIO-GD1 (assuming 65% gearing), whereas in the past GDNs' average issue size exceeded £220m.⁴⁰ Reducing the risk under the index would therefore require bond issues to be more frequent and smaller.

³⁶ The estimate of break-even inflation is derived from applying the Fisher relationship to nominal and inflation-linked government bond yields.

³⁷ FTI Consulting (2012), 'Cost of capital study for the RIIO-T1 and GD1 price controls', July 24th, para 11.23.

³⁸ Ofgem (2012), 'RIIO-GD1: Initial Proposals', finance and uncertainty supporting document, July 27th, Table 2.6.

³⁹ Ofgem (2012), 'RIIO-GD1: Initial Proposals', finance and uncertainty supporting document, July 27th, Table 2.6. The opening balances in 09/10 prices were converted into nominal prices using the RPI assumptions provided in Ofgem's financial model, available at: <http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=376&refer=Networks/GasDistr/RIIO-GD1/ConRes>.

⁴⁰ Based on data from Dealogic.

Some transaction costs associated with issuing debt, such as broker, legal and credit rating agency fees, are likely to be largely fixed. Issuing debt in such small sizes is likely to lead to a substantial increase in transaction costs as a proportion of the bond value.⁴¹

Furthermore, the new issue premium is likely to increase, as compensation for lower liquidity in the secondary market. There is no way to capture an increase in transaction costs under the currently proposed implementation of debt indexation.

For the GDNs, adjusting their financing policy in RIIO-GD1 to reduce risk is therefore likely to be prohibitively expensive. Additionally, considering the size of new debt requirements for most GDNs relative to the existing debt, such adjustments, even if feasible, would lead to only a marginal reduction in risk.

The very low asset growth and small asset bases are fundamental in nature, and their impact on cost of debt risk cannot be easily eliminated over time. This means that, during future price control periods, debt indexation is likely to continue to be a higher-risk option than a fixed allowance.

This would appear to contradict the principle behind the introduction of debt indexation. In the Final Proposals it is important that this increase in risk is adequately reflected in the allowed return, or that the debt index is modified appropriately so as to reduce risk.

4.1.3 Options to modify the index

Given the recent low levels of yields there is a risk that the ten-year trailing average falls below the efficient cost of debt for a typical network over the RIIO-T1/GD1 period. Ofgem's consultants have also noted that given that interest rates are currently at historically lows, there is a risk that '[d]epending on the future pattern of interest rates, the inclusion of these rates in the index may, therefore, not reflect the efficient costs of debt for a network company over the 2013/21 Price Controls.'⁴²

Therefore, one option to reduce risk and mitigate the negative impact on financeability could be to introduce a floor that protects companies against significant declines in the cost of debt allowance. Under such a mechanism, the allowance for the cost of debt would be updated annually based on movements in the ten-year trailing average. However, the updating is conditional on the index not falling below a pre-specified floor.

Supplementing the index with a floor would reduce risk, especially for those companies whose debt costs are largely fixed for the next price control period.

A floor is an asymmetric mechanism that provides protection against downside risk, but does not limit the potential for upside gains. If it is deemed that such an approach is inappropriate from a consumer perspective, then it might be appropriate to supplement the floor with a cap. Under such a mechanism, the allowance for the cost of debt would be updated annually conditional on the index not falling below/ rising above a pre-specified floor/ cap. In other words, the cost of debt allowance will be subject to a collar mechanism.

The exact magnitude of the cap and the floor and whether they should be symmetric would need to be carefully considered to ensure that the collar strikes the right balance between Ofgem's financing duty and its duty to protect consumer interests. For example, where companies are expected to raise significant amounts of new debt, it would be important that the collar mechanism does not increase the risk of under-recovery of efficiently incurred debt costs compared to current proposals.

⁴¹ See also FTI Consulting (2012), 'Cost of capital study for the RIIO-T1 and GD1 price controls', July 24th, para 8.87.

⁴² FTI Consulting (2012), 'Cost of capital study for the RIIO-T1 and GD1 price controls', July 24th, para 2.23(4).

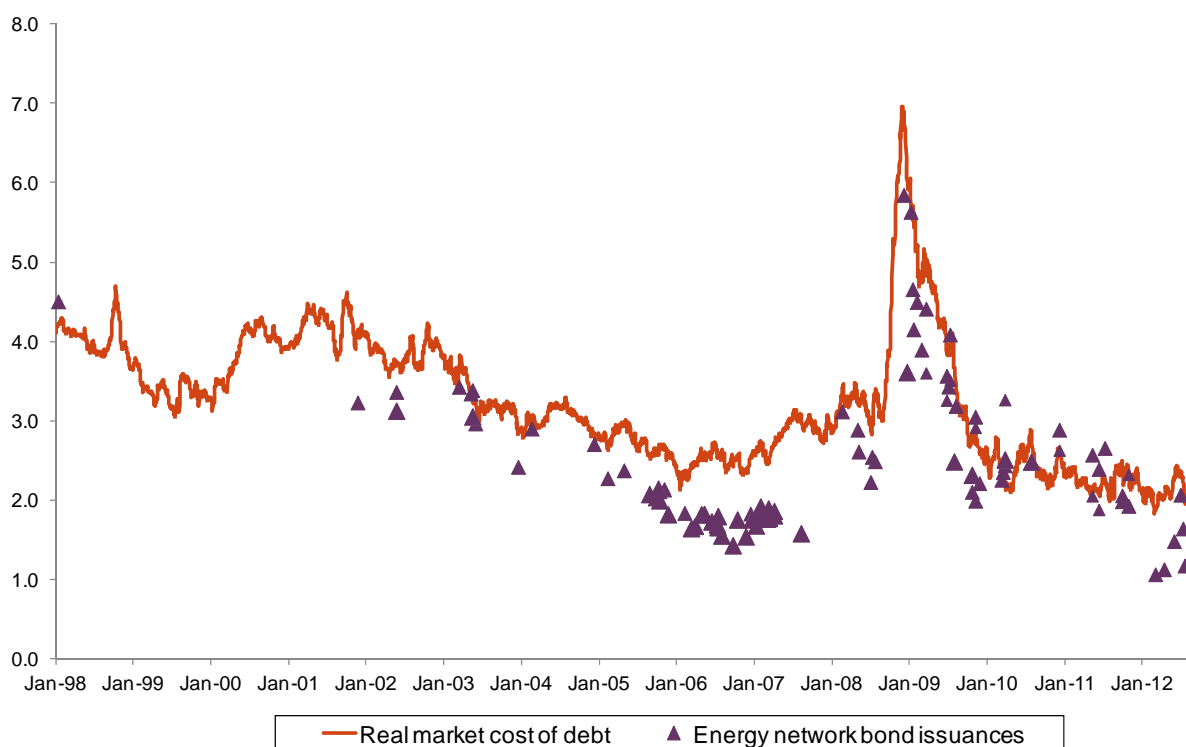
The proposed mechanism is an example of how the debt index could be modified in the Final Proposals so as to reduce risk and improve financeability of the price control package. Other options could also be considered, provided they demonstrably reduce the risk of deviations between the actual and allowed cost of debt.

4.2 Allowance for debt issuance costs

In the RIIO-T1 and GD1 strategy decision, Ofgem noted that utilities had typically been able to issue debt at lower yields than the iBoxx index, and that this 'out-performance' relative to the index should be sufficient to cover all costs associated with issuing debt and any new issue premia.⁴³

The Initial Proposals note that, more recently, this difference has narrowed substantially. Based on the most recent data, the average difference since the start of 2010 is 19bp, compared to an average of 53bp over the history of the iBoxx index (see Figure 3.4).⁴⁴

Figure 3.4 Market cost of debt versus energy network bond issuance yields (%)



Note: Energy network bonds issued on a standalone basis.
Source: Datastream, Dealogic, Bank of England, Ofgem and Oxera.

At this stage, this evidence has not warranted a shift in Ofgem's position, but it is intended for the matter to be kept under review until Final Proposals.

With only a few more months of extra data that will become available between the Initial and Final Proposals, it will be equally as challenging to judge if the recent narrowing of the gap is a temporary phenomenon, or a structural shift.

⁴³ Ofgem (2011), 'Decision on strategy for the next transmission and gas distribution price controls—RIIO-T1 and GD1 Financial issues', March 31st, pp. 28–9.

⁴⁴ The Initial Proposals noted that the average since the start of 2010 was about 9bp, compared with an average of 50bp over the history of the iBoxx index. See, for example, Ofgem (2012), 'RIIO-GD1: Initial Proposals', finance and uncertainty supporting document, July 27th, p. 20.

Regulatory change, such as Solvency II, is one factor that could contribute to the erosion of the gap going forward. As noted by Ofgem's consultants, there is a risk that there might be reduced demand for longer-dated utilities bonds as a result of Solvency II.⁴⁵ One potential impact of reduced demand is that it could make it difficult to issue debt below the index.

It would therefore seem appropriate to take a more explicit approach to ensuring that efficient debt costs, including debt issuance costs, are recoverable regardless of the market conditions. A separate allowance would be a suitable means of achieving this.

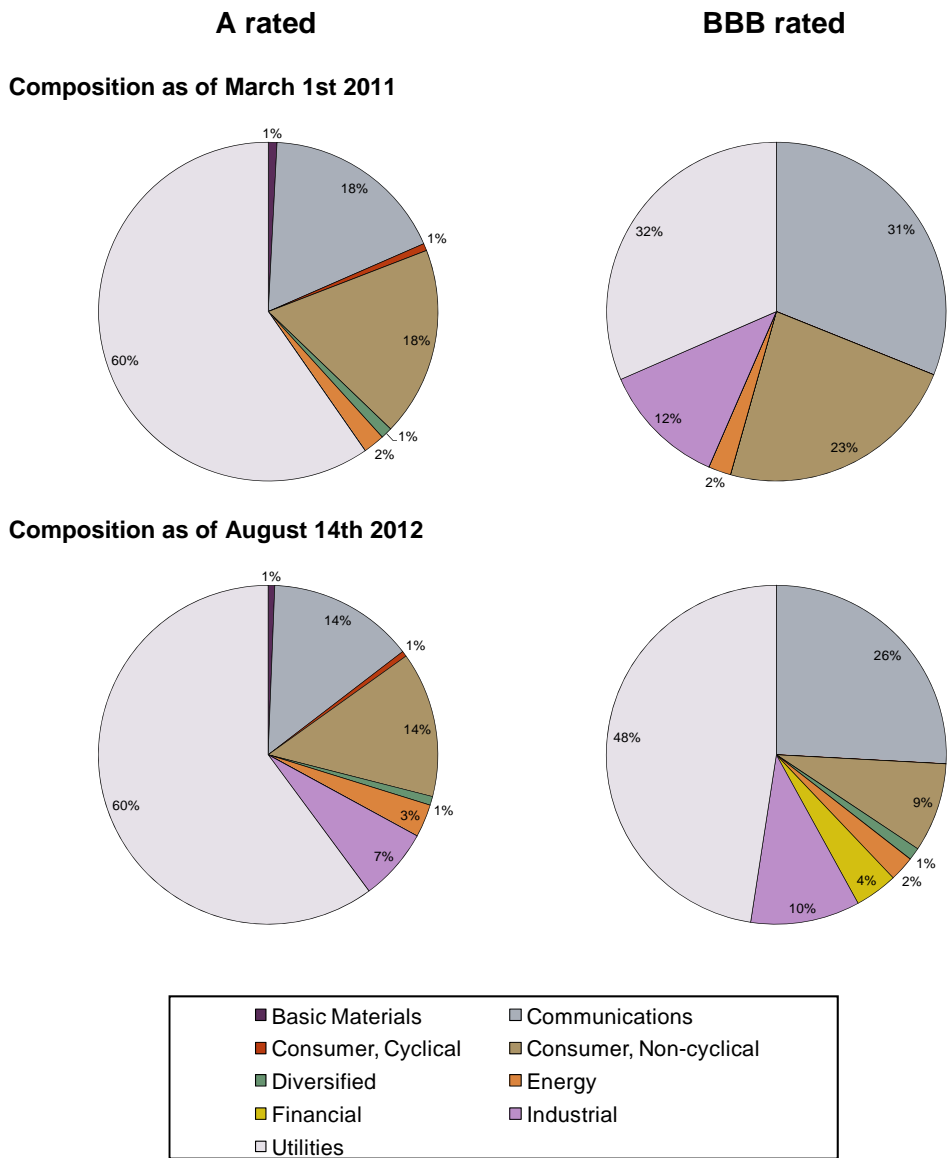
In addition, changes in the composition of the iBoxx index over time could affect the ability of the energy networks to issue debt below the index. Compared with the analysis presented in the RIIO-T1 and GD1 strategy document, utilities now make up a larger share of the two iBoxx indices used to set the allowed cost of debt. Since the strategy decision, the number of utilities bonds has increased from 40 and 20 to 61 and 35 for the iBoxx 10+ A and iBoxx 10+ BBB indices respectively.⁴⁶

The value of the iBoxx indices is calculated as the weighted average of all bonds in the index. As measured by the value of the bonds outstanding, utilities' share of the two indices has also increased on average. The shares are 60% and 48% of the iBoxx 10+ A and iBoxx 10+ BBB indices, respectively, compared with 60% and 32% in March 2011 (see Figure 3.5).

⁴⁵ FTI Consulting (2012), 'Cost of capital study for the RIIO-T1 and GD1 price controls', July 24th, para 9.20.

⁴⁶ Ofgem (2011), 'Decision on strategy for the next transmission and gas distribution price controls—RIIO-T1 and GD1 Financial issues', March 31st, p. 22. Updated analysis is based on data as at August 14th 2012.

Figure 3.5 Composition of iBoxx indices, GBP Non-financial 10+



Source: Datastream, Bloomberg and Oxera.

An increase in the weight of utilities in the index over time could mean that issuing bonds at yields below the index would be more difficult going forward. This lends further support for an explicit allowance for debt issuance costs to be included in the Final Proposals.

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