CROSS-CHECK STANDARDS OF EVIDENCE

A report prepared for the Energy Networks Association and Future Energy Networks

22ND AUGUST 2025

Contents

Executive Summary

We have been asked by the Energy Networks Association (ENA) and Future Energy Networks (FEN) to assess the basis on which regulators (mainly Ofgem and Ofwat) have decided what reliance to place on different sources of evidence when setting the allowed equity return. We have been further asked to identify whether there are any inconsistencies to be found in historical practice, and whether we would recommend a different approach for the current and future price controls.

Ofgem's position at RIIO-3 so far

Ofgem has stated hitherto that it intends to focus on developing an investable price control and that it would use cross-check evidence to support this endeavour.

In response, Frontier prepared a report for the ENA setting out how cross-check evidence could be used to assess investability (Frontier's Investability Report).[1] While this report covered a wide range of cross-check evidence, it highlighted the particularly important role that hybrid bonds (and other debt based cross-checks) might play in assessing the overall cost of equity. This and further work also set out that DGM based analysis could provide a valuable cross-check on Total Market Return (TMR) (e.g. through the TMR Glider and the calibrated DGM).[2]

However, having reviewed Frontier's Investability Report and cross-check evidence submitted by companies at business planning stage[3], Ofgem has maintained that it will continue to rely on its own cross-checks utilised at RIIO-2. In particular, it has stated that it will not rely on the hybrid bond, DGM-TMR evidence or TMR Glider, with Ofwat adopting a similar position.[4]

Bias in Ofgem's approach

We have reviewed the reasons given by Ofgem (and Ofwat) for not relying on hybrid bonds and DGM based cross-checks on TMR. This reveals that Ofgem and Ofwat have not to date appraised the merits of different types of cross-check (suggested by the regulators and the stakeholders) on a consistent and objective basis.

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[1]   Frontier Economics (2024), Equity Investability in RIIO-3, A report prepared for the Energy Networks Association

[2]   The cross-checks considered in this case were Ofgem's own TMR cross-checks (first applied at RIIO-2), as well as new TMR cross-checks proposed by Frontier, which include the TMR Glider and also the DGM-based TMR. This includes survey evidence that was relied on by Ofgem, and the Fernandez survey that was considered by Ofwat in PR19. See for example PwC (2014), Updated evidence on the WACC for PR14

[3]   Frontier Economics (2024), Updated cost of equity cross-check evidence, A report prepared for the Energy Networks Association

[4]   Ofgem (2025), RIIO-3 Draft Determinations Finance Annex, pp. 66-68, and Ofwat (2024), PR24 Final Determinations: Aligning risk and return – allowed return appendix, p. 28

The reasons to discard cross-checks proposed by networks are often based on unreasonable hurdles, such as the sample being small, benchmarks being imperfect and the need to use assumptions to operationalise the cross-checks. Our analysis in this paper shows that if these hurdles are applied to Ofgem's own cross-checks, they would need to be discarded as well. For example, it is irrational to dismiss DGM-based TMR evidence proposed by Frontier on principle while relying on DGM-based MAR cross-checks suggested by Ofgem itself.

If Ofgem were to apply a consistent quality standard to the available cross-check evidence, it would find the evidence suggested by debt-based cross-checks and DGM-based TMR cross-checks informative. Failure to place weight on relevant information would be wrong and could lead to the allowed return being set at the wrong level.

In respect of Dividend Growth Model (DGM) based cross-checks on TMR, we note that Ofgem has rejected these out of hand as a result of concerns over DGM-based methods generally. But at the same time, Ofgem (and Ofwat) continue to rely on the historical ex ante approach to estimate the TMR and on Market-Asset-Ratio (MAR) inference to cross-check the cost of equity (CoE), both of which are based on the same DGM logic. Given this, the criticisms levied by regulators on the DGM-based TMR cross-checks equally apply to their own MAR inference (summarised in the table below).

Table 1   Summary of concerns raised by regulators on the DGM model

Concern raised on DGM analysis	Relevance to regulators' MAR inference model
"The model is highly sensitive to changes in dividend and growth rate assumptions"[5]	■ The inference model directly relies on assumptions on future dividends, outperformance, and growth. ■ These assumptions have to be developed by regulators in order to conduct the CoE inference exercise.
"[It] presupposes predictable and constant dividend growth, forcing the conclusion that changes in share price must be the result of changes in the discount rate"[6]	■ Regulators' perpetuity model relies on a constant dividend growth assumption.
"Estimates for the long-run dividend growth rate are subjective"[7]	■ Regulators' own perpetuity model requires regulators to make an assumption of long-run RAV growth which goes beyond the next price control.

Source: Ofwat, Ofgem, UKRN, Frontier analysis

The DGM model dictates that the market price of equity is a function of future dividends. Therefore, to carry out the MAR analysis, regulators have to make assumptions on how dividends relate to allowed returns, outperformance, and growth (including the sustainable level of RAV growth). They are effectively attempting to 'guess' what investors have assumed in their valuations, which underpin the market price. However, these assumptions - which underlie investors' valuations - cannot be known (as they remain private information). Regulators have not justified the differing and partial treatment of these conceptually similar cross-checks.

Similarly, we find that the concerns raised by regulators regarding the hybrid bond cross-check are insufficient to render this cross-check uninformative, and moreover similar concerns are present and accepted in regulators' own cross-checks. The concerns in relation to our hybrid bond cross-check centre around the use of a narrow sample, and the need for further assumptions to be used to derive our result. But neither criticism is material. While we have selected a preferred bond around which to anchor our results, our main finding is supported

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[5]   Ofgem (2025), <u>RIIO-3 Draft Determinations Finance Annex</u>, para 3.103

[6]   See Ofwat (2024) <u>PR24 Final Determinations: Aligning risk and return – allowed return appendix</u> pp. 28-29.

[7]   UKRN (2023), <u>Guidance for regulators on the methodology for setting the cost of capital</u>, p. 19

by a much wider universe of hybrid bonds which reveals no bias results from this. And in respect of key assumptions, numerous sensitivities have been presented to inform a wider understanding of the strength of evidence. Moreover, we note that almost *all* of the cross-checks discussed to date require some assumptions to allow comparison with the CAPM CoE or its component parameters. For example:

■ As discussed in Section 3.1, inferring the CoE from MARs requires regulators to make assumptions on the growth rate and out/under-performance jointly.

■ Not only that, estimating the MAR for the regulated segment of the business also requires assumptions regarding the proportion of the business which is regulated. This can be challenging to carry out and is an issue for National Grid, for example.[8]

■ The infrastructure IRR cross-check employed by Ofgem requires an assumption on the conversion from the fund IRR to a cost of equity estimate with an adjustment for market to asset ratio.

Overall, we find that the concerns raised by regulators regarding the hybrid bond cross-check are present in other elements of the price control or regulators' own cross-checks. It is also unsatisfactory for regulators to continue to raise concerns with the evidence due to the existence of some limitations, even when these limitations do not materially affect the outcome of the cross-check evidence or the key conclusions that would logically follow.

Furthermore, Ofgem stated its concern that the debt-based cross-checks cannot definitively prove or 'back solve' to a required return on equity.[9] Fundamentally, this is not the right test to employ on cross-checks; no cross-check (nor the CAPM) can definitively prove a cost of equity, and using this as a criterion would render all cross-checks unusable.

It is not acceptable for regulators to reject potentially key sources of evidence – in particular given the efforts made to make the cross-check resilient to criticism – while accepting similar limitations in numerous aspects of their own analysis elsewhere.

Recommendations for RIIO-3

Our investigation suggests that Ofgem (and Ofwat) have not to date appraised the merits of different types of cross-check on a consistent and objective basis. Both have taken a biased approach to deciding which cross-check evidence to rely on, and which to essentially discard.

There is a wide range of available cross-checks evidence. We find that if Ofgem and Ofwat were to apply a consistent standard of evidence to the available cross-checks, they should:

■ Place some reliance on DGM-based TMR cross-checks, if they continue to assign weight to their MAR inference cross-check; and

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[8]   In reality, estimating the equity premium market-to-asset ratio is a complex exercise, as we have outlined in our Investability Report. Please see Frontier Economics (2024), 'Equity Investability in RIIO-3', paras 210-211

[9]   Ofgem (2025), RIIO-3 Draft Determinations Finance Annex, para 3.100

■ Place some reliance on debt based cross-checks such as hybrid bond cross-check when assessing the overall CoE, as the criticisms levied on the hybrid bond cross-check are present in regulators' own cross-checks.

It is irrational to dismiss DGM evidence on principle while relying on a DGM-based MAR cross-check. Failure to place weight on relevant information would be wrong and could lead to the allowed return being set at the wrong level.

By relying on a fuller set of information, regulators can come to a more informed view of market conditions with respect to the allowed equity return; it is clearly superior to place weight on a suite of cross-checks, albeit all with merits and limitations, than to place weight on a smaller number of cross-checks (given that Ofgem's own set of cross-checks are subject to limitations also). By considering a wider range of evidence, Ofgem would be better equipped to set the CoE at an appropriate level which mitigates investability risks and protects customers.

1 Introduction

1.1 Purpose of this report

We have been asked by the Energy Networks Association (ENA) and Future Energy Networks (FEN) to assess the basis on which regulators (mainly Ofgem and Ofwat) have decided what reliance to place on different sources of evidence when setting the allowed equity return.

This paper therefore focusses on the standards regulators have applied to the cross-check evidence to determine whether or not to lend it weight in reaching their decisions, and specifically whether the same standard has been applied to all the available cross-check evidence on a consistent and objective basis.

The purpose of this paper is not to debate the methodological aspects of each cross-check, although we make observations of this nature at a high level in places.

1.2 Relevant context

In its Sector Specific Methodology Consultation (SSMC) Ofgem sets out its intention to develop the concept of **investability** in order to "*better understand whether the allowed return on equity is sufficient to retain and attract the equity capital that the sector requires*".[10]

At SSMC stage, Ofgem asked stakeholders to provide views on "*how investability should be used and assessed*".[11]

On behalf of the ENA, we sought to develop proposals on this matter. In particular, the networks have submitted a number of key pieces of evidence to support Ofgem's assessments on this topic.

We found that equity investability requires that the cost of equity lies sufficiently far above the long-term return on senior investment-grade debt.[12] In particular, debt market cross-checks, such as the hybrid bond cross-check, can provide an indication of the minimum level of allowed equity return that may allow networks to attract and retain equity investment. Applying these cross-checks, we found that the allowed equity return set at SSMD was below the

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[10] Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation: Finance Annex, para 1.6.

[11] Ibid. para 1.6.

[12] This condition is derived from the relative risk profile of debt and equity. Senior debt implies lower risk and better recovery prospects:, senior debt is paid first and it is paid as a contractually stipulated sum, with contractual protections available as a backup. In contrast, holders of equity are paid last, and act as residual claimants on the business with no guarantee they receive anything, in particular in times of financial distress. Because of this marked difference in risk, it would be irrational for investors to opt for equity if equity returns are not sufficiently above the rates that could be earned from providing senior debt instead. See Frontier Economics (2024), 'Equity Investability in RIIO-3, a report prepared for the ENA', para 6

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investable level implied by the hybrid bond cross-check. Indeed, we found that this could be the case because Ofgem's TMR estimate included within its CAPM-CoE was too low.[13]

Returns to equity holders (including levels of the individual CAPM parameters) must be set commensurate with how the market prices the relevant risks, in order to ensure that networks can attract and retain the equity investment needed to deliver the raft of projects required to achieve a decarbonised future as well as to maintain network resilience and safety. Investors have many competing opportunities (projects, companies and geographies) into which they can deploy capital, as countries all over the world also seek rapid progress towards their own decarbonisation objectives. As a result, networks face stiff competition globally for that capital from a suite of competing projects in service of each country's own goals. It therefore becomes critical for GB regulators to set allowed returns which are resilient to these pressures.

In the SSMD Ofgem agreed that additional cross-checks or factors "such as those suggested by network companies" can inform investability.[14] However, at DD Ofgem:

- stated it would continue to rely on its suite of RIIO-2 cross-checks.
- proposed not to adopt the additional cross-checks e.g. the hybrid bond cross-check in light of methodological concerns,[15] and the TMR Glider evidence due to the TMR Glider relying on DGM which requires a set of sensitive forward-looking assumptions.[16]

Ofwat adopted a similar position in its PR24 FD, relying mainly on the MAR (Market-to-Asset-Ratio) cross-check. Ofwat also stated that 'significant caution' needed to be applied to Frontier's proposed cross-checks (the TMR Glider and the DGM TMR), due to its reliance on DGM evidence.[17]

It is reasonable for regulators to conduct a detailed appraisal and evaluate the cross-check evidence submitted by stakeholders to assess their merits and robustness for use to cross-check the step 1 CoE result.

However, it seems clear that Ofgem and Ofwat have both failed to appraise the merits of different types of cross-check on a consistent and objective basis. As a result of this failure, both have then taken a biased approach to deciding which cross-check evidence to rely on, and which to essentially discard. As we set out below, it seems to us that the most obvious

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[13]   Frontier Economics (2024), 'Updated cost of equity cross-check evidence – A report prepared for the Energy Networks Association', para 9.1.3

[14]   Ofgem (2024), RIIO-3 Sector Specific Methodology Decision: Finance Annex, para 3.245

[15]   Ofgem (2025), RIIO-3 Draft Determinations Finance Annex, para 3.99

[16]   Ibid. para 3.103

[17]   Ofwat (2024), PR24 Final Determinations: Aligning risk and return – allowed return appendix, p. 28. Ofwat disregarded the debt-based cross-checks on the basis of similar methodological concerns to those expressed by Ofgem.

example of this bias is the continued reliance on the MAR cross-check, while at the same time disregarding evidence from the DGM when determining where to locate TMR.

We also note that the UKRN Cost of Capital Guidance has included some discussions on cross-checks.[18] As we have flagged in the TMR report[19], it is not clear to us that the UKRN Guidance has facilitated any consistency and predictability across regulated sectors. In the context of cross-checks, Ofwat has relied almost solely on the MAR cross-check while Ofgem considers a broader set (as we discuss later on in this paper). In any case, the UKRN debate does not cover a discussion of how cross-check evidence should be appraised; therefore, we consider that the discussion set out here moves the thinking forward and the UKRN Guidance has limited bearing on the findings and recommendations in this paper.

A key question we seek to answer with this paper is **if regulators had applied consistent standards of evidence to appraise their own cross-checks alongside the cross-checks proposed by the networks and their advisors, would they still have relied on the same set of cross-checks in their recent decisions**?

To answer this question, we examine a number of relevant aspects below:

- In Section 2, we summarise regulators' approach to setting the allowed equity return, focussing on the evidence relied on and the nature of such evidence.
- In Section 3, we explore whether Ofgem has applied a consistent standard to appraise the quality of submitted cross-check evidence.
- In Section 4, we reflect on insights derived in the previous section, and recommend a more balanced and constructive way to use the available cross-check evidence for setting the allowed equity return.

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[18]   UKRN (2023), Guidance for regulators on the methodology for setting the cost of capital, pp. 26-30

[19]   Frontier Economics (2025), Assessing regulators' approach to setting the TMR - Implications for RIIO-3, Section 3.6 and 3.7

2 Evidence considered when setting the allowed equity return

Currently, both Ofgem and Ofwat adopt the following two steps when setting the allowed equity return.

■ Step 1 estimates the equity return using the capital asset pricing model (CAPM). This is regulators' primary approach to determining the equity return.

■ Step 2 considers the alternative evidence available to cross-check the estimate.

In the rest of this section, we summarise regulators' approach to setting the allowed equity return for each Step, focussing on the evidence relied on and the nature of such evidence.

2.1 Step 1: CAPM and the evidence required for its estimation

The CAPM has been widely relied on by regulators for setting the allowed equity return. It has been the primary tool for setting the regulated cost of equity for utilities in GB since privatisation. The CAPM states that:

$$Cost\ of\ Equity = Risk\ Free\ rate + \beta \times (Total\ Market\ Return - Risk\ Free\ rate)$$

In order to make use of CAPM, regulators then need to develop methods to estimate each of its parameters. As we set out below, while methods have been developed to do so, none are without potential estimation error.

Estimating the risk-free rate

Typically, the risk-free rate is proxied using the yields of government bonds or corporate bonds of very high credit quality, which can be observed from reliable sources.[20]

Estimating beta

Regulators also have to estimate the beta (β), which represents the relative riskiness of the target firm relative to the wider equity market. Betas can only be estimated for publicly traded entities; therefore, regulators typically need to select a sample of publicly traded comparator firms to carry out this step.

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[20] We note that Ofwat in its PR24 Final Determination relied on gilt yields and AAA corporate bonds when estimating the applicable risk-free rate. This approach draws on the insights from the Brennan (1971) CAPM framework, and intends to address the PR19 CMA panel's concern that the gilts rate was not a borrowing and lending rate available to all market participants, as is required by the Sharpe-Lintner version of the CAPM used by economic regulators including Ofwat. Ofwat did not apply a convenience yield adjustment, stating that there was no sufficiently strong evidence to calibrate an adjustment to the 10-20 year CAPM horizon. Please see Ofwat (2024), PR24 Final Determinations: Aligning risk and return – allowed return appendix, pp. 10-11, and p. 18

When deriving an appropriate sample of companies for beta estimation, it is ideal to select comparator firms that have a similar risk profile to the target company. If such comparators can be found, it is also common to examine the trading history of comparator firms, to ensure that the stock is sufficiently liquid and frequently traded such that the estimated betas are robust. Where there is irregular trading history, or low liquidity, practitioners often discard those comparators as the estimated betas could be biased.

In choosing beta comparators and estimating the beta, it is important not to lose sight of the primary objective, which is to estimate a beta that appropriately captures the relative riskiness of the target firm versus the wider market over the period of the price control. In some cases, it may not be possible to select comparators which meet all of the best practice criteria set out in the previous paragraph. Sometimes a notional company that fairly represents the sector as a whole is not publicly listed. Therefore, practitioners may have to assess a wide range of evidence, to triangulate the relevant beta range applicable to the target firm.

Estimating the Total Market Return

The Total Market Return cannot be observed, and must be estimated. Regulatory practice in GB has been to rely primarily on a very long historical series of realized market returns (e.g. reported annually in the UBS Investment Yearbook) to proxy forward-looking required returns, but there has also been a substantial debate over how to process and average that long run evidence, and whether to weigh it against other types of evidence. In any event, taking a very long history of realised returns can only minimise estimation error around that historical average; this approach still relies on a strong assumption that the estimate derived using such a method is consistent with what investors require on a forward-looking basis.

Reflections on the evidence required for estimating the cost of equity using CAPM

It is clear then that there is a degree of estimation uncertainty surrounding each CAPM parameter, and estimating each parameter necessarily relies on a degree of judgement. Moreover, CAPM (like all available models) is not perfect; over the years, there have been various academic studies aimed at assessing whether CAPM could be improved, and whether there are other models which may have a higher degree of predictive power.[21]

The key point to note is all models have advantages and limitations, and CAPM is no different. This creates a role for a balanced set of cross-checks, as a safeguard against estimation uncertainty and to sense-check judgements that have been taken when estimating CAPM parameters. We discuss the available cross-check evidence in the following subsection.

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[21] For example, Fama and French sought to develop models with additional factors (e.g. firm size and book equity to market equity ratios) as an attempt to develop a model which had better predictive power than the CAPM.

2.2   Step 2: Cross-check evidence

As we set out above, there is a role for cross-checks to play, given that CAPM itself is subject to its own limitations, and there is a degree of judgement that has to be exercised when estimating the CAPM parameters. However, cross-checks, too, are subject to limitations. Regulators need to be aware of these limitations, especially if they intend to use cross-check evidence to inform parameter ranges and the point estimates applied in allowed return decisions.

Ofgem stated that: "*there is no perfect cross-check to the CAPM, and … the CAPM remains a primary tool for estimating the cost of equity*".[22] Cross-checks therefore need to be developed and used wisely. Properly constituted and considered, a comprehensive and balanced set of cross-checks can assist in setting an equity return at a level which supports policy and regulatory objectives.

Table 2 below provides an overview of the cross-checks that have been debated in recent GB regulatory proceedings. We provide a high level discussion of each category below.

Table 2   Categorisation of cross-checks

Category	CoE cross-checks	TMR cross-checks
Debt market cross-checks	■ Hybrid bond evidence ■ ARP-DRP[23] ■ Debt inference models[24] ■ Unlevered CoE against the cost of new debt	
Survey evidence	■ Investment managers survey on CoE quoted by Ofwat in PR24[25]	■ Fernandez TMR survey ■ Investment Managers' TMR
Equity valuation based cross-checks	■ **Market-to-Asset ratios** 　□ Transaction MARs 　□ Traded MARs ■ DGM cost of equity for relevant comparators	■ Market-wide DGM ■ TMR Glider (which is based on the market-wide DGM)

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[22]   Ofgem (2018), <u>RIIO-2 Sector Specific Methodology Consultation Finance Annex</u>, para. 3.145

[23]   See for example Oxera (2024), <u>Evaluation of the ARP-DRP framework</u>.

[24]   See for example KPMG (2024), <u>Estimating the cost of equity for PR24</u>, Section 9.3

[25]   Ofwat (2024), <u>PR24 Final Determinations: Aligning risk and return – allowed return appendix</u>, p. 61 and p. 64

Equity IRR	■ **(Stated) infrastructure fund IRRs**
	■ **OFTO implied returns cross-check and other bid-implied IRR**
Accounting and profitability	■ Long-term profitability
Alternative models to CAPM	■ Multi-factor models (which have sometimes been deployed as a cross-check on beta)

Source: *Frontier Analysis, Ofwat, Ofgem*

Note: *The cross-checks in **bold** represent cross-checks that Ofgem has stated it will rely on in its DD. The cross-checks shown in **bold and italics** show those considered by Ofwat in the PR24 Final Determinations, but not considered by Ofgem.*

Clearly there is a wide range of potential cross-check evidence available to support regulatory decisions, and each type of cross-check has its own strengths and limitations. We agree with Ofgem that one needs to rely on a range of cross-checks (rather than relying on only a single category of cross-check, or one specific cross-check).[26]

Of the cross-checks set out in the table above, Ofgem has stated it will consider the following cross-checks for the CoE or CoE parameters:[27]

- CoE cross-checks
  - □ Market-to-Asset ratios
  - □ (Stated) infrastructure fund IRRs
  - □ OFTO implied returns cross-check
- TMR cross-checks
  - □ Investment Managers' TMR survey evidence

On the other hand, Ofwat relied heavily on MAR inference as its only cross-check, although at a very high level it did consider a small sample of survey evidence on the expected equity returns for the sector.[28]

2.2.1   Debt market cross-checks

The first category of cross-checks are **debt market cross-checks**. The term 'debt market' refers to the fact that all the cross-checks in this category draw on some kind of data from debt

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[26]   Ofgem (2023), <u>RIIO-3 Sector Specific Methodology Consultation: Finance Annex</u>, para. 3.82

[27]   Ofgem (2025), <u>RIIO-3 Draft Determinations Finance Annex</u>, para 3.91

[28]   Ofwat (2024), <u>PR24 Final Determinations: Aligning risk and return – allowed return appendix</u>, p. 79

market prices/yields. The principle of these cross-checks is that there should be some premium for holding equity over debt. This reflects the relative risk of each security for the same underlying asset.

The logic of these checks is as follows: if an investor can achieve a similar return by investing in a lower risk security for the same underlying asset, then it would be irrational to invest in the higher risk security (i.e. equity). Therefore, debt market cross-checks are helpful for informing the investable equity return level on a forward-looking basis.[29]

2.2.2 Survey evidence

The second category of cross-checks is **survey evidence**. This category of cross-check relies on the stated expectations from investors on equity returns (whether on the total market (TMR) level, or for the individual company). As survey evidence relies on the stated expectations of the respondents, it could inform if the CAPM-CoE or CAPM parameters are in line with current expectations (although this type of evidence is more reliably used when observed over time, i.e. it is more helpful for understanding trends rather than the precise level of a given parameter). Importantly, stated expectations will be subject to respondents' bias which is difficult to identify or correct for. The impact of bias could potentially be mitigated, e.g. if the pool of respondents is sufficiently large and the surveying method is designed to minimise bias.

Our understanding is all of the survey evidence set out in the table comprises of forward-looking survey evidence (i.e. respondents were surveyed on their expectations).[30]

2.2.3 Equity valuation cross-checks (dividend growth models)

Third, there are **equity valuation based cross-checks.** In general, the cross-check evidence in this category is underpinned by the Dividend Growth Model (DGM). The DGM posits that the market price of the company, or the share price, reflects investors' expectations of the present value of future cash flows to the investor. The interest rate which equalises expected cash flows to the share price is therefore an implied, forward-looking estimate of the cost of equity. DGM based cross-checks are by their nature forward-looking estimates of the cost of equity, as they are derived from expectations of future cash flows.

This framework can be applied to single equities and the wider equity market. When this framework is applied to individual companies, the cost of equity derived will be representative

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29   See Section 2 in Frontier Economics (2025), 'Updated Cross-Check Evidence reports', and Frontier Economics (2024), Equity Investability In RIIO-3, Section 5.2.3. Since the hybrid bond spread (adjusted for equity features) is added to the prevailing value of a relevant senior debt index, this cross-check should provide a forward-looking view of an investable allowed equity return.

30   We note however Ofwat conducted its own survey of analyst expectations for the water sector covering 12 respondents, which it used to cross-check PR24 allowed equity returns. We are unable to confirm the nature of this survey as details were not provided in Ofwat's allowed return appendix. See Ofwat (2024), PR24 Final Determinations: Aligning risk and return – allowed return appendix, p. 79

of the actual company itself (rather than the notional company). For example, both Ofgem and Ofwat have adopted a simplified 'perpetuity' DGM model to infer the cost of equity using MARs for publicly traded utility companies. The detail of this is discussed in Section 3.2 below.

If this analysis is applied to the entire equity market, one could derive the required market return (i.e. the market-wide DGM, which can be used as a TMR cross-check, as we have outlined in our Business Plan cross-checks report).[31] When we consider a consistent time series of the implied discount rate derived from the market DGM model, this can provide an indication of whether current expectations of the TMR are above or below historical trends.

At SSMC stage, we also outlined how the (market-wide) DGM outputs can be processed to produce a 'TMR Glider', a framework which aims to operationalise the UKRN's Guidance of setting a stable TMR by estimating a (linear) relationship between the market-implied required TMR and gilt yields.[32] In Frontier's Updated Cross-Check Evidence reports for the ENA and FEN[33] we set out in detail how this evidence can be used in the context of RIIO-3.

In general, this category of cross-checks is helpful as it takes into account prevailing share prices or market prices. However, assumptions about expected cash flows (or their underlying drivers) are typically required to operationalise this category of cross-check, and the reliability of the cross-check results can be influenced by the quality of the assumptions used.

2.2.4 Equity IRR cross-checks

Fourth, there is **equity IRR cross-check evidence**. This evidence is drawn from the total returns of relevant infrastructure investment funds. It is therefore backward-looking in nature. The realized return to the equity investor (the equity IRR) is calculated from reported information. The information value of this kind of evidence will depend on the coverage of funds reporting returns and their constituent investments, given that funds may be invested in many different kinds of infrastructure. It may also reflect views of the reasonableness of past returns (e.g. fund returns will reflect historical settlements that may now be regarded as too low or too high).

The derivation of equity returns (required for the cross-check) will typically rely on a range of assumptions, such as the net asset value of the fund and the gearing levels adopted by fund managers. This information may not necessarily be disclosed on a consistent basis across funds and over time – but a sufficiently large sample can mitigate some of these information deficiencies. At any point in time it will be necessary to assess whether it is reasonable to rely on the level implied by such cross-check evidence, and/or whether one can rely solely on the observed change over time.

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[31]   Frontier Economics (2024), Updated cost of equity cross-check evidence, Section 7

[32]   Frontier Economics (2024), Updated cost of equity cross-check evidence, Section 7.3

[33]   See Section 8 in Frontier Economics (2025), 'Updated Cross-Check Evidence reports', prepared for the ENA and FEN respectively

Ofgem also intends to consider OFTO IRRs as a cross-check. We understand these are the 'bid IRRs' submitted by investors in OFTO tender rounds. As this information is confidential, we are unable to replicate or comment on this cross-check in detail.[34] In principle, other bid IRRs for assets of a similar nature could also be considered as a cross-check. On this basis, additional evidence from e.g. Sizewell C's Final Investment Decision that recently completed, could also be referred to.[35]

2.2.5   Accounting and profitability cross-checks

The CAPM-COE can also be cross-checked using **Accounting and profitability** data. This method determines accounting profitability of a comparator set of companies with similar risks. It is a backward-looking method, but it builds on the assumption that investors will form expectations based on returns achieved in comparable sectors and markets.[36] As such, this metric can act as a guide on the level of allowed returns which would allow networks to attract and retain equity investment. It may be necessary to analyse accounting profitability over a longer time period to counter any noise in yearly outturn financial reporting data.

2.2.6   Alternatives to CAPM

Finally, the recent debate has also included **alternative models to CAPM** such as the multi-factor models. Multi-factor models aim to include more explanatory variables to the CAPM, with the aim of explaining "irregularities" in stock returns that cannot be explained with the simplest version of the CAPM.[37] On the one hand, the addition of explanatory variables can explain these observed irregularities; however, studies have found that the size, sign and significance of these additional variables can vary over time and between markets.[38] To date, the role of these models in regulatory settings in GB has been limited. In general, these alternative models are intended to be forward-looking (similar to CAPM).

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[34]   See for example Frontier Economics (2024), Equity Investability In RIIO-3, A report prepared for the ENA, para 220, and RIIO-3 Sector Specific Methodology Decision: Finance Annex, para 3.254

[35]   Frontier Economics (2025) Updated cost of equity cross-check evidence, a report prepared for the ENA and FEN respectively, Section

[36]   In contrast, all of the cross-checks discussed are forward-looking in nature.

[37]   Sak, Huang and Chng (2024), International Review of Financial Analysis

[38]   See Fama and French (1996), Multifactor Explanations of Asset Pricing Anomalies. The Journal of Finance, Vol. 51, No. 1 (Mar., 1996), pp. 55-84

3 Regulators applied inconsistent standards of evidence to the cost of equity cross-checks (MAR and DGM)

3.1 Regulators focus on MAR analysis while rejecting DGM analysis

While Ofgem and Ofwat have considered the range of cross-check evidence set out in the previous section, they have hitherto placed weight on only a small subset. At SSMD stage, there has been limited engagement with the hybrid bond cross-check and the TMR Glider cross-check; regulators have stated that they did not consider these cross-checks to be sufficiently robust to have any reliance placed on them due to methodological concerns, a position Ofgem set out at SSMD and has maintained at DD stage. However, on closer inspection, we find that Ofgem's and Ofwat's own cross-checks are subject to the same sets of concerns they raise against the DGM TMR / Glider and Hybrid bond evidence.

It appears to us that regulators are applying different standards of evidence and robustness when determining the set of cross-check evidence they choose to rely on, and the set they discard. This is particularly stark when we consider e.g. Ofgem's decision to continue to rely on the CoE inferred from MARs (which is based on DGM analysis), while simultaneously dismissing entirely other DGM-based evidence, such as the TMR Glider, on the account of issues related to DGM analysis. Similarly, Ofgem and Ofwat have estimated the TMR range using a historical ex ante approach which relies on DGM logic.[39]

Ofwat recently raised concerns regarding the TMR Glider and DGM-based cross-check evidence for the TMR, including:[40]

- The model is highly sensitive to changes in dividend and growth rate assumptions;
- It assumes predictable and constant dividend growth, forcing the conclusion that changes in share price must be the result of changes in the discount rate;[41]
- Estimates for the long-run dividend growth rate are subjective;[42] and
- Not all companies are valued based on their dividends.

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[39] Ofwat (2024), PR24 Final Determinations: Aligning risk and return – allowed return appendix, Section 2.2. At SSMD stage, Ofgem had stated it intended to rely on historical ex ante estimates of TMR; see for example: Ofgem (2025), RIIO-3 Draft Determinations Finance Annex, para 3.45

[40] Ibid. p. 28

[41] Specifically, Ofwat states *"Furthermore, the DDM [DGM] framework presupposes predictable and constant dividend growth, forcing the conclusion that changes in share price must be the result of changes in the discount rate, whereas it is plausible they might result from other factors (e.g. a view that dividends are unsustainable)"*. Ibid.

[42] UKRN (2023), Guidance for regulators on the methodology for setting the cost of capital, p. 19

We note that Ofgem did not engage substantially with the TMR Glider evidence in its DD, and previously did not support the use of DGM evidence at RIIO-2.[43]

3.2 MAR analysis is based on DGM calculations

It is important to note, as we have already set out in 2.2.3, regulators' CoE inferences based on Market-to-Asset ratios (MARs) directly rely on an entirely similar logic to the Dividend Growth Model. This is clearly set out in the ED2 draft determination documents, where Ofgem stated that they use a perpetuity dividend growth model to inform MAR inference.[44] In particular:

$$P = \frac{D_1}{COE - G}$$

$$COE = \frac{D_1}{P} + G$$

Where, P= Price paid, D_1 = Dividend in year 1, COE = Cost of Equity and G = Dividend Growth.

Ofgem states that "[t]his is a present value model, where the price paid (P) reflects: the expected dividends to be received (D_1) ; the cost of equity (COE); and future dividend growth (G)." [45]

In other words, Ofgem states that the 'true' CoE of regulated entities can be expressed as a function of future dividends and growth.

Ofgem derives its assumptions for dividends to be received (D_1) under the assumption that D_1 would consist of the baseline allowed return and expected performance, as shown in the equation below.

$$D_1 = ROE = BAR + EP$$

Where, ROE = Return on Equity expected, BAR = Baseline Allowed Return on Equity, EP = Expected Performance where sources of performance (positive or negative) can come from ODIs (Outcome Delivery Incentives), Totex, financing or debt performance.

Ofgem makes further assumptions regarding the sustainable growth rate in dividends (G), where Ofgem suggests that a sustainable growth rate in dividends must be less than the return on equity.

$$SGR = ROE * (1 - DPR)$$

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[43]   Ofgem (2022), RIIO-ED2 Final Determinations Finance Annex, 3.136

[44]   Ofgem (2022), RIIO-ED2 Draft Determinations – Finance Annex, Appendix 6 – MAR inference model

[45]   Ibid. para A6.3

Where, DPR = Dividend Pay-out ratio, which reflects the dividends paid as a proportion of earnings.

Ofgem assumes that the logic on the sustainable growth rate set out above can be applied to RAV growth. In effect, Ofgem's MAR inference model is defined by the following equation.

$$COE = \frac{D_1}{Equity_p} + G_{RAV}$$

Where $Equity_p$ is the equity premium derived from traded shares (for publicly traded utilities) or transaction prices for utilities which are privately held[46] (this term essentially represents the market price 'P' in the general form of the DGM model).

In PR24, Ofwat has applied the same CoE inference framework to the MARs of publicly traded water companies to cross-check the PR24 allowed equity return. Ofwat relies solely on the MAR cross-check, and does not formally consider other cross-check evidence for calibrating allowed equity returns.[47]

3.3 Criticisms on DGM therefore apply equally to MAR analysis

It is therefore clear that the CoE inferences at the heart of Ofgem's MAR model rely on DGM analysis, and is therefore subject to the same set of concerns that regulators themselves have raised in respect of DGM inference. These standing regulatory concerns with such models are summarised below.

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[46] At DD, Ofgem has maintained that large transaction premia can only be justified by sustained outperformance or higher than expected returns, but it now accepts that due to difficulty in estimating acquisition synergies, listed MARs are preferable. See Ofgem (2025), RIIO-3 Draft Determinations Finance Annex, para 3.107

[47] Ofwat (2024), PR24 Final Determinations: Aligning risk and return – allowed return appendix, p. 7

Table 3 Summary of concerns raised by regulators on the DGM model

Concern raised on DGM analysis	Relevance to regulators' MAR inference model
"The model is highly sensitive to changes in dividend and growth rate assumptions"[48]	■ The inference model directly relies on assumptions on future dividends, outperformance, and growth. ■ These assumptions have to be developed by regulators in order to conduct the CoE inference exercise.
"[It] presupposes predictable and constant dividend growth, forcing the conclusion that changes in share price must be the result of changes in the discount rate"[49]	■ Regulators' perpetuity model relies on a constant dividend growth assumption.
"Estimates for the long-run dividend growth rate are subjective"[50]	■ Regulators' own perpetuity model requires regulators to make an assumption of long-run RAV growth which goes beyond the next price control.

Source: Ofwat, Ofgem, UKRN, Frontier analysis

The DGM dictates that the market price of equity is a function of future dividends. Therefore, to carry out the MAR analysis regulators have to make assumptions on how dividends relate to allowed returns, outperformance, and growth (including the sustainable level of RAV growth). They are effectively attempting to 'guess' what investors have assumed in their valuations, which underpin the market price. However, these assumptions - which underlie investors' valuations - cannot be known (as they remain private information).

Broadly speaking, the right hand column in Table 3 describes the relevant DGM-related issues that apply to the MAR inference analysis carried out by the regulators.

We note that there is one final criticism that was raised by regulators, regarding the relevance of the DGM given that not all companies are valued based on their dividends. This assertion is inconsistent with the academic evidence. Brealey, Myers, and Allen's Principles of Corporate Finance clarifies this; the authors state:

■ The DGM values a stock based on expected dividends and capital gains over time, rather than focusing solely on terminal price.

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[48] Ofgem (2025), RIIO-3 Draft Determinations Finance Annex, para 3.103

[49] See Ofwat (2024) PR24 Final Determinations: Aligning risk and return – allowed return appendix pp. 28-29.

[50] UKRN (2023), Guidance for regulators on the methodology for setting the cost of capital, p. 19

■ Over an infinite time horizon, the present value of the terminal stock price approaches zero, allowing valuation to rely solely on discounted future dividends and not on terminal prices.

■ **The DGM remains logically correct for growth companies**, despite concerns about applying the DGM to high-growth firms, but difficult to use when cash dividends are far into the future.[51]

3.4 MAR results are similarly sensitive to assumptions as DGM analysis

It is therefore apparent that regulators' MAR cross-check heavily relies on assumptions. In particular, regulators' inference model assumes predictable and constant dividend growth, forcing the conclusion that changes in share price (captured in the MAR, or the term 'Equity$_P$') must be the result of changes in the discount rate (the inferred CoE). The estimates of very long-run dividend growth are ultimately subjective. Moreover, the MAR cross-check does not consider the possibility that markets may not be perfectly efficient, and there may be idiosyncratic factors embedded in the share price, and therefore MARs (in the 'Equity$_P$' term).[52]

In the figure below, we show the wide range of values that can be generated using the MAR framework adopted by Ofwat for the PR24 FD; focusing on Pennon.[53] In the PR24 FD, Ofwat estimated an implied cost of equity range for Pennon of 5.2% to 7.2% ("PR24 FD MAR" bar). The low end of this range was based on assumptions of zero outperformance, and zero real RCV growth. The high end was based on +2% RoRE outperformance, and +2% real RCV growth. All of these assumptions were perpetual and deployed using the same DGM-based framework set out in Section 3.2 above.

This figure shows that had the MAR value for Pennon been 0.05 higher or lower (capturing a realistic range for market movements), then the output range would have widened to 4.6% to 7.9% (see the "Overall range" bar). This represents a total range of over three percentage points (even without this sensitivity, Ofwat's original range was already relatively wide at 2 percentage points).

Despite this spread of results, and the subjective inputs, Ofwat was comfortable using this evidence to benchmark the cost of equity estimated from CAPM.

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[51] Brealey, R. A., Myers, S. C., and Allen, F. Principles of Corporate Finance, 11th ed. (McGraw-Hill, 2014)

[52] We have explained this in further detail in our SSMD cross-check report. See Frontier Economics (2024), Updated cost of equity cross-check evidence, Section 4.3

[53] Ofgem apply an equivalent framework.

Figure 1   MAR implied cost of equity sensitivity
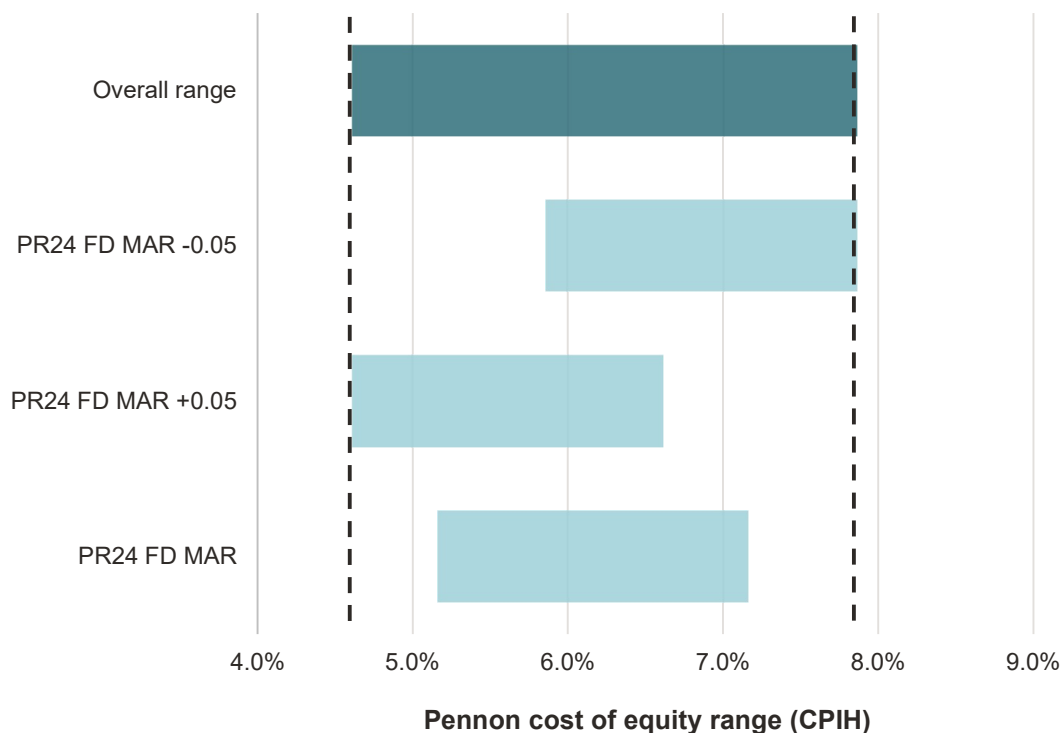
Source: Ofwat PR24 Final Determinations, Frontier Economics analysis

Note: *Overall range varies from 4.6% to 7.9% (real CPIH). Note that a higher MAR leads to a higher equity multiple, which is used to derive the dividend yield (dividends paid / equity multiple). The CoE inference comprises of the sum of the dividend yield and projected RAV growth, as such, a higher MAR leads to a lower cost of equity. See* PR24 Final Methodology – Allowed return on capital, *Appendix A2.*

Regulators continue to rely on this cross-check, while dismissing other DGM-based evidence, even though it is clear that the MAR inference is subject to the precise concerns raised by regulators in recent decisions, set out in Table 2 above.

If regulators were to appraise the available cross-check evidence using a consistent set of standards, similar consideration should be afforded to the wider set of DGM-based cross-check evidence, such as the TMR Glider and the DGM-estimated TMR (if regulators continue to rely on the MAR cross-check).[54]

3.5   The market-DGM is credible and relied on widely

We consider our DGM analysis to be robust and that it provides credible evidence of the contemporaneous TMR in the equity market. We have taken a number of steps to ensure that the DGM-TMR (which underlies the TMR Glider) is robust. The full technical detail is set out

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[54]   Although, we note that direct use of the DGM-estimated TMR may not be consistent with regulators' desired objectives to set a stable TMR over a very long period. Nevertheless, we consider that DGM-estimated TMR could be helpful as a guide, as we set out in our Updated Cross-Check Evidence reports

in Annexes E and F of our Updated Cross-Check Evidence reports. But broadly speaking, we have:

■ Reviewed the evidence on the usage and credibility of DGM as a method;

■ Engaged with regulators' concern that there is subjectivity in the DGM assumptions; and,

■ Managed the impact of any subjectivity through the use of 'calibrated DGM'.

We discuss each of these below.

To address any concern on the reliability of DGM outputs as a TMR cross-check, we have conducted a further review of the available evidence on DGM (including practical studies of how to improve the DGM's explanatory power), to ensure that DGM evidence is sufficiently robust to be relied upon as a cross-check in RIIO-3. Our review shows that:

■ Extensive academic and other research has been conducted on the DGM and its usefulness. The theoretical credibility of the DGM is highlighted by its prevalence in core valuation textbooks and in recent academic literature.[55] The DGM is also frequently used by credible institutions across a number of sectors, including regulatory bodies, and academic researchers.[56] Most notably, a number of central banks have conducted detailed studies and endorsed the practical applications of the market DGM.[57]

■ Over the years, the DGM modelling has undergone significant improvements, enhancing the model's practical value and reliability. We note that the DGM model presented in our Business Plan cross-checks report captures this innovation, in particular insights gained from the Bank of England's research since the early 2000s.[58] By accounting for factors such as share buybacks, the BoE found that it could improve the explanatory power of its DGM model. We have applied such innovations in our DGM modelling, and checked our

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[55] See for example: Damodaran, A. Investment Valuation, 3rd ed. (Wiley, 2012); Brealey, R. A., Myers, S. C., and Allen, F. Principles of Corporate Finance, 11th ed. (McGraw-Hill, 2014); Ogier, P., Rugman, A., and Spicer, A. The Real Cost of Capital (Oxford University Press, 2004). Bhaskar Singh, M., Malik, R., A Study on the Relevance of Gordon's Dividend Model for the Modern Business: A Critical Analysis (IJRAR, 2023). Cornell, B., Gerger, R., Let's Get Real About the Dividend Growth Model (Business Valuation Review, 2022).

[56] See for example: Bank of England, 'Long-Horizon Equity Return Predictability: Some New Evidence for the United Kingdom', (Working Paper No. 244, 2004); Bank of England, 'An improved model for understanding equity prices' (Quarterly Bulletin 2017 Q2); Banque de Espana, 'Measuring the equity risk premium with dividend discount models' (Documentos Ocasionales, no.2207)); ECB, 'Measuring and interpreting the cost of equity in the euro area' (ECB Economic Bulletin, Issue 4/2018.)

[57] See for example: Bank of England, 'Long-Horizon Equity Return Predictability: Some New Evidence for the United Kingdom', (Working Paper No. 244, 2004); Bank of England, 'An improved model for understanding equity prices' (Quarterly Bulletin 2017 Q2); Banque de Espana, 'Measuring the equity risk premium with dividend discount models' (Documentos Ocasionales, no.2207)); ECB, 'Measuring and interpreting the cost of equity in the euro area' (ECB Economic Bulletin, Issue 4/2018.)

[58] Bank of England, 'Long-Horizon Equity Return Predictability: Some New Evidence for the United Kingdom', (Working Paper No. 244, 2004); Bank of England, 'An improved model for understanding equity prices' (Quarterly Bulletin 2017 Q2);

results against the BoE's findings to ensure that we have captured those improvements in our modelling.[59]

Second, we have reflected on regulators' concerns that there may be subjectivity in the long-run dividend growth assumptions embedded in the market DGM submitted at SSMC and business planning stage. Our DGM model uses long-run forecasts of UK GDP as the dividend growth rate – while no assumption is 'perfect' it is our preferred approach for three reasons:

■ **Stable**. the assumption that dividends grow in line with GDP growth means that dividends remain stable as a proportion of GDP. This avoids cases where company payouts fundamentally diverge from the overall scale of the economy. It is also a feature that is consistent with measures of corporate profitability over time.

■ **Credible**. Our GDP forecasts are sourced from a credible third party (the International Monetary Fund) who have published forecasts on a consistent basis for nearly 30 years. This ensures continuity in the series and means that there is a greater degree of independence (from the user) when generating the outputs.

■ **Widely used**. Using GDP growth as an assumption for long-run dividend growth is commonplace. We note that the Bank of England draws upon IMF forecasts when undertaking DGM modelling, while the ECB also uses GDP growth for the long term when looking to understand the cost of equity for European stock markets – drawing on forecasts from Consensus Economics.

The full detail and evidence underlying our reasoning is Section 8 of our Updated Cross-Check Evidence reports.

Related to the above, we understand that regulators are particularly concerned that subjectivity in long-run dividend growth assumptions could lead to TMR estimates which are overstated. To mitigate this outcome, we have developed **a 'Calibrated DGM'** (Section 8 and Annex F of our Updated Cross-Check Evidence reports). The calibrated DGM solves for the long-term growth rate that forces the average DGM-derived TMR to match an assumed long run average TMR (this assumption can be flexed). In other words, the long-term growth rate is:

■ solved for endogenously rather than specified exogenously; and
■ set at a level where the model, by construction, produces unbiased estimates of the long-run TMR.

By construction, this calibrated DGM cannot inform on the right long run estimate of TMR. Instead, this is an assumption that must be provided by the researcher. But the output of this model can signal whether prevailing market conditions are above or below the long run historical observed trend, and therefore indicate how regulatory decisions on TMR might need

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[59]   Frontier Economics (2024), The relationship between total market returns and gilt yields, prepared for National Grid Electricity Transmission, A.5

to be flexed given prevailing market conditions. The calibrated DGM shows that the DGM-TMR estimates relating to the recent period have not been overestimated.[60]

Overall, we have undertaken considerable work to address regulators' concerns on this suite of cross-checks, and to ensure that our proposed TMR cross-checks are robust. In contrast, we note that Ofgem has not adapted its MAR inference approach, despite the concerns raised on the sensitivity of results, and the need to establish a number of assumptions jointly to operationalise the inference model (among other things).[61]

In addition, we note that at PR19, Ofwat placed considerable weight on DGM analysis to inform the TMR.[62] In fact, at that time Ofwat preferred DGM to MAR evidence, stating that, "***In informing our overall view of forward-looking TMR, we place proportionately more weight on the range provided by our DDM [DGM] evidence*** *(6.1% - 6.8% in CPIH-deflated terms) over that derived from Market to Asset ratio analysis, as it is more recent, and directly derived from a suitably broad index (the FTSE All-Share)* **which can credibly proxy for the UK TMR**" [emphasis added].[63] This shows again that an inconsistent standard has been applied to the same type of analysis carried out by regulators (and their advisors), based on no clear justifications.

In conclusion, we consider that the DGM model (and our modelling) is credible and has a strong foundation in theory and practice. From an objective point of view, the TMR cross-checks proposed in Frontier's Investability Report and Business Plan cross-check report should be given equal weight as the MAR cross-check, if not more, given the robustness checks and sensitivity analysis that have been applied to the DGM modelling. Full detail on interpreting the cross-check results is provided in Section 8 of our Updated Cross-Check Evidence reports.

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[60] Frontier Economics (2025) Updated Cross-Check Evidence reports prepared for FEN and ENA respectively, Section 8

[61] Frontier Economics (2024), Updated cost of equity cross-check evidence, a report prepared for the ENA, Section 4.3

[62] An implied TMR can be reached from the implied CoE from MAR analysis by assuming values for the risk-free rate and beta.

[63] See Ofwat (2019), PR19 Draft Determinations – Cost of capital technical appendix, p. 43

4 Different standards of evidence applied to hybrid bond cross-check evidence

Similar to our DGM based TMR analysis, regulators have also raised concerns regarding the debt cross-checks, including:

- the hybrid bond cross-check's reliance on a single bond (issued by National Grid);
- the presence of call options; and,
- the need to apply a percentage equity-like assumption to derive an implied cost of equity.[64]

We consider that these concerns, albeit valid in principle, are not sufficiently severe for this cross-check to be rejected. Considerable thought has been applied when developing the hybrid bond cross-check to address each of these questions, and a range of sensitivity testing applied. Also, this type of data imperfection is inherent in the process of estimating the allowed equity return, and is present in the analysis that underpins the regulators' own approaches to both the overall level and the estimation of individual parameters. It is therefore not obvious why these estimation challenges should be fatal for hybrid bonds, but acceptable when estimating using CAPM, and in respect of other cross-checks.

In our view, the issues raised by regulators can be classified into two types:

- First, the reliance on a narrow sample of benchmarks and/or imperfect benchmarks (the NG hybrid bond)[65]; and
- Second, the need to rely on assumptions to operationalise the cross-check, which covers the third concern on the list above.

We discuss each of these in turn below. We do not address the technical concern regarding the presence of call options in this paper, as we consider this as a technical misunderstanding on Ofwat's part and have responded to this in our Updated Cross-Check Evidence reports.

4.1 Reliance on a narrow sample of benchmarks

When selecting relevant benchmarks to estimate the allowed equity return (in both Step 1 and Step 2), we are typically facing a trade-off between a larger sample with less relevant benchmarks, or a smaller sample with more relevant benchmarks.

To address this trade off, we have developed the central estimate of the hybrid bond based on the spread at issue of the National Grid hybrid. This is because we consider this hybrid bond to be the most relevant, and to have the most desirable properties, out of the available

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[64] We note that these concerns were raised by Ofwat in the PR24 FD. See PR24 Final Determinations: Aligning risk and return – allowed return appendix pp. 63-66.

[65] Specifically, the NGG Finance Plc 2073 hybrid bond. This bond was issued in March 2013 and had a first call date of June 2025.

universe of similar instruments.[66] However, this was balanced against checking the NG hybrid spread against the estimates produced by other available hybrid bonds.[67] Such an approach allows us to select the most relevant point of reference while ensuring that the cross-check is robust. We have not identified any bias that this selection could be subject to and we had already explained this in our analysis when presenting this to the regulators.[68] But the regulators had previously raised concerns about the hybrid bond evidence simply due to that fact there is a sample selection rather than any concrete concern on potential bias in our sample selection.[69]

To be clear, these sampling issues are also present in regulators' cross-checks. An example where sampling issues exist is the Equity IRR cross-check. Ofgem identified a sample of infrastructure funds that invest in private finance initiatives and private utility assets, such as OFTOs.[70] These are all imperfect comparators to regulated utilities, clearly shown in Appendix 3 of the RIIO-2 SSMD, with some funds containing a lower percentage of regulated assets.[71]

Ofgem also makes sampling decisions in the Investment Managers TMR cross-check. As set out in Section 2, this cross-check relies on survey evidence, collating the TMR forecasts published by financial institutions. Ofgem relies on nine forecasts in its sample, without specifying which forecasts have been used or justifying why nine particular forecasts have been used when there are other publications available. In the Updated Cross-Check Evidence reports, we found that the value of this cross-check is highly sensitive to the combination of specific survey data points from different institutions included in the sample, and a range of values can be obtained from the sample of nine funds.[72] Here, it is clear that the sample has a significant impact on the result (unlike the hybrid bond cross-check, where we have found that the choice of bond in the sample does not have significant impact on the result in our sensitivity analysis).

Given the sensitivity of Ofgem's TMR survey evidence to the sampling approach, we have proposed that this cross-check is supplemented with the Fernandez TMR survey, which is

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[66]   Frontier Economics (2024) Updated cost of equity cross-check evidence, a report prepared for the ENA, Section 2.3

[67]   Frontier Economics (2024) Updated cost of equity cross-check evidence, a report prepared for the ENA, Figure 6. The full set of results including sensitivities is set out in Frontier Economics (2025) Updated cost of equity cross-check evidence, a report prepared for the ENA and FEN respectively, Section 2

[68]   In our updated cross-checks evidence report submitted at SSMD stage, we conducted further robustness checks to ensure that the points raised by Ofgem at SSMD were addressed. Please see: Frontier Economics (2024) Updated cost of equity cross-check evidence, a report prepared for the ENA, Section 2, in particular Section 2.2 and 2.3

[69]   See for example Ofgem (2023), RIIO-3 Sector Specific Methodology Consultation: Finance Annex, para 3.270; and, Ofwat (2024), PR24 Final Determinations: Aligning risk and return – allowed return appendix, p. 66

[70]   Ofgem (2020), RIIO-2 Draft Determinations – Finance Annex, para 3.93

[71]   Ofgem (2019), RIIO-2 Sector Specific Methodology Decision – Finance, Appendix 3. In our SSMD cross-checks report, we also found that we could not fully replicate this cross-check because some of the funds had been discontinued.

[72]   Frontier Economics (2025), Updated Cross-Check Evidence reports, prepared for the ENA and FEN respectively, Section 9

based on 82 responses for the UK TMR estimate in its most recent edition, incorporating a wider set of inputs than the investment manager TMR survey cross-check. In its Draft Determinations, Ofgem implies that the sample of 82 responses to the Fernandez survey is small,[73] while finding a sample of nine observations sufficient in its investment manager TMR cross-check. This again shows the different standards being applied to its own cross-checks versus the ones proposed by networks and their advisors.

The Fernandez survey is reported on a consistent basis across editions, allowing trends to be ascertained more easily over time. As set out in Section 2.2.2, stated expectations in surveys will be subject to respondents' bias which is difficult to identify or correct for. The impact of bias could potentially be mitigated e.g. if the pool of respondents is sufficiently large and the surveying method is designed to minimise bias. The Fernandez survey appears to better meet these criteria relative to the Investment Managers' TMR survey.

These examples show that regulators regularly make sampling choices and choose to include or exclude certain comparators from the sample, so the fact that we have exercised a sample selection process, at the end of which we concluded that one NG bond was the most suitable comparator, is perfectly in line with regulators' own approaches towards sample selection. This is especially the case when we have explained in our paper that our hybrid bond result is not sensitive to the choice of specific hybrid bond. In rejecting our hybrid bond evidence on the account of sample selection, regulators have applied inconsistent standards to our evidence compared to their own.

4.2 Reliance on assumptions

The remaining element of regulators' critique involves the need to make assumptions when operationalising the hybrid bond cross-check. We have addressed the specific concern on the assumptions raised by Ofwat in the technical section on the updated hybrid bond analysis in our DD cross-checks report for the ENA and FEN,[74] so we do not repeat it here. However, we note that almost *all* of the cross-checks discussed to date require some assumptions to allow comparison with the CAPM CoE or its component parameters. For example:

■ As discussed in Section 3.1, inferring the CoE from MARs requires regulators to make assumptions on the growth rate and out/under-performance jointly.

■ Not only that, estimating the MAR for the regulated segment of the business also requires assumptions regarding the proportion of the business which is regulated. This can be challenging to carry out and is an issue for National Grid, for example.[75]

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[73]   See Ofgem (2025), RIIO-3 Draft Determinations Finance Annex, para 3.106

[74]   Frontier Economics (2025), Updated Cross-Check Evidence reports, prepared for ENA and FEN respectively, Annex A

[75]   In reality, estimating the equity premium market-to-asset ratio is a complex exercise, as we have outlined in our Investability Report. Please see Frontier Economics (2024) Equity Investability in RIIO-3, a report prepared for the ENA, paras 210-211

■ The infrastructure IRR cross-check employed by Ofgem requires an assumption on the conversion from the fund IRR to a cost of equity estimate with an adjustment for market to asset ratio.

Overall, we find that the concerns raised by regulators regarding the hybrid bond cross-check are present in other elements of the price control or regulators' own cross-checks. It is also unsatisfactory for regulators to continue to raise concerns with the evidence due to the existence of some limitations, even when these limitations do not materially affect the outcome of the cross-check evidence or the key conclusions that would logically follow. Further, Ofgem has also stated *"our broader concern with any debt-based cross-check is that we do not consider that it can definitively prove or 'back solve' to a required return on equity"*.[76] Fundamentally, this is not the right test to employ on cross-checks; no cross-check (nor the CAPM) can definitively prove a cost of equity, and using this as a criterion would render all cross-checks unusable.

If regulators applied a consistent standard of evidence to all of the cross-check evidence, they would find that it would be appropriate to consider the hybrid bond cross-check in their calibration of allowed returns.

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[76]   Ofgem (2025), RIIO-3 Draft Determinations Finance Annex, para 3.100

5   A more robust set of cross-checks for RIIO-3

As set out in Section 2 above, estimating the allowed return (in both Steps) relies on information that may not be perfect. Regulators need to be aware of the uncertainties in the estimation process (even in Step 1), as well as the advantages and limitations of different bodies of evidence, especially for Step 2.

There is a wide range of available cross-checks evidence. It is therefore important for Ofgem to apply a consistent quality standard on these cross-checks when assessing their implications for the appropriateness of the step 1 CAPM CoE result.

Our analysis in this paper found that Ofgem has been applying inconsistent standards on its own cross-checks compared to the ones proposed by the networks and their advisors, in doing so unfairly favouring the former while disqualifying the latter. Ofgem has effectively picked evidence that supports its own step 1 estimates, using arguments and criteria to dismiss valid cross-checks without holding up its own cross-checks to the same standard.

The reasons to discard cross-checks proposed by networks are often based on unreasonable hurdles, such as the sample being small, benchmarks being imperfect and the need to use assumptions to operationalise the cross-checks. Our analysis in this paper shows that if these hurdles are applied to Ofgem's own cross-checks, they would need to be discarded as well. For example, it is irrational to dismiss DGM-based TMR evidence proposed by Frontier on principle while relying on DGM-based MAR cross-checks suggested by Ofgem itself.

If Ofgem were to apply a consistent quality standard to the available cross-check evidence, it would find the evidence suggested by debt-based cross-checks and DGM-based TMR cross-checks informative. Failure to place weight on relevant information would be wrong and could lead to the allowed return being set at the wrong level.

By relying on a fuller set of information, regulators can come to a more informed and clearly superior view of market sentiment with respect to the allowed return, allowing them to set the CoE at an appropriate level which mitigates investability risks and protects customers.