

# RISKY BUSINESS

Options to improve the  
robustness and consistency  
of risk measures for  
regulated infrastructure

# 2020

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## OPTIONS TO IMPROVE THE ROBUSTNESS AND CONSISTENCY OF RISK MEASURES FOR REGULATED INFRASTRUCTURE

In discussing the details of RoRE measurement we focus on its application in the water sector at PR19, but our assessment and recommendations are largely relevant to all regulated infrastructure businesses.

### HOW RORE HAS BEEN CALCULATED

RoRE represents a measure of risk for equity investors. As applied in the water sector, it has the following features:

- It covers the **'business as usual' risks** a company faces, including cost risk (totex outturn higher or lower than allowed); service performance payments (ODIs and C-MeX/D-MeX); revenue risk and financing cost risk (cost of new debt).
- In principle it is measured as an **upside scenario and a downside scenario** against the base return on equity. The downside scenario is assessed at the P10 probability level (i.e. only 10% of outcomes would be worse than this scenario) and the upside case is assessed at the P90 probability level (i.e. only 10% of outcomes would be better than this scenario).
- It reflects the total impact over the five-year price control period and incorporates the effect of regulatory sharing mechanisms, even if they apply after the end of the period. Therefore it captures the NPV impact of the risk.
- The scenarios are intended to capture the linkages between different risks rather than simply aggregating them.

The figure below shows the RoRE ranges as published by Ofwat in its December 2019 final determinations. The downside return on equity ranges from -4% to 0%, while the upside return ranges from 7% to 11%.

### EXEC SUMMARY

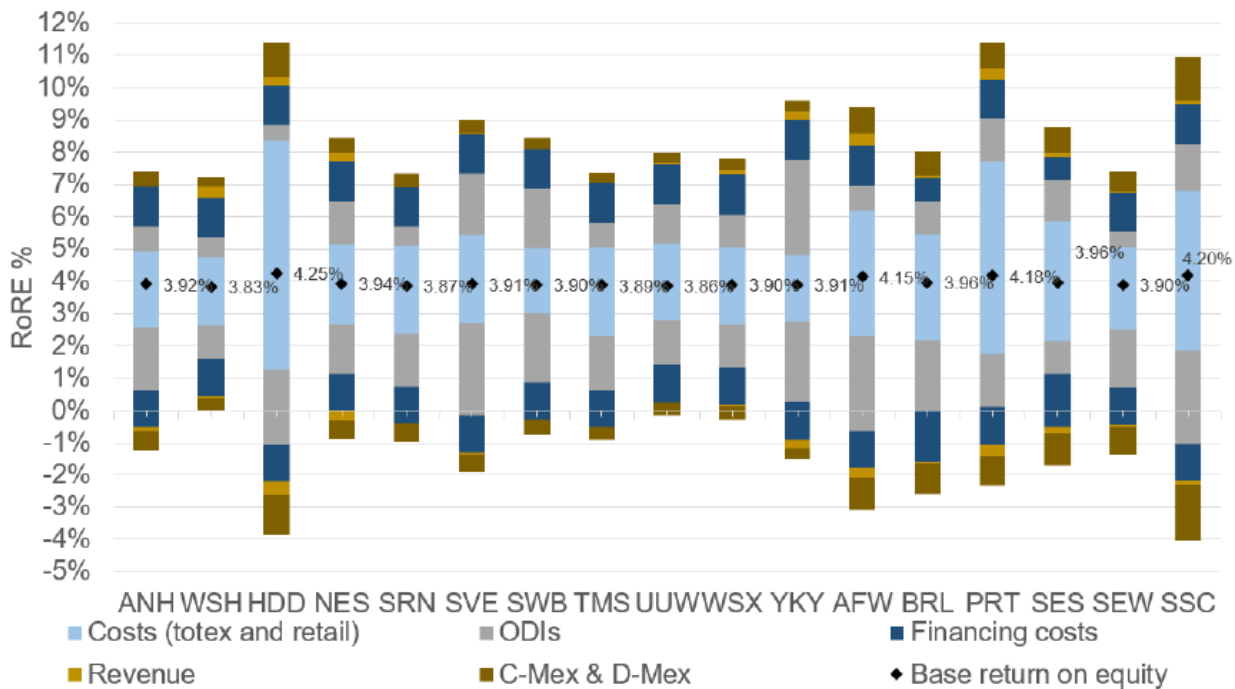
Understanding the level of financial risk faced by utilities can help regulators to design incentive mechanisms and calibrate the rate of return. It can assist companies and investors to gauge their risk exposure and ensure financial resilience.

UK regulators have focused on the Return on Regulatory Equity (RoRE) as a central yardstick of risk. RoRE measures the return that equity investors will earn in specific upside and downside scenarios and is assessed against the cost of equity component of the Weighted Average Cost of Capital (WACC).

But RoRE is not without its drawbacks. In this paper we identify those issues and explore how it and other risk measures can be improved. Specifically, we consider:

- What are the problems with the current RoRE approach?
- What are the aims of a risk measure? What are we trying to achieve? And
- How can we improve the measurement of risk?

**FIGURE 1 OFWAT FINAL DETERMINATION RORE RANGE**



Source: Ofwat, PR19 final determinations, Aligning risk and return technical appendix, December 2019, page 35

The figure shows the wide range of RoRE outcomes according to Ofwat’s own analysis, with some companies exposed to materially more risk than others. However, in Ofwat’s final determination these different degrees of risk do not appear to affect any of the other elements of the regulatory settlement such as allowed return, notional gearing or risk-sharing mechanisms. This raises questions about the role of RoRE and whether there is a case for other measures of risk.

## IMPLEMENTATION OF RORE

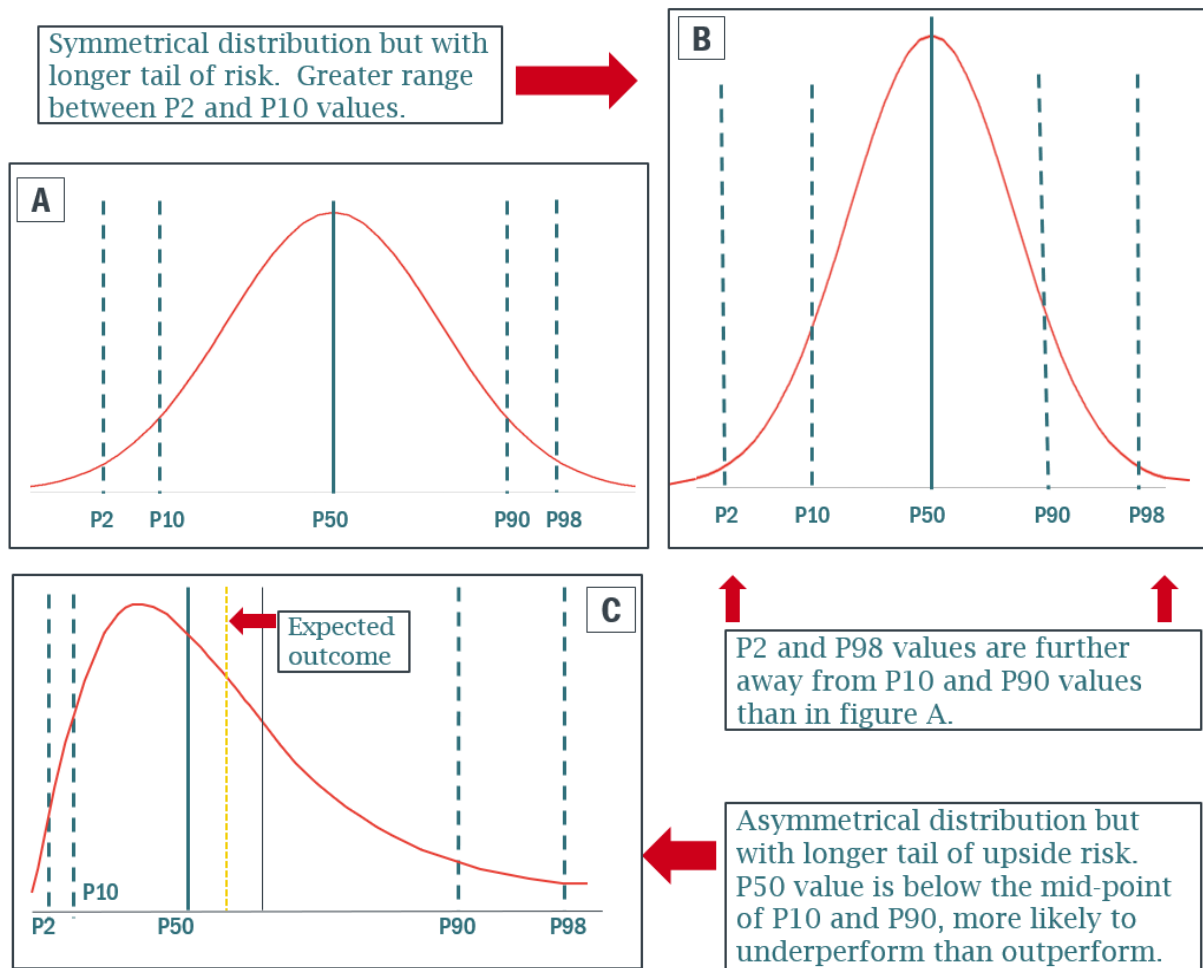
The way that RoRE has been implemented to date raises a number of concerns.

## LIMITATION OF P10 AND P90 VALUES

An understanding of risk should focus on the whole distribution of probabilities, whereas RoRE is limited to the P10 and P90 outcomes. Consider the different risk distributions illustrated in the figures below, which also show the P2, P98 and P50 outcomes.

Figure A shows a typical normal distribution. With a symmetrical distribution of risk, the P50 value is therefore equal to the expected outcome. Figure B is also a symmetrical distribution but has a longer tail of extreme outcomes. Therefore, compared to figure A, the P2 and P98 values are further away from the P10 and P90 values respectively.

**FIGURE 2 UNDERSTANDING THE WHOLE RISK DISTRIBUTION - ILLUSTRATION**



Source: Frontier Economics

Figure C shows a distribution that is not symmetric. In this case there is a high probability of a relatively small negative outcome and a long tail of potential positive outcomes. The P50 value is below the expected outcome, which is below the mid-point of the P10 and P90 range. These figures start to illustrate the wide range of risk distributions that can occur in practice. For example, customer supply interruptions may follow a distribution that is the mirror image of figure C, i.e. asymmetric but with greater chance of material underperformance.

Therefore the P10 and P90 values do not capture all the relevant information about risk. In theory a RoRE analysis could have led to the same upside and downside for scenarios A, B and C but with very different underlying probability distributions. RoRE focuses only on the upside and downside at two specific points and gives no further insight into the distribution of risk. Investors and management care about the extreme tails of the risk distribution as they have important consequences for risk management, financing strategies and required returns. They also care about the expected outcome, which may not be at the mid-point of the P10 and P90 range. And if the expected outcome is not equal to the allowed cost of equity

there are implications for Ofwat's ability to fulfil its duties to protect customers' interests and ensure that companies can finance their operations.

### **CONSISTENCY OF INPUT DATA**

Another concern with the implementation of RoRE is that Ofwat has provided only high-level guidance on the data and method to be used by companies to arrive at the P10 and P90 values. The advantage of this approach is that it is flexible and can encourage firms to innovate and improve the processes used. Nevertheless, a lack of consistency in input data makes it harder to draw conclusions based on comparisons between companies.

Clearly, it is not easy to estimate the forward-looking P10 and P90 figures. Companies have data on past performance of ODIs and costs. They also have access to external projections of variations in future weather patterns and economic growth. The challenge is to combine this evidence in a consistent modelling approach to generate a forecast of risk distributions. One option is to define the aggregate risk scenarios (for example, an economic recession or extreme weather event or global pandemic) and then consider the individual risk categories within these scenarios. Ofwat adopted a similar approach with the definition of risk scenarios in the Risk Assessment Tool at PR14. This helps with consistency between individual components but it places great reliance on the choice of the aggregate scenarios.

### **METHOD OF COMBINING RISKS**

Even with a consistent approach to generating values for individual risks, the next challenge is to establish the method for amalgamating these risks into aggregate upside and downside scenarios.

If the risks were independent of each other this would be straightforward, but the reality is that they are not. For example, situations that lead to upside or downside outcomes for service performance or revenue are also likely to lead to variations in cost levels. In other words, there are correlations between the individual risk factors that affect the calculation of the aggregated scenarios.

Provided these correlations can be estimated, the aggregated scenarios can be calculated using Monte Carlo simulation techniques. To date though, the evidence base on correlations is not well developed and there is a lack of consistency in the method used for simulation analysis. This is certainly an area that would benefit from further analysis, with a focus on developing a best practice approach for the industry.

### **ASSUMPTION ON THE CENTRAL VALUE**

A further issue is that the P10 and P90 values tend to be calculated as variations in return that then need to be applied to some central cost of equity. The problem is that there are various options for defining this central value, each involving a slightly different set of assumptions about the risk profile and a different interpretation. These are summarised in the figure below.

FIGURE 3 APPROACH TO DEFINING CENTRAL VALUE

OPTION	ASSESSMENT
<p><b>The value set by the regulator in the determine</b></p>	<p><b>Strength.</b> Understanding the risk distribution around the determination is an important aspect of demonstrating the reasonableness of the decision and the consistency between risk and reward.</p> <p><b>Weakness.</b> Two practical issues. First, the risk values proposed by the companies would have been based on business plan assumptions. Do they need adjusting in order to be applied to Ofwat’s assumptions and does the regulator have the right information to do this? Second, as discussed below, the determination values may reflect a level of efficiency that Ofwat considers customers should pay for; this may differ from what a given company can achieve. There is a need to be clear whether the risk range reflects an assumption that the company is already efficient or whether it reflects a realistic path based on the company’s starting position.</p>
<p><b>The value used by the company in its business plan</b></p>	<p><b>Strength.</b> The companies’ P10 and P90 submission should be consistent with the business plan assumptions.</p> <p><b>Weakness.</b> Companies have prepared these in isolation, whereas the regulator has the benefit of being able to make a cross-company comparison of what can be achieved.</p>
<p><b>The actual current level</b></p>	<p><b>Strength.</b> This level of performance may be most consistent with the historical input data used to assess the risk distributions.</p> <p><b>Weakness.</b> It does not take account of scope to improve efficiency over time.</p>

Source: Frontier Economics

### WHERE DOES THIS LEAVE RORE?

In our view, the RoRE evidence has not been taken seriously, perhaps due to the practical concerns outlined here. There is a wide range of RoRE outcomes according to Ofwat’s own analysis, with some companies exposed to more risk than others. These differences in risk do not flow through to other elements of the regulatory determination.

This suggests there is a strong case to revisit the role of RoRE, to consider alternative risk measures and to examine ways to improve the credibility of the RoRE figures themselves.

As a starting point for this process, it is important to be clear on what we are trying to achieve with a measure of risk such as RoRE.

## WHAT IS THE RISK MEASURE TRYING TO ACHIEVE?

While there are a lot of practical ways of improving RoRE, it is important to step back and think about the overall objectives of a risk measure. Applied to a regulated network, there are several potential goals:

- 1 **A measure to cross-check the WACC estimate.** Regulators need to estimate the WACC as part of the price-setting process. The primary method is to use the Capital Asset Pricing Model (CAPM) to estimate the cost of equity and market data on corporate debt interest rates to estimate the cost of debt. In principle a risk measure could be used as part of the evidence base to estimate the cost of equity or WACC - for example, to understand if the forward-looking cost of equity should be higher or lower than the backward-looking CAPM estimate. However, this would need to account for the degree of diversifiable risk, since risk that is completely diversifiable does not affect the CAPM estimate of the cost of equity. We note that RoRE has not been used in this way.
- 2 **A relative measure of risk.** Even if RoRE was not considered to be robust as an absolute measure of the cost of capital, it could still be used as a relative measure. This could assist in understanding:
  - Trends in the riskiness of the industry over time. For example, is this price control placing more risk on companies than previous controls?
  - Differences between companies at a point in time. Does one water company face greater exposure to risk than others?
  - Differences in risk between different regulated infrastructure sectors.

This evidence could help explain and justify differences in the WACC and allowed rate of return between companies and sectors. It could also help regulators in the design of risk-sharing mechanisms. The data has been available for these comparisons but there is no indication that RoRE results have been used for this purpose in any meaningful sense.

- 3 **A relative measure of risk to calibrate different components of risk and incentives.** A risk measure such as RoRE can be broken down into components: cost risk, service quality, financing, etc. This evidence could help the regulator to calibrate its incentives and risk-sharing mechanisms and address questions such as:
  - Do investors have stronger incentives to reduce costs or to improve performance? The regulator can adjust these parameters through the cost-sharing rate or financial incentives for service performance.
  - Do investors have stronger incentives to reduce supply interruptions or improve customer contact experience? Does the regulator consider that these will lead to the desired behaviours?

In our view, the limited use of RoRE to date has been for this purpose.

- 4 **A measure of financial viability.** Risk measures can provide an indication of the financial resilience of the company and the likelihood that it will end up needing support from shareholders

to maintain its credit metrics and rating. The focus of this objective is typically on credit benchmarks calculated as part of the financeability assessment but risk measures can provide additional evidence.

Given the range of different objectives, we would not expect any one risk measure to perform well against all of them. This highlights the importance of being clear about the objective for which the measure is being designed.

If we consider the current RoRE measure against these objectives, we would conclude as follows.

First, as a measure to estimate or calibrate the WACC it has a number of limitations.

- It does not encompass the full set of risks because it focuses on those linked to regulatory incentives and cost-sharing mechanisms. It does not capture the risk of regulatory change or wider political risks.
- The measurement of risk does not distinguish between diversifiable and non-diversifiable risk. This is important to equity investors since they will typically want to hold a portfolio of assets to minimise exposure to diversifiable risk.

Overall, it is not really possible to estimate the WACC based on RoRE evidence. RoRE data may have some value as a relative WACC measure. In other words, comparisons of RoRE between one price control period and the next, or between two regulated sectors, could signal that the WACC should be higher or lower. Even then it could only be indicative and would need to be supplemented by other evidence of the cost of capital.

Second, the current RoRE does not perform well as a measure of financial viability. This is because it reflects changes in value rather than changes in cashflow. In addition, it aggregates risks over a five-year horizon, which is a relatively long time frame that could obscure the impact of short-term shocks on the viability of the company.

Therefore the current measure of RoRE is best designed as a measure of relative risk that aids the calibration of incentives and risk-sharing mechanisms within the regulatory methodology. However, the ability of RoRE to fulfil this important role has been hampered to date by the lack of data consistency highlighted above.

## WAY FORWARD

In this section we outline options for improving the current RoRE method. We then look at other measures, focused more on viability, that could be used alongside RoRE.

## TOWARDS A BETTER RORE METHOD

### IMPROVED ROBUSTNESS AND CONSISTENCY OF DATA

The quality of the RoRE evidence can be enhanced by improving both the robustness and the consistency of the input data and the modelling approach. In the short term, though, there may be a tension between



robustness and consistency. Data could be made more robust by improvements and innovation in the companies' internal inputs and risk-modelling, whereas greater consistency would stem initially from more prescriptive guidance by Ofwat.

In a separate paper<sup>1</sup> we outline the scope for using the latest data analysis tools to improve company efficiency and performance. These tools can also contribute to a better understanding of operational risks and the interactions between them. Being able to model integrated risk scenarios across different operational, asset management and investment planning models would help to generate more robust results.

At the same time, more could be done to promote a consistency of method. This could take the form of more detailed guidance from Ofwat or a best-practice approach developed by the industry. The advantage of the latter option is that it is more likely to reflect the risk assumptions that companies use internally.

- **Guidance on input data.** This could involve more detailed guidance on method or even specify suitable ranges for the P10 and P90 values for individual risks. But there could be a trade-off that is difficult to justify: the greater the desire for consistency, the more prescriptive the guidance needs to become. After all, the 'true' P10 and P90 ranges for a given risk are unlikely to be identical across companies due to differences in asset configuration and operational structures. As a result, valuable insights into company differences may be missed.
- **Guidance on method.** This could provide more clarity on the evidence to be used in assessing the risk values and also the technique for combining individual risks. Assuming that it is based on a form of Monte Carlo simulation, the guidance could also cover the method or values for the cross-correlation between different types of risk.
- **Guidance on how RoRE calculations will be assessed.** If Ofwat was taking the lead, a less prescriptive option would be for it to set out the criteria for assessing company calculations. This would build on the regulator's current approach, enhanced by making greater use of realised risk and RoRE. There is an expanding dataset of actual RoRE results that could be used to evaluate variances and cross-correlations and on which Ofwat could draw to calibrate company evidence.

Figure 3 provides an example of the type of historical evidence that is available. It shows outturn totex compared to the regulatory allowance. The figure illustrates that there is a wide distribution of cost performance and that, historically at least, there has been modest outperformance on average.

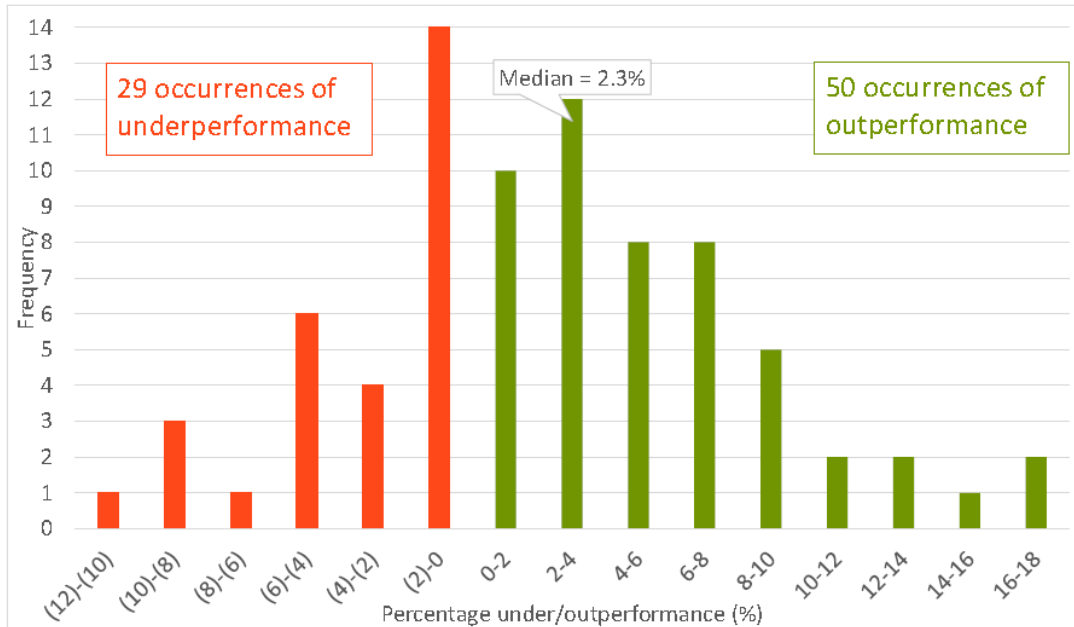
The increased availability of past performance data can help overcome the informational asymmetry that exists between companies and the regulator. Firms have an advantage in understanding the risks they face, an asymmetry that is greater in the absence of comparable cross-company data. This state of affairs can distort the way in which the regulator approaches the companies' evidence; namely, it may consider that companies have an incentive to overstate the downside risks. Better historical data can reduce this asymmetry and improve the engagement over risk between regulator and company.

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<sup>1</sup> *How more and better data can improve the regulatory approach in the water sector*, June 2020.

Overall, there is a case for the companies and the industry as a whole to be given time to improve their risk-modelling methods and the evidence base for RoRE calculations. Ofwat would then be able to decide whether further guidance or intervention was required.

**FIGURE 4 TOTEX RISK DISTRIBUTION**



Source: Ofwat, Reference of the PR19 final determinations: Risk and return - response to common issues in companies’ statements of case response to CMA, p32, May 2020.

**USE OF NOTIONAL EFFICIENCY BENCHMARKS**

RoRE measures can also be improved to provide greater clarity on the distinction between notional and actual efficiency projections. Efficiency benchmarking has always been a core element of the regulatory methodology, but at PR19 Ofwat hardened its position on notional benchmarks. For many of the parameters in the regulatory determination Ofwat estimated an efficient level of performance and assumed that all companies could achieve that benchmark from the start of the price control period. In other words, it moved away from the concept of a glidepath from current to efficient performance. Note that ‘actual efficiency’ in this case is still a forecast that is subject to error, but the difference is that it represents an unbiased estimate of how quickly the company can raise the efficiency level.

In making this decision Ofwat was not necessarily claiming that companies that were underperforming would be able to reach the higher level. Instead it argued that customers should pay only for efficient costs and that historical inefficiency should be borne by shareholders.

From the point of view of RoRE calculations this matters for the central value for each risk. The P10 and P90 values are expressed as variations from this central value, so:

- If the central value is set as the regulatory target (i.e. notional efficiency) then the RoRE range will capture the risk of the company on the assumption that it was already operating at the notional efficient level.

- If the central value is based on a reasonable glidepath from current performance to the notionally efficient level then RoRE will capture the risk that is more likely to arise in practice.

The advantage of the first approach is that it is consistent with Ofwat's regulatory methodology and provides a basis for comparing the strength of incentives across companies that is independent of the starting position on efficiency.

The advantage of the second approach is that, as long as the glidepath is realistic, it provides a more accurate assessment of the actual downside risk faced by the companies. This could be particularly relevant if the RoRE is being used as a measure of financial viability and resilience. One way to obtain an estimate of a realistic glidepath is to look at the historic rates of efficiency improvement and productivity growth of those utilities that have been benchmarked as less efficient. This could give an indication of an achievable rate of catch-up.

Given that both approaches can generate useful insights, one way forward would be to calculate both versions – the notional version as a way to calibrate the different incentives and sharing rates, and the actual or glidepath version as a metric of financial resilience.

### **BETTER DATA ON DISTRIBUTION OF RISK**

The third area where the existing RoRE method can be improved is through a better understanding of the overall risk distribution. Rather than just estimating the P10 and P90 values this would involve a stronger grasp of:

- The more extreme risks, for example the P2 and P98 values (or P1 and P99). For some risks the extreme outcomes are curtailed, perhaps due to caps and collars on the incentives but also due to operational reasons. For other risks the extreme outcomes will be materially different from the P10 and P90 values.
- The skewness (shape) of the distribution – whether the distribution of risks is symmetrical or whether there is likely to be some outperformance or underperformance.
- Other P-values (e.g. P20 or P30) may also be relevant and help the companies to understand risk and plan mitigation strategies.

This additional insight on the distribution of risks would be useful in a number of respects. First, a better understanding of the distribution of downside risks beyond the P10 threshold is important in assessing a company's viability and financial resilience. Second, the information can assist Ofwat in the design of incentives and, in particular, the case for caps or collars or other risk-sharing mechanisms for more extreme outcomes.

In terms of the calculation methodology, the distribution of risk can be assessed at the level of individual risk and/or at the aggregate level. The Monte Carlo techniques can automatically calculate the full distribution of the aggregate RoRE. However, these results are meaningful only if the distributions of the underlying individual risks are accurate. Therefore, it is important to be able to estimate the distributions of the individual risks. As outlined in our separate paper, rapid advances in data analytics provide opportunities to integrate data systems and operational models and to generate the tools needed to understand these risk integrations.

## A CASHFLOW RISK MEASURE

The current RoRE method assesses risks over the five-year price control period and also takes account of regulatory sharing mechanisms that apply at the end of the period or in the following one. Therefore, this RoRE measure does not capture the cashflow impact of a given set of risks.

Measures of cashflow risk are relevant to the assessment of the risk of default and so are important for debt investors. They can inform decisions relating to credit ratings and optimal capital structure. As a result, they provide a measure of financial resilience and could help identify circumstances in which equity investors may need to forego dividends or inject extra equity.

Of course, there are already a number of cashflow measures that are used in credit rating assessments and the financeability tests that regulators undertake. Key among these are the cash interest cover ratio and the ratio of retained cashflow to net debt. However, these are primarily used as central case projections where we are concerned with how much headroom there is above a target level. Probability distributions around these metrics are often considered by companies in their viability tests but, unlike RoRE, they do not feature prominently in the regulatory determination.

There is scope therefore to develop new cashflow measures of risk that combine elements of RoRE and existing credit metrics. As for the time frame, the five-year aggregation used in the RoRE is less suitable for a cashflow measure. It would make more sense to measure annually but to model over at least a five-year horizon to understand how regulatory sharing mechanisms and company mitigations feed into cashflow on a year-by-year basis.

A cashflow measure could incorporate a number of risks that are not included in the RoRE, for example because any short-term cashflow impact is offset by a regulatory correction mechanism. These could include:

- Annual variations in wholesale revenues
- Variations in retail revenue, including shocks to business retail cashflows similar to that currently experienced as a result of the COVID-19 pandemic
- The failure of a major supplier/contractor or delivery partner.

In this way cashflow measures would be suitable to assess a broader range of short- and medium-term risks that could affect the financial viability of the water companies.

The approach to modelling the risks and the P-values used would be consistent with that employed in the RoRE analysis; the options outlined in the previous section would thus be relevant here. As these measures are aimed at financial resilience and viability, the focus would chiefly be on the downside risk values (e.g. P1, P2 and P10).

Such a consistent, integrated approach to risk-modelling would help both regulators and investors.

Our initial thinking is that the following measures need to be considered:

- **Cashflow after capex but before financing.** This measures operational cashflow risk and includes capex to reflect the importance of the capex programme to the water company and its customers.
- **Cashflow after capex and after notional financing.** This would measure free cashflow after capex and financing costs using the regulator's notional assumptions. There could be two versions of this measure:
  - One where financing costs include debt financing costs and assumed dividends. This would capture the risk that the company does not have sufficient cashflow unless it reduces dividends below a normal level.
  - Another one where financing costs just include debt financing costs. The aim would be to capture the risk that the company does not have enough cashflow, even with zero dividends, and may have to inject new equity.
- **Cashflow after capex and after actual financing.** This could be measured in a similar way to cashflow after notional financing but based on the company's actual financing structure and financing costs. This would capture the risk that action is required from equity investors to support cashflow. Differences between these measures and the notional measures could inform the regulatory response, in line with Ofwat's position that equity investors should bear the risks associated with differences between notional and actual structures.

These proposed cashflow risk measures combine elements of the RoRE and existing credit metrics and would offer insights that these measures do not provide.

Companies have been undertaking risk analysis of credit metrics for long-term viability statements (LTVS). These proposals would build on this existing work and improve the consistency of risk analysis across the board, from RoRE to LTVS.

## CONCLUSIONS AND NEXT STEPS

This paper has examined the limitations of the current method of calculating RoRE, which help to explain why it does not feature prominently in the regulatory decision-making or in the water companies' own planning. Nevertheless, because we consider that risk-modelling has an important role to play, it is useful to explore how the measurement of risk can be improved.

We have identified a number of purposes that risk measures can serve: from the design of regulatory incentives and risk-sharing through the calibration of differential WACC figures to the assessment of financial resilience. No single metric is likely to be adequate to meet all these purposes, so the measures we have discussed here should be seen as potential complements rather than substitutes.

In this light, we have considered two broad areas for further development:

- First, options for improving the existing RoRE to provide a more robust way to support the design of regulatory incentives.
- Second, options for developing cashflow risk measures to assess financial resilience that combine features of RoRE and existing credit metrics.

These options are summarised in figure 5 below.

**FIGURE 5** SUMMARY OF WAY FORWARD ON RISK MEASURES

OPTION	ASSESSMENT	PURPOSE OF MEASURE
Improved input data and risk modelling for RoRE	<p>More robust risk distributions and risk aggregation methods.</p> <p>Initially comparisons will be hampered by different company approaches – until best practice emerges.</p>	Better measurement of relative impact of risks in regulatory method – e.g. to calibrate cost-sharing and service incentives.
More prescriptive Ofwat guidance on RoRE calculations	<p>RoRE results will be more comparable across companies.</p> <p>Could stifle innovation in risk-modelling.</p>	Better measurement of relative impact of risks in regulatory method.
Better assessment of risk distribution – going beyond P10 and P90 (i.e. P1, P2 ...).	<p>Would provide a better understanding of skewness and long-tail risk.</p> <p>Additional complexity in analysis and modelling.</p>	<p>Better measurement of relative impact of risks in regulatory method.</p> <p>Would provide some evidence to understand WACC/rate of return differentials between companies or sectors.</p>
Cashflow risk distributions – notional gearing	<p>Can capture a broader range of risks than RoRE and assess short-term cashflow impacts.</p> <p>Overlap with existing credit metrics, importance of developing a consistent risk-modelling approach.</p>	Better measurement of financial resilience and viability. Based on notional gearing and can help inform regulatory assessment of financeability.
Cashflow risk distributions – actual gearing	As above.	Better measurement of financial resilience and viability. Based on actual gearing and can help inform companies’ and investors’ assessment of viability.

Source: Frontier Economics

Looking ahead, the key questions to be answered are:

- How far can the industry develop more consistent methods and datasets for modelling risk distributions?
- How prescriptive should Ofwat be in providing guidance to drive more consistent data and methods for RoRE?
- Which cashflow risk measures would be most relevant and, at the same time, consistent with RoRE and existing credit metrics?

The aim is to achieve a greater consistency and tighter integration among three approaches: regulatory risk-modelling (e.g. RoRE), companies' internal operational risk-modelling and financial risk-modelling (e.g. LTVS). Doing so will help companies with their own risk management strategies and also allow the regulator to place more weight in its price control decisions on RoRE or other risk measures.

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