UUWR_72

PR24 Draft Determination: UUW Representation

Area of representation: Cost of Capital

August 2024

This document "Cost of Capital for PR24: An update prepared for United Utilities - August 2024" is an independent report by Frontier Economics setting out its view of the cost of capital for PR24. This supports our draft determination response document UUWR_70 and provides an update on our October business plan document UUW73.

United Utilities

Water for the North West

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COST OF CAPITAL FOR PR24

AN UPDATE PREPARED FOR UNITED UTILITIES

AUGUST 2024

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Executive summary

Frontier Economics has previously provided reports to United Utilities (UU) that estimated the WACC (Weighted Average Cost of Capital) for PR24 – covering the April 2025 to March 2030 period.

This is an extension of those reports. We have largely retained the methodology used in our initial 2022 report, and highlight any changes throughout. This methodology reflects our view of how an appropriate WACC should be estimated for PR24.[1]

In this report we also give careful consideration to 'investability'. This focuses on the ability of the water sector to attract and retain equity. We reflect on our considerations of investability when selecting an appropriate WACC range and point estimate. Namely, we consider:

- What the material changes to capital market conditions since the PR19 FD mean for investability; and
- What the step-change in investment in the sector means for investability – particularly at a time where there are perceptions of asymmetric risk in the sector.

The purpose of this update is to provide a view on where the appropriate cost of capital for the AMP8 regulatory period lies. It provides a point of comparison to the allowed return set out in Ofwat's PR24 Draft Determination (DD), which were published 11 July 2024.

New information reflected in this update report

Since our last update, which used a data cut-off of 30 April 2023, there has been a series of new information to reflect. This includes:

- Business plan data – in October 2023 water companies published their business plans (including data tables). Previously, particularly on the cost of debt, we had made assumptions which we have replaced with business plan data in this report. The plans also reveal information on the scale of capital the sector requires. In particular we note that the plans set out £96 billion of expenditure between 2025 and 2030.[2] That sum includes £41 billion on enhancement schemes, compared to £11 billion allowed by Ofwat for 2020 to 2025. This represents a 271% increase – clearly demonstrating the important role that investors will play in the next few years. In the DD, Ofwat has reduced sector expenditure, particularly through reductions to enhancement expenditure, but the scale of expenditure is still significantly higher than previous price controls.

- Further data on the financial conditions the sector will face – what has become clear in market projections is that interest rates are expected to remain elevated for a prolonged

[1] In this report we use data to the end of March 2024 unless otherwise specified.

[2] We note that the latest business plan revisions now lead to a figure of approximately £100bn.

period of time. No data is indicating that a return to negative real rates is likely in the near term. As a result, the return investors require for investing in long-term debt has increased. This in turn has implications for equity investor returns, as corporate finance principles outline that equity returns need to reflect the relative risk to debt. We discuss those implications and what they mean for CAPM in this report and set out below how we have used this information when selecting a point estimate.

- Sector risk perceptions – investors may exercise a greater degree of caution about water sector investment that in previous periods. One reason for this is the observable downside skew in company performance across the sector in the current price control.[3] While Ofwat's DD argues that the package is "broadly balanced", it is unclear whether investors agree that this will be the case. Another reason is that broader observable perceptions about risk in the sector may persist into the next control period – specifically, we find there is evidence from debt markets of changes to investment appetite, and this may also be feeding through to equity market too.[4] Additionally, how the ongoing situation with Thames Water is evolves might also have implications for the broader sector in respect of risk sentiment and investor appetite.

In this update we also provide a view on a suitable point estimate for the WACC. This draws on a wide range of information, including those set above, to assess where in the WACC range an allowed return should be set.

Key findings on the CAPM range

Having considered the latest evidence, including on investability, we estimate a **cost of equity range of 5.43% to 6.02%** in CPIH-deflated terms. This estimate reflects recent market data, information from PR19 to date, business plan submissions for PR24, and evidence from cross-checks. The entirety of our cost of equity range is above Ofwat's DD point estimate of 4.80%.[5]

We find that the **cost of debt has increased** in recent estimates. This is driven by both the cost of embedded debt and cost of new debt. On embedded debt, we draw on business plan submissions and market indices to estimate a range from 2.28% to 2.41%. For the cost of new debt, we focus on recent yields from the iBoxx Utilities 10Y+ index as this index has been the best proxy for water sector financing costs since Q3 of 2023 – Ofwat did not consider this latest relevant data in the DD, as its cut-off for company financing costs was Q1 2023. Ofwat's assessment is therefore over a year out of date at the time of the DD.[6] Using the Utilities index provides a cost of new debt 3.64%. Drawing on business plan data we also increase our estimate for the relative weight of new debt to embedded debt.

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3 For example, 16 out of 17 companies are reported to be overspending on totex in the current control period to FY2023, and 13 out of 17 companies are being penalised in net terms on outcome delivery incentives in FY2023.

4 This evidence from debt market is discussed in the Cost of Debt section of this report.

5 And is entirely above Ofwat's highest estimate of 4.88%.

6 Excluding bonds issued by the Thames Water.

Our estimates continue to use a **gearing figure of 60%**. We consider that this remains an appropriate gearing figure for the notional company and note that the same figure has been adopted in other price control decisions where large enhancement plans have been allowed.

Updated WACC estimate for PR24

Our updated estimate for PR24 is set out in the table below. Overall, **we estimate a vanilla wholesale WACC in the range 3.85% to 4.11%**. This is an increase of 39bps at the low end, and 24bps at the high end from our 2023 report.[7] Our lower bound is 46 bps above the low end of Ofwat's range at the DD and our upper bound is 41 bps above Ofwat's high end of its range. There is no overlap between our range and the wholesale WACC used by the Ofwat in the DD of 3.66%.

Table 1 PR24 WACC estimate, CPIH deflated

Parameter	PR24 estimate	
	Lower bound	Upper bound
Gearing	60%	60%
Cost of equity	**5.43%**	**6.02%**
Cost of debt	**2.90%**	**2.99%**
Appointee WACC (vanilla)	3.92%	4.20%
Retail net margin deduction	0.07%	0.09%
Wholesale WACC (vanilla)	**3.85%**	**4.11%**

Source: Frontier Economics
Note: Based on a cut-off date of March 31 2024

Selecting an appropriate point estimate

For this update UU has asked us to provide a view on the point estimate from the WACC range. Given that most of the variation in the WACC range is being driven by the cost of equity, we focus our attention on drawing a point estimate from the cost of equity range.

Our view is that an appropriate cost of equity point estimate for PR24 is at the top-end of the range set out. In other words, a cost of equity estimate of 6.02%. We consider this appropriate for a number of reasons:

- **Capital market based cross-checks suggest a figure higher than the top-end of the CAPM range** – specifically, we set out a cross-check based on hybrid bonds. As the name suggests, these are securities that combine debt and equity characteristics. From

[7] Our previous estimate was a wholesale WACC of 3.46% to 3.87%.

this asset class we are able to observe market information on the yields of these securities. This means those yields can be analysed to infer required equity returns. This cross-check provides a clear link from capital market conditions through to the equity returns that utilities investors are likely to require. It also helps to test whether the difference between the cost of equity and cost of new debt is consistent within reasonable bounds of the CAPM logic. **Our finding from this cross-check is a cost of equity range of 5.8% to 8.4%** (CPIH-deflated) with a central estimate of 6.6%. We note that only very top-end of our cost of equity range (based on CAPM) overlaps with the range produced by this cross-check. This suggests the appropriate point estimate can only be the very top of the range, particularly as the central estimate from the cross-check (6.6%) remains above even the top-end of the range. We note that Ofwat's proposed cost of equity point estimate of 4.8% is a whole percentage point below the low-end of this cross-check range.

- **The scale of investment required in the sector has risen substantially, and the timeframe for delivery matters** – the sector is proposing a range of significant enhancements in business plans. These represent a step-change in the scale of investment – with the sector proposing around £41 billion of enhancements.[8] If these enhancements are financed on a notional basis, this would likely require around £15bn of equity financing in the sector in the next control period.[9] The prompt delivery of these enhancements also matters for improving customer and environmental welfare. This is because the enhancements enable improvements in outcomes customers prioritise. It is therefore important that the required quantum of capital can be attracted in a timely manner. The large scale of investment for AMP8 increases the impact of the asymmetric risks associated with the WACC being set too low.

- **Investor risk perceptions** – we find that there is an ongoing risk that investors perceive asymmetric risks in the water sector. Indeed, Ofwat themselves cite a Barclays survey indicating that water is rated the riskiest utility sector and that the UK is the riskiest European country.[10] Perceptions of risk may not be aided by the introduction of new complex components in the price control which have downside risk associated with them.

- **It is consistent with previous regulatory decisions** – UK regulatory practice over the past decade or more has been to move Total Market Return (TMR) down to reflect prevailing market conditions. As interest rates and yields on government bonds fell over much of the last decade, UK regulators responded by lowering their estimates of TMR used to determine the allowed cost of equity. There are clear statements showing how regulators actively adjusted TMR to these low rate conditions. This movement was not one-for-one, i.e. regulators moved TMR by a proportion of the fall in yields on government

8 Ofwat has reduced the scale of enhancement proposed by companies by around 22% on average in the DD.

9 Using a notional gearing assumption of 60%. The figure may be higher or lower than this in practice depending on the proportion of enhancement expenditure that is opex-like in nature and therefore could be recovered via PAYG rather than being financed through the RCV. This financing could be in the form of retained earning as well as injections.

10 Ofwat (2024), Aligning risk and return – Allowed return appendix.

bonds. This "stable but not fixed" policy has been endorsed by the UK Regulators Network (UKRN). Real interest rates are now materially positive and available evidence points to materially positive real rates persisting. By the same logic that caused estimates of TMR to fall at PR19, it is now time for regulators to increase TMR for PR24.

- **Wider capital market evidence indicates weakened investor sentiment –** we observe market-to-asset ratios (MARs) in the water sector and beyond indicate weakened sentiment. We observe that recently the MAR for Pennon (covering South West Water, Bristol Water and Bournemouth Water) has been trading close to 0.8.[11] In addition to this, a recent private transaction for Phoenix Natural Gas Limited (a gas network owner in Northern Ireland) may imply a MAR of less than 1.0.[12] Given these indicators of sentiment, we suggest that investability cannot be considered a foregone conclusion, and requires careful consideration at PR24.

Given all of the points above, in particular the capital market based cross-checks and the scale of investment the sector requires, **we consider there could be heightened equity investability risks within AMP8 if Ofwat were to set an allowed equity return figure significantly below 6.0%**. Given the DD point estimate of 4.8%, we consider it critical that Ofwat carefully considers the points raised in this report ahead of the PR24 FD.

Although some of the cross-check evidence, namely the hybrid bond cross-check, suggests a cost of equity figure greater than 6.0%, we consider that an estimate from within the long-term CAPM approach helps from the perspective of regulatory stability and predictability.

Drawing upon the higher end of our cost of debt range (2.99%), combined with the top end of our CAPM cost of equity range of 6.02%, we therefore propose a point estimate for the wholesale WACC of 4.11% for PR24.

11 Based on data from May 2024. We also note the purchase of Sutton and East Surrey was announced by Pennon in January 2024. The equivalent ratios for UU and Severn Trent (SVT) are above one for the same time period, but we note that these companies may be expected to perform more strongly relative to peers if recent relative performance trends are expected to continue – SVT and UU are both at the top-end of the industry in terms of RoRE in the current AMP to date, 1st and 3rd respectively.

12 As measured by GBP sale price compared to Total Regulatory Value (TRV).

1 Introduction

1.1 Purpose of this report

Frontier Economics has previously provided two reports for United Utilities (UU) which estimated the WACC for PR24 – covering the April 2025 to March 2030 period. These were:

- **The "2022 report"** setting out our preferred methodology for estimating the WACC, and an early WACC view.[13] This was to support UU's response to Ofwat's PR24 Draft Methodology Consultation. The cut-off date for that report was 30 June 2022 for market data, with data from companies' Annual Performance Reports (APRs) reflecting the latest FY2022 submissions.

- **The "2023 update report"** which was an extension to the 2022 report, setting out an update on the WACC estimate for PR24 using the same methodology as our 2022 report.[14] The purpose of this is to provide UU with an updated view of what we consider to an early indicator for the WACC, using the methodology that we consider to be most suitable.[15] The data cut-off for that report was 30 April 2023.

This report is a further update to this existing set of work for UU. The purpose of this report is to provide a point of comparison to the allowed return proposed by Ofwat in the PR24 DD. Setting out our view on the relevant components based on recent capital market and sector specific developments. In this document we also provide a view on WACC point estimate – taking into account a range of investability considerations in doing so.

1.2 Scope of this report

This update largely follows the structure of the 2023 update report. We have also retained most of the methodology used in our previous report – highlighting any changes throughout. Where we have made revisions to methodology this is in response to the new information that has become available, for example, water company business plans – which were published in October 2023.

For the avoidance of doubt, the methodology reflects our view of how an appropriate WACC should be estimated for PR24. In places this diverges from Ofwat's preferred methodology.

In this report we also give careful consideration to 'investability'. This focuses on ability of the water sector to attract and retain equity. We reflect on our considerations of investability when selecting an appropriate WACC range and point estimate. Namely, we consider:

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13 Available at: https://www.ofwat.gov.uk/wp-content/uploads/2022/07/UUW_PR24_WACC_Final-report_STC_02-09-2022.pdf

14 Available at: https://www.unitedutilities.com/globalassets/z_corporate-site/pr24/supplementary-documents/uuw73.pdf

15 This report did not address proposals put forward by Ofwat in its Final Methodology.

- What the very material changes to capital market conditions since the PR19 FD mean for investability; and
- What the step-change in investment in the sector means for investability – particularly at a time where there are heightened perceptions of risk in the sector.

Our estimates in this report use data up until the end of March 2024. We note that Ofwat's DD has the same data cut-off date. In specific places we also reflect data from April or May 2024, this is in response to fast-moving situations in the sector, namely the circumstances surrounding Thames Water.

In this update we also provide a specific recommendation to UU on the point estimate for the WACC. To make this recommendation we draw on a range of sector-specific and capital market information. As most of the variation in our WACC estimate is driven by the cost of equity range, the selection of a point estimate from this range is our focus.

1.3 Structure of this report

The structure of this report is as follows:

- Section 2 provides market context for setting the WACC for PR24;
- Section 3 discusses inflation assumptions;
- Section 4 provides an estimate for notional gearing;
- Section 5 provides an estimate for the cost of debt;
- Section 6 provides an estimate for the cost of equity;
- Section 7 sets out the recommendation on a point estimate for the cost of equity;
- Section 8 provides an estimate for the retail net margin deduction;
- Section 9 concludes with an estimate for the preliminary wholesale WACC for PR24 that would be appropriate for the PR24 FD, and discusses selecting a point in the range; and
- Annex A provides more detail on the hybrid bond cross-check.

2 Market context for PR24

In this section we set out some important market context for the WACC. The findings in this section inform many of the sections that follow. We focus on two categories:

- Sector-specific market context, which we divide into:
  - Business plan information – covering the scale of investment the sector has requested for the next control period and trends in total expenditure – noting any major changes proposed by Ofwat in the DD.
  - Sector risk perceptions – covering the balance of risk that investors may perceive in the sector.
- Capital market context – which captures the latest market data which is relevant to WACC, including interest rate expectations.

2.1 Sector-specific market context

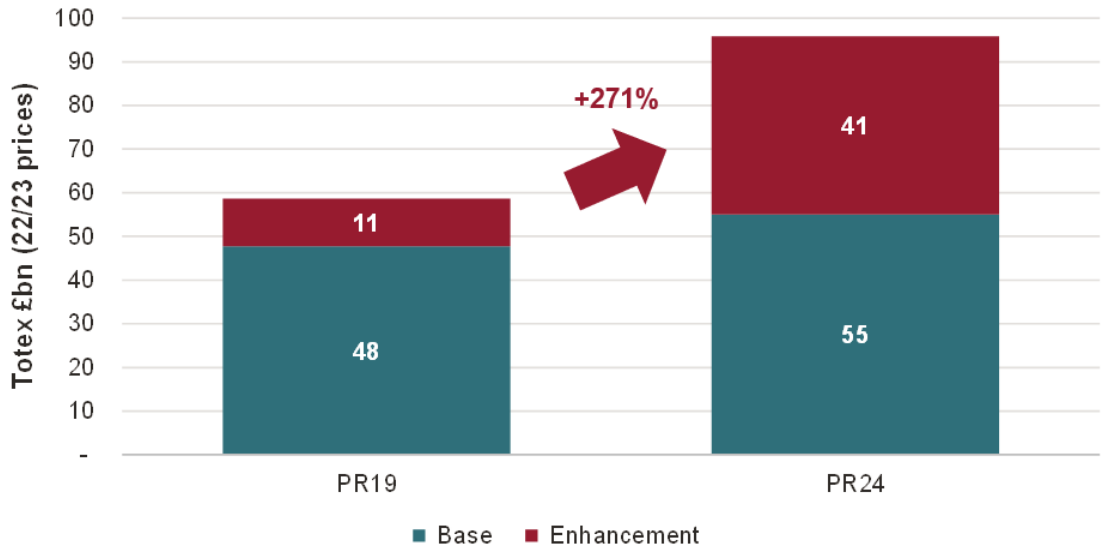
In our previous reports we did not yet have key pieces of information on PR24 business plan proposals. At a high level we noted some of the expected trends in rising capital expenditure – for instances to address storm overflows and meet environmental obligations. These high level expectations have been confirmed in the submissions, and we outline some of the key data points which are relevant to the scale of financing in PR24 below.

2.1.1 Business plan information

In aggregate, the sector is proposing a significantly higher level of enhancements expenditure at PR24. Specifically, the sector is proposing an additional £30bn of enhancement expenditure compared to the PR19 FD across water and wastewater (an increase of 271% in real terms).[16] As shown in Figure 1 below, it is this additional enhancement expenditure which is driving the large difference in totex between the PR19 FDs and the PR24 business plans.

16 Using information from the October 2023 submissions.

Figure 1 Business plan expenditure overview



Source: *Ofwat totex summary of company submissions*
Note: *October 2023 submissions; 2022/23 prices, base includes retail costs*

We note that Ofwat has proposed changes to the level of enhancements expenditure in the DD. With the average reduction on enhancement of approximately 22% across the sector.[17] However, these changes do not alter the main theme from the business plans – which is that the sector is going to need to finance significant investment schemes. And that these schemes represent a step-change in the scale of financing the sector requires.

Much of this enhancement expenditure will be added to the RCV.[18] And therefore is likely to be financed with a combination of debt and equity capital. The step-change in enhancement expenditure therefore emphasises the role of investors in delivering the long-term plans of the sector.[19] Given the long-term nature of the investment plans, supporting long-term equity investability in the sector is key at PR24. In order to provide this support, risks and market conditions need to be fully accounted for.

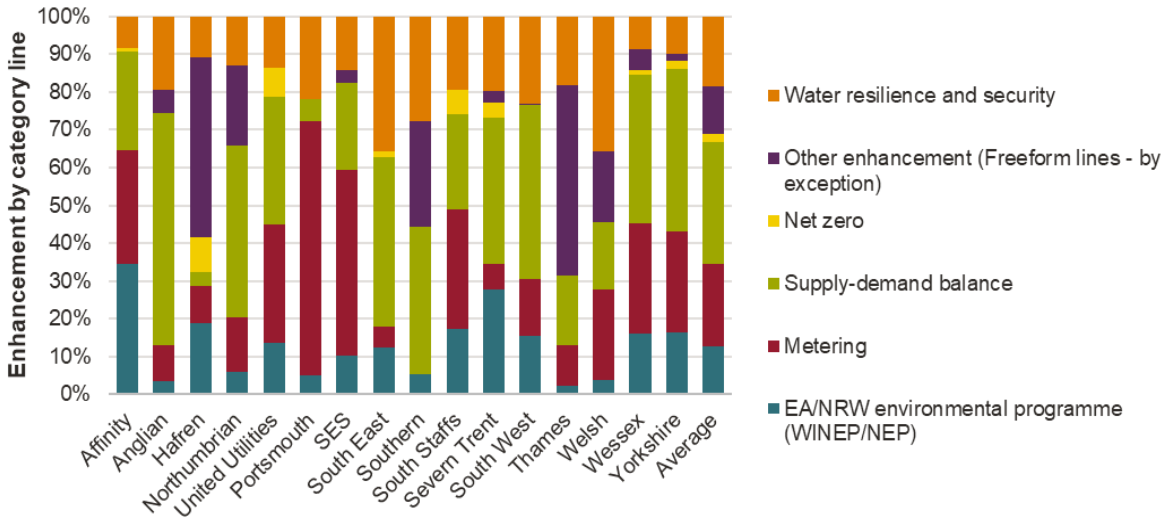
In terms of what is driving enhancement plans, we set out an example below from the water value chain. In Figure 2 below we show that two significant elements of company enhancement plans are water resilience and supply-demand balance.

17 There was a wide spread of changes to proposed enhancements levels within the sector – ranging from close to zero to reductions approaching two-thirds of proposed enhancement for some companies.

18 In other words, treated as "slow money".

19 Investments made in the next five-year period are an essential part of long-term (25-year) delivery strategies to meet the challenges the sector faces. Ofwat recognises this saying that, "Funding will support efficient enhancement investment, both in the short and long term." (Our final methodology for PR24: foreword and executive summary, pg.7).

Figure 2 Water enhancement expenditure composition



Source: Frontier analysis of company submissions
Note: October 2023 submissions

Both of these investment categories are critical for ensuring the sector can continue to meet the long-term needs of customers by responding to challenges such as climate change. Their successful implementation in the next control period has ramifications for future service quality. This illustrates the importance of investability for delivering against future customer priorities.

2.1.2 Sector risk perceptions

Another relevant part of sector-specific market context are the risk perceptions of investors. In particular, how investors perceive the skew of risk in the sector. This is relevant when assessing whether investors will consider the allowed rate of return on capital as a true indication of expected returns.

A key reason this is relevant is that the CMA considered the topic of asymmetry when setting a point estimate for the WACC. The CMA stated that:

> *"we consider that asymmetry continues to be potentially relevant to the choice of a point estimate for the cost of capital. Overall, the assessment in this section illustrates the importance of retaining a measure of judgement in the choice of the point estimate for the cost of capital. The overall degree of structural asymmetry in the ODIs, and otherwise in the determination, should be reflected in the choice of point estimate of the cost of capital."* [20]

[20] CMA (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations; Final Report'; para 9.1344.

Starting with implications from PR19 for perceptions of asymmetry, we note that according to Ofwat's latest performance and monitoring financial resilience reports:[21]

- 16 out of 17 companies are reported to be overspending on totex in the current control period to FY2023;[22]
- 13 out of 17 companies are being penalised in net terms on outcome delivery incentives in FY2023;[23] and
- 5 out of 17 companies are under-performing from a financing perspective.

Based on this data, investors may perceive that the current control price control is exhibiting asymmetry.

While Ofwat's DD argues that the package for PR24 is "broadly balanced", it is unclear whether investors agree that this will be the case. Many of the elements between PR19 and PR24 have similarities. There are also some specific differences between PR19 and PR24 where investors may perceive increased complexity and downside risk. For example, PR24 includes the introduction of Price Control Deliverables (PCDs).[24] This could contribute negatively to forward-looking views on asymmetry through to PR24.[25]

From a debt investors perspective we note that Moody's have signalled in recent credit rating reports for Southern Water and South West Water that it, "*may revise our view of the regulatory framework following Ofwat's final determination, in particular the stability, predictability and supportiveness of regulation and the ability of companies consistently to recover their costs and earn an adequate return. This would result in downward rating pressure.*"[26] This signals that there may be negative investor sentiment associated with the sector unless some issues are addressed at FD.

Lastly, we note that the current circumstances surrounding Thames Water could be further adding to risk perceptions in the sector. In Section 5, on the cost of debt, we show how risk perceptions are feeding through the water debt securities, and note that, given those debt market trends, the situation could be impacting equity risk perceptions too.[27] For now we do not specifically adjust our WACC assessment in this report for the Thames Water circumstances as it is an evolving situation.

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21 Ofwat (2023), "Water Company Performance Report 2022-23"; and, Ofwat (2023), "Monitoring Financial Resilience Report 2022-23"

22 These figures exclude the timing of expenditure.

23 Rewards and penalties netted.

24 At the extremes, the new aggregate sharing mechanism (ASM) may limit some exposure.

25 We are cautious about drawing precise conclusions from RoRE analysis given subjectivity of projecting RoRE – so do not necessarily consider Ofwat's DD ranges as an accurate guide to risk.

26 Moody's rating reports from July 2024.

27 By their nature these are more challenging to observe.

We consider the implications of asymmetry for the cost of equity point estimate in section 7.

2.2 Capital market developments

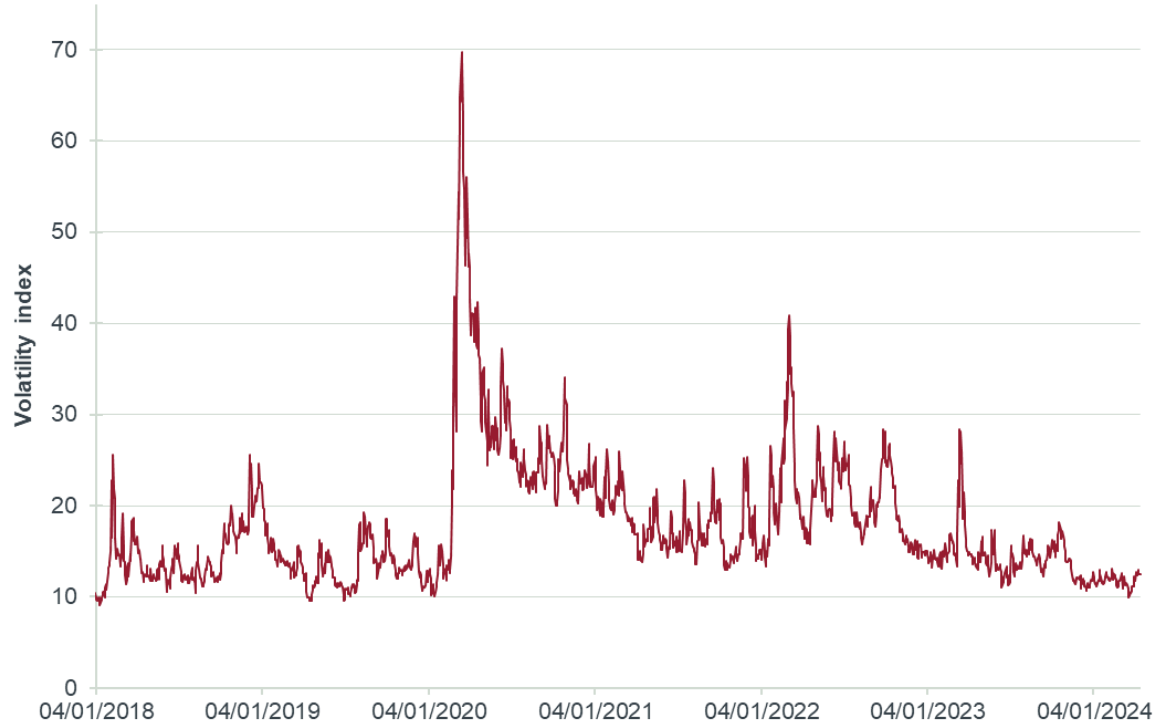
We review two main capital market developments in this update.

- Firstly, we review trends in **market volatility**. This follows from our previous concerns about the weight which can be placed on historical periods of high volatility – for instance, around pandemic lockdown announcements – when considering a forward-looking five-year period.
- Secondly, we review **interest rate trends**, both short-term and long-term. As these have implications for both the cost of debt and cost of equity estimates.

2.2.1 Market volatility

Since the PR19 decision, there have been significant periods of market volatility. Figure 3 below shows the option implied volatilities on the FTSE-100 index over time. The average of this index during 2018 and 2019 was 14.1. There was then a significant spike in volatility during the initial COVID period in 2020 and this higher volatility persisted above the pre-COVID levels. The average of the index during 2021 and 2022 was 19.2 which is materially higher than the average from 2018 to 2019.

Figure 3 FTSE 100 Option Implied Volatility Index



Source: Bloomberg

As explained in the 2022 report, high levels of volatility such as the ones observed during the pandemic and around the war in Ukraine create challenges for setting a forward-looking cost of capital for the 2025 to 2030 period. A key question is how representative historical data such as this is going to be for that period of time. While the current level of volatility implied by this index has broadly returned to pre-COVID levels, this period of volatility will still impact the CAPM estimation of the cost of equity through the equity beta which relies to a greater extent on historical data. We therefore treat observations from this period with caution when considering how the WACC should be set for PR24.

We discuss the implications of this increased volatility for setting the equity beta in the cost of equity estimation in section 6.3.

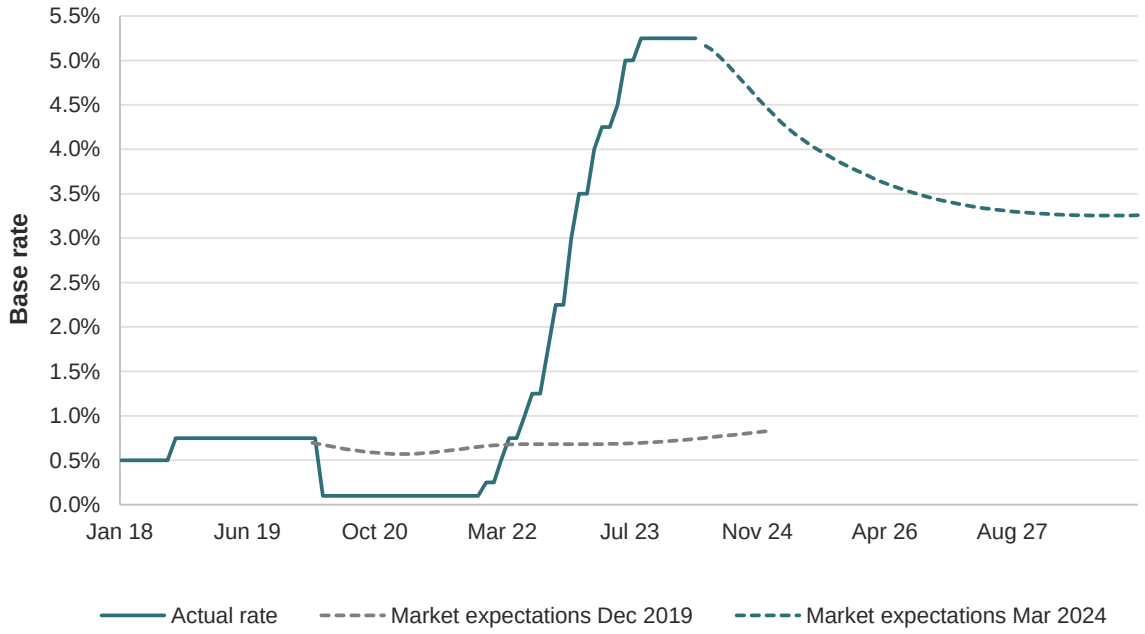
2.2.2 Interest rate trends

In line with our previous 2023 update, the market continues to expect that interest rates will persist at levels much higher than those expected at PR19.

In Figure 4 below we demonstrate this using market expectations for the Bank of England base rate. The chart shows the actual bank rate over time, and current/previous projections. Around the time the PR19 FD was published the expectation was that the base rate would

remain flat at approximately 0.75% in the medium-term. In contrast, recent market expectations are that rates will remain elevated, following some declines in the first one-to-two years of the next price control.[28]

Figure 4 Market expectations of the base rate



Source: Bank of England, Frontier analysis
Note: End of month values shown for market expectations

This persistence of higher interest rates is reflected in long-term real interest rates too. Specifically, in Figure 5 we show recent yields on 20-year index-linked gilts (ILGs).[29] At the time of Ofwat's Final Methodology there was some uncertainty around the future path for long-term real interest rates. What has become clear in this update is that the market does not expect a return to negative real interest rates. This has now been the case since the final methodology was published, and therefore should be reflected in PR24 estimates.

[28] These rates have increased through April. With the expectation towards the end of April being that the base rate will remain over 4% in two years time.

[29] Constant maturity.

Figure 5 Index-linked gilt yields

Source: *Bank of England*
Note: *20-year constant maturity*

These higher rates have implications for both the cost of debt and cost of equity – placing upwards pressure on both. We discuss how our estimates have been updated to reflect the latest market data in the subsequent chapters.

3 Inflation

In this section we discuss the two main inflation assumptions that are required when estimating the WACC for PR24:

- First, what an appropriate assumption is for the long-run CPIH rate; and
- Second, what an appropriate assumption is for the long-run RPI-CPIH wedge.

3.1 Our assumption on long-run CPIH

As we are estimating a WACC expressed in CPIH-deflated terms, in order to convert nominal figures into CPIH-deflated equivalent, an assumption for CPIH is required. Because the nominal figures being deflated are often associated with long-term financing, the assumption required for CPIH is also long-term in nature.

In our 2022 report, we considered whether it is appropriate to assume that the CPIH inflation rate is equivalent to the CPI inflation rate by looking into long-run evidence on the spread between the two.[30] We found that while there can be some differences between the two measures over time, the only significant ones appear to be in periods of high inflation. Given that forecasts continue to show inflation returning to lower levels during the 2025 to 2030 period, we consider it reasonable to assume that there is no long run CPI-CPIH wedge for the same period.

Based on the trajectory for CPI forecasts we continue to use a long-run CPI assumption of 2.0%.[31] We note that Ofwat also adopts the same CPIH figure in the DD.

3.2 Long-run RPI-CPIH wedge

3.2.1 Our approach to long-term RPI-CPIH wedge

As some data sources are expressed in RPI-deflated terms, an assumption on the difference between RPI and CPIH is required in order to convert them into a CPIH-deflated equivalent. This is sometimes referred to as the RPI-CPIH wedge.

In the 2022 report, we considered three options for converting RPI-linked data to a CPIH basis outlined in Ofwat's PR24 Draft Methodology.[32] After considering possible shortcomings of the approaches, we proceeded on the basis of using official forecasts. Under this approach, the RPI-CPIH wedge is based on the OBR's RPI and CPI forecasts before 2030, and then assumes that the RPI will be fully aligned with the OBR's long-term CPI forecast after 2030. This approach is consistent with the latest information from the UKSA who are looking to

30 Frontier Economics, "Cost of capital for PR24, a report prepared for United Utilities", September 2022, page 19-20.

31 For example, the OBR's March 2024 CPI forecast trends towards 2.0% (for FY2028 and beyond).

32 Frontier Economics, "Cost of capital for PR24, a report prepared for United Utilities", September 2022, page 21.

reform RPI "at the earliest practical time", which, "can legally and practically be made by the Authority in February 2030".[33]

We use different time horizons for the RPI-CPIH wedge for different areas of the estimation. For the RFR, where the wedge is used to convert 20 year ILG into CPIH terms, we use a 20 year wedge, whereas we use a 13 year wedge to align with our assumptions on the average time to maturity of embedded debt.[34]

3.2.2 Estimate of the RPI-CPIH wedge

As caveated in the 2022 report,[35] we do not know what the forecasts for inflation will be at the time of the final determinations, and therefore we cannot say with certainty what this method will produce for the upcoming price review period. However, we are able to produce estimates of what the indicative figure for the period may be using currently available data.

Applying the same method as in the 2022 report to the latest OBR forecast available to us (which provides an estimate of inflation up to FY2029), we estimate the long-term 20-year RPI-CPIH wedge to be 0.25% while the 13 year wedge is 0.40%. However, there is still some uncertainty in terms of the value of the wedge in the period 2029-30 (for which there are no OBR forecasts available) and during the assumed transition year of 2030.

33 UKSA, 2020; available at: https://uksa.statisticsauthority.gov.uk/news/response-to-the-joint-consultation-on-reforming-the-methodology-of-the-retail-prices-index/

34 We have not reviewed the extent to which the reform to RPI could have different implications for the sovereign bond market compared to the corporate bond market. A possibility that has previously been discussed when previous RPI reforms have been proposed is that index linked corporate bonds may have adjusted terms or be subject to early redemption in connection with RPI reforms, and that this may depend on the contractual terms of a given bond. For example, see Moody's 2012 report: "UK Regulated Utilities: Possible Change in the Calculation of RPI Would Be Credit Negative".

35 Frontier Economics, "Cost of capital for PR24, a report prepared for United Utilities", September 2022, page 22.

4 Gearing

In our 2022 report we highlighted that we, "*have seen no significant evidence to support a move away from the current 60% gearing level.*"[36] This finding was supported by a separate report we wrote in September 2022 specifically on the topic of notional capital structure.[37]

The evidence reviewed included:

- Credit rating guidance;
- Actual sector gearing;
- Competitive infrastructure project finance; and
- Regulatory precedent.

Our 2022 report also highlighted that:

- Other regulators have considered alternative solutions (other than lowering notional gearing) to address uncertainty from factors such as increased risk of extreme weather;
- Lowering the notional gearing rate without supporting evidence is likely to reduce investor confidence due to higher perceived regulatory risk; and
- Ofwat had not provided an impact assessment to demonstrate that a reduction in notional gearing levels is beneficial for customers, particularly as any change in gearing levels will have associated costs including equity issuance cost and tax liability impacts.

In this updated report we review regulatory decisions on notional gearing that have taken place since our 2022 report, and review the actual gearing submitted in company business plans.

4.1 Regulatory decisions

In the table below, we set out the gearing values in three recent decisions from Ofgem and the CAA. These were for Electricity Distribution companies, Gas Distribution companies and Heathrow Airport respectively. In both cases a notional gearing assumption of 60% was used.

Table 2 Recent regulatory decisions

Regulator	Decision	Gearing
Ofgem	RIIO-ED2	60%
CAA	H7	60%

36 Frontier Economics, "Cost of capital for PR24, a report prepared for United Utilities", September 2022, Section 4.

37 Frontier Economics (2022), 'Notional Capital Structure: An independent assessment of Ofwat's proposed approach for PR24', 02 September 2022.

Regulator	Decision	Gearing
Ofgem	RIIO-3 (GD) SSMD	60%

Source: Final Determination documents and Ofgem's RIIO-3 SSMD

We note that these decisions were for companies which have historically been considered to have higher systematic risk that water companies.[38]

4.2 Company business plan gearing

Company business plan data also provides new information on gearing. Specifically, the business plan tables included values for company average actual gearing levels over the 2025-2030 period.[39] Summary statistics from the sector are set out in the table below. These show that actual gearing levels are expected to be 68% on average, with a median of 69%.[40]

A notional gearing figure of 60% is therefore a relatively cautious value compared to actual projected capital structure.

Table 3 Actual gearing from plans

Summary statistic	Actual gearing value
Mean	**68%**
Median	**69%**
Maximum	76%
Minimum	52%

Source: Frontier analysis of company submissions
Note: October 2023 submissions

4.3 Conclusion on gearing

A review of this additional information shows continued support for our notional gearing assumption of 60%, and we continue to apply it in this update.

38 As measured by unlevered beta used in those decisions.

39 Business plan table RR16.

40 Showing there is relatively little skew in the data.

5 Cost of debt

Our cost of debt estimate is comprised four inputs:

- An estimate of the cost of embedded debt;
- An estimate of the cost of new debt;
- A weighting between the embedded and new debt costs; and
- An allowance for additional borrowing costs.

In this update we make two key changes to the approach used in our previous reports in 2023 and 2022. Firstly, we draw on data provided in company business plans when estimating the cost of embedded debt – rather than relying on annual performance report (APR) data (this is discussed in Section 5.1 below). Secondly, we consider information from the iBoxx Utilities index as an alternative to the iBoxx A/BBB indices (this is mainly discussed in Section 5.2 below).[41]

We discuss each input in turn below.

5.1 Cost of embedded debt

To update our estimates for the cost of embedded debt we have used the data tables submitted as part of the PR24 business plans, specifically table RR24.[42] This contains:

- The expected embedded debt as of Financial Year End 24/25 with this split into fixed, floating, RPI linked and CPI linked categories. Our understanding of the Ofwat guidance is that "pure" debt only covers bonds, loans, finance leases, private placements and debentures, consistent with what Ofwat will include for estimating the cost of embedded debt through the balance sheet approach. Using this data provides us with each company's best view on the estimates of debt rolled forward up to the next price control;
- The debt repaid each year of the review period; and
- Interest rates for the existing embedded debt as of Financial Year End 24/25 with this being updated as debt is repaid throughout PR24. Under the Ofwat guidance[43] the data provided is:
  - In nominal terms for fixed and floating debt; and
  - In real terms for CPIH and RPI linked debt.

41 We use the 10 year+ indices since the longer-term tenor is consistent with Ofwat's assumption about long-term financing, associated with the long asset lives in the sector.

42 As submitted in initial plans in October 2023

43 PR24 Final Methodology submission table guidance – section 2: Risk & return, August 2023, Section 26

To deflate the fixed and floating debt we have used the long-run CPIH inflation assumption of 2%.[44]

For index-linked debt, Ofwat's guidance states that these are already in real terms. We take as given that companies took this approach, and a spot check of the data did not raise material concerns. Therefore we made an adjustment for the RPI–linked debt to convert it into CPIH terms – using an RPI-CPIH wedge. Our methodology for estimating the RPI-CPIH wedge is discussed in section 3.2.[45]

In Table 4 below we present a range of estimates using the 'all companies' approach, the 'large company' approach, the 'actual-notional cost' approach.[46]

Table 4 Estimates of the embedded cost of debt

Estimation approach	Estimate for PR24 (CPIH)
'All companies' median	2.41%
'All companies' weighted average	2.29%
'Large company' median	2.33%
'Large company' weighted average	**2.28%**
'Actual-notional' weighted average	2.63%

Source: Frontier Economics based on Business Plans, Table RR24 as submitted in October 2023
Note: Large companies are defined as WaSCs and large WoCs (Affinity and South East Water)

In addition to this data based on company business plans, we also consider cross-checks on the embedded cost of debt using benchmark indices. In the table below, we have shown the

44 One exception was made where a submission appeared to be already be real rates – but we have not confirmed this directly. In that case we conducted a spot check of the company's reported instrument level debt and found that our approach appears appropriate.

45 We use the same methodology for estimating the wedge throughout this report but in this section use a 13 year horizon approximately reflecting the average years to maturity for actual debt held within the sector. Using this time horizon the RPI-CPIH wedge is 0.4%. Changing this wedge by 10bps leads to a change in the cost of embedded debt of around 3-4bps.

46 In line with our previous update for the 'actual-notional cost' approach we estimated the notional share of index-linked debt based on our notional gearing assumption of 60% and use the PR19 notional structure with 33% of debt index-linked. We assumed 10% of this is CPI-index linked. This assumed no floating debt.

iBoxx collapsing average[47] for the A/BBB benchmark and the Utilities benchmark.[48] For the reasons set out in our previous reports for UU, we prefer the 20-16 year collapsing average.[49]

Table 5 Benchmark approach

Benchmark approach	Estimate (CPIH)
20-16 year collapsing average A/BBB index	**2.41%**
20-16 year collapsing average Utilities index	2.36%

Source: Markit, Frontier Economics analysis
Note: GBP, 10Y+ indices

Consistent with our previous reports, we form a range for the cost of embedded debt based on company debt books and the index cross-check. Previously we have focused on the large company weighted average, and the index outputs when forming the range. Adopting the same approach again provides a range of **2.28% to 2.41%.** We continue not to place weight on the actual-notional approach.

5.1.1 Comparison to our 2023 update report

Our revised cost of embedded debt estimates are higher than those set out in our 2023 update. We expect this to be driven by two effects;

- The real cost of debt observed in the market is slightly higher than our assumptions in the previous analysis; and
- There has been significantly more debt issued for RCV growth for the remainder of PR19 than assumed.[50] This debt has been issued to fund the significant recent investment. As this is a higher proportion than expected and issued at a higher cost than previously projected, this has driven increases in the overall cost of debt.[51]

47 Based on the relevant averages calculated over historic annual iBoxx GBP 10+ Utilities and non-financial A/BBB 10+ (a simple average of daily rates is taken for each financial year). iBoxx rates between the present day and the start of PR24 are projected by using the 10-year nominal spot forward curve and then applying the 3- year average iBoxx-gilt spread

48 Specifically, we focus on the 10Y+ versions of the indices. For A/BBB use the non-financials indices and we take the simple average of the A and BBB series.

49 We found that the collapsing approach best reflects the fixed end date for which we are estimating the cost of embedded debt, and in terms of tenor found this approach was consistent with a notional company issuing long-tenor debt, and that our selection broadly matches to the average remaining years to maturity on the indices considered.

50 As discussed in our first report our estimates for RCV growth were conservative and an illustration that would be refined as more data was available.

51 One source of this increase in cost could be higher credit spreads associated with Thames Water uncertainties. To the extent that uncertainties persist, higher spreads could remain in AMP7.

We note that an increase is also reflected in Ofwat's DD which estimates the cost of embedded debt to be 2.46% (a higher figure than was estimated by Ofwat at the time of the final methodology).

5.2 Cost of new debt

5.2.1 Outperformance on the cost of new debt

In our 2022 report and previous update we used the iBoxx non-financials 10 year+ A/BBB indices as the benchmark for the cost of new debt which is in line with Ofwat's approach in the Final Methodology. At PR19 and at the PR24 FM, Ofwat applied a 15 bps deduction to the A/BBB index average to account for, "*the ability of the notional company to issue at a discount to the iBoxx A/BBB"* [52] which we have not applied in our previous reports. In particular, we were concerned that water bond yields were distorted as a results of pandemic-related flight-to-safety effects; and that these would not be representative of market appetite for a forward-looking period of five-years.

At the DD, Ofwat decided to remove the 15bps deduction *since, "the average for the 16 issuances from 1 November 2022 until 31 March 2023 was 5bps higher than the index"*.[53] Our analysis of the current data on yields of bonds in the water sector also shows that a downward adjustment to the iBoxx index increasingly does not reflect the reality in the market. However, more recent data since Ofwat's data cut-off of 31 March 2023 for this analysis shows that water bonds yields are now **significantly elevated** relative to the A/BBB benchmark. Therefore we find that Ofwat's data cut-off when assessing cost of new debt has excluded the latest relevant data.

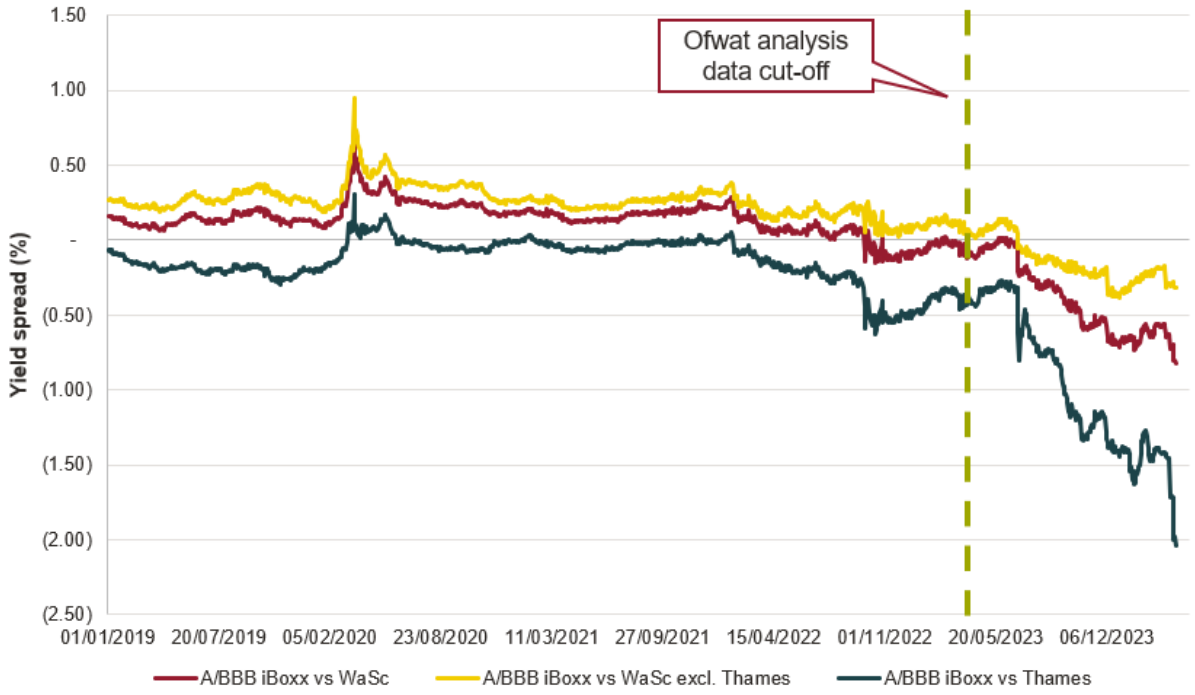
In Figure 6 below, we show the spread water of bonds yields compared to the overall A/BBB indices benchmark.[54] A negative value represents water bonds yields being greater than the benchmark yields. Due to current circumstances which have increased the yields on Thames Water bonds significantly, we also compare the benchmark indices to the average yield of the water bonds *excluding* those issued by Thames Water (the yellow line).

52 Ofwat, Final Methodology, Appendix 11, p58

53 Ofwat, Draft Determination, Allowed return appendix, p87

54 We have used the bonds contained in the iBoxx A and BBB 10+ year indices in April 2024. We focus on bonds that have a 15-25 years remaining to maturity since this is in line with the average time to maturity of the iBoxx indices.

Figure 6 Frontier analysis of spread between iBoxx A/BBB and WaSC bonds



Source: *Frontier Economics, based on iBoxx data and Bloomberg*

Note: *Bonds from WASCs that featured in either the iBoxx A/BBB 10+ index and with 15-25 years to maturity at the time of analysis were included*

As we noted above, uncertainty in the pandemic period was associated with a "flight to safety" effect where the average yield on the iBoxx indices was higher than those on the water bonds. With a peak of over 60bps during the initial period of COVID (shown by the red line).[55] However, since that peak, the spread diminished, and by mid-to-late 2022 was close to zero.

Through 2023, most notably the second half of 2023, the spread between the average yield of water bonds (excluding Thames; the yellow line) and the iBoxx A/BBB average has turned negative. This spread has continued to go increasingly negative and, at the end of March 2024, the average yield of water bonds (excluding Thames) is around 30 bps above the A/BBB average. This data shows that there should not be an assumption for PR24 that water companies can issue bonds at yields lower or at parity with the iBoxx A/BBB average. As this would be inconsistent with market conditions. We therefore continue our approach of not adjusting index values downwards. Recent capital market data also raises questions about what the most suitable benchmark index for PR24 is. We discuss this topic below.

55 Frontier Economics, "Cost of capital for PR24, a report prepared for United Utilities", September 2022, Section 5

5.2.2 Benchmark index for the cost of new debt

The increasing spread that water company bonds are trading over the A/BBB iBoxx index suggests that the index is no longer effectively capturing the level at which the sector can issue new debt. Therefore, we have also considered the Utilities 10+ Year index, which was used by Ofgem at RIIO-2 to calculate the allowed return on debt. At the recent RIIO-3 SSMD, Ofgem have indicated that they will maintain the use of this index for RIIO-3.

Figure 7 shows the average yield of the water bonds contained in the iBoxx indices compared to overall index yields for the A/BBB average and Utilities.[56] We focus on the time period since our 2022 report, to understand the case for revising our initial methodology.

At the DD, Ofwat said that its evidence on bond issuances up to 31 March 2023 does not show, *"evidence of a significant difference to the benchmark index."*[57] Our analysis shows that while this was true up to Ofwat's data cut-off, there has been significant divergence since March 2023 and that water bond yields are now significantly above the A/BBB average. If Ofwat has considered the latest relevant data it would have shown that there is a significant difference. We set this out below.

Bonds issued by water companies are now trading at a yield that is much closer to the Utilities index than the A/BBB average. Before June 2023, the yield on the water bonds in the indices (excluding Thames bonds) was close to the A/BBB average. However, as the yield on these bonds has diverged from the A/BBB average, it has moved much closer to the Utilities index.

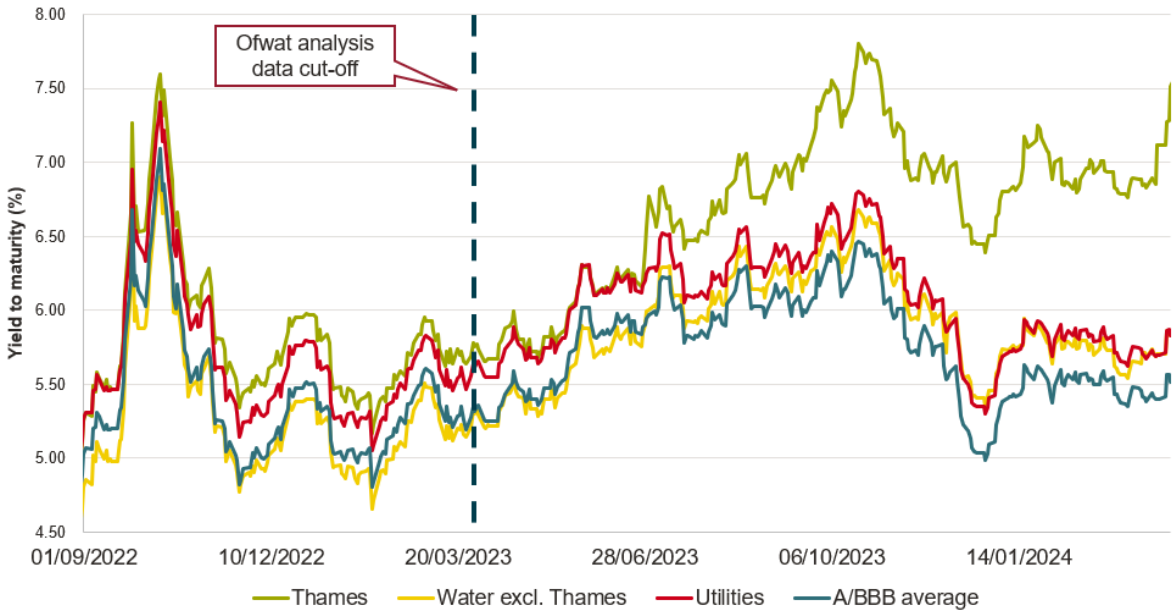
Since December 2023, the yield on these bonds has moved almost in line with the Utilities index. To demonstrate this, currently there is a 30bps spread between the yield on the water company bonds (excluding Thames) relative to the A/BBB average, but there is only a 1bps spread between the yield on these bonds and the Utilities index.[58] While we note that it is difficult to anticipate how debt markets will evolve over PR24, this evidence suggests that the Utilities index is, **up to the point of our data cut-off**, a more targeted benchmark for sector debt costs.

56 As of April 2024, all of the bonds in the A and BBB indices are also within the Utilities 10+ year index.

57 Ofwat, Draft Determination, Allowed return appendix, p87

58 As of 28th March 2024. If Thames bonds are included, the spread above the A/BBB average is 72 bps.

Figure 7 Yield of water company bonds relative to iBoxx benchmarks



Source: Markit, Bloomberg, Frontier calculations
Note: Water bonds included in the chart are all constituents of the iBoxx indices with 15-25 years remaining to maturity

In July 2024, **after our data cut-off**, Thames Water bonds were downgraded by Moody's to Ba1 from Baa2.[59] This downgrade led to the Thames bonds being removed from both the BBB and Utilities indices, as they were no longer investment grade. As shown in Figure 7, the Thames bonds within those indices (green line) have had significantly higher yields relative to the overall indices since June 2023. Therefore, since these bonds have now been removed from the indices, the overall yield of these indices will move downwards from August onwards following their removal.[60]

All else equal, this makes it more challenging for the sector to raise debt in line with even the the Utilities benchmark. Although the yield on the water bonds (excluding Thames) has been in line with the Utilities index and above the A/BBB average since December 2023, the impact of Thames being removed from the indices will make the yield on water bonds higher than both indices (Utilities and A/BBB) as the yield on these bonds, which do not include Thames bonds, will be unaffected by the change. This makes the A/BBB average even less representative of the sector's ability to raise new debt, and may also mean that matching the Utilities index become more stretching going forward as well.

More generally, beyond the downgrade of Thames, we note that one of the reasons that Ofwat have decided not to use the Utilities index previously is that it contains a material proportion

59 Moody's, July 2024. Available at: https://ratings.moodys.com/ratings-news/425424

60 We understand the constituents of the indices are updated on a monthly basis.

of water bonds within the index.[61] While the Utilities index does have a larger weighting on bonds from the water sector, these bonds still make up a significant weighting within the A and BBB indices too. Our estimate is that bonds issued by regulated water companies in England & Wales currently make up around 28% of the Utilities index while they are around 17% of the A/BBB average.[62] Therefore, water bonds are a material part of either index.

Regardless of whether the water bonds make up a significant proportion of the index, the incentive for each company to issue their debt efficiently remains. Each individual bond makes up a very small amount of each index which means that the index will not move much in response to a single bond being added. The biggest weighting for a single bond in the Utilities 10+ year index is 1.54% while the average individual water bond has a weighting of 0.81%.

This is lower than the impact of some individual bonds in the Non-Financial A 10+ year index that Ofwat currently uses where one water bond makes up 3.4% of that index (1.7% of the A/BBB average).[63] We therefore don't consider there to be any distortions to company financing incentives from one index over another.

Further, we would caution that whilst recent evidence, up to our data cut-off, supports that the sector (excluding Thames) can on average raise new debt at a cost in line with the Utilities index, how the Thames situation evolves could lead to increased new debt costs across the sector more broadly, which could mean that the Utilities index would need an upwards adjustment to adequately reflect sector new debt issuance costs. This should be monitored in the run-up to the FD.

A final point which is relevant to the choice of benchmark is Ofwat's approach financeability and to RCV run-off rates in the DD. Specifically, Ofwat highlights that their approach is to, make downward adjustments run-off rates where, "*there is sufficient headroom for key financial metrics to the target credit rating.*"[64] In other words, price control revenues are reduced where notional financeability outputs are closer to those associated with the 'A' rating band. In affect this approach creates a credit rating ceiling for the notional company.

The result of this approach in the DD is a set of financeability outputs across the sector where the credit ratios (both FFO to net debt and Adjusted Interest Cover Ratio) are towards the lower end of the Baa (BBB) rating band.[65]

Given this approach and the DD financeability outputs it is unreasonable to assume that the notional company should have debt costs weighted towards the A credit rating band. The

61 Ofwat, PR19 Draft Determinations Cost of capital technical appendix, p74

62 Using March 2024 constituents and market value weightings. Bonds from the water sector account for a slightly higher proportion of the A index relative to BBB.

63 Anglian Water bond maturing 20/06/2039

64 Ofwat, Aligning risk and return appendix, page 44.

65 See Table 6 of the Aligning risk and return appendix. FFO to net debt ratios are very close to or less than 10% in most cases, and AICR is close to 1.7x in most cases.

50% weighting implied by Ofwat's current approach to the cost of new debt is inconsistent with the approach to run-off rates and financeability exercise Ofwat has undertaken. This is another key reason to consider alternative indices such as the iBoxx Utilities for PR24.

5.2.3 Frontier estimate of the cost of new debt

In line with our previous report, our estimate for the cost of new debt is based on a one month average of the benchmark yields. Given the evidence above, we use the Utilities index as the benchmark for cost of new debt – as this is currently the most representative benchmark of debt costs in the sector.[66] The average for this index over March 2024 was 5.71% (nominal) which is 3.64% in CPIH deflated terms.

5.3 Ratio between new and embedded debt

In our previous two reports we have used the PR19 ratio between new and embedded debt as a holding assumption until information on planned investment for PR24 was available.

In this update we estimate the ratio by reviewing new debt requirements from company plans. The new debt requirement is comprised of two elements:

- The replacement of maturing debt, which is refinanced as new debt; and
- The financing of additional new debt each year which is required as a result of RCV growth.

We have used table RR24 in the October 2023 business plan submissions to replace the assumption in our previous analysis. This new information allows us to use company level data specific to PR24 plans, providing an up to date view on how debt is intended to be issued over PR24. This will be subject to change through the draft and final determination process.

Using this new information we believe a more accurate estimate of the ratio between new and embedded debt is 30%:70%. This is an increase from the Ofwat PR19 estimate and reflects the increased capital expenditure expected throughout the next control period. We note that Ofwat's estimate at the DD has also increased since PR19 to 26% new debt. One reason this may be lower than our estimate is that Ofwat has reduced enhancement amounts in the DD. Another factor that might contribute is the exclusion of contingent 'gated' totex.

5.4 Additional borrowing costs

In our 2022 report, we set out an estimate for additional borrowing costs of 22bps.[67] We retain that estimate in this update. This figure included the costs of:

66 Noting the caveat referenced above with regard to how the situation facing Thames Water evolves could have a material impact on future sector new debt costs.

67 Frontier Economics, "Cost of capital for PR24, a report prepared for United Utilities", September 2022, Section 5.

- Issuance costs;
- Liquidity costs;
- Costs of carry; and
- CPIH basis risk mitigation.

Ofgem, at RIIO-2, included an estimate of 25 bps which accounted for the same four cost components. In the RIIO-3 SSMD, Ofgem have initially maintained this 25 bps allowance for additional borrowing costs. This contrasts with the 15bps figure proposed by Ofwat in the DD.

A key difference is that Ofwat does not make an allowance for CPIH basis risk mitigation.[68] The rationale Ofwat use for rejecting this allowance is flawed. It focuses on retrospective analysis of how inflation outturned, but this does not reflect forward looking risk. This conflates forward looking risk mitigation, and the cost of mitigating that risk, with observations about whether a risk happened to crystallise over a limited historical period.

However, even excluding this difference Ofgem's allowance is still greater than Ofwat's. The Ofgem allowance for issuance, liquidity and costs of carry totals 20bps.

Separately, we note that Ofwat has provided 2% equity issuance allowance based on data from Seven Trent's share placing in 2021.[69] We note that this is significantly below Ofgem's allowance of 5% at the RIIO-3 SSMD.

5.5 Conclusion on the cost of debt

Table 6 sets out our overall estimate of the cost of debt range reflecting the components described above. Overall, we estimate a cost of debt range, in CPIH terms, of 2.86% to 2.99% (CPIH).

Table 6 Cost of debt estimate (CPIH)

Component	Lower estimate	Upper estimate
Share of new debt	30%	30%
Cost of embedded debt	2.28%	2.41%
Cost of new debt	3.64%	3.64%
Additional cost of borrowing	0.22%	0.22%
Cost of debt	**2.90%**	**2.99%**

Source: Frontier Economics
Note: CPIH deflated

68 This is despite the water sector having approximately 53% index-linked debt as at March 2023 (the majority of which is RPI-linked). And Ofwat's notional index-linked assumption being greater than Ofgem's equivalent.

69 Ofwat, Draft Determination, Aligning risk and return appendix, p52.

6 Cost of equity

6.1 Risk-free rate

We use two data sources to estimate the risk-free rate. These are index-linked gilt yields (ILGs) and AAA-rated corporate bonds.[70]

Evidence from index-linked gilt yields

One key data source for proxying the risk-free rate is the yield on index-linked gilts (ILGs). As shown in Figure 8 below, the yields on 20-year index-linked gilts continued to rise over the second half of 2023 but has stabilised in the first few months of 2024. The yield at the end of March 2024 was +0.97% compared to yields of around -2.8% in December 2021.

Figure 8 Index-linked gilt yields

Source: Bank of England

Note: Frontier calculations of trailing average, 20yr Government Liability Curve spot yields

Taking a one month averaging period, the estimate for the risk-free rate from this data source as at 28 March 2024, is 1.07% in RPI-deflated terms. Expressing this in CPIH deflated terms, the equivalent figure is 1.32%.[71]

70 Frontier Economics, "Cost of capital for PR24, a report prepared for United Utilities", September 2022, Section 6.

71 See Section 3 for further discussion of inflation assumptions.

Evidence from AAA-rated corporate bonds

Another data source that can be used to inform the risk-free rate is AAA-rated corporate bonds. Specifically, we focus on those AAA indices considered by the CMA during the PR19 appeals. These are:

- The iBoxx GBP non-gilt AAA 10Y+ index; and
- The iBoxx GBP non-gilt AAA 10-15Y index.

The one-month average for these indices at the end of April 2023 was 4.53% and 4.34% respectively (in nominal terms). Converting to CPIH-deflated equivalent, using a long-run assumption for CPIH, produces a range from 2.30% to 2.48%.

Conclusion on the risk-free rate

To estimate a range for the CPIH-deflated risk-free rate we combine the two data sources.

In Table 7 below, we set out estimates of a CPIH-deflated risk-free using the method based on a ILG proxy with the addition of a convenience premium estimate.[72] As shown, the output from this method is a risk-free rate of 1.72%.

Table 7 ILG based risk-free rate estimate

Parameter	Estimate
ILG yield (CPIH)	1.32%
Convenience premium	0.40%
Risk-free rate (CPIH)	1.72%

Source: Frontier calculations
Note: Convenience premium estimate based on academic evidence

The other data source we draw upon is AAA corporate bond proxy data which produces a range of 2.30% to 2.48%. This produces an upper bound figure of 2.48%.

Combining these two we estimate a **risk-free rate range of 1.72% to 2.48%.**

[72] Frontier Economics, "Cost of capital for PR24, a report prepared for United Utilities", September 2022, Section 6.

6.2 Total Market return

Our approach to TMR reviews ex-post historical equity returns.[73] In line with long-standing regulatory precedent, we estimate historical returns using a range of different methods. This includes both a range of different estimators and averaging/holding periods.

To us it seems sensible and prudent to consider a range of measures, since we consider that no single measure is superior to any other in all regards. Reliance on any single one seems to us to require an undue level of confidence that one approach is right and all the others are wrong.[74]

We therefore look at the results from the Blume, JKM unbiased, JKM (MSE) estimators, and overlapping averages, as well as the DMS adjusted estimator.[75] With regards to holding periods, we look at 5, 10 and 20 years.[76]

In Figure 9 below we show the outputs from the different estimators and holding periods that we analyse. These estimates draw on 124 years of nominal stock return data.[77]

As shown, the CPIH deflated returns vary within a relatively narrow range. We find that all but one observation lies between 6.6% and 7.1%. The outlier is the JKM (MSE) estimator using a 20-year holding period (shaded in grey) which has been discarded from our range. We do not include non-overlapping averages given the small sample size that the averages are based on. Particularly for the 10yr and 20yr estimators. These small sample sizes can lead to large variations when updating the dataset for an additional year.

The simple Arithmetic Mean, the most straightforward of the estimators, is approximately 7.0%.

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73 We note that other approaches Ofwat has used historically are 'historical ex-ante' and 'forward looking'. Regarding 'historical ex-ante', we find that there are series of judgements involved. For example, they are based on subjective decompositions of historical returns, and a subjective assessment of which aspects of these decompositions are repeatable. Regarding forward looking methods, primarily DDM, our view is that there are be risks associated with using 'spot' DDM estimates directly in a regulatory context. DDM estimates are volatile, and reliance on them for regulatory purposes would result in a regime where returns may vary materially from period to period.

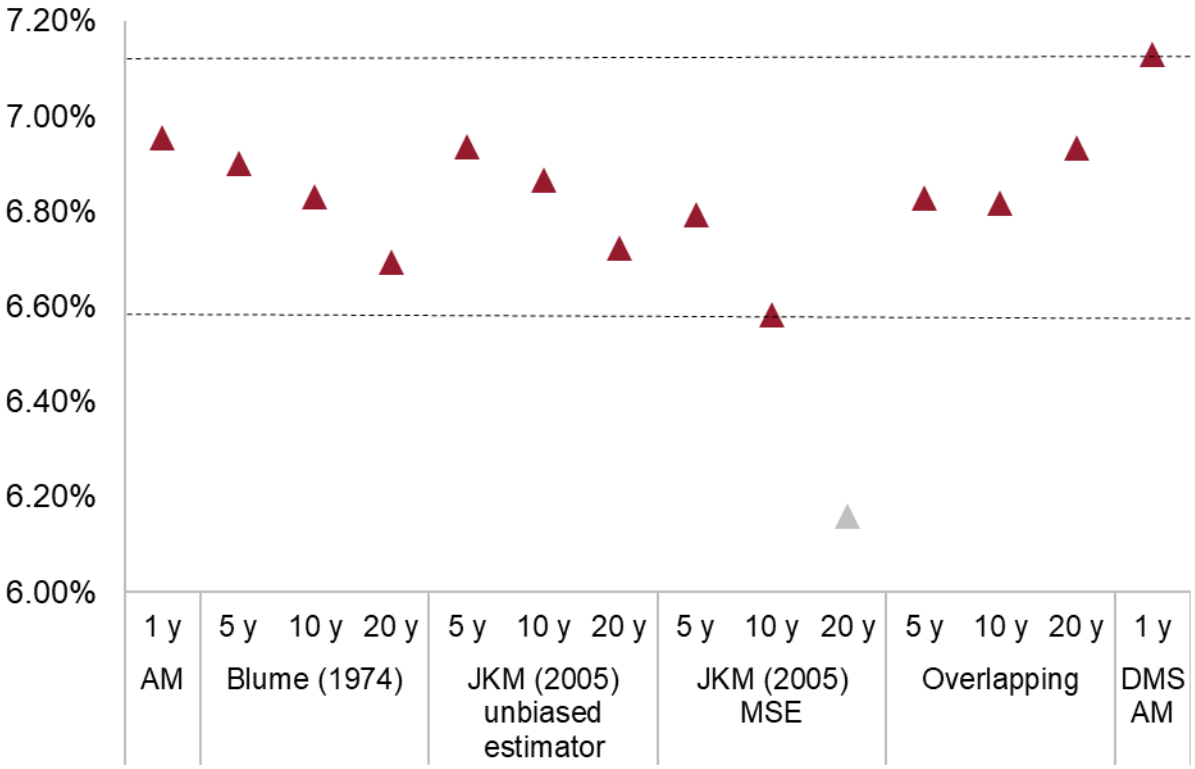
74 As noted in our 2022 report, we nevertheless observe, consistent with Ofwat's own view, that the non-overlapping averages may suffer from small sample size issues which may limit its reliability.

75 We do not provide a detailed description of each in this update.

76 For deflating historical equity returns we use the ONS terms series of CPIH to 1950, and for data prior to 1950 we use the CED (Consumption Expenditure Deflator) series as this is consistent with past approaches of regulators.

77 Data from 1900 to 2019 is drawn from the Credit Suisse Yearbook, data for 2020 to 2023 is nominal total returns from the FTSE All-Share index. In recent years nominal total returns from the FTSE All-Share index have tracked the nominal returns from the Credit Suisse Yearbook extremely closely.

Figure 9 CPIH deflated long-run equity returns



Source: *DMS, Bloomberg, BoE, Frontier Analysis*
Note: *CED inflation index used until 1950, CPIH inflation used post 1950*

Drawing upon the evidence above, **our estimate of the TMR for PR24 is in the range of 6.6% to 7.1% (CPIH-deflated).** We note that our range is very similar to Ofgem's range of 6.5% to 7.0% at the RIIO-3 SSMD. Despite estimating the same parameter, the midpoint of Ofgem's SSMD range, 6.75%, is 17 bps higher than the midpoint of Ofwat's range at the DD (6.58%).

The top end of Ofgem's range is informed by the 1-year AM (Arithmetic Mean) – as shown by the first marker on the chart. This data is not currently used by Ofwat – focusing on 10-year and 20-year overlapping averages at the high end of its TMR range.

Our lowest estimate is informed by the JKM 10-year figure (see chart above) whereas Ofwat's lower end if informed by the Fama French approach. Ofgem did not place weight on the Fama French approach when deriving its range. We continue to focus on ex-post estimates of TMR for both the low and high end of the range given the issues we have previously highlighted with ex-ante approaches.

In Section 7, where we consider an appropriate point estimate for the cost of equity, we revisit this TMR range, and discuss which values in the range are most suitable for PR24.

6.3 Beta

6.3.1 Unlevered beta

In order to estimate the unlevered beta for PR24 we use the following methodology:

- Listed water companies are included in the initial sample (Pennon, Severn Trent and United Utilities).[78]
- We focus on daily data as this avoids the issue of reference day risk and lower precision.[79]
- We consider a range of estimation approaches, presenting 2, 5 and 10 year regression windows covering spot rates, 2, 5 and 10 year averages.[80]
- To de-lever equity betas we de-lever using the observed gearing from the comparators - where gearing is expressed as net debt to enterprise value. We apply the Harris-Pringle formula.[81]

The table below shows our updated estimates of unlevered betas based on raw equity betas de-levered using observed gearing.

78 We consider that more weight can be placed on PNN beta estimates for shorter-term regression windows where all, or a significant proportion of, the data has been drawn from the period following the sale of the waste business.

79 Frontier Economics, "Cost of capital for PR24, a report prepared for United Utilities", September 2022, Section 8.

80 Our 2022 report concluded that there are advantages and disadvantages associated with both short and long-term estimation windows and averaging periods, and therefore considered a range of approaches.

81 Our 2022 report set out the reasons why we adopt Harris Pringle other alternatives.

Table 8 Daily unlevered betas

Window	Averaging Period	Pennon	Severn Trent	UU	Average (all)	SVT/UU (average)
2 year	Spot	0.34	0.31	0.28	0.31	0.30
2 year	2 years	0.28	0.25	0.24	0.26	0.25
2 year	5 years	0.29	0.26	0.25	0.27	0.26
2 year	10 years	0.33	0.30	0.29	0.31	0.30
5 year	Spot	0.29	0.27	0.26	0.27	0.27
5 year	2 years	0.28	0.26	0.25	0.26	0.26
5 year	5 years	0.31	0.28	0.27	0.29	0.28
5 year	10 years	0.32	0.29	0.28	0.30	0.29
10 year	Spot	0.32	0.29	0.29	0.30	0.29
10 year	2 years	0.32	0.29	0.28	0.30	0.29
10 year	5 years	0.32	0.28	0.27	0.29	0.28
10 year	10 years	0.31	0.29	0.28	0.29	0.29

Source: Bloomberg, Frontier Economics
Note: Estimates are to the end of March 2024

Some of the shorter-term estimates (e.g. 2 year window with 2 year averaging period) appear to be lower than the longer term estimates. This appears to be, in part, driven by the recent COVID period where we would expect utility stock betas to be lower. We looked at the impact of increased volatility on beta estimates on behalf of the ENA (Energy Networks Association) as part of the response to Ofgem's RIIO-3 SSMC.[82] This shows that the level of utilities' beta is inversely related to market volatility, i.e. the higher the market volatility, the lower the beta. Formulaically, unless the volatility of an individual stock increases at a greater rate than the level of market – which will not be the case for defensive stocks including utilities – measured betas will fall when market volatility rises.

As noted in section 2.2.1., the COVID period led to a period of higher than usual volatility in the market which would severely impact the shorter term beta estimates that place significant weight on data from this period. Longer-term estimates, while still impacted, place less weight on the data from this period.

Ofwat have not used the 2 year beta to construct its range at the DD and has focused on longer term betas since it reflects, *"a more comprehensive range of systematic risk events which a notional water company might encounter."*[83] However, we note that the current 2-

[82] Frontier Economics, The low beta puzzle, 5 March 2024. Available at: https://www.ofgem.gov.uk/publications/riio-3-sector-specific-methodology-gas-distribution-gas-transmission-and-electricity-transmission-sectors

[83] Ofwat, Draft Determination, Allowed return appendix, p55

year window spot estimate is now largely unaffected by some periods of significant volatility This estimate uses data from April 2022 to March 2024. Therefore, relative to the longer term estimates, it will reflect more up to date sector risk perceptions that we discuss in section 2.1.2. It is also unaffected by the period of volatility during 2020 to 2021 due to COVID lockdowns as well as the initial market impact of to the outbreak of the Ukraine war in February 2022.

Additionally, we note that Pennon has been a 'pure play' water company since June 2020. We explained earlier in our 2022 report that at the point that the PR24 determinations are made the relevance of PNN as a beta comparator would have increased further as there will be more data available.[84] Since the shorter term estimates now rely on data that is mostly (or entirely) after Pennon sold its waste business, it is now appropriate to also consider Pennon as a comparator when looking at these shorter-term windows. We have therefore taken into account information from Pennon when considering the cost of equity point estimate in Section 7.

We note that Ofwat have not included Pennon in its beta estimates at the DD. It says that it has not considered Pennon even after becoming a "pure play" water company in June 2020 as the sale of Viridor as well as the acquisition of SES water in January 2024 has impacted Pennon's gearing.[85] We do not consider changes in gearing due to sales or acquisitions to invalidate the resulting unlevered beta since the level of gearing will be taken into account when calculating the unlevered beta.

With regards to estimating our overall range based on the results presented, we consider two sets of evidence:

- We consider the longer-term 5 and 10 year averaging periods which will place less weight on data during the COVID period. For the longer term averages, we have used the estimates from UU and Severn Trent since Pennon has only been a 'pure play' water company since June 2020. This approach, using 2, 5 and 10 year windows and 5 and 10 year averaging periods, gives a range of 0.26 to 0.30 for the unlevered beta.

- We also consider the short-run estimates with 2-year windows – both the spot and 2-year averaging period. For these estimates, we consider all three comparators. These estimates will place more weight on the current market conditions though the 2-year averaging period will also capture the period of COVID volatility. This approach provides a range of 0.26-0.31 for the unlevered beta.

Given the above evidence, **we estimate a core range for the unlevered beta of 0.26-0.31**. We also retain our debt beta value of 0.05 for this update.[86]

84 Frontier Economics, "Cost of capital for PR24, a report prepared for United Utilities", September 2022, Section 8

85 Ofwat, Draft Determination, Allowed return appendix, p49

86 In our 2022 report we undertook a detailed review of debt beta values. In order to avoid creating an unhelpfully wide range we select a single debt beta value of 0.05 as the point estimate in our WACC estimation.

6.3.2 Re-levering the beta

In the previous section, we set out estimates for the unlevered beta (0.26 to 0.31) and the debt beta (0.05). In order to convert these inputs into an equity beta assumption for PR24, we re-lever them using the assumed notional gearing of 60%.

Consistent with our approach to de-levering in our 2022 report we use the Harris Pringle formula. The table below sets out our estimates for the asset beta and equity beta. The asset beta range we estimate is 0.29 to 0.34 and the equity beta range we estimate is 0.64 to 0.77.

Table 9 Re-levered equity beta estimates

Parameter	Low	High
Unlevered beta (A)	0.26	0.31
Debt beta (B)	0.05	0.05
Observed gearing	53%	53%
Asset beta (D = A + B*C)	0.29	0.34
Notional gearing (E)	60%	60%
Equity beta (F = [D – E*B] / [1-E])	0.64	0.77

Source: Frontier calculations

7 Cost of equity estimate

In this section, we bring together evidence from the preceding chapters to estimate the post-tax cost of equity range and use cross checks to inform our final point estimate.

7.1 Selecting a range and point estimate for the cost of equity

In this report UU has asked us to consider a point estimate for the WACC. In reaching a point estimate for the cost of equity we consider it critical to consider a wider set of evidence beyond CAPM. This is because this wider evidence can provide an indication of the market conditions companies are likely to face when raising capital in the next control period. In other words, it helps in selecting a point estimate which supports equity financeability.

Below we consider four pieces of evidence to inform our cost of equity point estimate:

- Sector specific considerations;
- Post-COVID beta evidence;
- A comparison of debt and equity returns;
- Market-to-asset ratios; and
- Previous regulatory decisions.

7.1.1 Sector specific considerations

There are two sector-specific considerations that we think are relevant for setting a point estimate. These are:

- **The scale of investment in the next control period and beyond** – information on the trends in sector investment were set out in Section 2. What is clear from business plans is that major new investments are required across the water and wastewater value chain. Investors therefore have a key role to play in the next five-year period. Significant sums of capital are required to make the investments set out in long-term plans a reality. Given the long-term nature of the investment plans, supporting long-term equity investability is important for PR24 for delivering on customer priorities. The large scale of investment for AMP8 increases the impact of the asymmetric risks associated with the cost of equity being set too low. As a result we see the scale of investment as a reason to select a point estimate from the upper end of the range.

- **Investors risk perceptions of the sector** – information on this topic was also provided in Section 2. Overall, we find that there is an ongoing risk that investors perceive heightened and asymmetric risks in the water sector. The topic of asymmetric risk was carefully considered by the CMA during the PR19 appeals, and was ultimately used as a key factor in moving the CMA's estimates upwards. While there are ways to mitigate asymmetric risk, for example, through uncertainty mechanisms, changes to the structure of ODIs, or through the use of other regulatory mechanisms, where it is not sufficiently

mitigated we consider that a higher cost of equity is appropriate. Similarly, for the reasons set out in Section 2, we also consider it an appropriate reason to select a point estimate from the upper end of the range.

Based on the above, we find that sector-specific considerations suggest a figure from the upper end of the range is appropriate for PR24.

7.1.2 Post-COVID beta evidence

In Section 6.3 we considered a range of beta evidence to produce an unlevered beta range of 0.26 to 0.31. This was based on consideration of different time periods, and when to include Pennon in the beta sample. When developing that range we did not place weight on any single beta observation. This followed the methodology used in our previous reports for UU, and a methodology which we consider to be balanced.

We note our 2-year spot estimates support the top end of our beta range. This is not surprising and we think there are a number of important factors that suggest a spot figure for the 2-year daily beta could be an important data point to consider in the present environment::

- The 2-year spot figure is the only estimates in our sample where Pennon is entirely a pure-play water company, meaning it can be combined with UU and SVT on an equal footing – adding to the sample size.
- The 2-year spot figure uses market data from a time period where market volatility is closer to the equity market volatility level pre-COVID (see Figure 3). This is because is excludes market observations associated with COVID lockdowns and excludes the initial market impact from the war in Ukraine. In other words, it excludes data which may not be representative of AMP8.
- The 2-year spot figure will reflect information about the risks associated with the AMP7 period, as well as reflecting information on the methodology for AMP8. Meaning it captures the risks associated with current and prospective regulatory regime.

For these reasons, we draw upon the 2-year spot figure when considering a point in the range. The estimates for that data point are set out in Figure 10 below.

Figure 10 2-year spot unlevered betas

Window	Averaging Period	Pennon	Severn Trent	UU	Average (all)
2 year	Spot	0.34	0.31	0.28	0.31

Source: Bloomberg, Frontier Economics
Note: Estimates are to the end of March 2024

As shown, betas of the three water companies vary from 0.28 to 0.34, with an average of 0.31 across the three companies. And the average of 0.31 is supportive of a point estimate at the top end of the range.

We therefore consider that a beta estimate from the top-end of the range is most suitable for capturing less extreme volatility and recent regulatory developments.

We find that Ofwat has not given sufficient weight to the points set out above when considering its unlevered beta estimate in the DD. By the time of the FD, some of the points set out above will also carry even more weight – in particular the two-year window will cover a time period where significant amounts of new information regarding the PR24 methodology, business plans and Ofwat's DD will have been digested by the market. Given the changes between PR19 and PR24 it will be important that market information specific to PR24 is captured in the assessment of systematic risk. Furthermore, information from three companies adds greater robustness to the exercise.

By not including Pennon relevant information is missed, which has a significant impact on 2-year beta estimates.

7.1.3 Comparison of debt and equity returns

In previous reports for UU we have highlighted how debt returns have recently approached allowed returns (as measured by CAPM). In terms of corporate finance principles this creates an inconsistency.

Senior debt implies lower risk and better recovery prospects. It is paid first and it is paid a contractually stipulated sum. In contrast, holders of equity are paid last, and act as residual claimants on the business with no guarantee they receive anything. Because of this difference in risk, it would be irrational for investors to opt for equity if expected returns were similar to or below the expected returns on senior debt.

Given this, the pertinent question is: how much higher should equity returns be relative to debt? Given the large gap in relative risk between senior conventional debt and equity, comparing unadjusted yields on senior debt to equity returns would only provide a limited cross-check on equity returns, i.e. a test that we would typically expect to be easily passed.[87] A meaningful cross-check must reflect the incremental return that equity requires over debt.

We find that **hybrid bonds**, which are closer to equity in nature, provide a more meaningful point of comparison.[88]

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87 Except in instances where debt returns are higher than equity returns – signalling an obvious implication that allowed equity returns are too low.

88 Hybrid bonds can be of very long tenor – covering multiple decades, making it more similar to the perpetual nature of equity. These securities can also have debt like qualities, including periodic coupon payments, however, in certain circumstances there can be a higher degree of flexibility over when these are paid. Hybrid bonds also sit between senior

Since the yield on these hybrid bonds is directly observable, with an appropriate assumption on the proportion of equity like feature of the hybrid bond, an **expected return on equity can be implied**.[89] If the allowed equity return is set below the level implied by the yields on hybrid bonds, then risks in attracting sufficient equity capital are greater.

Using data on hybrid bonds issued by UK utility networks companies[90] as the basis of this check on equity returns, we find that hybrid bonds indicate that the cost of equity should currently fall in the range 5.8% to 8.4% (CPIH deflated).[91] With a point estimate of 6.6%. More detail on the methodology used to estimate this range can be found in a paper we drafted in response to Ofgem's Sector Specific Methodology Consultation (SSMC).[92] We also set out some key elements in Annex A.[93]

We note that the point estimate selected by Ofwat of 4.8% in its PR24 DD falls well below our lower bound cross-check result of 5.8% suggested by the hybrid bond analysis (even if Ofwat's point estimate were converted to 60% gearing, which would be equivalent of 5.15%[94]). This clearly points to the fact that Ofwat's CAPM estimate of the COE is too low in its entire range, when viewed in today's equity market condition. Ofgem's COE range in the SSMD, on the other hand, stretches to 6.35%, which is supported by the cross-check evidence.

Ofwat has made a passing reference to a SVT submission in relation to hybrid bond evidence, but dismissed it along with other debt based cross-checks, in particular the ones proposed by water companies such as ARP-DRP analysis and inference analysis.[95] However, Ofwat has not explicitly addressed any problem specific to hybrid bond cross-checks.

Ofgem has reviewed our hybrid bond analysis in its SSMD[96], and has agreed in principle to the logic used in this cross check. The only criticism Ofgem raised on the hybrid bond analysis specifically was the fact that the analysis relied on only one bond. Ofgem has indicated that they would consider this cross check in more detail in RIIO-3 DD.

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debt and ordinary shares in a company's capital structure, being eligible for payments prior to equity-holders, but after senior debt-holders.

89 A key reference point is the assessment of credit rating agencies on the 'equity credit' of hybrid bonds – which are ascribed at issue. For example, on the hybrid bonds we focus on, 50% equity content is ascribed.

90 NGG Finance (a part of the wider National Grid group of companies) issues hybrid securities. Therefore, they provide a specific figure that reflects risk for regulated network businesses.

91 Using data to the end of February 2024.

92 Frontier Economics (2024), 'Equity Investability in RIIO-3: A report prepared for the ENA', available at: https://www.ofgem.gov.uk/publications/riio-3-sector-specific-methodology-gas-distribution-gas-transmission-and-electricity-transmission-sectors

93 We also explain how these findings are directly applicable to the water sector.

94 4.8% COE at 55% gearing, converted to 60% using the Harris-Pringle formula, keeping all other parameters as per the DD.

95 PR24 Draft Determinations, Aligning-Risk-and-Return-Allowed-Return-Appendix, page 60.

96 RIIO-3 SSMD Finance Annex, page 108.

However, our results based on data from the hybrid bond asset class are in fact robust to a range of bonds being considered (see Annex A for the range of bonds considered). In particular, we have tested our outputs against a range of hybrid bonds issued by UK utility networks, and a range of European utility network bonds. All of the available evidence points towards the values used in our cross-check being a balanced reflection of the hybrid bond asset class.

This output shows that the cost of equity range implied by this hybrid bond cross-check only just overlaps with the top-end of the CAPM range we estimate (which is 6.02%, or 6.0% to one decimal place).

Given that the cross-check is driven by capital market data, it also means that figures further down the CAPM range could increasingly lead to outputs that are viewed as irrational by the market – given the relative risk of equity to debt. Without taking account of such capital markets observed cross-checks, there is a risk that a CAPM-derived allowed equity return is set too low, with the consequent asymmetrical risk for companies and customers if the sector proves not to be financeable from an equity perspective.

Given that only the very top-end of our CAPM cost of equity range overlaps with the range produced by this cross-check, this suggests the appropriate point estimate can only be the very top of the CAPM range, particularly as the central estimate from the cross-check (6.6%) remains above even the top-end of the CAPM range.

By retaining an estimate from within the long-term CAPM approach, and not drawing upon higher cross-check values, the point estimate helps to provide regulatory stability and predictability, and has the benefit of avoiding volatile regulatory outcomes. We also note that **this cross-check suggests there are greater risks to investability if a figure lower down the CAPM-derived range**, and outside of the cross-check range, **was chosen**.

7.1.4 Past regulatory decisions on TMR justifies going towards the top end

As set out in Section 2, the interest rate environment is now very different to that at the time the PR19 decisions were taken. Namely, interest rates are significantly higher, and do not show signs of reverting to the low levels previously experienced. One of the parameters this has implications for is the TMR.

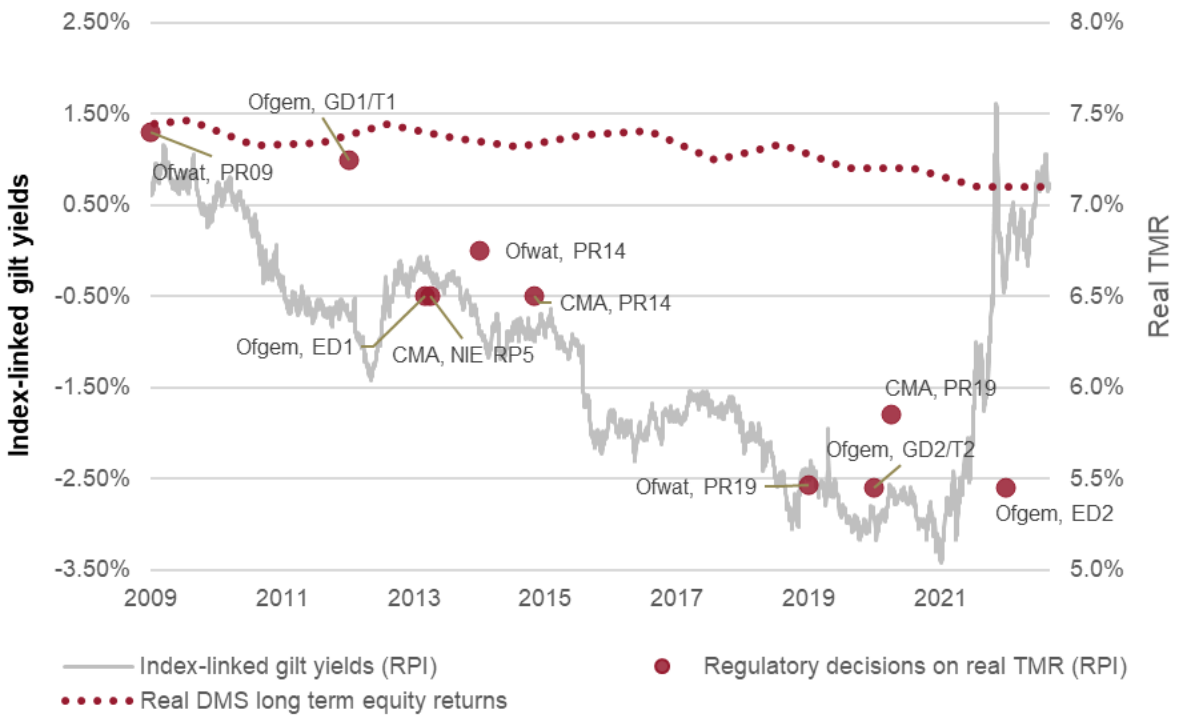
UK regulatory practice over the past decade or more has been to move TMR down to reflect prevailing market conditions. As interest rates and yields on government bonds fell over much of the last decade, UK regulators responded by lowering their estimates of TMR used to determine the allowed cost of equity. This movement was not one-for-one, i.e. regulators moved TMR by a proportion of the fall in yields on government bonds. This “stable but not fixed” policy has been endorsed by the UK Regulators Network (UKRN).[97]

[97] UKRN (2023) UKRN guidance for regulators on the methodology for setting the cost of capital, p19.

The recent history of regulatory TMR decisions is illustrated alongside other key evidence in Figure 11 below.

- The dotted red line (right-hand scale) shows the underlying evidence on real long-term equity returns as published by DMS. The estimated long run level has fluctuated in a narrow range roughly between 7.1% and 7.3% (in real terms according to DMS's definition of inflation for the UK), i.e. it has barely changed.
- The grey line (left-hand scale) shows yields on 20-year government ILGs (an often used proxy for RFR), RPI-real.
- The red dots show regulatory decisions on the estimated TMR (also right-hand scale) in the same period, all converted to RPI-real terms for comparison purposes.[98]

Figure 11 Long run TMR as estimated by DMS, Regulatory decisions on TMR and yields on 20 year ILGs.



Source: Bank of England, DMS, Frontier Economics, UKRN
Note: Data to July 2023 shown

In Ofwat's case, it is clear that TMR has moved downwards to reflect the interest rate environment. Ofwat's 'risk and reward guidance' for PR14 set out a TMR range of 6.25% to

[98] We note that some of the TMR decisions were expressed in CPI or CPIH-real (PR19 Ofwat, PR19 CMA, GD2/T2 Ofgem, and ED2 Ofgem). Where this was the case, the UKRN expressed these in RPI-real terms using a RPI/CPI wedge of 1%. Please see: UKRN (2023) Cost of Capital – Annual Update Report, Table 7. Accessible here: https://ukrn.org.uk/app/uploads/2023/08/2023-UKRN-Annual-Cost-of-Capital-Report_080823_minor-editorial-corrections-1.pdf

6.75% (RPI terms). This was a large reduction from the 7.4% TMR that featured in its PR09 decision. A key reason Ofwat selected this new range was that:

> *"monetary policy and investor appetite have significantly reduced Government and corporate bond yields and put downward pressure on returns across most asset classes"*[99]

Similarly, when producing the final methodology for PR19 there was an extensive discussion of TMR and wider market conditions. Again, there was clear evidence of a link between equity returns and interest rates, with Ofwat saying:

> *"Our draft methodology proposals, together with supporting analysis by PwC, set out evidence from recent market data that the extended period of low interest rates has reduced returns required by UK equity investors to below long-run historical averages of realised returns."*[100]

Going on to conclude that:

> *"We consider that reflecting recent market conditions in our point estimate of TMR is a continuation of past practice, which we see as necessary to uphold our statutory duties for financing functions as well as customers."*[101]

As clearly shown in Section 2, the low interest rate environment has now reversed. The deeply negative real interest rates that caused regulators to lower their estimates of TMR over the last decade are no longer observed. On the contrary, real interest rates are now materially positive, and available evidence points to materially positive real rates persisting.

Despite this, at the PR24 DD, Ofwat did not take into account these current market conditions when setting the TMR. It said that:

> *"Intervening to correct the allowed return where the 'fixed TMR' approach is too low, without allowing for an equivalent correction when it is too high, is a clear violation of this 'fair bet' principle and would not deliver a balanced outcome for customers"* [102]

Here, Ofwat claim that they should not increase the TMR when it is 'too low' as they did not make any adjustments when it was 'too high'. However, the evidence above clearly shows that the low interest rate environment of previous price controls were a key reason for reducing its estimate of the TMR. Ofwat saw an active reflection of market conditions as being key to its duties.

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99 Ofwat (2014), Setting price controls for 2015-20 – risk and reward guidance, p.14

100 Ofwat (2017), "Delivering Water 2020: Our methodology for the 2019 price review; Appendix 12: Aligning risk and return; section 5.4.

101 Ofwat (2017), "Delivering Water 2020: Our methodology for the 2019 price review; Appendix 12: Aligning risk and return; section 5.4.

102 Ofwat, Draft Determination, Allowed return appendix, p62

We therefore find it appropriate that an equivalent upward adjustment should now be made. In practice, Ofwat followed the approach of a 'stable' rather than a truly 'fixed' TMR. Much tighter monetary conditions for PR24 should therefore result in an upward adjustment – albeit with some stability continuing to be provided by long-term historical evidence on returns.

The logical extension of this is that estimates of TMR should be higher than decisions taken during the period of lower, negative real rates.[103] For this reason **we consider that a figure from the top-end of our TMR range is appropriate**.[104]

7.1.5 Market-to-asset ratios

In order to understand broader investor sentiment, we also reviewed recent evidence from MARs. For the avoidance of doubt, we do not attempt to infer the cost of equity from MARs, as it is extremely challenging to attribute a given MAR to different factors.[105] However, we consider there are some data points which reflect weakened investor sentiment. Specifically:

- We observe that recently the MAR for Pennon (covering South West Water, Bristol Water and Bournemouth Water) has been trading close to 0.8.[106]
- A recent private transaction for Phoenix Natural Gas Limited (a gas network owner in Northern Ireland) may imply a MAR of less than 1.0.[107]

Given these indicators of sentiment, we suggest that investability could indeed be a material challenge facing the UK utilities sector at present time, and particularly the water sector. Now more than ever, an appropriate allowed level of return therefore requires careful consideration at PR24.

In the conclusion section below we bring together our view of how investability relates to the appropriate PR24 cost of equity range.

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103 The upward trend in return requirements can also be captured through wider market data points. For example, infrastructure fund implied equity IRRs have increased markedly over the past two years. With increases ranging from +2.4 percentage points to +5.7 percentage points (see Frontier Economics (2024), 'Equity Investability in RIIO-3: A report prepared for the ENA', Section 6.4.4). While we have concerns over the precise application of this data to setting the level of allowed equity returns, it captures the changing investment conditions facing companies in AMP8.

104 This is a figure of 7.1% CPIH-deflated.

105 Such as growth or outperformance.

106 Based on data from May 2024. We also note the purchase of Sutton and East Surrey was announced by Pennon in January 2024. The equivalent ratios for UU and Severn Trent (SVT) are above one for the same time period, but we note that these companies may be expected to perform more strongly relative to peers if recent relative performance trends are expected to continue – SVT and UU are both at the top-end of the industry in terms of RoRE in the current AMP to date, 1st and 3rd respectively.

107 Using an estimated sale price was around £760m based on a media reported figure of $945m, as compared to a TRV (Total Regulatory Value) of approximately £800m in current prices. We note some uncertainties regarding the value attributed to non-regulated activities or the specific structure of the transaction.

7.1.6 Conclusion on the cost of equity range and point estimate

In summary, all of the factors we considered above suggest a figure towards the top-end of the CAPM range. The point estimate of our hybrid bond cross check may even suggest that almost our entire CAPM range may be insufficient for the purpose of raising equity capital effectively in the current capital market.[108] We conclude that a figure below the top-end of the range, around 6.0%, would fail to adequately capture the current evidence from capital markets and the circumstances of the sector, and is more likely to create investability challenges for equity capital during PR24.

In the table below, we set out how we have reflected this evidence in our selection of an appropriate cost of equity range. More specifically, we have discarded the low end of our CAPM derived cost of equity range, as our additional evidence clearly shows that the low end from the estimation would not be compatible with the market conditions.[109]

Table 10 Cost of equity range

Parameter	Low	High
Risk-free rate	1.72%	2.48%
Total market return	6.60%	7.10%
Equity risk premium	4.88%	4.71%
Equity beta	0.64	0.77
CAPM-derived cost of equity	4.85%	6.02%
Mid-point of CAPM derived cost of equity	5.43%	
Adjusted cost of equity range	**5.43%**	**6.02%**

Source: Frontier calculations
Note: CPIH deflated

Although we see benefit of adhering to the long-term historic approach regulators have adopted over the previous controls (i.e. we do not estimate our range using forward-looking market data), we consider it important for our range and point estimate to appropriately reflect the current market conditions. This is in line with regulators' more recent decisions on allowed returns in the "lower for longer" environment, where they allowed some of the estimates to come down and stopped aiming up on their final decisions. We believe there is currently strong enough evidence, as shown in our hybrid bond cross-checks, to support that the market conditions at present warrant a move to the opposite direction. We believe therefore the lower

[108] Given that the point estimate from this cross-check was 6.6% CPIH-deflated.

[109] The low end of our adjusted cost of equity range is based on the midpoint of the CAPM derived cost of equity range.

end of the CAPM range derived using long-term historic data is not appropriate for PR24 and could heighten risks around the ability to raise equity finance in AMP8.

Our of equity range is therefore **5.43% to 6.02% (CPIH deflated).** Given that a number of evidence sources considered above suggested a cost of equity value at the very top-end of the range would be suitable, **we propose a point estimate of 6.02% for the cost of equity**.

Given the DD point estimate for cost of equity of 4.8%, we consider it critical that Ofwat carefully considers the points raised in this report ahead of the PR24 FD.

8 Estimating the wholesale WACC

As set out in our 2022 report, while in theory a separate cost of capital could be set to compensate for the impact of different risks faced under each of the wholesale controls, it was beyond the scope of that report to consider this issue.

On this basis, we estimated a single wholesale WACC to be applied for all relevant wholesale controls.

8.1 Retail margin adjustment

In setting a single wholesale WACC to capture risk across each of the controls (including household retail), an adjustment is required to the allowed returns to reflect that companies are compensated for retail risk through the retail return, i.e. the appointee WACC needs to be adjusted to isolate and deduct any components of the retail margin that double count compensation for systematic retail risk.

In our 2022 report, we agreed with the high-level approach adopted by Ofwat and the CMA at PR19 to estimate the retail margin adjustment, i.e. that the retail margin adjustment be estimated as the retail margin less the cost of fixed asset and working capital financing. In estimating a retail margin adjustment to the return to apply at PR24, we therefore adopt this same high-level approach.

The specific assumptions and information we used to estimate this retail margin adjustments are explained in more detail in our 2022 report.[110]

Based on this approach and assumptions, we estimated a retail margin adjustment to the appointee WACC in the range of **7-9 bps**. We have previously tested whether this range of 7-9bps was sensitive to the updated estimate for the vanilla appointee WACC, and found that it was not. We therefore retain this range for this update.

[110] [Reference to 2022 report, Section 10]

9 PR24 WACC estimate

In this section we set out our estimate for the PR24 wholesale WACC. In the table below we set out all of values used to derive our range of **3.85% to 4.11%.** This is formed from:

- A gearing assumption of 60%;
- A cost of debt range of 2.90% to 2.99%;
- A cost of equity range of 5.43% to 6.02%; and
- Includes a 7bps to 9bps adjustment for the retail net margin deduction.

Our view if that a point estimate from the top-end of this range, 4.11% is appropriate for PR24.

Table 11 PR24 WACC estimate, CPIH deflated

Parameter	PR24 estimate	
	Lower bound	Upper bound
Gearing	60%	60%
Cost of equity	**5.43%**	**6.02%**
Cost of debt	**2.90%**	**2.99%**
Appointee WACC (vanilla)	3.92%	4.20%
Retail net margin deduction	0.07%	0.09%
Wholesale WACC (vanilla)	**3.85%**	**4.11%**

Source: Frontier Economics
Note: Based on a cut-off date of March 31 2024

Annex A – Hybrid bond cross-check

In this Annex we set out information on the key elements of our hybrid bonds cross-check. Further detail on the methodology, data and sensitivities can be found in the report we produced for the ENA.[111] Below we cover four items:

- What hybrid debt is;
- An overview of our methodology for cross-checking equity returns;
- The results from the cross-check; and
- Why we consider the findings are directly relevant for the water sector.

A.1 What is hybrid debt?

Hybrid bonds, as the name suggests, are securities that combine debt and equity characteristics. For example, hybrid bonds can be of very long tenor – covering multiple decades, making them more similar to the perpetual nature of equity. These securities can also have debt-like qualities, including periodic coupon payments. But, importantly, in certain circumstances there can be a higher degree of flexibility over when these are paid. Hybrid bonds also sit between senior debt and ordinary shares in a company's capital structure, being eligible for payments prior to equity-holders, but after senior debt-holders.

In our work we have focused on hybrid bonds issued by GB utilities. The table below provides an overview of the available securities. They are issued by NGG Finance Plc, a financing subsidiary of National Grid Plc, and by SSE Plc.[112]

Table 12 Hybrid bonds for GB utilities

Issuer	Issue date	Maturity date	Amount
NGG Finance Plc	Mar 2013	Jun 2073	£1,000m
NGG Finance Plc	Sep 2019	Dec 2079	€500m
NGG Finance Plc	Sep 2019	Sep 2082	€750m
SSE Plc	Jul 2020	Perpetual	£600m
SSE Plc	Jul 2020	Perpetual	€500m
SSE Plc	Apr 2022	Perpetual	€1,000m

Source: Fitch, Bloomberg

Note: Our analysis excludes SSE bonds that have been superseded by more recent hybrid bonds

111 Frontier Economics (2024), 'Equity Investability in RIIO-3: A report prepared for the ENA', available at: https://www.ofgem.gov.uk/publications/riio-3-sector-specific-methodology-gas-distribution-gas-transmission-and-electricity-transmission-sectors

112 We have not identified any hybrid bonds issued by water companies which are currently outstanding.

We have not identified any hybrid bonds issued by water companies which are currently outstanding. However, we demonstrate the relevance of these bonds for the water sector in Section A.4.

The hybrid bonds we consider present the following characteristics:

- Subordination: Hybrid debt-holders receive payment after senior debt-holders but before ordinary shareholders;
- Extended tenors: All bonds have a maturity of more than 60 years at issuance;
- Deferrable coupons: The coupons attached to these bonds are deferrable;
- Call dates: Periodic call dates are incorporated into the structure of all bonds, with the specifics varying by security;
- 50% equity attributes: Rating agencies designate these hybrid bonds as 50% equity-like and 50% debt-like from an analytical standpoint;[113] and
- All the bonds listed above were issued during the period when the RIIO framework (which has similarities to the model adopt by Ofwat since PR14) was operational and are currently traded.

A.2 Overview of our methodology

We use the hybrid bond data to estimate the implied cost of equity. Assuming the allocation of securities between debt and equity stands at 50%, the spread between the expected return on hybrid bonds and conventional senior debt would fall at the midpoint between equity and senior debt costs. This approach enables us to sense check the allowed cost of equity.

Our method for deducing equity returns from hybrid bonds involves the following steps:

- We estimate the spread between expected returns of hybrid bonds and senior debt;[114]
- Assuming 50% equity-like characteristics in hybrid bonds, we calculate additional returns from equity attributes; and
- We calculate the cost of equity by adding senior debt returns to the extra returns from equity attributes.

Specifically, we focus on evidence from the NGG Finance Plc 2073 Hybrid for our core output.[115] This choice is driven by its longest years to call at issue date, extending beyond a

[113] The details of analytical treatment can vary between agencies.

[114] Given the more subordinated nature of hybrid bonds, we estimate the 'expected return' on the hybrid bond, factoring in the potential for the bond to not deliver the promised cash flows, that is, the default risk. This factors in the specific credit rating which these bonds get assigned, which in turn captures rating agency views of company capital structure.

[115] The liquidity of this bond is comparable with other conventional corporate bonds as measured by bid-ask spread, and we also find that yield data for this bond changes on a daily basis.

decade. This date maximises the remaining tenor and thereby allows us to measure long-term return expectations.[116] However, we have tested the robustness of these outputs to:

- Other National Grid hybrid bonds – which supported the figures from the NGG Finance Plc 2073 hybrid, which lies between the spreads to senior debt of these other bonds;
- SSE bonds – which had a higher spread to senior debt than the National Grid hybrid bonds and is therefore a logical result given SSE's significant ownership of non-regulated businesses e.g. generation. This is also in consistent with SSE having a higher beta than National Grid ; and
- Other hybrid bonds issued by European network utilities – again, this evidence supports the values for the hybrid bond spread we have used.

The goal of our methodology is to calculate the cost of equity by determining the additional returns associated with the percentage of equity-like features in hybrid bonds. The greater the resemblance to equity, the smaller the difference between hybrid and equity returns. This is set out in the following formula:

$$Cost\ of\ equity_t = avg(iBoxx\ Utilities\ yield)_t + \frac{Hybrid\ bond\ spread\ to\ iBoxx}{\%\ equity\ like}$$

Where:

- The 'iBoxx Utilities yield' represents the average yield of the iBoxx £ Utilities 10Y+ index over the last recent year;
- The 'hybrid bond spread to iBoxx' remains constant at 136bps, aligning with the expected returns on the NGG 2073 hybrid bond at the time of issuance relative to the iBoxx £ indices' yields on the issue date; and
- The '% equity-like' stands for the percentage of equity-like characteristics, assumed at 50%.

A.3 Results

The table below summarises the outputs for the long-term cost of equity estimate. Our **point estimate** of the expected returns on equity implied from hybrid debt evidence lies at 8.8% in nominal terms (**6.6% in CPIH terms**).

Table 13 Results of the cost of equity cross-check

Value	Estimate
Hybrid bond spread (adjusted for default risk, at issue)	+136bps

[116] Selecting a security denominated in sterling further avoids currency exchange complications.

Value	Estimate
iBoxx £ Utilities10Y+ (1Y average)	6.04%
Higher returns on equity (based on 50% equity-like)	+272bps
Nominal cost of equity	**8.76%**
Real cost of equity (CPIH deflated)	**6.63%**

Source: *Frontier calculations*

Note: *Analysis as of 29 February 2024. We consider a 2% inflation assumption to derive CPIH-real cost of equity.*

To provide further comfort around these results, we have undertaken a set of sensitivity tests on the key assumptions of the analysis. The outputs from those checks are shown in the table below.

The sensitivities are used to derive a range around the central CPIH real cost of equity of 6.6%. Overall, this results in a low end of the range from the cross-check of 5.8%, and a high end of the range from the cross-check of 8.4%.[117] We note that our point estimate is closer to the lower end than the upper end – this simply reflects the non-symmetric outputs from the sensitivity analysis.[118]

Table 14 Summary of sensitivity checks on key assumptions

Summary results	Low	High
Sensitivity on historical hybrid-iBoxx spread	7.8%	10.1%
Sensitivity on the percentage of equity-like	7.9%	11.5%
Sensitivity on iBoxx averaging	8.2%	10.1%
Nominal cost of equity	**7.9%**	**10.6%**
Real cost of equity (CPIH deflated)	**5.8%**	**8.4%**
Real cost of equity (CPIH deflated) – point estimate	**6.6%**	

Source: *Frontier calculations*

Note: *Results for the cost of equity are obtained by averaging the low and high values of each sensitivity respectively. We consider a 2% inflation assumption to derive CPIH-real cost of equity.*

As shown in the table above, we conducted three sensitivity tests on our results:

[117] Our range reflects plausible high and low scenarios of hybrid spread, equity-like proportions and iBoxx yields, although the lower and higher bounds of our range do not represent the lowest and highest outcome of all of the scenarios compounded, which would have produced implausibly low and high values. Instead, they represent average lower and higher bounds of these scenarios.

[118] For example, on equity likeness, dividing a constant spread value by different percentage equity-like leads to this results.

a. Sensitivity on the historical hybrid-iBoxx spread.

i. An assumption in our analysis is that the hybrid spread to iBoxx has remained constant over time. We have adopted this approach as the spread is associated with a long-term hybrid bond yield at issue – making it an appropriate observation to use when checking long-term equity returns. It also aides simplicity.

ii. Nevertheless, we test the sensitivity of our analysis in response to the hybrid spread volatility over time by constructing a range around the 10th and 90th percentile.[119] We obtain a spread between 86bps and 201bps, resulting in nominal equity returns between 7.8% and 10.1%. Applying the CPIH assumption of 2.0% produces a CPIH deflated range of 5.6% to 7.9%. Our main analysis output lies towards the centre of this sensitivity range.

b. Sensitivity on the percentage of equity-like.

i. In our main analysis, we have taken the assumption that hybrid bonds stand at the midpoint between debt and equity, specifically, we assume 50% equity-likeness from an analytical perspective. However, we test sensitivities ranging from 75% to 25%.

ii. This sensitivity tests produces a range of 7.9% to 11.5% (equivalent to 5.7% to 9.3% in real terms). Although the lower end of this range aligns closely with the prior sensitivity, the upper limit exhibits a significant increase in magnitude. This is not surprising since in the upper case a larger multiplier is applied to the hybrid spread to imply the equity premium.

c. Sensitivity on iBoxx averaging.

i. In estimating the cost of equity cross-checks from hybrid debt, we considered the average value of the iBoxx £ Utilities 10Y+ during the latest year.[120] This average window, in our view, captures the outlook for debt market in the near future reasonably well whilst smoothing out short-term volatilities on market rates.

ii. However, we have conducted sensitivity scenarios on the iBoxx yield, and assessed how different dates and 'milestones' in the hybrid bond's trading history could influence the final value.

iii. When we average across these periods, we find that the iBoxx values range from 5.4% to 7.4%. Consequently, the nominal cost of equity falls between 8.2% to 10.1%, which translates to 6.0% to 8.0% in real terms cost of equity. This aligns with the sensitivities observed in the previous sections.

119 Using traded yield data whereas the main outputs are based on yield at issue data.

120 As of 29 February 2024.

In conclusion, our results are a point estimate for the implied cost of equity for 6.6% CPIH-real, within a range of 5.8% - 8.4% CPIH-real.[121]

A.4 Relevance for the water sector

As set out above, the central result for the cross-check is based on a hybrid bond issued by National Grid. Given this, one way to explore relevance for the water sector is to qualitatively compare water companies to National Grid. We consider that, in the context of the hybrid bond analysis, there are several similarities between National Grid and water companies which mean the results are relevant for the water sector cost of equity, these are:

- **Long-lived network assets** – both types of company manage a large network of assets that provide an essential service. A key characteristic of those networks in both cases is long-lived assets.
- **RCV based regulatory models** – both types of network are regulated through a RCV (or RAV to use Ofgem's terminology) model. Both earn a return on capital linked to the RCV value, and have a component of revenue linked to the depreciation of that RCV value.
- **Revenue model** – both types of network operate under a regulator model of allowed revenues, which involve an assessment of efficient costs (totex) and a system of rewards and penalties linked to outcomes.
- **Use of water company data by Ofgem** – when assessing the cost of equity, Ofgem directly considers evidence on the beta of listed water companies (Severn Trent, Pennon and United Utilities) alongside that of National Grid. Therefore, Ofgem considers these data points to have sufficient similarity to the networks they regulate to inform its cost of equity allowance.

Given these shared characteristics, we consider the results from the cross-check can be utilised in the context of PR24, but have also considered other quantitative data points too:

- Firstly, comparing unlevered beta estimates at the time the National Grid 2073 Hybrid was issued, we find that there are no large differences. In fact, we find that the unlevered betas for National Grid and two listed water companies (UU and SVT) were very similar to each other in 2013, with the outputs showing minimal dispersion.
- Secondly, comparing gearing levels at the time, we find that the gearing level (measured by net debt to enterprise value) of National Grid was actually lower than the two water companies around 2013.[122] This suggests, given similarities in unlevered beta, an equity beta for National Grid which happened to be lower than water companies at that particular

[121] As noted above, our point estimate is closer to the lower end than the upper end – this simply reflects the non-symmetric outputs from the sensitivity analysis

[122] We focus on Enterprise Value rather than RCV/RAV since this is more reflective of an investor's outlook.

moment in time. Arguably this implies that the inputs to the cross-check were reflecting risks lower than those present in water network at that time.

We consider **this evidence supports the use of the cross-check in a water sector context**. And again, the points of comparison set out above may even suggest that the cross-check is calibrated in a relatively cautious manner.