FIRST ECONOMICS

www.first-economics.com

An Estimate of the GT22 Cost of Capital for GNI (UK)

Prepared for the Utility Regulator

11 October 2021

1. Introduction

This report contains First Economics' estimates of the cost of capital for GNI (UK)'s licensed pipeline assets. It is intended to inform the Utility Regulator's calculation of allowed returns for the new GT22 price control, covering a five-year period starting 1 October 2022.

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 an investor in GNI (UK) carries and puts forward an estimate of beta;
- section 4 proposes 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 return on the market portfolio; 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 real, CPI-stripped rate of return that the GNI (UK) pipelines need to provide to investors in order to attract and retain capital within the business. 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 GNI (UK)'s current ownership arrangements so that the return on offer through the price control is capable of supporting any reasonable and efficient investor set.

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.

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

The prevailing market cost of debt is directly measurable and in the analysis that follows we explain how the Utility Regulator might use empirical evidence to set an appropriate value for 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 the GNI (UK) business. 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 cost of capital calculation is 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 figures that Ofgem used in its December 2020 RIIO-2 price control determinations for the GB energy networks and the views expressed by the Competition & Markets Authority (CMA) in recent regulatory determinations. 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 the GT22 price control review.

3. Riskiness and Beta

We start deliberately with an assessment of GNI (UK)'s risk profile and beta on the basis that the analysis that follows will also be a key input into a number of the other cost of capital assumptions.

3.1 Preliminaries

Methodology

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 firm in the portfolio 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 covariance 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 collect beta estimates for companies that look to be in some sense similar and to make a judgment about the value of GNI (UK)'s beta on the basis of this comparator evidence. This is an approach that has been deployed in an increasing number of periodic reviews, including several CMA inquiries, during recent years as the number of regulated companies 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.

Asset beta

When comparing the betas of different firms, one has to be careful to take account of the different gearing levels that firms choose since, all other things being equal, a firm with higher gearing will exhibit a higher equity beta. Unless one controls for this effect, there is a danger of confusing the risk that comes from high leverage with the underlying business risk that a firm faces by virtue of the nature of the activities it is carrying out.

This is where the concept of an asset beta proves useful. An asset beta is a hypothetical measure of the beta that a firm would have if it had no debt and were financed entirely by equity. By comparing different firms' asset betas it becomes possible to isolate the underlying systematic

risk that a company has and carry out an assessment of the relative riskiness of different businesses.

The asset beta is calculated using the following formula:

$$\beta_a = (1 - g) \cdot \beta_e + g \cdot \beta_d$$

where β_a is a firm's asset beta, g is gearing and β_d is the firm's debt beta.[1]

A firm's actual gearing is something that is easily calculated using reported debt figures and the firm's market capitalisation, but a firm's debt beta is not something that is directly observable. We have assumed in our work that β_d is a constant of 0.075 (a value that Ofgem and the CMA have used in reviews of companies with approximately the same gearing as we identify in section 4).

Confidence intervals

This provides a complete description of our methodology for estimating asset betas. The only other point we must make is that beta estimates are exactly that: estimates. Every estimate that we identify comes with a standard error and the figures that follow must be regarded as mid-points within wider confidence intervals.

3.2 Comparator analysis

Our comparator set comprises two types of data:

- calculated betas for comparator firms with a stock market listing; and
- the beta estimates that regulators have made in recent periodic reviews.

In the first of these groups we have collected beta estimates for the last remaining network-dominated companies with a UK stock market listing – National Grid, Pennon Group, Severn Trent and United Utilities – based on ten years of share price data.[2]

The second group comprises the most recent assessments by the Utility Regulator, Ofgem and the CMA of betas for regulated networks

The comparator data is presented in tables 1 and 2.

Table 1: Calculated asset betas

	Average asset beta
National Grid	0.36
Pennon Group	0.35
Severn Trent	0.32
United Utilities	0.31

Source: Bloomberg and First Economics' calculations using data up to May 2021.

[1] For those that have not come across this concept before, a debt beta is similar to the equity beta, but rather than measuring the systematic risk taken by the company's shareholders, it represents such risk presented to the company's lenders.

[2] This approach ensures that estimates of beta are not overly swayed by short-term movements in share price data.

Table 2: Beta estimates used in recent periodic reviews

	Year	Regulator's estimates of asset beta
Ofgem, energy networks	2020	0.35
CMA, water and sewerage companies	2021	0.33
Utility Regulator, NI Water	2021	0.36

References: Ofgem (2020), RIIO-2 final determinations – finance annex; CMA (2021), Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: final report; Utility Regulator (2021), PC21 final determination – main report.

The tables show that the comparator betas sit in a relatively narrow range of 0.31 to 0.39. The task that we face is to position GNI (UK) at an appropriate point relative to these comparators based on an assessment of GNI (UK)'s relative riskiness.

3.3 Benchmarking of the GNI (UK) beta

Approach to comparisons of riskiness

In working through this task it is useful to highlight four main determinants of the (systematic) risk that shareholders bear through their ownership of GNI (UK) and the above-mentioned networks.

- Demand variability – regulated networks operate in markets where the demand for access is very closely correlated to the overall demand for energy or the overall demand for water. This demand will in turn be sensitive to macroeconomic conditions, insofar as a downturn in the economy will cause both households and businesses to use less energy and water while strong growth will bring about increases in volumes.
- Cost variability – network businesses employ direct and indirect staff. As labour becomes more expensive costs will go up, and as labour becomes less expensive costs will go down. Similarly, businesses are exposed to changes in the costs of other inputs like materials and business rates.
- 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 controls and associated incentive mechanisms, a regulator has a significant degree of control over the degree to which shareholders are exposed to risks – a situation that distinguishes regulated companies from unregulated companies. In particular, revenue caps may offer investors quite significant protection against changes in demand, while a regulator's design of opex and capex incentives are a key determinant of 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 regulatory asset bases (RABs) in comparison to ongoing revenues present shareholders with greater risk than companies which have large RABs 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 investor capital base and company B has a large investor capital base, as measured by their RABs. 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 3: 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 4: 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 5: 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 returns 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 size of the capital base. Holding all other things equal, shareholders in a regulated company with a small RAB 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 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 the different shareholders in our sample of firms 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 pure demand and cost variability alone.

The characteristics of the UK's network companies are set out in table 6.

Table 6: Characteristics of regulated companies

	Exposure to demand risk	**Exposure to cost risk**	**Operational gearing – average annual controllable totex-to-RAB ratio**
GB gas transmission	Low – companies have revenue caps	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 incorporates an incentive rate of 39%.	Low – around 5%
GB electricity transmission	Low – companies have revenue caps	Low to moderate – costs are mainly repeated opex and capital works, with some major enhancement projects. Costs have high labour content, with some exposure to commodity prices and the construction cycle. Price control design incorporates incentive rates of between 33% and 50%.	Low – around 10-20%
GB gas distribution	Low – companies have revenue caps	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 incorporates incentive rates of around 50%.	Low – around 10%
England & Wales water and sewerage	Low – companies have revenue caps	Low to moderate – 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 incorporates incentive rates of around 50%.	Low – around 10-15%

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 up to six years.	Low to moderate – around 25%

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

We make the following observations about the entries in this table:

- the network businesses all face negligible revenue risk;
- there is a good degree of similarity in companies' exposure to cost risks, even if sharing rates and/or the precise design of regulatory incentives vary from sector to sector; and
- all of the companies have sizeable RABs relative to ongoing expenditures and revenues.

The positioning of GNI (UK) depends on the regulatory framework that the Utility Regulator puts in place for the GT22 period. We have been told to assume that the business will:

- be subject to a revenue cap, which will give GNI (UK) an income entitlement irrespective of the volumes passing through its pipelines;
- be given a five-year allowance for opex and replacement capital expenditure, and take the risk of spending more or less than this allowance; and
- have the ability to ask for a special review if it is forecasting an over-spend of more than 15% against its opex allowance. (Similarly, the Utility Regulator will be able to initiate such a review of there is a forecast under-spend of more than 15%.)

We can therefore add a further entry to the list in table 7 as follows.

Table 7: Characteristics of GNI (UK)

	Exposure to demand risk	**Exposure to cost risk**	**Operational gearing – average annual totex-to-RAB ratio**
GNI (UK)	Low – company has a revenue cap	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 up to five years.	Low – around 5% to 10%.

A comparison between table 6 and table 7 suggests that there is nothing particularly exceptional about the GNI (UK) business as a regulated network. GNI (UK) and our comparator networks:

- all have the same negligible exposure to revenue risk;
- face similar exposure to cost risks; and
- have similar totex to RAB ratios.[3]

We note that this is consistent with the cost of capital submission made by GNI (UK), which did not seek to mark the business's risk profile out as being different from the Ofgem-regulated companies.

The evidence therefore leads us to conclude that GNI (UK)'s beta should be squarely 'in the pack' with the values that we identified in tables 1 and 2. Choosing a specific point estimate for beta is not an exact science. However, our advice to the Utility Regulator is that it has no reason to deviate from the 0.35 figure that Ofgem used in its recent price control determination for the GB gas transmission business. Insofar as the GB and NI transmission networks present broadly similar risk profiles to investors, it is logical that they should also have equivalent betas.

4. Gearing

The assumption made about gearing affects directly 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.

Recent regulatory precedent in this area is shown in table 8. In each case the regulator concerned sought to select a figure for gearing which is consistent with the regulated company maintaining an A to BBB/Baa credit rating.

Table 8: Gearing assumptions in recent regulatory reviews

Decision	Gearing assumption	Year
Ofgem, energy networks	55-60%	2020
CMA, water and sewerage	60%	2021
Utility Regulator, NI Water	50%	2021

The table gives a range of 50% to 60%. In comparing GNI (UK) against these other companies, it is important to be cognizant of the assessment of relative risk given in section 3. This tells us that there is no particular reason to think that the business should not be 'in the pack' with the other regulated utilities.

On this basis, we propose a figure of 60% to align with Ofgem's notional gearing for the GB transmission business.

[3] We note that this is a change from the position that we identfiied in our GT17 report. GNI (UK)'s totex-to-RAB ratio has been increasing due to the gradual payback of its regulatory asset base.

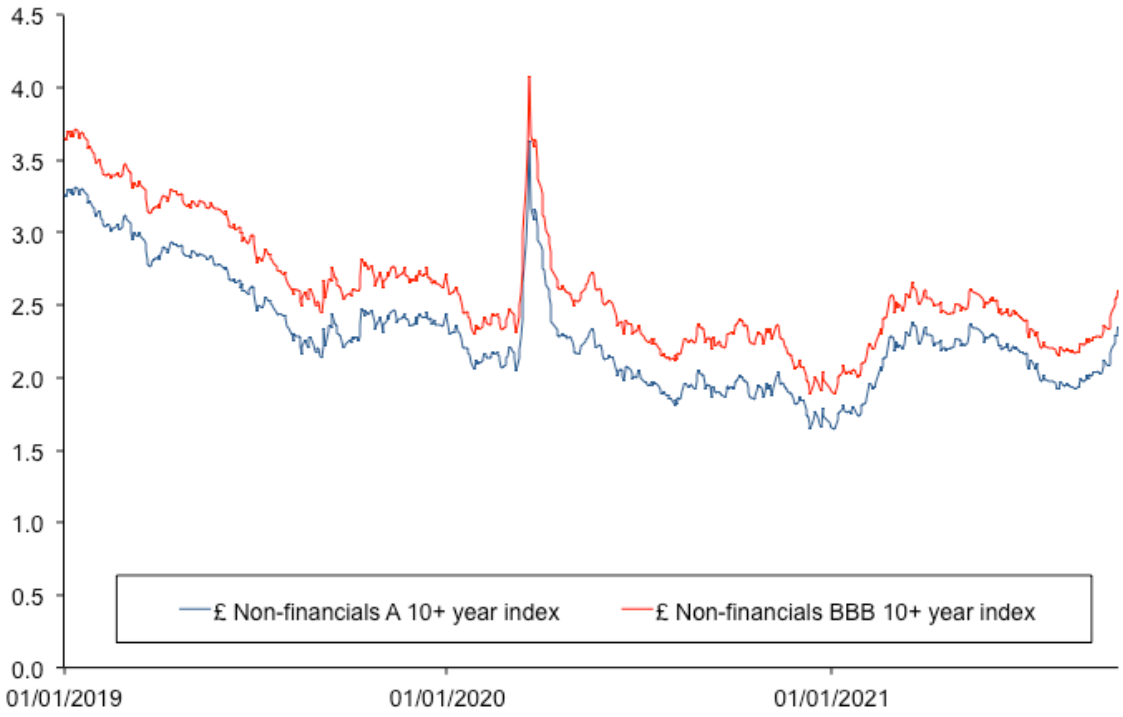
5. Cost of Debt

Our task in putting a value to the cost of debt is to use available data to estimate the interest that we would expect an efficiently financed business with an A to BBB rating to pay on its borrowings.

In previous cost of capital reports we have expressed a preference for focusing on the interest paid by the real-life company as the natural starting point in this analysis. In this review, there is an obstacle to this approach because GNI (UK)'s debt takes the form of loans from its parent company. In the circumstances, GNI (UK)'s licence suggests that the allowed cost of debt should be benchmarked to the market interest rates that a company with GNI (UK)'s character would expect to pay if it were to borrow directly from the markets.

Regulators commonly use iBoxx secondary market bond indices as benchmarks for the cost of debt that must be paid by a network company borrower. Figure 9 shows the yields on A and BBB rated UK corporate bonds with 10+ years to maturity.

Figure 9: iBoxx bond yield indices (%)



Source: iBoxx.

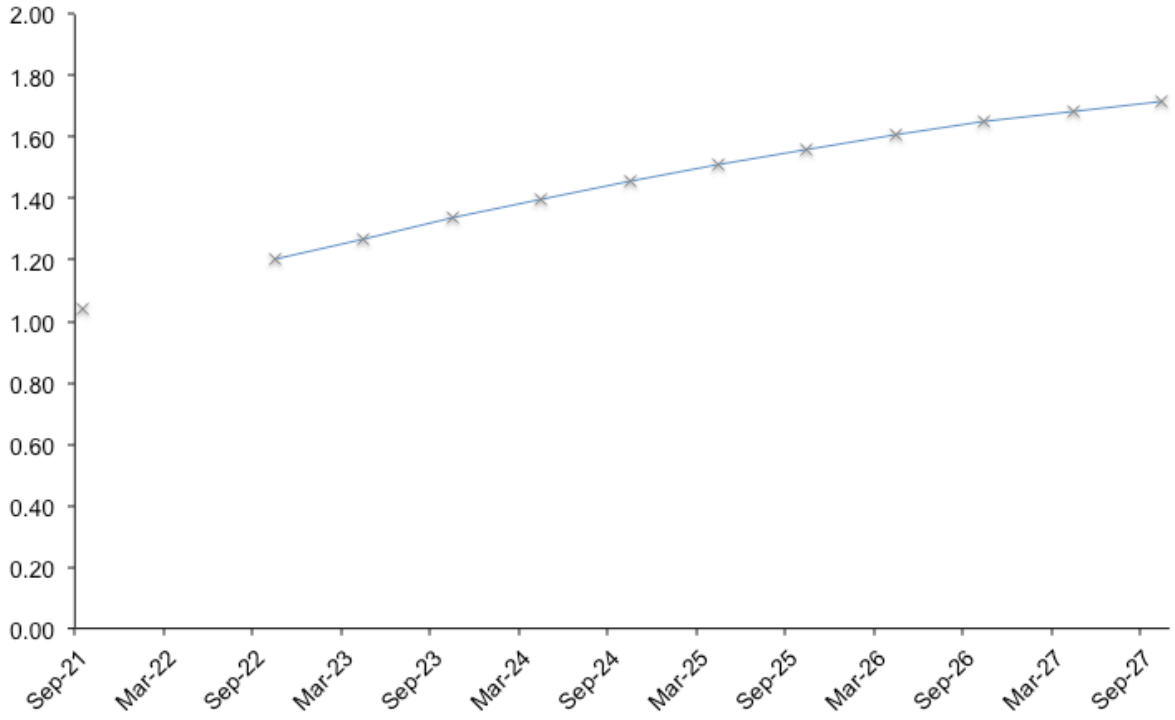
Yields as at the end of September 2021 were approximately 2.35% for A rated debt and 2.60% for BBB rated debt. Figure 9 shows that these figures are broadly representative of the average rates in the market over the last three years, save for a short period around the start of the COVID pandemic.

We assume that the Utility Regulator will wish to continue with its policy of setting a cost of debt allowance that is in line with its forecast of prevailing A and BBB yields during the regulatory period. In recommending this approach, we do not agree with GNI (UK)'s suggestion that the Utility Regulator ought to take a trailing average of historical rates. Our understanding is that neither GNI (UK) nor its parent company possesses any embedded fixed-rate debt and we not

think it is logical to set a cost of debt allowance by reference to historical interest rates that GNI (UK) does not and need not pay.

Our cost of debt calculation starts with the current average yield on A and BBB bonds of 2.475%. We then allow for a small move up in borrowing costs to be consistent with forward gilt rates. These are shown in figure 10.

Figure 10: Forward rates for 10-year nominal gilts (%)



Source: Bank of England.

The curve shows that markets are currently pricing in a ~15 basis points increase in gilt rates by October 2022 and a ~70 basis points increase by September 2027. All other things being equal, we might expect similar upward pressure on corporate interest rates in the next few years, suggesting that it is prudent to increase the 2.475% estimate of market interest rates by a flat five-year average uplift of 0.425% to give an average nominal GT22 cost of debt of 2.9 %.

We need to convert from a nominal figure to a real cost of debt for inputting into our real, CPI-stripped cost of capital computation. We advise that the conversion for inflation should be consistent with the inflation forecasts that the regulator is using throughout the GT22 review. Pending detail on what these forecasts are we use an average annual inflation rate of 2.0%. This means that we convert the nominal cost of debt into a real, CPI-stripped cost of debt of 0.9%.[4]

We also add an allowance for fees of 25 basis points, giving a final cost of debt figure of 1.15%.

[4] The conversion formula is (1 + real cost of debt) = (1 + nominal cost of debt) / (1 + forecast inflation).

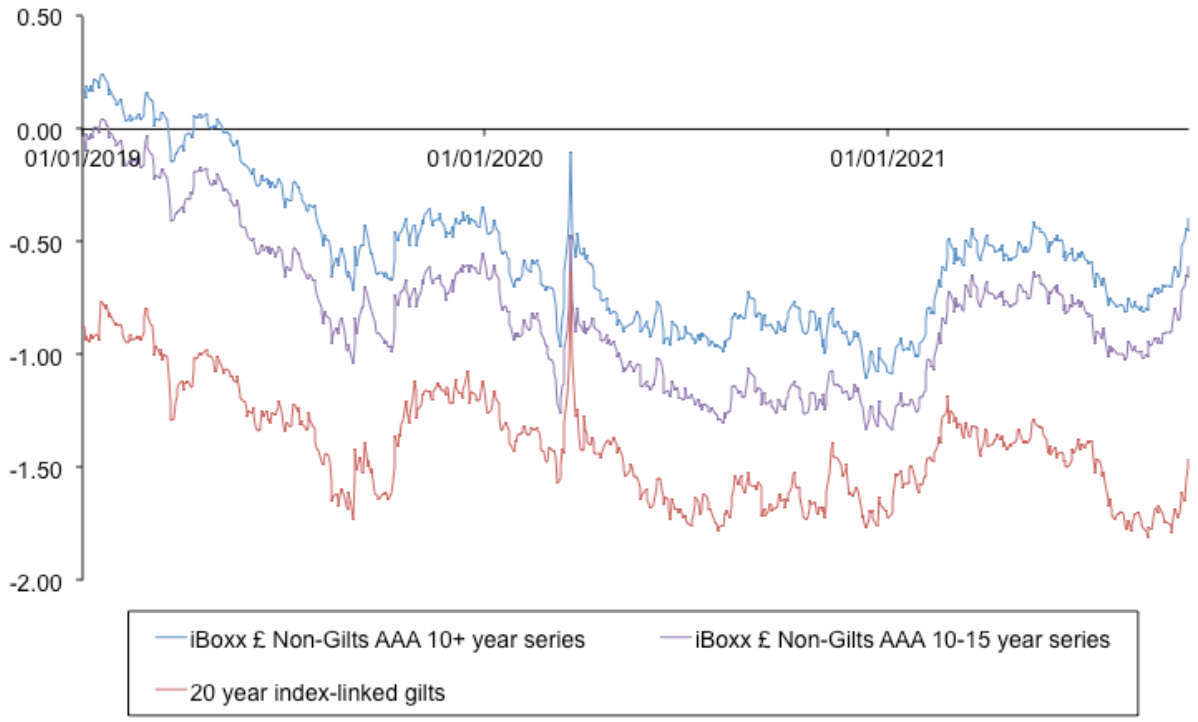
6. Generic Cost of Equity Parameters

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 CMA has suggested that readings of the CAPM risk-free rate can be obtained by examining the yields on government gilts and AAA rated corporate bonds. Figure 11 below plots the yields on three benchmark indices.

Figure 11: Real yields on government gilts and AAA corporate bonds (%)



Source: Bank of England and iBoxx websites.

Note: we have converted the published indices into real, CPI-stripped equivalents using inflation assumptions of 2.0% and 2.9% for CPI and RPI respectively.

The CMA gave its take in its March 2021 PR19 decision on how to extrapolate forward from this data to a forward-looking estimate of the risk-free rate. Its position was as follows:

> We consider that a 6-month period would provide a suitable balance of ensuring the use of up-to-date data while avoiding the issues of short-term mark volatility. As a result, we adopt the approach of measuring average market data over a 6-month look back period.

A 50:25:25 weighted average of the gilt and two AAA series respectively in the six months to September 2021 was -1.1%.

Table 12 compares this calculation to the risk-free rate assumptions used in other recent reviews.

Table 12: Risk-free rate assumptions in recent regulatory reviews (CPI-stripped)

Decision	Risk-free rate	Year
CMA, NATS	-1.4%	2020
Ofgem, energy networks	-1.48%	2020
Ofcom, fixed telecoms	-1.0%	2021
CMA, water and sewerage	-1.34%	2021
Utility Regulator, NI Water	-1.3%	2021

The table shows that our risk-free rate is in line with other regulatory decisions, with the small variation in figures arising principally as a consequence of different reference dates.

6.2 Expected market return

The final input into CAPM is the expected return on the market portfolio, R_m. Some cost of capital studies arrive at a value for R_m only indirectly by estimating an equity-risk premium and adding this figure to the risk-free rate. Like Ofgem and the CMA, we prefer to estimate R_m directly so as to ensure that there is no inconsistency in the cost of equity calculation.[5]

Recent regulatory assumptions for the overall market return for equities are given in table 13 below.

Table 13: Equity market return assumptions in relevant regulatory reviews (CPI-stripped)

Decision	R_m assumption	Year
CMA, NATS	6.5%	2020
Ofgem, energy networks	6.5%	2020
Ofcom, fixed telecoms	6.7%	2021
CMA, water and sewerage	6.81%	2021
Utility Regulator, NI Water	6.8%	2021

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 ~7.7% (in real, CPI-stripped terms) that the Utility Regulator used in its GT17 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 has recently completed an extensive review of the evidence on R_m as part of its PR19 inquiry. The CMA's conclusion from its work was as follows:

[5] 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.

> In coming to a view on a reasonable range of TMR estimates, we have placed most weight on the historic ex-post and historic ex-ante approaches. The former gives a range of 5.6% to 6.5% (RPI real), while the latter gives a range of 5.2% to 5.7% (RPI real) ... On this basis, we conclude that the overall TMR range is between 5.2% and 6.5% (RPI-real).

(NB: a range of 5.2% to 6.5% in RPI-stripped terms converts into a CPI-stripped range of 6.1% to 7.4%.)

Our view is that there could be grounds for setting the expected market return lower than the CMA's range. The CMA assumed in its work that the expected market return is broadly stable over time, and therefore that a change in the risk-free rate translates one-for-one into a change in the equity-risk premium. Most practitioners consider that it is more likely that there is some degree of correlation between movements in the risk-free rate and movements in the expected market return. At a point in time when returns on riskless assets are at historical lows, this suggests that the CMA may have over-estimated the prevailing expected market return.

We nevertheless defer[6] to the CMA's expertise and the thoroughness of its recent work in this area. Our proposed point estimate for R_m is the mid-point of the CMA's range of 6.8%.

7. Overall Cost of Capital Calculation and Conclusions

Table 14 combines our individual component estimates into a range for the overall real, CPI-stripped vanilla cost of capital.

Table 14: Proposed range for GNI (UK)'s GT22 real, CPI-stripped cost of capital

	Point estimate
Gearing	0.6
Cost of debt (%)	1.15
Risk-free rate (%)	-1.1
Market return (%)	6.8
Asset beta	0.35
Equity beta	0.76
Post-tax cost of equity (%)	4.92
Vanilla WACC (%)	2.66

The calculations give a real vanilla cost of capital of 2.66%

As shown in the annex overleaf, these figures are lower than the current rate of return, reflecting the shift down that there has been in market interest rates since 2017 and the development of wider regulatory thinking in relation to the estimation of the expected market return.

[6] Our advice to the UR is that using a top-end R_m value obviates the need to 'aim up' elsewhere in the cost of capital calculation.

Annex

Table A1: Proposed GT22 cost of capital in CPI-stripped and RPI-stripped terms

	CPI-stripped	RPI-stripped
Gearing	0.6	0.6
Cost of debt (%)	1.15	0.27
Risk-free rate (%)	-1.1	-1.97
Market return (%)	6.8	5.87
Asset beta	0.35	0.35
Equity beta	0.76	0.76
Post-tax cost of equity (%)	4.92	4.01
Vanilla WACC (%)	2.66	1.76

Note: the calculations in the final column of the table are based on an annual RPI inflation rate of 2.9%.

Table A2: Proposed GT22 cost of capital vs GT17 allowed return

	First Economics GT22, RPI-stripped	Utility Regulator GT17, RPI-stripped
Gearing	0.6	0.65
Cost of debt (%)	0.27	0.2
Risk-free rate (%)	-1.97	1.25
Market return (%)	5.87	6.5
Asset beta	0.35	0.34
Equity beta	0.76	0.79
Post-tax cost of equity (%)	4.01	5.38
Vanilla WACC (%)	1.76	2.01

Table A3: Proposed GT22 cost of capital vs GNI (UK) business plan

	First Economics CPI-stripped	GNI (UK) plan CPI-stripped
Gearing	0.6	0.65
Cost of debt (%)	1.15	1.21
Risk-free rate (%)	-1.1	-1.26 to -0.24
Market return (%)	6.8	6.58 to 7.44
Asset beta	0.35	0.35 to 0.38
Equity beta	0.76	0.81 to 1.00
Post-tax cost of equity (%)	4.92	5.13 to 7.44
Vanilla WACC (%)	2.66	2.58 to 3.39