

PR24 and RIIO-3: The Cost of Equity Capital

Discussion Paper

4 October 2024

1. Introduction

Britain's electricity/gas transmission and gas distribution networks are currently assembling business plans for the period 2026-31. On 19 December 2024, Ofwat is expected to announce new price controls for water and sewerage companies for a five-year period starting 1 April 2025. One of the issues that companies and regulators alike have been grappling with is the question of where regulators' allowed returns need to be positioned in order to make companies 'investable' in the eyes of equity providers. This short note offers an independent perspective on this important topic.

2. Background and Benchmarking

The cost of equity for a regulated utility business is not something that is directly observable. Regulators therefore model the returns that they think shareholders look for from equity investments using the capital asset pricing model (CAPM), i.e.:

$$\text{Cost of equity} = \text{risk-free rate} + \text{beta} \times (\text{expected market return} - \text{risk-free rate})$$

Unfortunately, none of the three inputs into the CAPM calculation can be estimated with complete precision. We can, however, see what has been happening recently to interest rates across the economy and we can calculate with a good degree of accuracy the returns that investors can currently obtain from other competing asset classes. As at 30 September 2024, the numbers show:

- yield on 20-year UK government bonds = 4.6%;
- yields on long-dated¹ sterling A corporate bonds ≈ 5.4%; and
- yields on long-dated sterling BBB corporate bonds ≈ 5.9%.

Ofwat's PR24 draft determination and Ofgem's RIIO-3 sector-specific methodology decision (SSMD) proposed that allowed returns on equity should be positioned as follows:

- water company equity = 6.9%;² and
- electricity transmission³ company equity = 6.3% to 7.9%.

Many observers' initial reaction upon looking at these figures has been that the returns that Ofwat, and potentially Ofgem if one looks at lower reaches of the RIIO-3 SSMD range, are offering to shareholders sit surprisingly close to bond yields. Regulated utility businesses have historically been among the most dependable investments that equity investors can put money into, but the fixed-period, fixed-revenues form of regulation that we have in the UK does nonetheless expose equity investors to non-trivial amounts of expenditure risk, performance risk and financing risk (as the water companies, in particular, have shown us recently). The figures set out above seem to suggest that investors will take on these equity risks in exchange for premia of 230 basis points over gilt rates in the case of water companies, or 170 to 330 basis points over gilt rates in the case

¹ Based on the yields on the iBoxx £ non-financials 10+ year indices.

² Calculated as the regulator's proposed real return converted into a nominal equivalent assuming annual CPIH inflation of 2% per annum.

³ We focus in this paper primarily on the electricity transmission networks because Ofgem's cost of equity calculations use the same 55% gearing assumption that Ofwat is using in PR24, thus providing a like-for-like comparison.

of energy networks. When compared to investment-grade bond yields, the equity premia are just 100 basis points and 40 to 200 basis points.

Given the importance that regulated water and energy infrastructure have to the UK economy, we think it is worth drawing out some of the key reasons why returns are being positioned in this way and probing whether there is anything in the regulators' calculations (as set out in table 1 below) that could be causing them to arrive at an unduly low costing of required returns.

Table 1: Cost of equity estimates (real, CPIH-stripped)

	Ofwat PR24 draft determination	Ofgem RIIO-3 range
Risk-free rate	1.43%	1.18% *
Expected market return	6.29% to 6.87%	6.5% to 7.0%
Unlevered beta	0.26 to 0.29	0.26 to 0.36
Debt beta	0.15 to 0.05	0.075
Equity beta	0.57 to 0.63	0.57 to 0.79
Cost of equity (at 55% gearing)	4.19% to 4.88% point: 4.80%	4.19% to 5.77%
Nominal equivalent	6.3% to 7.0% point: 6.9%	6.3% to 7.9%

* Indexes in line with prevailing index-linked gilt yields.

In the sections that follow, we identify three possible factors that we think might merit further attention, covering the regulators' calibrations of each of the risk-free rate, the expected market return and beta.

3. Risk-free Rate

The suggestion that regulators are offering a return worth potentially around 200 basis points above gilt rates is not a characterisation that Ofwat or Ofgem would recognise. In the regulators' eyes, as table 1 shows, the PR24 and RIIO-3 returns are positioned at around 335 basis points and 300 to 460 basis points, respectively, above the estimated risk-free rate of return

The difference of perspective stems from the particular way in which the regulators are reading the gilt market. The 4.6% return on government bonds referenced at the start of section 2 is the yield on conventional, nominal gilts. The regulator's preferred measure of the risk-free rate in table 1, by contrast, is the yield on index-linked gilts. Strangely, the two types of bond currently⁴ offer investors rather different expected returns.

Table 2: Gilt yields, 30 September 2024

	Yield
Conventional gilts, 20Y	4.57%
Index-linked gilts, 20Y	1.21%

Source: Bank of England website.

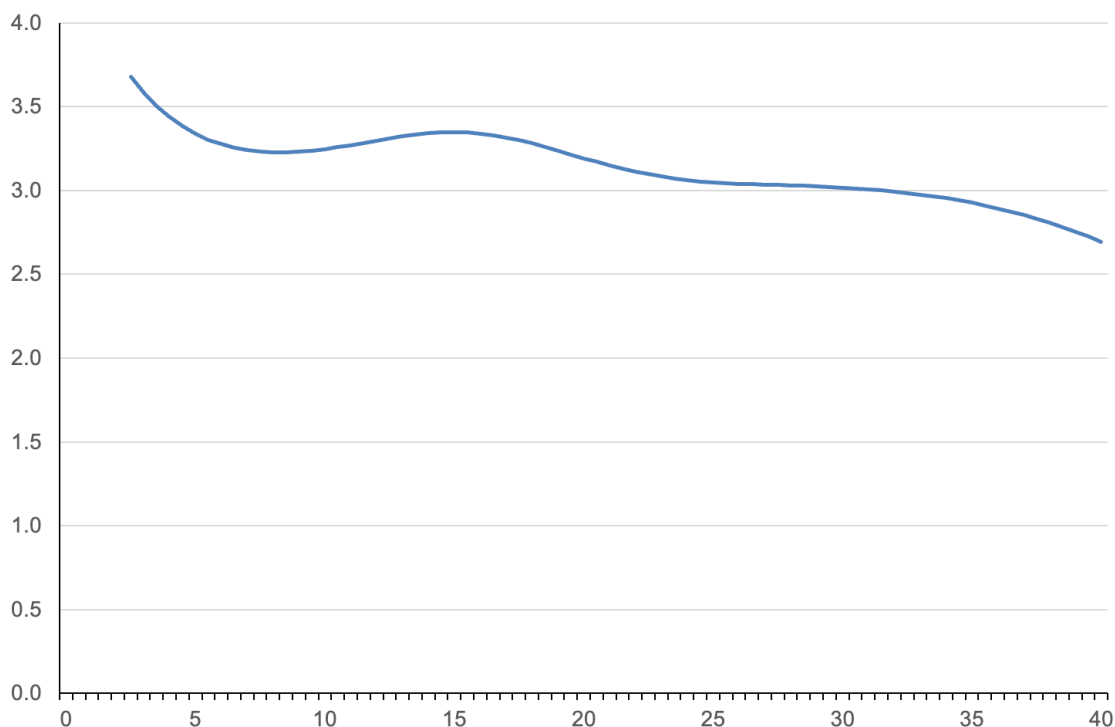
Note: the principal on an index-linked gilt is indexed to the RPI measure of inflation.

⁴ For the avoidance of doubt, this is not a new phenomenon. We have been writing about this topic for more than ten years. See https://www.ofgem.gov.uk/sites/default/files/docs/2012/12/ena_ed1stratresponse_first-economics_paper2_indexation.pdf and <http://www.first-economics.com/riskfreerate.pdf>.

We would normally expect the difference between the yields on nominal and index-linked gilts to be a function of expected RPI inflation and an inflation-risk premium. However, the 3.4 percentage point differential shown in table 2 is almost certainly too big to be explained by any rational forecast of future inflation and any reasonable estimate of the premium that investors require for bearing inflation risk.

We can see this even more clearly if we plot the instantaneous forward inflation curve (i.e. a measure of the RPI inflation that would have to materialise at any given point in the next 40 years in order to equalise the yields on conventional and index-linked gilts of all maturities).

Figure 1: Instantaneous forward inflation curve (%), 30 September 2024



Source: Bank of England website.

The line in this chart is not one that any expert on inflation would recognise. Back in 2020 the UK Statistics Authority announced⁵ that it intends that the methodology for calculating RPI will be brought into line with the methodology for calculating CPIH starting in 2030. Figure 1 should, as a result, logically show 'break-even' inflation of around 3% up to 2030 and around 2% from 2030, in line with the government's inflation target. The actual instantaneous forward inflation curve is therefore remarkable as regards both:

- the *level* of break-even inflation – i.e. tracking at or above 3% through to the 2050s; and
- the *shape* of the forward curve – i.e. with expectations for inflation apparently falling then increasing then falling then flatlining before falling again, and with no discernible break point around 2030.

Figure 1 therefore indicates prima facie that something odd is happening in the gilt market, with index-linked gilts promising a much lower return than ought to be expected relative to conventional gilts and consensus inflation expectations. It is difficult from market commentaries to pin down

⁵ UKSA and HM Treasury (2020), A response to the consultation on the reform to Retail Prices Index (RPI) methodology.

exactly what the oddity is, but there is a widely held view⁶ that the explanation likely lies in the fixed supply of gilts and highly inelastic demand from pension funds that buy inflation-linked bonds to match their long-term inflation linked pension liabilities.

First Economics has repeatedly argued, starting from the peer review that John Earwaker provided of the UKRN cost of capital guidance two years ago, that regulators need to be cautious when reading a risk-free rate off of gilt market data in the presence of a clear but not well-understood departure from economic fundamentals. We have said, in particular, that:⁷

[We] think that it would be prudent for a regulator to look beyond just index-linked gilts to a wider basket of proxies for the riskless assets. We note that this this is not a novel idea – the possible other ways that there are of obtaining estimates of the risk-free rate have been discussed at length over a period of many years due to long-standing concerns about the “specialness” of index-linked gilts compared to other assets.

Ofwat’s and Ofgem’s response has been to argue that this is not right as a matter of principle and to question whether it would, in any case, make any practical difference to their calculations.

On the first of these points, the regulators have taken the line first suggested by 2018 Wright et al paper for UKRN⁸ that “the price of tomatoes is the price of tomatoes”. We have always felt uneasy about this point of view because the marginal investor in the index-linked gilt market – i.e. UK defined benefit pension funds – may not be the same as the marginal investor that regulated utilities are trying to obtain equity from. If this is the case, it is possible that the squeeze that there has been on index-linked yields has had little or no impact on the cost of equity capital, and that the comparison we drew at the start of section 2 between the 4.6% yield that investors can get from conventional gilts and the regulators’ proposed returns is far more important in the real world than the comparison shown in table 1.

The second line of response is, however, categorically incorrect. In its PR24 draft determination, Ofwat purported to show⁹ that deflating observed nominal yields into a real risk-free rate produces the same estimate as the regulators’ preferred approach of converting index-linked gilt yields to a CPIH real basis. However, Ofwat was able to generate similar numbers only because it is used a ~3.4% per annum long-term CPIH assumption, making the supposed cross-check it took from the conventional gilt market an entirely circular¹⁰ one.

For the avoidance of doubt, a regulator will arrive at very different estimates of the risk-free rate depending on whether it starts with a reading of conventional nominal gilt yields or a reading of index-linked gilt yields. Table 3 gives the relevant data.

Table 3: Possible estimates of the risk-free rate, 30 September 2024

	Nominal	RPI real	CPIH real equivalent
Conventional gilts, 20Y	4.57%	-	2.52%
Index-linked gilts, 20Y	-	1.21%	1.49%

Note: yields in table 2 converted into CPIH real using 2% CPIH and 3%/2% RPI inflation assumptions.

⁶ See, for example: <https://mybrand.schroders.com/m/ebf8ad63fa9ae2a5/original/2016-06-Pension-schemes-and-index-linked-gilts.pdf>

⁷ First Economics (2022), The risk-free rate.

⁸ Wright et al (2018), Estimating the cost of capital for implementation of price controls by UK regulators.

⁹ Ofwat (2024), PR24 draft determinations: aligning risk and return – allowed return appendix, figure 3.

¹⁰ Ofwat’s 3.4% inflation assumption was based on inflation swap rates. Demand for long-dated swaps is dominated by pension funds seeking to replicate index-linked gilt inflation exposures via derivative trades.

Looking at the figures in this table, we continue to take the view that there is real danger in regulators focusing on the last line to the exclusion of the preceding line and all other possible measures of the risk-free rate. It follows that we find it hard to shake the feeling that there must be a possibility that the regulators' proposed equity returns have inadvertently been left too low as a result of a miscalibration of the baseline 'floor' that has been applied when calibrating CAPM.

4. Expected Market Return

A second key driver of the relative positioning of regulated equity returns is the way in which regulators have been calculating the CAPM expected market return.

A huge amount has been written on this subject over the last six years, with regulators devoting considerable time and resources to work that has sought to pinpoint the returns that investors have historically taken from UK stock market investments. Crucially, the UK's regulators have then used the computed historical average return as their preferred estimate of the return that investors expect to make from a portfolio of equity investments in the future, reasoning that past performance offers the best available guide to future performance.¹¹

In reality, there is a broad consensus among economists that the market-wide cost of equity changes over time and, in particular, that the cost of equity varies in the face of changes in interest rates. The logic here is not hard to see. If interest rates fall, and returns on gilts and corporate bonds move lower, it stands to reason that investors will be willing to accept lower returns on alternative, riskier assets like equities. Conversely, when interest rates increase, investors will find it easier to make returns on their money and so need the prospect of relatively higher returns to justify taking on the risks that come with equity investments.

Despite the consensus that there is on this point, UK regulators opted to anchor their allowed returns on equity to historical stock market average returns in the reviews conducted between 2019 and 2022 and have continued stick unflinchingly to the same position in the round of reviews that is taking place now.¹² We therefore have a situation in which regulated returns have been / are being calibrated, out of principle, to a single unchanging market-wide benchmark during both periods of unprecedentedly low interest rates, like we saw during COVID, and the new 'higher-for-longer' outlook that we are looking at today.

One might think that this would be the number one topic of attention and debate during regulators' recent consultation exercises. But after getting a good amount of airplay around 2018-20 when interest rates were low, it has been a curiously under-discussed subject area ever since interest rates have moved higher. The handful of paragraphs that regulators have written recently on the rationale for and consequences of adopting a constant expected market return have tended to be buried deep inside consultation documents or supporting consultant reports. And the responses from companies and their advisers have often omitted any discussion of the point whatsoever, even as they make the case for higher returns than the regulators have so far been willing to offer.

We think this is a mistake. Using a constant expected market return through the ups and downs of the economic cycle very directly affects the relative positioning of allowed equity returns versus current yields on government and corporate bonds and versus the returns that are available elsewhere in the equity market. Right now, when the broader gilt, bond and equity markets are

¹¹ See, for example, UKRN (2023), UKRN guidance for regulators on the methodology for setting the cost of capital.

¹² This means that the expected market return in the CAPM formula is treated as a constant, leaving only the risk-free rate to vary with interest rates.

reacting in real time to expectations of higher-for-longer interest rates, but regulators are holding a key input into their CAPM calculations unchanged, regulatory returns are inevitably going to look ungenerous relative to the returns that can be earned elsewhere.

It therefore feels like we are long overdue an open and frank conversation between regulators, companies and investors about the wisdom of using a fixed¹³ expected market return. In our view, we really ought to be discussing:

- how, in the real world, expected equity market returns respond to changes in interest rates, recognising that the relationship is unlikely to be 1-for-1;
- where current interest rates sit relatively to long-term historical averages (i.e. how high the higher-for-longer actually is) and what this means for the CAPM expected market return;
- the pros and cons for both consumers and companies of adopting a ‘through-the-cycle’ approach, in which variations in regulatory returns are deliberately muted¹⁴ during periods of both low and high interest rates; and, in particular
- the likelihood of attracting investors into regulated infrastructure if regulators choose not to respond in full to the emergence of higher returns in other asset classes.

Our view, which again is consistent with the perspective that John Earwaker fed into the UKRN peer review, is that regulators were wrong to use a constant total market return when interest rates were low (in that this forced them to make some unnatural choices elsewhere in their CAPM calibrations to keep profits in regulated industries from becoming excessive). We likewise consider that it is wrong for regulators to stick with a long-term historical total market return now that real interest rates look like they are above historical averages (noting that the sting on this occasion is probably more severe if offering a return that is out-of-line with market rates has the effect of deterring the injections of capital that are needed to finance new investments).

5. Beta

Regulators typically estimate betas empirically by examining the covariance that there is between movements in a company’s share price and movements in the value of the stock market as a whole. This makes for quite a narrow way of looking at the way in which investors view the riskiness of different investment opportunities, in that, consistent with CAPM, only events which are capable of affecting the slope of the regression line in the chart overleaf ‘count’ for the purposes of sizing a company’s cost of equity.

¹³ Note that there have been small changes in Ofwat’s and Ofgem’s chosen values of the expected market return between PR19 and PR24 and between the RIIO-2 and RIIO-3 reviews. However, this reflects refinements to the regulators’ estimates of historical returns rather than a direct reaction to recent changes in interest rates.

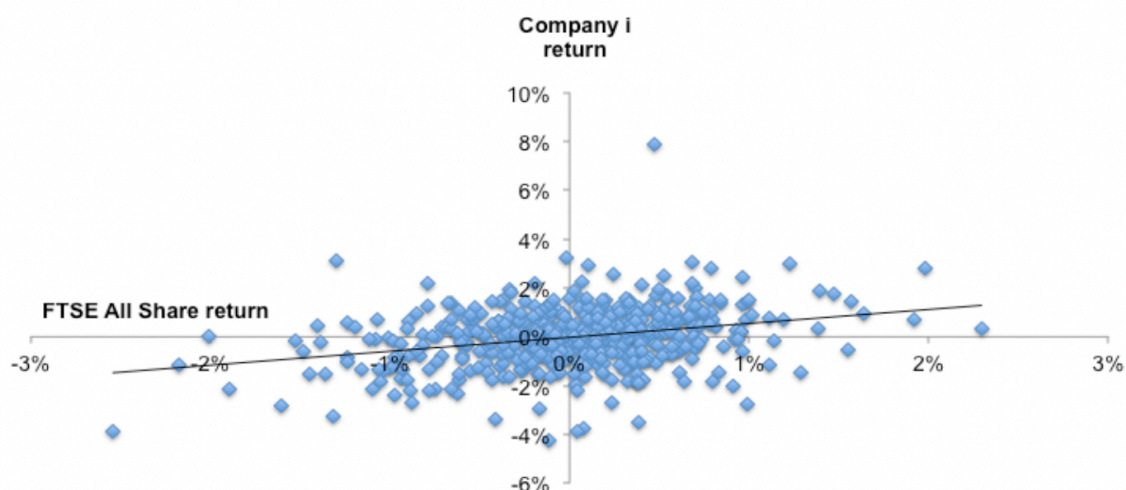
¹⁴ The focus on this paper is on companies with a beta of less than 1. Elsewhere in UK regulation, there are regulators that regulate companies with a beta of more than 1 – e.g. the CAA in its regulation of Heathrow Airport. Here, the use of a constant expected market return creates an even more perverse result where an increase in the risk-free rate will result in a reduction in the calculated cost of equity, all other things being equal.

Note that the CAPM formula can be rearranged as:

$$\text{Cost of equity} = \beta \times \text{expected market return} + (1 - \beta) \times \text{risk-free rate}$$

When beta is less than 1, the second term on the right-hand side of the equation has a positive coefficient; when beta is equal to 1, the value of the risk-free rate is unimportant; and when beta is more than 1, the risk-free rate term has a negative coefficient.

Figure 2: A beta calculation

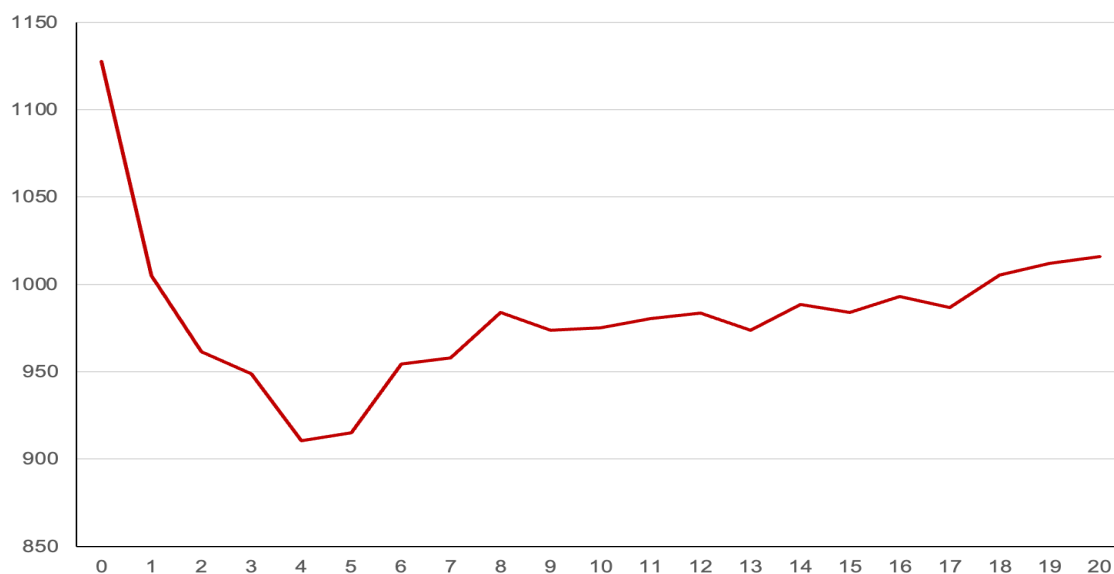


No practitioner would claim CAPM and beta offer a complete explanation of the way in which investors think about required returns. In the City and in academia there has been a huge amount of research over the years into a range of additional factors that can usefully be added to the basic CAPM model, alongside the development of alternative asset pricing models.

As we have watched the UK's regulated companies' share prices this year, we have started to wonder whether the understandable difficulties that regulators have processing such research might be starting to become a problem. We say this mainly because of what we saw happen to three of the UK's regulated companies' share prices during May and June 2024.

Figure 3 begins by looking at what happened to National Grid's share price when it set out clearly for investors that the company's role in supporting the transition to net zero would entail an increase in the size of its investment programme, necessitating a rights issue and a cut in dividend per share.

Figure 3: National Grid's adjusted[^] share price (pence per share) in the 20 days following the publication of its annual results

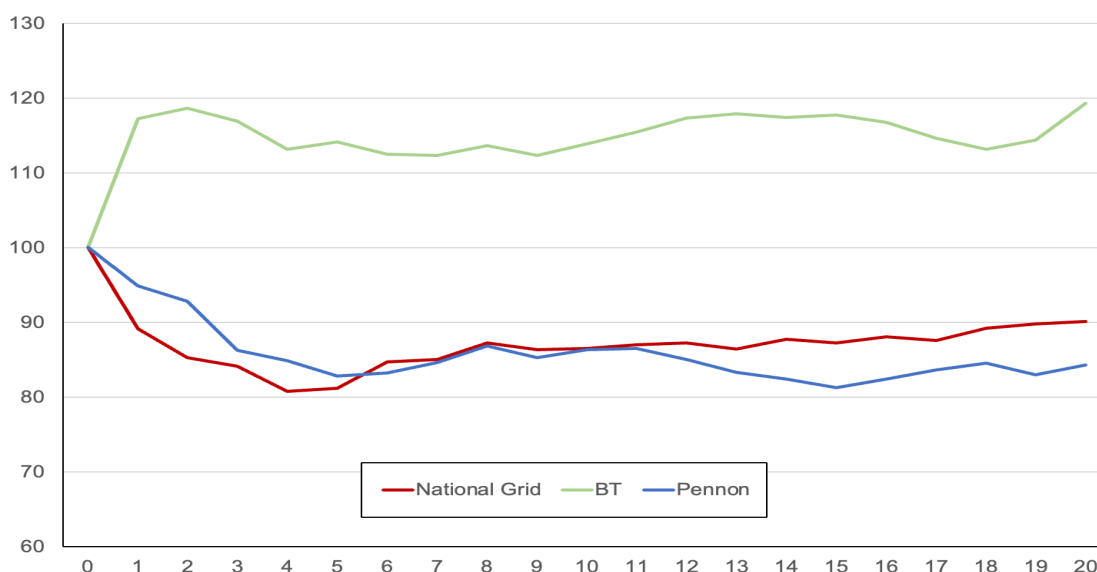


Note: [^] we have adjusted the reported share price for the effects of National Grid's discounted rights issue and first annual dividend payment.

The chart shows that National Grid’s share price in mid-June was around 10% lower than the share price in on 21 May, having been around 20% lower in the week immediately following the results announcement. While it is not possible to know for certain what caused this sudden decline, the commentaries that we read from journalists, analysts and investors indicate that the market reacted in a very negative manner to the news that a previously reliable payer of dividends was asking for money from shareholders and, more generally, was pushing back the profile of hard cash returns that investors could expect to receive in exchange for their equity investments.

Corroboration for this story can be found by looking at what happened to BT’s and Pennon’s share prices after they published their annual results.

Figure 4: Share prices in the 20 days following the publication of annual results (share price on day prior to announcement = 100)



The above chart shows BT’s share price moved up by close to 20% during a 20-day period in May/June. Again, we can’t be sure exactly what caused this re-rating, but the commentaries at the time focused on BT’s announcement that it had reached a peak in its annual capex and was moving into what it described as a “new phase” of year-on-year growth in free cash flow – i.e. the exact opposite of the story that National Grid was telling the markets.

The change in Pennon’s share price on the day it issued its annual results was slightly less dramatic, but still contributed to a sizeable cumulative 15% drop in the share price over a 20-day period. The main catalyst here appears to have been Pennon’s decision to unexpectedly reduce its latest dividend by a relatively small £2.4m in recognition of a court fine following a prosecution by the Environment Agency. It appears that investors that had previously expected a stable and predictable profile of cash payments came to understand that Ofwat’s new licence condition on dividend payments links water companies’ dividends very directly to operational performance, making annual cash returns much less dependable than had been the case in the past.

Looking at all three of these episodes together, the clear sense we have is that we were learned something in May/June that we had not previously picked up about the importance that equity investors place on the cash that passes from a company and its shareholders (and vice versa). That is to say that where our training as economists makes us think first and foremost in terms

NPVs and IRRs, the markets were saying that investors care just as much about the actual pound notes that come into their pockets.

This is potentially of quite considerable importance to today's regulated companies. In both the water and electricity industries, we are about to enter into a period of unprecedented investment, with companies having to deal with a growing net financing requirement rather than a surplus of cash. If markets are saying that investors look (much) less favourably on a company that needs (more) capital and will deliver a return of and on that capital (much) later rather than earlier, and insofar as this is not picked up anywhere within a standard beta regression, then it could conceivably be that regulators are missing one of the key factors that is shaping future required returns.

6. Conclusion

The preceding discussion highlights three key topics that, in our assessment, have been under-discussed in Ofwat's PR24 and Ofgem's RII0-3 reviews. Together, they help to explain why regulators have been provisionally concluding that the required return on regulated utility companies' equity could be 6.9% (or lower) even though an investor can lock in a return of 4.6% on gilts and/or a not hugely dissimilar return of 5.9% on investment-grade bonds and in doing so sidestep all the risks and responsibilities that equity ownership confers.

Time is now obviously very tight for Ofwat in its PR24 review. Ofgem is arguably in a slightly better place, in that it has the luxury of an extra year that Ofwat does not have and has tabled a range that looks capable of accommodating at least some allowance for the three factors that we have set out above. The question is: how persuaded are the regulators that the benchmarking that we started with on p.1 of this paper suggests there is a problem; and how able are the regulators to take on the 'sacred cows' that they might need to kill in order to make returns on regulated infrastructure look more competitive next to the returns that investors can currently obtain elsewhere?