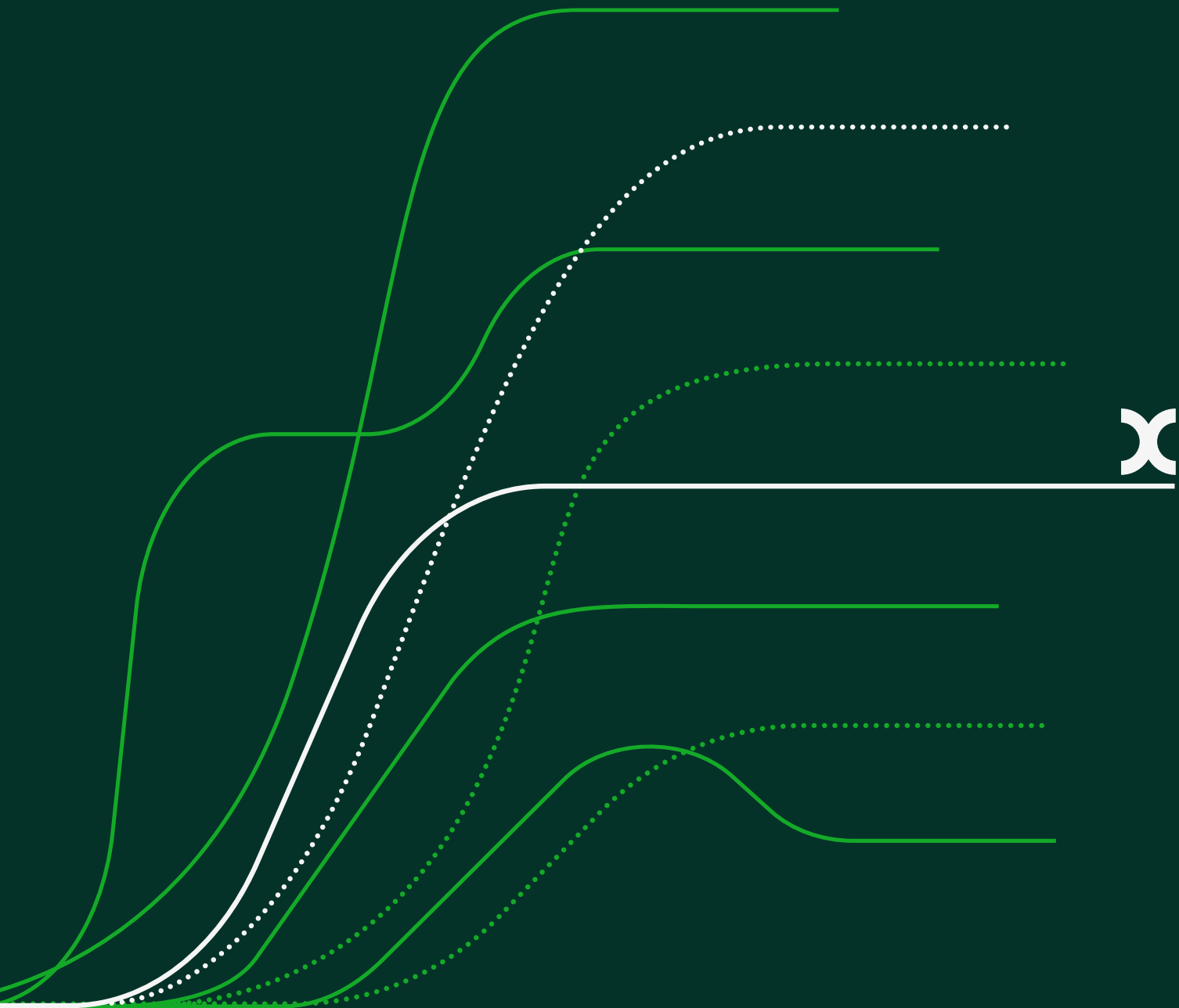




Contents

Executive summary	1
1 Introduction	5
1.1 Overview of Ofwat's PR24 FD approach	5
1.2 Cross-checks considered by Ofwat	6
2 Debt-based cross-checks	7
2.1 Critique of Ofwat's PR24 FD debt-based cross-check	7
2.2 Unlevered cost of equity cross-check	11
2.3 Debt premia cross-check	12
2.4 Conclusions	18
3 Market-to-asset ratios cross-check	19
3.1 Critique of Ofwat's PR24 FD MARs analysis	19
3.2 Conclusions	23
4 Infrastructure fund returns cross-check	24
4.1 Direct infrastructure fund discount rate comparison	24
4.2 Cost of equity implied by discount rates of infrastructure funds	26
4.3 Conclusions	29
5 Evidence from equity analysts	30
5.1 Equity analyst reports	30
5.2 Conclusions	31
6 Conclusions	33

Figures and Tables

Table 1.1	Summary of cross-check ranges against Ofwat's PR24 FD CAPM-implied CoE range and Oxera's estimated CoE range (CPIH-real)	3
Figure 1.1	Cross-check ranges against Ofwat's PR24 FD CAPM-implied CoE range and Oxera's estimated CoE range (CPIH-real)	4
Figure 2.1	Spreads of cost of equity determinations relative to selected cost of debt benchmarks (CPIH-real)	10
Table 2.1	Spread of the unlevered cost of equity over the cost of new debt based on Ofwat's FD estimates	11
Figure 2.2	The relationship between gearing and risk premia	12

Oxera Consulting LLP is a limited liability partnership registered in England no. OC392464, registered office: Park Central, 40/41 Park End Street, Oxford OX1 1JD, UK with an additional office in London located at 200 Aldersgate, 14th Floor, London EC1A 4HD, UK; in Belgium, no. 0651 990 151, branch office: Spectrum, Boulevard Bischoffsheim 12-21, 1000 Brussels, Belgium; and in Italy, REA no. RM - 1530473, branch office: Rome located at Via delle Quattro Fontane 15, 00184 Rome, Italy with an additional office in Milan located at Piazzale Biccamano, 8 20121 Milan, Italy. Oxera Consulting (France) LLP, a French branch, registered in Nanterre RCS no. 844 900 407 00025, registered office: 60 Avenue Charles de Gaulle, CS 60016, 92573 Neuilly-sur-Seine, France with an additional office located at 25 Rue du 4 Septembre, 75002 Paris, France. Oxera Consulting (Netherlands) LLP, a Dutch branch, registered in Amsterdam, KvK no. 72446218, registered office: Strawinskylaan 3051, 1077 ZX Amsterdam, The Netherlands. Oxera Consulting GmbH is registered in Germany, no. HRB 148781 B (Local Court of Charlottenburg), registered office: Rahel-Hirsch-Straße 10, Berlin 10557, Germany, with an additional office in Hamburg located at Alter Wall 32, Hamburg 20457, Germany.

Although every effort has been made to ensure the accuracy of the material and the integrity of the analysis presented herein, Oxera accepts no liability for any actions taken on the basis of its contents.

No Oxera entity is either authorised or regulated by any Financial Authority or Regulation within any of the countries within which it operates or provides services. Anyone considering a specific investment should consult their own broker or other investment adviser. Oxera accepts no liability for any specific investment decision, which must be at the investor's own risk.

© Oxera 2025. All rights reserved. Except for the quotation of short passages for the purposes of criticism or review, no part may be used or reproduced without permission.

Table 2.2	Number of debt instruments per company in the sample set	14
Table 2.3	Average debt risk premium of sample set	15
Figure 2.3	Implied asset risk premium lower bound	16
Table 2.4	Implied cost of equity based on one-month average debt risk premium (CPIH-real)	17
Table 3.1	MARs-inferred CoE results	19
Table 3.2	Adjusted MARs-inferred CoE results	22
Table 4.1	Portfolios of infrastructure funds	25
Table 4.2	Discount rates used by infrastructure funds (2024, nominal terms)	26
Table 4.3	Cost of equity implied by infrastructure funds cross-check (CPIH-real)	28

Executive summary

The cost of equity (CoE) is not directly observable from market evidence, unlike the debt component of the WACC. Consequently, Ofwat's estimation of the CoE allowance for the PR24 final determinations (FD) is determined by its use of the capital asset pricing model (CAPM).

The CAPM and its parameters are inherently subject to estimation and measurement error. Owing to underlying parameter uncertainty, the CAPM-implied CoE is typically quoted as a range, from which a point estimate is then selected and used to calculate the WACC.

The use of additional information is an important way to then cross-check the CAPM-implied CoE, allowing informed considerations to arrive at the appropriate CoE point estimate. This is because **while the CAPM is the commonly accepted method to estimating the CoE, this does not mean that the CAPM-implied CoE should be relied upon without adequate cross-checks.**

As the England and Wales water sector faces a multi-AMP period of significant investment, it is imperative that the calibration of the CoE point estimate considers all available evidence, in order to provide an adequate return that ensures the sector can attract and retain equity.¹

In this report prepared for Anglian Water (ANH), we explore the details of Ofwat's PR24 approach to the use of cross-checks to inform its CAPM-implied CoE range, and provide our cross-checks to our own CoE range developed for ANH's referral to the CMA.²

In its PR24 FD, Ofwat referred to a range of considerations in supporting its CAPM-implied CoE range and point estimate, including cross-checks from market evidence, asymmetry in the choice of CAPM parameters, and financeability. Despite this however, Ofwat placed weight on only the market-to-asset ratio (MAR) cross-check, arguing that it supported its CAPM-implied CoE range. While Ofwat did not disregard debt-based cross-checks, Ofwat concluded that this cross-check did not raise a significant concern over the level of the allowed CoE. We find that Ofwat's conclusions are not supported by its own evidence.

¹ Refer to Oxera (2025), Investability and Financeability in PR24, 21 March.

² Refer to Oxera (2025), PR24 Cost of equity estimation, 21 March.

In response, we first study debt-based cross-checks, which describe the use of evidence from debt markets to determine the premia on equity over debt. By building on the fundamental financial principle that equity capital is riskier than debt (and thus requires higher returns), debt-based cross-checks serve as a market-based measure of the adequacy of a CoE estimate.

Our analysis shows that even using Ofwat's estimates of the cost of capital parameters, the premia of equity over debt from the PR24 FDs is too low. Developing this iteratively, we show that Ofwat's PR24 FD allows an unlevered CoE, (i.e. CoE without gearing) that is 32bps below the cost of new debt (CoND), thus violating the fundamental principle that the CoE should be higher than the cost of debt in all circumstances. We then provide new analysis based on debt premia observed on water company bonds since the FD, from which we determine that **debt-based cross-checks imply a strict lower bound CoE of 6.20% (CPIH-real)**.

Second, we consider Ofwat's use of MARs analysis to derive a MARs-inferred CoE, using stylised in-perpetuity assumptions over the rate of regulatory capital value (RCV) growth and return on regulatory equity (RoRE) performance. We show that the results of this cross-check cover a wide range of estimates of the CoE, stemming from the heterogeneity within the small sample set studied. Notably, Ofwat fails to recognise that its CAPM-implied CoE falls entirely within the lower half of its own MARs analysis. More importantly, we highlight that Ofwat's approach is not representative of the sector or notional company, as this is biased by the sample set reflecting the top performers in the sector.

Calibrating even partially to reflect a more balanced and industry-reflective view, we derive a MARs-inferred CoE range of 6.13–7.34% (CPIH-real), i.e. one that is substantially higher than Ofwat's CAPM-implied CoE range of 4.58–5.07% in its PR24 FDs.

Third, we consider evidence from listed infrastructure funds' discount rates. These funds regularly review and publish their discount rates used for calculating the Net Asset Value (NAV). The collective assessment by investors of the value of the NAV is reflected in daily share prices, making them a timely source of market evidence on required returns for these portfolios of assets. Adjusting for each fund's share price premium/discount to NAV, we determine that the market-implied discount rate of these funds is on average 9.02% (CPIH-real). Extending this further, we filter the sample set to better reflect comparability to the water sector, and find that upon controlling for gearing, **the CoE implied by infrastructure funds is 7.12–7.24% (CPIH-real)**.

Finally, we review the equity analyst reports cited by Ofwat as support for the 5.1% CoE allowance in the FD. We find that Ofwat mis-characterised certain reports as supporting its CoE allowance in the FD, when in fact these reports were predicting the outcome of the FD. Instead, the reports by analysts suggest the CoE for the sector is higher than allowed in the FD, with a negative perception over returns and overall sector attractiveness, despite positive prospects for several listed companies.

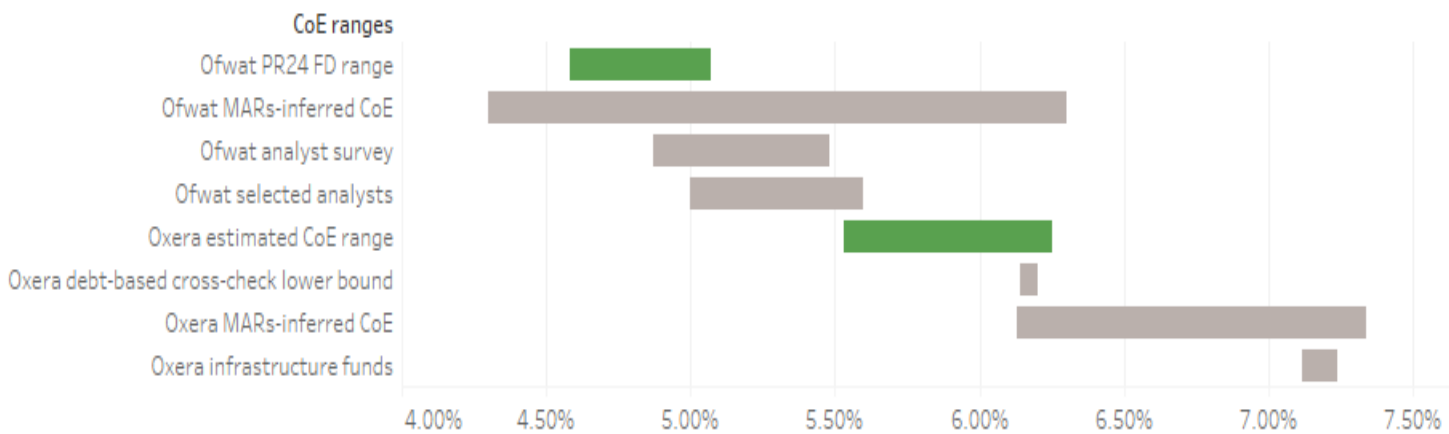
We show our findings on the various cross-checks considered in this report in Table 1.1, illustrated also in Figure 1.1, and compare this to Ofwat's CAPM-implied CoE and other PR24 FDs cross-checks evidence, and our estimated CoE range, as contained within our report, PR24 Cost of equity estimation.

Table 1.1 Summary of cross-check ranges against Ofwat's PR24 FD CAPM-implied CoE range and Oxera's estimated CoE range (CPIH-real)

Parameter/ cross-check	Cost of equity
Ofwat's PR24 FD range	4.58–5.07%
Ofwat's MARs-inferred CoE ¹	4.30–6.30%
Ofwat's selected analyst reports ²	5.00–5.60%
Ofwat's analyst expectations survey ³	4.87–5.48%
Oxera's estimated CoE range	5.53–6.25%
Oxera debt-based cross-check lower bound	6.14–6.20%
Oxera's MARs-inferred CoE	6.13–7.34%
Oxera's infrastructure fund cross-check	7.12–7.24%

Note: ¹ Shown to two decimal places as rounded based on Ofwat's PR24 FD. ² Shown to two decimal places as rounded based on Ofwat's PR24 FD. Ofwat's investor surveys refers to (1) Deutsche Bank (2024), ODI shift incrementally positive, although review still challenging, 17 October, (2) Bank of America (2024), UK water utilities a turning tide: sea higher returns', 22 October, (3) Email correspondence with UBS in November 2024, (4) JP Morgan (2024), UK Water, 5 November. ³ Ofwat does not provide a source for this. Source: (1) Ofwat (2024), PR24 final determinations: Allowed return appendix, 19 December, accessed: <https://www.ofwat.gov.uk/wp-content/uploads/2024/12/PR24-final-determinations-Aligning-risk-and-return-Allowed-Return-Appendix.pdf>. (2) Oxera analysis.

Figure 1.1 Cross-check ranges against Ofwat's PR24 FD CAPM-implied CoE range and Oxera's estimated CoE range (CPIH-real)



Source: Oxera analysis.

In summary, our findings presented in this report support the view that **Ofwat's PR24 FD CoE allowance is set too low**. Indeed, Ofwat's own cross-checks presented in the FDs do not support its CAPM-implied CoE range. Applying the cross-checks to our estimated CoE range for PR24, we find that **the cross-checks support the upper bound (6.25%, CPIH-real) of our CAPM-implied CoE range**.

1 Introduction

The PR24 price review process conducted by Ofwat in consultation with the England and Wales water sector sets the regulatory allowances for the upcoming regulatory period covering 2025–2030 (known as AMP8).

A key building block of the allowed revenues under the regulatory model is the weighted average cost of capital (WACC), which captures the base rate of return to capital investors. The cost of equity (CoE) is a key component of the WACC—as the CoE is not immediately observable from capital markets, the commonly accepted regulatory approach relies on the Capital Asset Pricing Model (CAPM) to derive an estimate of the CoE.

The CAPM and its parameters are inherently subject to estimation and measurement error. Owing to this parameter uncertainty, the CAPM-implied CoE is typically quoted as a range, from which a point estimate is then selected and used to calculate the WACC.

The use of additional information is an important way to cross-check the CAPM-implied CoE, allowing informed considerations to arrive at the appropriate CoE point estimate.

In this report, we consider the evidence from cross-checks in the context of Ofwat's PR24 FD and our estimate of the appropriate CoE, as contained within our report PR24 Cost of equity estimation.³ Specifically, we comment on Ofwat's analysis of the suite of cross-checks and outline additional evidence that should be considered to set a robustly evidenced CoE point estimate that would address the challenges faced by the industry, in particular on investability.

1.1 Overview of Ofwat's PR24 FD approach

In the PR24 Final Determinations (FDs), Ofwat's CAPM estimation resulted in a range for the CoE from 4.58% to 5.07% (4.83% midpoint, CPIH-real).

Ofwat then 'aimed up' from the midpoint of its CoE range to a point estimate of 5.10% using an implied aiming up adjustment of 27bps. Ofwat reasoned that this aim up was justified given considerations of

³ Refer to Oxera (2025), PR24 Cost of equity estimation, 21 March.

negative investor sentiment towards the water sector, and extensive financing needs of the large capital programmes planned for AMP8.

In arriving at its CoE point estimate, Ofwat highlighted the following considerations in supporting its CAPM-implied range.

- Cross-checks from market evidence;
- Welfare impacts from underinvestment;
- Asymmetry in the incentives package;
- Asymmetry in the choice of CAPM parameters; and
- Financeability.

However, Ofwat did not provide a quantitative breakdown of its aiming up adjustment.

1.2 Cross-checks considered by Ofwat

In the FD, Ofwat considered the following cross-checks.

- Debt-based cross-checks studying the differences in debt and equity premia (which includes a range of methods);
- Multi-factor models;
- Market-to-asset ratios (MARs);
- Evidence from equity analyst reports and investor survey evidence.

However, while it commented on a range of cross-checks, Ofwat ultimately placed weight on only the MARs cross-check, arguing that this was supportive of its CAPM-implied CoE estimates. While Ofwat has recognised the importance of debt-based cross-checks in principle, based on its analysis, Ofwat concluded that this cross-check does not raise a concern over the level of the allowed CoE.

This report is structured as follows.

- Section 2 explores cross-checks based on observations from debt market data, to inform the sufficiency of the equity premium.
- Section 3 details our analysis of the market-asset ratio (MAR) cross-check, including the MARs-inferred CoE.
- Section 4 considers evidence from infrastructure funds as a cross-check to the CAPM-implied CoE.
- Section 5 covers evidence from equity analyst reports.
- Section 6 concludes.

2 Debt-based cross-checks

Debt-based cross-checks are grounded in the fundamental principle of risk aversion in finance, comparing the spread or premia on equity over debt. As debt holders have priority claims over an asset and its cashflows ahead of equity investors, equity investors are subject to greater risks and accordingly expect higher returns. If the allowed return on equity is set too low relative to the market return on debt, investors would not be incentivised to allocate equity capital to the water sector—suggesting an error in the CoE estimation.

Securing a sufficient spread in the returns of equity over debt is especially important given the significant equity capital requirements forecasted for AMP8 and for the following periods.⁴ **An insufficient equity premium, signalled by a low or negative spread between the returns of equity over debt, would depress the water sector's ability to attract the required capital for investment.** This could also channel potential investors to prefer debt investments—notwithstanding the notional gearing set by Ofwat, it is imperative that real world concerns affecting the availability of capital are sufficiently considered. In other words, the extensive capital programme of AMP8 and onwards, including the associated equity investment, must be feasible without materially higher gearing than currently assumed.

A key advantage of debt-based cross-checks is that the yields on publicly traded debt are directly observable in the market, while the CoE is unobservable. To improve comparability of the relative spread or premia and increase the robustness of debt-based cross-checks, a range of methodologies have been developed and used by various parties including investors, advisors and regulators.

2.1 Critique of Ofwat's PR24 FD debt-based cross-check

In its PR24 FDs, Ofwat commented on a range of debt-based cross-checks proposed by the water companies, however opted to perform its own debt-based cross-check. Specifically, Ofwat compared the midpoint of its CAPM-implied CoE range (4.82%, CPIH-real) with yields on (i) two water company bonds (Severn Trent and South West Water) and (ii) the benchmark debt indices (iBoxx A 10+ non-financials and iBoxx BBB 10+ non-financials).

⁴ Oxera (2025), Investability and Financeability in PR24, 21 March.

2.1.1 Ofwat's use of swaps market data to inform the inflation deflator for its cross-checks

Ofwat's decision to use maturity-matched CPI swap rates to deflate nominal data assumes that these rates provide an unbiased estimate of long-horizon CPIH inflation plus a risk premium. However, several salient facts documented in a Bank of England working paper on the inflation swap market suggest this is unlikely to be the case.⁵

First,

"dealer banks are not neutral market makers. [They] have issued an amount of inflation protection in this market that is beyond their holdings of index-linked government bonds." ⁶

Second,

"it is primarily Pension Funds and Liability Driven Investors (PFLDIs) that take the opposite position to dealers. They have persistently large and positive net notional positions in this market [and there is a] largely one-directional appetite of PFLDIs for buying inflation protection." ⁷

The authors then report the following results from modelling supply and demand for inflation swaps.

"The observed prices of inflation swaps... can therefore be very far from actual risk-adjusted expected inflation... and move significantly over time, **driven by market frictions.**" ⁸ [Emphasis added]

And,

"... in the long horizon market, the slope of the supply function is close to zero. This almost-horizontal supply curve is close to a situation where **dealers effectively set prices in the long-horizon market, with full bargaining power relative to their pension fund clients.**" ⁹ [Emphasis added]"

A market characterised by sellers of inflation swaps having full bargaining power, suggests that the fixed-leg of inflation swaps paid by

⁵ Bank of England, Bahaj, S., Czech, R., Ding, S., Reis, R. (2023), The market for inflation risk—staff working paper no. 1,028, June, accessed: <https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2023/the-market-for-inflation-risk.pdf>.

⁶ Ibid, p.8.

⁷ Ibid, p.8.

⁸ Ibid, p.20.

⁹ Ibid, p.31.

PFLDs to banks will be high relative to an unbiased estimate of long-horizon inflation plus a risk premium. This implies that Ofwat's use of swap market evidence to deflate nominal values will produce CPIH-real values that are too low.

2.1.2 Unevidenced conclusion over sufficiency of spread

Based on its analysis of two water company bonds and benchmark indices, Ofwat then acknowledges that while the spread between its CoE and bond yields is lower than in previous determinations, this was not 'clearly too low'.¹⁰

Crucially, Ofwat does not define what it considers a 'reasonable' level of spread of equity over debt returns, nor does it evidence how low the spread would need to be before it is considered too low.

To illustrate the scale of narrowing spread acknowledged by Ofwat, we extend Ofwat's point-in-time analysis into a time series. Using the same sample of debt instruments as Ofwat, we plot a comparison of debt yields to historical CoE determinations in Figure 2.1.

¹⁰ Ofwat (2024), PR24 final determinations: Allowed return appendix, 19 December, p. 64, accessed: <https://www.ofwat.gov.uk/wp-content/uploads/2024/12/PR24-final-determinations-Aligning-risk-and-return-Allowed-Return-Appendix.pdf>.

Figure 2.1 Spreads of cost of equity determinations relative to selected cost of debt benchmarks (CPIH-real)



Note: iBoxx yields deflated to CPIH-real terms assuming 2% long-run inflation. Historical RPI-real determinations have been converted to CPIH-real using the long-term wedge as stated by the Office for Budget Responsibility (OBR). We have reflected the changes in the long-term wedges over time. The respective wedges used for PR04, PR09 and PR14 are 0.49%, 0.49%, and 0.69% respectively. For the years before the Bank of England started targeting CPI, we use the 2.5% RPI target.

Source: Oxera analysis.

The analysis above shows that regardless of the inflation assumption applied to deflate debt yields, it is clear that equity premia over debt resulting from the PR24 FDs is significantly lower relative to historical determinations. Specifically, Ofwat's FD allowance for the CoE is only some 90bps higher than its determination in PR19, despite the fact that debt yields have risen by over 400bps in the same time span. This clearly illustrates that the incentives for equity investment have diminished greatly.

In the coming sections, we build on this observation to establish that Ofwat's PR24 FD CoE allowance fails to satisfy debt-based cross-checks, and indeed sets a spread of equity over debt that is too low. We do so iteratively, by determining incrementally the lower bound for the CoE as follows.

- First, as we have shown in this section, the equity premia over debt resulting from the PR24 FDs has narrowed significantly. This analysis provides only a loose lower bound for the CoE, as it does not fully inform the adequacy of the CoE.
- Second, in Section 2.2, we use the cost of new debt to set a tighter lower bound, relying on comparisons to the FD unlevered CoE, i.e. equity return assuming the notional company has no gearing.
- Finally, in Section 2.3, we further tighten the lower bound by studying the debt risk premia arising from actual bonds issued by the sector. Extrapolating this by assuming the notional company is fully debt-funded, we then establish the most informative lower bound for the CoE by adjusting for gearing.

2.2 Unlevered cost of equity cross-check

Following the observation of the significant narrowing in equity spreads over debt, it can be determined that Ofwat’s PR24 FD sets the CoE too low by considering the spread of the unlevered CoE over debt.

In simple terms, this analysis estimates the CoE of a fully equity financed company (a company with no leverage, i.e. unlevered). As established above, the CoE must be higher than the cost of debt in all circumstances, including on an unlevered basis. Conducting this analysis is advantageous as it allows the definition of a tighter theoretical lower bound for the CoE than the direct comparison applied by Ofwat in Section 2.1. In doing so, this analysis provides a simple, unambiguous test of the sufficiency of the CAPM-implied CoE, without any adjustments necessary other than to use Ofwat’s FD asset beta and cost of new debt (CoND) estimates.

Using only the parameters of Ofwat’s FD, this simple test shows that the relationship between equity and debt returns is violated as the unlevered CoE is 32bps lower than the CoND. In other words, the FD CoE is set too low.

Table 2.1 Spread of the unlevered cost of equity over the cost of new debt based on Ofwat’s FD estimates

Parameter	Value
Unlevered CoE	3.42%
Cost of new debt (CoND)	3.74%
Unlevered CoE v CoND	-0.32%

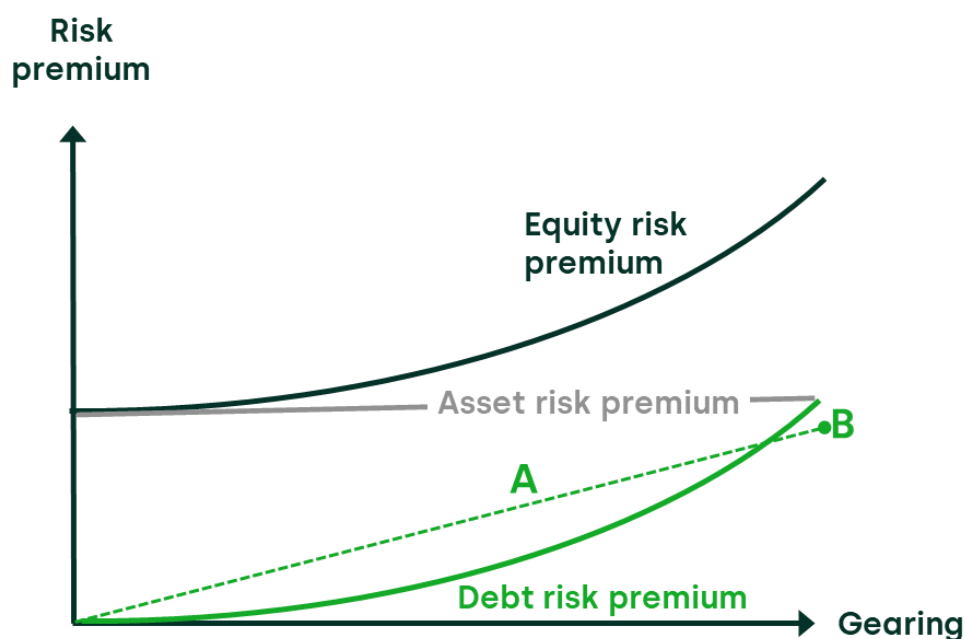
Having established the insufficiency of Ofwat's FD CoE, we next consider how expanded debt-based cross-checks can provide a tighter lower bound for the estimate of the appropriate CoE that provides a sufficient premium over the cost of debt.

2.3 Debt premia cross-check

2.3.1 Framework for evaluating debt and asset premia

While improving on the baseline direct comparison of the CoE to the cost of debt, the unlevered CoE cross-check only provides the absolute theoretical lower bound. This lower bound can be refined further by adjusting the cost of debt for gearing through analysing the premia on assets over debt (ARP–DRP framework).

Figure 2.2 The relationship between gearing and risk premia



Source: Oxera.

For this comparison, the CoE, CoD, and WACC are expressed in terms of the premia available to equity and debt investors respectively, defined as a return on the asset in excess of the risk-free rate (RfR). We estimate the premia as follows.

$$ARP = \text{asset beta} * (TMR - RFR)$$

$$DRP = CoND - \text{expected loss} - RFR$$

The asset risk premium (ARP) is calculated based on the CAPM parameters used by the regulators or suggested by other stakeholders. In the debt risk premium (DRP) calculation, the CoND is measured through the observed yield to maturity of relevant debt instruments. The 'expected loss' parameter represents the annualised probability of default multiplied by the losses that a debt investor will suffer if a borrower defaults. For BBB+ rated debt (as is applicable to the water sector), we have estimated this parameter to be equal to 0.30%. Our expected loss calculation uses annualised default rates based on Feldhütter and Schaefer (2018) that are higher than those reported by Moody's. Using Moody's reported default rates would produce a lower expected loss assumption, i.e. a higher DRP estimate, and so we consider our assumed 0.30% expected loss to be a conservative estimate.¹¹ Subtracting the expected loss converts the CoND into an expected return on debt.

The key advantages of this approach are:

- through expressing the relative CoE and CoND as risk premia, this provides an evaluation that is neutral to the treatment of inflation. In other words, the risk differential will be the same, whether it is derived in nominal, RPI-, or CPIH-real terms; and,
- other premia in the debt yields are accounted for through the deduction of the expected loss.

Similar to the analysis of the unlevered CoE cross-check in Section 2.2, the ARP must always exceed the DRP. However, to arrive at a tighter lower bound than the unlevered CoE cross-check, we re-lever the CoD to estimate the DRP at 100% gearing, i.e. assume the notional company to be fully debt-financed.

As illustrated in Figure 2.2 above, the DRP at 100% gearing proxies the overall ARP. We extrapolate on a linear basis the DRP from observed company gearing to 100% gearing. We have shown in a separate report that a linear extrapolation is likely to be an underestimation of the actual risk premium that would be expected for a hypothetically 100%

¹¹ For the full methodology behind the 0.30% point estimate, see Oxera (2019), 'Risk premium on assets relative to debt', 25 March, p. 11, <https://www.northerngasnetworks.co.uk/wp-content/uploads/2020/09/Oxera-2019-%E2%80%98Risk-premium-on-assets-relative-to-debt%E2%80%99-25-March.-1.pdf> (accessed 24 September 2024). See Feldhütter, P. and Schaefer, S.M. (2018), 'The myth of the credit spread puzzle', *The Review of Financial Studies*, 31:8, pp. 2897–2942; Moody's (2023), 'Annual default study: Corporate default rate will rise in 2023 and peak in early 2024', 13 March, Exhibit 36.

debt-financed company.¹² Therefore this calculation provides a tighter and more informative lower bound for the ARP and hence CoE.

2.3.2 Cost of equity implied by water companies' debt premia

We perform this analysis based on a comprehensive sample of water company bonds with comparable characteristics. Based on Ofwat's balance sheet model used in the PR24 FDs, we filter for company debt instruments based on the following criteria:

- fixed interest rate bonds;
- bullet maturity;
- maturity date after 1 January 2035 (i.e. time to maturity from current date of at least 10 years);
- denominated in GBP;
- excluding bonds from Thames Water and Southern Water.¹³

Based on these criteria we have identified a sample of 34 bonds (one bond was excluded from the overall sample of 35 bonds due to a lack of historically traded price data). We consider our selected sample to be representative of the sector median, given the weighted average rating of our sample is equivalent to Baa1.¹⁴ We note also that this implies our deduction for the expected loss is conservative as it may be an overestimate, given that the expected loss on a Baa1 bond would be lower than the expected loss on a broad BBB-rated bond (the latter of which is the basis for the 0.30% expected loss deduction). The total number of debt instruments per company included in the sample is summarised in Table 2.2.

Table 2.2 Number of debt instruments per company in the sample set

	AFW	ANH	NES	SVH	SBB	UUW	WSX	YKY
Number of bonds forming the sample	2	2	1	8	1	8	4	8

¹² Oxera (2024), 'Evaluation of the ARP–DRP framework', prepared for Energy Network Association's electricity distribution network operator and transmission owner members, 8 November. The key assumption affecting the effectiveness of a linear extrapolation is the convexity of the DRP curve. Based on volatility estimates for a regulated utility company within a Merton model the convexity assumption is very likely to hold. Hence, our approximation suggests that a linear extrapolation is likely to underestimate the actual lower bound for DRP at 100% gearing and hence also ARP.

¹³ Bonds issued by Thames Water and Southern Water are excluded as following recent debt write-downs, several bonds thus trade at deep discounts to par, and as such are not representative of the rest of the sector or a notional company.

¹⁴ Of our sample, using Moody's ratings, 1 bond has an A1 rating, 2 have A3 ratings, 23 have Baa1 ratings, and 7 have Baa2 ratings, as of 14 February 2025.

For the sample of instruments, we then calculate a daily DRP series for each bond by:

- 1 Taking the mid yield to maturity and Macaulay duration of each instrument.
- 2 Matching each instrument with a nominal gilt with tenor corresponding to the duration of the bond.¹⁵
- 3 Subtracting the corresponding gilt yield from the yield of the bond.
- 4 Subtracting a 30bps adjustment for expected loss.

Next, based on the DRP series for each of the instruments we calculate a simple average DRP for each company in our sample set. The resulting average DRP estimates for each company are presented in Table 2.3.

Table 2.3 Average debt risk premium of sample set

	AFW	ANH	NES	SVH	SBB	U UW	WSX	YKY	Average
Spot	1.43%	1.40%	1.27%	0.99%	1.46%	0.95%	1.27%	1.34%	1.26%
1m	1.46%	1.39%	1.35%	1.01%	1.55%	0.92%	1.26%	1.42%	1.30%

Source: Oxera analysis

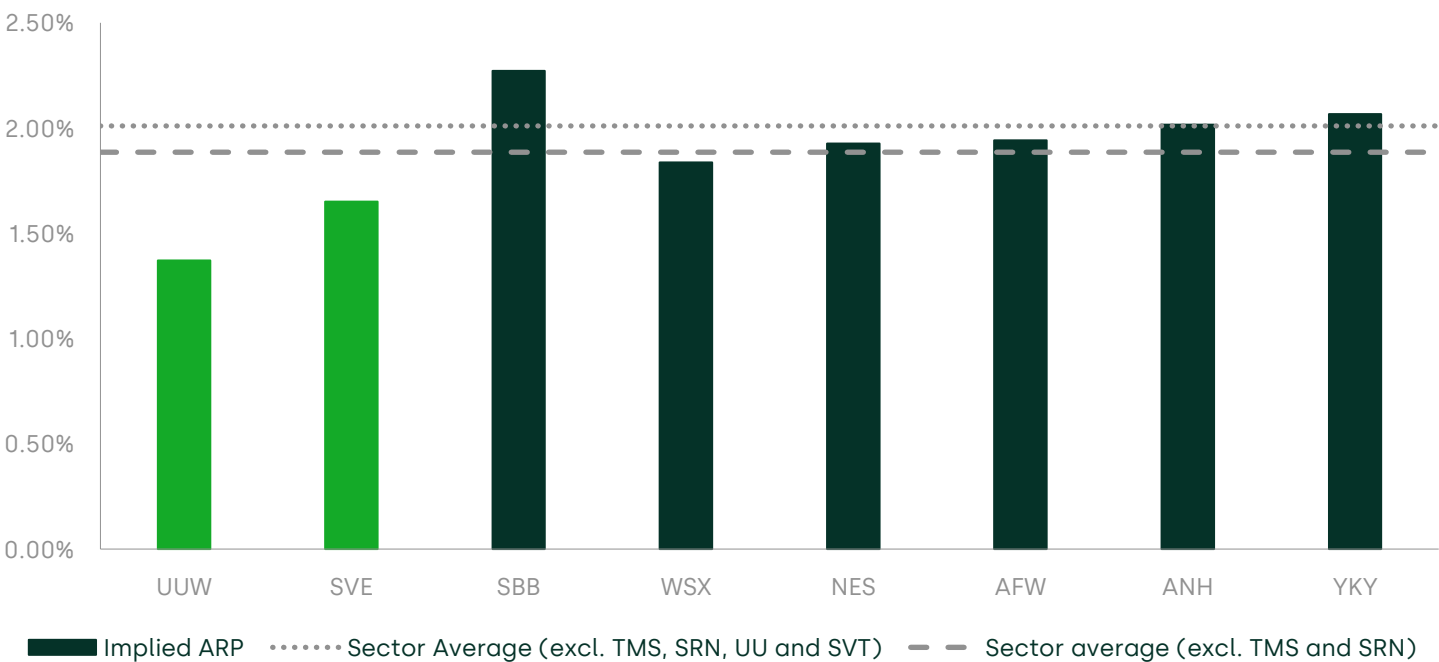
The results add support to the sample selection, as we observe that company DRPs are broadly comparable to each other, with the exclusion of Severn Trent and United Utilities—both of these show outlier DRPs well below the sample average. We return to this observation below. Elsewhere, we also note only minor differences in estimates when calculated on a spot or one-month average basis. In order to avoid bias from potentially outsized impacts from spot market volatility on the estimates, we use the one-month average value in the following calculation steps.

Next, we extrapolate the DRP estimate for each company to 100% gearing based on the actual gearing of each company in order to

¹⁵ The corresponding gilt is based on the Bank of England nominal zero coupon gilt spot curve.

estimate the implied ARP lower bound. The resulting lower bound ARP estimates are presented in Figure 2.3.

Figure 2.3 Implied asset risk premium lower bound



Source: Oxera analysis.

The estimates of the implied ARP show a divergence over the perceptions of risk across the sector with Severn Trent and United Utilities having a materially lower level of perceived risk and thus, lower implied risk premium than other companies, even after adjusting for differences in gearing. Indeed, the implied risk premium on Severn Trent and United Utilities is markedly below the sector average, signalling that as top performers in the sector, their inclusion into various analyses could lead to results that are not representative of the wider water sector .¹⁶

¹⁶ This is consistent with our findings in the beta section of the CAPM, in inferring the CoE from MARs analysis, and in analysing the net equity needs by water company. UU and SVT are shown to be consistently top performers across various analyses, suggesting that analysis results including and based on just these companies could lead to biased estimates which are not representative of the notional water company. See: (1) Oxera (2025), Investability and Financeability in PR24, 21 March, and (2) Oxera (2025) PR24 Cost of equity estimation, 21 March.

Finally, we calculate the corresponding CoE based on assumptions for the RfR and total market return (TMR). Specifically, we calculate the implied CoE ranges based on:

- Ofwat's FD TMR assumption (6.83%, CPIH-real), and RfR with updated market data up to 31 January 2025 (2.07%, CPIH-real);¹⁷ and
- Oxera's estimates of the RfR (2.31%, CPIH-real) and TMR range (7.00–7.50%, CPIH-real).¹⁸

Table 2.4 Implied cost of equity based on one-month average debt risk premium (CPIH-real)

	Ofwat FD with market update ¹	Oxera estimates
Sector average (excl. TMS and SRN)	5.68%	5.87–5.93%
UU and SVT	4.85%	5.03–5.09%
Sector average (excl. TMS, SRN, UU and SVT)	5.96%	6.14–6.20%

Note: ¹Implied cost of equity range for Ofwat's FD parameters are calculated based on one-month average DRPs and RfR up to 31 January 2025. Oxera estimates are based on the Oxera CAPM range assuming a RfR of 2.31% (CPIH-real) and TMR range of 7.0–7.5% (CPIH-real).

Source: Oxera analysis.

The results of the analysis show that a significant increase to the PR24 FD CoE (of 5.10%, CPIH-real) is needed to achieve a sufficient spread over traded debt costs. Indeed, Ofwat's FD CoE is only shown to be sufficient by the implied CoE of UU and SVT (of 4.85%, CPIH-real).

This highlights a second key implication of the analysis, specifically that the implied CoE is significantly lower when including, or based on, the debt instruments of UU and SVT, compared to the rest of the sector. **This underlines that the Ofwat FD CAPM-implied CoE estimate, which is based on the betas of UU and SVT exclusively, is not representative of the CoE of the sector nor of the notional water company.** We expand on

¹⁷ We maintain fully Ofwat's PR24 FD methodology for the estimation of the RfR, updating only for market data to our cut-off of 31 January 2025. See Ofwat (2024), PR24 final determinations: Allowed return appendix, 19 December, p. 6, accessed: <https://www.ofwat.gov.uk/wp-content/uploads/2024/12/PR24-final-determinations-Aligning-risk-and-return-Allowed-Return-Appendix.pdf>.

¹⁸ Oxera (2025), PR24 Cost of equity estimation, 21 March.

this, and the differences in risk perceptions and the expected returns of UU and SVT relative to the rest of the sector in Section 3.

After adjusting for the effects of gearing, this analysis of debt premia suggests that an appropriate range for the CoE for a notional company is likely to be in a range of 6.14–6.20% (CPIH-real), drawing from our estimates of the sector averages excluding TMS, SRN, UU and SVT. Based on our analysis of the relationship between debt spreads and the CoE, this range serves as a lower bound to the required return on equity that an investor would require to invest equity rather than debt.¹⁹ Importantly, this analysis excludes the risk premia implied by the traded debt yields of Thames Water and Southern Water (as the riskiest companies in the sector), and Severn Trent and United Utilities (as the top performers in the sector)—including these into the sample would bias the sector average implied CoE materially and limit representatives for the notional company. **Accordingly, we conclude that debt-based cross-checks imply an appropriate CoE of at least 6.20% (CPIH-real)—this supports the upper-bound of our CAPM-implied CoE range of 6.25% (CPIH-real).**²⁰

2.4 Conclusions

Overall, evidence from the iterations of debt-based cross checks point at the same conclusion—**Ofwat's PR24 FD does not offer a sufficient premium on equity over debt.** Direct comparisons of historical CoE determinations with the underlying return on debt show that the spread on equity has narrowed to an unprecedented low level. Further refining the comparison through de-levering the CoE shows that Ofwat's FD CoE estimate violates the fundamental principle of risk aversion in finance, signalled by the premia on equity without gearing being less than the cost of new debt. Finally, based on a sample of water company bonds, **adjusting debt premia for gearing shows that a stricter lower bound on the CoE at least 6.20% (CPIH-real)** is warranted for AMP8—considerably above Ofwat's allowance of 5.10% (CPIH-real) in its PR24 FDs.

¹⁹ Oxera (2024), Evaluation of the ARP–DRP framework, 8 November, <https://www.spenergynetworks.co.uk/userfiles/file/Oxera-Evaluation-of-the-ARP-DRP-Framework.pdf>.

²⁰ Oxera (2025), PR24 Cost of equity estimation, 21 March.

3 Market-to-asset ratios cross-check

The market-to-asset ratio (MARs) cross-check studies the ratio of the market value of the company, as indicated by public market trading, to its regulatory capital value (RCV). In its PR24 FD, Ofwat expanded on this to infer a range of the expected CoE based on the market premium (or discount) of the traded market capitalisation of the company relative to the regulatory value of equity.

Ofwat's extension, which we label as MARs-inferred CoE analysis, requires stylised in-perpetuity assumptions to be made on the expected rate of RCV growth and return on regulatory equity (RoRE) performance to derive a CoE range.

3.1 Critique of Ofwat's PR24 FD MARs analysis

In its FD, Ofwat assumed RCV growth of 0–2% and RoRE outperformance of 0–2%, and used the midpoint of its CAPM-implied CoE range of 4.82% (CPIH-real) as inputs to derive the MARs-inferred CoE.

In the first instance, from the results of Ofwat's analysis in the FDs (shown in Table 3.1), it can be discerned that this results in a very wide MARs-inferred CoE range of 4.30–6.30%, questioning the usefulness of this cross-check in calibrating the CAPM-implied CoE range. Moreover, in concluding that the results support its CAPM estimates, **Ofwat fails to recognise that its CAPM-implied CoE range falls entirely within the lower half of its own MARs-inferred CoE range.** Substantially, Ofwat's FD CoE point estimate is below even the midpoint implied by its own MARs-inferred CoE range (5.3%, CPIH-real). This is problematic for several reasons which we detail in this section.

Table 3.1 presents the results of Ofwat's MARs-inferred CoE analysis in the FD, along with an updated view based on Ofwat's methodology, applying the FDs allowed CoE and subsequent movements in the market capitalisation of the three listed water companies.

Table 3.1 MARs-inferred CoE results

	Ofwat FD Low	Ofwat FD High	Ofwat Updated Low	Ofwat Updated High
Notional gearing	55%	55%	55%	55%
Allowed CoE	4.82%	4.82%	5.10%	5.10%
RoRE performance	0%	2%	0%	2%

	Ofwat FD Low	Ofwat FD High	Ofwat Updated Low	Ofwat Updated High
RCV growth	0%	2%	0%	2%
MARs				
United Utilities	1.08	1.08	1.10	1.08
Severn Trent	1.16	1.16	1.28	1.20
Pennon	0.97	0.97	1.00	0.98
Inferred CoE				
United Utilities	4.09%	6.09%	4.16%	6.30%
Severn Trent	3.56%	5.56%	3.13%	5.52%
Pennon	5.16%	7.16%	5.12%	7.34%
Average¹	4.30%	6.30%	4.10%	6.40%

Note: Cut-off date of 31 January 2025. ¹ Shown to two decimal places as rounded based on Ofwat's PR24 FD.

Source: Ofwat (2024), 'PR24 Final Determinations: Allowed return appendix', 19 December, <https://www.ofwat.gov.uk/wp-content/uploads/2024/12/PR24-final-determinations-Aligning-risk-and-return-Allowed-Return-Appendix.pdf>; Oxera analysis.

It is instructive to first acknowledge a wider problem with the MARs-inferred CoE approach that Ofwat has adopted—this approach is insufficiently representative of the sector, and the notional water company. **As MARs analysis is dependent on a small sample of listed water companies—in this case, Severn Trent, United Utilities, and Pennon—its results are prone to bias.** This should be uncontroversial—for example, two out of three companies were rated as Outstanding in Ofwat's QAA mechanism (and were the only two companies in the sector to be rated Outstanding), all three expect to generate returns outperformance over AMP8 (as highlighted above), and all three have a track record of historical outperformance, and being 'best in class'.²¹

Effectively, the sample set is formed of only upper quartile performing water companies. It is therefore unreasonable for Ofwat to conclude that its MARs-inferred CoE range supports its CAPM-implied CoE as the appropriate estimate of the CoE for the notional company. As a result,

²¹ Refer to Section 5.1. A publication by Deutsche Bank highlights explicitly that the three listed companies "are considered best in the class" and the "average sector return would be much lower, and very unattractive". As such, evidence from analysis of the three listed companies alone is likely to be optimistically biased when considering the required rate of return, thus understating the CoE for the notional water company.

the impact of the expected outperformance of the listed companies creates challenges for a direct read-across of the MARs analysis to the CoE for a notional company.

An additional complication limiting the robustness of Ofwat's MARs-implied CoE is that the MARs of the listed companies are strongly influenced by investor expectations over regulatory settlements and the out- or under-performance of the companies—this is likely to be different from the in-perpetuity assumptions that Ofwat relies on. These investor expectations are heavily influenced, among other things, by statements made by the listed companies on their expected performance over AMP8 and beyond.

Expanding on this, in the responses to the FDs, all three listed companies signalled optimism over their ability to outperform the base return allowance either explicitly or through highlighting their significant historical track record of outperformance. Specifically, the listed companies made the following statements.

- Severn Trent highlighted the QAA reward (30bps to RoRE) granted to it in the FDs and placed further emphasis on its outperformance of base returns over AMP6 and AMP7 (2.9% and 4.2% above the base returns, respectively);²²
- United Utilities similarly emphasised its historical outperformance over base returns, in addition to stating its ability to maintain dividend growth in-line with inflation;
- Pennon explicitly targeted a return of 7% for AMP8 period, implying a significant outperformance of the baseline return.²³

While the overall level of outperformance is inherently uncertain, it is clear that these communications to investors would influence the pricing of the company's equity in public markets, thus impacting the MARs. In particular, it is not immediately clear that reading across from the MARs-inferred CoE to the appropriate allowed CoE for the notional company is a robust approach, especially when the MARs-inferred CoE is impacted by returns outperformance expected of the three listed companies, rather than the base returns that a notional company would be expected to achieve. Indeed, as the base case assumption is that the notional company would achieve only its base returns, Ofwat should

²² Severn Trent (2024), PR24 Final Determination webcast slides, 20 December, accessed: [severn-trent-water-pr24-webcast-slides.pdf](https://www.severn-trent-water-pr24-webcast-slides.pdf).

²³ Pennon Group (2025), PR24 Final Determinations investor summary, January, accessed: https://www.pennon-group.co.uk/system/files/uploads/financialdocs/J522%20InvestorDoc_FD%20FINAL%20280125.pdf.

have concluded that the reasonable range for the CoE should be the upper half of its MARs-inferred CoE range (i.e. results which do not impute any outperformance), thus indicating the insufficiency of its CAPM-implied CoE range.

At the minimum, for MARs analysis to be useful for informing the range of CoE expected by the investors in the listed companies, the lower bound of expected RoRE outperformance should be recalibrated from 0% to at least 1% to reflect investor expectations of persistent outperformance over the baseline allowance for the sample set. The CoE implied by this adjustment to Ofwat's input assumption is summarised in Table 3.2.

Table 3.2 Adjusted MARs-inferred CoE results

	Low	High
Notional Gearing	55%	55%
Allowed CoE	5.10%	5.10%
RoRE performance	1%	2%
RCV growth	0%	2%
MARs		
United Utilities	1.10	1.08
Severn Trent	1.28	1.20
Pennon	1.00	0.98
Indicative CoE		
United Utilities	4.97%	6.30%
Severn Trent	3.75%	5.52%
Pennon	6.13%	7.34%
Average	4.95%	6.38%

Note: Cut-off date of 31 January 2025.

Source: Oxera analysis.

It is clear that even minor changes to the RoRE outperformance assumption significantly affect the CoE range implied by the MARs analysis. A revision to the RoRE expectations in the 'Low' scenario to 1%

to reflect investor expectations of outperformance leads to an increased implied CoE range of 4.95–6.38% (CPIH-real).

However, even with this calibration it is noticeable that the indicative CoE of UU and SVT are significantly different to that of PNN—for example, the average of the UU and SVT high case indicative CoE (of 5.91%, CPIH-real) is below even the lower bound of PNN (of 6.13%, CPIH-real). This again underlines that UU and SVT are outliers, visibly diluting the indicative CoE—on balance, **we conclude that it is unreasonable to suggest that the MARs or CoE for the notional company would be comparable to that of UU or SVT.** Therefore, to inform our range of the appropriate MARs-inferred CoE for the notional company, we opt to use the indicative CoE from PNN only, thus **arriving at a calibrated MARs-inferred CoE range of 6.13–7.34% (CPIH-real).** We consider this a reasonable approach, given that of the sample set, it is likelier that the notional company would be more comparable to PNN than either of UU or SVT.

3.2 Conclusions

The MARs analysis as implemented by Ofwat has several key drawbacks—the CoE implied by the traded prices of the listed water companies is (i) biased by the inclusion of SVT and UU, which are top performers in the sector with limited read across to the notional water company, and (ii) strongly influenced by investor expectations over the actual performance of the companies (guided also by company announcements post FD publication) and as such, is sensitive to the assumption used for RoRE outperformance in the analysis.

Updating Ofwat's analysis for stock price movements post-publication of the FD, reflecting listed company statements, and revising the RoRE outperformance adjustment to 1% in the 'Low' scenario, we find that the MARs-inferred CoE cross-check implies a range of 4.95–6.38% (CPIH-real). However, owing to significant attenuation of this range by UU and SVT data (which is unrepresentative of the notional water company), we elect to use data from PNN only, thus arriving at a calibrated **MARs-inferred CoE range of 6.13–7.34% (CPIH-real) which is more representative of the notional water company.**

4 Infrastructure fund returns cross-check

Water companies are competing for capital with other infrastructure assets across industries and geographies. As such, expected returns of listed infrastructure funds can serve as a useful datapoint to inform the returns that might be available (and expected) by an investor in infrastructure assets. A simple cross-check can use the discount rates used by the infrastructure funds as a proxy for the implied CoE. In this section, we outline how this analysis can be refined further to improve comparability with the CoE for a water company.

4.1 Direct infrastructure fund discount rate comparison

A simple version of the infrastructure fund cross-check has been applied by Ofgem in RII-GD/T2 price control determinations—Ofgem analysed the discount rate and net asset value (NAV)²⁴ premium of 13 infrastructure funds as a cross-check to the CoE allowance.²⁵ Ofgem's methodology for the infrastructure funds cross-check consisted of adjusting each fund's discount rate used for calculating NAV by the market premium/discount to the latest NAV to derive an adjusted IRR. This adjusted IRR was then used as a cross-check to support Ofgem's CoE assessment. The intuition for the application of this cross-check is that any premium/discount above the NAV means that the fund is overestimating/underestimating its own cost of capital, and hence that the discount rate needs to be 'corrected' to account for that overstatement/understatement.

Table 4.1 below summarises the sample of infrastructure funds included in the analysis.

²⁴ $NAV\ per\ share = Cash\ flow / Discount\ rate_{fund}$
²⁵ Ofgem (2020), 'RIIO-2 Draft Determinations – Finance Annex', 9 July, https://www.ofgem.gov.uk/sites/default/files/docs/2020/07/draft_determinations_-_finance.pdf.

Table 4.1 Portfolios of infrastructure funds

Company	Portfolio
BBGI	100% long-term availability-based public–private partnership
HICL	60% in public–private partnership, 19% in demand-based assets, and the remainder in regulated assets
GCP	65% in renewable energy, 24% in Private Finance Initiative, and 11% in social housing
INPP	50% in regulated investments, 29% in availability-based public–private partnerships, 11% in public–private partnerships with revenue risk mechanisms, and 10% in other rolling stock and digital infrastructure
GRP	100% in renewable energy technologies within the eurozone
UKW	100% operating in UK windfarms
FSFL	100% operating in ground-based solar power plants across the UK, Australia and Spain
TRIG	50% in onshore wind, 33% in offshore wind, 13% in Solar PV, and 4% flexible capacity
BSIF	100% operating in UK solar energy
NESF	100% operating in solar photovoltaic assets
JLEN (renamed FGEN)	100% in environmental infrastructure including wind, waste and bioenergy, anaerobic digestion, solar, low-carbon solutions, controlled environment and hydro
Excluded from the analysis	
JLIF	Inactive since 25 May 2018
JLG	Acquired by KKR in 2021

Source: Oxera analysis based on each fund's website.

Based on this sample, we calculated the adjusted discount rates for each of the funds based on their most recent financial reports. Results are summarised in Table 4.2. We find that all of the funds traded below their NAV at the date of the most recent publication of financial results for each fund. This suggests that the discount rate applied by the funds may be lower than the discount rate applied by the market. In other words, assuming that the discount rate reflects all the difference in asset valuation, the returns demanded by investors are higher than the cost of capital assumed by the infrastructure funds.

Table 4.2 Discount rates used by infrastructure funds (2024, nominal terms)

	Share Price ¹	NAV per share	Discount Rate	Adjusted discount rate
HICL	132.0	156.5	8.1%	9.6%
INPP	127.6	149.5	8.7%	10.2%
GCP	78.9	105.2	8.0%	10.6%
BBGI	132.8	147.4	7.3%	8.1%
GRP - unlevered portfolio IRR	0.8	1.1	7.2%	9.7%
UKW - levered portfolio IRR	127.7	151.2	11.0%	13.0%
FSFL - weighted average UK assets	90.1	114.9	8.0%	10.2%
TRIG	85.8	115.9	8.6%	11.6%
BSIF	105.6	219.7	8.0%	16.6%
NESF	71.5	104.7	8.1%	11.9%
FGEN	93.7	113.6	9.4%	11.4%
Average			8.4%	11.2%

Note: ¹Share price as of the date of publication of the relevant financial reports.

Source: HICL Infrastructure (2024), '2024 Interim Results Presentation', p. 6; International Public Partnerships (2024), 'Half-Yearly Financial Report for the six-months to 30 June 2024', pp. 50 and 55; GCP Infra (2024), 'Annual report and Financial Statements 2024', pp. 2 and 49; BBGI (2024), 'Interim Report 2024', pp. 21 and 22; Greencoat Renewables (2024), '31 December 2024 Factsheet', p. 1; Greencoat UK Wind (2024), 'Annual Report for the year ended 31 December 2024', pp. 1 and 84; Foresight Solar Fund Limited (2024), 'Half Year Report Presentation', pp. 12 and 13; TRIG (2025), 'The Renewables Infrastructure Group Annual Results 2024', pp.15 and 30; Bluefield Solar Income Fund (2024), 'Annual results for the period ended 30 June 2024 Presentation', pp.14 and 15; Next Energy Solar Fund (2024), 'NESP Annual Report 2024', p. 24; JLEN Environmental Assets Group Limited (2024), 'Annual Report 2024', pp. 9 and 39.

Specifically, the results show a range of adjusted discount rates from 8.1% to 16.6% (nominal), for an **average adjusted nominal discount rate of 11.2%**. Deflating this estimate to a CPIH-real estimate would clearly result in an implied return on equity significantly higher than is currently available in the water sector—for example, deflating by the long-run Bank of England CPI target of 2% would imply a real discount rate of 9.02%. Overall, that all of the sample funds trading at a discount to their NAV could be an indicator of highly competitive capital markets for investment in infrastructure.

4.2 Cost of equity implied by discount rates of infrastructure funds

The analysis based on the direct read across of the fund discount rates adjusted for NAV premium/discount can be refined by selecting the

most comparable funds in terms of risk and return attributes relative to the water sector. The discount rates of these funds can then be adjusted based on the specific fund characteristics and assumptions reported by the fund managers in their regular financial reporting.

Of the list of 13 infrastructure funds cited by Ofgem in RIIO-GD/T2 we observe that the asset classes and the risk of most of the diversified portfolios differ significantly to those of a pure-play energy network business. However, we find that HICL and INPP, partly due to their significant holdings in regulated assets, are most likely to have risk profiles comparable to water companies.

- **HICL** is an infrastructure fund focused on investments in core infrastructure assets across public–private partnership, demand-based assets, and regulated assets. As of 2024, the largest investment in HICL's portfolio is a 33.2% holding of Affinity Water. Of its total portfolio, 64% of its assets are held in the UK, including Affinity Water, HS1 and Southmead hospital.²⁶
- **INPP** is an infrastructure fund focused on investments in public services infrastructure—including investments in social infrastructure assets (health and education sectors), regulated utilities, transport and other sectors. As of 2024, the two largest investments in INPP's portfolio are Cadent, which owns four of the UK's eight regional gas distribution networks ('GDNs') and the Thames Tideway Tunnel. Around half of the portfolio fair value is made up of investments in 11 OFTOs. Of the total portfolio, 72% of its assets are held in the UK.²⁷

We note that these funds generally target investments with stable and predictable long-term cashflows.²⁸ In particular, some of the revenue or volume risks faced by the funds' portfolio companies may be effectively hedged by long-term or availability-based contracts and/or government subsidies.

We start our analysis by considering the discount rate used by each respective fund, as a proxy of the fund's nominal CoE. Next, we adjust

²⁶ HICL (2024), Annual report 2024, <https://www.hicl.com/wp-content/uploads/2024/05/HICL-Annual-Report-2024.pdf> (last accessed 5 March 2025)

²⁷ INPP (2024), Interim report 2024, <https://www.internationalpublicpartnerships.com/media/ycdkmpdj/inpp-interim-report-2024.pdf> (last accessed 5 March 2025)

²⁸ INPP (2024), Interim report 2024, p.15, <https://www.internationalpublicpartnerships.com/media/ycdkmpdj/inpp-interim-report-2024.pdf> (last accessed 5 March 2025),

the discount rate by the implied net asset value (NAV) premium—reflecting the market pricing of the fund and as such, the effective CoE implied by the pricing of the asset. We recalculate the implied NAV discount based on the movement of the underlying fund share price from the date of discount rate reporting to our cut-off of 31 January 2025. To convert the resulting nominal CoE to a CPIH-real implied CoE, we apply the inflation assumption used by each fund in its reporting.

Finally, we consider the impact of gearing on the resulting estimates. To control for the effects of gearing, we determine the implied equity beta from the implied CoE, using our estimate of the risk-free rate and total market return.²⁹ We then apply the de-lever and re-lever steps, using Ofwat's assumption of notional gearing of 55% in PR24, to arrive at the re-levered beta. Finally, we feed this into the CAPM along with our risk-free rate and total market return estimates to derive the implied re-levered CoE.³⁰ Table 4.3 summarises our results.

Table 4.3 Cost of equity implied by infrastructure funds cross-check (CPIH-real)

	Discount rate (nominal)	NAV adjusted discount rate (nominal) ¹	Fund inflation assumption	Implied fund CoE	Fund gearing	Implied re- levered CoE
HICL LN Equity	8.10%	11.28%	2.40%	8.67%	66%	7.24%
INPP LN Equity	8.70%	11.51%	2.25%	9.06%	69% ²	7.12%

²⁹ We use a risk-free rate of 2.31% (CPIH-real), and total market return of 7.50% (CPIH-real). Refer to Oxera (2025), PR24 Cost of equity estimation, 21 March.

³⁰ Using the NAV-adjusted nominal discount rate, we deflate this by the respective fund's stated inflation assumption, to arrive at the real implied CoE. We calculate the implied equity beta based on our CAPM point-estimate RfR of 2.31% (CPIH-real) and TMR of 7.50% (CPIH-real).

Note: ¹ The share price of HICL and INPP of 31 January 2025 were £112.4 and £113.0, respectively. ² INPP gearing was reported as c. 68% excluding senior and mezzanine debt. Adjusting for senior debt of 1%, this implies a gearing of 69%. See INPP (2024), H1 2024 results presentation, September, pp.28–32, accessed: <https://www.internationalpublicpartnerships.com/media/zizlu22p/inpp-hy-results-presentation-2024-vf.pdf>. Conducting the analysis based on the Ofwat FDs parameter estimates of RfR of 1.52% (CPIH-real) and TMR of 6.83% (CPIH-real) implies a re-levered cost of equity range of 6.88–7.05% (CPIH-real). Source: Oxera analysis.

The analysis suggests an implied CoE range of 7.12–7.24% (CPIH-real) at 55% gearing. The implied CoE estimates are reflective of the NAV discounts arising from market movements since the publication of the funds' latest financial reports. While we do not suggest that the output range be taken as a direct substitute to the CAPM-implied CoE or CoE ranges implied by other cross-checks, we consider this cross-check important as it **illustrates that higher returns on equity exist, and are available to (and expected by) infrastructure investors.** As the output range has been adjusted to reflect (i) Ofwat's notional gearing assumption of 55%, and (ii) the funds' inflation assumptions, which are higher than the long-run Bank of England CPIH target of 2%, we also note that the range may be an under-estimate.

4.3 Conclusions

Analysis of infrastructure fund discount rates suggest that on average after adjusting for NAV discount/premia listed infrastructure funds use a discount rate of 11.2% (nominal). Further analysis of the infrastructure funds with significant investments in regulated industries suggests an **implied CoE range of 7.12–7.24% (CPIH-real) at 55% gearing.**

5 Evidence from equity analysts

In this section we review how Ofwat interpreted information from equity analysts and an investor survey when citing these pieces of evidence as source of support for the 5.1% CoE in the PR24 FD.

5.1 Equity analyst reports

In the FD, as part of the top-down cross-checks, Ofwat has considered four equity analyst reports and unpublished email correspondence with one bank, in order to infer market sentiment and investor expectations. Based on the reports considered, Ofwat claims that:

- Equity analyst expectations support a range between 5.0–5.6% which envelopes Ofwat's 5.1% allowed return on equity estimate.
- 28% of respondents in the Barclays investor survey deem Ofwat's CoE allowance as appropriate;

There are several issues with Ofwat's representation of investor sentiment based on the equity analyst reports. Firstly, **most of the equity analyst reports comment on their expectations of the CoE allowance set by Ofwat, rather than what they deem sufficient to attract equity investment.** Indeed, equity analyst commentary on the sufficiency of the expected return of the listed companies are underpinned by expectations of significant RoRE outperformance, which cannot then be extended to the notional company (as it would by definition achieve only base returns).³¹

For example, a Deutsche Bank report cites an expected return of equity for the listed companies that is on average 1% higher than their estimated CoE for the sector.³² It also explicitly notes that the three listed companies "are considered best in the class" and the "average sector return would be much lower, and very unattractive". As such, these estimates are based on the outperformance expectation of the strongest performers in the sector are not reflective of the CoE for the sector as whole (and by extension the CoE of a notional water company).

Ofwat also cites that 28% of the respondents in the Barclays investor survey require a 5.0–5.6% (CPIH-real) return on equity for investing in a

³¹JP Morgan (2024), 'UK water', 5th November, p. 11, 15, & 16.

³² Deutsche Bank (2024), 'ODI shift incrementally positive, although review still challenging', 17th October.

water company.³³ However this does not clearly represent the expectations of the average investor, and was obsolete at the time of the FD publication. A November 2024 update to the survey found that 24% of investors require a return on equity above 6% (CPIH-real), with 74% of surveyed investors requiring a return on equity of at least 5.51% (CPIH-real). The same survey finds that 77% of surveyed investors consider that higher growth companies, reflective of the inherently increasing risks associated with the extensive capital investment programmes of the water sector, require a higher CoE allowance. Additionally, investors in the survey perceived UK water as by far the riskiest sub-sector of regulated utilities in Europe.

Ofwat also refer to a Morgan Stanley report, which states that the declining spread between regulated returns and bond yields may be offset by the change in CAPEX growth adding to the regulated equity based.³⁴ However, the report caveats this by stating that there is a **"strong onus on the regulator to present a regulatory framework going forward that continues to support value-accretive growth"**.

Overall, it is clear from the analyst reports that investors and equity analysts perceive the UK water sector as having increased in risk sector and thus requiring a corresponding increase in returns. As such, considering the large amount of equity needed to finance the AMP8 investment programme a sufficiently high CoE allowance is needed to ensure investability.

5.2 Conclusions

Our review of evidence from equity analyst reports highlights significant challenges facing the UK water sector in attracting investment, particularly due to relatively low allowed returns and increasing regulatory and operational risks.

Contrary to Ofwat's characterisations in its FDs, we find that equity analysts do indeed demand a higher CoE allowance than allowed by Ofwat in its FDs. In doing so, analysts highlight, in particular, the evolving risks arising from the capital investment programme, which do not compare well to the allowed CoE.

This underlines that unless Ofwat's regulatory package is adjusted to offer a more compelling investment proposition, the sector may struggle

³³ Barclays (2024), 'Rating agencies and investor survey: all about contagion', 14 November, p. 12.

³⁴ Morgan Stanley (2024), 'Final Determination Presents Opportunity for Sustained ReRating', 27th November.

to secure the essential funding needed to deliver on its investment programme while ensuring long-term sustainability and resilience.

6 Conclusions

In this report, we have considered a wide range of CoE cross-checks based on market debt costs, market pricing of the listed water companies, discounts rates used by listed infrastructure funds and top-down evidence on investor sentiment from surveys and analyst reports. All of these cross-checks universally point to a required CoE above the Ofwat point-estimate in its PR24 FDs of 5.10% (CPIH-real).

As should be clear, **the estimation of the CoE is a subject to estimation and measurement error**—this affects the CAPM as it does the cross-checks considered in PR24. **However, this should not mean that the CAPM-implied CoE should be relied upon unequivocally**, especially when all other cross-check evidence points to the contrary.

The strongest available cross-check evidence can be inferred through debt-based cross-checks, as these are based on fundamental principles of finance and debt data directly observable in the market. A simple historical examination of the spread of debt and equity as employed by Ofwat suggests that the premia available to equity investors has fallen to an unprecedentedly low level. By extending iteratively, we determine that debt-based cross-checks indicate a strict **lower bound for the CoE allowance of 6.20% (CPIH-real)**. This is supported by **our calibration of Ofwat's MARs-inferred CoE which suggests a range of 6.13–7.34% (CPIH-real)**. We also draw from **evidence from listed infrastructure funds, which suggests a CoE range of 7.12–7.24% (CPIH-real)** once adjusted for gearing. Finally, our research of equity analyst evidence altogether supports our findings across other cross-checks.

In summary, we consider that all of the cross-checks evidence suggests that Ofwat's PR24 FD CoE allowance is set too low, and is thus insufficient to attract the equity capital required for AMP8 and onwards. Instead, **the evidence presented in this report supports the upper bound (6.25%, CPIH-real) of our CAPM-implied CoE range.**³⁵

³⁵ Oxera (2025), PR24 Cost of equity estimation, 21 March.

Contact

Peter Hope

Partner

+44 (0) 20 7776 6621

peter.hope@oxera.com

oxera.com



oxera