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PC21: NI Water's Cost of Capital

Prepared for the Utility Regulator

30 March 2020

1. Introduction

This report contains First Economics' estimate of NI Water's cost of capital. It is intended to inform the Utility Regulator's calculations of the allowed return that is to be factored into NI Water's PC21 price control.

The paper is structured into six main parts:

- section 2 outlines the methodology that we have used in our work;
- section 3 assesses the risk that NI Water's equity carries and puts forward an estimate of beta;
- section 4 gives a figure for gearing;
- section 5 provides a calculation of the cost of debt;
- section 6 contains estimates of the two generic parameters in the cost of equity calculation – the risk-free rate and the expected market return; and
- section 7 brings all of the preceding inputs together into an overall estimate of the cost of capital.

2. Approach

The cost of capital that we consider in this paper is a forward-looking estimate of the return that a water company in Northern Ireland needs to offer in order to give fair remuneration to providers of capital. In line with the terms of reference that were given to us by the Utility Regulator, and consistent with regulatory practice more generally, we have deliberately sought to estimate this cost of capital independently from NI Water's current ownership arrangements so that the return on offer through the price control is comparable to the return that the private sector would deliver to equity holders.

The cost of capital is a weighted average of two components: the cost of equity (K_e); and the cost of debt (K_d), where the weightings (gearing or g) reflect the relative importance of each type of financing in a firm's capital structure.

$$WACC = K_d.g + K_e.(1-g)$$

The cost of debt is directly measurable and in the analysis that follows we use NI Water's actual borrowing arrangements to calculate the value of K_d. The cost of equity, by contrast, cannot be directly observed and we have instead modelled the returns that we would expect a shareholder to demand in exchange for holding shares in a provider of water and sewerage services operating under the Utility Regulator's regulatory framework. The tool that we have used in our analysis is the CAPM, which relates the cost of equity to the risk-free rate (R_f), the expected return on the market portfolio (R_m), and a business-specific measure of investors' exposure to systematic risk (beta or β_e):

$$K_e = R_f + \beta_e \,.\, (R_m - R_f)$$

The two equations together show that our costs of capital calculations are based on estimates of five parameters: g, K_d, R_f, R_m and beta. In putting specific figures against each of these inputs we have sought to draw as far as possible on primary market data. We have also taken account of recent regulatory precedent, giving particular attention to the views that the Competition & Markets Authority (CMA) and other UK regulators have expressed in recent decisions. Inevitably, in many areas we have had ultimately to exercise a degree of judgment in order to be able to select precise numbers from the evidence we have collected, but we have tried in the analysis that follows to give a clear explanation for these judgments and to make our thinking as transparent as possible in order to assist the parties to forthcoming consultations.

3. Riskiness and Beta

We start deliberately with a section on risk profile and beta on the basis that the analysis that follows describes the key features of the business whose cost of capital we are trying to estimate.

3.1 Preliminaries

A firm's equity beta is a measure of the riskiness of a firm – or more specifically, a measure of the systematic risk that a firm presents – relative to the market portfolio. Firms that exhibit a beta of more than 1 can be considered more risky than the average stock market investment and need to pay their investors a higher-than-average return; firms with a beta of less than 1 are less risky and warrant lower returns; and firms with a beta of exactly 1 are seen by investors as being of equal risk to the market portfolio and are expected to generate a return in line with R_m.

Empirical estimates of beta are usually obtained by measuring the correlation between movements in a company's share price and movements in the value of the stock market as a whole. However, in this report we are interested in obtaining beta estimates for an unlisted business and cannot use market data directly. The next best alternative that we have is to look at beta estimates for companies that look to be in some sense similar and to make a judgment about the value of NI Water's beta on the basis of this comparator evidence. This is an approach that has been deployed in an increasing number of periodic reviews during recent years as the number of regulated companies in the UK with a stock market listing has dwindled, and is regarded as a robust and reliable way of assessing beta in the absence of direct stock market data.

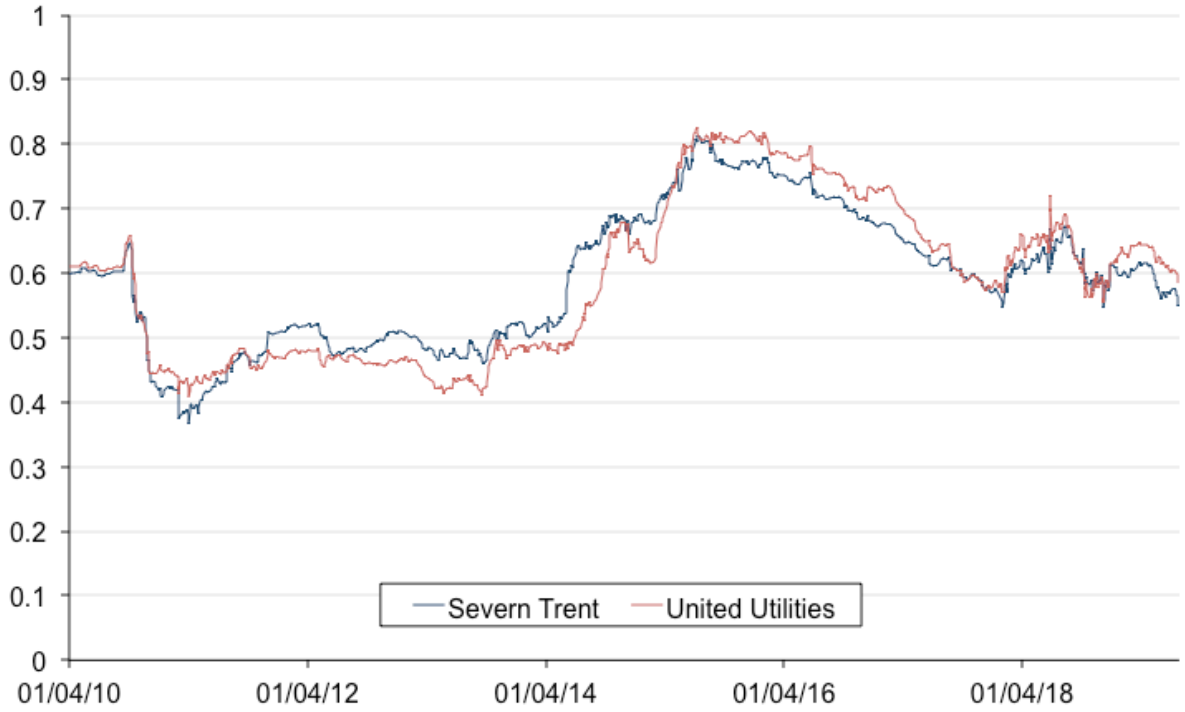
3.2 Comparator analysis

The obvious comparators for NI Water are the listed England & Wales water and sewerage companies. These businesses are conducting essentially the same activities as NI Water in a similar regulated environment. As such, their observed betas ought to serve as a useful first reference point when estimating NI Water's beta.

Figure 1 plots Severn Trent's and United Utilities betas from 2010 up to a cut-off date of February 2019.[1] The betas are calculated on a rolling basis using two years of daily share price data.

[1] Our cut-off date ensures that our estimates of beta are not distorted by the idiosyncratic share price movements that occurred in the assessment phase of Ofwat's PR19 process.

Figure 1: Comparator betas



Source: Bloomberg and First Economics' calculations.

The chart shows that there has been a fair amount of oscillation in empirical betas, with estimates generally increasing during 2014 and 2015, decreasing during 2016 and 2017, and exhibiting volatility with no discernable trend up or down since the start of 2018.

There is no single right way of taking a point estimate of beta from this data. In its December 2019 PR19 final determination, Ofwat selected a range of 0.58 to 0.66 to insert into its 2020-25 price control calculations. In a submission to Ofwat's review, we suggested focusing on the average beta over a five-year period, which gives a point estimate towards the top end of this range.

Our recommendation to the Utility Regulator is that it can use the same points of reference in its PC21 computations.

3.3 Relative risk analysis

We can now consider where NI Water's beta should logically sit relative to the England & Wales companies' betas.

Approach to comparisons of riskiness

In working through this task it is useful to highlight four main determinants of the (systematic) risk that the equity in NI Water bears.

- Demand variability – NI Water operates in markets where demand for its services is correlated to the health of the local economy, particularly on the non-household side of the customer base. Strong growth will bring about increases in consumption while a downturn in the economy will cause customers to consume less.

- Cost variability – NI Water relies heavily on direct and indirect staff to carry out its functions. As labour becomes more expensive, NI Water's costs will go up, and as labour becomes less expensive costs will go down. NI Water is also exposed to changes in the costs of other inputs like power, materials and plant/equipment.
- Regulation – the two previous risk factors cannot be looked at in isolation from the important role that regulation plays in determining the way in which changes in volumes or costs translate into changes in profit. Through its design of the price control and associated incentive mechanisms the Utility Regulator has a significant degree of control over the degree to which shareholders are exposed to risk – a situation that distinguishes regulated companies from unregulated companies. In particular, the choice that the Utility Regulator makes between price and revenue caps determines how much exposure equity has to demand risk, while the Utility Regulator's design of opex and capex incentives is an important determinant of equity's exposure to cost risk.
- Cost/revenue structure – a final consideration is the sensitivity of profit to out-/under-performance against the networks' price control assumptions. In particular, it is now widely acknowledged in regulation that companies which have small asset bases in comparison to ongoing revenues present shareholders with much greater risk than companies which have large asset bases in comparison to ongoing revenues.

The first three items on this list are fairly straightforward to understand, but the fourth merits a slightly more detailed explanation. In the worked example below, we depict two companies with identical ongoing expenditures. They differ only insofar as company A has a small regulatory asset base and company B has a large regulatory asset base. Both companies set charges so as to be able to cover their expenditure plus a return on the RAB. For the purposes of this illustration, let us assume initially that both companies seek a return of 10% per annum.

Table 2: Illustrative worked example

	Company A	**Company B**
RAB	£100m	£1,000m
Expenditure	£200m	£200m
Return on RAB @ 10%	£10m	£100m
Revenues	£210m	£300m

Now consider what happens to these companies when they experience the same percentage cost overrun or the same percentage revenue loss. Although the absolute £m loss of profit is similar in both companies, the percentage loss is far greater for company A with the small RAB than it is for the company B with the larger RAB.

Table 3: Revenues, costs and profits after a 2% cost shock

	Company A	**Company B**
RAB	£100m	£1,000m
Revenue	£210m	£300m
Expenditure	£204m	£204m
Profit	£6m	£96m
Profit as % of RAB	6%	9.6%

Table 4: Revenues, costs and profits after a 2% revenue shock

	Company A	Company B
RAB	£100m	£1,000m
Revenue	£205.8m	£294m
Expenditure	£200m	£200m
Profit	£5.8m	£90m
Profit as % of RAB	5.8%	9.4%

An exactly analogous story can be told of the effects of unexpected cost reductions and about revenue gains, insofar as a given cost or revenue shock causes a greater percentage change in profits for companies with small RABs.

This provides important insights into the riskiness of different firms because it shows that the variability in out-turn profits is not just a function of the likelihood and scale of cost and demand shocks, but also the upfront margin that is factored into allowed revenues. Holding all other things equal, shareholders in a regulated company with a small RAB/profit relative to ongoing costs are likely to suffer proportionately more when downside shocks occur (and gain more following upside events) in comparison to shareholders in firms whose RABs/profits are large relative to ongoing costs.

This higher potential volatility in profits makes companies with high 'operational gearing' more risky in the eyes of shareholders. Consequently, a firm with a small RAB would not have the same cost of capital and would not seek the same return as a company with a large RAB. It would instead need to factor a higher cost of capital upfront into its charges.

Comparison of risk profiles

It follows that in order to understand how much risk shareholders any firm are exposed to one has to look holistically at the potential volatility in demand and costs, take the range of outcomes that one can envisage through the sector's regulatory rules and then examine the impact on each comparator's profits. It is not possible to evaluate riskiness without taking the full chain of events into account – in particular, we would caution anyone from making judgments about a business's risk profile on the basis of perceptions of industry demand and industry cost variability alone.

Despite their similarities, the England & Wales companies and NI Water are not identical in the above respects. For the purposes of this paper, we have been told to assume that the PC21 framework will be identical to the PC15 framework. This means that NI Water will:

- face a cap on the average annual change in a basket of tariffs, with an end-of-period true-up to correct for any unanticipated over- or under-recovery of required revenues;
- be given a six-year operating expenditure allowance, with unders and overs in this six-year period to be borne by the company;
- be given a six-year capital expenditure allowance, with unders and overs to be trued up in the RCV with a lag of six years;
- have a mid-term review in year 3 of the control;
- be able to make use of the existing review provisions within the licence.

Table 5 compares NI Water's resulting risk profile to the risks borne by investors in companies operating in England & Wales.

Table 5: Characteristics of regulated companies

	Exposure to demand risk	Exposure to cost risk	Operational gearing
NI Water	Low – the end-of-period adjustment mechanism means that NI Water ultimately has a fixed entitlement to revenues irrespective of demand	Low – costs are mainly repeated opex and capital works. Costs have high labour content, with some exposure to commodity prices and the construction cycle. Price control design exposes the company to variations in most of these costs for a period of six years.	Low to moderate – RCV-to-totex ratio at the start of PC21 is approximately 4 times
England & Wales companies	Low – companies typically have revenue caps, giving a fixed entitlement to collect revenues irrespective of demand	Low – costs are mainly repeated opex and capital works. Costs have high labour content, with some exposure to commodity prices and the construction cycle. Price control design exposes companies to a ~50% share of variations in most of these costs for a period of five years.	Low – a typical RCV-to-totex ratio is 7 times

Source: First Economics' analysis.
Note: the RCV-to-totex metric is intended to capture the observations we made earlier about the higher riskiness of firms with small RCVs/profits. A high RCV-to-totex ratio implies that profits are fairly resilient in the face of shocks and a small RCV-to-totex ratio implies that returns can be affected quite significantly by even small variations in costs and revenues.

We can observe that:

- NI Water and England & Wales companies have similar proections against demand risk;
- the six-year PC15 control period increases NI Water's exposure to cost risk; and
- NI Water has a comparatively small RCV in comparison to the annual totex that is proposing to manage in its business plan.

3.4 Conclusion

These observations suggest to us that NI Water presents slightly more equity risk than the England & Wales companies. However, we would not wish to exaggerate the scale of the additional risks that NI Water faces or to argue that NI Water's beta will naturally sit much higher than the England & Wales companies' betas.

The conclusion that we draw from the analysis is that NI Water shares a good number of similarities with the Ofwat-regulated business, but should probably be given a beta that sits towards the upper end of the range that we identified in section 3.2. In its submission to the Utility Regulator, NI Water sought a beta of 0.64. We suggest that there is no obvious reason to depart from this estimate.

4. Gearing

The assumption that we make about gearing affects the weightings of the cost of debt and cost of equity components of the weighted average cost of capital calculation. It is also an important input to the calculation of the cost of debt and cost of equity themselves as, all other things being equal, a higher level of gearing will increase the risk to both debt and equity holders, causing them to demand a higher return in exchange for making capital available.

As a matter of principle, a regulator's estimate of gearing should reflect the efficient mix of equity and debt financing for the company. Table 6 reports the assumptions that regulators have made about optimal gearing ratios in recent price reviews.

Table 6: Regulators' calculations of optimal gearing

Decision	Gearing	Year
UR – PC15	0.5	2014
Ofcom – BT Openreach	0.4	2019
Ofgem – RIIO-2	0.6	2019
CAA – NATS	0.6	2019
Ofwat – PR19	0.6	2019
CMA – NATS	0.3	2020

NI Water's gearing, expressed as net debt divided by the value of RCV, was 45% at 31 March 2019. The company's business plan projects that this ratio will increase to 50% over the PC21 period.

Gearing of 45% to 50% sits within the range that emerges from table 8. As such, it is difficult to say that NI Water's actual gearing is sub-optimal. Accordingly, we are happy to use NI Water's actual projected mix of debt and equity as the weights in our weighted average cost of capital calculation.

We use a rounded figure of 50% for computational convenience. Specifically, we note that the comparator companies that we utilise in section 4 historically had gearing of around 50% (measured as net debt divided by market capitalisation plus net debt), meaning that we do not have to adjust our 0.64 beta estimate for gearing effects.

5. Cost of Debt

NI Water borrows through a facility provided by the Department for Infrastructure. Interest payable on existing borrowings is fixed and can be predicted with certainty, while the interest on any new debt is determined formulaically as the yield on the UK's government 2034 bond on the date of drawdown plus 85 basis points.[2]

Embedded debt

NI Water's business plan states that the weighted average nominal cost of £1,147m of existing debt at 31 March 2019 was 4.44%. We can take this figure straight though to the cost of capital calculation.

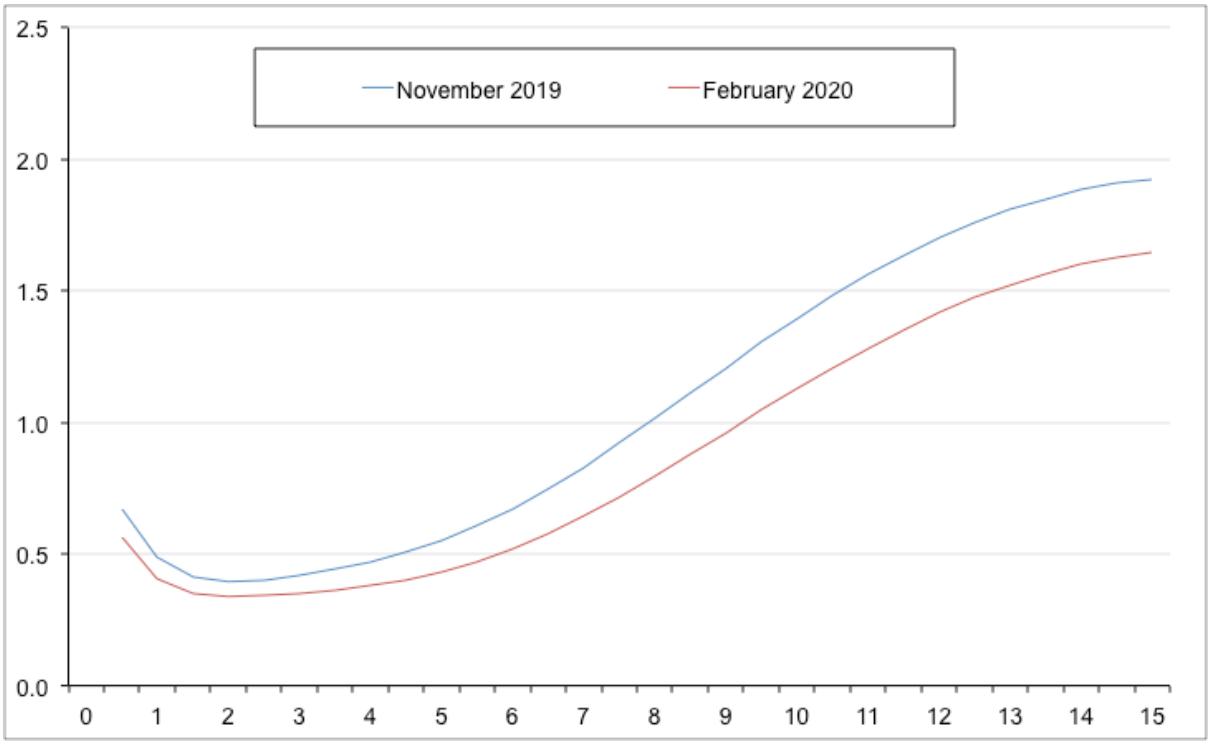
[2] The reference gilt will be reviewed during the PC21 period.

New debt

NI Water's business plan forecasts that NI Water will require an additional £957m of debt prior to 31 March 2027. The exact financing requirement will not be known until the end of the Utility Regulator's price review, but for the purposes of this exercise we use NI Water's forecasts to help us calculate the weighted average cost of new debt.

The interest cost to the business will be dependent on the prevailing yield on the 2034 government gilt. The best forecast of future gilt yields comes from today's gilt market prices, which we can use to construct a forward curve of yields over the PC21 period. The forward curves at November 2019 (the cut-off date used in NI Water's business plan) and at February 2020 (the cut-off date for this report) are shown in figure 7.

Figure 7: Instantaneous gilt forward yield curve (%)



Source: Bank of England.

The data shows that yields have moved down slightly since NI Water produced its business plan. However, day-to-day perturbations are to be expected and the shift in rates is not so significant as to cause us to want to disturb NI Water's calculations. We are happy, therefore, to use NI Water's projections of the cost of new debt, as set out in table 8.

Table 8: Cost of new debt (%)

Date	Drawdown amount	Benchmark gilt yield	Interest rate payable by NI Water
August 2019	£5m	1.02%	1.87%
September 2019	£15m	0.70%	1.55%
January 2020	£12m	0.97%	1.82%
March 2020	£10m	1.07%	1.92%

October 2020	£40m	1.09%	1.94%
October 2021	£90m	1.12%	1.97%
October 2022	£120m	1.18%	2.03%
October 2023	£130m	1.25%	2.10%
October 2024	£170m	1.33%	2.18%
October 2025	£195m	1.42%	2.27%
October 2026	£170m	1.52%	2.37%

Source: NI Water.

We do, however, take a slightly different approach from NI Water when calculating the regulatory allowance for the cost of new debt during the PC21 period. In its business plan NI Water quotes the average annual interest rate it expects to pay as at 31 March 2027. This misstates/overstates the costs the business will pay during each of the preceding six years. Our proposal to the Utility Regulator is that it ought to provide in its PC21 calculations for year-specific costs of debt, calculated as the weighted average cost of all new debt raised since 2019, as set out in table 9 below.

Table 9: Proposed cost of new debt (%)

	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Annual allowance	1.91%	1.96%	2.00%	2.05%	2.11%	2.15%

Inflation

NI Water's interest costs are expressed in nominal terms. The cost of debt that goes into our cost of capital calculation is a real, inflation stripped cost of debt. The Utility Regulator has asked us to convert from nominal to real using a constant annual RPI inflation rate of 3% to be consistent with the inflation assumption that it is using throughout its draft determination.

Table 10: OBR annual RPI inflation forecasts (%)

	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
RPI inflation	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%

Source: OBR; First Economics' extrapolation.

Overall calculation

Our calculation of the weighted average of NI Water's embedded and new nominal interest costs in PC15 is given in table 11.

Table 11: First Economics' cost of debt calculation (%)

	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Embedded debt	4.44%	4.44%	4.44%	4.44%	4.44%	4.44%
New debt	1.91%	1.96%	2.00%	2.05%	2.11%	2.15%
Weights	87:13	80:20	73:27	66:34	59:41	55:45
Weighted average nominal cost of debt	4.11%	3.94%	3.78%	3.63%	3.49%	3.40%
RPI inflation	(3.0%)	(3.0%)	(3.0%)	(3.0%)	(3.0%)	(3.0%)
Real cost of debt	1.08%	0.91%	0.76%	0.61%	0.48%	0.39%

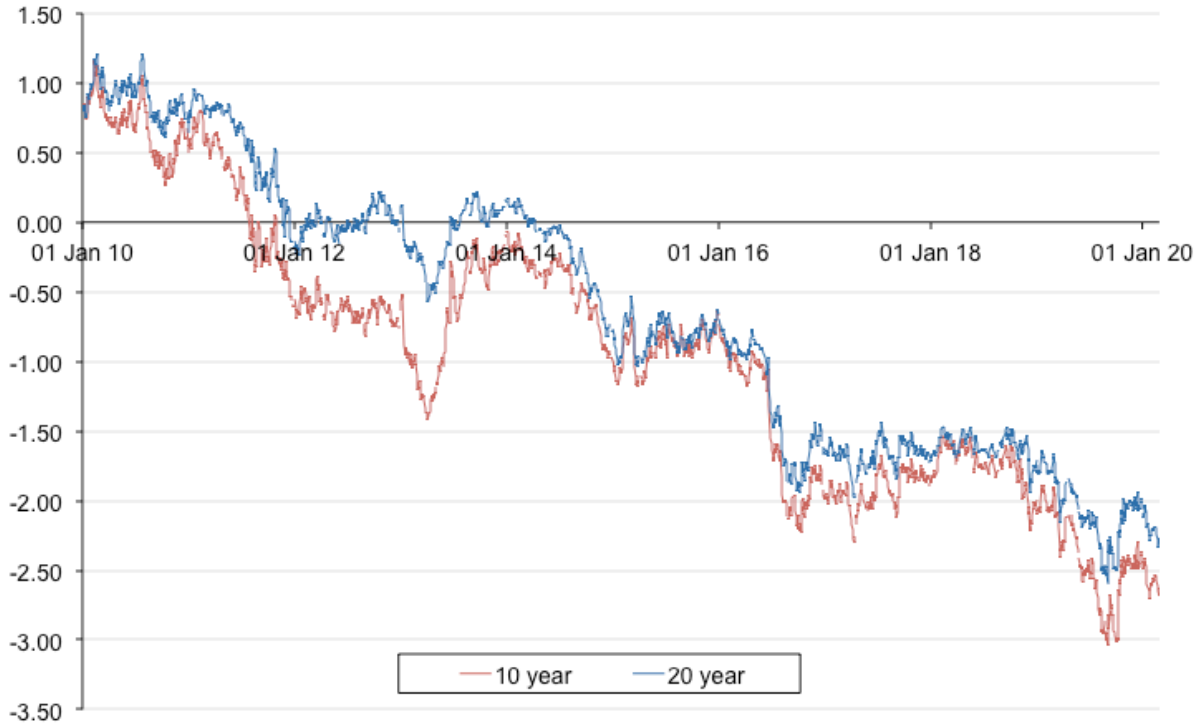
6. Generic Cost of Equity Parameters

6.1 Risk-free rate

Having estimated the cost of debt directly, an estimate of the risk-free rate is needed solely for the purpose of estimating the cost of equity.

The conventional approach used by regulators to assess the risk-free rate is to analyse yields on government-issued index-linked gilts. Figure 12 below plots the index linked gilt yields over the last ten years, for two different maturities of bond.

Figure 12: Index-linked gilt yields (%)



Source: Bank of England.

The key feature of this chart is the emergence of negative real yields (in CPI-adjusted terms) after the 2016 Brexit referendum. The CMA gave its take on how to interpret this data in its March 2020 NATS inquiry provisional findings report. Its position was as follows:[3]

> We consider that current ILG rates continue to provide the most appropriate basis for the measurement of a notional investors' achievable risk-free returns. While we acknowledge that ILG yields are low in the historical context (and negative in absolute terms), we do not consider that negative yields are irrational, per se, and therefore inappropriate for inclusion in the calculation of WACC …

The CMA's point estimate of the risk-free rate as at a reference date of 28 February 2020 was -2.25%. The estimates made recently by regulators in other sectors are shown in table 13.

Table 13: Risk-free rate assumptions in relevant regulatory reviews

Decision	Risk-free rate assumption	Year
UR – PC15	1.5%	2014
Ofcom – BT Openreach	-1.3%	2019
Ofgem – RIIO-2	-1.78%	2019
CAA – NATS	-1.7%	2019
Ofwat – PR19	-2.35%	2019
CMA – NATS	-2.25%	2020

The table shows that other regulators' thinking has been aligned with the CMA's position in the NATS inquiry, once we allow for differences in publication/estimation dates. We recommend to the Utility Regulator that it should likewise move its estimate of the risk-free rate down to match recent market evidence. Selecting an exact figure for the PC21 period is not an exact science, but the CMA's estimate of -2.25% would seem to be a reasonable benchmark.

6.2 Expected market return

The final input into CAPM is R_m, the return on the market portfolio. Some cost of capital studies arrive at a value for R_m directly. Others come at R_m indirectly by estimating an equity-risk premium and adding this figure to the risk-free rate. Like the CMA, we prefer to estimate R_m directly so as to ensure that there is no inconsistency in the cost of equity calculation.[4]

Recent regulatory assumptions for R_m are given in table 14 below.

[3] CMA (2020), NATS (En Route) plc / CAA regulatory appeal: provisional findings report.
[4] The main risk of inconsistency comes from using an R_f in the derivation of an equity-risk premium that differs from the choice of R_f that we made earlier (note that R_f appears twice in the CAPM formula and should take the same value each time). Among other things inconsistencies can arise due to the measurement of R_f over different times periods or as a result of using data from different 'risk-free' securities when deriving an equity-risk premium.

Table 14: Equity market return assumptions in relevant regulatory reviews

Decision	R_m assumption	Year
UR – PC15	6.5%	2014
Ofcom – BT Openreach	5.8%	2019
Ofgem – RIIO-2	5.2% to 5.7%	2019
CAA – NATS	5.4%	2019
Ofwat – PR19	5.47%	2019
CMA – NATS	5% to 6%	2020

The table shows that the values for R_m that other regulators have been inserting into recent price control calculations are noticeably lower than the figure of 6.5% that the Utility Regulator used in its PC15 decision. This is first and foremost a consequence of revisions that regulators have been making to their estimates of the real returns that investors have historically taken from UK stock market investments, particularly in relation to the deflators that should be used to convert data on nominal stock market returns into a useable real terms equivalent. The CMA set out its thinking on this matter in its March 2020 NATS provisional findings:

> We note that our range is lower than that identified by the CMA in its NIE decision (of 6-7%) as the result of two revisions to our previous approach: i) our current view that the CED inflation series is a better measure of [pre-1947] inflation than the COLI; and ii) our view that the step-change in the formula effect as of 2010 means that historic RPI-deflated returns need to be adjusted when used on a forward-looking basis.

The CMA's conclusion from its work was as follows:

> On an historic ex-post basis, the CED/CPI inflation series approach produces a range of 5.1 to 5.9% on an RPI-real basis, while the CED/RPI approach produces a slightly higher range of 5.6 to 6.2% on an RPI-real basis. … We consider that the CED/CPI approach is likely to be more reliable than the CED/RPI approach due to CPI's greater accuracy and consistency as a measure of inflation ... Taking this evidence in the round, our provisional view is that the TMR estimates produced under both the historic ex-post and historic ex-ante approaches are consistent with a figure of between 5 and 6% on an RPI-real basis.

We have no reason to depart from the CMA's conclusions in this report. Our proposed point estimate for R_m is the mid-point value of the CMA's range of 5.5%.

7. Overall Cost of Capital Calculation and Conclusions

Table 15 combines our individual component estimates into a range for the overall cost of capital.

Table 15: Proposed estimate of the NI Water cost of capital

	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Gearing	0.5	0.5	0.5	0.5	0.5	0.5
Risk-free rate	-2.25%	-2.25%	-2.25%	-2.25%	-2.25%	-2.25%
Market return	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Equity beta	0.64	0.64	0.64	0.64	0.64	0.64
Post-tax cost of equity	2.71%	2.71%	2.71%	2.71%	2.71%	2.71%
Cost of debt	1.08%	0.91%	0.76%	0.61%	0.48%	0.39%
Vanilla WACC (%)	1.89%	1.81%	1.74%	1.66%	1.59%	1.55%

The proposed return of 1.89% declining to 1.55% compares to a rate of return of 3.53% used by the Utility Regulator in PC15. The circa 165-200 basis points reduction is attributable to both:

- a reduction in NI Water's actual cost of debt, driven by falling interest rates; and
- a reduction in NI Water's estimated cost of equity, attributable to the selection of a lower risk-free rate, a lower R_m and a lower beta

Our proposed return is below the return of 2.43% that NI Water sought in its business plan. Our calculation of NI Water's cost of debt aligns almost exactly to NI Water's own calculations, except that we have provided for year-specific costs of debt rather than use the 2026/27 cost of debt to fix the return that NI Water receives throughout the PC21 period. Our estimate of the cost of equity is significantly lower than NI Water's calculation, but aligns to the CMA's recent provisional findings in its NATS inquiry.

We are happy that the evidence outlined in the paper supports the figures that we are proposing. We therefore commend the estimates in table 15 to the Utility Regulator for use in its PC21 price control calculations.