The Riskiness of the Electricity DNOs under RIIO Relative to Other Regulated Networks

A report prepared for the UK's Electricity DNOs

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Executive Summary

This report by First Economics assesses the riskiness of the electricity DNOs under Ofgem's RIIO-ED1 regulatory framework. The analysis has two main strands: (a) a comparison of shareholder risk under DPRC5 and RIIO rules; and (b) as assessment of the relative riskiness of the electricity transmission, gas transmission and gas distribution networks.

Comparison to DPCR5

Ofgem's RIIO model will bring in a number of changes to the calculation of companies' revenue entitlements. The most significant of these as far as risk is concerned are: (a) the extension of the price control period from five years to eight years, accompanied by the introduction of new uncertainty mechanisms; and (b) indexation of the cost of debt. In addition, there is scope for Ofgem to increase or reduce risk by tuning up or down the level of totex incentive rates.

Ofgem acknowledges in its RIIO-GD1 and RIIO-T1 initial proposals that the longer price control period, in isolation, makes future returns more uncertain and more risky. However, Ofgem also argues that its uncertainty mechanisms, RPI indexation and the removal of reset risk counterbalance this higher risk and leave companies in a broadly neutral position.

This is not persuasive for the following reasons:

- as pointed out by FTI Consulting, the risk that Ofgem should be interested in is systematic, non-diversifiable macroeconomic risk. Ofgem's new uncertainty mechanisms do not provide for companies to share more of such risks with customers. Instead, they target project- and industry-specific risks of the type that regulators have always said do not impact on the cost of capital. If Ofgem were minded to allow for an uncertainty mechanism around costs/inputs prices, we would agree such mechanisms are capable of neutralising the effects of a longer price control period. But since shareholders are now exposed to unforeseen movements in wages, materials prices and contractor margins for three years more than was previously the case, it seems vey clear to us that exposure to economy-wide, systematic risk has increased;

- RPI indexation has always been a feature of Ofgem's price controls and clearly does reduce risk. However, it is not a new innovation and Ofgem should not be scoring it as such in its analysis. The relevant fact here is that an eight-year RPI-linked price control presents more risk than a five-year RPI-linked price control; and

- reset risk is not risk in the sense that Ofgem is using the word. The regulatory model that the DNOs owners have all bought in to is one in which periodic resets of the price control bring an efficient company's rate of return from whatever level it may have reached in previous years back to the cost of capital. Resets therefore fundamentally reduce risk. Although it may be the case that there is some uncertainty about the level of each new price control, this uncertainty is short-lived and relates first and foremost to the potential for regulatory error – i.e. a company- and/or industry-specific non-systematic risk which does not impact on the cost of capital.

Ofgem in its analysis counts indexation of the cost of debt as an additional uncertainty mechanism. Our analysis shows that the match between actual and allowed DNO interest costs in RIIO-ED1 is going to be no better than the match that Ofgem would have achieved by setting a fixed cost of debt allowance for eight years. This is because the ten-year trailing average updates too quickly for DNOs which have locked most of their existing debt into fixed rates and which have only modest new borrowing requirements in the period to 2022/23.

All that Ofgem's indexation mechanism does is to reverse the relationship between interest rate movements and DNO profits. Whereas currently lower interest rates translate into higher profits and higher interest rates translate into lower profits, the RIIO-ED1 framework will see companies gain when interest rates rise and lose when interest rates fall.

This is important because interest rates are being held down artificially at present and will rise from their current historical lows only when the UK economy starts to show solid signs of recovery. It is only when this happens that the Bank of England will feel confident unwinding its policy of quantitative easing and moving the base rate back to a more normal level. Ofgem's argument that the relationship between interest rates and stock market returns is not procyclical is not therefore persuasive. Although it is correct that it is possible to identify periods in history where rising interest rates have been associated with a weak economy and falls in share prices (and vice versa for falling interest rates), the backdrop to RIIO-ED1 is very clearly one in which the direction of interest rates, GDP and equity returns are closely aligned.

It is also not sustainable for Ofgem to argue that it can ignore this newly created procyclicality on the basis that the allowed cost of debt is only 10% of companies' revenue requirements. The correct percentage to focus on is the 45% of companies' allowed return that is attributable to interest payments. Using Ofgem's RoRE measure, we calculate that indexation of the cost of debt amplifies the financial effect of a 1 percentage point change in interest rates by around 185 basis points per annum by 2022/23. This is not something that Ofgem can ignore on the grounds of insignificance.

Comparison to other network businesses

Ofgem's RIIO-GD1 and RIIO-T1 initial proposals provide a framework for assessing the relative riskiness of different network businesses. We agree that the scale of a company's expenditure relative the value of its RAV is the key driver of risk. But we do not agree that Ofgem's measure of expenditure should be capital expenditure and exclude completely the operating expenditure that firms incur. Both types of expenditure have the potential to add to or eat into shareholder returns if there are unforeseen reductions or increases in costs and both types of expenditure should therefore be seen as a source of risk.

We note that the Competition Commission has in the past gone further than this and argued that the opex to RAV ratio is the key driver of risk. A theoretical view might also be that capital expenditure is a simple scaling up of a company's core business; just as a retailer wouldn't expect to see its cost of capital increase because it chooses to open more shops nor would a manufacturer see its cost of capital increase because it builds a new factory, there should be no implications for the cost of capital when a network business decides to become a bigger network business. Taken together with the Commission's policy steer, such considerations suggest that Ofgem is on unsafe ground with its narrow focus on capex to RAV.

The table overleaf amends Ofgem's relative risk analysis to include an entry for opex to RAV. We also highlight in this table the differing scale of the mismatch between actual and allowed interest costs under indexation of the cost of debt.

Table 1: Relative risk versus the DNOs under RIIO

	NGET TO	NGGT TO	GDNs	DNOs
capex to RAV, average 2013-21 (except where stated)	13% to 17%	3% to 10%	7%	12% (DPCR5)
controllable opex to RAV, 2013/14	2%	2%	5%	6%
indexation of the cost of debt	Smaller potential mismatch, due to high RAV growth	Significant potential mismatch, due to moderate RAV growth	Severe potential mismatch, due to zero RAV growth	Significant potential mismatch, due to moderate RAV growth
incentive rate	48% to 50%	44%	61% to 64%	tbc
other	similar	similar	similar	similar

The conclusion that we take from this assessment is that the DNOs are likely to be among the more risky regulated networks from the perspective of equity investors.

Implications for the cost of capital assessment

Our analysis suggests that the RIIO-ED1 cost of equity will need to be higher than the DPCR5 cost of equity. The electricity DNOs' cost of equity should also sit a meaningful distance above the NGGT and GDNs' cost of equity and at a small premium to the NGET cost of equity unless there is a significant reduction in the scale of DNO capex under the RIIO model and/or a change in the design of Ofgem's cost of debt index.

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1. Introduction

The six GB electricity DNO owners have commissioned First Economics to produce a comparative assessment of risk under Ofgem's new RIIO framework.

Our intention is that the analysis that follows will inform the methodology that Ofgem will use to assess relative risk in its forthcoming RIIO-GD1 and RIIO-T1 price control decisions, and thereafter in its RIIO-ED1 proposals. There are two main strands to the work. First, we set out to show how the degree and nature of uncertainty around future returns will change as a result of the switch from DPCR5 rules to the new RIIO framework. And second, we aim to provide Ofgem with an early sighter of the electricity DNOs' likely position vis-à-vis other networks in the sector's hierarchy of risk and allowed returns.

The report is structured as follows:

- section 2 explains what we mean by risk;
- section 3 focuses on the implications that the RIIO model has for risk and returns;
- section 4 looks at the riskiness of the electricity DNOs compared to the transmission and gas distribution networks; and
- section 5 concludes.

2. Analytical Framework

2.1 Definition of risk

Before beginning the substantive analysis it is important to establish exactly what 'risk' means. At its simplest level risk can be defined as the uncertainty that surrounds the different cashflows that the regulated energy networks manage. These cashflows include operating expenditure, capital expenditure and interest payments on the cost side and charges paid by customers on the revenue side. None of these cashflows can be predicted with certainty and we want in the work that follows to highlight how different regulatory rules and/or different types of network present higher or lower levels of uncertainty to investors.

2.2 Profit risk

Strictly speaking our focus throughout this paper is on the riskiness of the cashflow that is available to equity holders after the deduction of operating expenses, depreciation, tax and the payment of interest. This stream of income – which we label 'profits' or 'return' in subsequent sections of the paper – by definition combines the impact of different types of risk, allowing for upside and downside shocks to be offset against each other in any given period.

Focusing attention on out-turn profits in this way means that we need to pay particular attention to efforts made by Ofgem to match variations in costs with variations in income. It is not sufficient to identify that a company faces significant uncertainty around a particular item of cost; if the regulator provides for revenues to move up and down as this uncertainty crystallises it may be that investors are shielded completely from the risk in question (and, by implication, that customers carry that risk in full).

2.3 Equity risk

In carrying out the analysis that follows we have to recognise that shareholders price risk in a specific way.

When setting companies' allowed returns Ofgem uses the Capital Asset Pricing Model (CAPM) to explain how the cost of equity is determined. CAPM divides risk into two categories: non-systematic risks, which a shareholder can diversify away within a balanced portfolio of stocks; and systematic risks, which cannot. It follows that any assessment of the riskiness of a regulated network must consider the extent to which the above-mentioned risks are systematic in nature in order to give an accurate picture of a firm's beta and its cost of equity.

One important consequence this has is that it is perfectly possible to envisage a situation in which the absolute level of uncertainty around future returns, as measured, say, by expected variance, is constant and yet shareholders consider a network to be more risky because there is a heightened exposure to systematic, macroeconomic risks. This may not necessarily show up in the company's cost of debt or its credit rating, but it would have a material impact on the cost of equity.

2.4 Time horizons

Investors in regulated companies provide capital for firms to invest in very long-lived assets. It follows that shareholders will be interested in risk over the life of the investments they are financing, albeit placing more weight on events that can occur in the short term than on risks in the very distant future.

In a regulated industry the existence of periodic reviews of price limits typically causes investors to focus their attention on the years leading up to the next periodic review. Beyond this point, it is difficult to predict what a firm's cashflows will look like except for the knowledge that the regulator has statutory duties to bring about an overall alignment of efficient costs and revenue at each periodic review. In the intervening period, investors will be able to analyse much more accurately the scope for potential out-/under-performance against the periodic review settlement and will know how regulatory rules allocate this out-under-performance between customers and shareholders.

In recognition of these time horizons we focus in this paper on risks to returns during a single price control period.

3. Comparison of the DPCR5 and RIIO-ED1 Frameworks

Having set out the key features of our analytical framework, we now turn to the comparison of risk under the DPCR5 and RIIO-ED1 frameworks.

We consider there to be three key regulatory changes in the RIIO model with the potential to drive changes in the electricity DNOs' risk profiles:

- the extension of the price control period from five years to eight years in length;
- the introduction of new uncertainty mechanisms; and
- indexation of the cost of debt.

In addition, there is scope for Ofgem to increase or reduce risk by tuning up or down the level of totex incentive rates.

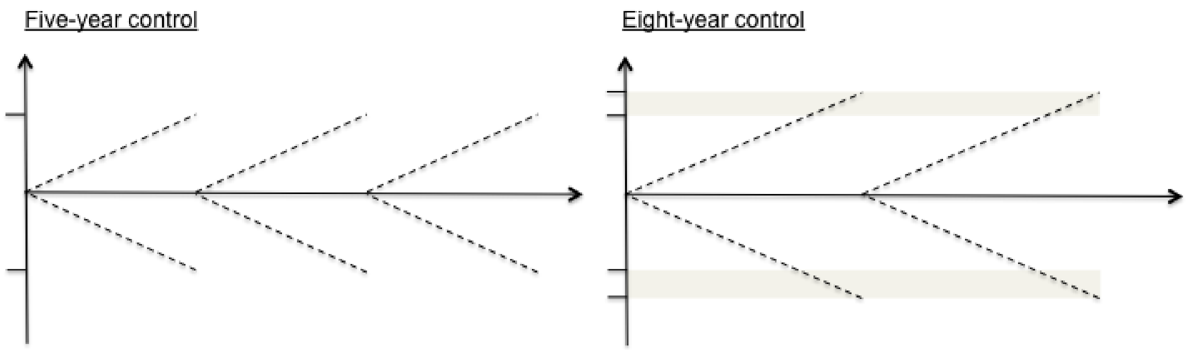
This is by no means an exhaustive list of the changes that the RIIO model contains. Our focus on the above factors is guided mainly by materiality – i.e. the sense that other reforms do not have a meaningful impact on the variability of future returns – and the importance of isolating only changes which affect shareholders' exposure to systematic risk.

3.1 Five-year versus eight-year control periods

The extension of the price control period by three years requires Ofgem to fix revenue entitlements for 2020/21, 2021/22 and 2022/23 in late 2014. Since risk in regulated industries comes primarily from the scope for companies and regulators to under- or over-predict the prevailing level of costs, and since a longer forecasting period brings with it a greater risk of forecasting error, it is fairly obvious that risk in these three extra years is much greater than it would have been had Ofgem waited until 2019 to set revenue entitlements.

This uncertainty is depicted diagrammatically in figure 3.1, with the shaded area indicating the new risk that companies face under RIIO.

Figure 3.1: Scope for sub-normal or super-normal profits under eight-year and five-year price controls



Arguably the most interesting feature of figure 3.1 is the revelation that risk is eliminated by the resetting of price controls. Certain commentators have in the past depicted periodic reviews to be a source of risk, given the uncertainty and disruption that they bring to a business. What figure 3.1 shows is that a price control is ultimately a process that brings allowed revenues back into line with efficient costs. If resets take place more frequently, there is less scope for companies to earn sub-normal or super-normal returns and less risk for companies and their shareholders. If reviews take place less frequently, there is more uncertainty about future returns and more risk.

The effect this can have on the cost of equity was demonstrated empirically by a 1996 study carried out by Monica Gandolfi Tim Jenkinson and Colin Mayer. Looking at the betas of companies operating under five-year RPI-X regulation in the UK and the betas of companies that were subject to rate of regulation in the US, with its much more frequent resets of price controls, it was apparent that the UK companies were perceived by equity investors to be much more risky than the US companies. There also appeared more generally to be a statistically significant correlation within the international data between beta and the length of the regulatory lag.

These are observations that broadly tally with Ofgem's statements in its July 2012 RIIO-GD1 and RIIO-T1 initial proposals documents. The question that Ofgem rightly raises is whether the increase in risk that comes from a switch to eight-year control periods is diluted and neutralised by the introduction of new uncertainty mechanisms.

3.2 Uncertainty mechanisms

Ofgem identifies a number of mechanisms which offset the extension of the price control period and reduce risk. They are:

- RPI indexation;
- mid-period review of outputs;
- the annual iteration process; and
- indexation of the cost of debt.

3.2.1 RPI indexation

RPI indexation has always been a feature of Ofgem's price controls and clearly does reduce risk. However, it is not a new innovation and Ofgem cannot score it as such in its analysis. The relevant fact here is that an eight-year RPI-linked price control presents more risk than a five-year RPI-linked price control.

3.2.2 Mid-period review

The promised review after four years of a price control period has been described by Ofgem in the following terms:

> We recognise the uncertainty about what network companies need to deliver over the eight-year period and have included the potential for a tightly-scoped mid- period review of output requirements to take place to manage significant incremental changes in one go during the period. The scope of any mid-period review would be set out in licence conditions as part of the comprehensive price control review. We do not expect to review past expenditure, financial assumptions (e.g. components of the allowed return) or incentive arrangements for cost efficiency or existing output incentives.[1]

The mid-period review is thus a mechanism for managing very tightly bounded sector-specific, non-systematic risks. It is deliberately designed to exclude any re-consideration of the macroeconomic risks that might cause companies to over- or under-spend against periodic review assumptions.

Had Ofgem cast the net wider and sought to capture systematic risks in its mid-period reviews, we would agree that this form of uncertainty mechanism counterbalances the extension of the control period. But because Ofgem has chosen consciously to rule out any consideration of unexpected changes in costs like wages, materials prices and contractor margins, it cannot be that provision for mid-period review reduces shareholders exposure to risk.

[1] Paragraph 5.11 of Ofgem's RIIO Handbook.

3.2.3 Annual iteration process

The annual iteration process provides for allowed revenues to be updated within a control period for a defined set of variable parameters. Ofgem makes it clear in its July 2012 initial proposals documents that:

> the items we are adjusting during the price control are items we would normally true-up at the end of the price control or are additional variable items that are introduced as part of RIIO, such as the cost of debt indexation mechanism.[2]

This means that the annual iteration process is a timing innovation designed to bring forward revenue entitlements in an NPV-neutral manner. As such, the new mechanism does not in any way offset the extra forecasting risk that we identified in section 3.1 nor is it capable of reducing the uncertainty around future returns. It should not therefore be labelled an 'uncertainty mechanism' in the way that Ofgem has used the phrase in its RIIO documents.

3.2.4 Indexation of the cost of debt

Annual adjustment of the allowed cost of debt appears on the face of it to be a much more valid protection against uncertainty and forecasting error. Indeed, Ofgem's stated intent in moving away from the old fixed cost of debt allowances has been to eliminate the gains and losses that shareholders currently make from unforeseen changes in borrowing costs.

The value of this protection is, however, dependent on the design of Ofgem's new index and the quality of the match that Ofgem is able to achieve between the allowed and actual cost of debt. To test this we have looked at the value of Ofgem's index and the DNOs' actual cost of debt under a range of illustrative scenarios about future interest rates. In conducting this analysis we have assumed that:

- the DNOs' existing borrowings as at 31 December 2011 remain in place until maturity;
- existing debt is financed pound-for-pound by new borrowing at prevailing market rates on the date of maturity;
- the DNOs collectively need to raise an additional £500m per annum at prevailing market rates to finance new investment over the next ten years.

The third of these assumptions is obviously an indicative figure at this stage of the RIIO-ED1 process. We have also run other figures through our model and have confirmed that the overall story that we are about to tell does not change if we make other plausible assumptions about future financing requirements.

To illustrate our findings, we show below the results of three main scenarios:

- the actual cost of new debt and the spot value[3] of Ofgem's cost of debt benchmark is 3% from now until 31 March 2023;
- the actual cost of new debt and the spot value of Ofgem's cost of debt benchmark increases to 4% from now until 31 March 2023; and
- the actual cost of new debt and the spot value of Ofgem's cost of debt benchmark falls to 2% from now until 31 March 2023.

Figures 1 to 3 plot the values of the DNOs' actual cost of debt and Ofgem's ten-year trailing average index in each of these scenarios.

[2] Paragraph 7.13 in the appendix to Ofgem's RIIO-GD1 initial proposals.
[3] The references here to 'spot value' means the on-the-day value of the iBoxx indices less the on-the-day value of gilt market break-even inflation.

Figure 1: Prevailing cost of debt = 3%

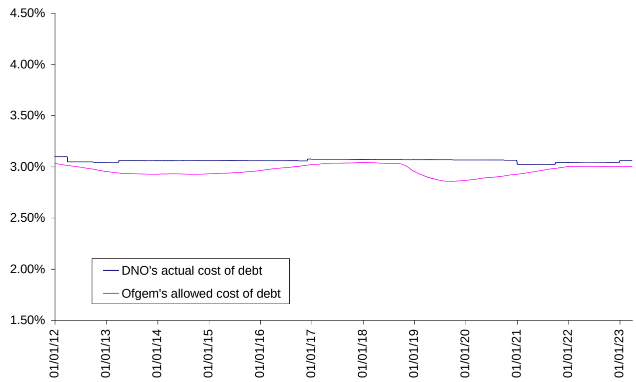


Figure 2: Prevailing cost of debt = 4%

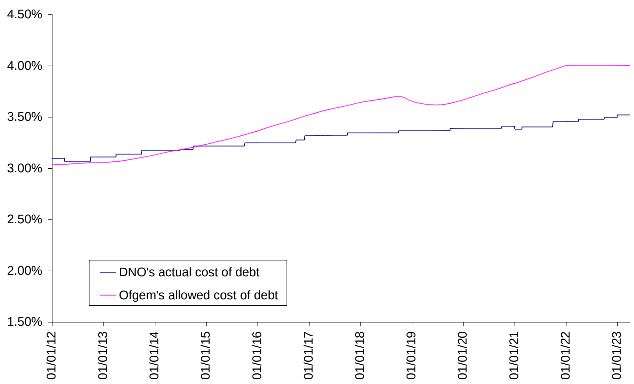
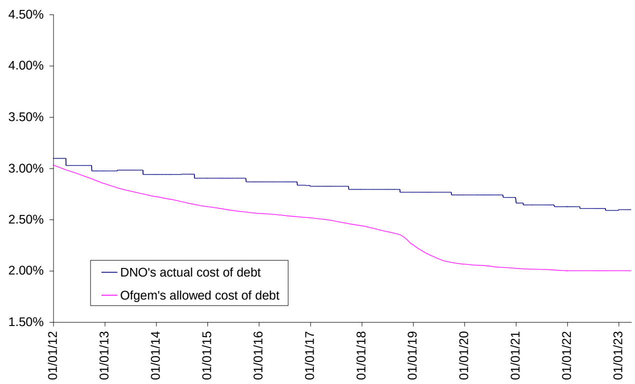


Figure 3: Prevailing cost of debt = 2%



The charts show that Ofgem's trailing average reacts much more than the actual cost of debt to changes in prevailing interest rates. This is because:

- the DNOs' actual cost of debt is kept relatively stable by the £8.7 billion of debt on existing balance sheets that will remain in place until the end of the RIIO-ED1 period (in comparison to a £2 billion refinancing requirement and other modelled new borrowing of £5 billion over ten years); while, by comparison
- Ofgem's cost of debt index completely refreshes itself over a ten-year period.

The scale of the gap between the two lines in figures 2 and 3 is quite surprising. A change in the value of Ofgem's index of +/-1 percentage point is accompanied by a change in the DNOs' actual cost of debt of less than 0.5 of a percentage point.

Importantly, this means that the match between the actual and allowed cost of debt is no better than it would be if Ofgem were to provide for a fixed cost of debt allowance for a full eight-year period. Because Ofgem's index over-reacts so much to changes in market interest rates, the gap that emerges between the actual and allowed cost of debt is actually slightly greater than it would be if Ofgem were to allow for a fixed cost of capital for the full duration of the price control (e.g. if it were to allow a fixed cost of debt of 3% in the above scenarios).
Indexation of the cost of debt is not, therefore, an uncertainty-reducing mechanism. Indeed, the analysis that we have set out above actually implies that Ofgem's new approach to setting the cost of debt actually increases shareholder exposure to systematic risk. This is

because the direction of the relationship between interest rates and DNO profits reverses as a result of the switch to an indexed cost of debt.

To see this note that currently the DNOs make money when interest rates fall within a price control period (i.e. because their revenues are fixed but the cost of new borrowing reduces) and lose money when interest rates rise, but under Ofgem's new proposals the DNOs will lose money when interest rates fall (i.e. because the index and allowed revenues fall much more quickly than actual interest costs) and make money when interest rates rise. This matters greatly at a time when policymakers have explicitly sought to lower the cost of borrowing, via interest rate reductions and a programme of quantative easing,[4] in order to stimulate the economy and bring an end to the current recession. Although Ofgem and its consultants are correct to point out that the historical correlation between interest rates and GDP growth is weak, the current situation is very clearly one in which borrowing costs will be held low for so long as there is concern about economic growth and will be allowed to go up from their current artificially low level only when there is solid evidence of an increase in economic activity.

Against this backdrop, Ofgem has effectively elected to make returns much more pro-cyclical with its new indexation mechanism even though it could have left network businesses as a natural hedge against interest rate and GDP risk if had stuck with the old fixed cost of debt allowances. Using Ofgem's RoRE measure, we calculate that indexation of the cost of debt alters the financial effect of a 1 percentage point change in market interest rates by around 185 basis points per annum by 2022/23.[5]

This is not something that Ofgem can ignore on the grounds of insignificance. All other things being equal, the effects we have identified will push up the cost of equity and requires Ofgem to provide for higher equity returns to compensate for the higher systematic risk that shareholders will now face.

3.3 Conclusions

The observations set out above mean that the uncertainty mechanisms that Ofgem refers to in its RIIO-GD1 and RIIO-T1 initial proposal documents are collectively insufficient to counter-balance the increase in risk that Ofgem has acknowledged comes from a three-year extension to the price control period. Of the four mechanisms that Ofgem highlights, one is not a new innovation, two bear no relevance to the scope for systematic risk to impact on shareholder returns, and one actually increases DNOs' exposure to systematic risk.

This means that we can say with some confidence that the electricity DNOs will be perceived by equity investors to be more risky after the reset of price controls in 2015. All other things being equal, this implies that the cost of equity in Ofgem's RIIO-ED1 proposals should be higher than the 6.7% cost of equity that Ofgem allowed for in its DPCR5 decision.

[4] The link to corporate bond yields is analysed in Bank of England (2011), The United Kingdom's quantitative easing policy: design, operation and impact. .

[5] The calculation here is that a 1 percentage point increase in market interest rates adds 1% x 0.65 = 65 basis points to the return on the RAV and, hence, adds 65 basis points / 0.35 = 185 basis points to RoRE.

4. Comparison of the Electricity Distribution, Gas Distribution and Transmission Networks

A quite separate question from the one we have just considered is whether the allowed return for the electricity DNOs ought to be or higher or lower than the return that Ofgem allows the other network companies at the end of the RIIO-GD1 and RIIO-T1 reviews..

The regulatory arrangements that Ofgem is applying to each class of network generally exhibit a lot of similarities. We agree with Ofgem, albeit with one important qualification, that the main differentiating factor as far as risk is concerned is therefore the scale of new expenditure compared to size of the starting RAV. We focus on this in section 4.1 before turning to other possible distinguishing features in section 4.2.

4.1 Expenditure to RAV comparisons

4.1.1 Principles

The worked example shows the importance of the expenditure-to-RAV ratio. The illustration depicts the financial profiles of two companies with identical ongoing opex and capex. They differ only in having different sized RAVs, with the company on the left-hand side having a relatively small RAV relative to ongoing costs and the company on the right-hand side having a relatively high RAV. The calculations shows what happens to these companies when they are exposed to the same cost overrun or the same revenue loss. Although the absolute loss of profit is roughly the same in both companies, the percentage loss is far greater for the company with the small RAV on the left-hand side than it is for the company with the larger RAV on the right-hand side.

Company A	Company B
RAV = £100	RAV = £1,000
Rate of return = 10%	Rate of return = 10%
Expenditure = £1,000	Expenditure = £1,000
Revenue = £1,010	Revenue = £1,100
2% cost shock = minus £20	2% cost shock = minus £20
loss of profit as % of RAV = minus 20%	loss of profit as % of RAV = minus 2%
2% revenue shock = minus £20.20	2% revenue shock = minus £22
loss of profit as % of RAV = minus 20.2%	loss of profit as % of RAV = minus 2.2%

It should be fairly easy to see how an exactly analogous story can be told about the effects of unexpected cost reductions and about revenue gains, insofar as a given cost or revenue shock causes a greater percentage loss of profit for companies with small RAVs.

This provides important insights into the riskiness of different firms because it shows that the variability in out-turn returns is not just a function of the likelihood and scale of cost and demand shocks, but also the upfront profit margin that is factored into allowed revenues. Holding all other things equal, shareholders in a regulated company with a small RAV relative to ongoing costs and revenues are likely to suffer proportionately more when downside shocks occur (and gain more following upside events) in comparison to shareholders in firms whose RAVs are large relative to ongoing costs and revenues. This volatility in profits makes companies with high ‘operational gearing’ more risky in the eyes of shareholders, causing them to demand higher upfront returns.

4.1.2 Precedent

This is by no means the first paper to highlight the link between risk and the size of a company’s ongoing expenditure compared to the value of its RAV. In the last decade the issue has attracted attention in at least the following periodic reviews:

- ORR’s 2003 and 2008 reviews of Network Rail;
- the CAA’s 2005 and 2010 periodic reviews of NATS;
- Postcomm’s 2006 review of Royal Mail;
- Ofgem’s 2007 gas distribution price control review;
- the Competition Commission’s 2010 Bristol Water inquiry; and
- the NI Utility Regulator’s 2011 review of SONI.

In all of these reviews, metrics linked directly or indirectly to expenditure-to-RAV were used as a justification for allowing slightly higher rates of return than normal for the companies’ under review.

The only decision that stands out from this pack is the Competition Commission’s calculation of Bristol Water’s cost of capital. The Commission’s reasoning in this case was slightly different from the logic that we have put forward above insofar as the Commission focused only on the scale of Bristol Water’s opex relative to RAV rather than total expenditure.[6] Its position on capex was as follows:

> Bristol Water also argued that its systematic risks were higher than those of [water and sewerage companies] because of its larger capex relative to revenue. However, we did not see evidence that the risks associated with capex were positively correlated with market risks—for example, if capex prices are positively correlated with the economic cycle, the resulting effect on water companies’ cash flow would be negatively correlated with the market. Therefore, we do not consider that any additional adjustment is appropriate.[7]

We cannot say that we agree completely with this view. The factors that might serve to push capex prices up or down – wages, materials costs, contractor margins, etc. – are just as likely to drive opex out- and under-performance as capex out- and under-performance. The cyclicality of capex and opex does not therefore look to us to be materially different.

There is, however, another reason why capex-to-RAV ratios may be less interesting than opex-to-RAV ratios from the point of view of an investor. Specifically, there is a view in the academic literature that capex is a simple scaling up of a business and its investor capital. The equivalent in other industries would be, say, a retailer adding more stores or a manufacturer adding more factories. In cases such as these, no one would argue that a firm’s cost of capital increases because it chooses to do more of what it is already doing; the cost of capital remains that of being a retailer or of being a manufacturer. Looked at in an equivalent way, if a transmission business or a distribution business chooses to become a bigger network company, it is not obvious why the transmission or distribution cost of capital should change.

[6] Strictly speaking, the Commission’s chosen metric was opex to revenue. Since the non-opex components of allowed revenue are the depreciation of the RAV and the return on the RAV, this measure is very closely correlated with opex to RAV.
[7] Paragraph 129 in Appendix N to the Competition Commission’s 2010 Bristol Water inquiry report.

Put alongside the Competition Commission's views, such considerations seem to steer us and steer Ofgem to put slightly more weight on opex-to-RAV ratios as a driver of risk compared to capex-to-RAV ratios.

4.1.3 Ofgem's approach

Ofgem's July 2012 RIIO-GD1/RIIO-T1 initial price control proposals put the emphasis the other way around. The regulator's assessment of relative risk is driven almost exclusively by comparisons of capex to RAV, with opex to RAV not even getting a mention.

This is not only inconsistent with the Competition Commission's policy steer, it is also a significant change from Ofgem's 2007 GDPCR analysis, which drew inferences about relative risk from expenditure-to-RAV metrics. It also seems, more generally, to be counter-intuitive – after all, a £100 increase in opex is just as capable of putting a dent in returns as a £100 increase in capex.

We therefore question whether the omission of opex to RAV is an oversight on Ofgem's part. As written, we do not think that the analytical framework in the initial proposals document can be relied upon.

4.1.4 Our analysis

The table below corrects the fault that we see in Ofgem's work by adding entries for opex to RAV and total expenditure to RAV.

Table 4.1: Expenditure and RAV comparisons

	NGET TO	NGGT TO	GDNs	DNOs
capex to RAV, average 2013-21 (except where stated)	13% to 17%	3% to 10%	7%	12% (DPCR5)
controllable opex to RAV, 2013/14	2%	2%	5%	6%
Total expenditure to RAV	15% to 19%	5% to 12%	12%	18%

We acknowledge upfront that the table mixes slightly different time periods. In the case of opex, we have directly comparable data for 2013/14 – the first year of the RIIO-GD1/RIIO-T1 periods and the fourth year of the DPCR5 price control. However, for capex, we do not yet have any precise estimate of the average[8] capex electricity DNOs will be carrying out over the 2013-21 period. We therefore show the scale of the DPCR5 capital programme to give a very high-level indication of the capex that the DNOs might be planning to undertake in the next eight years.

Within these limitations, the figures in the table above alter significantly perceptions of relative riskiness.

[8] Note that it would not be appropriate to compare capex in a single year given the lumpy nature of capital programmes.

If one focuses initially only on opex to RAV, as the Competition Commission has guided us to do, we see that the gas and electricity distribution companies are more vulnerable than the transmission companies to cost shocks. This is partly a consequence of the more opex-intensive nature of distribution networks and partly a consequence of the way in which Ofgem's financial policies – e.g. in relation to repex and depreciation periods – have historically constrained the growth of distribution RAVs. The combined effect of these two things is that the distribution networks have comparatively smaller RAVs/capital bases to support day-to-day expenditures and will therefore experience higher percentage gains or losses for any given amount of opex out- or under-performance.

The effect of small distribution RAVs also then comes through in the capex to RAV comparison. Here, though, the sheer scale of NGET's investment programme in the next few years is an additional factor which distinguishes the company from the other regulated networks.

In terms ultimately of total expenditure, the hierarchy is one in which electricity transmission looks more risky than gas distribution which in turn looks more risky than gas transmission. The electricity DNOs' position can only be assessed with certainty when the scale of their RIIO capital programmes is known, but the evidence from DPCR5 suggests that there is every reason to expect total expenditure to RAV to come out in line with the top end estimate for the electricity transmission networks.

4.2 Other determinants of risk

Ofgem's July 2012 proposals documents identify other determinants of risk as follows:

- complexity of investment;
- incentive rates;
- application of Ofgem's totex approach;
- scope and design of uncertainty mechanisms;
- treatment of pension costs;
- length of price control;
- timing of revenue adjustments; and
- application of the cost of debt indexation mechanism.

The first of these factors sits incongruously in this list. Complexity of investment is project- or firm-specific risk and is not something that would be considered relevant by investors with a diversified portfolio of assets. If some types of network are dealing with more complex investments than others, we would not expect this to cause any meaningful difference in the cost of equity.

Consistent with Ofgem's views, we don't see anything in most of the other factors that would obviously distinguish the riskiness of companies' under the RIIO-GD1, RIIO-T1 and RIIO-ED1 price controls. We agree, however, that decisions by Ofgem to set the electricity DNOs markedly different incentive rates would be something that could cause us to re-evaluate this judgment later in the RIIO-ED1 process.

The only consideration that we consider to be relevant at this stage to the assessment of relative risk is the differing impact of cost of debt indexation. In section 3.2 of this paper we highlighted how indexation produces roughly the same sort of mismatch between allowed and actual DNO interest costs as a fixed cost of debt allowance, albeit with a reversal in the direction of the relationship between movements in interest rates and changes in profit. Importantly, this finding was predicated on the quantum of embedded debt that the DNOs will take into RIIO-ED1 and the amount of new financing required for capex in the new eight-year period. The other regulated network companies find themselves in different positions on the latter of these variables and may therefore be looking at quite different consequences as a result of indexation.

As an indication of this, table 4.2 compares RAV growth across the different classes of network.[9]

Table 4.2: Average annual RAV growth, 2013-21 (except where stated)

	NGET TO	NGGT TO	GDNs	DNOs
% of starting RAV	5% to 8%	-1% to 5%	0%	3% (DPCR5)

The numbers show that the electricity and gas transmission networks have the biggest new capital requirements during the next eight years. By contrast, the gas distribution networks have very stable RAVs and will need to go to the debt markets only to refinance existing debt. The electricity DNOs' position will not be known until later in the RIIO-ED1 process, but any sort of continuation from DPCR5 will see companies with a more modest, but still significant, requirement for new borrowing in comparison to the electricity transmission networks.

These figures mean that the adverse effects we identified in section 3.2 will be even more pronounced for the gas distribution networks, unless they happen to have a significant refinancing requirement during the next eight years. By contrast, a constant flow of new borrowing will help the transmission networks' cost of debt keep up with Ofgem's new index and give investors much less cause for concern.

4.3 Conclusions

Table 4.3 brings the preceding analysis together into an overall summary of relative riskiness.

	NGET TO	NGGT TO	GDNs	DNOs
capex to RAV, average 2013-21 (except where stated)	13% to 17%	3% to 10%	7%	12% (DPCR5)
controllable opex to RAV, 2013/14	2%	2%	5%	6%
indexation of the cost of debt	Small potential mismatch, due to high RAV growth	Significant potential mismatch, due to moderate RAV growth	Severe potential mismatch, due to zero RAV growth	Significant potential mismatch, due to moderate RAV growth
incentive rate	48% to 50%	44%	61% to 64%	tbc
other	similar	similar	similar	similar
Riskiness	**High**	**Lowest**	**Moderate**	**Potentially highest**

[9] It is beyond the scope of this paper to carry out the sort of modeling that we produced for the electricity DNOs in section 3.2. The focus on RAV growth isolates the variable that is most likely to cause the implications of cost of debt indexation to vary across companies, especially if one judges there to be no reason why the different networks should be carrying different quantities of embedded debt into the new RIIO price controls.

There are two main conclusions that we take from this analysis.

First, the hierarchy of allowed returns that Ofgem has allowed for in its RIIO-GD1 and RIIO-T1 initial proposals is not appropriate. Although there may be a case for allowing the transmission networks a premium rate of return, the scale of this premium has been overstated and the gas distribution networks should be earning higher returns than the gas transmission network, not the other way around.

And second, unless the electricity DNOs' RIIO-ED1 investment programme is smaller than the DPCR5 programme, the electricity DNOs' allowed return should not be any lower than the electricity transmission allowed return and may need to be slightly higher.

5. Summary of Findings

The analysis that we have produced in this paper will need to be updated during the RIIO-ED1 process to reflect better information about the electricity DNOs' expenditure plans and the design of Ofgem's regulatory framework. For now we can conclude provisionally that:

- in the absence of any meaningful new transfer of systematic risk away from shareholders, the extension of the price control period from five years to eight years increases the regulated electricity and gas networks' costs of equity;

- indexation of the cost of debt does not make future DNO returns more stable or predictable. Its only real effect is to reverse the relationship between changes in interest rates and changes in profits. At a point in time when the level of borrowing costs is intrinsically linked to GDP growth, indexation therefore serves to increase shareholders' exposure to systematic risk and to increase the cost of equity;

- comparisons of the scale of total ongoing expenditure to RAV suggest that electricity distribution and electricity transmission investors are more exposed to future cost shocks than gas distribution and gas transmission investors. This implies that allowed returns in the electricity sector should be set higher than allowed returns in the gas sector; and

- unless Ofgem is prepared to redesign its cost of index to make it more suitable for the electricity DNOs, the better match between the actual and allowed transmission cost of debt makes the electricity DNOs the more risky electricity-sector investment and requires Ofgem to set the electricity distribution cost of equity at a small premium to the electricity transmission cost of equity.