

FINANCEABILITY OF THE NOTIONALLY EFFICIENT FIRM: TOP-DOWN ANALYSIS

A PR19 representations report for Anglian Water, Northumbrian Water,
Welsh Water and Yorkshire Water



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1. Executive summary

Ofwat's assessment of financeability is undertaken with respect to the notionally efficient firm. As such, the question of whether Ofwat is fulfilling its financeability duty (and relatedly, therefore, its consumer duty) is intrinsically connected to whether the regulator has set an efficiency challenge that reflects achievable performance for the notional firm. This issue is critical at PR19, because Ofwat has intentionally set a 'step change' in the scale of challenge to the industry.

Whilst identifying the cost and outcomes performance level an efficient firm can achieve is complex, a 'top down' approach provides a practical way of considering the question. In particular, in the absence of an overall increase in productivity in the economy, for such a 'step change' to be appropriate, one would need to: (i) find evidence of substantial, systematic and persistent historical outperformance; and (ii) ensure that the increase in the PR19 challenge is proportionate to this. However, we find neither of these to be true.

The implication of this, as is clear from the evidence on the distribution of risk, is that the notional firm is likely not financeable. As such, Ofwat is at risk of failing to fulfil its primary duties and, therefore, needs to recalibrate its cost and outcomes incentives packages, in order to ensure the notional firm is financeable and to protect the interests of current and future consumers.

These findings are unsurprising and are consistent with prior academic studies and the logical presumptions that follow from Ofwat's methodology.

In line with its duties under the Water Industry Act (1991), and as is commonly understood, it is appropriate for Ofwat to assess financeability with respect to the notionally efficient firm and, relatedly, it is for the regulator to determine or identify ‘what’ the notional firm is able to achieve with respect to efficiency (both costs and outcomes).

This means that **if the regulator ‘mis-identifies’ the notional firm – say, by assuming levels of cost and outcomes performance that are unachievable by it – it will not be financeable.** This would further logically imply that, by failing to appropriately allow the notional firm to efficiently fund its activities and investments, **the regulator would be failing to protect the interests of current and future consumers.**

Seen through the above lens, **it is important to consider the evidential basis for Ofwat’s central assumption at PR19 – namely, that: ‘now is the time for an efficiency step change.’** We explore the theory and evidence relevant to determining the validity of this. Our analysis shows that:

- Consistent with economic theory, ‘catch up’ efficiency potential in the water industry has declined since privatisation and total factor productivity (TFP) in the water industry is converging to overall UK TFP. This is further consistent with incentive regulation acting as expected over time and so provides no evidence of a rationale for increasing the efficiency challenge at this time.
- Empirically, it is clear that the overall productivity performance of the UK has ‘flatlined’ post financial crisis. A consistent pattern of weak or falling productivity can be found across various industries in the UK, including in competitive markets. Consequently, contrary to Ofwat’s claims that firms elsewhere in the UK are ‘stepping up’ their efficiency performance at this time (which Ofwat uses to imply that the water industry should also achieve a step change), the data consistently and unambiguously shows the opposite is true.

In light of the above, the theoretical validity of Ofwat’s view that a ‘step change’ in efficiency can now be delivered, depends on:

- previous price controls being ‘too lenient’, as would be observable in substantial, systematic and persistent outperformance of allowed regulatory returns in the past by companies, such that there is some ‘stored up’ catch up inefficiency to be taken out at PR19; and
- the increase in regulatory challenge at PR19 being proportionate to that.

However, we find neither of these to be true. In particular:

- **We find no evidence of substantial, systematic and persistent historical outperformance by the industry.** Specifically:
 - » We analyse outturn return on capital employed (ROCE) and compare this to the WACC, back to PR04. We find average industry ROCE to be 5.1% over the period, compared to an average vanilla WACC of 5.0%. We consider this to be the most appropriate measure, as it properly reflects the overall

opportunity cost to debt and equity investors. This, then, would imply fractional outperformance of 3.8% over the long term.¹

- » Also on our measure of ROCE versus WACC, we find that: whilst some companies do slightly outperform (9 out of 16²), a similar number underperform (the remaining 7). In other words, there are ‘winners’ and ‘losers’ over time, exactly as one would expect to observe if incentive regulation is working effectively.
- » Ofwat itself previously published analysis of outturn ROCE versus its expectations for the industry. In line with our own findings, the regulator consistently found no evidence of substantial, systematic and persistent outperformance.
- » We also examine RORE as an alternative measure of historical performance against regulatory allowances (although it is less relevant than ROCE versus WACC, as it: (i) clearly does not reflect the full opportunity cost to investors – noting that debt finance plays a significant role in the water industry; and (ii) is a relatively recent measure in the water industry, only having been properly established at PR14 – meaning that a long-term analysis cannot be meaningfully undertaken). Notwithstanding these limitations, Ofwat’s own data shows that, on average between March 2015 and March 2018, the industry average outturn RORE has been 6.2%, compared to the average base allowed equity return of 5.6%. This indicates a *slight* outperformance on equity returns over the period by 10.2%. Significantly, when we look at the analysis by company, we find an even split in the number of companies that outperform (9 out of 17) relative to those that underperform (the remaining 8). As per the ROCE analysis, therefore, this is clearly not consistent with substantial, systematic and persistent outperformance.
- » In addition, we review various academic and third party studies of historical water sector financial performance against regulatory allowances. Consistent with our analysis, these also show no evidence of substantial, systematic and persistent outperformance. We note that these studies are independent and were not, therefore, undertaken in order to support either an industry, or regulator, perspective on this matter.
- » We further note that, more broadly, in the past Ofwat itself has consistently provided various evidence that there has not been significant, persistent or systematic outperformance by the industry. This includes evidence given by Ofwat to the Select Committee for the Environment, Food and Rural Affairs.
- » We note that, more recently, Ofwat has quoted examples of outperformance *selectively* during the PR19 process, such as outperformance on RORE

¹ The percentage outperformance over the WACC is calculated as: the gap between the outturn ROCE performance and the vanilla WACC as a percentage of the vanilla WACC. In this case, this would be $(5.1 - 5.0) / (5.0)$. Please note that calculating the outperformance based on figures mentioned in this report suggest an outperformance of 2% (instead of the 3.8%). However, this calculation would be erroneous because all figures presented in the report have been rounded to 1 decimal point for ease of reference, but are therefore, not precise.

² In order to account for change of ownership during the period (i.e. mergers or carve-outs), the analysis has been aggregated at the level of the 17 companies of relevance for PR19. Further, it has not been possible to disaggregate the relevant historic publicly available data to reflect the structural changes which occurred between Hafren Dyfrdwy and Severn Trent. Therefore, for the purpose of this analysis, Hafren Dyfrdwy and Severn Trent have also been combined and are presented together. As such, our ROCE analysis is at the level of 16 companies: Affinity, Anglian, Bristol, Dwr Cymru, Northumbrian, Portsmouth, Severn Trent (including Hafren Dyfrdwy), South East, South Staffordshire, South West, Southern, SES Water, Thames, United Utilities, Wessex and Yorkshire.

relating to ODIs, or totex allowances. This is misleading, as it provides no information as to whether a company is outperforming ‘overall’. Hence, realised outturn financial returns are plainly the appropriate measure.

- **We find the increase in regulatory challenge at PR19, relative to the past, to be unprecedented and well in excess of even the most ‘aggressive’ view of historical outperformance.** Specifically:
 - » We examine the percentage “gap” between Ofwat’s draft determinations (DDs) of allowed revenues and those submitted in company plans at PR19 – which we take as our measure of ‘regulatory challenge’. We compare this to the same metric over previous price controls. This shows that, based on Ofwat’s DDs, **the regulatory challenge has increased by 60% at PR19, relative to the past.**
 - » As noted above, in our view there is no evidence of substantial, systematic and persistent historical outperformance over the relevant time period – and so no overall increase in regulatory challenge can be objectively justified at PR19. Notwithstanding this, even if one took an ‘aggressive’ view of our prior analysis, this would imply, ‘at most’ outperformance of circa 4% (using the ROCE measure). Consequently, the increase in challenge is clearly grossly disproportionate, even on this basis.
 - » We further note that our measure of challenge at PR19 may understate the ‘true’ extent of the increase. This is because it likely does not fully capture the significant increase in ‘outcomes performance’ that companies are also being asked to make within their allowed revenues at this time.³

The obvious consequence of Ofwat setting an overall (cost and outcomes) efficiency challenge that is beyond the performance level the notionally efficient firm can deliver, is that: (i) the expected returns for an efficient firm will be below the allowed return; and (ii) an efficient firm must also face a balance of risk that is materially skewed to the downside (whereas, had the efficiency challenge set by Ofwat been appropriate, it would face a symmetrical balance of risk). Accordingly, we analyse Ofwat’s RORE risk ranges for companies, as published at the DDs. This shows that: (i) efficient firms do, indeed, face risk that is materially skewed to the downside; (ii) in actual fact, no company faces a symmetrical balance of risk at PR19. This means that, by implication, Ofwat’s view of the notionally efficient firm is a level of performance that is beyond both currently observable, or projected, performance levels in the industry.

It is theoretically possible that the notionally efficient firm could be beyond industry performance levels (although this raises a number of difficult questions regarding the value of benchmark regulation in the first place). Therefore, to examine whether Ofwat’s DDs might still be consistent with a notionally efficient firm having a symmetrical balance of risk, we examined the correlation between efficiency and RORE risk. Here, we would expect a strong, positive correlation, with more efficient firms facing ever more symmetrical risk. If this were the case, one might take comfort that, although on Ofwat’s view, no actual company was notionally efficient, by extrapolating from the correlation, one might infer that ‘at some point’ beyond actual company performance, such a notional firm might exist, with a symmetrical balance of

³ For instance, as highlighted in a previous submission on behalf of Yorkshire Water, Ofwat’s approach underfunds Yorkshire’s leakage reduction plans. Please see [‘Maximising customer benefits from the outcomes framework: A Report for Yorkshire Water.’ Economic Insight \(March 2019\).](#)

risk. However, our analysis shows no discernible relationship between efficiency and RORE risk, meaning that there is no basis to support such a view. Hence, the evidence on the distribution of risk is consistent with the notionally efficient firm having expected returns below its allowed returns, with risk skewed to the downside. Put simply, the observable data on the distribution of risk is the logical consequence of the fact that the efficiency step change is not supported by theory or evidence – meaning that the notionally efficient firm is likely not financeable.

Finally, the above should not be considered a surprising result, in light of clearly observable facts regarding the methodology for PR19 and the inception of Ofwat’s ‘step change’ narrative. As said evidence has been highlighted to Ofwat previously and / or is a matter of public record, we do not recap it in any detail in this report. However, key observations are as follows:

- » Ofwat’s narrative of an ‘efficiency step change’ first emerged as a policy position and was not, itself, the conclusion of any objective analysis that sought to explain, or quantify, why such a step change is appropriate at PR19. Therefore, from its inception in the shaping of Ofwat’s approach to PR19, there would be no objective reason to *presume* that the statement would be ‘true’.
- » Related to the above, for there now to be ‘pent up’ catch-up inefficiency to remove in a ‘big bang’ at PR19, not only would previous price controls have had to be misaligned, but in addition, one would need to believe that Ofwat had not previously modified its approach in response to this. This seems unlikely, given that: (i) the very essence of incentive regulation is to ‘reveal’ the efficient price path over time, by observing how firms respond to incentives – and thus adapting the regulatory approach accordingly; and (ii) it would seem to run contrary to the widely held perception of high quality economic regulation being in place in the UK. In this context, we note that Ofwat described its PR14 Final Determinations as being: the “*biggest-ever challenge for [the] sector on efficiency.*”⁴
- » Ofwat has separately assessed cost and outcomes efficiency in a way that logically drives a presumption of an overall unachievable efficiency frontier. This point was also highlighted by the CMA in its redetermination of Bristol Water’s PR14 price control.
- » Various specific targets set by Ofwat are ‘arbitrary’ (i.e. are themselves policy decisions) rather than being driven by efficiency analysis. For example, a 15% reduction in leakage, or targeted upper quartile performance for internal sewer flooding. Consequently, these targets could only be equal to the economically efficient level by coincidence – which seems unlikely.
- » Ofwat has tended to select ‘aggressive’ assumptions across each of the building blocks of PR19, creating something of an ‘artificial’ model of the outcomes expected of a notional firm, without explicitly taking potential trade-offs into account, or evenly balancing the reliability of evidence.
- » Ofwat has made various methodological changes that increase the overall efficiency challenge relative to prior price controls. These include, for example: (i) not fully allowing for real price effects; (ii) increasing the materiality thresholds for cost adjustment claims; and (iii) not allowing glidepaths for improved performance.

⁴ [‘Setting price controls for 2015-20: Overview.’ Ofwat \(December 2014\); page 5.](#)

- » Ofwat has continued to make ex-post interventions in company plans that represent changes in its previously described methodology – most obviously, in relation to companies’ outcomes delivery incentives. This represents a further increase in regulatory risk – which (at least in part) will be systematic – thus further increasing the cost challenge.

Taken together this implies that, if Ofwat retains this position at the Final Determinations (FDs), the notional firm will likely not be able to finance its functions on reasonable terms. Hence, Ofwat is clearly at risk of failing to fulfil its financeability duty. Significantly, by implication, this would also seem to run contrary to Ofwat’s ability to fulfil its consumer duty since, by failing to allow efficient companies appropriate funding, they will be unable to deliver the outcomes and service levels demanded by their current and future customers. Given this, it is essential that Ofwat now reconsiders its overall approach in order to ensure it remains compliant with its duties, as set out in the Water Industry Act.



2. Introduction

In this chapter, we set out our framework for assessing whether the notionally efficient firm is likely to be financeable at PR19. This turns on whether Ofwat has set an overall cost and outcomes efficiency challenge that reflects the performance an efficient firm could achieve. Consequently, it is important to consider the theoretical and empirical basis for Ofwat’s policy of setting an ‘efficiency step change’ challenge for the industry. Here, we find that: (i) consistent with economic theory, ‘catch up’ efficiency potential in the water industry has declined since privatisation and TFP in the industry is converging to overall UK TFP; and (ii) the overall productivity performance of the UK has ‘flatlined’ post financial crisis (including in competitive markets). In light of these facts, we establish that in order for such a ‘step change’ to be appropriate, one would need to: (a) find evidence of substantial, systematic and persistent historical outperformance in the industry; and (b) ensure that the increase in the regulatory challenge at PR19 is proportionate to this.

2.1 How the financeability and consumer duties are intrinsically linked to the overall efficiency challenge

Section 2 of the Water Industry Act (1991) sets out Ofwat’s general duties. These include a primary duty: *“to secure that companies holding appointments under Chapter 1 of Part 2 of this Act as relevant undertakers are able (in particular, by securing reasonable returns on their capital) to finance the proper carrying out of those functions”*;⁵ referred to as the ‘financeability duty’.

Established precedent and best practice are that financeability is interpreted as follows:

- It is tested with respect to a ‘hypothetical’ (or notional) efficient firm (reflecting the fact that economic regulation is intended to incentivise outcomes consistent

⁵ *Water Industry Act (1991); Section 2a; bullet b.*

with a competitive market; and that therefore, regulators do not have a duty to ensure an inefficient firm is financed).

- That in order to be financeable, a firm must: (i) be able to make profits in line with those that would arise in a competitive market (in the water sector, the duty specifically defines this in relation to return on capital); and (ii) generate cashflows that are consistent with it being able to raise finance on reasonable terms.⁶

Ofwat's Final Methodology for PR19 is consistent with the above, with the regulator describing its approach to assessing financeability as follows: *"our approach will assess whether allowed revenues, relative to allowed costs (including the cost of debt embedded within the cost of capital), are sufficient for an efficient company to finance its investment and so deliver its activities, on reasonable terms."*⁷

It is right, as a point of principle, that financeability should be assessed relative to what a hypothetically (or notionally) 'efficient' firm can achieve (in terms of both cost efficiency and outcomes) and the risks it bears. It is also the case that, ultimately, in making its determinations, these are matters that the regulator must reach views on.

An important implication of the above, therefore, is that if a regulator has not appropriately identified the efficient costs and outcomes that the notionally efficient firm can deliver, nor the risks it bears, its assessment of financeability will not be meaningful. For example, if a regulator materially overstated the efficiencies and outcomes that can be delivered, then it is likely that the notional firm would, in actual fact, not be financeable. In that event, a further implication in the water sector would also be that the regulator fails to fulfil its duty to further the consumer objective (to protect the interests of existing and future consumers).⁸ For instance, the notional firm may not be appropriately funded in order to:

- deliver service levels that its customers want (meaning that the regulator would be failing to meet its duty to protect the interests of current consumers);
- make efficient investments and undertake maintenance work (which might also imply the regulator was failing to meet the resilience duty - the logical impact of which would be that future consumers, in particular, would be harmed);
- invest to ensure long-term sustainability of water resources (potentially resulting in Ofwat failing to meet its responsibilities towards environmental protection, to the lasting detriment of consumers); and
- undertake investments in community protection, such as, flood prevention (with immediate, as well as lasting, impacts on consumers).

It is, therefore, imperative that Ofwat ensures that the overall cost and outcomes efficiency challenge it sets accurately reflects the performance level a notionally efficient firm can deliver. Erring in this regard has significant implications in terms of

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⁶ Whilst at face value, one might assume that (i) is sufficient to ensure financeability, in practice there can be mismatches between the timings of when revenues are earned and when expenditure occurs so that, even if a firm earned a 'reasonable return' on average, at a given point in time, its cashflows might not be sufficient to allow it to raise finance at an efficient cost. Thus leg (ii) of the assessment is required.

⁷ 'Delivering Water 2020: Our final methodology for the 2019 price review.' Ofwat (December 2017); page 189.

⁸ Water Industry Act (1991); Section 2a; bullet a; and Section 2b.

ensuring that the regulator meets its duties under the Water Industry Act (1991), and in particular, its duty towards current and future consumers.

Following from the above, however, *precisely* defining the costs and outcomes performance level that could be achieved by the notionally efficient firm is highly complex – as is the assessment of risk. In particular: (i) for each individual element of a price control, there are a ‘range’ of reasonable estimates, reflecting imperfections in the underlying evidence and analysis; and (ii) there are likely complex interactions and trade-offs across the individual elements. Accordingly, the detail around each individual issue has already been the subject of considerable debate in the PR19 process to date.

Given the above, it is helpful to ‘step back’ and consider whether, when one looks at the overall picture, Ofwat’s DDs are consistent with an achievable cost and outcomes efficiency challenge that reflects the performance level of the notionally efficient firm. In the following sections, we set out the theory and evidence relevant to this, which we then draw on to develop a ‘top-down’ framework that can be used to assess whether, in practice, the notionally efficient firm is likely to be financeable.

2.2 Theory and evidence relevant to understanding the appropriateness of a ‘step change’ in efficiency

2.2.1.1 Ofwat’s efficiency challenge at PR19

At PR19, Ofwat is setting a materially greater efficiency challenge for water companies relative to previous price determinations (when the package is considered ‘as a whole’, reflecting both cost efficiency and outcomes concurrently). Indeed, Ofwat itself has been explicit that this is its intention, stating, in its PR19 Final Methodology that: *“in our 2019 price review (PR19), we expect a step change in efficiency for the sector.”*⁹ We further note that Ofwat has repeatedly referred to the need for an ‘efficiency step change’, both in the context of cost and outcomes performance.

2.2.1.2 Economic theory and evidence underpinning an efficiency challenge

The statement underpinning Ofwat’s efficiency challenge is problematic as a matter of economic theory and logic. Specifically, the efficiency challenge for regulated monopoly companies has two components:

- a ‘catch up’ element, which reflects the fact that, because they are not active in competitive markets, they might not be operating on the ‘efficiency frontier’; and
- a ‘frontier-shift’, which relates to the ongoing efficiency savings even an efficient firm could make, due to productivity gains.

In relation to the first element, if incentive regulation works effectively, the ‘catch up’ inefficiency should be reduced over time, as companies respond to Ofwat’s incentives post-privatisation. Ultimately, therefore, the overall efficiency challenge should

“In our 2019 price review (PR19), we expect a step change in efficiency for the sector”
- Ofwat

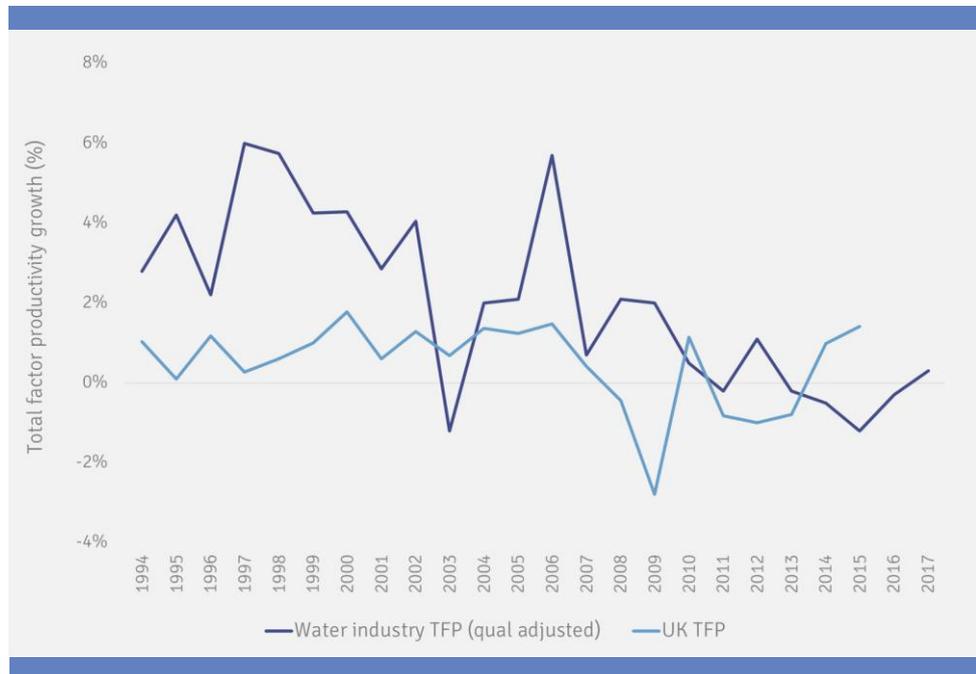
⁹ *‘Delivering Water 2020: Our final methodology for the 2019 price review.’ Ofwat (December 2017); page 135.*

reduce and converge to just the ‘frontier-shift’ element, which one might reasonably expect to be close to the UK’s overall total factor productivity (TFP).¹⁰

Related to the above, an analysis by Frontier Economics for Water UK¹¹ is entirely consistent with this. Specifically, and as shown in the following figure (see below), water industry TFP (which, importantly, incorporates both catch up and frontier gains) averaged just over 4% pa in the early years post-privatisation; but has gradually declined over time and has averaged closed to 0% pa since 2011.

As can be seen from the data, and consistent with theory, immediately post privatisation, the industry significantly outperformed UK TFP, indicating that ‘catch up’ inefficiency was being removed. More recently, the water industry’s TFP performance has been lower and is now very close to UK TFP, consistent with there being ‘less’ catch up inefficiency left to remove (i.e. consistent with incentive regulation ‘driving out’ the catch up inefficiency over time).

Figure 1: Water industry TFP relative to UK TFP



Source: Adapted from Frontier Economics and EI analysis of EU KLEMS data.

Ofwat has referenced the Frontier Economics analysis on a number of occasions, suggesting that, in fact, it provides evidence of the need for the ‘step change’ in efficiency at PR19. For example, in its Initial Assessment of Plans (IAP) Ofwat stated: *“There appears to be scope for water companies to improve on-going efficiency. The Frontier Economics study for Water UK shows that in the period immediately after privatisation productivity growth was 3.5% to 4.5% per year, but has shown little change since 2011.”*¹² As outlined above, we do not think that this is the appropriate inference to draw from the TFP analysis. To believe otherwise would be to suggest that the water industry could materially outperform UK TFP (or other comparative

¹⁰ The time period over which such convergence should occur is subject to uncertainty. In addition, there might be reasonable debate as to which sectors provide the most appropriate point of comparison to the water industry.

¹¹ ‘Productivity improvement in the water and sewerage industry in England since privatisation.’ Frontier Economics (2017).

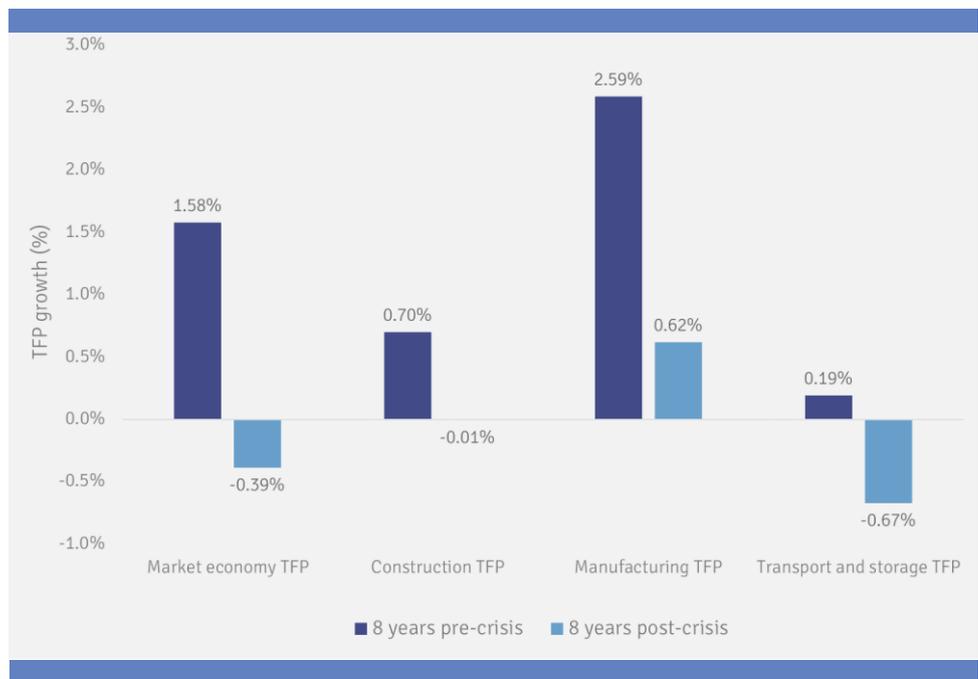
¹² ‘Initial Assessment of Plans: Technical appendix 2: Securing cost efficiency.’ Ofwat (January 2019); page 41.

THERE IS NO LOGICAL BASIS TO SUPPOSE THAT THE WATER INDUSTRY CAN MATERIALLY OUTPERFORM UK TFP (OR OTHER COMPARATIVE SECTORS) INDEFINITELY.

sectors) indefinitely. There is simply no logical basis to suppose that this should be true.

Relatedly, in positioning its claim about the need for an ‘efficiency step-change’, Ofwat has also repeatedly referred to businesses in the UK increasing their efficiency at this time. For example, in its Final Methodology, Ofwat stated: *“businesses across the UK are facing cost pressures from a changing economy and are responding to these pressures by improving efficiency. We expect monopoly water companies to play their role too”*¹³ [emphasis added]. However, this statement is factually incorrect. As has been repeatedly highlighted to Ofwat, the UK’s overall TFP performance has, in fact, flatlined since the 2008 financial crisis. This picture holds true even when one looks at subsets of the UK economy. For example, the following chart shows average TFP in the 8 years prior to the financial crisis (2000-2007 inclusive) and the 8 years post financial crisis (2008-2015 inclusive) for: the UK market economy; construction; manufacturing; and transport and storage. In every case, it is clear that productivity has collapsed – and, in fact, has been negative, on average, for the market economy.

Figure 2: Slowdown in UK TFP across industries



Source: Economic Insight analysis of EU KLEMS data

Put simply, Ofwat appears to be, in part, ‘justifying’ a step change in the efficiency of the water sector at this time on the basis that firms in competitive sectors have themselves recently made a ‘step change’. Plainly, this is not the case.

2.2.1.3 Implication

Bringing the above together, in many ways, theory and evidence logically points to, if anything, a decline in the efficiency challenge over time in sectors subject to incentive regulation (or, at the very least, a need for caution in considering any material *increase* in that challenge).

¹³ [‘Delivering Water 2020: Our final methodology for the 2019 price review.’ Ofwat \(December 2017\); page 138.](#)

2.3 Framework for assessing the need for an efficiency step change

In our view, there is one theoretical basis on which Ofwat's assertion that the efficiency challenge should materially increase at PR19 might be sound. Namely: if previous regulatory determinations had been 'too easy'. In that case, there might be some 'stored up' inefficiency that *could* now be taken out. Indeed, this too appears to be part of Ofwat's narrative for a 'step change' in efficiency at PR19. For example, we note that in its DDs, Ofwat observed that:

- In relation to cost allowances, from 2015-2018 companies 'on average' outperformed by an amount equivalent to 0.6% return on regulatory equity (RORE).¹⁴
- In relation to outcomes delivery incentives (ODIs) over the same period, companies have outperformed by an amount equal to 0.13% of RORE, on average.¹⁵

The above isolated examples do not, however, come close to providing robust evidence of the substantial, systematic and persistent historical outperformance necessary to objectively support a 'step change' in the overall efficiency challenge (or a measure of its 'extent'). This is because: (i) companies that might be outperforming on cost allowances might be underperforming on ODIs, and so may, or may not be, outperforming in totality; (ii) relatedly, there are multiple dimensions of a regulatory determination and performance (i.e. in addition to cost and outcomes), and so focusing on only narrow aspects gives a misleading picture; (iii) no consideration is given as to the reasons for outperformance; and (iv) the analysis relates to a relatively short period of time.

There are two evidential questions, the answers to which can inform us as to whether Ofwat has set achievable cost efficiency / outcomes targets that reflect what a notionally efficient firm could deliver at PR19 – and hence, whether it is likely to be fulfilling its financeability and consumer duties.

- **Firstly, has the UK water sector, in totality, substantially, systematically and persistently outperformed regulatory allowances in the past and to what degree?** Here, it is important that: (a) the measures used reflect the 'totality' of performance against regulatory allowances – hence, it is much more appropriate to focus on 'outturn financial returns', relative to allowances; and (b) the analysis is undertaken over a relatively long period of time, spanning multiple price controls.
- **Secondly, if so, is the increase in 'challenge' by Ofwat at PR19 proportionate to that outperformance?**

The above framework is consistent with the very essence of incentive regulation – which is to 'reveal' the efficient price path over time (by observing how firms respond to incentives and modifying regulation accordingly), rather than second guessing exactly what a competitive market might deliver. Indeed, with this in mind, intuitively one would not expect to observe persistent out (or under) performance in the industry, as the logical expectation should be that, if and when this occurred, Ofwat

¹⁴ 'PR19 draft determinations: Aligning risk and return technical appendix.' Ofwat (July 2019); page 19.

¹⁵ 'PR19 draft determinations: Aligning risk and return technical appendix.' Ofwat (July 2019); page 15.

PERSISTENT OUT OR UNDER PERFORMANCE OVER TIME WOULD INDICATE THAT PRIOR PRICE DETERMINATIONS WERE MIS-SET AND THAT OFWAT DID NOT TAKE REMEDIAL ACTION. THIS SEEMS UNLIKELY AND WOULD BE INCONSISTENT WITH A WIDELY HELD PERCEPTION OF HIGH QUALITY ECONOMIC REGULATION.

should have naturally adjusted its challenge previously to address this. To believe otherwise would seem to indicate: (i) not only had prior determinations by Ofwat been materially mis-set; but also that (ii) Ofwat had not observed this and taken remedial action. Whilst this is, of course, theoretically possible, it seems inconsistent with a general perception of high quality economic regulation in the UK.

Related to the issues discussed above, we note that Ofwat's narrative of an 'efficiency step change' first emerged as a policy position and was not, itself, the conclusion of any objective analysis that sought to explain, or quantify, why such a step change is appropriate at PR19.¹⁶ Therefore, from its inception in the shaping of Ofwat's approach to PR19, there would be no objective reason to presume that the statement would be 'true'. Thus, it is vital to now look closely at what an objective assessment of the evidence implies.

2.4 Structure of the report

The primary objective of this report, prepared on behalf of Anglian Water, Northumbrian Water, Welsh Water and Yorkshire Water, is to objectively examine the evidence relating to the above two questions. The aim being to determine, factually, whether there is any basis at all for materially increasing the efficiency challenge at PR19; and, if so, to what degree. Accordingly, we focus on setting out a 'top-down' analysis of the evidence relevant to determining this. This is structured as follows:

- Chapter 3 provides a detailed analysis of the industry's historical performance, relative to regulatory allowances and compares this to the 'change' in regulatory challenge over multiple price controls.
- Chapter 4 then examines evidence on the distribution of risk for the notionally efficient firm.
- Chapter 5 discusses the interpretation of the financeability duty, and the assessment of financeability, in the context of uncertainty.
- Chapter 6 draws together the various analyses and evidence contained in this report, in order to arrive at a set of clear, fact based, conclusions.
- Annexes 1 to 3 provide additional supporting evidence and further details of our methodology.

¹⁶ As far as we can tell, an explicit reference to an 'efficiency step change' first appeared in Ofwat's PR19 Draft Methodology consultation, in July 2017. In this document, Ofwat made various references to the 'step change'. This includes: "companies will need to deliver a step change in efficiency to give customers better services and bill reductions." No empirical evidence is provided to explain 'why' a step change in efficiency is appropriate, or its order of magnitude. Rather, Ofwat simply provides contextual statements, such as references to customers struggling with affordability and climate change.



3. Top-down analysis of historical performance relative to regulatory challenge

In this chapter, we set out a detailed analysis of outturn financial returns in the water industry over time. The purpose of this is to determine whether, and to what extent, there has been historical out / under performance. Here we focus on company returns on capital employed relative to the WACC, where we draw on: our own analysis; analysis previously published by Ofwat; and a review of the existing literature. We then compare this to the extent of regulatory challenge applied by Ofwat, to determine whether there is any evidential basis to suggest that a ‘step change’ in the challenge is appropriate at PR19 (i.e. whether it is proportionate to any identified outperformance). Overall, we find no evidence of substantial, systematic and persistent historical outperformance by the industry. Indeed, our analysis shows that, although there has been considerable variation in individual companies’ historical performance, the industry has, on average, outperformed by just 3.8% in the long run. However, even on this basis, the significant increase in the overall regulatory challenge at PR19 (nearly 60%, compared to previous determinations) is highly disproportionate.

3.1 Historical industry performance

In this section, we examine historical industry performance in relation to outturn financial returns; and in particular, the return on capital employed (ROCE). The main reason for focusing on outturn returns is that this takes into account the possibility of trade-offs across the various aspects of performance within the price control. Put simply, if Ofwat’s regulatory challenge had been ‘too easy’ in the past, then ultimately one should observe companies outperforming the settlement ‘as a whole’ – which logically, should translate to them earning financial returns above the ‘allowed’ return.

In order to robustly address the issues identified in the previous chapter of this paper, it is further important to ensure the analysis reflects the following:

- **The overall out / underperformance of the industry as a whole, against the regulatory settlement.** This is in order to establish whether, and to what extent, there has been outperformance, which might support an ‘increase’ in the efficiency challenge at PR19.
- **The distribution of out / underperformance across companies.** This matters because, if the regulatory challenge has been ‘too easy’ in the past, one might expect to see *most* or *all* companies outperforming. Whereas, if this is more ‘balanced’ (with some companies out, and some companies under, performing) this would point to incentive regulation working effectively.
- **How both of the above vary over a reasonably long period of time.** This is because, suppose one only focused on PR14 and found some evidence of outperformance. One might erroneously conclude that there was ‘pent up’ inefficiency to remove, without taking into account whether companies had underperformed in prior periods.

3.1.1 Return on capital employed

We firstly examine return on capital employed (ROCE) over time (post-tax). This measure is calculated as the post-tax return on the average RCV, where the post-tax return is the current cost operating profit of the appointed business, net of current tax.¹⁷ Conceptually, this is the most appropriate measure to address the question of interest here. This is because: (i) ROCE fully captures the fact that companies must deliver returns to: both, debt and equity holders; and, by way of taxation, HMRC (i.e. it reflects the total opportunity cost faced by investors); (ii) it is the basis on which the industry is regulated (i.e. Ofwat sets an overall allowed return on capital); and (iii) ROCE is the measure specified in the Water Industry Act relevant to the determination of financeability. Of these, the first reason is most pertinent to the issues explored in this report. This is because in order to determine whether, and to what extent, the industry has outperformed a regulatory settlement in totality, it is essential to reflect the overall opportunity cost. Put simply, if a company had truly outperformed, it would be observable by its outturn ROCE being above the vanilla WACC.¹⁸

In the following, we therefore explore the outturn ROCE against the real vanilla WACC between the years ending March 2006 and March 2019 (i.e. covering PR04, PR09 and PR14 to date) for the industry as a whole - and for individual companies.

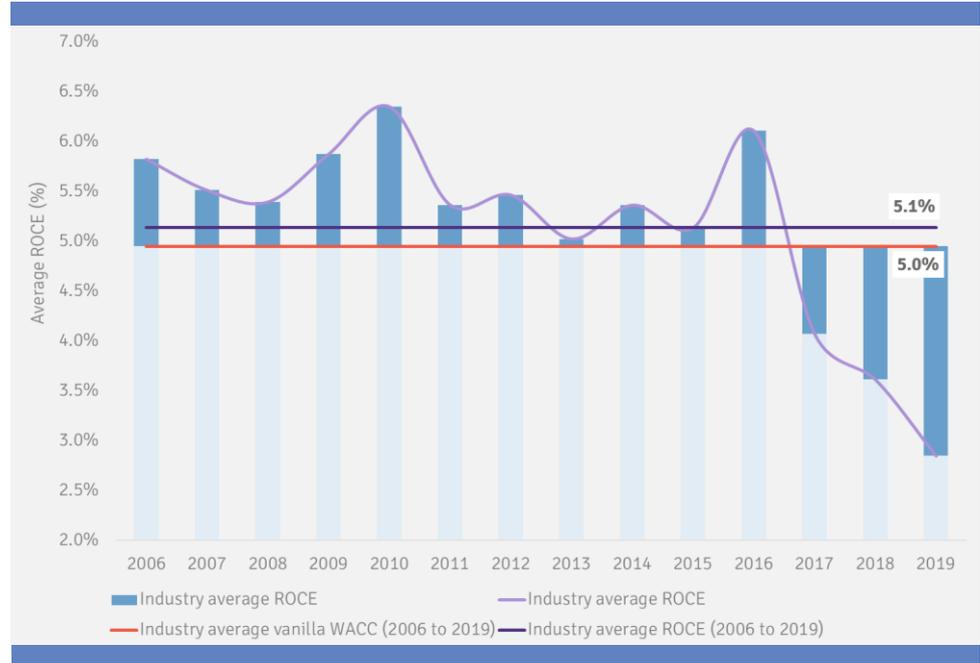
¹⁷ This is consistent with Ofwat’s own definition of the post-tax return on capital compared against the real vanilla WACC in the PR09 period, please see: <https://www.ofwat.gov.uk/regulated-companies/company-obligations/performance/companies-performance-2011-12/financial-2012-13/>.

¹⁸ For completeness, we note that another possible theoretical basis for the lack of outperformance by water companies may be that, in the event that previous price controls were ‘too lenient’, as monopolists they chose to benefit from this by ‘padding’ their costs, rather than delivering enhanced returns. However, this does not appear to be a compelling argument, as: (i) the point of regulation is that it motivates firms to respond to the financial incentives they are set; (ii) the water companies have long been privatised and are answerable to their shareholders, who benefit from maximising returns (and not from padding costs); and (iii) as shown in the previous chapter, the data clearly shows the industry has extracted significant catch-up inefficiency over time.

3.1.1.1 Industry-level outturn performance against regulatory settlement

Figure 3 below shows the industry average ROCE performance against the real vanilla WACC, averaged over the full period, between years ending March 2006 and March 2019.

Figure 3: Overall industry average ROCE performance against real vanilla WACC (year ending March 2006 to March 2019)



Notes: (i) The industry average ROCE performance and the average real vanilla WACC are calculated as an RCV-weighted average across all companies. (ii) The averages for the period are calculated as simple averages across each individual year. (iii) Please find the complete underlying methodology detailed in Annex 3.

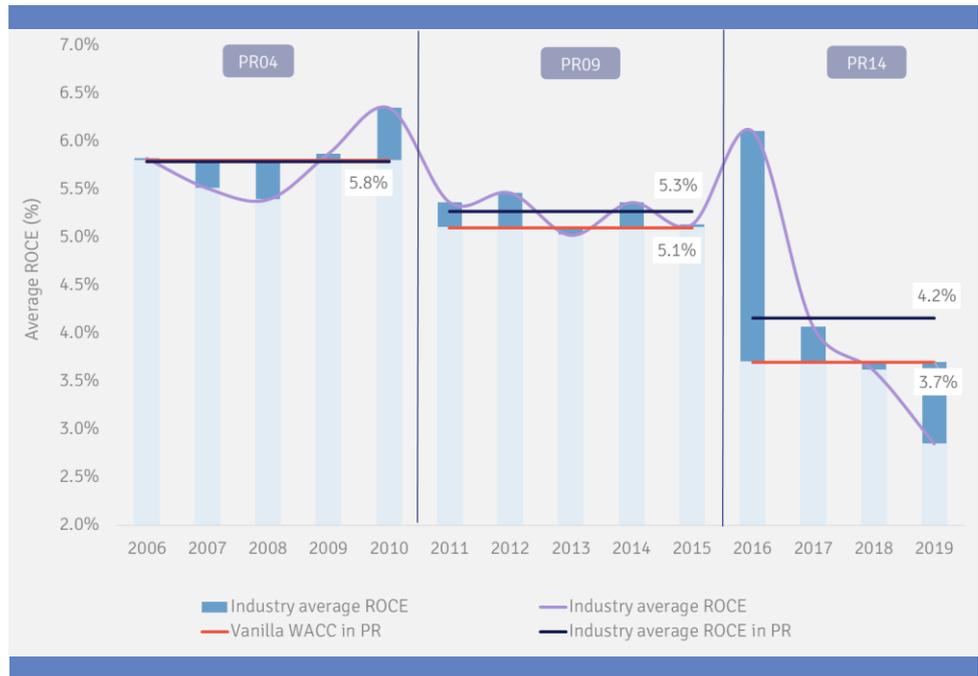
Source: Economic Insight analysis of publicly available data.

As shown in the figure above, over the last 14 financial years, the industry has, on average, *fractionally* outperformed the average vanilla WACC allowance by 3.8% (this is not the same as the percentage point outperformance, which is 0.1 percentage points = 5.1 – 5.0).¹⁹ Consequently, we can conclude that **there has not been significant historical outperformance**.

The data does, however, show significant variation in this performance over time. In order to explore this issue further, Figure 4 overleaf presents the industry average ROCE performance against the real vanilla WACC in each of the individual price review periods, between the years ending March 2006 and March 2019.

¹⁹ The percentage outperformance over the WACC is calculated as: the gap between the outturn ROCE performance and the vanilla WACC as a percentage of the vanilla WACC. In this case, this would be = (5.1-5.0)/(5.0). Please note that calculating the outperformance based on figures mentioned in this report suggest an outperformance of 2% (instead of the 3.8%). However, this calculation would be erroneous because all figures presented in the report have been rounded to 1 decimal point for ease of reference, but are therefore, not precise.

Figure 4: Industry average ROCE performance against the real vanilla WACC in each price review period (year ending March 2006 to March 2019)



Notes: Please find the underlying methodology detailed in Annex 3.

Source: Economic Insight analysis of publicly available data.

As can be seen in the figure above, on average, the industry:

- performed in line with the real vanilla WACC set by Ofwat for the period at PR04;
- outperformed the real vanilla WACC for the period by 3.3% at PR09; and
- outperformed the real vanilla WACC set for the period by 12.4% at PR14.

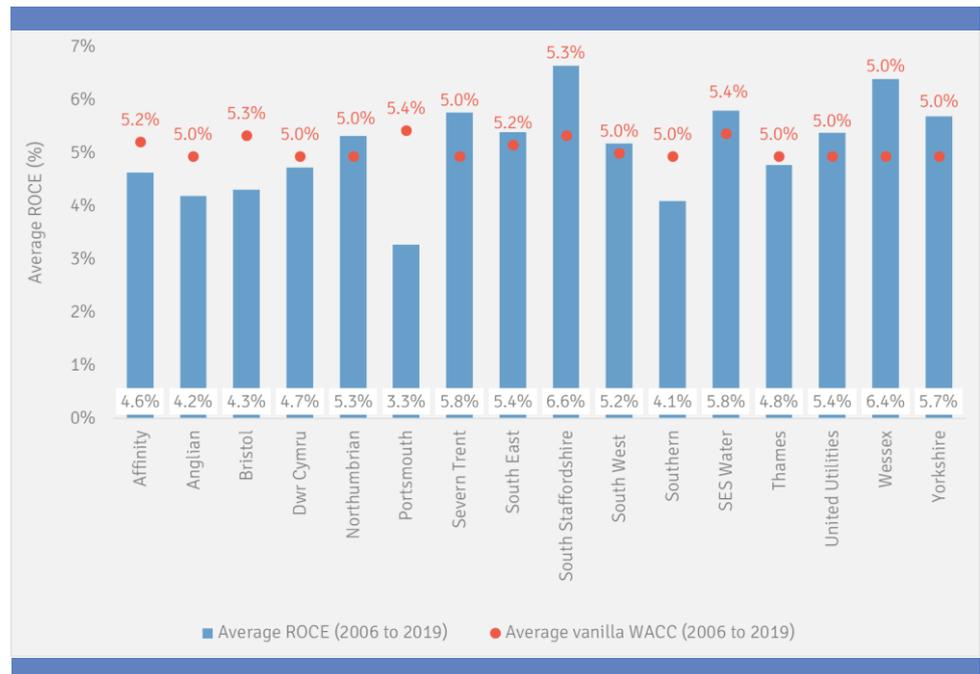
However, within each price review period, there appears to be significant variation in the average industry performance in individual years. In fact, noticeably, there appears to be no consistent pattern to this performance (i.e. it does not point towards the industry ‘gaming’ the regulatory settlement by planning the timing of their performance).²⁰ Moreover, the scale of the above out and underperformance has also varied considerably over time. **Hence, the evidence shows that nor has there been persistent historical outperformance.**

²⁰ The large outperformance in year ending 2016 is primarily (but not exclusively) driven by the large positive capital maintenance charges included in the current cost operating profit for Yorkshire Water.

3.1.1.3 Distribution of individual companies’ outturn performance against their regulatory settlement

Figure 5 below shows individual companies’ average ROCE performance against the real vanilla WACC for the full period between years ending March 2006 and March 2019.

Figure 5: Overall average ROCE performance against real vanilla WACC for each individual company (year ending March 2006 to March 2019)



Notes: (i) The average ROCE performance and vanilla WACC for each individual company across the period are calculated as simple averages across each individual year. (ii) In order to account for change of ownership during the period (i.e. mergers or carve-outs), the analysis has been aggregated at the level of the 17 companies of relevance for PR19. Further, it has not been possible to disaggregate the relevant historic publicly available data to reflect the structural changes which occurred between Hafren Dyfrdwy and Severn Trent. Therefore, for the purpose of this analysis, Hafren Dyfrdwy and Severn Trent have also been combined and are presented together as Severn Trent in the chart. (iii) Please find the underlying methodology detailed in Annex 3.

Source: Economic Insight analysis of publicly available data.

As can be seen above, there is considerable variation in individual companies’ ROCE performance against the vanilla WACC. On average across the period:

- 9 of the 16 companies outperformed their respective average vanilla WACCs for the period (Northumbrian, Severn Trent, South East, South Staffordshire, South West, SES Water, United Utilities, Wessex, and Yorkshire). However, the extent of the outperformance varies between these companies.
- 7 of the 16 companies underperformed their respective average vanilla WACCs for the period (Affinity, Anglian, Bristol, Dwr Cymru, Portsmouth, Southern, and Thames). Similar to the above, the extent of the underperformance also varies between companies. For example, Portsmouth underperformed to the largest extent (by 39.6%) while Thames underperformed to the smallest extent (by 3.5%).

In fact, if we exclude the performance of the two largest outperformers (ranked by RCV, these are United Utilities and Severn Trent) in Figure 3 above, there is no evidence of industry outperformance in comparison to the real vanilla WACC over the last 14 years.

Furthermore, similar to the variation in industry-level ROCE performance against the real vanilla WACC, individual companies' performance also varies over time (please see Annex 1). In particular, we find that:

- Across the industry, there has been considerable variation in individual companies' performance against the regulatory settlement, such that some companies outperform, and others underperform, their regulatory settlements.
- Looking at the performance of individual companies over time, some companies fluctuate between outperforming and underperforming; both between, and within, price review periods.
- Even for companies that have regularly outperformed or underperformed their regulatory settlements, there is considerable variation in the *extent* of this out (or under) performance over time – such that there is no clear discernible pattern to this.

From the above, the evidence clearly shows a 'mix' of performance across the companies, with an even balance of 'winners' and 'losers', and where the identities of out - and under - performing firms also varies. As such, we can conclude that **nor has there been systematic historical outperformance** in the industry.

ON A ROCE BASIS, THERE IS NO EVIDENCE TO SUGGEST THAT THE INDUSTRY (OR, INDIVIDUAL COMPANIES) ARE SUBSTANTIALLY, SYSTEMATICALLY AND PERSISTENTLY OUTPERFORMING OFWAT'S 'ALLOWED' RETURNS.

Drawing the three preceding analyses together, we do not find any evidence to suggest that the industry as a whole, or even individual companies, have historically been earning ROCE above the real vanilla WACC in a way which would suggest that they are substantially, systematically and persistently outperforming Ofwat's 'allowed' returns.

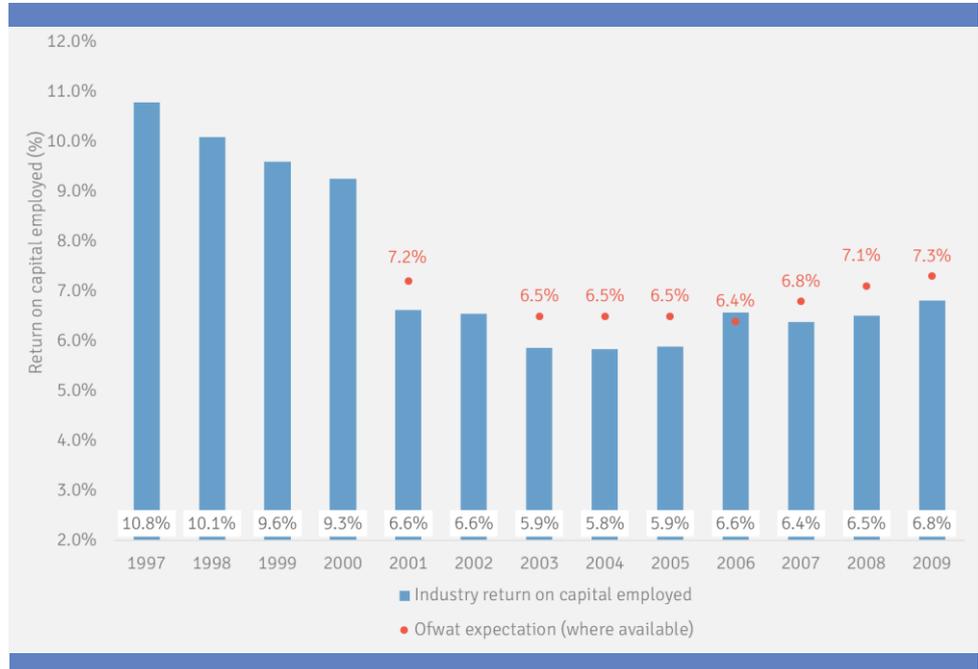
Consequently, on a ROCE versus WACC basis (which we consider most appropriate) **there is no evidence of any significant 'pent up' historical inefficiency that objectively merits a 'step change' in the efficiency challenge at PR19.** At most, a slight increase in challenge might arguably be justified on this basis, proportionate to the 3.8% historical outperformance identified. However, even this is not clear-cut, due to the lack of any evidence of outperformance being systematic (i.e. there have been 'winners' and 'losers'). One would therefore need to consider very carefully the factors that might have caused this outperformance, even to go that far.

3.1.1.4 Evidence from Ofwat's own assessment of historical performance against expectation

Looking even further back, and as an alternative measure, Ofwat itself published an assessment of individual water companies' ROCE performance (estimated as the pre-tax return on average RCV) against its expectations (as set in the relevant price limit). As noted above, conceptually, we believe that our measure of ROCE is the most appropriate in this case - since it realistically captures returns to debt and equity holders after the company has met its tax obligations. Nevertheless, Ofwat's measure of pre-tax return on average RCV provides a useful cross-check against our own findings above.

Figure 6 summarises Ofwat’s own assessment of the industry average performance against its expectations in the relevant price limits (where known) between years ending March 1997 and March 2009.

Figure 6: Ofwat’s assessment of industry average ROCE performance against expectations (year ending March 1997 to March 2009)



Source: Economic Insight analysis based on Ofwat’s publications on “Financial performance and expenditure of the water companies in England and Wales” based on companies’ June returns.

As shown above, based on Ofwat’s own assessment up to March 2009, the industry’s performance fluctuated over time, but has overwhelmingly been below its expectations in the price limits. Therefore, Ofwat’s analysis shows no evidence of significant or persistent historical outperformance. Annex 2 provides further details on Ofwat’s assessment in each year.

Furthermore, Ofwat noted that there was considerable variation in companies’ performance. In order to demonstrate this, Figure 7 overleaf shows individual companies’ average performance, as reported by Ofwat, across the period of year ending March 2001 to March 2009. This is compared against Ofwat’s reported expectation of industry average returns in the period.²¹ As can be seen, on Ofwat’s own analysis:

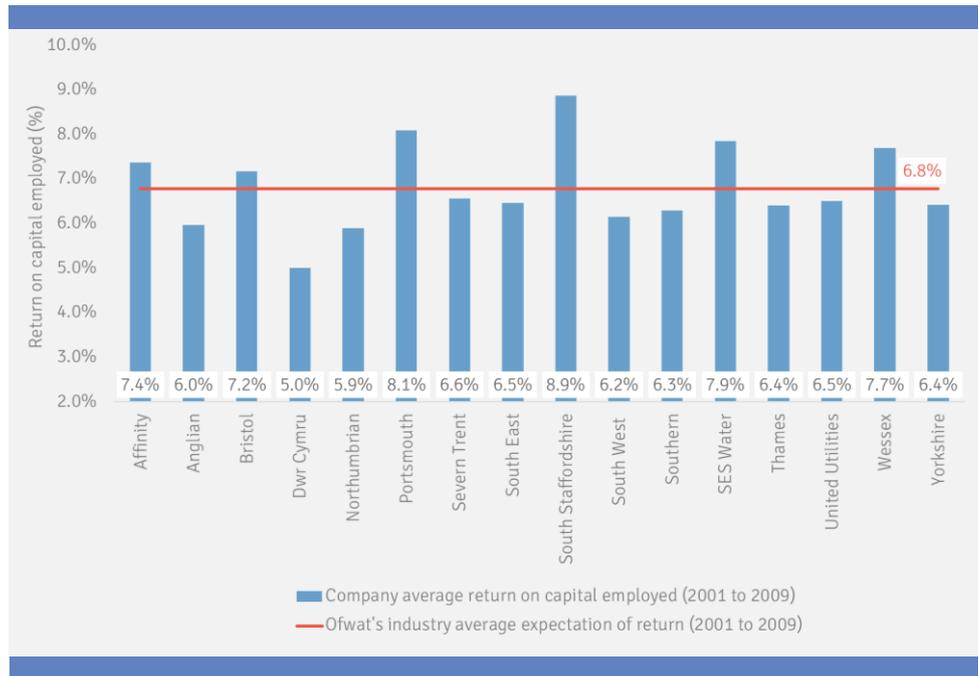
- 10 companies underperformed against the WACC; and
- 6 companies outperformed.

Put simply, and consistent with our own analysis in the previous section, Ofwat found a mix of ‘winners’ and ‘losers’, meaning that there is no evidence of systematic outperformance. As can be seen from the additional evidence in Annex 2, this pattern of mixed performance can be observed across various years.

²¹ It is not possible to assess individual companies’ overall performance over the period against Ofwat’s expectations of their respective returns on the basis of these reports because Ofwat does not report its expectations of individual companies’ performance set in the price control.

OFWAT’S OWN ANALYSIS, GOING BACK OVER FURTHER PRICE CONTROLS, ALSO FAILS TO IDENTIFY SUBSTANTIAL, SYSTEMATIC AND PERSISTENT OUTPERFORMANCE.

Figure 7: Overall average ROCE performance reported by Ofwat for individual companies (year ending March 2001 to March 2009)



Notes: (i) The averages for the period are calculated as a simple average across each individual year. (ii) Ofwat’s industry average expectation for the period excludes 2002 since Ofwat did not report its expectation of returns in the year.

Source: Economic Insight analysis based on Ofwat’s publications on “Financial performance and expenditure of the water companies in England and Wales” based on companies’ June returns.

Beyond 2009, although Ofwat has not published similar reports following a change in its reporting standards, in its assessment of companies’ financial performance for the year ending March 2013, Ofwat reported that “Companies’ average post-tax return on their regulatory capital value was 5.0%, which was in line with our 2009 final determinations of the prices companies could charge customers between 2010-15. Companies’ returns ranged from 4.2% (Anglian Water and Portsmouth Water) to 7.8% (Sembcorp Bournemouth Water)”²² [emphasis added].

Taken together, even on Ofwat’s own ROCE based analysis, there is no evidence of significant, persistent and systematic historical outperformance by the industry. As we note subsequently in our literature review, this is further consistent with evidence Ofwat previously gave before the Select Committee for the Environment, Food and Rural Affairs, at the House of Commons.

²² Please see: <https://www.ofwat.gov.uk/regulated-companies/company-obligations/performance/companies-performance-2012-13/financial-2012-13/>.

3.1.2 Return on regulatory equity

Another measure of companies’ outturn performance is the return on regulatory equity, or RORE, as defined by Ofwat in PR14. This is a less relevant measure to the questions addressed in this report than ROCE, because:

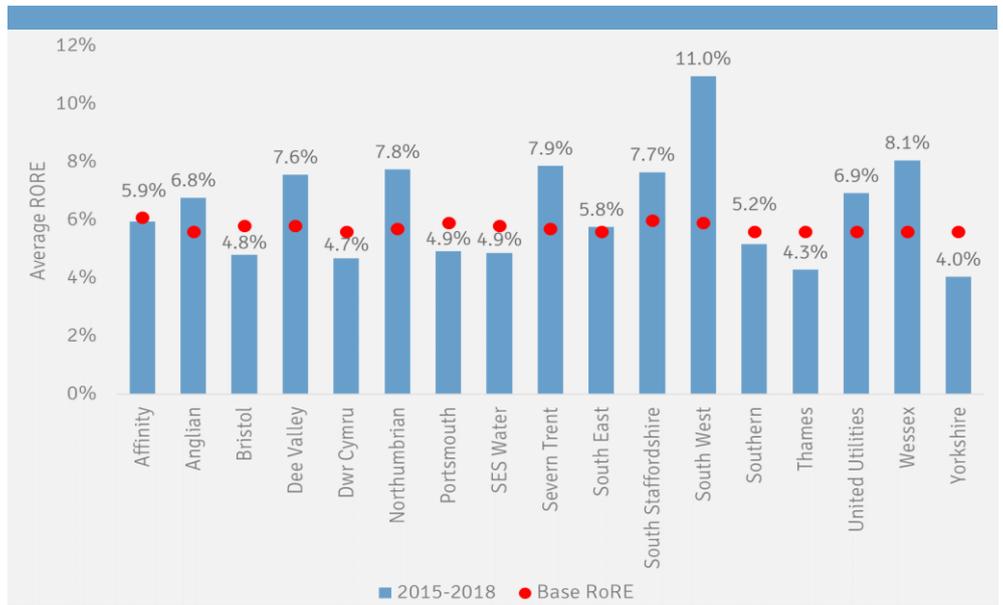
- it will not capture the ‘totality’ of opportunity cost nor, therefore, outperformance (as debt finance plays a significant role in the industry);
- it does not reflect the way in which the industry is regulated, nor the financeability duty, as defined in the Water Industry Act;
- under economic theory equity risk will vary with gearing - and firms have made differing decisions as to their own capital structures; and
- given the relative nascency of the measure, there is limited historical data available to undertake a similar long time-series analysis as with ROCE.

Notwithstanding the above, for completeness we have also examined whether there is evidence of substantial, systematic and persistent outperformance when measured in terms of RORE. In the following, we therefore explore the evidence relating to this. In turn we address: (i) individual companies’ overall RORE performance compared to the base allowances over the PR14 period to date; (ii) the variation in individual companies’ RORE performance over time; and (iii) the source of any RORE outperformance across the period.

3.1.2.1 Companies’ overall RORE compared to base allowances over PR14

Figure 8 below presents an analysis of each water companies’ actual average RORE performance between 2015 and 2018, compared to the ‘base’ allowed return.

Figure 8: Overall average RORE performance against base, by company (2015-2018)



Notes: (i) Data labels show actual RORE performance. (ii) The average performance for the period is calculated as a simple average across each individual year. (iii) For 2015-16 and 2017-18, where the underlying data tables for the outturn RORE figures were not published by Ofwat, we have interpreted the RORE for each company using the investor reports published. As such, the RORE figures for these years may not be precise. (iv) For consistency across time, RORE performance for Bournemouth Water and South West Water are presented together. Source: Economic Insight analysis of Ofwat’s ‘Monitoring financial resilience’ reports for each year.

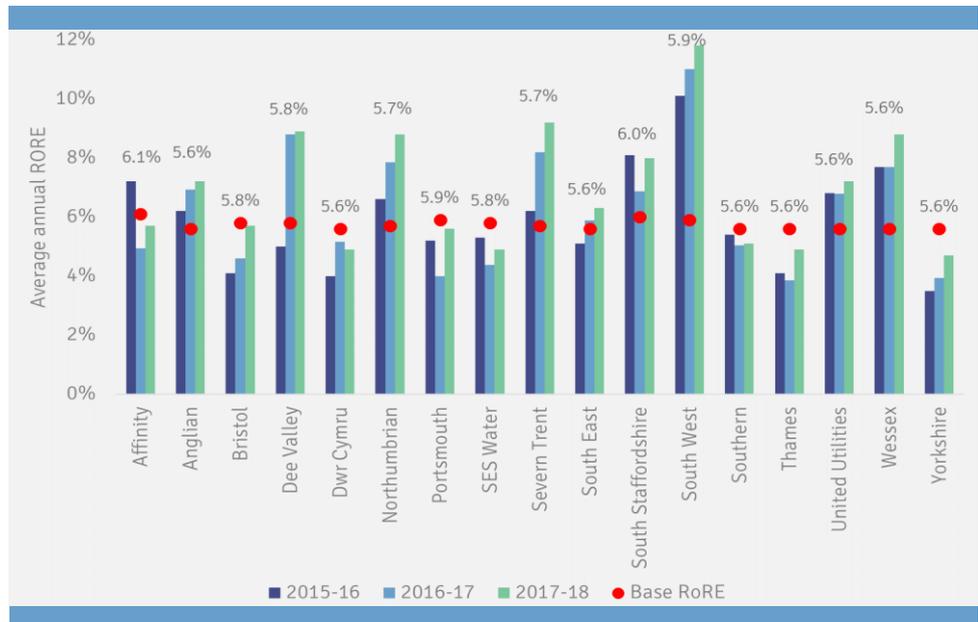
Based on the above, we find that, out of the 17 companies, 8 have, on average, underperformed (Affinity, Bristol, Dwr Cymru, Portsmouth, SES Water, Southern, Thames and Yorkshire). Consequently, 9 have outperformed. In other words, there is an ‘even balance’ of companies out and under-performing on overall RORE. This is not, therefore, consistent with firms systematically outperforming, but rather, would appear to be consistent with incentive regulation working effectively, resulting in an even split of ‘winners’ and ‘losers’.

At an overall industry level, the average outturn RORE (weighted by average RCV for each company in each year) over the same time period is 6.2%. This compares to a similarly weighted average base allowed RORE of 5.6%. At face value, this may suggest that the industry, as a whole, has outperformed the base RORE over PR14. However, this outperformance is *modest*, at just 10.2% and so, even on that basis would not suggest significant outperformance. Furthermore, it is clear from Figure 8 that this outperformance is driven by the outperformance of some of the larger companies – notably, United Utilities and Severn Trent. This pattern is, however, not consistent across the industry. In fact, excluding these two key outperformers, the industry average outperformance on the base RORE would reduce to just 2.6%.

3.1.2.2 Variation in RORE performance across time

We have also examined outturn RORE performance against base RORE by company for each individual year of PR14. This shows that, whilst some companies have been ‘above’ or ‘below’ base RORE in all three years, others have seen significant variation in their performance year-to-year, being ‘above’ the base return in some years and ‘below’ in others. The results of our analysis are shown in Figure 9.

Figure 9: Annual average RORE performance against base by company (2015-2018)



Notes: (i) Data labels show base RORE. (ii) For 2015-16 and 2017-18, where the underlying data tables for the outturn RORE figures were not published by Ofwat, we have interpreted the RORE for each company using the investor reports published. As such, the RORE figures for these years may not be precise. (iii) For consistency across time, RORE performance for Bournemouth Water and South West Water are presented together.

Source: Economic Insight analysis of Ofwat’s ‘Monitoring financial resilience’ reports for each year.

As can be seen, there is significant variation in the actual RORE for a company between years. In particular:

- Only 7 of the 17 companies consistently outperformed their base RORE in each of the three years (Anglian, Northumbrian, Severn Trent, South Staffs, South West, United Utilities and Wessex).
- Likewise, 7 of the 17 companies consistently underperformed their base RORE in each of the three years (Bristol, Dwr Cymru, Portsmouth, SES Water, Southern, Thames and Yorkshire). However, in these cases, the actual outturn RORE has varied in each of the three years.
- On the other hand, Affinity, Dee Valley and South East's performance fluctuated, such that they outperformed the base in some years - and underperformed in others. However, here too, there is no consistent pattern in the performance against the base.

Consequently, the data does not suggest there is a persistency of outperformance on a RORE basis. However, more broadly we note that the limited time period for which the RORE analysis is feasible means that we do not think it can provide reliable evidence on the *persistency* of outperformance. As noted previously, this is one of the reasons why the RORE measure is inappropriate to the questions we are seeking to address.

3.1.2.3 Sources of RORE outperformance

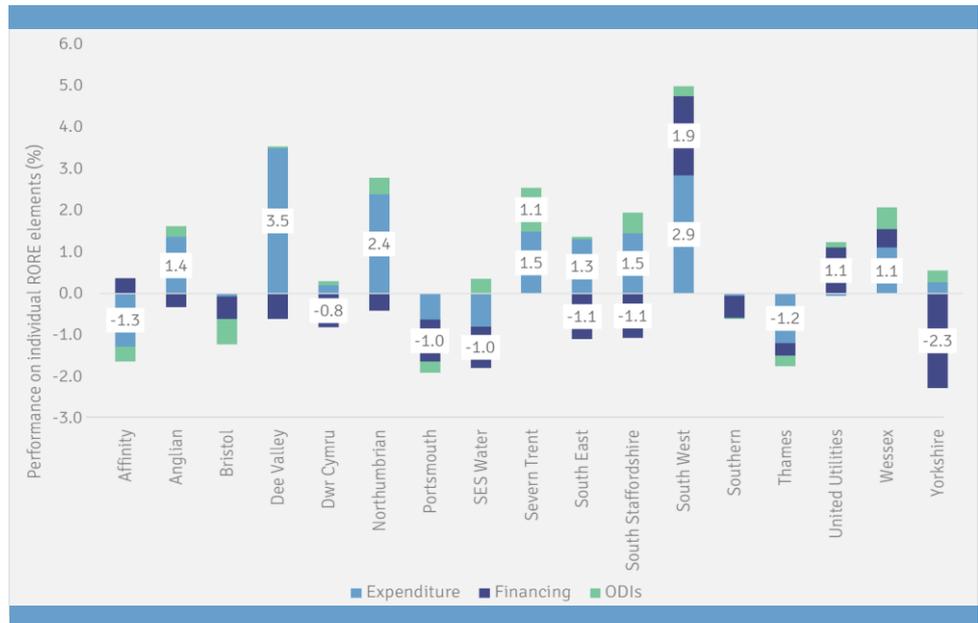
Owat also breaks down outturn RORE performance into its constituent parts (i.e., expenditure; financing; and outcome delivery incentives (ODIs)). Examining this is helpful to informing the issues of:

- **Trade-offs.** That is to say, are companies that outperform base RORE systematically outperforming on all areas (which would not suggest there are performance trade-offs)? Or, is there a 'mix' of out and under-performance within a firm's overall outturn RORE (which would be consistent with trade-offs existing)?
- **Diagnosis of outperformance.** If one observes a common pattern of outperformance against a particular component of RORE, it might be suggestive that *this element* was mis-calibrated at PR14 (e.g. the allowance was 'too generous' for that specific element). On the other hand, if one observes an even mix of winners and losers on individual measures then, as above, it might be more suggestive of companies responding appropriately to incentives.

In order to explore the above, Figure 10 overleaf splits each companies' RORE performance relative to the base by its constituent parts for the year ending 2017.²³ This allows us to investigate the source of each company's RORE out/under performance.

²³ This year has been chosen as an example since this is the only year for which Ofwat has published the data underlying the charts reported in its 'Monitoring financial resilience' report.

Figure 10: Breakdown of annual average RORE performance relative to base by individual components for each company (2016-2017)



Source: Published data underlying charts reported in Ofwat’s ‘Monitoring financial resilience’ reports for 2016-17.

On the basis of the figure above, we see that there is considerable variation in outturn performance, when one examines each individual component that makes up the overall outturn RORE. In particular, we see that:

- Even the companies which have outperformed the base RORE overall (as per Figure 9, in 2016-17, these are: Anglian, Dee Valley, Northumbrian, Severn Trent, South East, South Staffs, South West, United Utilities and Wessex), there is variation in performance on individual RORE components. For instance:
 - while Severn Trent, South West and Wessex outperformed on each of the individual RORE components;
 - Anglian, Dee Valley, Northumbrian, South East and South Staffs outperformed on expenditure and ODIs, but underperformed on financing; and
 - United Utilities outperformed on financing and ODIs, but underperformed on expenditure.
- Similarly, even the companies that underperformed the base RORE overall, did not necessarily underperform on each individual measure and may even have outperformed on some.

Overall, this is more consistent with companies facing performance ‘trade-offs’ in terms of individual measures – and with incentive regulation functioning as it is intended to.

In summary, in relation to RORE we find that there has, on average, been modest outperformance by 10.2% over PR14 - for the industry as a whole. However, we have also shown that: (i) there is a mixture of ‘winners’ and ‘losers’ across the companies; and that (ii) over and under performance varies by the individual components of overall RORE. Hence, on this measure (and on Ofwat’s own evidence) this is not consistent with there being substantial, systematic and persistent outperformance. This is, of course, notwithstanding the fact that, in any case, we consider ROCE, not

RORE, to be the relevant measure for assessing the totality of performance against regulatory allowances.

EXISTING ACADEMIC AND THIRD PARTY STUDIES ALSO DO NOT SHOW PERSISTENT OUTPERFORMANCE. TO THE EXTENT THAT THERE MAY HAVE BEEN OUTPERFORMANCE POST-PRIVATISATION, THE 'CLAW BACK' OF THIS HAS ALREADY OCCURRED.

3.2 Existing studies of industry outperformance

We have reviewed existing academic, and other, independent research and literature relating to historical outturn financial performance in the water industry. We summarise this in the following passages.

3.2.1 Academic literature

Armitage (2011), in a paper on dividend demand, finds the following: *“the track record shows that, since Ofwat took control of prices in 1994, the returns actually earned by the industry have not exceeded the cost of capital estimated by the regulator. With the benefit of hindsight, the allowed returns were probably too generous until 2000-01, and have probably been about right since then [emphasis added].”²⁴*

Maziotis et al (2009) use an index number approach to empirically test the comparative performance of water companies over time in relation to profits, productivity and costs. Of relevance to this report, they conclude: *“Our methodology performs particularly well in demonstrating and quantifying the dramatic tightening of Ofwat’s regulatory policies in the 1999 price review. Thus, a sharp tightening in regulation in 2001 is quantified as a substantial fall in the ratio of allowed regulatory revenues relative to benchmark costs, as measured by regulatory TPP. Moreover, we also clearly demonstrate that Ofwat’s dramatic regulatory tightening in 2001 amounted to a move from “weak” price caps that allowed economic profits... to “catch up promoting” price caps that required the elimination of at least some excess costs in order to regain economic profitability. Furthermore, while our regulatory TPP index clearly demonstrates a momentary but substantial reduction in regulatory incentives in 2006, which was the first year of the current price review, it also demonstrates a return to tighter regulation in subsequent years. Thus, our results suggest that since 2001 Ofwat has implemented “catch up promoting” price caps since average regulated revenues were always below average regulatory excess costs indicating that the firms were required to eliminate at least some excess costs in order to regain economic profitability” [emphasis added].²⁵*

In a related, and updated, paper to the above, Maziotis et al (2015) further provide a decomposition of changes in water industry performance over time. The primary focus of this is productivity, but the authors nonetheless make some observations relating to financial returns. These are as follows: *“The immediate impact of the 1999 price review in 2001 is consistent with an interpretation emphasizing that Ofwat chose to pass considerable accumulated past productivity improvements to consumers. Moreover, the steady decline in average price performance, gains in TFP and relatively stable economic profitability that have characterized the 2001-2008 period, suggests that Ofwat is now more focused on passing productivity benefits to consumers, and maintaining stable profitability than in the earlier regulatory periods...”* The authors further go on to find the following: *“average economic profitability increased significantly until 1994 by 23.4% and that this exceeded benchmark economic*

²⁴ *‘Demand for dividends: the case of UK water companies.’ Seth Armitage; University of Edinburgh / CASS Business School (2011); page 6.*

²⁵ *‘Regulatory Price Performance, Excess Cost Indexes and Profitability: How Effective is Price Cap Regulation in the Water Industry?’ Maziotis, Saal and Thanassoulis; Aston Business School (2009).*

profitability growth (19.6%) allowed an average catch-up to benchmark profitability of 3.1%. The tightening of price caps from 1994 resulted in a downward trend for average and benchmark economic profitability. Thus, during the years 1995-1998, the average firm did not improve its economic profitability relative to the benchmark but this was once again interrupted during 1998-2000, when average economic profitability increased more than benchmark profitability, allowing average catch-up of 2.4%. The substantial reduction in output prices due to the tightened 1999 price review resulted in a significant reduction in average and benchmark economic profitability for the subsequent years”²⁶

A paper by David Newbery (1997) makes references to policy in the 1990s being directly aimed at addressing previous outperformance in the water sector. He writes: *“Similarly, the British Labour Party’s 1997 manifesto commitment to impose a windfall profits tax on the privatized utilities to claw back ‘excessive’ past profits has been criticized for effectively changing the regulatory compact.”²⁷* Whilst not directly relevant to our analysis, we highlight this because it shows policy at that time was consistent with a ‘ramp up’ of challenge in order to claw back previous (perceived) excess returns. This might be seen, therefore, as being consistent with the findings highlighted in the above academic papers, some of which, to differing degrees, indicate that the early price determinations post privatisation were, indeed, ‘too lenient’; but that this has long since already been addressed. Put simply, the ‘clawback’ has already occurred.

Erbetta and Cave (2007) also note a ‘tightening’ of regulatory challenge at PR09, which materially increased the efficiency challenge.²⁸

3.2.2 Other third party evidence

The House of Commons Report by the Select Committee for the Environment, Food and Rural Affairs Committee on the PR09 price control noted that evidence (including that submitted to it by Ofwat) was that returns had been below the cost of capital.²⁹

In 2015, the National Audit Office (NAO) published its review of regulation in the water sector. Whilst the NAO had some criticism of aspects of Ofwat’s regulatory framework (most obviously in relation to the historical allocation of risk relating to the cost of debt) it largely considered it to work well. Of relevance to this report, the NAO examined historical industry profit, in terms of ROCE. The NAO found: *“our analysis indicates that water sector returns over the period 2010-11 to 2014-15 as a whole were broadly in line with Ofwat’s expectation of the minimum return an efficiently run company ought to be able to earn”³⁰ [emphasis added].*

²⁶ *‘Profit, productivity and price performance changes in the water and sewerage industry: an empirical application for England and Wales.’ Maziotis, Saal and Thanassoulis. Clean Technologies and Environmental Policy (2015).*

²⁷ *‘Rate-of-return regulation versus price regulation for public utilities.’ David Newbery; University of Cambridge (1997); page 4.*

²⁸ *‘Regulation and Efficiency Incentives: Evidence from the England and Wales Water and Sewerage Industry.’ Review of Network Economics (2007).*

²⁹ *‘Ofwat Price Review 2009.’ House of Commons Environment, Food and Rural Affairs Committee: Fifth Report Session 2008-09 Volume 1.*

³⁰ *‘The economic regulation of the water sector.’ NAO (2015); page 29.*

3.2.4 Summary of key points from the literature

Overall, the existing independent research does not suggest evidence of substantial, systematic and persistent outperformance in the water industry. This is, therefore, consistent with both our, and Ofwat's own previous, analysis of this issue.

We note that there appears to be a degree of consensus that, in the early post-privatisation years, there was some evidence of 'excess' returns, which authors in part attribute to 'too lenient' regulation. However, there also appears to be a view that this was 'corrected for' some time ago, with PR09 being cited by some as the point at which this occurred – others cite PR04. As highlighted in the introductory chapter of this report, such a viewpoint is intuitively sensible. That is to say, had early price controls been 'too lenient' (or indeed, 'too severe') one would logically expect Ofwat to modify its approach accordingly, to avoid any out or under performance persisting over time. Had this not occurred, it would seem to raise significant questions regarding the performance of the regulatory regime and the regulator, which would have been highlighted previously.

3.3 Extent of regulatory challenge

3.3.1 Overview of approach

Having set out the evidence on historical out / under performance, we now compare this against the 'extent' of challenge set by Ofwat over time. There are various ways in which this could be done. Consistent with focusing on the 'overall' picture, we think a helpful measure is to examine the percentage 'difference' between:

- the total revenues *companies submitted* in their Final Business Plans for each price control; and
- the total revenues Ofwat ultimately *allowed* in its FDs.

The advantage of this approach is that it will take into account the fact that the 'scope' of what companies are asked to, or propose to, deliver might have changed across the controls (say due to legislative, or regulatory, requirements). Indeed, consistent with our approach, in the past Ofwat itself has frequently drawn on comparisons between 'company proposals' and its 'determinations' as a way of quantifying the extent of challenge it applies.³¹ In contrast, more recently, Ofwat has highlighted that if one compares total allowed spend at PR19 with *current* spending levels, the 'challenge' at PR19 does not appear so great.³² However, that perspective does not reflect the fact that the industry is being asked to significantly increase the scope and quality of what it delivers at PR19 – and so, is irrelevant to the questions we are seeking to address.

Following from the above, the next table presents a comparison of the % gap between company submitted revenues and regulator allowed revenues (proxied by bills) at the previous price controls (back to PR04) against this gap at PR19 – as implied by Ofwat's DDs. This allows us to calculate the % change in the extent of the challenge at PR19, relative to the average challenge at the previous price controls (i.e. the increase in the gap between company submitted revenues and allowed revenues at PR19, as percentage of the same gap at the previous price controls.) In the last column,

³¹ For example, Ofwat did exactly this in the PR14 Final Determinations. See 'Setting price controls for 2015-20: Overview,' Ofwat (December 2014); page 5.

³² 'Transcript of the Ofwat city briefing, 19 July 2019.' See remarks by Jonson Cox, page 3 of the transcript.

therefore, we highlight: in *red*, instances where the % increase in challenge at PR19 is more than 100%; in *amber*, instances where the % increase in challenge at PR19 is less than (or equal to) 100%; and in *green*, instances where there is a decrease in challenge at PR19.

Table 1: Comparison of extent of challenge to business plans at PR19 with previous price controls

Company	% gap between company submitted revenues and allowed revenues		% change in challenge at PR19
	PR04 to PR14	PR19 (DD)	
Affinity	-5.5%	-12.0%	117.1%
Anglian	-3.9%	-11.6%	200.2%
Bristol	-15.5%	-10.7%	-30.7%
Dwr Cymru	-1.4%	-9.4%	583.3%
Northumbrian	-2.6%	-7.0%	168.2%
Portsmouth	-5.3%	-7.2%	35.8%
SES Water	-10.6%	-11.3%	7.3%
Severn Trent	-2.3%	-0.7%	-70.0%
South East	-5.2%	-9.3%	80.3%
South Staffordshire	-5.0%	-9.5%	88.9%
South West	-0.7%	-0.8%	19.3%
Southern	-4.6%	-7.7%	64.6%
Thames	-7.4%	-7.7%	3.7%
United Utilities	-5.8%	-2.4%	-58.7%
Wessex	-2.3%	-7.6%	224.6%
Yorkshire	-1.1%	-9.8%	817.4%
Industry	-4.1%	-6.5%	60.1%

Notes: (i) In PR19, PR09 and PR04, the gap between the company submitted revenues and allowed revenues is proxied on the basis of the gap between the average household bills in each year. Where the average household bill profile for each year was not available, we have estimated these using the average household bill in the last year and the price limits. (ii) The average gap for a price review is estimated as the simple average of the gaps for each of the individual years. (iii) The average gap for the PR04 to PR14 period is estimated as the RCV-weighted gap in each of the price controls. (iv) The industry average gap is calculated as the RCV-weighted gap for individual companies. (v) In case of mergers, in order to aggregate to the company of relevance for PR19, the average household bills in each year was calculated as the RCV-weighted average for each company. The same methodology has been used to aggregate Severn Trent, Dee Valley and Hafren Dyfrdwy.

Sources: For PR04 – as detailed in Ofwat's final determination available here:

https://webarchive.nationalarchives.gov.uk/20150603192547/http://www.ofwat.gov.uk/pricereview/pr04/det_pr_fd04.pdf; for PR09 – Ofwat's final determination available here: https://www.ofwat.gov.uk/wp-content/uploads/2015/11/det_pr09_finalfull.pdf and individual companies' business plans detailed here:

https://webarchive.nationalarchives.gov.uk/20150603195854/http://www.ofwat.gov.uk/pricereview/pr09phase3/sub_fbp_pr09partasumm; for PR14 – as detailed in Ofwat's final determinations available here:

https://webarchive.nationalarchives.gov.uk/20150603214647/http://www.ofwat.gov.uk/pricereview/pr14/prs_web20141212pr14fdboard; and for PR19 – as detailed in Ofwat's draft determinations available here: <https://www.ofwat.gov.uk/regulated-companies/price-review/2019-price-review/draft-determinations/>.

As can be seen, in totality, PR19 represents a 60% increase in the regulatory challenge for the industry, relative to the previous price controls. This appears grossly disproportionate to the historical performance in the industry (where, on our ROCE versus WACC measure, outperformance was just 3.8% over the last 14 years). In fact, based on the previous table, we note that:

PR19 REPRESENTS A 60% INCREASE IN THE REGULATORY CHALLENGE FOR THE INDUSTRY AS WHOLE, RELATIVE TO THE THREE PREVIOUS CONTROLS.

- Some companies (6 out of 16) are facing an increase in challenge of over 100%.
- Most other companies (7 of the 16) are facing an increase in challenge of between 4% and 89%.
- Only 3 companies (Bristol, Severn Trent and United Utilities) are facing a reduction in challenge.

Further to the above, we note that our measure of challenge may not fully reflect the true extent to which the industry is being asked to increase its outcomes performance within the allowed revenues and so, may actually be conservative. In this context, the ‘mismatch’ in the increase in challenge and historical performance we have found is, therefore, remarkable.

While the ‘mismatch’ above is substantial, the scale of the increase in *regulatory challenge* at PR19 itself seems to be the inevitable consequence of various observable methodological changes Ofwat has made, which collectively increase the overall efficiency challenge relative to prior price controls. These include, for example: (i) not fully allowing for real price effects; (ii) increasing the materiality thresholds for cost adjustment claims; and (iii) not allowing glidepaths for improved performance. However, in addition to these, the most significant issue likely to be driving the increase in challenge at PR19 remains the ‘disconnect’ between the setting of cost efficiency and outcomes targets and the relative arbitrariness of the latter. Here, the key points (which have been previously highlighted to Ofwat on a number of occasions) are as follows:

- Because the notionally efficient firm faces trade-offs between costs and output (or quality) the economically efficient level of performance is whatever ‘outcomes’ the cost efficient firm is achieving (or vice-versa).
- However, because Ofwat’s method does not reflect this, and sets outcomes targets independently of cost efficiency, it will likely not be targeting the efficient level of outcomes performance. That is to say, Ofwat’s targets for outcomes could only be the efficient level ‘by chance’ and the presumption would be that they are ‘beyond’ that point – meaning that companies are not appropriately funded to deliver the outcomes targets they are set.³³
- Relatedly, notwithstanding the disconnect, Ofwat’s approach to setting outcomes targets has been, to varying degrees, arbitrary and not based on a framework or analysis rooted in efficiency. For example, the 15% reduction in leakage target; or forecast upper quartile for other outcomes.

³³ For instance, as highlighted in a previous submission on behalf of Yorkshire Water, Ofwat’s approach underfunds Yorkshire’s leakage reduction plans. Please see [‘Maximising customer benefits from the outcomes framework: A Report for Yorkshire Water.’ Economic Insight \(March 2019\).](#)

- Importantly, the CMA recognised the above issues in its redetermination of Bristol Water's PR14 control.³⁴

The large increase in 'challenge' at PR19 can also be viewed in the context of Ofwat's own statements relating to previous price controls. For example, Ofwat described its PR14 Final Determinations as being: the "*biggest-ever challenge for [the] sector on efficiency.*"³⁵ As noted earlier, if one assumes that incentive regulation works well and that regulators rationally 'adapt' in response to revealed company performance over time, the starting *presumption* should be that significant out, or under, performance would likely not persist. Therefore, by increasing the efficiency challenge at PR19 by such a significant degree, the result is the material 'mis-match' shown above.

3.4 Re-cap of key findings

On the basis of the above, we find no evidence of substantial, systematic and persistent historical outperformance by the industry. As such, there appears to be no evidence to underpin Ofwat's assertion that '*now is the time for an efficiency step change*'. Consequently, there is no evidential basis whatsoever for assuming that the companies can deliver materially larger efficiency gains and outcomes improvements than in the past – or, put another way, that the 'performance level' of the notionally efficient firm is 'much further ahead' of that of the regulated companies than Ofwat had previously thought. Specifically:

- We find average industry ROCE to be 5.1% over the period, compared to an average vanilla WACC of 5.0%. We consider this to be the most appropriate measure, as it properly reflects the overall opportunity cost to debt and equity investors. This, then, would imply fractional outperformance of 3.8% over the long term.
- Also on our measure of ROCE versus WACC, we find that, whilst some companies do slightly outperform (9 out of 16), a similar number underperform (the remaining 7). In other words, there are 'winners' and 'losers' over time, exactly as one would expect to observe if incentive regulation is working effectively.
- Ofwat itself previously published analysis of outturn ROCE versus its expectations for the industry. In line with our own findings, the regulator consistently found no evidence of substantial, systematic and persistent outperformance.
- We also examined RORE as an alternative measure of historical performance against regulatory allowances (although it is less relevant than ROCE versus WACC). Ofwat's own data shows that, on average between March 2015 and March 2018, the industry average outturn RORE has been 6.2%, compared to the average base allowed equity return of 5.6%. This indicates a *slight* outperformance on equity returns over the period by 10.2%. Significantly, when we look at the analysis by company, we find an even split in the number of companies that outperform (9 out of 17) relative to those that underperform (the remaining 8). As per the ROCE analysis, therefore, this is clearly not consistent with substantial, systematic and persistent outperformance.

³⁴ For example, see '*Bristol Water PLC. A reference under section 12(3)(a) of the Water Industry Act 1991.*' CMA (2015); para 9.16.

³⁵ '*Setting price controls for 2015-20: Overview.*' Ofwat (December 2014); page 5.

- In addition, various academic and third party studies have also shown no evidence of substantial, systematic or persistent outperformance.

Based on our analysis of the increase in regulatory challenge at PR19, we find that:

- The regulatory challenge at PR19 has increased by 60%, relative to the previous price controls.
- Notwithstanding our findings that there is no evidence of substantial, systematic and persistent historical outperformance over the relevant time period (i.e. to justify such an increased efficiency challenge) even if one took an 'aggressive' view of our prior analysis, this would imply, 'at most' outperformance of circa 4% (using the ROCE measure). Consequently, the increase in challenge is clearly grossly disproportionate, even on this basis.
- We further note that our measure of challenge at PR19 may understate the 'true' extent of the increase. This is because it likely does not fully capture the significant increase in 'outcomes performance' that companies are also being asked to make at this time.

Looked at in the round, the implications of the above are clear, and are of serious concern. Under any logical view, the 'efficiency challenge' proposed by Ofwat at the DDs must be beyond the performance level a notionally efficient firm can deliver. Moreover, the extent of the mismatch between historical performance and the increase in challenge is so large, that it likely renders the notional firm unfinanceable. The adverse implications of this for customers are, of course, self-apparent.



4. Evidence on the distribution of risk for the notional firm

Based on the evidence outlined in Chapter 3, Ofwat's overall efficiency challenge in the DDs is beyond the performance level a notionally efficient firm can achieve. The size of the disparity between historical outperformance and the increase in Ofwat's challenge is such that, logically, the notionally efficient firm is likely not financeable. Consequently, the notionally efficient firm will have expected returns below allowed returns and will face risk that is skewed to the downside (which is contrary to what one would expect, had the efficiency challenge been set appropriately).

The analysis in this chapter therefore examines whether the above consequence is observable in the data on RORE risk. Notwithstanding the fact that the notionally efficient firm is a somewhat abstract concept, the evidence is highly consistent with it having expected returns below allowed returns and having risk skewed to the downside. In particular, we highlight that: (i) even firms deemed 'cost efficient' by Ofwat have RORE ranges that are strongly negatively skewed to the downside; (ii) no firm in the industry has a symmetrical balance of RORE risk; and so, implicitly, (iii) Ofwat's view of the notionally efficient firm is a level of performance 'beyond' that currently observable in the industry, or 'projected' over PR19.

More significantly still, we find no correlation between the distribution of risk and efficiency across companies. This means that even the suggestion that the notional firm is an achievable point of performance 'beyond' that observable in the water industry, at which the distribution of risk would be symmetrical, is unsupported.

THE NOTIONALLY EFFICIENT FIRM SHOULD FACE SYMMETRICAL RISK AROUND THE ALLOWED RETURN.

4.1 Evidence on the distribution of risk for the notionally efficient firm

4.1.1 Framework

4.1.1.1 The balance of risk for the notionally efficient firm

In this chapter, we assess the evidence on the distribution of risk (using the RORE ranges published by Ofwat in companies' DDs) in order to illustrate the consequences of Ofwat setting an overall efficiency step change that is beyond the performance of a notionally efficient firm.

Before examining the data, it is important to recall that, for the notionally efficient firm to be financeable, one would logically expect the following to hold true:

- In relation to any incentive mechanisms that apply at PR19, the expectation should be that the notionally efficient firm will achieve the 'target' level of performance (i.e. the target should also be the P50). As such, its 'expected return' should equal its 'allowed return'.
- It should face an equal chance of over, or under-performing against its targets (i.e. it should face a symmetrical distribution of risk around the allowed return / expected cash flows).

In fact, consistent with its Final Methodology for PR19,³⁶ in its DDs, Ofwat suggests that: *"an efficient company, with a notional capital structure, should be able to achieve a RORE that is equivalent to the cost of equity that is allowed in our cost of capital over the period of the price control."*³⁷ Ofwat further states: *"we expect each company can achieve the notional base RORE based on a P50 estimate of performance, but we expect each company to reflect its expected performance and exposure to a range of risks within P10 and P90 confidence limits. For example poorer performing and/or less efficient companies may have greater cost downside, higher ODI downside and financing downside. Conversely high performing companies may expect greater scope for upside."*³⁸ In summary, and consistent with economic theory, Ofwat's position seems to be that: (i) an efficient firm should face symmetrical RORE risk; but (ii) inefficient firms may face risk that is skewed to the downside.

4.1.1.2 Defining the notionally efficient firm

Related to the above, it is important to be clear about what we mean by the 'notionally efficient firm'. Specifically, it is a firm that is 'perfectly efficient' and so is operating on the efficiency frontier (i.e. it has no 'catch-up' inefficiency left to remove, but may still make productivity gains over time). As a result of being on the efficiency frontier, it faces trade-offs between costs and output (or quality). Critically, however, the notionally efficient firm is a somewhat abstract concept and the costs and outcomes performance it can deliver is inherently 'unknowable'. Consistent with this, and as we highlighted earlier, the essence of incentive regulation is to 'reveal' efficient costs and outcomes over time, by observing how firms respond to incentives and modifying the

³⁶ *'Delivering Water 2020: Our final methodology for the 2019 price review.'* Ofwat (December 2018).

³⁷ *'PR19 draft determinations: Aligning risk and return technical appendix.'* Ofwat (July 2019); Page 13.

³⁸ *'PR19 draft determinations: Aligning risk and return technical appendix.'* Ofwat (July 2019); Page 13.

regulatory approach in response (e.g. ‘tightening’ the challenge where there is overperformance; and vice versa).

In the above context, ‘benchmark’ regulation (such as that applied in the water industry) uses comparisons of relative performance between companies to help set the efficiency challenge. There are two key motivations for this: (i) firstly, it allows regulators to make use of observable ‘known’ data to help ensure their assessment of efficiency is as robust as possible; and (ii) secondly, efficient costs and outcomes vary hugely across industries - and so it is logical to determine the efficiency benchmark based on ‘within sector’ performance, where that is possible.

The above does not necessarily mean that a specific individual company (or companies) needs to be identified as being the ‘notionally efficient’ firm. For example, a regulator might take a view that a firm that is performing well in one dimension has scope to improve in another. However, this line of reasoning needs to be treated with care and caution, for the following reasons.

- Firstly, as noted above, the notionally efficient firm is operating at the efficiency frontier and so does, by definition, face performance trade-offs.
- Secondly, by implication, to the extent that regulators rely on ‘mixing and matching’ their benchmarks for differing elements of a price control (‘Company A’ for cost efficiency; ‘Company B’ for outcomes, say) there is an inherent degree of logical tension. Namely, ‘Company A’ is acting as a benchmark for a notional firm, but is not, in the regulator’s view, the notionally efficient firm.
- Thirdly, and also by implication of the above, such logic introduces considerable subjectivity and arbitrariness. That is to say, once one takes the view that a notionally efficient firm is a level of performance beyond any individual company, the obvious question that arises is “how far beyond”? Clearly this is a matter of degree, but the further one stretches performance beyond what is observable and measurable, the more one undermines the logic and value of benchmarking to begin with.
- Fourthly, in our view, the most practical evidence relevant to the question posed above again goes back to the essence of incentive regulation ‘revealing’ the efficient costs and outcomes over time. Put simply, historical performance against regulatory allowances provides the best guide. For example, significant, systematic and persistent outperformance in the past might indicate that, indeed, the notionally efficient firm is capable of delivering performance beyond that currently observed.

It is important to be clear that the above does not imply that Ofwat, or any regulator, is compelled to clearly identify a firm (or firms) that are the notionally efficient benchmark. Indeed, it is quite theoretically possible that the notionally efficient firm is a level of performance ‘beyond’ that of any actual company. However, it is also important to be mindful of the difficult questions this raises – particularly in the context of the financeability duty and the issues explored in this report. Specifically, it is essential that, in order to comply with the financeability duty, the notionally efficient firm must be an achievable benchmark. So, if Ofwat is not defining the notional firm in a way that allows it to be ‘observable’, alternative strong and credible evidence is required in order to understand exactly ‘what’ the regulator considers the notionally efficient firm to be - and why it represents an achievable benchmark.

Having established the above, we now present an analysis of Ofwat’s published RORE risk ranges for companies at the DDs and consider whether they are consistent with a notionally efficient firm facing a symmetrical balance of risk.

4.1.2 Evidence on RORE ranges at DD

4.1.2.1 RORE risk ranges for cost efficient firms identified by Ofwat

As a starting point, it is helpful to examine the RORE risk ranges for firms used by Ofwat to set the ‘catch-up’ cost efficiency challenge in its PR19 DDs. On a historical basis (i.e. using data based on known, observable costs and cost drivers), Ofwat identified the following firms as being cost efficient (i.e. the benchmarks): South Staffordshire; Yorkshire; and Bristol. In the table below, we highlight their RORE ranges, as reported by Ofwat in their DDs.

Table 2: RORE ranges for the cost efficient companies

Cost efficiency area	Upper quartile firm	P10 RORE	P90 RORE
Water	South Staffordshire ³⁹	-4.11%	1.80%
Wastewater	Yorkshire ⁴⁰	-5.32%	3.98%
Retail	Bristol ⁴¹	-6.76%	3.92%

Notes: The cost efficient firms are identified based on Ofwat’s updated models used to inform the historical catch-up efficiency challenges. These may differ from the companies with the smallest total cost gap. We consider these firms as being the most informative with respect to Ofwat’s assessment of the ‘notionally efficient firm’ because this assessment is: (i) based on Ofwat’s benchmarking of companies’ actual costs; and (ii) used by Ofwat to set the future challenge, and therefore, provides Ofwat’s best view of an efficient firm in the water industry.

Source: Table 5.2 in Ofwat’s draft determination for each company.

As can be seen, none of the companies face symmetric RORE risks. That is to say, they all face returns on equity that are skewed to the downside. It is important to consider the implication of this. Namely, that whilst on one hand the regulator considers them to represent meaningful benchmarks for cost efficiency, on the other, their ‘expected’ returns are below the ‘allowed’ cost of equity.

4.1.2.2 RORE risk ranges for the fast track companies

Noting Ofwat’s comment that “*high performing companies may expect greater scope for upside*”,⁴² in the table overleaf, we highlight the RORE ranges for the fast track companies. As can be seen, these also face skewed returns to the downside – meaning that their ‘expected’ return is also below the cost of equity. Here, it is further important to note that these are companies that, in its DDs, Ofwat considered to be amongst the most cost efficient on a forward-looking basis.

³⁹ As indicated in Ofwat’s ‘Feeder model 2: Wholesale water – Water Catch up adjustment’ available here: <https://www.ofwat.gov.uk/slow-track-and-significant-scrutiny-draft-determinations-models/>.

⁴⁰ As indicated based on having an efficiency score closest to the upper quartile catch-up efficiency challenge set by Ofwat in ‘Feeder model 2: Wholesale wastewater – Wastewater Catch up adjustment’ available here: <https://www.ofwat.gov.uk/slow-track-and-significant-scrutiny-draft-determinations-models/>.

⁴¹ As indicated in Ofwat’s ‘Feeder model 2: Retail – Catch up adjustment’ available here: <https://www.ofwat.gov.uk/slow-track-and-significant-scrutiny-draft-determinations-models/>.

⁴² ‘PR19 draft determinations: Aligning risk and return technical appendix.’ Ofwat (July 2019); Page 13.

Table 3: RORE ranges for the fast track companies

	P10 RORE	P90 RORE
Severn Trent Water	-6.59%	3.05%
South West Water	-4.88%	4.28%
United Utilities	-5.58%	3.67%

Notes: Although we use the total RORE range reported by Ofwat, for United Utilities, we note that the sum of the individual elements of the RORE reported by Ofwat do not sum up to the total RORE. Source: Table 5.2 in Ofwat’s draft determination for each company.

4.1.2.3 RORE risk ranges across the industry

It is also informative to look at RORE risk ranges across the industry as a whole. Indeed, this shows that, on Ofwat’s DDs, no company faces a symmetrical distribution of RORE – as highlighted in the figure below.

Figure 11: Ofwat’s assessment of company RORE ranges in the DD



Notes: Although we use the total RORE range reported by Ofwat, for United Utilities, we note that the sum of the individual elements of the RORE reported by Ofwat do not sum up to the total RORE. Source: Table 5.2 in Ofwat’s draft determination for each company.

We particularly note that:

- The ‘average’ RORE upside and downside from the base return according to Ofwat are 2.70 percentage points and -4.89 percentage points respectively.⁴³
- 10 companies have a downside skew of more than 2 percentage points (including, Affinity; Anglian; Bristol; Hafren Dyfrdwy; SES Water; Severn Trent; South East; South Staffordshire, Southern; and Thames).

⁴³ Estimated as a simple average across all companies.

- On Ofwat's numbers, one company (Wessex) has a positive RORE skew. However, from Ofwat's perspective, Wessex cannot logically be considered the notionally efficient firm, since it is not a cost efficiency benchmark, based on Ofwat's own updated cost assessment models at DD⁴⁴ (nor was Wessex a 'fast track' company on Ofwat's assessment).

4.1.2.4 Key implications

The implications that follow from the above are as follows:

- On Ofwat's published DDs no firm, including ones identified by Ofwat as being cost efficient, faces a symmetrical distribution of RORE risk. In fact, the cost efficient firms, identified by Ofwat, all face RORE risk that is skewed to the downside, and have expected returns below their cost of equity.
- The above means that Ofwat's view of the notionally efficient firm is a level of cost and outcomes performance that is beyond both: (i) that which is currently observable; and (ii) that which is projected by the companies over PR19.
- As we previously explained, it is theoretically possible that the notional firm might be able to deliver a performance level 'beyond' currently observable (or even forecast) performance within the industry. However, given: (a) the lack of substantial, systematic and persistent historical outperformance; (b) the fact that the downside RORE skews are material, even for cost efficient firms 'within' the industry; and (c) companies have already baked in significant performance improvements in their forecasts; the 'extent' to which this is credible is highly doubtful.
- The more logical explanation of the observed distribution of risk is that it is the natural consequence of the evidence set out in the previous chapter. Namely, that by not properly calibrating the overall incentive package to the WACC in light of measured historical performance, Ofwat has set an overall cost and outcomes efficiency challenge that is beyond that which a notionally efficient firm can deliver. Hence, the notional firm is likely not financeable.

4.1.3 Evidence on the relationship between efficiency and RORE risk

With the inherent ambiguity concerning what a notionally efficient firm can deliver in mind, it is further helpful to examine the relationship between RORE risk and efficiency. That is to say, because it is 'theoretically' possible that the notionally efficient firm could be 'beyond' current observable (or projected) industry performance, another way of sense-checking whether Ofwat has likely set an achievable efficiency challenge is to examine whether Ofwat's DDs result in 'less efficient' firms facing more 'downside risk', relative to 'more efficient firms'.

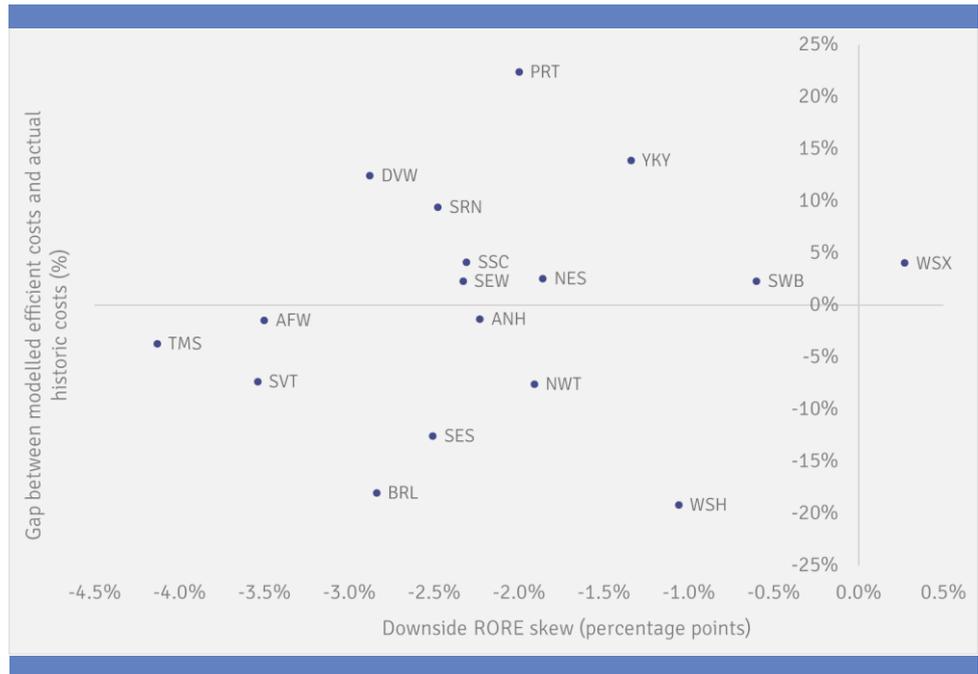
Indeed, and as we previously highlighted, Ofwat itself has confirmed that its method is intended to deliver this, stating: "*poorer performing and/or less efficient companies*

⁴⁴ Note, this does not mean that Wessex is not, objectively, efficient – we are simply observing that on Ofwat's analysis, it is not the 'benchmark'.

may have greater cost downside, higher ODI downside and financing downside. Conversely high performing companies may expect greater scope for upside.”⁴⁵

Accordingly, we have examined the relationship (or, lack thereof) between wholesale water efficiency gaps and the extent of RORE skew around the base return. This is based on Ofwat’s assessment of cost efficiency used to inform the catch-up efficiency challenge at DD. The results are shown in Figure 12.

Figure 12: Relationship between wholesale water efficiency cost gaps and extent of downside RORE skew around the base return



Notes: The wholesale water efficiency cost gap is calculated as the difference between each companies’ modelled efficient costs (based on the triangulation of the individual water models) and their actual wholesale water costs, as a percentage of the modelled efficient costs. This is consistent with Ofwat’s calculations of the efficiency scores used to inform the catch-up efficiency challenge set at DD.

Source: Economic analysis of the following Ofwat’s publications: ‘Feeder model 2: Wholesale water – Water Catch up adjustment’ and draft determination for each company.

As can be seen, there is no discernible relationship between the wholesale water efficiency gaps and the extent of RORE skew around the base return. This implies that, contrary to Ofwat’s suggested intentions, expected returns for the more efficient firms are just as skewed to the downside as the less efficient firms.

To demonstrate this further, the figure below presents the RORE ranges at the DDs for:

- (i) the “least efficient” water company (on Ofwat’s view) i.e. the one with the largest negative gap between modelled efficient costs and actual costs, Dwr Cymru; and
- (ii) the “most efficient” water company (on Ofwat’s view) i.e. the one with the largest positive gap between modelled efficient costs and actual costs, Portsmouth.

⁴⁵ ‘PR19 draft determinations: Aligning risk and return technical appendix.’ Ofwat (July 2019); Page 13.

Figure 13: Ofwat’s assessment of company RORE ranges in the DD for Dwr Cymru and Portsmouth

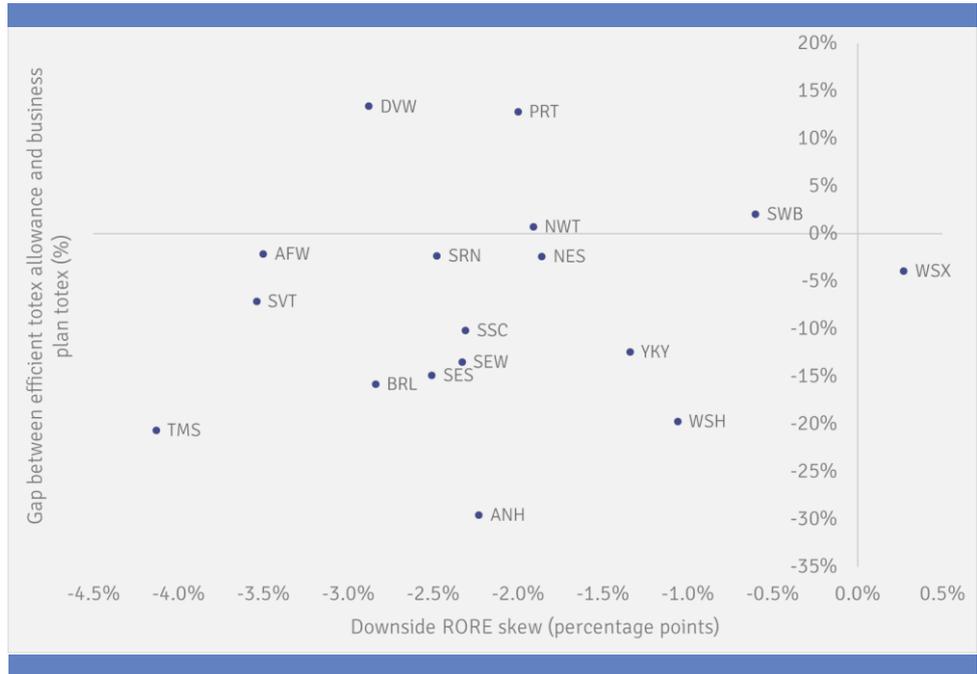


Notes: Although we use the total RORE range reported by Ofwat, for United Utilities, we note that the sum of the individual elements of the RORE reported by Ofwat do not sum up to the total RORE. Source: Table 5.2 in Ofwat’s draft determination for each company.

As can be seen, both companies face a negative skew to their RORE ranges at PR19. In addition, counterintuitively, the most efficient firm faces a larger negative skew than the least efficient (2% vs 1.1%).

We consider the above measure of wholesale water efficiency gaps (based on Ofwat’s assessment of the historical catch-up efficiency challenge) as being the most informative with respect to Ofwat’s assessment of the ‘notionally efficient firm’. This is because: (i) this is based on Ofwat’s benchmarking of companies’ actual costs; and (ii) it is used by Ofwat to set the future challenge, and therefore, provides Ofwat’s best view of an efficient firm in the water industry. Nevertheless, for completeness, in Figure 14, we present similar analysis, showing the relationship between the total wholesale water cost gap at PR19 and the extent of RORE skew around the base return.

Figure 14: Relationship between wholesale water total cost gap and extent of downside RORE skew around the base return



Notes: The wholesale water total cost gap at PR19 is calculated as the difference between the efficient totex allowance for financial modelling and the business plan totex (excluding third party and PDRC but including G&C), as a percentage of the efficient totex allowance.

Source: Economic analysis of the following Ofwat’s publications: ‘Feeder model 4: Wholesale water – Water resources and water N+ cost allowances’ and draft determination for each company.

As above, there is no discernible relationship between the wholesale water total cost gaps and the extent of RORE skew around the base return.

4.1.3.1 Key implications

- Given the inherent ambiguity in determining what a notionally efficient firm can deliver in terms of cost and outcomes performance, the question of whether the notionally efficient firm faces a symmetrical balance of risk can be further informed by examining the relationship between RORE risk and efficiency.
- Here, one would expect a strong, and clear, positive relationship between the two. If this were the case, one might take some comfort that, although in Ofwat’s DDs no actual company faced symmetrical risk, if one ‘extrapolated’ based on the correlation, it was plausible that a more efficient (notional) firm some point ‘beyond’ the most efficient company did, in fact, face symmetrical risk (and was financeable).
- In practice on Ofwat’s DDs the above does not hold. This is concerning, as it means there is no basis to suppose that the overall benchmark against which the industry is being measured represents a realistic level of performance for the notionally efficient firm. Indeed, the data seems to imply that the probability of a firm’s expected returns being in line with allowed returns is, in fact, ‘random’ under Ofwat’s methodology.
- Again, this would seem to be the logical consequence of the evidence set out in the preceding chapter.

4.2 Ofwat’s approach to assessing RORE risk and implications

The analysis in the preceding section suggests that Ofwat has not properly calibrated incentives and that, further, even on its own numbers, the notionally efficient company cannot, logically, be financeable. However, that analysis actually significantly understates the extent of the issue. In this section, we explain why this is the case, addressing in turn:

- our understanding of how Ofwat has assessed RORE risk in its DDs;
- the issues raised by this; and
- the implications that follow.

4.2.1 Ofwat’s approach

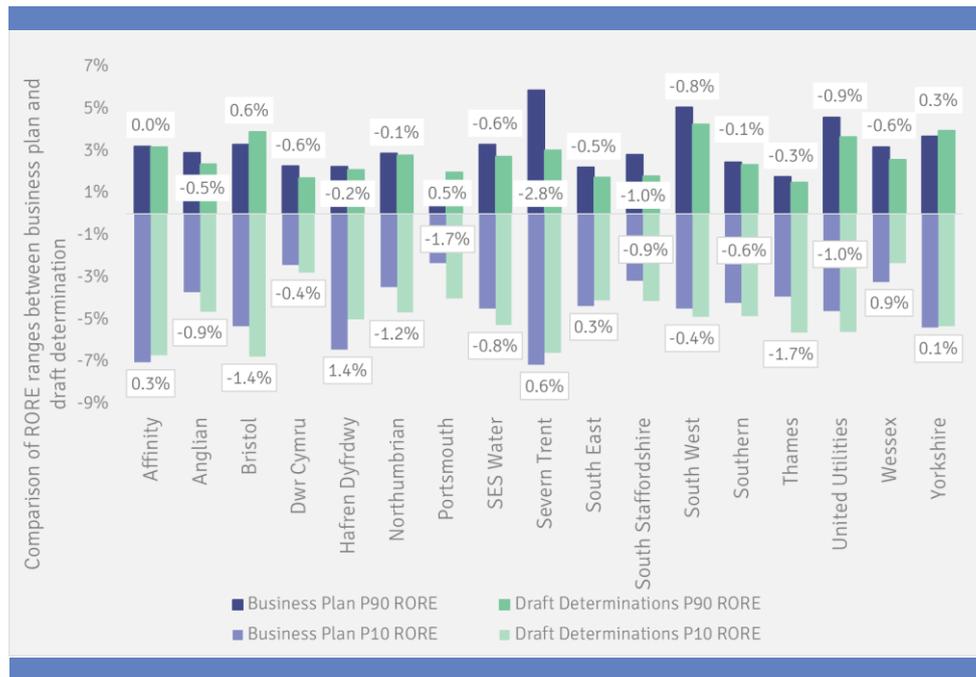
Whilst Ofwat has not published the precise details of what it has assumed on risk ranges for each individual incentive, company-by-company, its DDs do outline the overall approach taken. The key points are as follows:

- Firstly, Ofwat stated that, at IAP, “in general” companies did a good job of identifying their P10/P90 risk ranges for the RORE risk analysis.⁴⁶
- Secondly, although Ofwat asked some companies to provide additional evidence and assurance regarding their RORE risk analysis (and in some cases, intervened to adjust RORE risk ranges) for most companies it did not. Indeed, and as shown in the figure overleaf, in relation to the % RORE ranges proposed by companies, the extent of Ofwat’s amendments is limited.
- Thirdly, by definition, the above implies that, in the main, Ofwat has largely **‘transposed’** company views as to the percentage risk range around company proposed targets (for cost efficiency; revenues; ODIs; etc) and applied them to Ofwat’s views as to the appropriate target for the notional firm. Indeed, in relation to cost risk in particular, Ofwat’s description seems to confirm that this is, in fact, the case: *“we have not intervened for any other company to adjust the cost range to reflect our view of risks, as we expect companies will respond to our cost challenge.”*⁴⁷

Ofwat has largely ‘transposed’ company views of the RORE risk range around company proposed targets and applied them to Ofwat’s views about the appropriate target for the notional firm.

⁴⁶ [‘PR19 draft determinations: Aligning risk and return technical appendix.’ Ofwat \(July 2019\); page 13.](#)
⁴⁷ [‘PR19 draft determinations: Aligning risk and return technical appendix.’ Ofwat \(July 2019\); page 19.](#)

Figure 15: Ofwat changes to % RORE ranges by company at DD



Notes: Data labels show the percentage point changes in RORE ranges.
 Source: Table 5.2 in Ofwat’s draft determination for each company.

4.2.2 Issues with Ofwat’s approach

In one sense, and perhaps in a different context, the above approach should not be unreasonable. Indeed, and as noted previously in this report, it is for any regulator to determine ‘what’ the notionally efficient firm can achieve. So, in this respect, if Ofwat determines that the notional firm can achieve more than companies assumed in their plans, it is also right that Ofwat assesses risk on that basis (i.e. it is the regulator’s view of the target around which risk should be appraised). However, in this case, as company assessments of the performance risk range were clearly undertaken relative to the targets they themselves proposed in their plans, it is plainly erroneous to simply transpose them in the way that Ofwat has done. Rather, it is for Ofwat to look carefully at potential risk ranges around its proposed targets and to undertake a proper risk analysis. Without this, we do not understand how one could objectively identify ‘what’ an efficient firm could achieve in any case. This, however, does not appear to have occurred.

4.2.3 Implications

In this specific case, the ‘order of magnitude’ of the difference between the industries’ assessment of what an efficient firm can deliver (i.e. the P50) and Ofwat’s is so large that it should have raised serious questions as to how ‘certain’ one can be as to what the true achievable level might be, so as to avoid inadvertently setting unachievable targets that result in the notional firm being unfinanceable.

Put another way, conceptually it is clear that targets should be set such that for the notionally efficient firm, their expected performance is equal to the target (and hence is the P50). However, that does not mean that the expected performance (P50) for the notional firm is ‘whatever the regulator says the target is’. Indeed, Ofwat’s position now seems to be to simply assert this latter point, ex-post. For example, in its recent

Q&A in relation to outcomes, Ofwat was asked: “Can you confirm then, that you believe all targets to be a P50?” Ofwat replied: “we think all of the performance commitment levels we set are achievable and are at the centre of the P90-P10 range, based on a notionally efficient company.”⁴⁸ This is an entirely circular position – which implies that any target set by Ofwat would be consistent with the P50 for a notionally efficient firm. In actual fact, Ofwat’s method means that – by definition – the targets will likely not be consistent with a P50 for a notionally efficient firm. This is because, as explained in Section 3.3.2, Ofwat’s outcomes targets are not connected to cost efficiency and are (to differing degrees) arbitrary. As such, and as accepted by the CMA, they could only represent the economically efficient level of performance ‘by coincidence’.

4.3 Re-cap of key findings

- Notwithstanding the fact that the notionally efficient firm is a somewhat abstract concept, the observable data set out in this chapter are highly consistent with it having expected returns below allowed returns and having risk skewed to the downside. We highlight that:
 - » Even firms deemed ‘cost efficient’ by Ofwat have strong negative skews to the downside.
 - » No firm in the industry has a symmetrical balance of RORE risk.
- The above means that, implicitly, Ofwat’s view of the notionally efficient firm is a level of performance ‘beyond’ that currently observable in the industry, or ‘projected’ over PR19.
- More significantly still, we find no correlation between the distribution of risk and efficiency across companies. This means that even the suggestion that the notional firm is an achievable point of performance ‘beyond’ that observable in the water industry, at which the distribution of risk would be symmetrical, is unsupportable.
- In totality, therefore, the observable evidence is highly consistent with (and is the logical consequence of) the analysis set out in Chapter 3: namely, that the notionally efficient firm is likely not financeable.

⁴⁸ ‘Ofwat webinar: Delivering outcomes for customers.’ (24th July 2019).



5. The financeability duty in the context of uncertainty

The evidence set out in Chapter 4 is the logical and expected consequence of the issues discussed in Chapter 3 (i.e. it reflects the fact that the material ‘step change’ in the overall challenge contained in Ofwat’s DDs is not supported by theory or data – and so the notionally efficient firm is likely not financeable).

Reflecting on the above, in this chapter we make some observations as to how the approach to financeability may need to evolve to reflect recent developments in the regulatory approach. We address two key issues. Firstly, we explain that: (i) if regulation is to continue becoming more complex, with an increasing number of incentive mechanisms; and (ii) if the overall challenge regulated companies are set is not based on observable performance but, rather, is ‘implied’ as a result of the setting of multiple individual targets, then a more ‘risk-based’ approach to financeability is required. This is to ensure that, in the absence of being able to ‘observe’ the benchmark, the overall challenge set is achievable. Secondly, given the inherent interlinkages between the WACC, financeability and the calibration of incentives – it is important to consider these holistically. A best practice approach should be to set the WACC, such that it reflects the balance of risk faced by the notionally efficient firm; and then calibrate incentive targets, such that its ‘expected’ returns equal its ‘allowed’ returns.

To date, Ofwat’s approach does not seem to address the above, which perhaps further explains why the size of challenge set in its PR19 DDs is likely to be ‘beyond’ the performance level a notionally efficient firm can deliver.

5.1 Interpreting the financeability duty in the context of uncertainty

5.1.1 The complexity of price controls and the resulting uncertainty in targets

From the DDs and the analysis contained in the preceding chapters of this report, it is clear that there are substantial differences between the industries' assessment of what can be achieved by an efficient firm and Ofwat's. There is, in addition, considerable variation across firms in this regard also. The extent of these differences is such that it should naturally have raised serious questions for Ofwat as to both the 'plausibility' of the targets set within its incentive package and the degree of 'confidence' the regulator could have in being able to robustly assess these.

The above goes to a fundamental issue: *the interpretation of the financeability duty in the context of uncertainty*. In particular, as price controls become more complex, with an ever greater number of incentive mechanisms that collectively determine the realised cash flows and returns of regulated companies, the approach to financeability needs to reflect this. In relation to PR19 specifically, there are four important distinctions relative to previous price controls that are crucial to this point:

THE EXTENT OF THE DIFFERENCES BETWEEN THE INDUSTRIES' ASSESSMENT OF WHAT CAN BE ACHIEVED BY AN EFFICIENT FIRM AND OFWAT'S IS SUCH THAT IT SHOULD NATURALLY HAVE RAISED SERIOUS QUESTIONS FOR OFWAT AS TO BOTH THE 'PLAUSIBILITY' OF THE TARGETS AND THE DEGREE OF 'CONFIDENCE' IT HAS IN THEM.

- Firstly, the number and complexity of incentives that collectively determine the cash flows and returns of firms has increased significantly. For example, these include: a material increase in the number of ODIs; financial outperformance sharing; C-MEX; D-MEX; asymmetric cost sharing; use of upper quartile benchmarks for an increasing number of ODIs; and increased use of forward-looking information for setting benchmarks, amongst other reforms.
- Secondly, the total amount of 'value' at stake through incentives is materially greater than in previous controls.
- Thirdly, the extent of uncertainty around these incentives is considerable and multidimensional. It includes, for example, uncertainty relating to: (i) identifying what the 'efficient' level of performance might be; (ii) the performance risk around any identified target level; (iii) the 'value' customers attach to the outcomes; (iv) the efficient costs incurred in achieving outcomes; and (v) the extent to which there are performance trade-offs between various incentive mechanisms.
- Fourthly, whilst benchmarking continues to be used to help inform various specific targets *within* the price control at PR19, Ofwat's determination of the 'overall' performance a notionally efficient firm can deliver is not itself based on the observable or projected performance of any one firm (or subset of firms). Rather, it is merely 'implied' as a consequence of each of the individual targets set by the regulator. Whilst, as previously explained, this is not 'incorrect' per se, this increasingly piecemeal approach introduces yet further uncertainty regarding the fundamental achievability of the overall challenge it implies.

5.1.3 Implications for assessing financeability

To a degree, one might argue that the above raises questions as to whether certain incentive mechanisms are sensible or fit for purpose in the first place. However, setting that to one side, if regulatory regimes are to become more complex, with more incentive mechanisms - and where the extent of uncertainty surrounding some of those mechanisms is as large as shown here, it becomes paramount to have an approach to financeability that reflects this.

Whilst it is beyond the scope of this report to consider in detail the specifics of what such an approach might mean in practice, it seems clear that a more 'probabilistic' or 'risk based' interpretation and testing of the financeability duty is essential. Logically, there are two key questions that need to be addressed:

- **Firstly, what is the spread of possible cash flows and returns of the notionally efficient firm?** Answering this question requires detailed and comprehensive risk analysis around each individual incentive mechanism. This ideally would need to include the range of evidence available and the relative quality of that evidence. It should also consider the possibility of trade-offs and whether probabilities of performance are independent across incentives or not. This is particularly important the more regulators are willing to depart from setting overall benchmarks based on observable firm performance in totality. In relation to PR19, no one firm is achieving (or is projected to achieve) the targets set by Ofwat – and so there is no longer any 'observable' benchmark(s) for the notionally efficient firm. Thus, in the absence of said observable benchmark, to ensure the overall challenge is achievable it would seem essential to have alternative evidence and risk-based analysis to help determine if this is the case.
- **Secondly, 'how likely' or 'confident' does one need to be that the notional firm is financeable in order for the financeability duty to be met?** Prior to the introduction and expansion of complex incentive mechanisms, the approach to financeability implicitly assumed that the targets set by the regulator were the most likely outcome for the efficient firm – and so the financeability duty was met so long as, on that basis, the notional firm generated cash flows consistent with it being able to raise finance on reasonable terms. However, for the reasons discussed above, the approach at PR19 at the very least raises the question as to whether this interpretation remains fit for purpose. Specifically, if a proper risk analysis was undertaken, that reflected the various uncertainties outlined, this would give rise to a 'spread' of possible cash flows and returns for the notional firm. In turn, one might then need to consider whether the firm being financeable at the P50 level is the appropriate test. Put another way, suppose the analysis shows that, in 20% of cases, the notional firm was not financeable – one might reasonably take the view that this was an unacceptably high level of risk, in light of the financeability duty (and, indeed, the consumer duty, given the obvious detriment to consumers in the long run of an efficient firm not being financeable).

5.1.4 Issues with Ofwat's approach

Unfortunately, Ofwat's approach does not consider either of the above questions. For example, in relation to the first, no such risk analysis appears to have been undertaken. Rather, Ofwat generally deals with measurement uncertainty by making arbitrary adjustments to company proposals (for example, assuming that variation in

company willingness to pay estimates are measurement error and so ‘limiting’ the variation). It deals with uncertainty around identifying the efficient performance level by assuming that its own proposed targets are ‘correct’. The second question does not seem to have been considered at all, which is a natural consequence of not addressing the first. This is most concerning.

Finally, we also note that Ofwat’s approach to financeability at the DDs assumes the use of equity injections in order to resolve financeability constraints – alongside a lower level of gearing at PR19, relative to prior controls. However, against a context of: (i) the uncertainty highlighted above; (ii) lower equity returns; (iii) equity returns that are skewed to the downside, even for efficient firms; and (iv) a plausible increase in systematic risk - this too, raises further serious questions.

5.2 Incentive calibration in the context of the WACC and financeability

The expected cash flows of the notionally efficient firm are a function of both its allowed return and performance against incentives (cost efficiency and outcomes). As such, in order to ensure that a notional firm can earn suitable returns, the WACC should firstly be set, so that it appropriately reflects the balance of risks faced by the notionally efficient firm; and then incentives should be calibrated, such that the expectation is that the firm will achieve its targets. Importantly, this calibration of incentives ensures the notional firm earns cash flows consistent with it being financeable. What this also means, of course, is that one should not consider, or set, incentives in isolation of the assessment of the WACC or financeability.

“By providing investors with more upside risk from ODI rewards, for stretching levels of outperformance, we can set a lower cost of capital for companies than would otherwise be the case, which leads to lower bills for customers.”
- Ofwat

Ofwat itself has previously recognised the above. For example, early on in its thinking regarding its approach to setting outcomes incentives at PR19, Ofwat contemplated increasing upside rewards, where it said: *“by providing investors with more upside risk from ODI rewards, for stretching levels of outperformance, we can set a lower cost of capital for companies than would otherwise be the case, which leads to lower bills for customers.”*⁴⁹ Similarly, this logic underpins Ofgem’s proposal to draw a distinction between ‘allowed’ and ‘expected’ returns at RIIO-2. In fact, we disagree with Ofwat and Ofgem - in the sense that we do not think the WACC should become an ‘error correction’ mechanism for a failure to properly calibrate incentives. However, what is plainly the case – and consistent with the views expressed by the regulators – is that the concepts of the WACC, financeability and incentive calibration are intrinsically linked. For example, suppose a regulator has properly calibrated incentives for the notionally efficient firm relative to the WACC, but subsequently makes ‘changes’ to aspects of the incentive package (e.g. setting ‘harder’ outcomes targets). In that case, without further calibration, the expected return of the notionally efficient firm will be below the allowed return. Consequently, for the notional firm to be financeable, one would either have to:

- increase the WACC to compensate (although, as above, we do not think this is the correct approach); or
- re-calibrate other aspects of the incentive package until expected returns = allowed returns (which we consider to be the more correct approach).

⁴⁹ [‘A consultation on the outcomes framework for PR19: Appendix 2 – More powerful outcomes delivery incentives.’ Ofwat \(2016\) p29.](#)

Alongside its Final Methodology, Ofwat published its ‘early view’ on the cost of capital, supported by a report from Europe Economics.⁵⁰ The Europe Economics report itself contains no discussion of the calibration of the incentive package in the context of the WACC. However, as noted above, it is clear from its risk and return technical annex that Ofwat was mindful of the interaction between the two. At the time, Ofwat’s assessment was that the real (RPI) WACC was 2.4%. Logically, therefore, one would assume that Ofwat’s various other targets and incentives – and hence indicative RORE ranges – were calibrated in a way that meant they were consistent with Ofwat’s view of the WACC, such that (for a notionally efficient firm) they resulted in expected returns equal to allowed returns.

5.2.1 Issues with Ofwat’s approach

Whilst Ofwat clearly understands the above interactions, from our review of the DDs, it does not appear to have properly reflected them when applying its methodology in practice.

For instance, we note that Ofwat’s published RORE ranges at the DDs are *materially different* from the regulator’s initial guidance on indicative RORE ranges, as published in its PR19 methodology. That is to say, and as shown in preceding sections, in practice efficient firms also face a significantly higher downside risk than expected, based on Ofwat’s previously stated views.⁵¹ However, Ofwat’s view of the WACC is now 2.19% (RPI real) – this is lower than its initial assessment of 2.4%.

This would seem to imply that Ofwat has failed to calibrate incentives in order to ensure appropriate expected returns for the notional firm (which, as we explained above, should be equivalent to the WACC). That is to say, assuming Ofwat’s previous views on the balance of risk were consistent with its assessment of the WACC at the time, by definition the balance of risk in the DDs seems to be misaligned.

It is important to note that this is entirely separate from the question of whether changes in the incentive package (such as more stretching ODIs, for example) in and of themselves change systematic risk – and therefore the beta (or, indeed, whether the WACC should be adjusted to reflect ‘skewed’ returns).⁵² Rather, here we are focusing only on the interaction between incentive calibration and the WACC, as it relates to determining the expected cash flows of the notionally efficient firm and thus, whether it is likely to be financeable.

⁵⁰ ‘PR19 — Initial Assessment of the Cost of Capital.’ Europe Economics (December 2017).

⁵¹ By which we mean, for example, indications that, more efficient companies would face less downside risk than less efficient companies.

⁵² We note that Ofwat does not consider these reforms to impact systematic risk. We disagree and think that this is a ‘matter of degree’. Whilst Ofwat may be correct in that some, or even the majority, of incentive based performance is diversifiable, we think certain parameters of company performance would invariably be market correlated. Consequently, to claim that there is ‘no’ impact on systematic risk is too extreme. Similarly, we think the ‘in principle’ case for an uplift to the WACC to account for skewness is clear.

5.4 Re-cap of key findings

- Given the considerable uncertainty around the plausibility of Ofwat's challenge – and the inherent uncertainty surrounding the various complex incentive mechanisms that now exist – the interpretation of the financeability duty needs to evolve to a more 'risk-based' approach. This would seem to be especially important in circumstances where the overall challenge set by the regulator (i.e. the performance of the notionally efficient firm) is no longer based on observable industry performance but is, rather, 'implied' as a consequence of the setting of multiple targets in an unconnected manner. To date, Ofwat has not taken this into consideration.
- We further show that Ofwat does not seem to have calibrated the incentive package in the context of the WACC and financeability. Again, this is consistent with our findings in Chapter 3.



6. Conclusions and findings

In this final chapter of our report, we draw together the various analyses set out in the preceding sections and outline our key conclusions and findings. Our main conclusion is that, whilst any analysis is subject to uncertainty, there is no evidence of substantial, systematic and persistent outperformance against regulatory allowances. As such, the material increase in regulatory challenge at PR19 is not objectively justified and most likely results in the notionally efficient firm not being financeable. The fact that, on Ofwat's published RORE risk ranges at the DDs, even 'efficient' firms have expected returns below their cost of equity - and the absence of any relationship between RORE risk and cost efficiency - is the logical consequence of this. As such, if Ofwat retains this position at the FDs, it risks failing to fulfil both its financeability and consumer duties, thus giving rise to potential serious harm to customers. We therefore recommend that Ofwat 'steps back' and consider carefully the basis on which it has determined the overall level of challenge at PR19.

6.1 Conclusions and findings

Our main conclusions are as follows:

- First, as is commonly understood, it is appropriate to assess financeability with respect to the notional firm and, relatedly, it is for the regulator to determine or identify 'what' the notional firm is able to achieve with respect to efficiency (both costs and outcomes). This means that **if a regulator 'mis-identifies' the notional firm – say, by assuming levels of cost and outcomes performance that are unachievable by it – it will not be financeable.**
- **Second, seen through the above lens, it is important to consider the evidential basis for Ofwat's central assumption at PR19 - namely that: 'now is the time for an efficiency step change.'** We explore the theory and evidence relevant to determining the validity of this. Our analysis shows that:

- » Consistent with economic theory, 'catch up' efficiency potential in the water industry has declined since privatisation and is converging to overall UK TFP. This is further consistent with incentive regulation acting as expected over time and so provides no evidence of a rationale for increasing the efficiency challenge at this time.
 - » Empirically, it is clear that the overall productivity performance of the UK has 'flatlined' post financial crisis. A consistent pattern of weak or falling productivity can be found across various industries in the UK, including in competitive markets. Consequently, contrary to Ofwat's claims that firms elsewhere in the UK are 'stepping up' their efficiency performance at this time (which Ofwat uses to imply that the water industry should also achieve a step change), the data consistently and unambiguously shows the opposite is true.
- **Third, in light of the above, whether there is any 'validity' in there being scope for an efficiency step change depends on: (i) previous price controls being 'too lenient', such that there is some 'stored up' catch up inefficiency to be taken out at PR19; and (ii) the increase in regulatory challenge at PR19 being proportionate to that.** Both can be measured empirically with data. If the first were true, it would be observable in substantial, systematic and persistent outperformance of allowed regulatory returns in the past by companies.
- **Fourth, we find no evidence of substantial, systematic and persistent historical outperformance by the industry.** Specifically:
 - » We analyse outturn ROCE and compare this to the WACC, back to PR04. We find average industry ROCE to be 5.1% over the period, compared to an average vanilla WACC of 5.0%. We consider this to be the most appropriate measure, as it properly reflects the overall opportunity cost to debt and equity investors. This, then, would imply fractional outperformance by 3.8% over the long term.
 - » Also on our measure of ROCE versus WACC, we find that whilst some companies do slightly outperform (9 out of 16), a similar number underperform (the remaining 7). In other words, there are 'winners' and 'losers' over time, exactly as one would expect to observe if incentive regulation is working effectively.
 - » Ofwat itself previously published analysis of ROCE versus WACC for the industry. In line with our own findings, the regulator consistently found no evidence of substantial, systematic and persistent outperformance.
 - » We also examine RORE as an alternative measure of historical performance against regulatory allowances (although it is less relevant than ROCE versus WACC, as it: (i) clearly does not reflect the full opportunity cost to investors – noting that debt finance plays a significant role in the water industry; and (ii) it is a relatively recent measure in the water industry, only having been properly established at PR14 – meaning that a long-term analysis cannot be meaningfully undertaken). Notwithstanding these limitations, Ofwat's own data shows that, on average between March 2015 and March 2018 industry average outturn RORE has been 6.2%, compared to a base allowed equity return of 5.6%. This indicates a *slight* outperformance on equity returns over the period by 10.2%. Significantly,

however, when we look at the analysis by company, we find an even split in the number of companies that outperform (9 out of 17) relative to those that underperform (the remaining 8). As per the ROCE analysis, therefore, this is clearly not consistent with substantial, systematic and persistent outperformance.

- » In addition, we review various academic and third party studies of historical water sector financial performance against regulatory allowances. Consistent with our analysis, these also show no evidence of substantial, systematic and persistent outperformance. We note that these studies are independent and were not, therefore, undertaken in order to support either an industry, or regulator, perspective on this matter.
 - » We note that Ofwat itself has recently quoted examples of outperformance selectively, such as outperformance on RORE relating to ODIs, or totex allowances. This is misleading, as it provides no information as to whether a company is outperforming 'overall'. Hence, realised outturn financial returns are plainly the appropriate measure.
- **Fifth, we find the increase in regulatory challenge at PR19, relative to the past, to be unprecedented and well in excess of even the most 'aggressive' view of historical outperformance.** Specifically:
 - » We examine the percentage "gap" between Ofwat's DDs of allowed revenues and those submitted in company plans (proxied by bills) at PR19 – which we take as our measure of 'regulatory challenge'. We compare this to the same metric over previous price controls. This shows that the regulatory challenge has increased by 60% at PR19, relative to the past.
 - » As noted above, in our view there is no evidence of substantial, systematic and persistent historical outperformance over the relevant time period – and so no overall increase in regulatory challenge can be objectively justified at PR19. Notwithstanding this, even if one took an 'aggressive' view of our prior analysis, this would imply, 'at most' outperformance of 3.8% (using the ROCE measure). Consequently, the increase in challenge is clearly disproportionate, even on this basis.
 - » Our measure of challenge at PR19 will understate the 'true' extent of the increase. This is because it likely does not fully capture the significant increase in 'outcomes performance' that companies are also being asked to make at this time.
 - **Sixth, the observable data on RORE risk are consistent with the notionally efficient firm having expected returns below allowed returns - and having risk skewed to the downside.** In particular, we highlight that:
 - even firms deemed 'cost efficient' by Ofwat have RORE ranges that are strongly negatively skewed to the downside;
 - no firm in the industry has a symmetrical balance of RORE risk; and so, implicitly,
 - Ofwat's view of the notionally efficient firm is a level of performance 'beyond' that currently observable in the industry, or 'projected' over PR19.

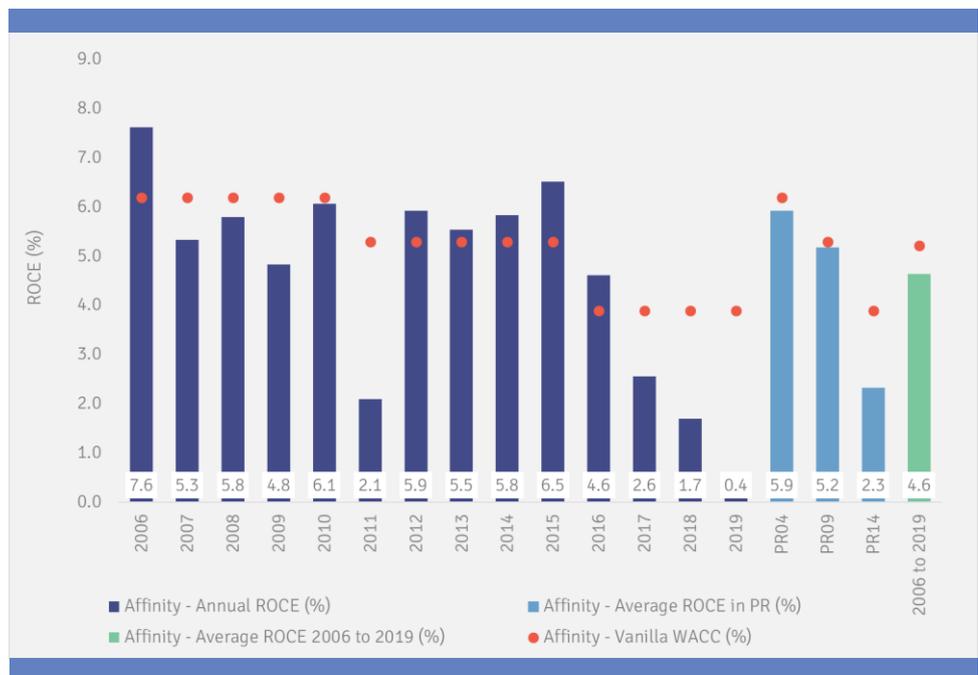
- **Seventh, we find no correlation between the distribution of RORE risk and efficiency across companies.** This means that even the suggestion that the notional firm is an achievable point of performance 'beyond' that observable in the water industry, at which the distribution of risk would be symmetrical, is unsupportable.
- **Eighth, when examined in totality, the evidence therefore indicates that the notional firm is likely not financeable** - as a result of the overall efficiency challenge not being achievable. Given this, it is essential that Ofwat now reconsiders its overall approach in order to ensure it remains compliant with its financeability (and consumer) duty. Going forward, if the current path of regulation is to continue, we would suggest that a more 'risk based' approach to the interpretation of the financeability duty (and the assessment of financeability) is likely to be essential.
- **Ninth, and finally, the above should not be considered a surprising result, in light of clearly observable facts regarding the methodology for PR19 and the inception of Ofwat's 'step change' narrative.**

7. Annex 1: Analysis of outturn return on capital employed for each company

This annex presents the complete analysis of the ROCE compared to the real vanilla WACC for each of the companies. For each company the analysis is presented: (i) for each year; (ii) aggregated across years for each price review; and (iii) for the whole period.

7.1.1 Affinity Water

Figure 16: Affinity Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)

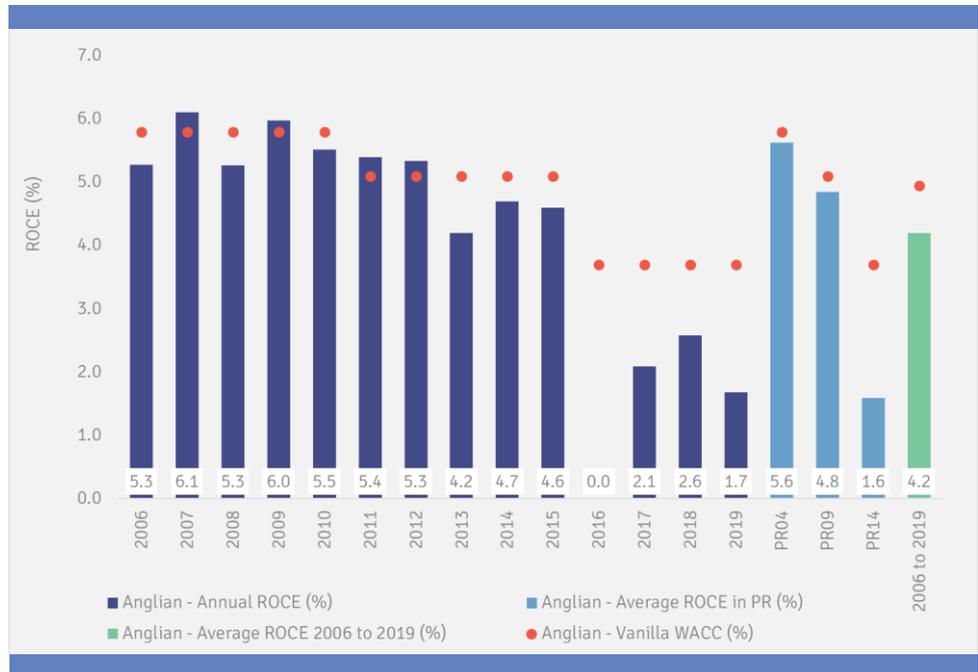


Notes: Please find the underlying methodology detailed in Annex 3.

Source: Economic Insight analysis of publicly available data.

7.1.2 Anglian Water

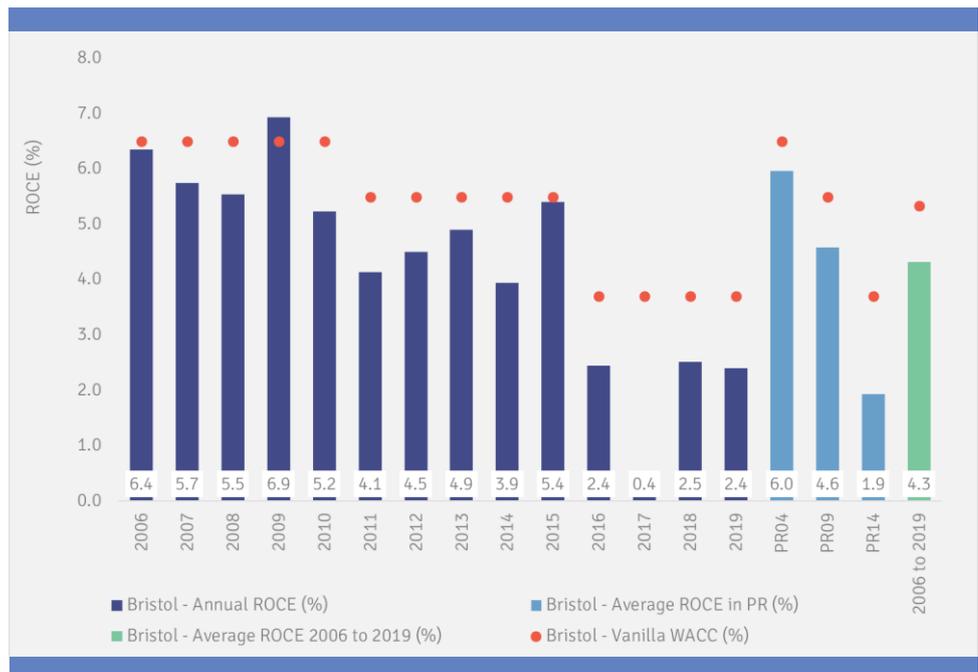
Figure 17: Anglian Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: (i) No publicly available data is available for the calculation of the ROCE in 2016. (ii) Please find the underlying methodology detailed in Annex 3. Source: Economic Insight analysis of publicly available data.

7.1.3 Bristol Water

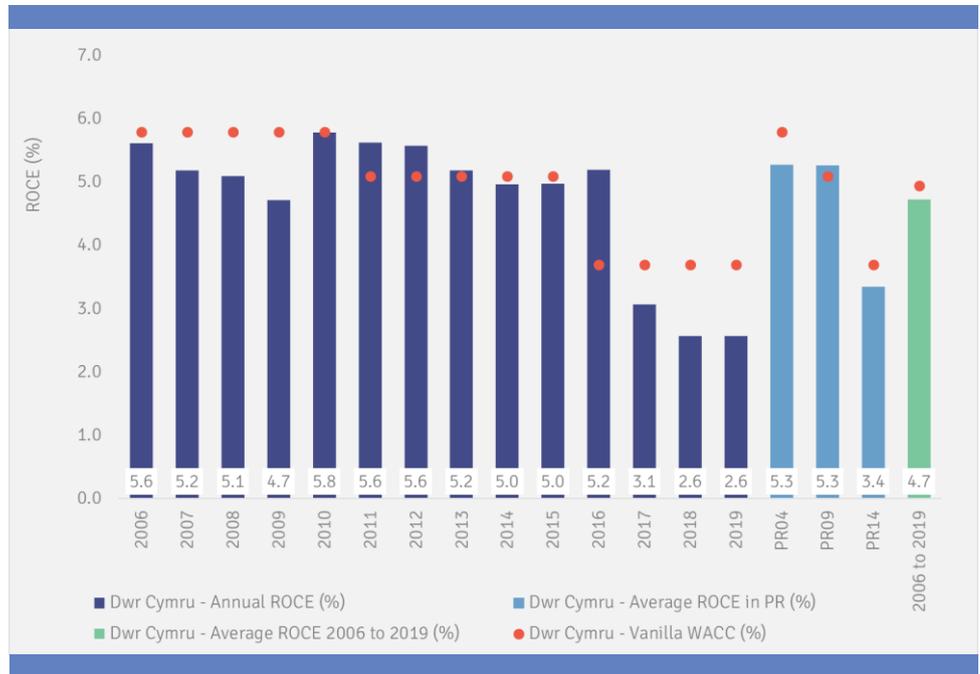
Figure 18: Bristol Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3. Source: Economic Insight analysis of publicly available data.

7.1.4 Dwr Cymru

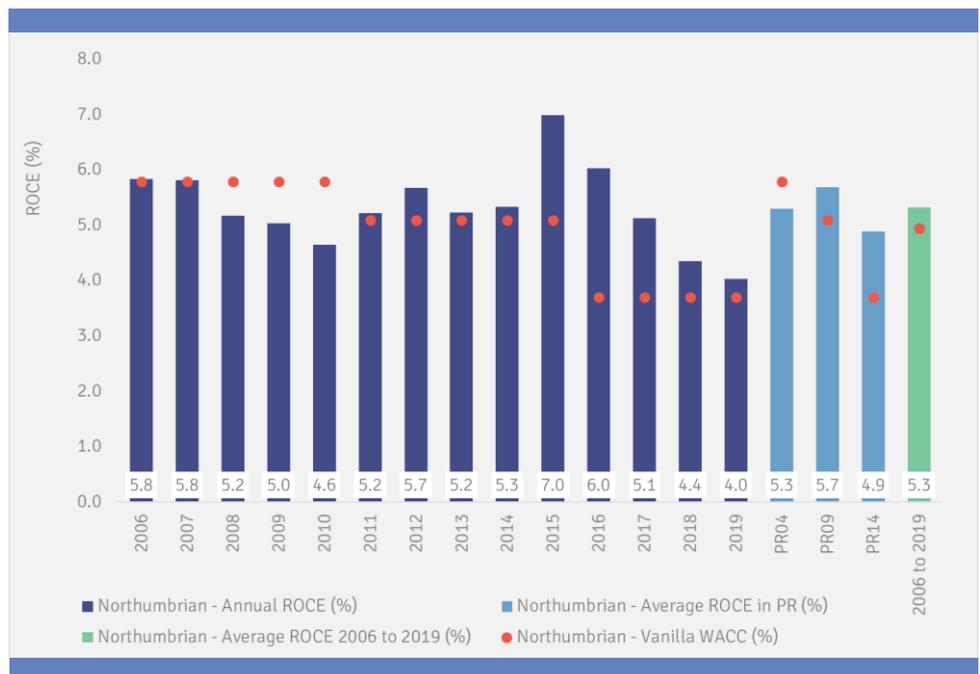
Figure 19: Dwr Cymru’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.5 Northumbrian Water

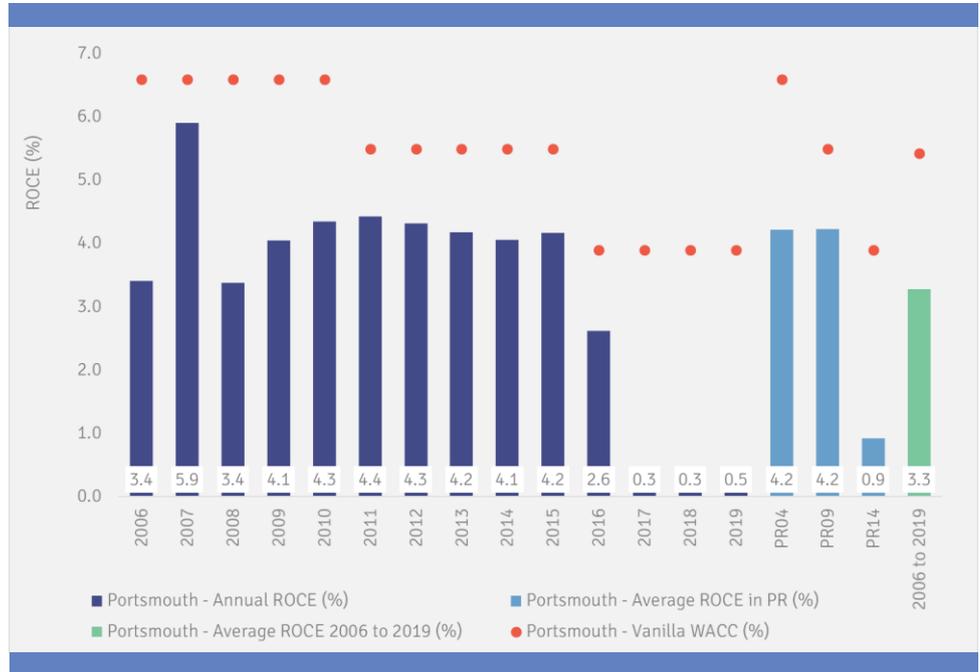
Figure 20: Northumbrian Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.6 Portsmouth Water

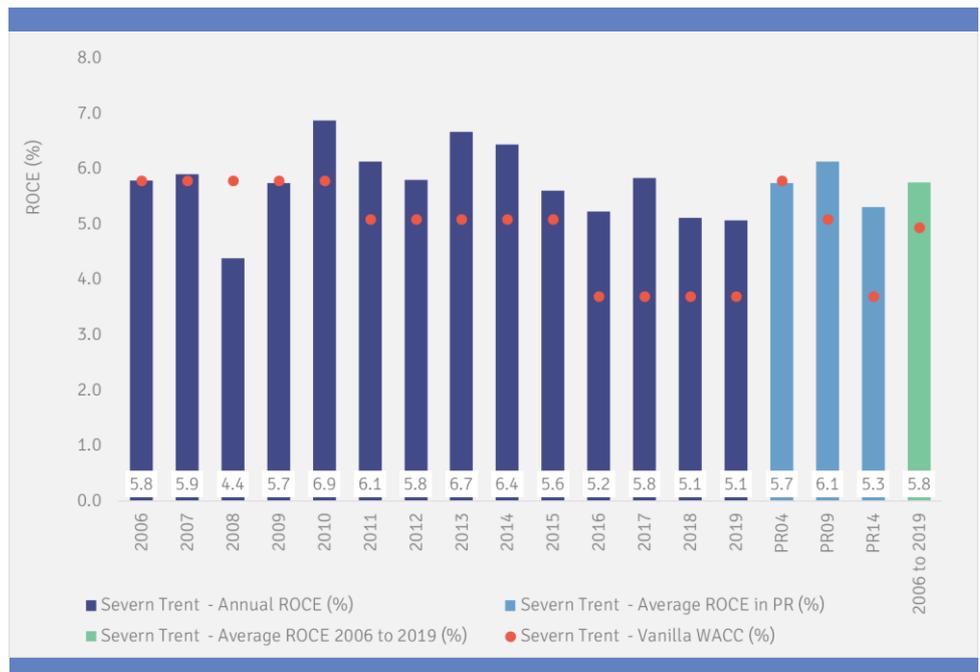
Figure 21: Portsmouth Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.7 Severn Trent (including Hafren Dyfrdwy)

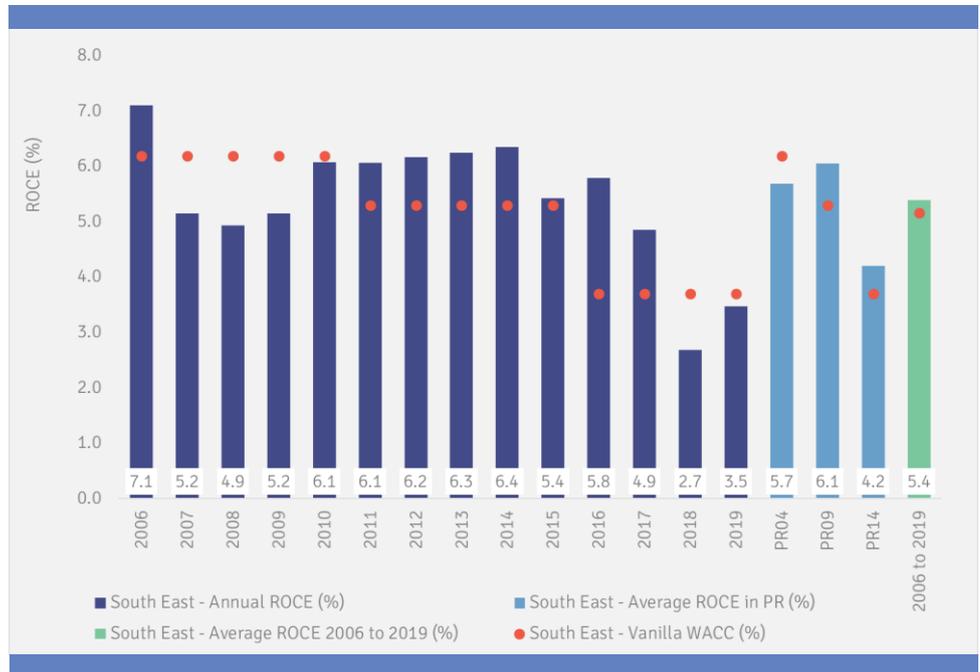
Figure 22: Severn Trent’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.8 South East Water

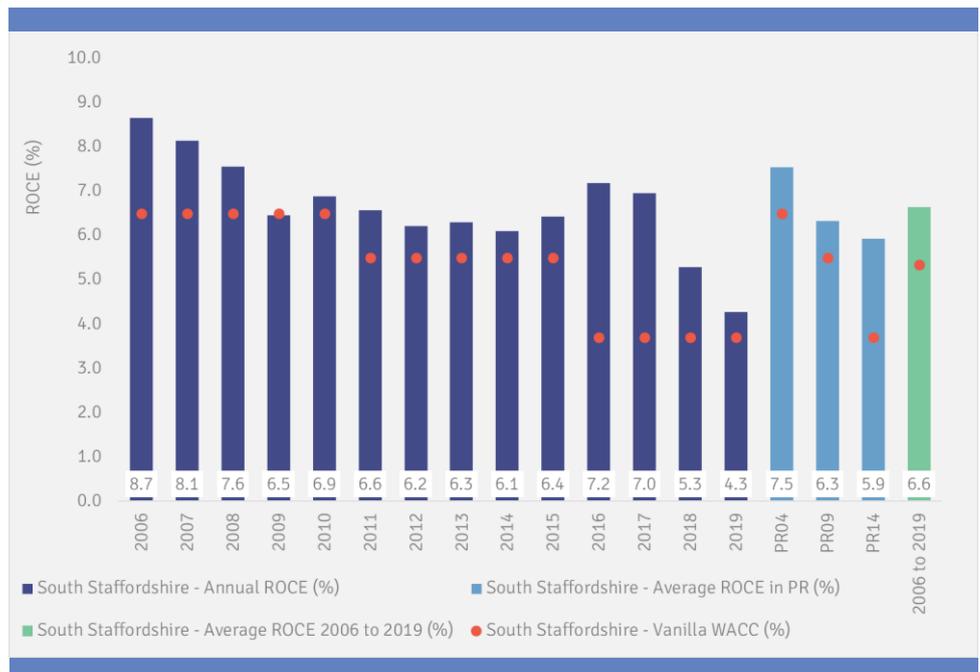
Figure 23: South East Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.9 South Staffordshire Water

Figure 24: South Staffordshire Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.10 South West Water

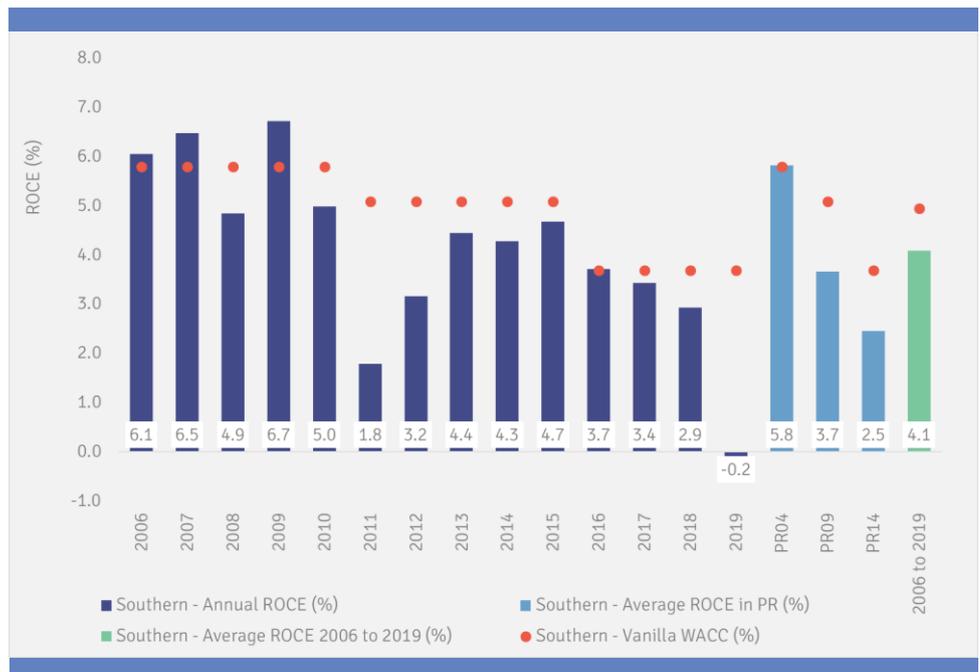
Figure 25: South West Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.11 Southern Water

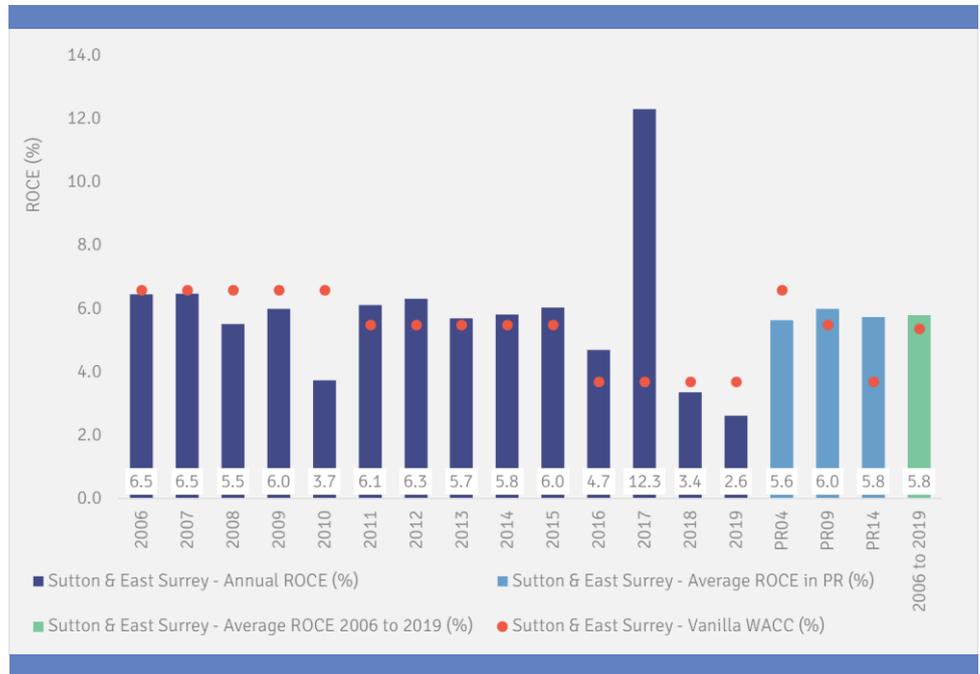
Figure 26: Southern Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.12 SES Water

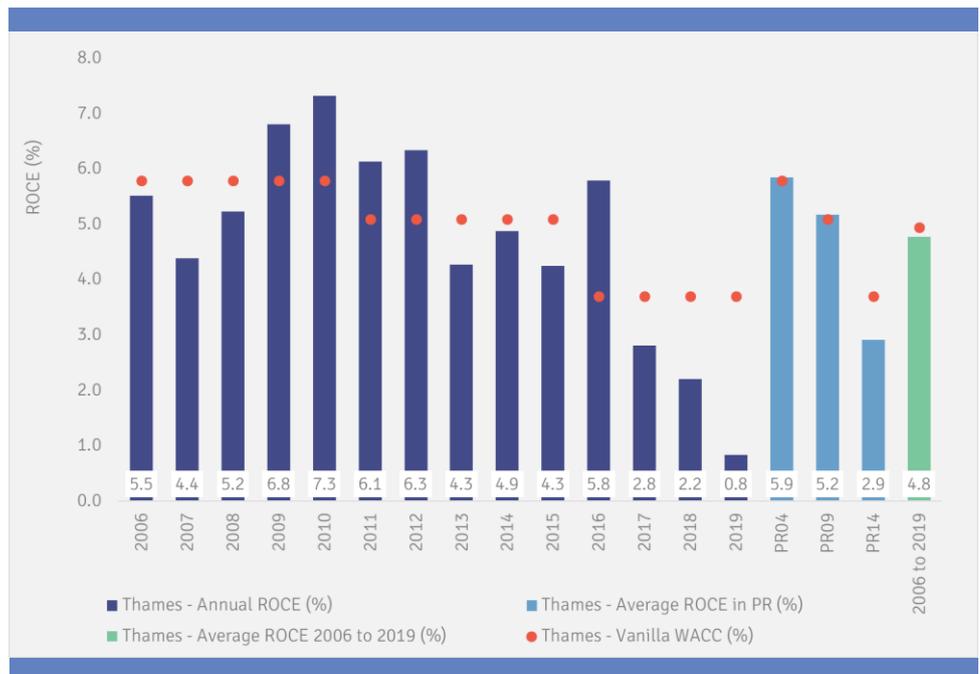
Figure 27: SES Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.13 Thames Water

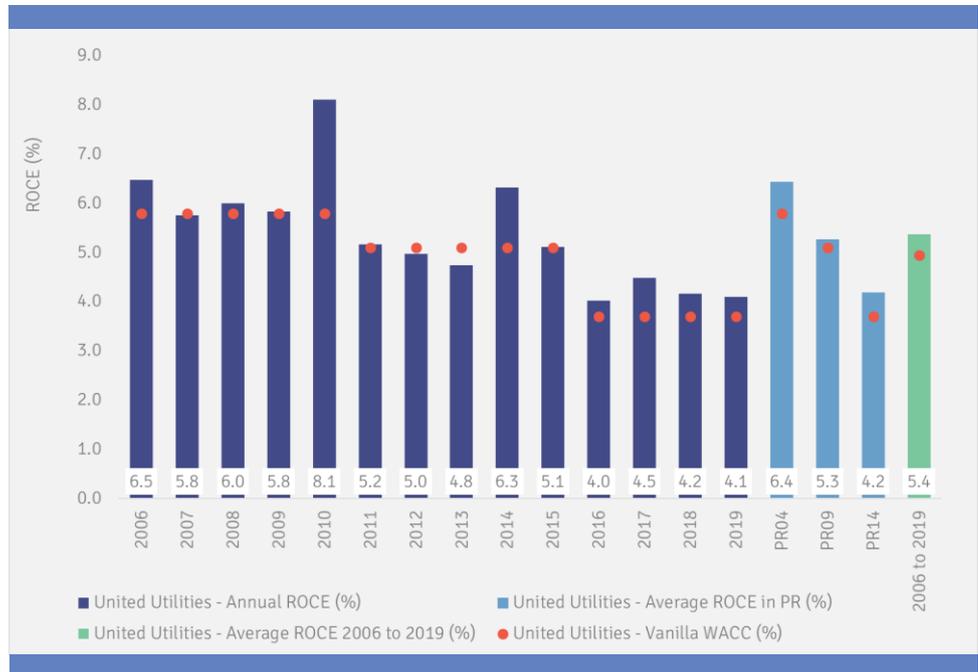
Figure 28: Thames Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.14 United Utilities

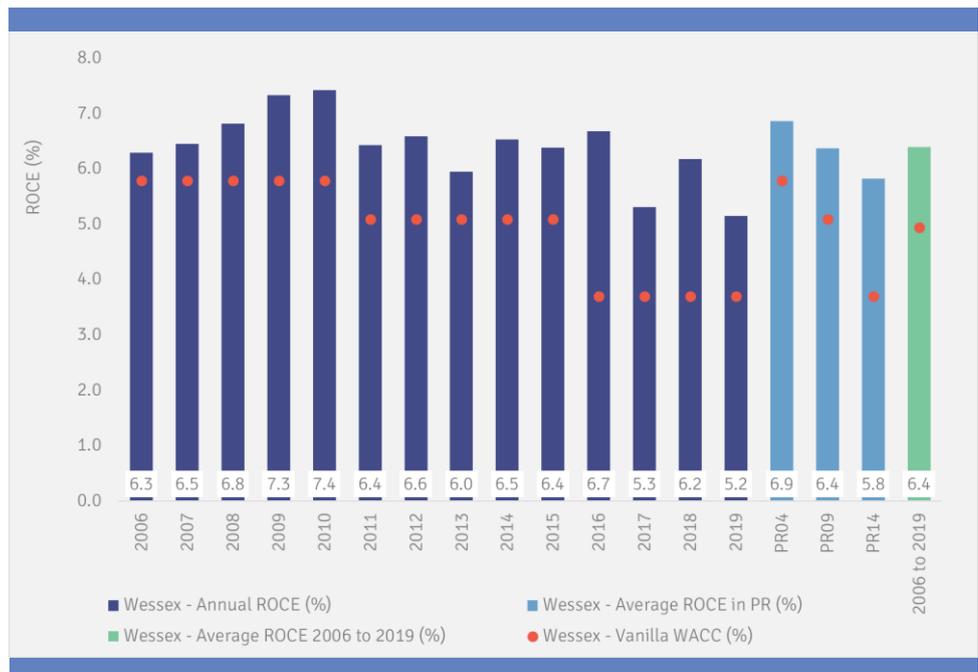
Figure 29: United Utilities’ ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.15 Wessex Water

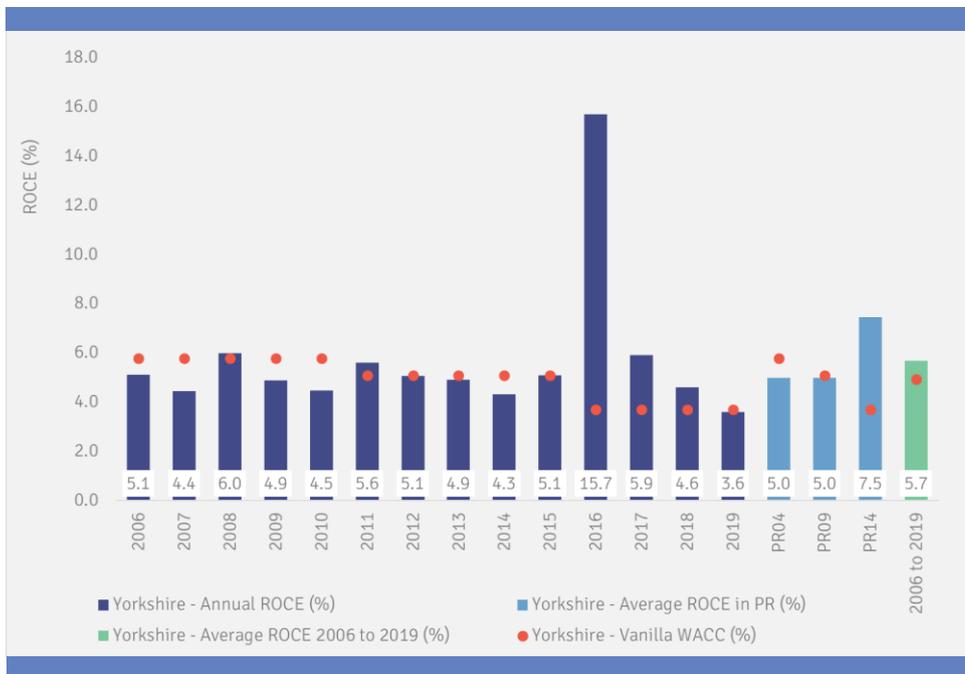
Figure 30: Wessex Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

7.1.16 Yorkshire Water

Figure 31: Yorkshire Water’s ROCE performance against the vanilla WACC (year ending March 2006 to 2019)



Notes: Please find the underlying methodology detailed in Annex 3.
 Source: Economic Insight analysis of publicly available data.

8. Annex 2: Ofwat's evidence on historic ROCE performance against expectations

In Chapter 3, we presented Ofwat's evidence on historical ROCE performance versus its expectations (on a pre-tax basis). In this annex, we highlight Ofwat's evidence on this in each year, going back to year ending 2000.

Ofwat reported that:

- In 2008-09, "The companies' overall return on capital for 2008-09 was slightly higher (6.8%) than in 2007-08 (6.5%) and also lower than our expectation of 7.3% assumed in price limits. [emphasis added]" It further reported that "The infrastructure renewals charges are the single biggest cost variance compared with our expectation."⁵³
- In 2007-08, "The companies' overall return on capital for 2007-08 was slightly higher (6.5%) than in 2006-07 (6.4%) and also lower than our expectation of 7.1% assumed in price limits. [emphasis added]" It further reported that "The infrastructure renewals charges are the single biggest cost variance compared with our expectation."⁵⁴
- In 2006-07, "The companies' overall return on capital for 2006-07 was lower (6.4%) than 2005-06 (6.6%) and also lower than our expectations for the return assumed in price limits (6.8%). [emphasis added]"⁵⁵
- In 2005-06, "The pre-tax return on capital in 2005-06 for the industry, based on the current cost operating profit and regulatory capital value (RCV), is 6.6%, compared with the 5.9% achieved in 2004-05. The return assumed in price limits for 2005-06 was 6.4%. For 2004-05 the allowed return on the RCV was similar (6.5%) but the actual return was lower. This highlights the increased costs borne by companies prior to the last price review, which were addressed by the increases allowed in price limits. [emphasis added]" It further reported that "The returns achieved by individual companies in 2005-06 ranged from 4.8% for South West Water to 11.2% for Tendring Hundred Water. The average return for water and sewerage companies was 6.5% (5.8% in 2004-05) and 8.4% (6.5% in 2004-05) for water only

⁵³ Please see: https://webarchive.nationalarchives.gov.uk/20110110110720/http://www.ofwat.gov.uk/regulating/reporting/rpt_fpr_2008-09.

⁵⁴ Please see: https://webarchive.nationalarchives.gov.uk/20090130011110/http://www.ofwat.gov.uk/regulating/reporting/rpt_fpr_2007-08.pdf.

⁵⁵ Please see: https://webarchive.nationalarchives.gov.uk/20100909070349/http://www.ofwat.gov.uk/regulating/reporting/rpt_fpr2006-07_fpe.pdf.

companies. The return allowed for the water only companies in 2005-06 was 7.2%.”⁵⁶

- In 2004-05, “We note that the return for 2004-05 remains below the level we assumed in price limits for the year (6.5%). This is a continuing trend over the whole of the five-year period. [emphasis added]” It further reported that “The returns achieved by individual companies in 2004-05 ranged from 3.6% for South East Water to 10.1% for Tendring Hundred Water. The average return for water and sewerage companies was 5.9% (5.8% in 2003-04) and 6.3% (6.8% in 2003-04) for water only companies.”⁵⁷
- In 2003-04, “The combined effects of operating cost pressures and continued high depreciation charges have resulted in a lower return on capital for the industry in 2003-04 (5.8%) than in the previous year and compared with our assumptions in 1999. [emphasis added]” It further reported that “The returns achieved by individual companies in 2003-04 ranged from 4.1% for Dwr Cymru to 24.2% for Cambridge Water. Cambridge’s high return this year is due to a one-off property transaction during the year. The next highest return is Tendring Hundred at 9.2%. The average return for water and sewerage companies is 5.8% (2002-03: 5.8%) and 6.8% (2002-03: 7.2%) for water only companies.”⁵⁸
- In 2002-03, “Returns calculated on this basis fell sharply in 2000-01 following the 1999 price review. For 2002-03, the projected return was 6.5%, compared with the actual return of 5.9%. [emphasis added]” It further reported that “The returns achieved by individual companies in 2002-03 ranged from 4.6% for Dwr Cymru to 10.1% for Sutton and East Surrey Water. The average return for water and sewerage companies is 5.8% (2001-02: 6.4%) and 7.2% (2001-02: 8.2%) for water only companies.”⁵⁹
- In 2000-01, “Returns calculated on this basis have been slowly declining over the previous four years, from 10.8% in 1996–97 before falling sharply in 2000-01 following the price review. For 2000-01, the projected return was 7.2%, compared with the actual return of 6.6%. [emphasis added]” It further reported that “The returns achieved by individual companies in 2000–01 ranged from 5.1% for Dwr Cymru to 11.4% for Folkestone & Dover Water Services Ltd. The average return for water and sewerage companies was 6.6% (1999–2000: 9.1%) and averaged 8.1% (1999–2000: 12.1%) for water only companies.”⁶⁰

⁵⁶ Please see: https://webarchive.nationalarchives.gov.uk/20110110123449/http://www.ofwat.gov.uk/regulating/reporting/rpt_fpr2005-06_fpe.pdf.

⁵⁷ Please see: https://webarchive.nationalarchives.gov.uk/20110110123525/http://www.ofwat.gov.uk/regulating/reporting/rpt_fpr2004-05_fpe.pdf.

⁵⁸ Please see: https://webarchive.nationalarchives.gov.uk/20110110123556/http://www.ofwat.gov.uk/regulating/reporting/rpt_fpr2003-04_fpe.pdf.

⁵⁹ Please see: https://webarchive.nationalarchives.gov.uk/20110110123610/http://www.ofwat.gov.uk/regulating/reporting/rpt_fpr2002-03_fpe.pdf.

⁶⁰ Please see: https://webarchive.nationalarchives.gov.uk/20110110123619/http://www.ofwat.gov.uk/regulating/reporting/rpt_fpr_2000-2001.pdf.

9. Annex 3: Sources and method for ROCE calculations

This annex sets out the data sources and methodology used to calculate our measure of the ROCE (on a post-tax basis).

9.1.1 Methodology

Our analysis compares the ROCE against the real vanilla WACC set by Ofwat for each period. The ROCE is calculated as the 'current cost operating profit' net of the 'current tax' (which we refer to as the numerator) over the 'average RCV' (which we refer to as the denominator). This is consistent with Ofwat's own definition of the post-tax return on capital compared against the vanilla WACC in the PR09 period.

9.1.2 Data sources

The table below lists the sources used for calculating ROCE for each time period.

Table 4: Data sources for ROCE calculations

	PR04	PR09	PR14
Current costs Operating profit	Company June returns (table C). ⁶¹	Company regulatory accounts. ⁶²	Company performance reports. ^{63,64}
Current tax	Company June returns.	Company regulatory accounts.	Company performance reports.
Average RCV	Company June returns. (calculated as follows, Average RCV = ["Current cost operating profit" + "current tax"] / "Post tax return on capital")	Ofwat Website. ⁶⁵	Ofwat Website. ⁶⁶
Real vanilla WACC	Ofwat's Final Determination. ⁶⁷	Ofwat's Final Determination. ⁶⁸	Ofwat's Final Determination. ⁶⁹

⁶¹ Available here for 2006 to 2010: <https://www.ofwat.gov.uk/regulated-companies/company-obligations/performance/>

⁶² Available on each company's website, or on the Companies House website.

⁶³ Available on each company's website.

⁶⁴ Note: For the PR14 period current cost operating profit is reported only for the wholesale segment of the company (in Table 4G), therefore for these years the retail portion has been added using the relevant figures in Table 2A.

⁶⁵ Available here: <https://www.ofwat.gov.uk/publications/regulatory-capital-value-updates/>

⁶⁶ Available here: <https://www.ofwat.gov.uk/publications/regulatory-capital-value-updates/>

⁶⁷ Available here:

https://webarchive.nationalarchives.gov.uk/20150603192547/http://www.ofwat.gov.uk/pricereview/pr04/det_pr_fd04.pdf

⁶⁸ Available here:

https://webarchive.nationalarchives.gov.uk/20150603201359/https://www.ofwat.gov.uk/pricereview/pr09phase3/det_pr09_finalfull.pdf

⁶⁹ Available here: https://www.ofwat.gov.uk/wp-content/uploads/2015/11/prs_pre201412pr14investor.pdf

Where data was not available from these sources, we have used Ofwat's own ROCE figures. In particular, we have used Ofwat's ROCE figures in the following instances:

- for Anglian between 2011 to 2015 (year-end);
- for Southern in 2011 (year-end);
- for Thames in 2012 (year-end);
- for Cambridge between 2011 to 2013 (year-end);
- for South East Water between 2011 and 2015 (year-end);
- for Dee Valley Water between 2013 and 2015 (year-end);
- for Severn Trent Water in 2011 (year-end); and
- for South West Water between 2014 and 2015 (year-end).⁷⁰

However, Anglian Water has been excluded from the analysis in 2016 since: (i) its regulatory accounts / performance report were not available for the financial year ending 2016; and (ii) there is no Ofwat figure for comparison.

9.1.3 Mergers and changes in company structures

In order to account for mergers, we present our analysis at the level of the companies of relevance for PR19. Specifically, we have combined the relevant companies across all three of the price controls by summing the numerator and denominator before calculating the ROCE. Where combinations have been made, the allowed vanilla WACC comparator is then calculated as an RCV-weighted average of the individual firms' vanilla WACC.

It has not been possible to disaggregate the relevant publicly available data to reflect the structural changes which occurred between Hafren Dyfrdwy and Severn Trent, as such Hafren Dyfrdwy and Severn Trent have also been combined and are presented together throughout.⁷¹

9.1.4 Checks against Ofwat's own figures

We have also undertaken checks against Ofwat's reported figures to ensure these figures are consistent with our calculations of ROCE for the other time periods. The following cross checks have been used.⁷²

- PR04: The RCV (which was calculated using the ROCE) has been cross checked against the average RCVs presented on Ofwat's website.⁷³ Furthermore, using the current cost profit and calculated RCV we were able to cross check our values against Ofwat's own calculation of pre-tax ROCE.⁷⁴

⁷⁰ *Anglian Water's regulatory accounts/performance report is not available for the financial year ending 2016, and there is no Ofwat figure for comparison, thus Anglian has been excluded from the analysis in this year.*

⁷¹ *This also includes the relevant data for Dee Valley.*

⁷² *In some cases, Ofwat appears to have made inconsistent assumptions about the calculation of post-tax returns on capital (for instance, excluding current tax or including deferred tax). In these cases, we have relied on our own calculations of returns.*

⁷³ *Available here:*
https://webarchive.nationalarchives.gov.uk/20110110110720/http://www.ofwat.gov.uk/regulating/reporting/rpt_fpr_2008-09

⁷⁴ *See table 9, available here:*
https://webarchive.nationalarchives.gov.uk/20110110120141/http://www.ofwat.gov.uk/regulating/rpt_fpr_2008-09.pdf

- PR09: the ROCE figures have been compared directly to those published on Ofwat's website⁷⁵.
- PR14: There are no available relevant comparisons against Ofwat's figures in this period.

9.1.5 Aggregation

In order to calculate the industry-level ROCE and allowed WACC comparator in each year, we take an RCV-weighted average across all companies.

Finally, in order to calculate the average ROCE and WACC across each price review, we take a simple average across each year of the price review. The same methodology has been used for the calculation of the average ROCE and WACC for the full period.

⁷⁵ Available here: <https://www.ofwat.gov.uk/regulated-companies/company-obligations/performance/>

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