

December 2019

# PR19 final determinations

**Allowed return on capital technical appendix**

## **PR19 final determinations: Allowed return on capital technical appendix**

## Contents

1	Executive Summary.....	3
2	Inflation assumptions.....	8
3	Notional gearing.....	11
4	Retail margins.....	12
5	Allowed return on equity.....	17
6	Allowed return on debt.....	71
	Annex 1: Company-specific adjustments to the allowed return on capital.....	94
	Annex 2: Company representations and our response.....	114

## 1 Executive Summary

This appendix contains our final decision on the allowed return on capital for 2020-25 that we have used in our final determinations. Our objective in setting this allowed return is to provide a reasonable base level of return reflective of the sector's risks, and which is sufficient to cover efficient debt and equity financing costs for a company adopting our notional financial structure.

We have consulted a wide range of market, regulatory and academic sources to inform our decision, including the following:

- Europe Economics, who have provided analytical input and advice to inform our decisions – their accompanying report, “The Allowed Return on Capital for the Water Sector at PR19” is published alongside this decision document.
- Thematic cost of capital reports, particularly the March 2018 UK Regulators Network-sponsored cost of capital study (henceforth “The UKRN Study”),<sup>1</sup> which made various recommendations to UK economic regulators. The UKRN also in December 2019 published a report from CEPA which contained recommendations on debt beta estimation.<sup>2</sup>
- PwC, who have provided updated evidence from their dividend discount model.<sup>3</sup>
- Other economic regulators’ recent publications regarding the cost of capital.

The analysis we have carried out to inform our proposals has drawn on market data up to our cut off point of 30 September 2019.<sup>4</sup>

Our decisions take into account the representations made on all our draft determinations, responses from companies to our queries and additional information provided following further engagement with companies and other stakeholders as part of the final determination process. We have addressed points raised by respondents in the relevant sections of this appendix; we also tabulate representations and our responses in Annex A2. In the interest of brevity, where no representations have been made on our draft determination proposals, we do not repeat our reasoning in all cases. Please see the [PR19 draft determinations](#) for further details.

---

<sup>1</sup> P. Burns et al., ‘*Estimating The Cost of Capital For Implementation of Price Controls by UK Regulators*’, March 2018

<sup>2</sup> CEPA, ‘*Considerations for UK regulators setting the value of debt beta*’, December 2019

<sup>3</sup> PwC, ‘Updated DDM analysis for PR19’, October 2019

<sup>4</sup> We have considered market data since this cut off point, including very recent data at the time of publication of the final determinations in response to recent events. Our view remains that the allowed return is consistent with a reasonable allowed return on capital that, in the round, is consistent with market expectations for the period 2020-25.

## 1.1 Our decision on the allowed return on capital

For our PR19 methodology in December 2017, we made a preliminary assessment of the appropriate allowed return on capital for 2020-25. This 'early view' was intended to facilitate the production of business plans. We updated this initial view for our draft determinations in July 2019, using market data up to the end of February 2019, and also to reflect various methodological developments in cost of capital estimation which had occurred since then.

In our draft determinations, we noted that observable market data up to the end of June 2019 indicated an allowed return on capital which could be as much as 37 basis points lower for final determinations, due to our assessment that the risk-free rate, equity beta and the cost of new debt had all fallen since February.

Our allowed return on capital for final determinations is set out in Table 1.1 below. We discuss the reasoning behind our assessment of each component in sections 2 to 6.

**Table 1.1: Our decision on the allowed return on capital for 2020-25**

Component	Draft View (nominal)	Final determination			Notes
		Nominal	CPIH	RPI	
Gearing	60%	60%			The percentage share of debt in the capital structure of the notional company. We discuss gearing in section 3.
Risk-free rate (RFR)	1.54%	0.58%	-1.39%	-2.35%	The estimated return for investment in an asset with zero risk. We discuss the risk-free rate in section 5.2.
Total Market Return (TMR)	8.63%	8.63%	6.50%	5.47%	The total yield required by investors to invest in a well-diversified benchmark index (e.g. the FTSE All-Share). We discuss TMR in section 5.3.
Equity risk premium (ERP)	7.09%	8.05%	7.89%	7.81%	Calculated as the difference between the total market return and the risk-free rate.
Unlevered beta	0.29	0.29			A measure of undiversifiable risk faced by equity investors in water assuming zero debt. We discuss betas in section 5.4.
Debt beta	0.125	0.125			A measure of undiversifiable risk faced by debt investors in water. We discuss debt betas in section 5.4.

Component	Draft View (nominal)	Final determination			Notes
		Nominal	CPIH	RPI	
Asset beta	0.36	0.36			A measure of undiversifiable risk faced by equity investors in water assuming zero debt, but adjusted for the debt beta. We discuss betas in section 5.4.
Notional equity beta	0.71	0.71			A measure of undiversifiable risk faced by investors in water, assuming gearing at the notional level of 60%. We discuss betas in section 5.4.
Allowed return on equity (including a debt beta)	6.56%	6.27%	4.19%	3.18%	An estimate of the return required by equity investors assuming our notional capital structure.
Ratio of new to embedded debt	20:80	20:80			Assumed average ratio of new to embedded debt for the notional company. We discuss this in section 6.1.
Cost of new debt	3.36%	2.54%	0.53%	-0.45%	An estimate of the cost of for debt raised in 2020-25. We discuss the cost of new debt in section 6.2.
Cost of embedded debt	4.50%	4.47%	2.42%	1.43%	Our assessment of cost of debt for the notional company as at 31 March 2020. We discuss embedded debt in section 6.3.
Issuance and liquidity costs	0.10%	0.10%			An allowance for debt issuance fees and liquidity facilities. We discuss issuance and liquidity fees in section 6.4)
Allowed return on debt	4.38%	4.18%	2.14%	1.15%	Weighted average using the ratio of new to embedded debt.
Appointee allowed return on capital (vanilla)	5.25%	5.02%	2.96%	1.96%	Weighted average using the 60% notional gearing assumption.
Retail net margin deduction	0.11%	0.04%			Deduction to derive the allowed return on capital for wholesale operations. We discuss this deduction in section 4.3.
Wholesale allowed return on capital (vanilla)	5.14%	4.98%	2.92%	1.92%	Allowed return on capital which will apply to the wholesale controls.

Our overall appointee allowed return on capital is 5.02% in nominal terms, equivalent to 2.96% and 1.96% in CPIH and RPI terms. It is 23 basis points lower than our point estimate from draft determinations. Our wholesale allowed return is 4.98% in nominal terms, equivalent to 2.92% and 1.92% in CPIH and RPI terms. Compared to our point estimate from draft determinations, this is a lower fall of 16 basis points. This is due to the gap between appointee and wholesale allowed return reducing between our draft and final determinations, due to the lower retail margin adjustment which results from our updated approach (see section 4.3).

Our point estimate of 5.02% for the appointee in nominal terms is within the 4.49% – 5.48% range calculated for us by our consultants, Europe Economics. It is slightly above the consultancy's proposed point estimate of 4.83%, mainly due to our decision to adopt a higher point estimate for unlevered beta (made as part of our in-the-round assessment for final determinations). Our overall allowed return is considerably lower than the ranges proposed by Economic Insight and Frontier Economics on behalf of water companies of 5.6% to 6.6%<sup>5</sup> and 5.4% to 6.1%<sup>6</sup> respectively. Both consultancies take a different view to us of the appropriate inputs to our allowed return calculation for 2020-25, and have given their views on our estimation approach. We discuss our response to issues raised in these reports in sections 5 and 6 of this document.

In CPIH-deflated terms, our appointee return of 2.96% is broadly at the middle of the range of 2.73% to 3.38% proposed by ECA in its 2019 report for CCWater.<sup>7</sup> Our point estimate also lies roughly in the middle of financial analyst expectations published between August and November 2019, which ranged from 2.9%<sup>8</sup> to 3.3%,<sup>9</sup> and averaged 3.0%.

Our lower allowed return on capital reflects our assessment that the efficient return on both equity and debt have reduced relative to the point estimates we published as part of our July draft determinations:

- Our allowed return on equity for final determinations is 6.27% in nominal terms, equivalent to 4.19% and 3.18% in CPIH and RPI terms, deflated using our long-term inflation assumptions. This represents a decrease of 29 basis points relative to our point estimate from draft determinations and is almost wholly due to falls in yields on UK gilts, which indicate a lower risk-free rate. Our point

---

<sup>5</sup> Economic Insight's figure reflects our draft determinations data cut-off of 28 February 2019

<sup>6</sup> Frontier's figure reflects a data cut-off of 31 July 2019.

<sup>7</sup> ECA, Update to our recommendations for the Cost of Capital for 2020-w25, 29 January 2019.

<sup>8</sup> Barclays, 'UK Utilities: Never a dull moment in utilities: model updates, H1 result estimates', 11 November 2019, p11

<sup>9</sup> Credit Suisse, 'United Utilities Remain Outperform on fundamentals', 11 October, p11

estimates for Total Market Return and unlevered beta are unchanged from draft determinations.

- Our allowed cost of debt for final determinations is 4.18% in nominal terms, equivalent to 2.14% and 1.15% in CPIH and RPI terms – this represents a 20 basis point fall relative to our point estimate from draft determinations. This is almost entirely due to falls in our benchmark index, which indicate a lower cost of new and embedded debt.

## 1.2 Structure of this appendix

The analysis in the rest of this appendix is set out as follows:

- **Section 2** covers our assumptions for inflation and the wedge between RPI and CPI.
- **Section 3** covers our assumption for notional gearing.
- **Section 4** covers our assessment of allowed residential and business retail margins and the adjustment from the appointee allowed return on capital to the wholesale allowed return on of capital.
- **Section 5** covers our approach to setting the allowed return on equity, and how we have estimated the components used to derive it.
- **Section 6** covers our approach to setting the allowed return on debt, and how we have estimated the components used to derive it.
- **Appendix A1** sets out our decision on company-specific adjustments for Bristol Water, Portsmouth Water, SES Water and South Staffs Water.
- **Appendix A2** contains stakeholder representations on our draft determinations allowed return on capital and an account of how we have responded.

## 2 Inflation assumptions

Our PR19 methodology confirmed that we will transition away from indexation using the Retail Prices Index (RPI). This series is discredited as a robust measure of inflation, and since 2013 is no longer an official statistic.<sup>10</sup> We set out that from 1 April 2020, 50% of each company's RCV would be indexed to RPI; the rest, including RCV additions will be indexed to CPIH. Our decision means that we apply the allowed return separately for RPI and CPIH tranches of RCV.

As part of this decision, we set out that the allowed return that applies to the RPI indexed tranche of the RCV would be calculated using CPIH, adjusted for the RPI-CPIH 'wedge'. As part of our commitment to a transition which is NPV-neutral for investors, we will carry out a reconciliation as part of PR24 to correct for any variances in revenue and/or RCV growth which arise from an RPI-CPIH 'wedge' whose outturn value is different to our assumptions at PR19. Our [RPI-CPIH wedge reconciliation model](#) is published on our website.

### 2.1 Inflation assumptions: what we said in our draft determinations

We used long-term inflation assumptions to deflate our nominal allowed return on capital components to CPIH-deflated and RPI-deflated equivalents. For draft determinations, we used the following assumptions:

- **CPIH** – 2.0%, based on the assumption that the Bank of England will over the long-term hit its 2.0% CPI inflation target, and that CPIH will not systematically be higher or lower than this.
- **RPI** – 3.0%, based on CPI of 2.0% and the Office for Budgetary Responsibility (OBR)'s estimate of the long-term RPI-CPI wedge of 1.0%.<sup>11</sup>

In addition, we also used short-term assumptions about CPIH and RPI inflation, produced by the Office for Budgetary Responsibility.<sup>12</sup>

---

<sup>10</sup> UK Statistics Authority, 'Assessment of compliance with the Code of Practice for Official Statistics: The Retail Prices Index', Assessment Report 246, March 2013

<sup>11</sup> Office for Budgetary Responsibility, 'Revised assumption for the long-run wedge between RPI and CPI', March 2015

<sup>12</sup> Office for Budgetary Responsibility, 'Economic and Fiscal Outlook', March 2019

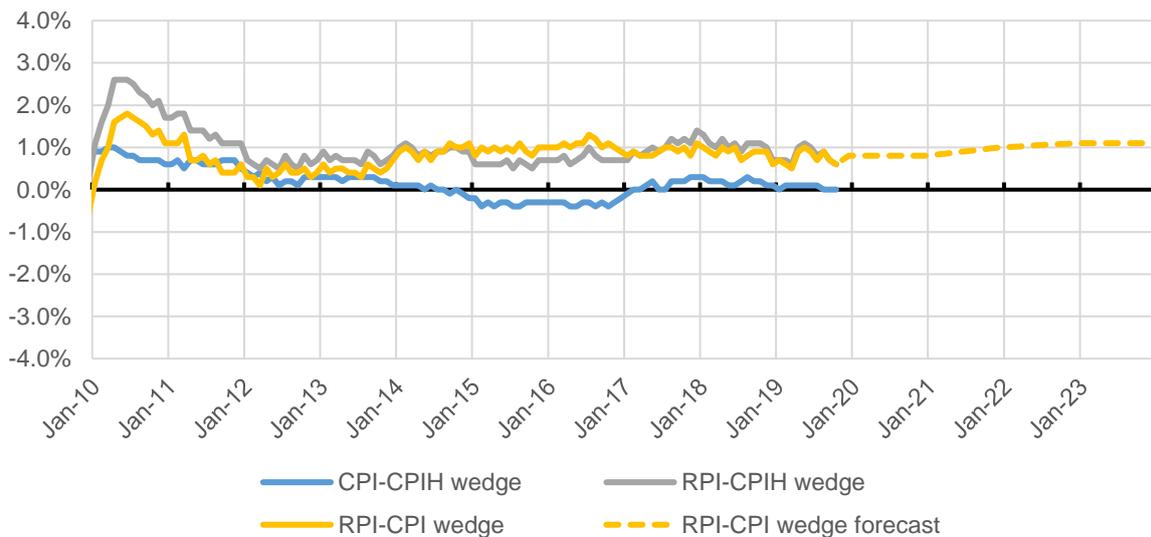
## 2.2 Inflation assumptions: stakeholder representations

Stakeholders did not raise our use of inflation assumptions as an issue in their representations.

## 2.3 Inflation assumptions: our final determination decision

Examination of recent inflation data (Figure 2.1) provides empirical support for the key assumptions supporting our long-term inflation assumptions. The post-2010 average level of CPIH inflation is 2.0%, and the RPI-CPIH wedge has averaged 0.8%, with HM Treasury's August 2019 consensus forecast suggesting the RPI-CPI 'wedge' will reach 1.1% by the end of 2023.<sup>13</sup> We consider that there is therefore no basis for changing our long-term inflation assumptions.

**Figure 2.1: Wedge between CPI, CPIH and RPI**



Source: Ofwat analysis of Office for National Statistics and HM Treasury data

For our July draft determinations we used March 2019 forecasts for RPI and CPI from the OBR to derive inflation inputs for our financial modelling. For final determinations, an updated OBR forecast was not available. We have instead used the most recent source of medium-term inflation data from the consensus of

<sup>13</sup> HM Treasury, 'Forecasts for the UK economy: a comparison of independent forecasts', August 2019

independent forecasters, compiled by HM Treasury in August 2019.<sup>14</sup> Table 2.1 sets out the short-term inflation assumptions used in our financial modelling.

**Table 2.1 - Short-term inflation assumptions used for PR19 draft determinations**

<b>Input</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>	<b>2024-25</b>
RPI, financial year average	2.87%	2.96%	3.15%	3.20%	3.20%
CPIH, financial year average	1.98%	2.00%	2.08%	2.10%	2.10%
RPI minus CPIH wedge	0.89%	0.95%	1.08%	1.10%	1.10%

Source: Ofwat analysis of HM Treasury data

<sup>14</sup> HM Treasury, 'Forecasts for the UK economy: a comparison of independent forecasts', August 2019

## **3 Notional gearing**

Our allowed return on capital is calculated with reference to a notional company with a pre-determined level of gearing (defined as net debt divided by the RCV). This is a continuation of our approach from previous price controls. A return on capital based upon a set notional gearing allows companies to make their own choice about their own financial structure while at the same time ensuring that customers fund no more than the efficient cost of capital for a notionally structured company.

### **3.1 Notional gearing: what we said in our draft determinations**

For draft determinations we retained the notional gearing assumption of 60% from our 'early view' of the allowed return on capital. We maintained our view that a lower notional gearing level compared to the PR14 level of 62.5% was appropriate, given the greater share of revenue at risk associated with service performance and our proposals to make greater use of markets on a forward-looking basis.

### **3.2 Notional gearing: stakeholder representations and our response**

We did not receive representations on our notional gearing assumption in response to our draft determinations.

### **3.3 Notional gearing: our final determination decision**

We consider that the rationale for a lower notional gearing remains the same as for our draft determinations. We therefore retain our assumption of **60%** for our final determination allowed return on capital.

## 4 Retail margins

As set out in the PR19 methodology, retail controls are set as average revenue controls, on the basis of retail costs plus a net margin that covers retail earnings before interest and tax.

### 4.1 Retail margins: what we said in our draft determinations

#### 4.1.1 Residential retail margin

For draft determinations we used a household retail net margin of 1.0%, based on analysis of comparator company accounts and previous regulatory decisions by Europe Economics. The consultancy concluded 1.0% was an appropriate retail margin for 2020-25.<sup>15</sup> This point estimate was also within the range of a study jointly commissioned by two water companies.

#### 4.1.2 Business retail margins

Consistent with the approach adopted at PR16, our revenue control for business retail took the form of default tariff caps based on allowed average cost per customer, and gross margins. The application of each approach depended on the contestability of market segment and customer type.

For our draft determinations, we proposed a continuation of the retail margin caps set as part of PR16. Given that PR16 was a relatively recent exercise, we considered that these retail margin caps remained appropriate.

#### 4.1.3 Retail margin adjustment

We calculate the allowed return for the appointee in the first instance as we estimate the parameters for debt and equity for a consolidated water and wastewater business. In order to determine allowed return for the wholesale controls, we must adjust the appointee allowed return to remove the impact of the allowed retail margin. If we did not make a retail margin adjustment, this would result in companies being compensated twice for bearing the same risks.

---

<sup>15</sup> Europe Economics, *PR19 – Initial Assessment of the Cost of Capital*, December 2017, pp86-89

For draft determinations we assumed that the entirety of the post-tax allowed revenue for the retail margin was double counted in the appointee allowed return. We used the populated Ofwat financial model from April resubmissions and fast-track draft determinations to calculate the revenue requirement for the retail margin. As a percentage of industry-average RCV this equated to 0.11%, which we deducted from the appointee allowed return to derive the wholesale allowed return.

## **4.2 Retail margins: stakeholder representations and our response**

We did not receive representations on our household or business retail margin assumptions or on our level of retail margin adjustment in response to our draft determinations.

## **4.3 Retail margins: our final determination decision**

### **4.3.1 Household retail margin**

We retain our draft determinations estimate of **1.0%** for final determinations on the basis that this level is well supported by analysis provided by Europe Economics and company submissions, and is not controversial with stakeholders.

### **4.3.2 Business retail margins**

Yorkshire Water exited the business retail market and transferred its non-household retail customers to Business Stream on 1 October 2019.

This exit leaves the Welsh companies (Hafren Dyfrdwy and Dŵr Cymru) as the only companies with business retail functions that are set price controls as part of PR19. These companies are subject to average revenue controls as part of their final determinations. Our approach is as follows:

- For these companies the market segment for sewerage customers and water users of less than 50Ml per year is not contestable – therefore we apply a retail net margin cap of 1.0% for business retail customers in this group, consistent with the net margin we apply for residential customers.
- For water users of at least 50Ml per year, we set a gross margin cap of 3.3%, as per our draft determinations. This is consistent with our simplified approach at

PR16, allowing companies to set several different tariffs for customers across different consumption bands while meeting the overall gross margin cap.

We confirm our draft determination decision for the Welsh companies that we are not retaining the 'supplementary cap'<sup>16</sup> for water users of at least 50Ml per year.

### 4.3.3 Retail margin adjustment

Though we did not receive representations on our approach for draft determinations, we have further considered and revise downwards our estimate of the retail margin adjustment.

The retail margin can be conceived of as covering three financing cost items:

1. **Required return on fixed assets:** A revenue requirement to cover the costs of financing fixed assets (e.g. IT equipment) which the retail business requires.
2. **Required return on working capital:** A revenue requirement to fund the financing costs of working capital used to bridge the period between wholesale costs being incurred and customer payments being received.
3. **Required return to compensate for additional systematic risk:** A revenue requirement to compensate investors for hard-to-diversify risks intrinsic to retail activities.

We consider that cost items 1 & 2 are not duplicated in the appointee-level allowed return on capital. The wholesale RCV can now be thought of as essentially free of retail fixed assets<sup>17</sup>, and working capital to cover late payment by customers is not an input to the appointee allowed return on capital. Retail assets and retail working capital are contained within the retail business.

In relation to item 3 above, the appointee allowed return on capital is intended to reflect the cost of capital raised at the overall company-level: it will reflect a blended average of systematic risks borne by the wholesale and retail business. As the retail margin is intended to cover these costs insofar as they relate to retail activities, this means that higher retail systematic risks are compensated within the retail margin. However, higher retail systematic risks (relative to the appointee) mean that the wholesale systematic risks are lower. This implies that cost item 3 will be double counted by allowing an appointee return on capital on the wholesale RCV and

---

<sup>16</sup> This rule capped annual price increases for business customers of Welsh companies above 50Ml/yr so that they would not result in more than 1% in the final bill for any customer type in any year.

<sup>17</sup> As part of PR14, retail fixed assets were transferred to the wholesale RCV, but the short asset lives of these investments (~ 9 years) and age on date of transfer meant that, at PR14, we assumed the assets transferred would be fully depreciated by 2020.

residential retail margin. For this reason, we reduce the appointee allowed return on capital to calculate a wholesale allowed return on capital which reflects the lower level of systematic risk in the wholesale business.

To remove this double-count, we infer the size of cost item 3 using business plan data and draft determinations financial models. Expressed as a percentage of RCV, this is our estimate of the retail margin adjustment which we use to derive the wholesale allowed return on capital from the appointee allowed return. Overall, this gives an updated figure of 0.04%, down from our estimate at draft determinations of 0.11%. This change is revenue-positive for the sector, as companies receive allowed revenues based on the wholesale return on capital (which is higher following our change) and the residential retail margin. The steps of our revised calculation are set out in table 4.1.

**Table 4.1: Revised retail margin adjustment calculation for 2020-25**

Component	Calculation	Point estimate (nominal)	Notes
Fixed asset balance for retail controls (2020-25 average)	A	£386m	From draft determination financial models
Cost of financing fixed assets	B	5.02%	Appointee allowed return on capital
<b>1) Required revenue for return on retail fixed assets</b>	<b>C = (A x B)</b>	<b>£19m</b>	
Average annual debtor days	D	40	From April revised business plans.
Average annual turnover	E	£11,989m	From draft determination financial models
Days in a year	F	365	
Average annual working capital requirement	$G = (D / F) \times E$	£1,309m	
Working capital financing rate	H	3.06%	From April revised business plans. <sup>18</sup>

<sup>18</sup> Estimate is the average for all companies, excluding the highest and lowest figures.

<b>Component</b>	<b>Calculation</b>	<b>Point estimate (nominal)</b>	<b>Notes</b>
<b>2) Required revenue for return on working capital</b>	<b><math>I = G \times H</math></b>	<b>£40m</b>	
Total retail-specific capital costs	$J = C + I$	£59m	
Retail margin allowed revenue apportioned to households	K	£93m	From draft determination financial models
<b>3) Required return for additional systematic risk</b>	<b><math>L = K - J</math></b>	<b>£34m</b>	
Average RCV	M	£84,125m	From draft determination financial models
<b>Retail margin adjustment</b>	<b><math>N = L / M</math></b>	<b>0.04%</b>	

Source: Ofwat analysis of populated PR19 financial models and business plan data

## 5 Allowed return on equity

This chapter sets out our point estimate for the allowed return on equity and its components, as well as how we have interpreted market data and stakeholder representations in producing our decision.

### Key points from our final determination decision:

- We have used market data up to the end of September 2019 to update our view of the risk-free rate, dividend discount model outputs, equity beta and debt beta.
- Our lower risk-free rate estimate reflects falls in RPI-linked gilt yields, which we retain as the basis of our estimate.
- We retain our draft determination estimate for Total Market Return – updated evidence from dividend discount models does not indicate a change is justified.
- We retain our draft determination estimate of unlevered beta, though this estimate now reflects more weight placed on 5 year data, and proportionally less weight on more recent 2 year daily data – which has fallen significantly since May 2019.
- We retain our draft determination estimate for debt beta. Updated market evidence does not strongly support a shift.

The components informing our final determination of the allowed return on equity are summarised in table 5.1.

**Table 5.1: Our final determination on the allowed return on equity for 2020-25**

Component	Draft Determination (CPIH)	Final Determination (CPIH)	Final Determination (RPI)	Commentary
Risk-free rate (RFR) (section 5.2)	-0.45%	-1.39%	-2.35%	Our updated estimate reflects falls in yields on RPI-linked gilts since February 2019.
Total market return (TMR) (section 5.3)	6.50%	6.50%	5.47%	We retain the point estimate from our draft determinations.
Equity risk premium	6.95%	7.89%	7.81%	Calculated as the difference between the TMR and RFR.
Unlevered beta (section 5.4)	0.29	0.29		Point estimate based on assessment of daily, weekly and monthly betas of duration 1-5 years, with

Component	Draft Determination (CPIH)	Final Determination (CPIH)	Final Determination (RPI)	Commentary
				most weight placed on 2 year daily data.
Debt beta (section 5.4)	0.125	0.125		We retain the point estimate from our draft determinations.
Asset beta (section 5.4)	0.36	0.36		Calculated as the unlevered beta adjusted for the debt beta.
Re-levered equity beta (section 5.4)	0.71	0.71		Calculated from the asset beta, debt beta and gearing.
Appointee cost of equity	4.47%	4.19%	3.18%	Calculated as RFR + Equity beta x Equity risk premium
Wholesale cost of equity	4.21%	4.09%	3.08%	The resultant cost of equity which, together with the appointee cost of debt estimate, produces the wholesale WACC.

Our allowed cost of equity for the appointee is, at 4.19% in CPIH terms, 28 basis points lower than our draft determination estimate of 4.47%. This fall is almost entirely due to our reduced estimate of the risk-free rate following falls in gilt yields since February 2019 – our point estimates for Total Market Return and unlevered beta are unchanged from our draft determinations.

Our decision to reduce the retail margin adjustment (see section 4.3.3) means that the reduction in the wholesale cost of equity since draft determinations (12 basis points) is less than the reduction at the appointee level.

Our point estimate for the Appointee of 4.19% is within the CPIH-based allowed cost of equity range of 3.16% to 5.11% recommended by our consultants, Europe Economics. It is, however, higher than its point estimate of 3.72%, largely owing to our decision to adopt a higher point estimate of unlevered beta (see Section 5.4). Our point estimate is lower than the cost of equity ranges proposed on behalf of companies by Economic Insight and Frontier Economics, of 5.7% to 7.3% and 4.7% to 6.4%, respectively – we discuss areas of disagreement with these consultancies in the following sections of this chapter.

The rest of this chapter is structured as:

- **Section 5.1:** Our allowed cost of equity in the round
- **Section 5.2:** Risk-free rate
- **Section 5.3:** Total Market Return

- **Section 5.4:** Equity beta

## 5.1 Our allowed cost of equity in the round

The Capital Asset Pricing Model (CAPM) is our primary approach to calculating the allowed cost of equity for the notional company. Use of the CAPM is a continuation of our approach from previous price controls, is widespread in UK economic regulation, and endorsed by the March 2018 UKRN-sponsored Cost of Capital Study (“The UKRN Study”). The cost of equity is calculated using the following equation:

$$K_e = R_f + (R_m - R_f) * \beta$$

Where:

$K_e$  is the cost of equity

$R_f$  is the risk-free rate

$R_m$  is the Total Market Return

$\beta$  is the equity beta of the notional company

$(R_m - R_f)$  is the Equity Risk Premium

The allowed cost of equity is a forecast of the required cost of equity faced by an efficient notional company in the forthcoming price control period. It is commonplace in economic regulation to consider other sources of evidence on the cost of equity to cross-check against the cost of equity range and point estimate generated by the CAPM.<sup>19</sup> This section discusses the evidence we have considered in forming our overall decision on the cost of equity.

### 5.1.1 Our allowed cost of equity in the round: what we said in our draft determinations

Our allowed cost of equity for our draft determinations was derived using the Capital Asset Pricing Model. We noted that our appointee cost of capital was aligned with contemporaneous financial analyst expectations. We also assessed that our draft determinations were financeable for each company under a notional company financing structure, in some cases following interventions which included dividend restrictions for companies with high RCV growth, or advancement of revenue from future customers with the use of pay as you go (PAYG) or RCV run-off adjustments.

---

<sup>19</sup> For instance, Ofgem’s May 2019 indicative cost of equity from its RIIO-2 framework decision document makes an explicit upwards adjustment to the CAPM-derived cost of equity to reflect the cost of equity range implied by its cross-checks.

## 5.1.2 Allowed cost of equity in the round: stakeholder representations and our response

While recognising that use of the Capital Asset Pricing Model (CAPM) is valid, stakeholders generally argue that our point estimate cost of equity should reflect the impact of factors not explicitly considered within the standard CAPM framework. It is argued that proper consideration of these factors indicates that a higher cost of equity than our draft determination point estimate is appropriate.

We address representations which raise the impact on financeability of our allowed return in our 'Aligning risk and return technical appendix'. With respect to our statutory duties, we consider that the appropriate approach is to set an allowed return on the basis of market data in the first instance. We subsequently consider how measures available to us to improve cashflow<sup>20</sup> can address financeability pressures under the notional financial structure.

Below we set out issues raised by stakeholders on the cost of equity in the round, and our response.

### **a) Our use of the CAPM is too mechanistic, not capturing macroeconomic and geopolitical risks.**

Anglian Water, Dŵr Cymru, Northumbrian Water, and Invesco suggest that our use of the Capital Asset Pricing Model for draft determinations was too mechanistic, and insufficiently reflective of recent developments. Responses argue variously:

- that the period of data used to inform our draft determination allowed return is characterised by significant market and geopolitical volatility (and hence unlikely to be representative of financing conditions in 2020-25).
- that future downside risks (e.g. a disorderly no-deal Brexit, or nationalisation) indicate a need for a larger 'equity buffer' provided for by a higher cost of equity allowance.

These representations tend to advocate for longer-term averages of CAPM parameters, or parameters picked from the upper end of the plausible range. This would have the effect of a higher allowed return overall.

We do not agree that our allowed return is underpinned exclusively by recent data and that this is unrepresentative. Examples of where we have drawn on longer periods include Total Market Return (118 years of equity returns and a 5 year trailing

---

<sup>20</sup> For instance changes in RCV run-off and Pay-As-You Go rates.

average of dividend discount model outputs), and beta (encompassing a 5 year span of historical data).

Moreover, we are not convinced of the need to explicitly adjust for company views of risks in 2020-25 in our allowed return point estimate. This is firstly as the market data informing our CAPM parameters already embeds forward-looking expectations,<sup>21</sup> and secondly as it is not clear in which direction an adjustment would be required. Finally, our regulatory framework contains some protections against forecast error in our allowed return on capital parameters.

If we were to impose our own assumption that financing conditions will be less benign in 2020-25 than indicated by market data, we would be adopting a position that the market is forecasting incorrectly or not incorporating some information. Company representations did not argue that this was the case, nor do we have cause to believe that this is so.

Even if we were to superimpose our own view of how risks may crystallize over 2020-25, quantifying the appropriate adjustments to market data would be beset with complexity and potential for miscalculation. For example, for one commonly-cited category of risks (Brexit risks), we assess that there are upside as well as downside risks, notably around how monetary policy stimulus could result in more benign financing conditions for water companies. Correctly estimating and netting off the financial impact of risks would thus be difficult to achieve with a high degree of confidence in the resulting estimate.

Finally, we point to the existence of re-opener mechanisms (e.g. substantial market effects clause) in our regulatory framework, and our reconciliation mechanism for the cost of new debt. These provisions protect investors in the event of our allowed return assumptions materially misaligning with financing conditions in 2020-25.

### **b) We should calibrate our allowed return based on the distribution of returns on regulatory equity.**

Wessex Water, Thames Water, Anglian Water, and United Utilities all suggest that decisions and interventions made by us at draft determinations mean that our allowed return on equity does not achieve the required return for an efficient notional company, once the likely impact of incentives in other areas of the price control is been reflected. Representations variously suggest that:

---

<sup>21</sup> For instance in water company share prices, and gilt yields.

- Incentives were not set at ‘P50’ levels<sup>22</sup> – arguing that the base cost efficiency and service levels built into price limits were excessively challenging, such that even an efficient notional company could expect to experience net penalties and underperform the base cost of equity.
- Capping of upside returns and an asymmetric penalty/reward regime for Outcome Delivery Incentives in our draft determinations has resulted in risk ranges with a negative skew.

These representations suggest that failing to correct for these factors (either in uplifting the allowed return or recalibrating incentives) would result in our failure to discharge our financing functions statutory duty.<sup>23</sup> Economic Insight (for Wessex Water) argue that the increased negative skew introduced by our draft determination decisions alone requires a compensating uplift of 5-7 basis points to the allowed return on equity.

In principle it might be appropriate to calibrate our allowed return on equity for expected out or under-performance in other areas of the price control. This is the approach endorsed by several UKRN Study authors, whose review of UK regulatory practice leads them to assess that informational asymmetries in setting cost and service targets has given an advantage to companies, leading to a realised return on equity significantly higher than the allowed return.<sup>24</sup> Ofgem’s RIIO-2 framework reflects this recommendation in the form of a 50 basis point downward adjustment to the CAPM-implied cost of equity. Ofgem justifies this measure with evidence on outperformance of other price controls, both within and outside the energy sector, and equity analyst estimates which imply that outperformance can be realised in future price controls, arguing that investor outperformance expectations will continue to be positive.<sup>25</sup>

We do not observe the same degree of systematic outperformance as Ofgem in our historic price controls, and do not consider that risk ranges provided by companies can be relied on as a guide to actual equity returns. As set out in our ‘Aligning risk and return technical appendix, RoRE performance for the sector over 2015-2019 was 0.0% on Outcome Delivery Incentives and +0.3% on costs, whereas the PR14 forecast risk ranges exhibited a negative skew on Outcome Delivery Incentives (-1.7% to +0.6% on average), and costs (-2.1% to 1.6% on average). Based on this historical evidence, we do not consider the negative skew in company RoRE risk

---

<sup>22</sup> i.e. with the efficient notional company having an equal chance of under or out-performance, and an expected contribution to equity returns of zero.

<sup>23</sup> ‘To secure that water companies can (in particular through securing reasonable returns on their capital) finance the proper carrying out of their statutory functions’

<sup>24</sup> P. Burns et al., ‘*Estimating The Cost of Capital For Implementation of Price Controls by UK Regulators*’, Appendix D, March 2018, pp73-75, Appendix K,

<sup>25</sup> Ofgem, ‘*RIIO-2 Sector Specific Methodology decision – Finance*’, May 2019, p67

ranges for PR19 provides meaningful information on the likelihood of under- and out-performance over 2020-25.

Even in cases where there is greater certainty of underperformance on cost or service targets, we do not consider that adjusting our allowed return on equity is an appropriate response. Such an approach would likely be poorly-targeted, has limited grounding in the CAPM framework, and would risk undermining the incentive properties of our regulatory regime.

Firstly, forecast RoRE ranges are variable, reflecting company-specific factors (both company circumstances and calculation methods), while the allowed return is a sector-wide parameter. This implies that any uplift to correct for targets that are too stretching for some companies would represent a windfall gain to those which are unaffected.

Secondly, we also note that company-specific (and therefore diversifiable) risks, such as those relating to management decisions, do not require a compensating return under the CAPM framework.

Finally, there is also a clear risk that, in intervening to set easier targets or increase returns to address a downside RoRE skew resulting from previous management decisions (e.g. underinvestment), that this would significantly reduce incentives to improve performance and maintain investment at efficient levels.

To provide added confidence over the appropriateness of our PR19 incentive regime, we have conducted a recalibration exercise following draft determinations. This has involved considering company representations and making changes to our approach and interventions, notably:

- We have carefully considered representations on the level of stretch in cost and service targets, making a number of revisions in our final determinations. For example, we apply a shallower glide path on water supply interruptions. More detail is available in our 'Overall stretch across costs, outcomes and allowed return on capital appendix'
- The gap between our view and the companies' view of efficient costs has narrowed to 4%, from 11% at draft determinations at sector level, and we have introduced bespoke cost-sharing arrangements for business rates and Environment Agency charges. More detail is available in our 'Securing cost efficiency technical appendix'
- We include bespoke uncertainty mechanisms for some companies where costs have not been allowed in full. More detail is available in our 'Aligning risk and return technical appendix'

These changes provide more confidence that achieving cost and service commitments is the most likely outcome for an efficient company, and therefore that an efficient company should be able to achieve the base allowed return on equity at the notional financial structure.

**d) Our allowed return does not reflect top-down cross-checks, which indicate a higher allowed cost of equity is appropriate.**

Frontier Economics' report (for three companies<sup>26</sup>) uses two analytical cross-checks to argue that our cost of equity for draft determinations is too low and should be increased:

- A multi-stage dividend-discount model applied to the share price of Severn Trent, United Utilities and Pennon. This analysis results in a cost of equity range for the first two of these companies of 4.5% to 6.3% in RPI terms (Table 5.2), significantly higher than our draft determinations allowed return of 3.5%.
- A thought experiment where the debt premium is compared to the equity premium of a notional company that is fully equity financed. Frontier Economics conclude that our draft determination allowed cost of equity for a 100 per cent equity-funded water company implies an equity premium only 0.22% higher than the debt premium. Frontier Economics argues that this differential is implausibly low and that, based on other precedents, it should be well above 1 per cent.

**Table 5.2: Frontier Economics Dividend Discount Model results for cost of equity (RPI basis, assuming notional gearing)**

Input	Date of share price estimate	Low-end DDM result (-0.5% long-term dividend growth)	High-end DDM result (1% long-term dividend growth)
Severn Trent	23/11/2018	4.94%	6.33%
United Utilities	12/02/2019	4.52%	5.85%
Average		4.73%	6.09%

Source: Frontier Economics, 'Cost of Capital for PR19'

The outputs of Dividend Discount Models tend to be volatile and sensitive to interday movement in share prices, hence it is commonplace to rely on trailing averages rather than spot rates. We note in this respect that Frontier Economics' analysis

<sup>26</sup> South West Water, Thames Water, and Wessex Water

relies on spot rates derived using a single day's share price - and that the cost of equity output appears sensitive to the choice of date.<sup>27</sup> In the case of Severn Trent, the date chosen is also quite distant from our 28 February data cut-off for draft determinations, reducing comparability with our CAPM-derived estimate. Share prices for both companies have also risen since the date chosen by Frontier Economics for their analysis, which all other things equal would reduce the calculated cost of equity.

In addition to this, we consider some of the short-term estimates of dividend growth used in the calculation to be contestable. Severn Trent's dividend is assumed in Frontier Economics' model to grow at a rate of RPI+4.6% and RPI+4% in the first two years of PR19. This contrasts with one equity analyst comment predicting dividend growth in line with CPIH inflation.<sup>28</sup>

Replacing the Frontier Economics' model inputs for Severn Trent with the company's share price on 30 September 2019 and the assumption of dividends that grow at 2% CPIH in the short and long term, results in an estimate of 3.45% for the cost of equity (In RPI terms), which is much closer to our point estimate of 3.18%. Overall therefore, we did not consider that this cross-check provided convincing justification to make an adjustment to our CAPM-derived estimate.

Europe Economics identifies various issues in Frontier Economics' approach of comparing differences between the debt premium and equity premium over time, namely that Frontier Economics:

- incorrectly uses the unlevered beta estimate rather than asset beta for the draft determination cost of equity (and assumes a point estimate of 0.28, not 0.29).
- uses spot iBoXX A/BBB figures instead of the allowed return on new debt for PR19 draft determinations and PR14 final determinations, hampering comparability across price controls.

Correcting the calculation, Europe Economics finds that the resultant gap between the debt and equity premium using our draft determination parameters is 0.73%. This is higher than the gap it estimates using Frontier Economics' own preferred cost of capital parameters of 0.61%. For our final determination parameters, we calculate that the gap is 0.90%. We conclude, based on this analysis, that Frontier Economics' cross-check does not undermine the validity of our cost of equity point estimates.

---

<sup>27</sup> For instance, using the share price for United Utilities on 19 March 2019, rather than that on 12 February 2019 reduces the low-end implied cost of equity for that company by 34 basis points.

<sup>28</sup> HSBC Global Research, 'Severn Trent, Hold: Squirrelling in progress', 25 November 2019

**e) Allowed cost of equity parameters are inconsistent with parameters implied by decisions made in other parts of our draft determinations.**

Bristol Water and Wessex Water suggest that our use of a low risk-free rate for 2020-25 is inconsistent with our use of a frontier shift assumption - which these representations deemed as high. Economic Insight (for both companies) suggest that our case for a lower allowed return is based on assuming low productivity growth and focusing on near-term historical data. It argues that this is inconsistent and that retaining our frontier shift assumption of 1.5% should necessitate adopting cost of equity parameter assumptions consistent with higher productivity periods.

We note firstly that our frontier shift assumption is based on productivity growth in comparable sectors, whose productivity growth in recent years has outstripped that in the wider economy. As Total Market Return (TMR) is an economy-wide input and our estimate draws on specific sectors, there is no inconsistency with respondents' views that a lower Total Market Return assumption should be associated with low productivity. (More detail is available in our 'Overall stretch across costs, outcomes and allowed return on capital appendix').

In addition, we do not accept the characterisation that our frontier shift estimate is disproportionately drawn from a single time period – it reflects productivity growth of comparator sectors over recent years and longer term growth over full economic cycles. This is consistent with our approach to using long-term historical equity returns and forward-looking market data – the former of which encompasses a span of 118 years which captures periods of high and low productivity growth.

Our estimate of the risk-free rate over 2020-25 equally does not require justification by recourse to a productivity assumption – it is based upon market data, which incorporates current expectations of economic performance and associated productivity trends.

**5.1.3 Allowed cost of equity in the round: our final determination decision**

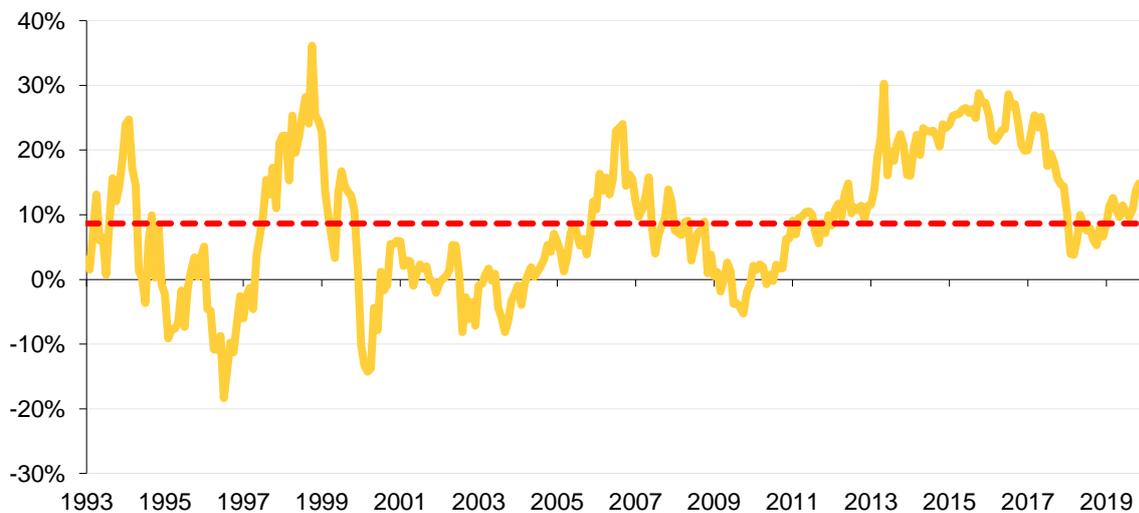
In addition to considering company representations, we have also considered additional relevant evidence on cross-checks.

We note that our appointee allowed return on equity of 4.19% in CPIH terms is at the top of financial analyst expectations published over August to November 2019, which lay in the range 4.0%<sup>29</sup> to 4.2%<sup>30</sup>, averaging 4.1%.

Market to Asset Ratio (MAR) evidence indicated a c.15% premium over RCV for Severn Trent and United Utilities for November 2019 (figure 5.1). In addition, JP Morgan forecasts an average premium of 18% over 2020-23, underpinned by an allowed return on capital of 1.85% in RPI terms.<sup>31</sup> These premia are above the historical average of 9% for these two companies. Estimates of positive MAR premia are not confined to listed companies, with RBC Capital Markets also considering that a 15% premium over RCV is appropriate for unlisted Affinity Water.<sup>32</sup>

We interpret this MARs evidence as consistent with a market view that our overall package of proposals from draft determinations (including our allowed return) is stretching but achievable, with outperformance potential for not only high-performing companies, but their peers as well.<sup>33</sup>

**Figure 5.1: Premium of enterprise value over RCV for Severn Trent and United Utilities composite (1993-2019)**



Source: Ofwat analysis of Refinitiv data

<sup>29</sup> Barclays, 'UK Utilities: Never a dull moment in utilities: model updates, H1 result estimates', 11 November 2019, p11

<sup>30</sup> Citi, 'UK Utilities: Value trade, not value trap', 25 September 2019

<sup>31</sup> JP Morgan, 'UK Utilities: 2020 Year Ahead', 2 December 2019

<sup>32</sup> RBC Capital Markets, 'UK Infrastructure Funds: Attractive in low-yield environment', December 10 2019

<sup>33</sup> Severn Trent Water and United Utilities were awarded fast track status as part of our January 2019 initial assessment of plans, while Affinity Water was put in the 'Significant Scrutiny' category.

As a further cross-check to our use of the Capital Asset Pricing Model, we commissioned Europe Economics to consider how our allowed cost of equity compares with recent UK equity returns. Stock returns from the FTSE 100 over the past three years confirm that our allowed return (6.27% in nominal terms) is slightly lower than the median value of the distribution of 7.6%<sup>34</sup>, as we would expect for a low-risk regulated utility company. This gives additional comfort that our allowed cost of equity is aligned with recent market evidence.

Having carefully considered company representations (section 5.1.2), and our own evidence in this section, we have decided to not make adjustments to the allowed return on equity estimated using the Capital Asset Pricing Model. In summary we:

- Do not make adjustments to our allowed return to account for macroeconomic or geopolitical volatility or future risks. We consider that our allowed return on equity is based on market data which already prices in the market view of these risks.
- Do not calibrate our allowed return to offset cost efficiency and service challenge, as we consider any necessary calibration is best done at the level of incentives themselves.
- Do not accept Frontier Economics' argument that their proposed cost of equity cross-checks represent a convincing case for adjusting our CAPM-derived estimate upwards.

---

<sup>34</sup> Europe Economics, *'The Cost of Capital for the water sector at PR19: final advice,'* December 2019, p44

## 5.2 Risk-free rate

The risk-free rate is used in the Capital Asset Pricing Model as the baseline return required by the market to commit capital, where the return is guaranteed. It acts as a benchmark for other, riskier financial investments, which have higher yields to compensate investors for any additional risk.

As is commonplace in UK economic regulation, we use the yields on Government bonds (in our case, UK Gilts) to proxy for the true risk-free rate, due to the exceptionally low default risk and liquidity risk of these instruments.

### 5.2.1 Risk-free rate: what we said in our draft determinations

For our draft determinations, we considered evidence from both nominal and RPI-linked gilt yields at 10 and 20 year maturities to construct estimates of the risk-free rate at our chosen 15-year investment horizon. This horizon was supported by the UKRN Study's recommendation that regulators should choose *'a fairly long horizon, for example, 10 years'*.

To estimate a risk-free rate applicable to the period 2020-25, we uplifted the spot yield on 28 February 2019 for gilts at 10 and 20-year maturities, based on market expectations of the average interest rate rise for these gilts over the period 2020-25. We then took the average of the uplifted 10 year and 20 year yields to be our forward-looking estimate of the risk-free rate.

We noted that the level of the CPIH-deflated risk-free rate point estimate was sensitive to whether the calculation is based on nominal or RPI-linked gilts. There was a 0.37% increase in the point estimate when changing the basis of the calculation from RPI-linked to nominal gilts.

In choosing how much weight to place on each type of gilt instrument, we considered the impact of risk premia that might cause yields to diverge from a truly risk-free rate: (for nominal gilts this is an inflation risk premium, and for RPI-linked gilts this is a liquidity premium). We concluded based on comparison of swap pricing and yields for nominal and RPI-linked gilts that any liquidity premium was likely to be small, and that the 37 basis point difference was therefore likely to be almost exclusively the result of an inflation risk premium on nominal rates. Consequently, we placed no weight on the estimate derived using nominal gilts, as it would be inappropriate to allow for a higher risk-free rate allowance based on compensation for inflation risk in a sector with substantial inflation protection to revenues and its regulatory capital value. We noted that using RPI-linked gilts is consistent with the recommendation of

the UKRN Study and also recent allowed return on capital estimates published by Ofgem, Ofcom, and the Civil Aviation Authority.

For our draft determinations estimate, we used an RPI-linked gilts based point estimate of the risk-free rate, which we calculated as -0.45% in CPIH-deflated terms.

## 5.2.2 Risk-free rate: stakeholder representations and our response

Stakeholders are generally critical of our draft determinations approach to estimating the risk-free rate, with representations tending to focus on the exclusive weight placed on RPI-linked gilts and our decision to not take a long trailing average of gilt yields. Below we set out issues raised by stakeholders and our response:

### **a) We did not convincingly evidence that an inflation risk premium made nominal gilts an inappropriate basis for estimating a risk-free rate.**

Dŵr Cymru and Economic Insight (for Bristol Water) disagree with our view from draft determinations that the 0.37% difference in the CPIH point estimate was largely due to an inflation risk premium. These respondents point to Europe Economics' view that the inflation risk premium is likely to be low, given the Bank of England's success in targeting inflation. Some also cite the Liu et al (2015)<sup>35</sup> estimate that this premium averaged 15bps between 2004 and 2014 for 10 year gilts. Frontier Economics' report for three water companies<sup>36</sup> raises similar points, stating that we have provided insufficient evidence for an inflation risk premium and that we ignore the liquidity premium in index-linked gilts. In addition, Economic Insight do not agree with our view that a nominal risk-free rate compensates water investors for inflation they are already protected against. The consultancy notes that the inflation risk premium is in RPI terms, but that water bills over 2020-25 will be indexed to CPIH, not RPI.

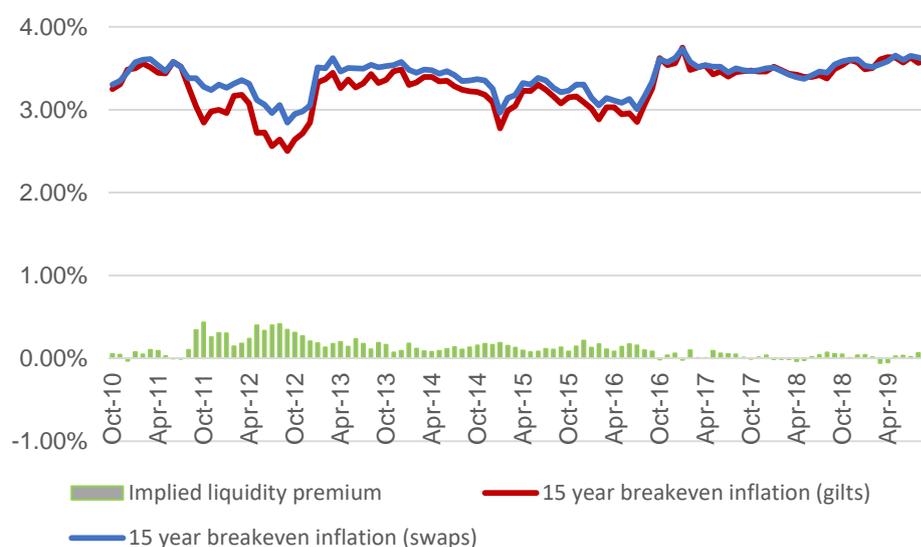
Updating our adaptation of the Liu et al (2015) approach to estimating the liquidity premium, we again estimate the liquidity premium as the difference in RPI swap inflation and 'breakeven' (gilt-implied) inflation. This approach continues to return very low estimates of the liquidity premium. Based on end September 2019 data, our estimate is negligibly different from zero and highly stable since 2017 (figure 5.2).

---

<sup>35</sup> Liu et al., 'The informational content of market-based measures of inflation expectations derived from government bonds and inflation swaps in the United Kingdom', Staff Working Paper No 551, September 2015

<sup>36</sup> South West Water, Thames Water, and Wessex Water

**Figure 5.2: Breakeven inflation implied by inflation swaps and gilts at 15 year maturities, and the implied liquidity premium**



Source: Ofwat analysis of Refinitiv and Bank of England data

In addition, we note that analysis of breakeven inflation provides evidence supporting an inflation risk premium. Breakeven inflation can be thought of as the additional yield required by investors to hold nominal gilts over RPI-linked gilts, consisting of an inflation expectation and an inflation risk premium.<sup>37</sup> In February 2019 breakeven inflation at the 10 year horizon was 3.3%, while February 2019 RPI inflation was 2.5% and the Office for Budgetary Responsibility's furthest forecast (to 2023) predicted 3.1% RPI inflation<sup>38</sup>. The additional yield required by investors was higher than forecast inflation; we consider the most likely explanation for this being a positive inflation risk premium.

Figure 5.3 plots breakeven inflation for 15 year gilts, together with outturn RPI inflation, and the February and August average of independent medium-term RPI forecasts collated by HM Treasury on a quarterly basis<sup>39</sup>. We note that the level of breakeven inflation in 15 year gilts rose sharply and persistently to a level around 40 basis points higher shortly after the UK's June 2016 referendum on leaving the European Union.<sup>40</sup> There is also a roughly 40 basis point gap between the August 2019 breakeven inflation figure (3.6%), and February and August's HM Treasury average of medium-term RPI forecasts – whose forecast to 2023 suggests RPI of

<sup>37</sup> We do not quantify the contribution of the liquidity risk premium to breakeven inflation given the low materiality of our estimates of this premium.

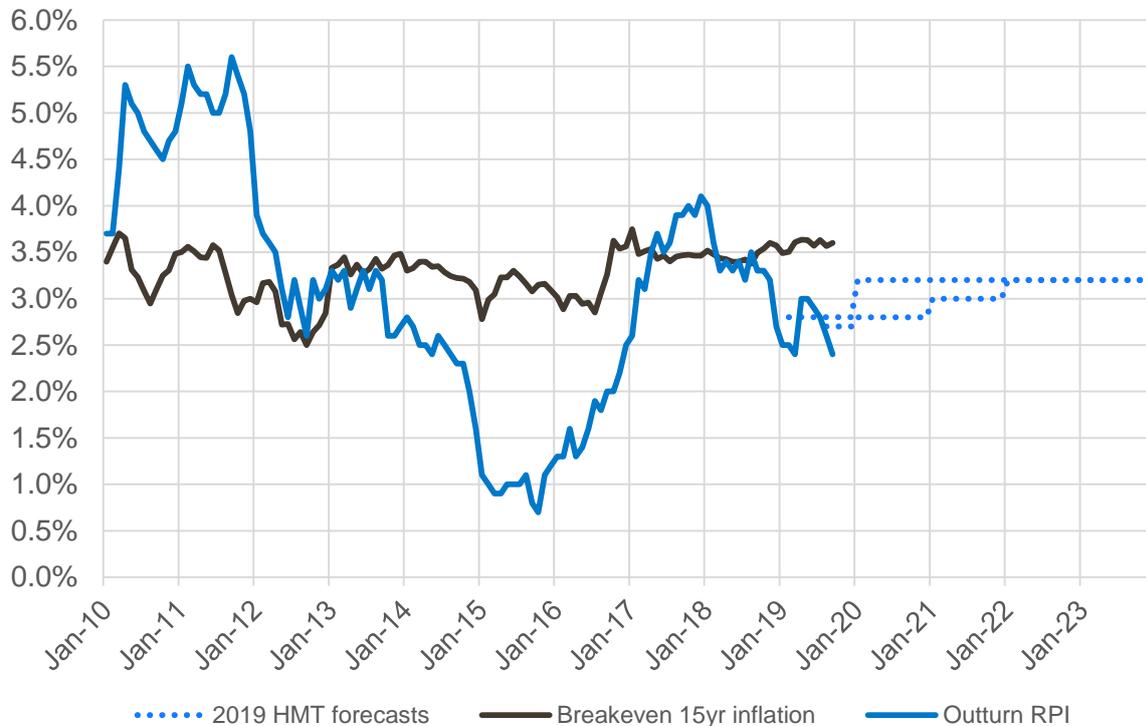
<sup>38</sup> Office for Budgetary Responsibility, *'Economic and Fiscal Outlook'*, March 2019

<sup>39</sup> HM Treasury, *Forecasts for the UK economy*, August 2019

<sup>40</sup> Breakeven inflation in 15 year gilts averaged 3.07% between Jan 2015 and Jun 2016, and 3.48% between Jul 2016 and Sep 2019.

3.2%. This updated analysis provides more support for the existence of an inflation risk premium embedded in nominal gilts.

**Figure 5.3: Estimates and forecasts of RPI inflation (2010 - 2023)**



Source: Ofwat analysis of Office for National Statistics and HM Treasury data

This evidence is complemented by a 2019 survey of 212 companies with defined benefit pension schemes. 84% of those surveyed state that they adjusted gilt yields for an inflation risk premium. Of those that used such an adjustment, 90% use a figure of at least 0.2% or above.<sup>41</sup>

In conclusion, we estimate the liquidity risk premium is currently negligible, and that the inflation risk premium is currently around 40 basis points. This indicates that it is appropriate to use RPI-linked gilts as the source of our risk-free rate assumption.

The indexation of water bills to CPIH rather than RPI does not affect our conclusion that including an inflation risk premium in our estimate of the risk-free rate is inappropriate. By definition, a genuinely risk-free rate should not include any risk premium.

<sup>41</sup> KPMG, 'Pensions Accounting Survey 2019', May 2019

**b) Our use of RPI-linked gilts as the basis for our point estimate is inconsistent with our position that RPI is a discredited measure of inflation.**

South Staffs Water, Severn Trent Water and Hafren Dyfrdwy all suggest that our decision to focus on RPI-linked gilts in deriving our point estimate is contrary to our view that RPI is a flawed measure, with the latter two respondents arguing that our move could undermine the credibility of our regulatory framework.

We agree with the view of the Office for National Statistics that RPI in its current form is a flawed measure, liable to overstate consumer price inflation. Our use of RPI-linked gilt yields for setting the risk-free rate does not imply a dilution of our policy of transitioning towards use of CPIH as our sole indexation measure.

In the context of setting the risk-free rate, we cannot however ignore evidence that basing our calculations on nominal gilts inappropriately embeds an inflation risk premium in our allowed cost of equity. In the absence of CPI or CPIH-linked gilts, this leaves RPI-linked gilts as the only alternative source of data not affected by this issue.

**c) RPI-linked gilt yields are artificially distorted by scarcity and regulatory requirements faced by institutional investors.**

Dŵr Cymru, Yorkshire Water and Frontier Economics (in a report for three companies<sup>42</sup>) variously argue that yields on RPI-linked gilts are lower than the 'true' risk-free rate due to their scarcity value, as well as regulatory and accounting rules which oblige institutional investors to hold these instruments. These representations opine that these 'distortions' ought to prompt the placing of greater weight on nominal gilt yields.

The market price for a given financial asset will be a function of the respective motives of buyers and sellers who engage in trading over a given period. In the specific case of RPI-linked gilts, we consider it unjustified to discount some motives (i.e. regulatory requirements, scarcity value) in this price discovery process as 'distortions' without providing a clear rationale justifying why this is appropriate – representations did not provide this.

We note in addition that arguments that RPI-linked gilt yields are distorted due to regulations and these instruments' relative scarcity have been made, but rejected, in numerous past price reviews in UK regulation. This view is supported by the Competition Commission's 2014 statement: *'We note that the effects of monetary policies and pension fund dynamics are increasingly well understood by the markets.'*

---

<sup>42</sup> South West Water, Wessex Water, and Thames Water

*Consequently we expect the market prices of ILGs to incorporate effectively expectations of the effects of these factors and therefore to provide a reasonable guide to future returns.*<sup>43</sup>

#### **d) A negative risk-free rate is inconsistent with economic theory.**

Dŵr Cymru suggest that the rational preference for current rather than deferred consumption does not support a negative risk-free rate. Yorkshire Water also state that a negative risk-free rate is not consistent with the Taylor Rule<sup>44</sup>, given that the outlook for 2020-25 indicated inflation close to target and actual output close to potential output. Economic Insight's report (for Bristol Water) argued that a high inflation risk premium was inconsistent with our assumption of a low interest rate environment.

The UKRN study<sup>45</sup> addresses this issue. Its authors argue that regardless of whether this point is true, the observed yield on risk-free debt is nevertheless of importance to regulators. This is because the drivers of the risk-free rate are ultimately unimportant: what matters is the rate itself, because this has implications for the prices of substitutes (other low-risk investments) in the market. From an allowed return perspective for regulated entities, the market price is therefore sufficient.

The UKRN study also highlights that there is no economic principle that rules out a negative risk-free rate, meaning that rates can feasibly be negative for lengthy periods. It further points out that risk-free rates have indeed been negative in the past. Having referenced the equilibrium condition of a standard intertemporal optimisation model, the UKRN authors identify multiple cases in which a negative risk-free rate is plausible. If either (a) future consumption growth is expected to be negative or (b) individuals experience and are averse to uncertainty about future consumption or (c) there are financial market frictions which depress the risk-free return, then a negative real risk-free rate is plausible.

We commissioned Europe Economics to review the academic literature on this topic which aims to explain drivers of the risk-free rate. The consultancy also concludes that there can be no strong presumption from finance theory that negative risk-free rates are impossible.<sup>46</sup>

---

<sup>43</sup> Competition Commission, '*Northern Ireland Electricity Limited price determination*', March 2014, 13.124

<sup>44</sup> A central bank policy rule linking the magnitude of change in the central bank (policy) overnight interest rate to the output gap and the gap to target inflation.

<sup>45</sup> P. Burns et al, '*Estimating the cost of capital for implementation of price controls by UK Regulators*', p35

<sup>46</sup> Europe Economics, '*The cost of capital for the water sector at PR19*', December 2019

Furthermore, we consider that the trend in developed economies for falling birth rates and longer life expectancies could also increase the current demand for saving to achieve future income smoothing, while failing to generate a sufficiently large offsetting expansion in the current pool of would-be borrowers to provide the assets to fund future income. Demographic explanations are widely featured in studies exploring the causes of low interest rates. For instance, Bean et al. (2015)<sup>47</sup> emphasise that the period of falling interest rates since 2000 has coincided with a period when the population share of the high saving middle aged (40-65 years) has been rising relative to the population aged over 65.

In relation to the Yorkshire Water point, we note that the Taylor Rule is one of many possible policy rules a central bank could follow rather than a deterministic relationship between inflation and surplus capacity and the economy and the interest rate. The Bank of England has chosen not to follow a Taylor Rule as its explicit policy, and evidence of its rate setting behaviour suggests that it has not in practice done so.<sup>48</sup> The interest rate governed by the Taylor Rule is also the very short-term (overnight) rate, not the 15-year rate which is our focus. We do not therefore consider that the Taylor Rule is relevant to the setting of our point estimate.

We interpret Economic Insight's argument to be that lower interest rates are associated with lower inflation risk premia. Our assessment of the inflation risk premium is based upon up-to-date information (during the current period of lower interest rates), so we do not consider there is any mismatch between the two.

In conclusion, we consider a negative risk-free rate is supported by current market pricing and is not inconsistent with economic theory.

**e) Using a longer trailing average would mitigate temporary volatility in recent data, which might be unrepresentative of conditions in 2020-25.**

Thames Water and South East Water disagree with our approach to using spot yields as the basis for our risk-free rate calculation. These companies suggest that short-run market data increases the cyclicity of returns and is a source of regulatory risk. These respondents argue that we should base our risk-free rate estimate on longer (for instance 6 month plus) averaging periods, as at previous price controls.

Longer trailing averages tend to have the effect of smoothing changes in the risk-free rate over time. This means that the point estimate will change less over time and will

---

<sup>47</sup> C. Bean et al, 'Low for Long? Causes and consequences of persistently low interest rates', October 2015

<sup>48</sup> J. Ferga, 'UK Monetary Policy Reaction Functions, 1992-2014: A Cointegration Approach Using Taylor Rules'

be less responsive to changes in yields from recent periods. However, this risks large gaps opening up between the trailing average of yields and most recent evidence provided by spot rates. This in turn risks undermining the credibility of the regulatory framework. Recently, the majority of the UKRN Study's authors and Citizens Advice (2015)<sup>49</sup> have been critical of the tendency of pre-2017 regulatory estimates to lie significantly above spot yields – often by more than one percentage point.

To rely on longer trailing averages is to implicitly assume that the prevailing risk-free rate in 2020-25 will be more like its historical level than recent spot rates. This assertion could be justified if there was evidence of a tendency towards mean-reversion in the historical data. However, this does not appear to be the case. Van den End (2011)<sup>50</sup> finds that long-term rates for German, US and Japanese bonds can persistently deviate from their long-run average value with only weak statistical evidence of mean-reversion. Brattle (2016)<sup>51</sup> in its advice to the European Union states: *'The best predictor of the future risk-free rate is the current yield. Taking a longer averaging period risks including old and out-of-date information that is not relevant to the future.'*

In conclusion, while we agree that there may be some benefit to taking a trailing average over a shorter period (for instance 1 month) to avoid reliance on market data from a single day, we consider that averaging over longer periods is liable to introduce inaccuracy in the estimate of the risk-free rate.

**f) We should consider using the direct estimate of 15 year gilt yields rather than the average of 10 and 20 year gilts to derive our point estimate.**

Frontier Economics, in its report for three water companies<sup>52</sup>, argue that current financial market conditions mean that the gilts yield curve is inverted<sup>53</sup>, with the 10 year gilts rate in particular unlikely to be representative of its level over the 2020-25 period. The consultancy argues that we should therefore base our point estimate directly from 15 year gilt yields, instead of taking an average of 10 and 20 year yields.

We have considered this proposal, and conclude that it has an advantage over our approach from draft determinations in some scenarios. Specifically, where the yield

---

<sup>49</sup> Citizens Advice, *'Many Happy Returns'*, 28 May 2015, pp30-34

<sup>50</sup> J.W. Van den End, *'Statistical evidence on the mean reversion of interest rates'*

<sup>51</sup> Brattle Group, *'Review of approaches to estimate a reasonable rate of return for investments in telecoms networks in regulatory proceedings and options for EU harmonization'*, 2016

<sup>52</sup> South West Water, Wessex Water and Thames Water

<sup>53</sup> Yield curve inversion refers to scenarios where short-term rates can be higher than longer-term rates further down the yield curve.

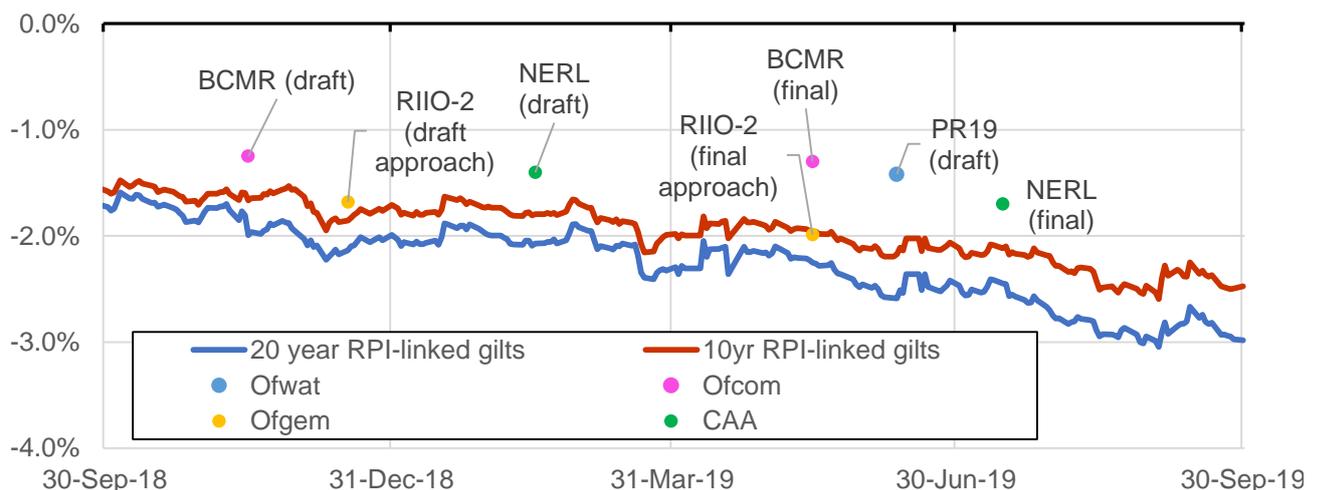
curve is convex or concave between the 10 and 20 year yields, the yield for the 15 year gilt rate derived from the yield curve will be different to the average of 10 and 20 year gilts. We consider that using the direct reading from the yield curve has advantages, as it is generated using a more sophisticated line of best fit.

### 5.2.3 Risk-free rate: our final determination decision

Spot yields for RPI-linked gilts in the maturity range 10 to 20 years have declined substantially since the data cut-off point of 28 February 2019 used to inform our draft determinations. Other regulatory estimates in the past two years have all been negative, with a tendency to track the evolution of spot yields (figure 5.4). The variance between spot yield and regulatory estimates can typically be explained due to:

- regulators placing differing weight on gilts of different maturities, based on their sector-specific view of the appropriate investment horizon
- regulators basing their point estimate on different trailing averages of yields of varying lengths rather than the spot value
- differing levels of market-implied interest rate uplift applied to calculate forward-looking estimates<sup>54</sup>

**Figure 5.4: RPI-linked gilt yields and UK regulator estimates of the risk-free rate**



Source: Ofwat analysis of Bank of England data and UK regulatory publications

<sup>54</sup> This is particularly pronounced for Ofgem – the regulator’s policy of indexing the risk-free rate means that the regulator did not apply an uplift for market-implied yield increases.

We retain our investment horizon of 15 years from our ‘early view’ and draft determinations exercises. Our choice is consistent with the UKRN Study’s recommendation that regulators should choose ‘a fairly long horizon, for example 10 years’.

Our preferred trailing average is one month in duration. While this is shorter than the averaging period proposed by several respondents, we consider it strikes the appropriate balance between limiting the influence of inter-day volatility in yields on our point estimate, and including only the data most relevant to setting the risk-free rate for 2020-25.

In forming our decision on the risk-free rate for the final determinations, we have drawn on the evidence presented in Europe Economics’ advice to us on the allowed return. Europe Economics consider yields and market-implied interest rate rises for nominal and RPI-linked gilts at maturities between 10 and 20 years. This evidence is summarised below, in table 5.3.

**Table 5.3: Forward-looking estimates of the risk-free rate based on nominal and RPI-linked gilts**

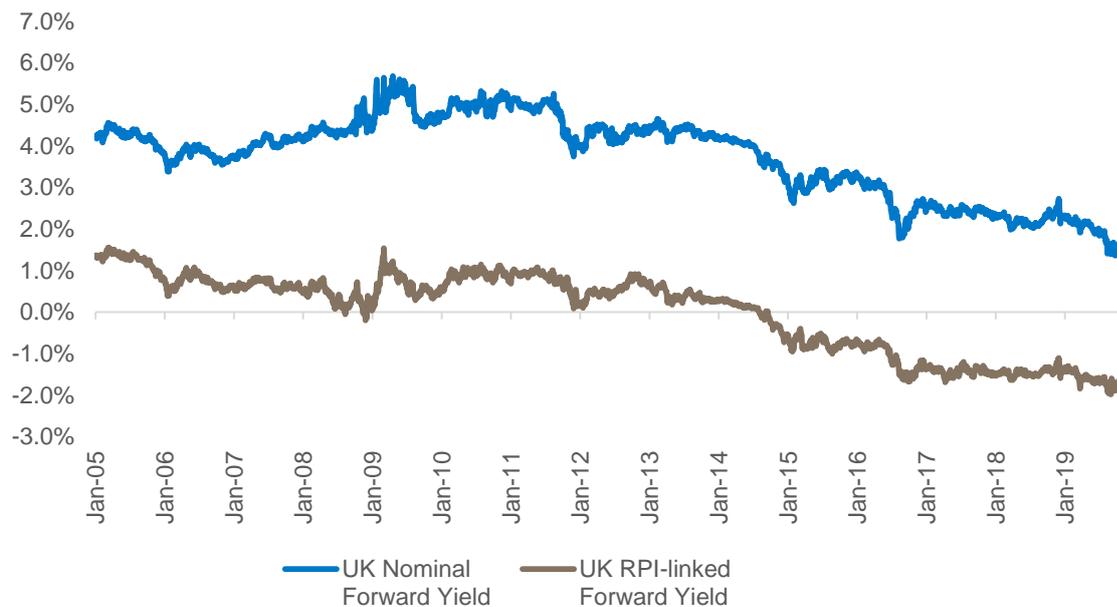
	Average yield for September 2019	Market-implied rate rise (average, 2020-25)	Implied risk-free rate (nominal / RPI) 2020-25	Implied risk-free rate (CPIH) 2020-25
10 year nominal gilt	0.56%	0.30%	0.86%	-1.12%
20 year nominal gilt	1.05%	0.15%	1.20%	-0.78%
Average of 10 & 20 year (nominal)	0.81%	0.23%	1.04%	-0.94%
10 year RPI-linked gilt	-2.89%	0.26%	-2.63%	-1.68%
20 year RPI-linked gilt	-2.35%	0.23%	-2.12%	-1.16%
Average of 10 & 20 year (RPI)	-2.62%	0.25%	-2.37%	-1.41%
15 year nominal gilt	0.85%	0.25%	1.10%	-0.88%
<b>15 year RPI-linked gilt</b>	<b>-2.61%</b>	<b>0.26%</b>	<b>-2.35%</b>	<b>-1.39%</b>

Source: Europe Economics analysis of Refinitiv and Bank of England data

As set out in section 5.2.2, consistent with the advice of Europe Economics, we have decided to base our point estimate on yields directly derived from 15 year gilts, rather than the average of 10 and 20 year gilts. We note from table 5.3 that the resultant point estimate is not particularly sensitive to this methodological change; repeating our approach from draft determinations would result in a point estimate just 2 basis points lower.

The implied risk-free rate in RPI terms from table 5.3 is negative for 10, 15, and 20 year horizons. In addition to our discussion from section 5.2.2 justifying why a negative risk-free rate is possible in principle, we note that it is also strongly supported by market expectations of future yields at our chosen 15-year investment horizon. Figure 5.5 sets out implied yields for 15 year gilts, ten years from each date plotted on the horizontal axis. The progression of these forward yields implies a market expectation that yields on RPI-linked gilts will be negative as far out as 2029.

**Figure 5.5: Evolution of the 10 year forward 15 year gilt rate (2000-2019)**



Source: Ofwat analysis of Bank of England data

The CPIH-based point estimate which would result from basing our calculation on nominal gilts is 51 basis points higher than that based on using RPI-linked gilts at the 15 year maturity. As set out in section 5.2.2, we consider there is strong evidence that the main driver in this difference is an inflation risk premium. Placing weight on nominal gilts would embed at least some of this risk premium into our allowed cost of equity. We consider this would be inappropriate for two reasons. Firstly, as the true risk-free rate should by definition contain no risk premia, we would knowingly be introducing inaccuracy to our estimate. Secondly, water companies enjoy extremely

high levels of inflation protection to their revenues and regulatory capital value, making it inappropriate to provide compensation for inflation risks.

We accordingly use as our point estimate our forecast of the average yield of 15-year RPI-linked gilts over 2020-25 from table 5.3, producing the following set of risk-free rate estimates;

- **-2.35%** - RPI based
- **-1.39%** - CPIH based, assuming a 100 basis point 'wedge' between long-term RPI and CPIH.
- **0.58%** - nominal, assuming 3.0% RPI

## 5.3 Total Market Return

The Total Market Return (TMR) is our estimate of the return investors expect in 2020-25 from being invested in a diversified basket of UK equities. It is the reference point against which to estimate required returns in the water sector, allowing for its differential risk characteristics.

### 5.3.1 Total Market Return: what we said in our draft determinations

For draft determinations we used a point estimate for the real Total Market Return of 6.5% in CPIH terms. We derived this estimate drawing on three approaches to estimating Total Market Return:

- **‘Ex-post’ approaches** – which assume that observed historical equity returns can be used to make inferences about investors’ current expectations for TMR.
- **‘Ex-ante’ approaches** – which aim to separate historical return expectations from realised returns, using an estimate of the former to infer investors’ current expectations for TMR.
- **‘Forward-looking’ approaches** – which use more recent market data and sentiment to infer investors’ expectations for TMR – particularly via the pricing of financial assets considered against their predicted cashflows.

Our **‘ex-post’** analysis used equity returns data from the 2019 edition of the Credit Suisse Global Investment Returns Yearbook, which we deflated to real returns using the Bank of England’s Millennium Dataset CPI series. We assumed a holding period of 5-10 years. We placed most weight on two approaches:

- Analysis of long-run historical UK equity returns at different holding periods and using different averaging methodologies (arithmetic, geometric, weighted averages of the two). We focused on the Jacquier Kane Markus (JKM) estimator – a holding period-weighted average of geometric and arithmetic averages. This estimator is designed to minimise mean-squared error when forecasting future returns based on their historical distribution. This approach yielded a range of 6.5%-6.7%.
- Adjusting the whole-period geometric average return for the UK for different holding periods and serial correlation. This follows the UKRN’s recommended approach to assessing the TMR for regulatory purposes. The size of the adjustment was based on PwC’s analysis for the CAA. This yielded a range of 5.5% – 6.6%.

We assessed that a narrowed plausible range sat where these two ranges overlapped, between 6.5% and 6.6%. We noted that this range was higher than the single-year holding period arithmetic return for Europe (6.0%) and the World (6.5%). We took this to indicate that a point estimate from within our plausible range would be sufficient to attract international capital, on an 'ex-post' basis.

Our **ex-ante** analysis placed most weight on two approaches

- A Fama & French-style Dividend Growth Model inferring prospective return requirements as the sum of average real dividend yields and the average real rate of dividend growth. This gave a range of 5.6% to 6.5% in CPIH terms, depending on whether the averaging period was 1990-2018 or 1900-2018, respectively
- A 'decompositional approach' used by the 2019 Yearbook<sup>55</sup> to adjust historical average returns for events which the authors considered are unlikely to be repeated (for instance, expansion of the price-to-earnings ratio). This gave a range of 5.9% to 6.6% in CPIH terms, depending on the extent to which the historically observed average premium of UK equity returns over World returns is presumed to persist in future.

We took our plausible range to be bounded by the highest and lowest estimate from these ranges, giving an overall range of 5.6% to 6.6%

Our **forward-looking** analysis placed most weight on the 5-year rolling average estimate of TMR from multi-stage<sup>56</sup> dividend discount models, based on a February 2019 data cut-off:

- A nominal model built by PwC using forecast GDP to proxy for the future dividend growth rate. The 5 year rolling average of TMR was 6.8%.
- A CPIH-real model built by Europe Economics using forecast GDP to proxy for the future dividend growth rate. The 5 year rolling average of TMR was 6.1%.
- A CPIH-real model built by Europe Economics using historical dividend-and-buybacks growth over the period 1989-2019 to proxy for the future dividend growth rate. The 5 year rolling average of TMR was 6.5%.

The overall range of 5 year rolling averages from these approaches was 6.1% – 6.8%. We adjusted the lower end of this range by 0.1% to give an overall range from

---

<sup>55</sup> E. Dimson, P. Marsh, M. Staunton, 'Credit Suisse Global Investment Returns Yearbook 2019', Credit Suisse, Febry 2019, p37

<sup>56</sup> Multi-stage refers to there being a different dividend growth assumption for short term and long-term projected returns.

forward-looking methods of 6.0% to 6.8%. This assigned some weight to analysis which we assessed as supporting lower expectations of TMR:

- Current estimates of TMR expectation from 9 finance practitioners which lay in the range 4.5% to 6.8% in CPIH-deflated terms.
- Inferred estimates of TMR expectation based on PwC and Europe Economics analysis of Market-to-Asset Ratios covering the period March 2016 – March 2017. This used analyst assumptions of outperformance to infer an investor cost of equity which was then converted to a TMR estimate using the Capital Asset Pricing Model. The range of CPIH-deflated TMR estimates from this method was 5.3% to 6.5%.

From these approaches we noted that the area of overlap lay in the range 6.5% to 6.6% in CPIH terms, from which we picked a point estimate of 6.5%.

### **5.3.2 Total Market Return: stakeholder representations and our response**

Representations are critical of our approach to estimating Total Market Return at draft determinations. Issues raised tend to focus on the inflation data and estimators we used to analyse historic equity returns and the specification of models used to estimate returns from current share prices. Below we set out issues raised by stakeholders and our response:

#### **a) Our approach to setting TMR for PR19 has opportunistically shifted weight placed on different approaches over time to engineer a low figure.**

Wessex Water suggests that for our ‘early view’ allowed return on capital we focused on forward-looking evidence from dividend discount models to inform our TMR estimate. It suggests that at draft determinations (when these models suggested a higher figure) we reverted to placing emphasis on long-run averages.

We do not agree with the characterisation that the evolution of our point estimate is due to changing the weight placed on different TMR approaches over time. While it is true that the centrepoint of our ‘ex post’ range was higher than our overall TMR point estimate for our ‘early view’ of the allowed cost of capital, our forward-looking evidence (and in particular, Market-to-Asset Ratio analysis) provided support to a figure significantly lower than our overall point estimate. Our subsequently improved understanding of the data issues and methodological debates around ex-post methods for draft determinations contributed to ranges in ‘ex-post’, ‘ex-ante’ and ‘forward-looking’ approaches which now have greater overlap. Our draft determination point estimate for TMR was based on the point of overlap between

these different ranges, rather than assigning different weights to each. We maintain our view that it is appropriate to consider a range of sources of evidence on the likely cost of capital over 2020-25 when setting our return allowance.

### **b) Our ex-post analysis of historical equity returns placed excessive weight on a single estimator.**

Frontier Economics' report for three companies<sup>57</sup> raises this issue, noting that the 6.5% to 6.7% TMR range from our approach analysing average long-run historical equity returns was based entirely on the Jacquier Kane & Markus 'optimal estimator'. Frontier Economics argued that this was not consistent with previous Competition Commission redeterminations (i.e. Northern Ireland Electricity 2014, Bristol Water in 2010) which did not discard results using the Blume unbiased estimator.

Jacquier Kane & Markus extend Blume's analysis in their 2005 paper<sup>58</sup> via their own unbiased estimator. Although very similar to the Blume estimator, it can be considered superior from the perspective of assuming lognormally distributed returns, as opposed to the Blume assumption of normally distributed returns.<sup>59</sup> Jacquier Kane & Markus state that, '*unbiasedness is not in itself an estimation goal.[...] estimators should be set to minimise a loss function, a measure of average distance to the true parameter.*' In terms of their preferred loss function (mean squared error), the authors note that their optimal estimator significantly outperforms the unbiased estimator, for example stating that '*The unbiased estimator, which is far lower than the compounded arithmetic average, is still very inefficient, often more so than a simple geometric estimator known to practitioners.*' We consider that the Jacquier Kane Markus 'optimal estimator' will give more accurate forecasts of prospective returns compared with the Blume estimator, and thus that no weight needs to be placed on the latter.

### **c) The Bank of England's historical CPI series is unreliable - we should use RPI instead**

Representations made by six companies<sup>60</sup> express concerns about our use of the Bank of England's CPI series from its 'Millennium Dataset', arguing that we have not

---

<sup>57</sup> South West Water, Wessex Water and Thames Water

<sup>58</sup> E. Jaquier et al '*Optimal estimation of the risk premium for the long run and asset allocation: a case of compounded estimation risk*', Journal of Financial Econometrics, 2005

<sup>59</sup> Lognormality is a more accepted distribution for equity returns, as the maximum loss any investor can bear is capped at -100% (i.e. losing all the principal invested).

<sup>60</sup> Severn Trent, South West Water, Wessex Water, Yorkshire Water, Bristol Water and South East Water

carried out sufficient analysis to justify its use. Representations contain the following specific arguments:

- That the Bank of England's CPI series is unreliable, as the price data needed to construct CPI over 1900 to 1989 is not available.
- That some weight ought to be placed on the inflation series from the 2019 edition of the Credit Suisse Global Investment Returns Yearbook ('The 2019 Yearbook').
- South East Water suggest that the Bank's series was constructed as a proxy for RPI and that any purported similarity to CPI is simply our opinion.
- Economic Insight (for Bristol Water) suggest that using inflation data in the 2019 Yearbook is preferable, as deflator-based estimates generally understate the impact of inflation, due to substitution effects from consumers switching to lower priced goods.

Overall, we are not convinced on the basis of reliability that either historical RPI or the 2019 Yearbook's inflation series has advantages over the Bank's historical inflation data. We form this conclusion due to:

- the greater consistency of the Bank's CPI series over time compared to RPI - enabling more accurate relating of real historical returns to prospective real return requirements.
- RPI data not being available prior to 1947.
- the Bank's inflation data between 1914 and 1947, which is of better quality than the Cost of Living Index (COLI) used in the 2019 Yearbook

We consider that use of historical RPI to deflate historical returns and derive a forward-looking return requirement is likely to overstate required returns. Successive changes to the RPI series since its inception have led to a structural increase in measured RPI, compared with its historic level. This is particularly evident in the Office for National Statistics' 2010 changes to inflation measurement, which led to a structural increase to the RPI-CPI wedge of at least 0.3% - though this is by no means the only relevant change.<sup>61</sup> RPI's status as a 'protected index' means that historic values have not been revised to be consistent with the latest calculation methodology. The implication is that returns data deflated for historical (lower) RPI cannot accurately proxy for a prospective RPI based return requirement to be indexed using today's (higher) RPI.

As agreed by the UKRN Study authors, the greater consistency of the Bank of England's historical CPI series is an advantage in terms of supporting comparability of historical CPI-based returns with prospective CPI-based return requirements. It

---

<sup>61</sup> A summary of methodological changes over time is provided by [ONS Consumer Price Indices](#)

also has the advantage of returning estimates which can be cross-checked more easily against international evidence on real returns (which use inflation indices which are methodologically much closer in their construction to CPI).<sup>62</sup>

We consider that the use of the 2019 Yearbook's inflation series is also liable to overstate returns, due to inflation in the 1914-1947 period being understated. Differences in inflation data over this period drive almost all of the (approximately 0.3%) higher average real equity return using the 2019 Yearbook's inflation series, compared to that obtained using the Bank's inflation series.<sup>63</sup> We consider that the Bank's inflation series over this period - an implied deflator for consumers' expenditure based on unofficial estimates of the national accounts featured in O'Donoghue et al. (2004)<sup>64</sup> - is of better quality than the alternative Cost of Living Index (COLI) used in the 2019 Yearbook.<sup>65</sup> This is mainly due to the weights in the COLI, which were not updated over this period, and based on a subjective assessment of what constituted legitimate expenditure. Our view is supported by Office for National Statistics guidance, which states: *'The implied consumers' expenditure deflator is preferred to the COLI, mainly due to the latter's relatively limited coverage in terms of both products and population, together with concern about the quality of the weights.'*<sup>66</sup>

We find no evidence in cited sources to corroborate the claim that the series for 1914-1949 is intended as a proxy for RPI, while several features are clearly more CPI-like (e.g. no 'formula effect', and excluding mortgage interest and depreciation). We also do not agree that Economic Insight's concerns about the consumption deflator understating inflation due to failing to reflect substitution effects are relevant to the choice between the two inflation series in question. We consider that the fixed weights used in the 2019 Yearbook's COLI for 1914-1947 would be more likely to misrepresent substitution effects than following a deflator approach.

We conclude that it is preferable to use the Bank of England's historical CPI series over other available inflation series.

---

<sup>62</sup> For instance, the ONS's 2012 [review of 30 countries](#) found none of them used the Carli averaging methodology used in the RPI.

<sup>63</sup> For instance, substituting the Bank of England inflation for the 2019 Yearbook inflation in these years results in whole-period arithmetic and geometric average returns which are the same to 1 decimal point.

<sup>64</sup> O'Donoghue et al, *'Consumer price inflation since 1750'*, ONS Economic Trends, March 2004

<sup>65</sup> The direct source is *Retail Prices 1914-1990*, Central Statistical Office 1991, which on p1 states that the Cost of Living Index is used to provide figures from 1914.

<sup>66</sup> Office for National Statistics, *'Consumer Price Indices Technical Manual, 2007 edition'*, p73

**d) Using the Bank of England's historical CPI series runs counter to our commitment to a transition to CPIH that is NPV-neutral for investors.**

Frontier Economics' report for three companies<sup>67</sup> suggests that our use of this series represented a reneging on our commitment to an NPV-neutral transition to CPIH, as it in practice has the effect of lowering the allowed return on equity.

Our use of the Bank of England's historical CPI series is unrelated to our decision to move to using CPIH as our primary inflation index. There would be a strong case for using this series even if we retained full RPI indexation, as RPI is not available prior to 1947, and we consider that the 2019 Yearbook's use of the Cost of Living Index over 1914-1947 is likely to understate inflation over this period. We also observe that the Civil Aviation Authority currently indexes to RPI and has based its ex-post TMR estimate on analysis featuring the Bank of England's CPI series.<sup>68</sup>

Although we recognise that our use of a CPI-based series to deflate historical nominal returns results in a lower TMR figure compared with PR14, this is the result of using more accurate and comparable historical inflation data; it is not related to our policy decisions over how indexation will operate from 2020 onwards.

**e) Our holding period assumption of 5-10 years is too long**

Economic Insight (for Bristol Water) suggests that our assumed holding period of 5-10 years is inconsistent with evidence on institutional investor holding periods. For instance, a 2016 Schrodgers investor survey<sup>69</sup> suggests individual investors hold investments for around 3 years, while pension fund investors have an average holding period of 4.7 years. The consultancy argues that we should therefore include 'ex-post' estimates assuming 1-year holding periods within our plausible range, and that a 10 year holding period is not supported by the evidence.

Our regulatory framework assumes an allowed return on equity which is fixed over five years. This means the Total Market Return assumption is also fixed over this period. When considering the appropriate benchmark Total Market Return for a water investor, we therefore consider it more logical to focus on the evidence for historical holding periods of at least five years, rather than one year.

---

<sup>67</sup> South West Water, Wessex Water and Thames Water

<sup>68</sup> Civil Aviation Authority, 'UK RP3 CAA Decision Document: Appendices', August 2019

<sup>69</sup> Schrodgers, 'Global Investor Study 2016 – Plan Sponsors', September 2016

Our 5-10 year range for holding periods is also consistent with the advice to regulators from the UKRN Study (which endorses a 10 year holding period),<sup>70</sup> investor surveys,<sup>71</sup> and also regulatory decisions. For instance, the Competition Commission stated in its 2014 redetermination of Northern Ireland Electricity's price control, *"The length of the period over which the return to be averaged is measured is a complex issue. The relevant period would seem to be the period for which investors expect to be invested in the market (we describe this as the holding period). It seems very unlikely that this is as short as one year. Because of their price variability, equities are usually regarded as a long-term investment."*<sup>72</sup>

### **f) The dividend growth assumption used in our dividend discount model analysis is too low**

Southern Water, Yorkshire Water and Economic Insight (for Bristol Water) suggest that dividend discount models by PwC and Europe Economics used assumptions which were too low. They suggest that the assumption that dividends should grow at the same rate as GDP growth is speculative, and that we should place weight on the Bank of England's dividend discount model. The Bank of England no longer publishes updated forecasts from this model, but Economic Insight notes that its latest (March 2017) implied estimate of Total Market Return was 8.8% in CPIH terms, based on a 5 year rolling average.

We recognise that the appropriate choice of dividend growth assumption in dividend discount models remains contentious, with different assumptions having a material impact on resultant estimates of TMR. We note however that there is long-run empirical support for dividend growth being lower than GDP growth. The Competition Commission noted in 2014 that the growth rate in real UK dividends was 0.5% over 1900-2010, compared to real GDP growth of 1.89% over the same period.<sup>73</sup> In addition, PwC's (2017)<sup>74</sup> advice to us also concluded that GDP-growth estimates could be an overestimate, noting that: *"in the longer-term it would be difficult for investor earnings to grow at a different rate to the broader economy without a material shift in the structure of the economy and the distribution of income shares between capital, labour and government."*

<sup>70</sup> P. Burns et al., *'Estimating The Cost of Capital For Implementation of Price Controls by UK Regulators'*, March 2018 Appendix E, p125

<sup>71</sup> 27 per cent of institutional investors target holding periods above 5 years. Source: Schroders, *'Institutional Investor Study 2019'*, June 2019, p9

<sup>72</sup> Competition Commission, *'Northern Ireland Electricity Limited price determination'*, March 2014, Appendix 13.3, para 2.,

<sup>73</sup> Competition Commission, *'Northern Ireland Electricity Limited price determination'*, March 2014, 13.154

<sup>74</sup> PwC, *'Refinancing the balance of incentives for PR19'*, June 2017

For our PR19 methodology, we expressed concerns around relying on the Bank of England Dividend Discount Model to inform estimates of Total Market Return. The Bank's description of its model sets out that its focus is on changes in the rate of equity risk premium over time, rather than their precise level (which is our focus).<sup>75</sup> In addition, the Bank of England's model uses analyst forecasts of dividend growth to generate its outputs. It has long been recognised in published papers such as De Bondt & Thaler (1990)<sup>76</sup> and Chan et al (2003)<sup>77</sup> that these forecasts tend to be subject to optimism bias. This would result in an upwards bias to the outputs of a Dividend Discount Model reliant on analyst forecast data.

In conclusion, we consider DDM models which use a growth assumption based upon GDP growth provide a reasonable basis for generating forward-looking estimates of TMR. We do not consider the (no longer published) outputs from the Bank of England's DDM model to be suitable for assessing the level of the TMR for setting regulatory price controls.

**g) Our dividend discount model evidence is based on geometric averaging, which does not compensate investors for share price volatility**

Southern Water suggests that our DDM outputs should have an upward adjustment applied to compensate investors for historical volatility in share price values, which it states has historically been higher than that of dividend growth.

We addressed the use of volatility adjustments in our PR19 methodology. We continue to maintain our position that such an adjustment is unnecessary because of PwC analysis including buybacks, which shows that the higher volatility of capital growth compared to dividend growth (which provides the rationale for the adjustment in Fama & French's 2002 paper)<sup>78</sup> has reversed in recent years and therefore no such adjustment is required.<sup>79</sup> In addition, as set out by Europe Economics (2017),<sup>80</sup> while GDP growth estimates are often conceived of as a proxy for dividend growth, there is no intrinsic reason why average GDP growth could not be conceived as providing a direct estimate of total return (i.e. both dividend growth and capital growth). In this case, a volatility adjustment would be unnecessary because the

---

<sup>75</sup> W. Dison, A. Rattan, 'An improved model for understanding equity prices', Bank of England Quarterly Bulletin 2017 Q2, p93

<sup>76</sup> De Bondt & Thaler, 'Do security analysts overreact', The American Economic Review, Vol 80, No. 2. May 1990

<sup>77</sup> Chan et al. 'The level and persistence of growth rates' The Journal of Finance, Vol LVIII, No 2. April 2003

<sup>78</sup> Fama & French, 'The Equity Premium', The Journal of Finance, 2002

<sup>79</sup> PwC, 'Updated analysis on cost of equity for PR19', December 2017, p16

<sup>80</sup> Europe Economics, 'PR19 – Initial Assessment of the Cost of Capital', December 2017, p31

component of return attributable to capital growth would be accounted for in the growth rate assumption.

#### **h) Our choice of a 5 year trailing average for dividend discount models is inconsistent with decisions taken on other cost of capital components**

South East Water suggests that our approach using 5 year averages of dividend discount model outputs rather than spot values is inconsistent with our draft determinations approach to other cost of capital parameters, such as the risk-free rate, which is based on a spot value averaged over the most recent month period.

We have, since our 'early view' cost of capital used 5 year averages of dividend discount model outputs, as the high degree of volatility makes spot estimates unsuitable to inform our estimate for Total Market Return for a 5 year period. Europe Economics (2017)<sup>81</sup> finds through statistical tests and academic research that 5-year rolling averages are a better predictor of future returns than spot values. This is in contrast to the risk-free rate, where spot values provide the best estimates of the future path of long-term interest rates.

Using shorter trailing averages would risk skewing our point estimate with volatile data which would be less likely to be representative of Total Market Return in 2020-25, based on Europe Economics' analysis.

#### **i) Our Market-to-Asset Ratios (MARs) analysis was outdated and should be updated or removed**

Severn Trent and Hafren Dyfrdwy note that we continued to place weight on our MARs analysis in our draft determination allowed return on capital analysis, which used data from 2016 and 2017, despite evidence showing that MARs had declined since that point. These companies suggest that we should update the analysis or exclude it from our consideration.

The purpose of the exercise PwC carried out for us in 2017 was in part to understand the extent to which the past allowed return on equity was in excess of the required return by investors. Since we have published our assessment of allowed returns in our PR19 early view and draft determinations, we expect these have informed market expectations. This creates a circularity, which was less prevalent in the 2017 work before we had provided any information on likely allowed returns in PR19. We have not therefore updated the MARs analysis and agree that it should not inform our overall TMR range.

---

<sup>81</sup> Ibid. p30

### 5.3.3 Total Market Return: our final determination decision

We have reviewed the stakeholder representations and evidence available to make our final determination. This results in our conclusion that for:

- **‘Ex-post’ approaches:** We note analysis from Europe Economics however, that in nominal terms, the average annualised return for the FTSE All Share index between June 1995 and September 2019 has been 8.66% in nominal terms (or 6.53% in CPIH terms).<sup>82</sup> Other than this, no new data on long-run historical equity returns has become available since we derived our ‘ex-post’ TMR range of 6.5% to 6.6% for draft determinations. As set out in section 5.2.2, we do not agree with representations that recommended placing more weight on alternative inflation indices and other estimators. We therefore retain this range for our final determination.
- **‘Ex-ante’ approaches** – There is no new relevant data since deriving our draft determination ‘ex-ante’ TMR range of 5.9% to 6.6%. Stakeholders did not raise issues with our ex-ante evidence. We therefore retain this range for our final determination.
- **‘Forward-looking’ approaches** – Since deriving our ‘forward-looking’ range for draft determinations of 6.0% to 6.8%, we have commissioned updated evidence on dividend discount models from consultants Europe Economics and PwC giving results up to September 2019. As set out in section 5.2.2, we disagree with representations around the source of dividend growth assumption and the need for a volatility adjustment, and so the models are unchanged from draft determinations. The range of 5 year rolling averages from these models is slightly higher, at 6.1% to 6.9% (see table 5.4). We have decided to adopt this range as our updated ‘forward-looking’ range, as our other forward-looking evidence is either more subjective (finance practitioner surveys), or not recent enough (Market-to-Asset Ratio analysis).

---

<sup>82</sup> Europe Economics, *‘The Cost of Capital for the water sector at PR19: final advice,’* December 2019, p23

**Table 5.4: TMR estimates implied by Dividend Discount Models (September 2019, CPIH basis)**

Originator	Dividend growth assumption	Implied TMR (5 year rolling average)
Europe Economics <sup>83</sup>	GDP growth	6.1%
	Historical dividend growth	6.6%
PwC <sup>84</sup>	GDP growth	6.9%
Overall range		6.1%-6.9%

Table 5.5 details TMR assumptions used by other economic regulators since we published our 'early view' allowed return on capital in December 2017. We note that regulatory estimates have over time converged to lie within the UKRN Study's recommended range of 6 to 7 per cent in CPI-deflated terms.

<sup>83</sup> Europe Economics, *'The cost of capital for the water sector at PR19'*, December 2019

<sup>84</sup> PwC, *'Updated DDM analysis for PR19'*, October 2019

**Table 5.5: TMR estimates from regulatory publications, 2017-2019**

Regulator	Date	Price control phase	TMR point estimate (at 2.0% CPI)
Ofwat	Dec 2017	PR19 'early view'	6.47%
Ofcom	Mar 2018	WLA (final)	7.06%
Ofcom	Nov 2018	BCMR (draft)	6.70%
Ofgem	Dec 2018	RIO-2 Framework consultation	6.54%
CAA	Feb 2019	NERL (draft)	6.43%
Ofgem	May 2019	RIO-2 Framework decision	6.50%
Ofcom	Jun 2019	BCMR (final)	6.60%
Ofwat	Jul 2019	PR19 draft determinations	6.50%
CAA	Aug 2019	NERL (final)	6.43%

Source: Ofwat analysis of regulatory publications, 2018-2019

Overall, we conclude, despite a small increase to our 'Forward-looking' range, that there is insufficient evidence to move from our draft determinations point estimate of **6.50%** in CPIH terms – which remains within the ranges for each of our three approaches, and is the recommendation of our consultants, Europe Economics. We restate our estimate below in nominal terms, deflating for our assumed future long-term average level of RPI and CPIH:

- **8.63%** - nominal;
- **6.50%** - CPIH based, assuming 2.0% CPIH; and
- **5.47%** - RPI based, assuming 3.0% RPI.

## 5.4 Equity beta

Equity beta is a measure of a stock's relative sensitivity to market-wide risks when considered against a broad portfolio of equities. Finance theory states that investors will accept lower returns for stocks with low equity beta, as these stocks help to reduce the overall volatility of a well-diversified investment portfolio.

### 5.4.1 Equity beta: what we said in our draft determinations

For draft determinations, we retained our 'early view' approach of using the Harris Pringle<sup>85</sup> approach to calculating an estimate of equity beta for the notional company<sup>86</sup>. This involved a 3 step process:

1. Taking a direct regression-based estimate of equity beta ('raw equity beta') using returns data for listed water companies and the FTSE All Share Index.
2. Adjusting this estimate to strip out the impact of listed company gearing ('unlevering')
3. Adding back the impact of gearing up to our notional level of 60% ('re-levering').

To derive our point estimate of beta we used data from two of the three listed water companies: Severn Trent, and United Utilities. We decided against using data from Pennon (owner of South West Water), because a significant proportion of its revenues derive from activities outside of regulated water (unlike the other two companies).

Supported by the recommendation of Europe Economics, we decided to focus on two year daily betas, as we considered that that two years amounted to a sufficient window to minimise the distorting impact of short-term volatility, but short enough to capture more recent data that was likely to be more relevant to 2020-25. We focused on daily data as it maximised the number of data points, which allows for more precise estimates. We drew on econometric estimates of beta produced by both OLS and GARCH estimators. The latter estimator has been recommended by the UKRN Study and Indepen (2018)<sup>87</sup> as it is designed to address time-variant volatility<sup>88</sup> commonly found in financial time series.

<sup>85</sup> Harris, R.S. and J.J. Pringle (1985), "Risk-Adjusted Discount Rates Extension from the Average-Risk Case", *Journal of Financial Research*, (Fall), 237-244.

<sup>86</sup> Europe Economics, 'PR19 – Initial Assessment of the Cost of Capital', December 2017, pp50-51

<sup>87</sup> Indepen, 'Beta Study – RIIO-2, Main Report', December 2018

<sup>88</sup> i.e. Sometimes referred to as heteroscedasticity, this refers to the phenomenon of data with a standard deviation which is not constant over time.

Our estimates of equity beta following unlevering and re-levering incorporated a debt beta of 0.125. A positive debt beta reduces the re-levered equity beta, as it recognises that a portion of systematic risk is borne by debt, and so does not require compensation in the equity yield. Our point estimate for debt beta was based on analysis by Europe Economics, which used a decompositional approach to derive an estimate of debt beta from the risk premium in the iBoXX A/BBB 10yrs+ non-financials index. We picked a point estimate which was at the low end of the range of a 2 year rolling average of results from this decompositional approach. This cautious approach recognised the volatility of debt beta estimates, and the uncertainty around whether current estimates of debt beta would persist into 2020-25.

We concluded that the plausible range for unlevered beta was 0.28-0.29. This was the range denoted by estimates of 2 year daily betas calculated using OLS and GARCH, respectively. In constructing this range, we focused on 2 year daily betas, with a cross-check to 1 and 5 year estimates, primarily based on the recommendations from our consultants Europe Economics – who recommended using 2 year daily data on the basis that daily data produced more precise estimates, and best struck a balance between too long trailing windows (risking inclusion of obsolete data) and too short windows (too much uninformative volatility). Europe Economics also reviewed estimates of 1 year daily and 5 year daily betas as cross-checks. The consultancy found that the average of its cross-checks resulted in a figure very close to its recommended 2 year estimate of 0.28, thereby not presenting a strong case to adjust this estimate upwards or downwards.

From our narrowed unlevered beta range of 0.28-0.29 range we picked 0.29 as our point estimate. This produced a re-levered equity beta of 0.71 for our notionally geared company.

#### **5.4.2 Equity beta: stakeholder representations and our response**

Stakeholder representations on equity beta are generally critical of our approach at draft determinations, although several representations supported our definition of gearing. Below we set out issues raised by stakeholders and our response:

##### **a) Our point estimate uses data from too narrow a sample of companies and ought to include Pennon and companies in other regulated utility sectors.**

Representations from Dŵr Cymru, United Utilities, Southern Water, and South East Water suggest that we should consider a wider set of companies than just Severn Trent and United Utilities in our equity beta analysis. They suggest this approach would be more consistent with that of Ofgem (whose RIIO-2 beta estimate draws on

cross-sectoral evidence), and also that this additional data could improve our estimate as these companies had similar risk profiles and regulatory frameworks to those of water companies.

The two companies we focused on to derive our point estimate of beta (Severn Trent and United Utilities) do not earn significant revenues outside of their core business of being regulated water and sewerage undertakers. This makes them particularly suitable to inform the equity beta of the notional company, which by construction contains no unregulated activities. In contrast, including in the scope of our analysis companies with significant non-water activities (e.g. Pennon) would result in additional volatility from the business risks of those activities feeding through into our estimate of the regulated water sector notional beta. We therefore consider that including such data would be unjustified - causing our estimate of beta to diverge from the true value for a regulated notional company.

**b) Our focus on 2 year daily betas is inappropriate – we should place weight on longer periods and lower frequencies.**

Eleven stakeholders' representations are opposed to what they considered to be the excessive weight we placed on 2 year daily betas to inform our point estimate of unlevered beta for draft determinations. In particular:

- Severn Trent, Hafren Dyfrdwy, SES Water and Economic Insight (for Bristol Water) argue that 2 year daily betas are unsuitable, due to being prone to periods of uninformative volatility. One example cited is the fall in 2 year daily betas between the end-February value of 0.29 and its end-June value of 0.26. Representations tend to argue that two year beta evidence we used for draft determinations was anomalous and not in line with results using longer-term trailing windows (the use of which was argued to be more strongly aligned with the view of the UKRN Study and past CMA decisions).
- Dŵr Cymru argues that the 2 year beta estimate risks capturing feedback effects from the price review process itself, arguing that PR19 decisions affecting listed companies used to estimate beta could result in even lower subsequent estimates of beta through affecting share price and gearing for these companies. It suggests that using a longer trailing window would somewhat mitigate this risk.
- South Staffs Water and First Economics (for Yorkshire Water) consider that our approach is inconsistent with the PR14 approach which was based on inspection of data over longer timeframes, for instance 5 years. First Economics argues that a move away from our PR14 approach would increase perceptions of regulatory inconsistency. It recommends that we should take an average over 5 years of 2 year beta, which according to its calculations produces an unlevered beta of 0.33.

- Frontier Economics, in a report for three companies, argues that our approach is a departure from precedent and out of line with the methodology adopted historically and in other regulated sectors. It proposes we base our estimate on 2, 5 and 10 year betas.
- United Utilities, argues that our focus on daily data could be producing incorrectly low estimates of beta due to the Epps effect, a phenomenon where measured correlation in high frequency data is biased downwards. It recommends using lower frequency data (i.e. weekly or monthly).

We note that the overall range of betas estimated using the GARCH method for our draft determinations was 0.26 (1 year daily betas) to 0.33 (5 year monthly betas). Our point estimate of 0.29 sits broadly in the middle of this range. Representations tend to omit mention of one year betas, despite evidence that this duration has been endorsed in previous academic advice to economic regulators.<sup>89</sup> This may explain recommendations on the level of point estimate which are higher than our point estimate. Despite increased volatility and smaller samples which would suggest that one year betas should not solely be used to derive an estimate, we continue to consider that they provide useful information to inform the appropriate point estimate for unlevered beta.<sup>90</sup>

As we require a forward-looking beta (i.e. the best estimate of that which will prevail over 2020-25), it is relevant to consider which betas have the greatest predictive power over similar timeframes. Analysis carried out by Europe Economics<sup>91</sup> indicates that the spot value of 2 year beta is a better predictor of the future average value of 2 year beta in an ensuing 5 year period compared to other durations of beta (i.e. 1-year, 3-year, and 5-year). Europe Economics also provides analysis demonstrating that shorter betas (i.e. 1-year and 2-years) derived using a data cut-off close to the point at which final determinations are made have been better predictors of the average 2 year beta over the subsequent price control period in water than longer durations of beta. We agree with Europe Economics that this strengthens the case for placing most weight on 2 year betas.

We were partially persuaded by representations which recommended more weight should be placed on longer duration betas. This is as:

---

<sup>89</sup> Mason et al, 'A study into certain aspects of the cost of capital for regulated utilities in the UK'. February 2003, p87

<sup>90</sup> For instance, the one year equity beta is based on half the two year equity beta data, and so the former has predictive power over the evolution of the latter.

<sup>91</sup> Europe Economics, 'The Cost of Capital for the water sector at PR19: final advice,' December 2019

- Such a decision would be aligned with our approach from PR14, which placed weight on 2 year daily and 5 year monthly betas to set our unlevered beta point estimate of 0.30.<sup>92</sup>
- We could not rule out that the price review process itself could be affecting unlevered beta via impacts on listed company returns and gearing, and agree that placing more weight on durations longer than 2 years could mitigate this issue by encompassing more data from periods less affected by price review activity.
- Recent regulatory decisions have placed weight on 5 year data – for instance Ofcom in 2018 placed weight on a 5 year daily beta to set British Telecom’s cost of capital.<sup>93</sup> The Competition and Markets Authority also drew on 2 year and 5 year betas to inform its plausible range for its re-determination of Bristol Water’s price control in 2015.<sup>94</sup>
- We consider that it is therefore appropriate to place more weight on 5 year data in our point estimate than at draft determinations. We do not consider it appropriate to reflect 10 year betas in our point estimate due to the inclusion of very old data from previous price controls which we consider to be of little relevance to a forward-looking estimate for 2020-25.

The Epps effect describes a phenomenon where the covariance of returns between assets is biased to zero at high sampling frequencies. The bias is usually explained as being due to non-trading of a share in a sample interval - when this is accompanied by trading in the benchmark index, this will tend to reduce the measured correlation. The chances of this happening increases at higher sampling frequencies, exacerbating the effect. Europe Economics investigated daily betas for Severn Trent and United Utilities to assess whether thin trading could be introducing a bias, concluding through statistical analysis (the “Dimson test”) that there is no evidence of thin trading introducing a downwards bias.<sup>95</sup> This finding is consistent with advice to economic regulators from Mason et al. (2003):<sup>96</sup> *‘For large stocks it is very likely that any impact of general market conditions is reflected in transaction prices and quoted prices’*.

### **c) Our beta analysis is backwards-looking and so cannot capture systematic risks which will arise in 2020-25**

<sup>92</sup> Ofwat, *‘PR14 Final Determinations: policy chapter A7 – risk and reward’*, December 2014, p36

<sup>93</sup> Ofcom, *‘Business connectivity market review’*, Annexes 1-22, November 2018

<sup>94</sup> Competition and Markets Authority, *‘Bristol Water PLC, A reference under section 12(3)(a) of the Water Industry Act 1991’*, October 2015, Appendices A10(1)-23

<sup>95</sup> Europe Economics, *‘The Allowed Return on Capital for the Water Sector at PR19 – Final Advice’*, December 2019

<sup>96</sup> Mason et al, *‘A study into certain aspects of the cost of capital for regulated utilities in the UK’*. February 2003

Frontier Economics' report for three companies raises the prospect of beta risks which it argues could crystallise over 2020-25 – and which our beta estimation methodology might not capture, being based on historical data. These risks are cited as:

- Brexit –that there is potential for beta to increase (greater impetus for nationalisation) or decrease ('flight to quality' scenarios).
- Climate change – that the pace and scale of future UK climate change is uncertain and potentially not reflected in beta estimates of listed water companies.
- Regulatory risks – that the overall forecast Return on Regulated Equity (RoRE) risk range is wider at PR19 draft determinations compared with PR14, and downside skew to returns more pronounced.

Frontier argues that these factors warrant picking a beta estimate from the top of any overall beta range. We are not convinced by this argument for the following reasons:

- Betas are forward-looking, reflecting the market view on risks and how likely they are to crystallise – we consider it is arbitrary to discount lower beta estimates, as we consider that the impact of market expectations on share prices will have an impact on all frequencies and durations of beta.
- As recognised by Frontier, Brexit risk could cause beta to increase as well as decrease. This does not offer an actionable insight into how our estimate should be adjusted, or what level of adjustment might be appropriate.
- On climate change, Frontier's argument is somewhat speculative – assuming rather than proving that undiversifiable risk would increase (and at the same time arguing that companies would be affected differently), and assuming that these risks would be materially different over 2020-25 compared to the periods used to derive different durations of beta.
- As set out in section 5.1.2, we do not accept that skewness in company risk ranges represents a defensible reason to make adjustments to parameters informing the allowed return on capital. We consider that an approach would likely be poorly-targeted, has limited grounding in the CAPM framework, and would risk undermining the incentive properties of our regulatory regime.

#### **d) Ofwat should retain enterprise value gearing when unlevering and re-levering beta.**

Our point estimate from draft determinations was based on using enterprise value gearing, consistent with our approach for our 'early view' allowed cost of capital. We noted that alternative views existed on the correct definition of gearing to use, with

both the UKRN Study and Indepen report containing criticism of our 'early view' approach. We invited views from stakeholders on two alternatives:

- using book value gearing; and
- adjusting book value gearing by the ratio of enterprise value to RCV (we described this as the 'Indepen approach').

SES Water and Frontier Economics (in its report for three companies) both reject the book value approach as implausible and inconsistent with financial theory. The primary reason for this assessment is that this approach implies that the risk faced by equity shareholders is the same regardless of how the market values this equity.

The Indepen approach is recognised as a valid alternative by these companies, but representations challenge the likelihood in practice of Indepen's suggested adjustment factor of 1.1x RCV. SES Water argue that the multiple sources of efficiency and service quality challenge in PR19 make it unlikely that the notional company will achieve the level of outperformance associated with a 1.1x RCV value. Severn Trent Water raise concerns about potential interactions between adoption of the Indepen approach and calibration of performance and totex incentives, arguing that it would be inappropriate for us to adopt this approach at such a late stage in the price review process.

We agree with representations that both the 'Indepen' and enterprise value gearing approaches represent acceptable definitions of gearing when deriving unlevered beta. Following the recommended approach of our advisors, Europe Economics, we have decided to retain the enterprise gearing approach for final determinations. We note that this definition of gearing returned a materially higher figure for re-levered notional equity beta (0.71) at draft determinations than the Indepen approach (0.64). The lower figure of 0.64 is also the figure which would have resulted from following the recommendation of some UKRN Study authors and Citizens Advice,<sup>97</sup> who favour the use of a raw equity beta as the notional equity beta assumption.

#### **e) Our debt beta point estimate is too high.**

South East Water suggest that our point estimate of 0.125 from draft determinations should be lower or zero, citing a paper by Zalewska (2019)<sup>98</sup> that produces debt beta estimates which are negative or close to zero over several estimation periods, while Economic Insight (for Bristol Water) suggest that the increase in debt beta is not

---

<sup>97</sup> Citizens Advice, *'Monopoly money: How consumers overpaid by billions'*, May 2017, p38

<sup>98</sup> NERA, *'Cost of equity for RP3, April 2019; Professor Zalewska, Estimation of the debt beta of the bond issued by Nats (En-Route) plc,'* April 2019

consistent with an increase in our ‘outperformance wedge’ on the cost of debt from 15 to 25 basis points.

For our final determination we have reverted to an ‘outperformance wedge’ on new debt of 15 basis points (see section 6.2.3), and we note that Europe Economics’ updated analysis captures the 15 basis point adjustment.

The Zalewska paper’s conclusion of a zero or negative debt beta for iBoxx index constituents is incongruous with wider evidence, as it implies that all of the debt premium can be accounted for in the company-specific risk of default. As argued by Europe Economics, even for half of typical debt premiums to be attributable to this effect would imply that in each year over 80 per cent of investment-grade corporate debt is expected to default – this seems implausible.<sup>99</sup>

In any case, negative point estimates of beta and confidence intervals encompassing zero are commonly encountered issues with regression-based debt beta approaches, and mirror both Europe Economics’ analysis supporting its cost of capital recommendation for draft determinations,<sup>100</sup> and earlier findings (e.g. by the Competition Commission in 2007<sup>101</sup>) that decompositional debt beta approaches are preferred on grounds of poor statistical properties of regressions and associated data quality issues.

Furthermore, the Zalewska paper’s estimates of debt beta using the iBoxx A/BBB indices focuses entirely on estimates of debt beta using daily and weekly data, whereas using monthly data produces results which are more consistent with positive estimates produced by the decomposition approach (Figure 5.6). We are concerned that the relatively more infrequent trading of debt instruments relative to equity indices such as the FTSE could bias downwards the estimates of debt betas using daily data (this is the “Epps effect”, as discussed in section 5.4.2.b). This justifies using a monthly sampling frequency.

---

<sup>99</sup> Europe Economics, ‘*The Cost of Capital for the water sector at PR19: final advice*,’ December 2019, p38

<sup>100</sup> Europe Economics, ‘*The Cost of Capital for the Water Sector at PR19*,’ July 2019, p61

<sup>101</sup> See p F24 of [https://webarchive.nationalarchives.gov.uk/20140402235745/http://www.competition-commission.org.uk/assets/competitioncommission/docs/pdf/non-inquiry/rep\\_pub/reports/2007/fulltext/532af.pdf](https://webarchive.nationalarchives.gov.uk/20140402235745/http://www.competition-commission.org.uk/assets/competitioncommission/docs/pdf/non-inquiry/rep_pub/reports/2007/fulltext/532af.pdf)

**Figure 5.6: Monthly spot estimates of 5 year monthly debt beta based on regression involving iBoxx non-financials 10yrs+ A/BBB indices and FTSE All Share)**



Source: Ofwat analysis of Refinitiv and IHS Markit data

In summary, we consider that the decompositional approach is an appropriate way of estimating debt beta, and limited weight should be attached to the findings of the Zalewska paper.

### 5.4.3 Equity beta: our final determination decision

#### a) Raw beta

We commissioned Europe Economics to provide updated analysis of equity beta using our data cut-off of 30 September 2019. We focus on a weighted average composite<sup>102</sup> of betas from Severn Trent and United Utilities. As set out in section 5.4.2, we consider that adding Pennon or non-water companies to our sample would introduce inaccuracy to our notional company beta estimate by introducing a component of non-water sector risk to returns.

Figure 5.7 demonstrates that betas estimated at all durations (1, 2 and 5 years) have declined since our draft determination data cut-off of 28 February 2019 (shown as a red dotted line). These falls are particularly pronounced for 1 year daily and 2 year weekly betas.

<sup>102</sup> Weights are provided by the market capitalisation of each company.

**Figure 5.7: Ordinary Least Squares estimates of raw equity beta (Severn Trent - United Utilities composite, January 2017 to September 2019)**



Source: Ofwat and Europe Economics analysis of Refinitiv data

Table 5.6 compares estimates of raw beta for our composite of Severn Trent and United Utilities, based on OLS and GARCH estimators. These figures produce an overall range of 0.42 to 0.71.

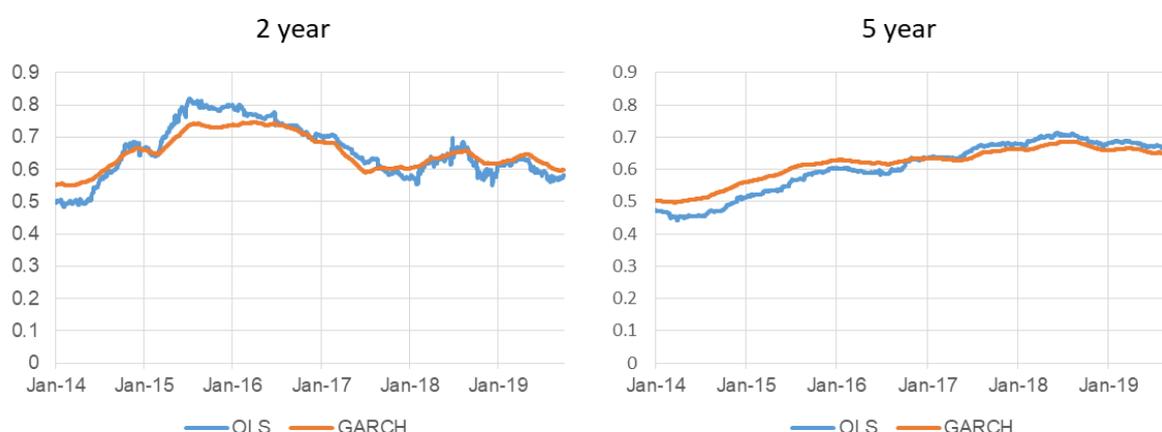
**Table 5.6: Comparison of OLS and GARCH raw betas (Severn Trent - United Utilities composite, September 2019)**

	Estimator	1 year	2 year	5 year
Daily	OLS	0.45	0.58	0.66
	GARCH	0.48	0.60	0.64
Weekly	OLS	n/a	0.42	0.63
	GARCH	n/a	0.53	0.62
Monthly	OLS	n/a	n/a	0.71
	GARCH	n/a	n/a	0.65

Source: Europe Economics analysis of Refinitiv data

We focus on 2 year and 5 year daily beta over time, due to the relatively more stable path these formulations of beta have taken over time, and correspondingly greater chance that the level of prevailing raw beta over 2020-25 will be more closely aligned with an estimate based on these formulations. Our decision also reflects our acceptance of company representations suggesting we place weight on longer-duration betas. Since the start of 2017, 2 year daily betas have broadly remained within a band of roughly 0.55 to 0.70, with 5 year daily betas broadly within in the 0.65 to 0.70 range.

**Figure 5.8: 2 year and 5 year daily betas (Severn Trent - United Utilities composite, January 2014 to September 2019)**



Source: Ofwat and Europe Economics analysis of Refinitiv data

Placing weight both on the most recent evidence, and evidence on recent values which the more stable 2 year and 5 year daily betas have taken, we consider a plausible range for raw beta to be 0.58 to 0.66.

### b) Listed comparator gearing

Following careful consideration of representations, other regulators' decisions, and academic publications, we have opted to retain our enterprise value approach to defining gearing from draft determinations. We maintain our view that applying the 'Indepen Approach' (see section 5.4.2) is acceptable, however. Table 5.7 sets out trailing average gearing at the different durations of beta which we consider.

**Table 5.7: Trailing averages of net debt to enterprise value for Severn Trent / United Utilities composite (September 2019)**

	1 year	2 year	5 year
ND / EV	56.7%	56.3%	52.1%

Source: Europe Economics analysis of Refinitiv data

For our listed comparator gearing point estimate used in our cost of equity calculation, we take the simple average of 2 year and 5 year daily gearing data, reflecting a raw beta estimate which places weight on both of these durations. This gives a point estimate of **54.2%**. This is the figure we have used to convert our preferred point estimate for unlevered beta to an asset beta.

### c) Unlevered beta

Table 5.8 compares estimates of unlevered beta for our composite of Severn Trent and United Utilities, based on our OLS and GARCH estimates of raw beta from table 5.6 and our estimates of gearing from table 5.7. These figures produce an overall range of 0.18 to 0.34.

**Table 5.8: Comparison of OLS and GARCH unlevered beta (Severn Trent – United Utilities composite, September 2019)**

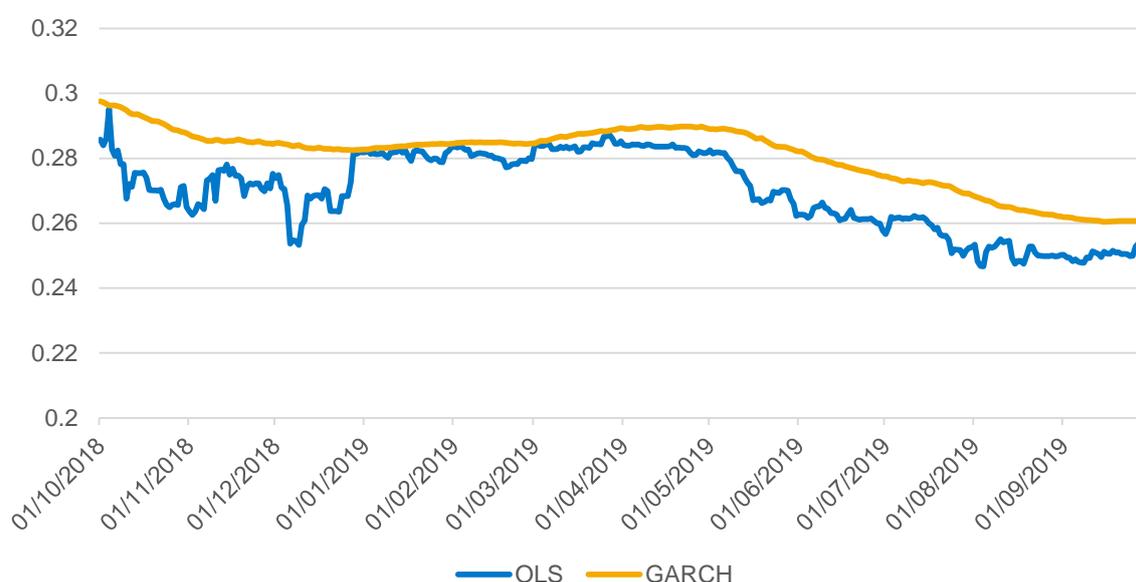
	Estimator	1 year	2 year	5 year
Daily	OLS	0.20	0.25	0.32
	GARCH	0.21	0.26	0.31
Weekly	OLS	n/a	0.18	0.30
	GARCH	n/a	0.23	0.30
Monthly	OLS	n/a	n/a	0.34
	GARCH	n/a	n/a	0.31

Source: Europe Economics analysis of Refinitiv data

We adopt a rounded point estimate for unlevered beta, as we consider that uncertainty in econometric estimation and volatility in share prices affecting enterprise value gearing necessitate taking an in-the-round view of these factors and their joint effect on the appropriate level of unlevered beta for 2020-25.

As set out in section 5.4.2, we consider that there are strong reasons for favouring 2 year daily betas to derive our unlevered beta point estimate. This formulation has the advantage of capturing relatively recent data, has historically been a good predictor of betas in the following 5 year period (see section 5.4.2.), and allows sufficient datapoints to derive point estimates with a high degree of precision. The pronounced fall in 2 year daily unlevered beta since May 2019 (Figure 5.9) does however raise the question of whether currently prevailing levels of 2 year daily beta can be expected to persist into 2020-25, or whether its current level is influenced by transient factors, which may lead it to revert to past levels instead.

**Figure 5.9: Comparison of OLS and GARCH 2 year daily unlevered beta, 2018-2019**



Europe Economic analysis of Refinitiv data

We have considered multiple sources of beta evidence in selecting our point estimate for unlevered beta:

- The overall unlevered beta range from Table 5.8 of 0.18 to 0.34.
- The implied range given by our raw beta plausible range (0.58 – 0.66) of 0.25 to 0.32.<sup>103</sup>
- Europe Economics' plausible range of 0.25 to 0.31 in its final advice to us.<sup>104</sup>
- The Competition and Market Authority's 2015 unlevered beta range of 0.27 to 0.3.<sup>105</sup>
- The desirable properties of 2 year daily betas (range 0.25-0.26) in terms of their predictive power and appropriate balance between focusing on relevant data while retaining statistically robust and stable estimates.
- Our view that it may be appropriate to assign more weight to 5 year data (range 0.30-0.34) relative to draft determinations, taking account of our approach at PR14, stakeholder representations, and other recent regulatory decisions.
- The close tracking of 0.29 by the GARCH estimate of 2 year daily betas over the first half of the last year (Figure 5.9).

<sup>103</sup> This range is derived by unlevering the low (2 year) end of our plausible raw beta range, and the high (5 year) end of the range with gearing figures taken from table 5.7.

<sup>104</sup> Europe Economics, *'The Cost of Capital for the water sector at PR19: final advice,'* December 2019, p36

<sup>105</sup> Competition and Markets Authority, *'Bristol Water PLC, A reference under section 12(3)(a) of the Water Industry Act 1991,'* October 2015, paragraph 10.150

Having due regard to all of these considerations, we have retained **0.29** as our final determination point estimate for unlevered beta. Our decision reflects caution over placing too much weight on recent 2 year daily data (given a pronounced recent fall), and hence we place some weight on 5 year data. We consider our estimate to be subject to considerable uncertainty, and do not discount the possibility that 2 year daily unlevered betas could subsequently move lower than our current assessment, given the current 0.20-0.21 range of 1 year betas.<sup>106</sup> We expect that the evolution of market data will provide firmer confirmation on the appropriateness of 2 year betas as a guide to the unlevered beta likely to prevail over 2020-25.

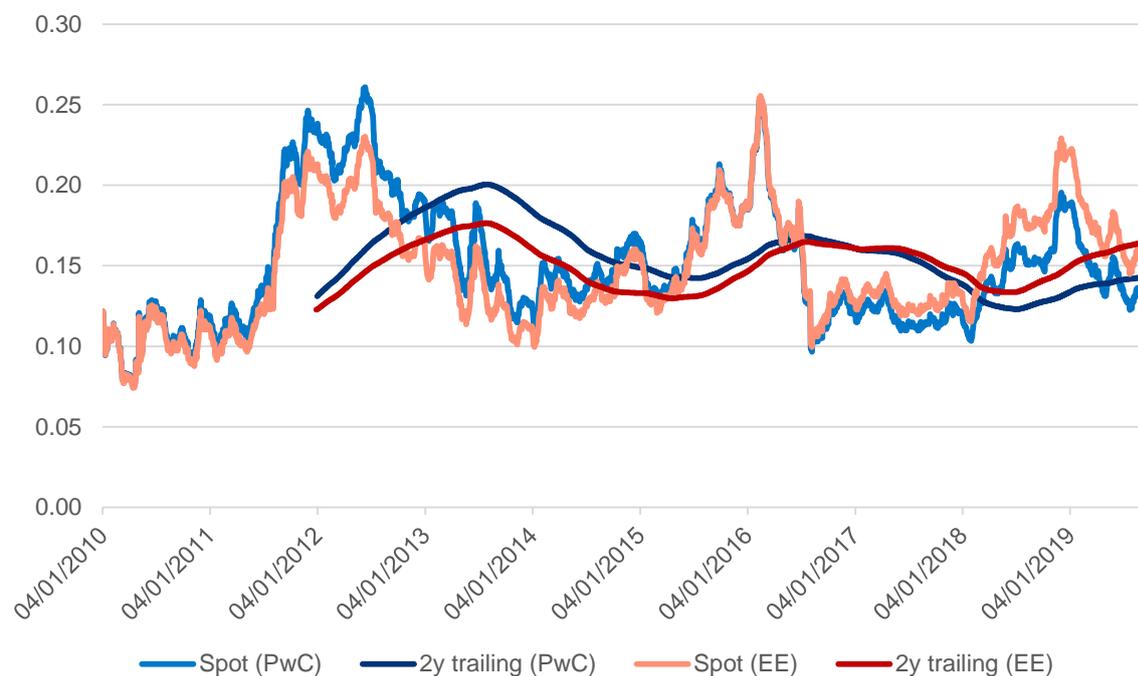
### **Debt beta**

In its final advice to us on the allowed return on capital, Europe Economics has updated its decompositional approach to estimating debt beta. This approach decomposes excess returns for the iBoxx A/BBB debt index after making a 15bps adjustment for new debt outperformance (see section 6.2.3.) and a liquidity premium. The 5 year rolling average of the equity risk premium from Europe Economics' GDP growth dividend discount model is then used to infer a debt beta estimate. As a sensitivity, we also asked Europe Economics to consider how its outputs might vary if it used outputs from PwC's GDP growth dividend discount model instead.

The results of this exercise are set out in Figure 5.10, with summary statistics in table 5.9.

---

<sup>106</sup> As the trailing window used to estimate 1 year beta will be overlapped by the trailing window for 2 year betas 1 year hence, the level of 1 year betas has predictive power over 2 year beta.

**Figure 5.10: Debt premium obtained through the calibrated decompositional approach**

Source: Europe Economics analysis of Refinitiv and PwC data

**Table 5.9: Summary statistics for debt beta decompositional analysis, October 2018 to September 2019**

Source of equity risk premium data		Spot	2 year trailing average
PwC GDP DDM	Range	0.12 – 0.20	0.13 – 0.14
	Average	0.15	0.14
Europe Economics GDP DDM	Range	0.12 – 0.23	0.13 – 0.17
	Average	0.17	0.15

We retain our point estimate of **0.125** from draft determinations. While higher numbers can be supported using outputs from both the PwC and Europe Economics dividend discount models— and despite Europe Economics recommending a point estimate of 0.15 – we have chosen to adopt a figure at the bottom of the 2-year trailing average ranges over the past year. We consider that our approach is supported by CEPA (2019),<sup>107</sup> which notes that results from the decompositional

<sup>107</sup> CEPA, 'Considerations for UK regulators setting the value of debt beta', December 2019

approach are sensitive to the choice of parameters, and that various academic studies support adjustments to debt premia in addition to the liquidity premium (for instance a tax premium). These adjustments would tend to lower the resulting estimate of debt beta.

### Notional equity beta

Table 5.10 sets out how we have brought together our point estimates for gearing, unlevered beta, and debt beta, to derive our notional company equity beta.

**Table 5.10: Notional equity beta for final determinations, September 2019**

		Europe Economics view	Updated view for final determinations	Draft determination view
Raw equity beta	A	0.60	0.63	0.64
Observed gearing	B	56.4%	54.2%	54.7%
Unlevered beta	$C = A \times (1 - B)$	0.26	0.29	0.29
Debt beta	D	0.15	0.125	0.125
Asset beta	$E = C + D \times B$	0.34	0.36	0.36
Notional gearing	F	60%	60%	60%
Re-levered beta	$G = (E - (D \times F)) / (1 - F)$	0.64	0.71	0.71

We note that our point estimate for re-levered beta of 0.71 is within the 0.62-0.76 range proposed by Europe Economics, but higher than its point estimate of 0.64. This can be explained by the consultancy's decision to pick a lower point estimate of 0.26 for unlevered beta, placing most weight on 2 year daily betas with cross-checks from 1 year and 5 year betas.

Beta estimation requires careful judgment, given the relatively wide range of unlevered beta estimates it is possible to derive from the data. The consequences of decisions are highly material to the allowed cost of equity - every 0.01 change in unlevered beta results in an approximate 0.20% change in the allowed cost of equity. In choosing our point estimate of 0.29 for unlevered beta, we have had regard to all relevant considerations, and we have considered our estimate as part of our decision

in the round on the cost of equity (noting there has been an increase in market forecasts for the risk-free rate since the cut-off date we have used), and our final determinations more broadly.

Betas at all frequencies and durations have fallen since the February 2019 data cut-off used for our draft determinations. While this latest market data could be interpreted as supporting point estimates for unlevered beta which are lower than 0.29 (and we note that Europe Economics' point estimate is 0.26), we have placed more weight on 5 year betas, as well as 2 year data from before our July 2019 draft determinations. This evidence is supportive of retaining our point estimate of 0.29 from draft determinations.

Our decisions on the treatment of gearing in beta estimation maintain consistency with our 'early view' and draft determinations and the recommendation of Europe Economics to use enterprise value gearing to unlever and re-lever. Alongside stakeholder representations which opine on the matter, we however recognise the Indepen approach of adjusting book value for the ratio of enterprise value to RCV as acceptable. Applying this approach would result in an unlevered beta of 0.26. We therefore also recognise from this perspective that unlevered beta could take a lower value than our point estimate of 0.29.

Finally, we also note the view of several UKRN Study authors that the appropriate notional equity beta to apply to water companies lies in the range 0.3-0.5.<sup>108</sup> The low end of this range is derived using quarterly data, and the high end denoted by daily data. The authors derive this range based on a regression involving a long-run sample of returns data from 2000-2016, due to their view that rolling beta estimates at commonly used durations (e.g. 2 year betas) risk giving implausibly high values.

For our final determinations, we calculate a re-levered equity beta point estimate of **0.71**. This is higher than our raw equity beta point estimate because of the higher gearing in the notional capital structure compared to our listed comparators.

---

<sup>108</sup> P. Burns et al., 'Estimating The Cost of Capital For Implementation of Price Controls by UK Regulators', March 2018, p9

## 6 Allowed return on debt

We set a cost of debt allowance at a level allowing an efficient company under our notional financial structure to cover its efficient debt interest costs. In this section we discuss the approach used to estimate the overall cost of debt and the components that make up this allowance. We also address comments provided by stakeholders on our draft determinations approach and decisions.

### **Key points from our final determination decision:**

- We retain our overall approach to the allowed return on debt from draft determinations, setting a fixed allowance for embedded debt, and an initial allowance for new debt subject to reconciliation as part of PR24.
- We have updated our analysis of the share of new debt, retaining our July draft determinations estimate of 20% on average over 2020-25.
- We have revised our allowed cost of new debt to account for recent changes in our benchmark index and lowered our 'outperformance wedge' from 25 to 15 basis points.
- We have revised our allowed cost of embedded debt to account for recent changes in our benchmark index and retained our 25 basis point 'outperformance wedge'.
- Our allowance for issuance and liquidity costs is 10 basis points, unchanged from our July draft determinations

The components informing our final determination calculation of the allowed return on debt are summarised in table 6.1.

**Table 6.1: Our final determination decision on the allowed cost of debt for 2020-25**

Component	Draft Determination (CPIH)	Final Determination (CPIH)	Final determination (RPI)	Commentary
Share of new debt (Section 6.1)	20%	20%	20%	Our updated estimate is based on an assessment of three approaches which use company and financial model data to estimate a new debt profile.
Cost of new debt (Section 6.2)	1.33%	0.53%	-0.45%	An initial fixed allowance based on our benchmark index, adjusted for 15 basis points of expected outperformance. To be reconciled based on outturn movements in the index as part of PR24.
Cost of embedded debt (Section 6.3)	2.46%	2.42%	1.43%	Our updated estimate is based on a 15 year average of our benchmark index, adjusted for 25 basis points of expected outperformance.
Issuance and liquidity costs (Section 6.4)	0.10%	0.10%	0.10%	Our estimate is unchanged from draft determinations.
Overall cost of debt	2.33%	2.14%	1.15%	Calculated as the weighted average of the cost of new and embedded debt using the assumed proportions of each as weights.

Our point estimate of 2.14% in CPIH terms is the same as that proposed by Europe Economics. We have collaborated with the consultancy in developing our point estimates, and share the same views over the relevant areas of judgment.

We note that our allowed return on debt of 2.14% in CPIH terms is slightly below the range implied by financial analyst expectations published over August to November 2019, of 2.16%<sup>109</sup> to 2.30%,<sup>110</sup> with an average of 2.25%.

<sup>109</sup> Barclays, 'UK Utilities: Never a dull moment in utilities: model updates, H1 result estimates', 11 November 2019,

<sup>110</sup> Jefferies, 'Reshuffling the Deck', 19 September 2019.

The rest of this chapter explains the methodological decisions we have made regarding our framework for deriving the cost of debt, and how we have interpreted debt market data.

This section is structured as:

- **Section 6.1:** Share of new debt
- **Section 6.2:** Allowed cost of new debt
- **Section 6.3:** Allowed cost of embedded debt
- **Section 6.4:** Issuance and liquidity fees

## 6.1 Share of new debt

Our allowed return on debt is a weighted average of new and embedded debt costs. This requires us to estimate the proportion of each type of debt over 2020-25. We define new debt as debt which will be raised over 2020-25, and embedded debt as debt which will remain on company balance sheets over this period.

### 6.1.1 Share of new debt: what we said in our draft determinations

For draft determinations, we analysed companies' September 2018 business plan submissions to estimate the average share of new debt over 2020-25 for the notional company. This involved calculating embedded and new debt balances over 2020-25 at the level of the sector and individual companies, calculating the share of new debt in each year, and taking an average over five years. We assessed that embedded debt balances would evolve from their level at the start of the 2020-25 period according to company-forecast profiles of paid down debt and indexation of inflation-linked debt.

We used estimates from two perspectives to derive our overall point estimate:

- Based on our assessment of the sector's aggregate profile of new and embedded debt balances, we concluded that new debt issued during the 2020-25 period would on average be 22% of total debt financing.
- Based on our assessment of company-level new and embedded debt balances, we found that the arithmetic average of companies' new debt balances was 17% of total debt financing.

We placed some weight on both of these estimates, choosing 20% as our overall point estimate.

## 6.1.2 Share of new debt: stakeholder representations and our response

Stakeholder representations argue for an even lower share of new debt than our assumption of 20%, based on revised April business plan data. Below we set out issues raised by stakeholders and our response:

### a) Our share of new debt estimate was too high.

Eight stakeholder representations<sup>111</sup> suggest that 20% is too high an estimate to use for the share of new debt. Specific arguments include:

- Northumbrian Water's suggestion that our 20% average new debt estimate implies a 40% end-of-period share and average tenor of 12.5 years, which is at odds with Annual Performance Report data. The company also argues that our figure does not reflect an 11% cost assessment challenge at draft determinations which could be expected to reduce new debt issuance further by reducing allowed totex.
- Various stakeholder responses use April business plan data to calculate a new estimate, with some adapting our approach. Frontier Economics (in its report for three companies) calculates a range of 14.0% to 18.3%, with a midpoint of 16.2%. This is similar to estimates from United Utilities (17%), and Anglian Water (15%).

We agree with representations that it would be appropriate to incorporate updated evidence from company business plans and our own decisions on totex allowances at final determinations. This analysis is provided in section 6.1.3.

### b) The new debt share assumption should be company-specific, not sector wide.

South East Water suggests that our use of a sector-wide new debt share assumption penalises companies with low investment programmes. The company estimates that its actual share of new debt is likely to be around 4% over 2020-25, due to its relatively small scale and concentrated debt profile, in contrast to our draft determinations assumption of 20%.

We recognise that a 'lumpy' investment (or debt issuance) profile can cause a company's share of new debt to deviate from our sector assumption, which may drive under- or outperformance. Over time, we would however expect these deviations to balance out, with underperforming positions becoming outperforming

---

<sup>111</sup> Anglian Water, Northumbrian Water, United Utilities, Severn Trent Water, South West Water, Thames Water, Wessex Water, South East Water

positions and vice versa. This is because, for example, an atypically high share of embedded debt attributable to issuance concentrated over a few years will become an atypically high share of new debt when this debt is refinanced. Over the long term therefore, we consider our approach reasonable, and that making more company-specific assumptions on share of new debt is not required to ensure equal treatment of companies.

### 6.1.3 Share of new debt: our final determination decision

We have conducted more detailed analysis to inform our estimated average share of new debt over 2020-25. This exercise considered three approaches:

- 'Notional' approach:
- 'Company-led data' approach: and
- 'Notional-actual hybrid' approach.

The **Notional approach** assumes that a new debt issuance profile can be inferred from data on the years-to-maturity of companies' existing embedded debt. The equation used is:

$$N = T/M$$

Where:

N = Proportion of new debt at the end of the control period

M = The weighted average years to maturity of debt

T = The number of years in the control period

The 2019 Annual Performance reports set out company-level data on weighted average years to maturity of borrowings. For the sector the issuance-weighted average is 13.9 years, with the company-level average 14.2 years. Using this data with the above equation gives a range of end-of-period new debt share estimates of 36% (issuance-weighted average) to 37% (company-level average).

This range underestimates end-of-period new debt share, as it does not account for new RCV formation financed by debt. Assuming that real RCV growth is financed 60% by new debt to maintain 60% notional gearing, this gives an adjusted end-of-period new debt share range of 40% to 42%, (based on the issuance-weighted average tenor) and 42% (based on company-level average tenor). Dividing these

two figures by 2 to derive the average share of new debt over 2020-25 gives an overall range of 20-21%.<sup>112</sup>

This approach has the benefit of simplicity, and is aligned with a purely notional cost of debt. It does not, however, capture company proposals around paydown of embedded debt (individually, and in aggregate), or profiling of new debt issuance – both of which could result in a different actual profile of new debt share.

We employed the **company data-led approach** for our draft determinations. This approach calculates rolling mid-year balances of new debt and embedded debt over 2020-25, assuming that new debt balances evolve according to company forecast debt issuance, and that embedded debt balances evolve according to company forecast inflation-linked indexation, and forecast paydown of debt.

Applying this approach to data submitted in revised business plans results in an average share of new debt over 2020-25 of 14% (company-level average) to 17% (sector weighted average). This range is very similar to the ranges and point estimates for new debt share proposed in representations.

We note from the timing of companies' revised business plan data (which were submitted in April) that forecasts of debt issuance would have been influenced by our provisional decisions on allowed totex for our initial assessment of plans. At our initial assessment of plans stage, we allowed £48.8bn, while at final determinations, this figure has increased to £49.7bn. This indicates that company forecast debt issuance profiles based on the former figure may be an underestimate of actual new debt issuance over 2020-25.

Finally, our **notional-actual hybrid approach** builds on revised business plan data, while including the latest evidence on totex allowances and our assessment of equity's contribution to new RCV. This approach assumes embedded debt balances evolve according to company forecast inflation-linked indexation, and planned paydown of debt (identically to the company data-led approach). For new debt, however, this approach uses a bottom-up profile of issuance which we generate for each company. This profile is based on assuming that all outstanding 'pure debt' falling due over 2020-25 is refinanced as new debt, and that growth in RCV will be financed by new debt, minus the contribution of equity, as set out in our Aligning Risk and Return technical appendix.<sup>113</sup>

---

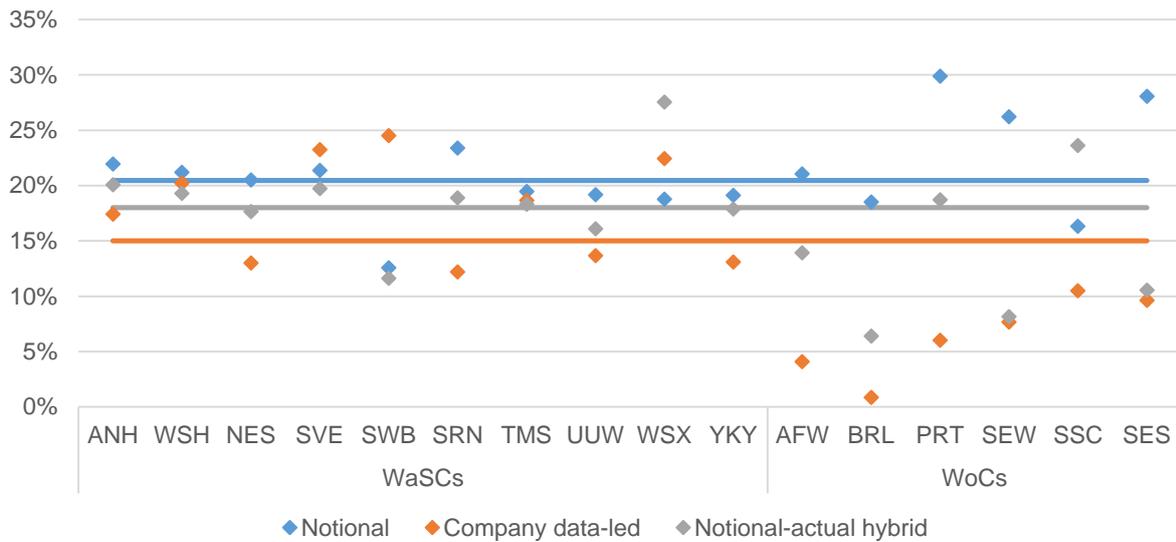
<sup>112</sup> This follows from the simplifying assumption of a constant rate of change of new debt share between the start of period value of 0% and the end of period value.

<sup>113</sup> The sector-wide notional company assumption being a dividend yield of 3.00% with dividend growth of 1.88% per year. We intervened to assume lower dividends for Southern Water (1.39%), Affinity Water (0.63%), Anglian Water (1.97%) and Thames Water (1.85%).

Applying this approach to data submitted in revised business plans results in an average share of new debt over 2020-25 of 17% (company-level average) to 18% (sector weighted average).

Figure 6.1 shows the company-level estimates we derive using each approach, as well as the midpoint of the range for each approach (solid lines).

**Figure 6.1: Estimated average share of new debt, 2020-25**



Source: Ofwat analysis of company business plan data and 2019 Annual Performance Reports

Our results indicate a new debt share of around 15% for the ‘company data-led’ approach, while the other two (more notional) approaches give estimates in the range 17-21%. Given that revised business plan debt issuance forecasts did not reflect higher final totex allowances, we are not convinced that the average share of new debt should be as low as 15%. Observing that the overall range for the ‘Notional’ and ‘Notional-actual hybrid’ approaches is very similar to that used for draft determinations (i.e. 17% to 22%), we consider that there is insufficient cause to move from our point estimate from draft determinations. We accordingly retain our draft determinations assumption that the average notional share of new debt is **20%** over 2020-25.

## 6.2 Cost of new debt

Our allowance for the cost of new debt is intended to remunerate the efficient financing costs for debt issued over the period 2020-25 for a company with a notional financial structure.

### 6.2.1 Cost of new debt: our decision from draft determinations

For our draft determination, we based our point estimate on a benchmark index: an average of the A and BBB rated IHS Markit iBoxx non-financial 10 years+ indices (henceforth the “iBoxx A/BBB”).

The yield of the iBoxx A/BBB on 28 February 2019 was 3.30%. We uplifted this initial figure by 30 basis points to account for the average market-implied interest rate rise over 2020-25 for borrowing at 10 and 20 year maturities embedded in the term structure of nominal gilts. Finally, we applied a downwards ‘outperformance wedge’ of 25 basis points, representing our view of the outperformance which an efficient notional company could expect on average to achieve. This gave an overall point estimate for the cost of new debt of 3.36% in nominal terms.

Our assessment of a higher ‘outperformance wedge’ of 25 basis points (increased from 15 basis points for our ‘early view’) was based on analysis of nominal, fixed-rate bonds with tenor of 10 years or more on the date of issue, over the period 2000-2018. Outperformance for the whole period averaged 31 basis points across all years, while the post-2015 average was 44 basis points. Our choice of an ‘outperformance wedge’ lower than the post-2015 average reflected the fact that not all years were marked by outperformance, and that there was a degree of uncertainty over the ability of the sector to sustain current levels of outperformance in future.

As a cross-check to our point estimate for the cost of new debt, we calculated a ‘bottom-up’ estimate of the cost of new debt by considering traded yields on water company bonds with around 10-20 years to maturity. We added the average market-implied interest rate rise over 2020-25 embedded in the pricing of nominal gilts at 10 and 20 year maturities. The resultant figure of 3.48% was reasonably close to our point estimate of 3.36%, giving comfort that our point estimate was a reasonable interpretation of market data.

## 6.2.2 Cost of new debt: stakeholder representations and our response

Stakeholders are generally critical of our approach to setting an allowance for the cost of new debt. Representations tend to focus in particular on our view of the 'outperformance wedge'. Below we set out issues raised by stakeholders and our response:

### a) The 'outperformance wedge' should be measured controlling for factors such as tenor and credit rating

Frontier Economics (for three companies), and South East Water argue that our 'outperformance wedge' should be calculated after controlling for the impact of tenor and credit rating. South East Water argue that our approach is inconsistent with the Competition and Markets Authority's approach for the 2015 British Gas Trading (BGT) appeal<sup>114</sup>, which it says adjusted for credit rating and tenor. In support of their view that there was no 'outperformance wedge', both respondents note the CMA's finding that there is no evidence to support such an adjustment for the energy company debt instruments it assessed post-2010.

We identify no evidence in the CMA's report which indicates that it controlled for credit rating and tenor. In describing its approach, the report simply states, '*We compared the cost of debt of the individual DNOs' actual financing arrangements, and those to the market index rates on the date of issuance.*' In addition, we do not agree that evidence on the 'outperformance wedge' from a different sector is relevant to the specific circumstances of the water sector.

While in principle controlling for tenor and credit rating would be appropriate if our aim was to isolate the debt pricing benefit of being a regulated water utility (we refer to this as the 'halo effect'), this is not relevant to the current exercise of setting an allowed return on capital. Our approach, in line with our statutory duties, is to set an allowance for the cost of new debt which is reflective of efficient borrowing costs and which does not materially overcompensate companies for these costs. Our analysis of nominal debt of at least 10 years to maturity at issuance indicates material and sustained outperformance over the period 2000-2018.<sup>115</sup> We therefore consider it appropriate to calibrate the level of the index for the observed 'outperformance wedge' to make it a better fit for the new debt costs the sector is observed to actually achieve.

---

<sup>114</sup> Competition and Markets Authority, '*British Gas Trading Limited v the Gas and Electricity Markets Authority, final determination*', September 2015

<sup>115</sup> For instance an issuance-weighted average spread across our entire sample of -31 basis points, and 13 out of 19 years when the in-year average spread has been lower than -25 basis points.

## **b) Our cost of new debt allowance does not reflect the credit rating of the notional company**

Anglian Water, Northumbrian Water, Severn Trent Water, Hafren Dyfrdwy, and South East Water suggests that our use of the iBoxx A/BBB as a benchmark is inconsistent with the financial ratios implied by our allowed return on capital. These companies assert that our allowed return on capital from draft determinations implied a credit rating of Baa2, while the weighted average credit rating of the iBoxx A/BBB was A3/Baa1 – arguing that it is therefore implausible that the notional company could outperform the index. Affinity Water argues similarly that macroeconomic and regulatory conditions which enabled historical outperformance no longer exist. Respondents have also argued that our cost of new debt allowance should be based on an index whose credit rating is consistent with that of the notional company. Taking the view that the iBoxx A/BBB has a higher credit rating than the notional company under our draft determination allowed return on capital, respondents argue for a ‘outperformance wedge’ lower than 25 basis points, with some arguing for its removal altogether.

We confirm through our own analysis that the weighted average credit rating of the iBoxx A 10yrs+ nonfinancials index is closest to A3, and that its BBB-rated counterpart has a weighted average credit rating closest to Baa1.<sup>116</sup> We consider that applying an ‘outperformance wedge’ to our benchmark index is consistent with our allowed return on capital however, for the following reasons:

- The credit rating of our benchmark index is irrelevant to the validity of our calibration approach. We could achieve a similar allowed cost of new debt by using an index with a much higher credit rating than sector companies (leading to a lower outperformance wedge) or a lower credit rating (leading to a higher wedge).
- In arguing that falling credit ratings over 2020-25 would diminish the ‘outperformance wedge’, respondents tended to focus on a single credit metric – the Adjusted Interest Cover Ratio (AICR). This measure does not by itself determine credit rating<sup>117</sup> and so a Baa2 score on this metric is not sufficient to imply a credit rating that is Baa2 overall. There is also a circularity issue when assessing this metric from a notional perspective. Using an index with a lower credit rating (and hence higher cost of debt) would cause AICR to worsen, not improve.
- Even in the event of downgraded credit ratings, there is insufficient evidence that this would necessarily drive underperformance against our draft determination

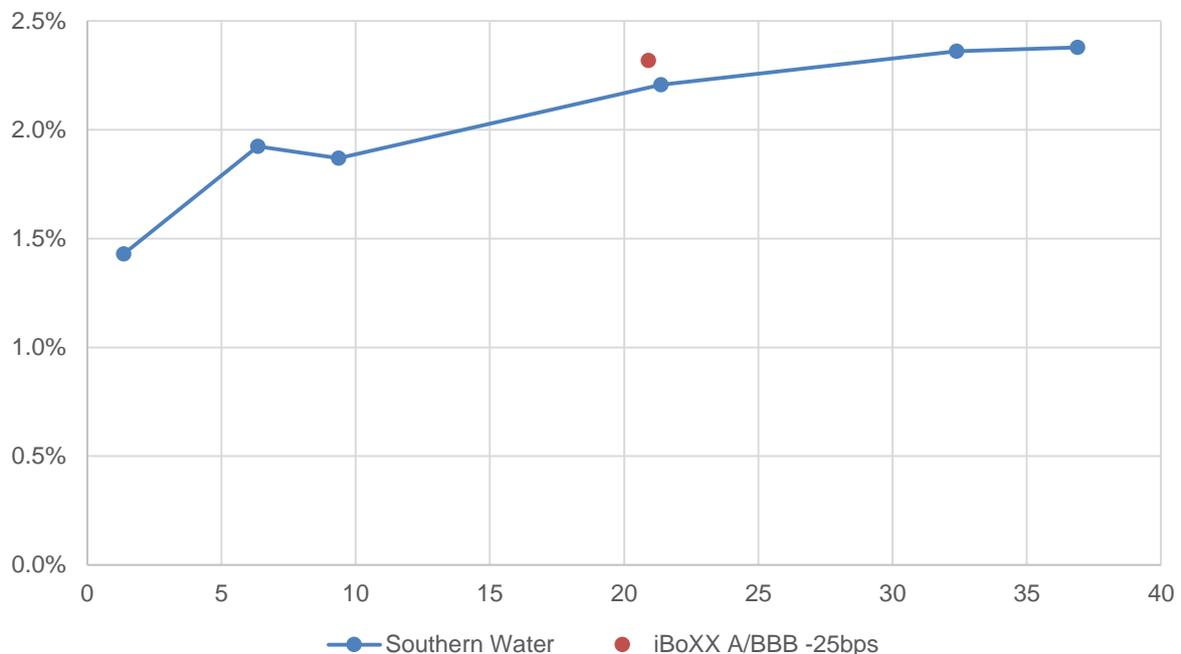
<sup>116</sup> Based on averaging iBoXX constituent credit ratings for Moodys, Standard & Poors, and Fitch on 21.11.2019

<sup>117</sup> For example, AICR carries a 12.5% sub-factor weighting in Moodys’ overall rating grid.

allowance. Figure 6.2 plots a credit curve for Baa3-rated Southern Water based on available yields data for nominal bonds, against the contemporaneous yield of the iBoxx A/BBB. This suggests that Southern Water should currently be able to issue debt at a yield comparable to our draft determination allowed cost of new debt benchmark, and that higher-rated peers would likely outperform this benchmark.

- The relatively high years-to-maturity of the iBoxx A/BBB (21 years) offers the prospect for even bonds issued at a lower credit rating than the average of this index to outperform, provided they are issued at shorter tenors. This follows from the observation that higher tenor is usually associated with higher yield.

**Figure 6.2: Comparison of yields - Southern Water nominal bonds vs. iBoXX A/BBB minus 25 basis points (21 November 2019)**



Source: Ofwat analysis of Refinitiv data

Based on analysis from our consultants, Europe Economics, we recognise that the reduction in cashflows from our lower allowed return on capital may result in outperformance on new debt that is lower than the historically-observed average over 2020-25. To give an indication of the size of the effect, Europe Economics compare spread to benchmark gilt for a selection of Southern Water's bonds in the month before and month after its downgrade to Baa3 by Moodys on 27 September 2019. This indicates that spreads increased by 4 basis points on average.<sup>118</sup> Taking a cautious view of future outperformance, we have decided to reduce the size of our

<sup>118</sup> Europe Economics, 'The Cost of Capital for the water sector at PR19: final advice,' December 2019, p50

'outperformance wedge' for new debt to 15 basis points (a reduction of 10 basis points). This brings the 'outperformance wedge' on new debt back to the level used for our December 2017 'early view' allowed return on new debt.

**c) Headroom should be included in the allowed cost of new debt**

Anglian Water suggests that the uncertain financing environment indicates that it would be desirable to allow for headroom in the allowed cost of new debt over and above the market-implied rate rise effect which we added to yields. The company notes that if this headroom is not required, it will be returned to customers.

We do not consider that the company's representation makes a sufficiently strong case for the inclusion of 'headroom' in our cost of new debt allowance. While cashflows would increase, potentially with benefits in terms of perceived creditworthiness, any positive amount returned to customers would effectively act as a loan from customers to companies over the period. Given that significant numbers of customers struggle with paying their bills, and are likely to face higher borrowing costs than a water company, we do not view this measure as consistent with fulfilling our statutory duties; particularly because the allowed return on new debt will be subject to a reconciliation mechanism at PR24.

**d) It is inconsistent to adjust for an 'outperformance wedge' while arguing that the efficient cost of debt allowance should be based on the iBoxx**

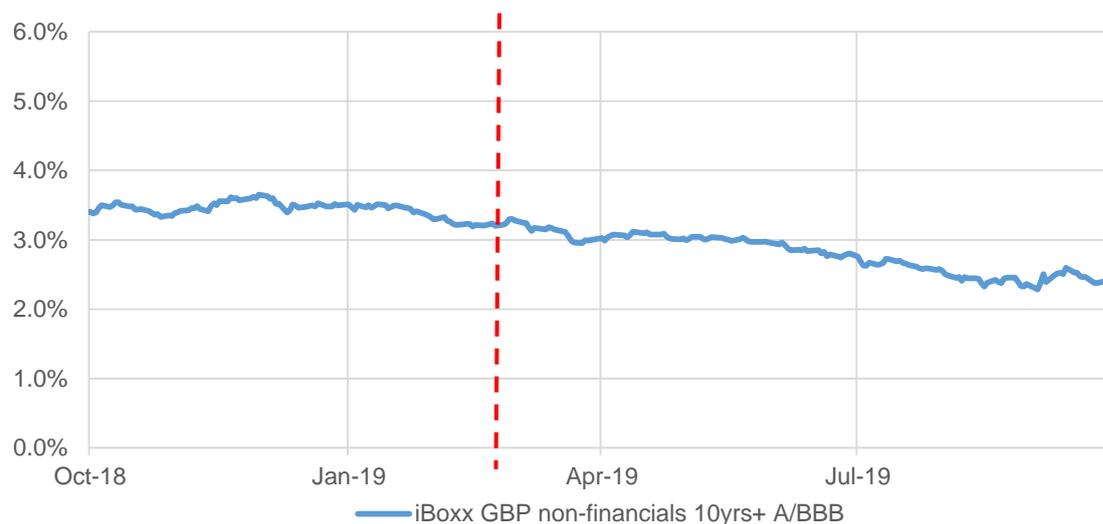
Dŵr Cymru suggests that it is inconsistent on the one hand to use an 'outperformance wedge', whilst on the other arguing that the costs of embedded debt should be based on market indices rather than water company balance sheet debt, on the grounds that the latter might be inefficient.

We do not agree with the portrayal of our position as a view that water sector issuance is more inefficient than the iBoxx A/BBB. Our case for using a trailing average of the iBoxx A/BBB as our main approach for setting the allowed cost of embedded debt is based on its incentive properties. Specifically, using a benchmark featuring debt from different sectors increases incentives to outperform relative to these sectors as well as to water sector peers. A benchmark based on debt costs across a range of sectors with similar credit rating therefore gives added confidence that allowances are appropriate for an efficient company.

### 6.2.3 Cost of new debt: our final determination decision

Yields for our benchmark index have declined significantly since our February 28 data cut-off for draft determinations (the dotted red line in Figure 6.3).

**Figure 6.3: iBoxx A/BBB non-financials 10yrs+ index, 2015-2019**



Source: Ofwat analysis of IHS Markit data

As at draft determinations, we base our allowance for the cost of new debt on recent evidence on the yield of our benchmark index, adjusted to account for the market-implied increase in the 15 year nominal risk-free rate over 2020-25, which is embedded in the term structure of nominal gilts.

We have lowered our estimate of the 'outperformance wedge' applicable to this estimate from 25 basis points to 15 basis points. This reflects our view (as set out in section 6.2.2) that our lower overall allowed return on capital could potentially reduce outperformance against the iBoxx A/BBB over 2020-25.

Table 6.1 sets out our calculations for our updated point estimate of the cost of new debt assumption.

**Table 6.1: Cost of new debt for final determinations (nominal)**

	iBoxx A/BBB spot figure	Market-implied rate rise	Outperformance wedge	Allowed cost of new debt
Point estimate	2.44%	0.25%	0.15%	2.54%

Source: Europe Economics analysis of IHS Markit and Bank of England data

We express our point estimate for the cost of new debt in nominal terms and deflate for our assumed future long-term average level of RPI and CPIH:

- **2.54%** - nominal;
- **0.53%** - CPIH based, assuming 2.0% CPIH.
- **-0.45%** - RPI based, assuming 3.0% RPI

As at draft determinations, we have also calculated a bottom-up estimate of new debt costs in 2020-25, based on spread to benchmark gilt for water bonds in a maturity range of approximately 10-20 years, issued by companies with gearing similar to our notional assumption of 60% (Figure 6.4). Adding the average spread for the three bonds in September (115 basis points) to the average yield of 15 year nominal gilts in September (0.85%), and uplifting by a further 25 basis points to reflect market-implied rate rises, gives a bottom-up estimate of 2.25%. This figure is lower (but broadly comparable to) the 2.54% derived using our iBoxx approach, providing additional assurance that our estimate is a reasonable reflection of market evidence.

**Figure 6.4: Spread to benchmark gilt for selected water bonds (basis points)**

Source: Ofwat analysis of Refinitiv data

## 6.3 Cost of embedded debt

Our allowance for the cost of embedded debt aims to cover the efficient cost of debt financing over 2020-25 for debt issued prior to 2020 and retained on the balance sheet of a company with our notional financial structure.

### 6.3.1 Cost of embedded debt: our draft determination decision

For our draft determinations, we produced a point estimate for the cost of embedded debt considering evidence from two approaches:

- **Balance sheet approach:** We calculated benchmarks using company-reported data on debt and other financial instruments recorded on company balance sheets as at 31 March 2018, as well as three listed bond instruments which were issued after this point. Our analysis focused on ‘pure debt’ – i.e. fixed, floating-rate and index-linked instruments, excluding non-standard instruments and swaps. We made adjustments to instruments’ headline coupon values to reflect our long-term inflation assumption, and also to reflect the impact of refinancing of debt scheduled to fall due before the start of the PR19 control period.
- **Benchmark index approach:** We calculated benchmarks using different length trailing averages of our benchmark index (an average of the A and BBB-rated IHS Markit GBP non-financials 10yrs+ indices). Using market-implied interest rate rises embedded in the term structure of nominal gilts, we projected the level of the index forward to derive trailing averages up to the start of the next control period at the end of 31 March 2020. We also adjusted these trailing averages for our draft determination view of the sector’s ability to outperform the iBoxx A/BBB – i.e. 25 basis points.

For our draft determination, we focused on the **benchmark index approach**. Using projected data up to 31 March 2020, we forecast the level of the 10 and 15 year trailing average from this point to be 4.07% and 4.75%, respectively. Applying a 25 basis point ‘outperformance wedge’ reduced these figures to 3.82% and 4.50%. We picked the latter of these figures, following our assessment of historic issuance patterns, which concluded that a 10 year trailing average accounted for only around half of the sector’s outstanding listed debt issuance – this figure rose to 80% for the 15 year trailing average.

As a cross-check to our point estimate, we used the **balance sheet approach** to consider the appropriateness of our point estimate. Using granular company data on debt issuance we calculated a range of benchmarks demarcated by the sector weighted average of 4.25% and the company-level median of 4.65%. As our point

estimate from the benchmark index approach was very close to the median for WaSCs and large WoCs, and lay within the overall range, we concluded it represented a sufficient allowance for an efficient company, while maintaining incentives for companies to raise efficient finance over the long term.

### **6.3.2 Cost of embedded debt: stakeholder representations and our response**

Respondents are generally critical of our approach to setting an allowance for the cost of embedded debt. Representations tend to focus in particular on our view of the 'outperformance wedge'. Below we set out issues raised by stakeholders and our response:

#### **a) The iBoxx A/BBB is an arbitrary benchmark, not relevant to a regulated utility**

Yorkshire Water suggests that our benchmark index is a wholly arbitrary benchmark, not relevant to a regulated utility, and whose value is highly sensitive to the selected averaging period.

We note that the company's opinion of the index is at odds with the generally supportive stance taken by attendees of our 2017 workshop on cost of debt indexation.<sup>119</sup> Delegates preferred the iBoxx A/BBB over alternative options, citing the similarity of the iBoxx A/BBB's tenor to that of the sector and its familiarity to the investor community. While recognising that averaging period will influence the point estimate, we consider that our choice of a 15 year index is not arbitrary, being guided by the sector's historic debt issuance patterns. We chose a 15 year trailing average, as it encompasses the period in which approximately 80% of the sector's outstanding listed bonds were issued.

#### **b) We should reverse exclusion of swaps and non-standard instruments in our balance sheet approach to setting the cost of debt**

Yorkshire Water, Anglian Water, Dŵr Cymru, and Economic Insight (for Bristol Water) express disagreement with our decision to exclude certain cost items from company submissions when estimating our allowance (e.g. swaps). These respondents argue that these instruments were legitimate and prudent means by which companies chose to finance their functions, and so should be included in the derivation of our allowance. Further specific points raised are:

---

<sup>119</sup> Ofwat, 'Workshop discussion summary', 20 January 2017

- Anglian Water's argument that index-linked swaps has benefited customers by enabling the 33% index-linked debt assumed in the notional company structure. The company argue that by retrospectively disallowing swaps, companies will be disincentivised from adopting innovative and lower cost financing strategies in future, which will not be in customers' interests.
- Dŵr Cymru's argument that our approach is selective, as it omits the cost of junior debt while taking the benefit of the lower cost of senior debt which this enabled.

In line with standard practice in UK economic regulation<sup>120</sup>, we do not include swap costs in our PR14 cost of debt allowance, and we maintain our position that this would be inappropriate. We consider the main function of swaps is company-specific risk management. This risk mitigation may provide more stability to cashflows, thus benefiting shareholders. It is however unclear that there are also benefits to customers which might justify including swaps in our allowance. Moreover, the more bespoke nature of swaps makes it difficult to make comparisons and assess if they have been efficiently incurred. There is also a risk that swaps might be used by companies to mitigate risks arising from high risk financial arrangements unrelated to the notional financial structure.

We do not agree that our assumption of 33% index-linked debt is dependent on the presence of swaps. The pre-swap issuance data supplied by companies indicates that RPI-linked debt accounted for 39% of total outstanding debt on 31 March 2018. This means that our assumption is justified based on originally-issued RPI-linked debt alone.

We excluded junior and other types of subordinated debt as we consider that this debt is relatively high cost, and would not be contemplated by an efficiently-financed company under our notional financial structure. We do not agree with Dŵr Cymru's assessment that taking on junior debt could reduce the cost of senior debt. While junior debt would incur losses before more senior tranches (acting as a buffer), it could also be expected to reduce credit quality by increasing gearing and reducing free cash flow, thereby depressing credit metrics.

### **c) The cost of embedded debt allowance should reflect company-specific factors.**

Yorkshire Water expresses its disagreement with our policy decision to set a single cost of embedded debt for the sector, arguing that our decision ignores actual debt costs that individual companies cannot avoid over 2020-25.

---

<sup>120</sup> CEPA, 'Alternative approaches to setting the cost of debt for PR19 an H7', August 2016, p124

We are not convinced that there is a strong case for setting an allowance on a company-by-company basis. Our notional approach of setting a single cost of embedded debt for the sector represents long-standing practice. It is widely recognised as offering better incentives to issue debt cost-effectively compared with an approach which passes through actual debt costs – companies absorb the cost of underperforming the sector allowance, and so are strongly incentivised to outperform. In addition, this approach means that customers do not bear all the risk associated with company financing decisions.

#### **d) More weight should be placed on the cost of embedded debt for small WoCs**

South Staffs Water, Severn Trent Water and Hafren Dyfrdwy argue that we have not justified choosing an embedded cost of debt point estimate which places less weight on the cost of embedded debt for small WoCs, compared with our ‘early view’ allowed cost of debt, noting that our draft determinations approach is a departure from our ‘early view’ and PR14 approaches. South Staffs Water notes that this change was a material factor in its deciding to apply for a Company-Specific Adjustment to its cost of debt.

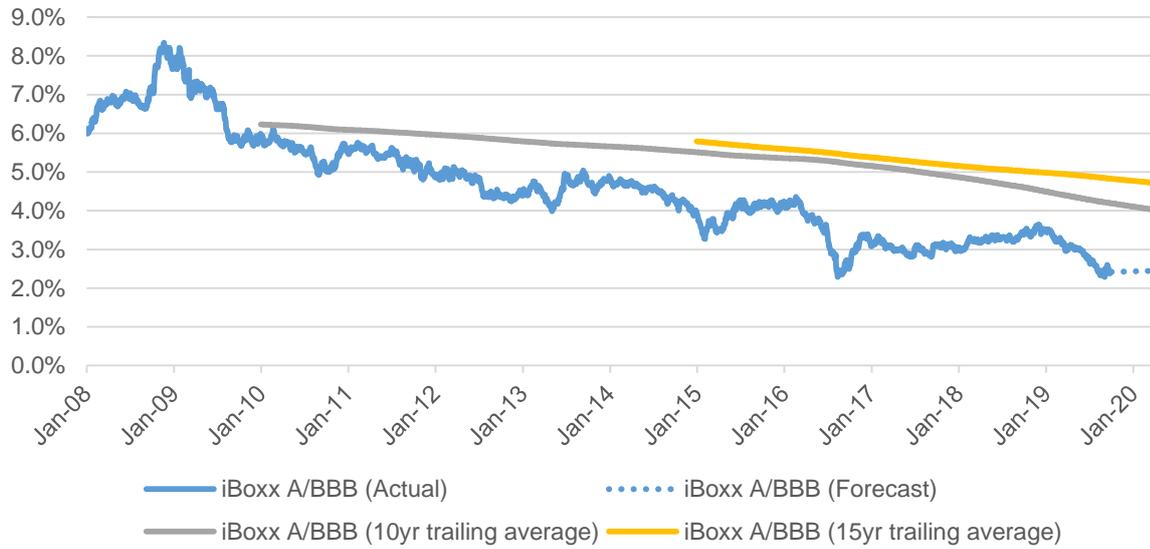
As noted at draft determinations, the four smaller WoCs accounted for less than 2% of embedded debt in our analysis. We maintain our view that applying the median for all companies as our benchmark would apply a weight to the cost of embedded debt of these companies disproportionate to their share of embedded debt. This would result in an allowance considerably higher than that required by the representative company. Smaller companies are also able to seek a company-specific uplift to their allowed cost of debt, which represents a potential remedy to the issue raised.

### **6.3.3 Cost of embedded debt: our final determination decision**

As at draft determinations, we focus on the benchmark index approach to calculate a point estimate, using the balance sheet approach as a cross-check. Figure 6.5 plots the expected evolution of the 10 and 15 year trailing average of the iBoxx A/BBB indices up to 31 March 2020.

We commissioned Europe Economics to produce forecast 10 and 15 year trailing averages to 31 March 2020 by forecasting the level of the iBoxx A/BBB on this date using market-implied interest rate rises for 15 year nominal gilts. Figures for dates between the last outturn value on 30 September 2019 and the 31 March 2020 value have been generated using interpolation.

**Figure 6.5: iBoxx A/BBB non-financials 10yrs+ index, 2008-2020 (nominal)**



Source: Europe Economics analysis of IHS Markit and Bank of England data

Europe Economics' analysis (Figure 6.5) forecasts that the value of the 10 year trailing average on 31 March 2020 will be 4.02%, with the 15 year trailing average 4.72%. Applying our 25 basis point 'outperformance wedge' to reflect historic observed outperformance, gives adjusted figures of 3.77% and 4.47% respectively.

We restate below in table 6.2 the benchmarks from our balance sheet approach, together with updated estimates from our benchmark index approach.

**Table 6.2: Comparison of cost of embedded debt benchmarks**

	<b>Nominal cost of embedded debt</b>
<b>Balance sheet approach (sector):</b>	
Sector weighted average	4.25%
Sector simple average	4.63%
Sector median	4.65%
<b>Balance sheet approach (large companies):</b>	
WaSC and large WoC company weighted average	4.23%
WaSC and large WoC company simple average	4.25%
WaSC and large WoC company median	4.45%
<b>Benchmark index approach</b>	
iBoxx A/BBB non-financials 10yr trailing average, adjusted downwards by 25 basis points	3.77%
<b>iBoxx A/BBB non-financials 15yr trailing average adjusted downwards by 25 basis points</b>	<b>4.47%</b>

Source: Ofwat and Europe Economics analysis of IHS Markit iBoxx and company business plan data

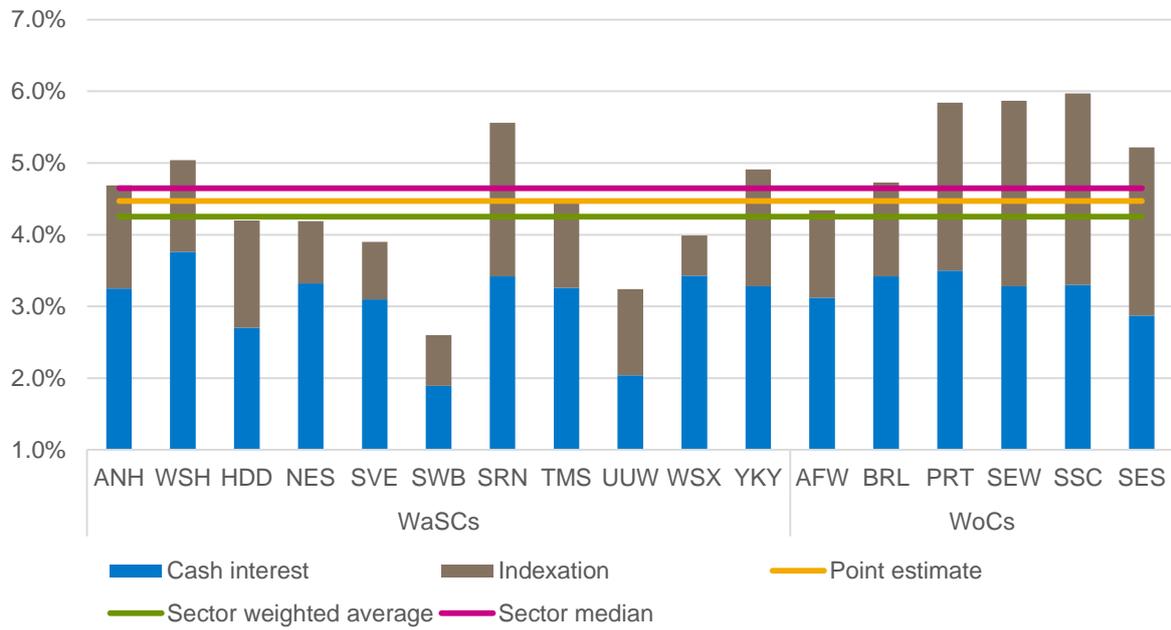
As at draft determinations, we consider that the 15 year trailing average index is a more appropriate reflection of the sector's issuance profile, with approximately 80% of outstanding listed bonds captured in the 15 year period 2005-2019, compared to 40% for the 10 year 2009-2019 period. The resultant point estimate of 4.47% is comparable to the WaSC and large WoC company median cost of debt of 4.45% from our balance sheet approach.

We express our point assumption for the cost of embedded debt in nominal terms and deflate for our assumed future long-term average level of RPI and CPIH:

- **4.47%** - nominal;
- **2.42%** - CPIH based, assuming 2.0% CPIH;
- **1.43%** - RPI based, assuming 3.0% RPI.

Figure 6.6 sets out companies' March 2019 weighted average indicative cost of debt against our point estimate and selected sector benchmarks. We consider that this evidence demonstrates our point estimate is sufficient for an efficient company, and maintains sufficiently challenging incentives for companies to raise efficient finance over the long term while protecting the interests of customers.

**Figure 6.6: March 2019 indicative weighted average cost of debt and our benchmarks (nominal, %)**



Source: Ofwat analysis of company data and 2019 annual performance reports

## 6.4 Issuance and liquidity fees

Companies incur costs in order to issue debt in addition to interest costs. Debt issuance fees to financial intermediaries (for example, banks syndicating a debt issue) represent one significant source of such costs. In addition, the terms of some loans may also oblige firms to maintain liquidity, which can be achieved through holding cash or maintaining short-term lending facilities.

### 6.4.1 Issuance and liquidity fees: what we said in our draft determinations

For draft determinations we retained our point estimate of 10 basis points for issuance and liquidity fees which featured in our 'early view' cost of capital. This estimate was assessed by Europe Economics as the sum of two components:

- Issuance fees based on 72 issuances over the period 1993-2017, with an assessed range of 3-6 basis points.
- Liquidity facilities, based on a cost of 35-45 basis point fee and assumed to be required for 10% of total outstanding debt, suggesting liquidity fees of 3.5 – 4.5bps

Summing these two components, Europe Economics concluded that a figure of around 10 basis points was sufficient to cover issuance and liquidity fees. We retained this figure for draft determinations, noting that it remained Europe Economics' recommendation, and that the Competition and Markets Authority's 2015 determination for Bristol Water<sup>121</sup> also used this figure.

### 6.4.2 Issuance and liquidity fees: representations and our response

We did not receive representations on issuance and liquidity fees in response to our draft determinations.

### 6.4.3 Issuance and liquidity fees: our final determination decision

We consider that our 10 basis point uplift to the cost of embedded and new debt remains appropriate to compensate water companies for efficient issuance and liquidity costs, as no new information has emerged which might indicate another

---

<sup>121</sup> Competition and Markets Authority, "Bristol Water PLC, A reference under section 12(3)(a) of the Water Industry Act 1991", October 2015, paragraph 10.82

figure is appropriate. We add this to our allowance for the interest costs for embedded and new debt.

## Annex 1: Company-specific adjustments to the allowed return on capital

### A1.1 Summary

Customers are not able to choose their service provider, but investors are able to seek financing efficiencies, including as a result of mergers, and by pooling financing arrangements. As customers cannot choose their supplier (nor the corporate or ownership structure of the company that supplies them), we apply a high bar to accepting any company-specific adjustments to the allowed return on capital. Where we accept an adjustment we must be satisfied that the allowances we make are reasonable and serve the interests of customers.

In our PR19 methodology we set out a three-stage approach to assessing requests for a company-specific adjustment to the cost of capital, asking:

1. **Levels assessment:** Is there compelling evidence that the level of the requested adjustment is appropriate?
2. **Benefits assessment:** Is there compelling evidence that there are benefits that adequately compensate customers for the increased cost?
3. **Customer support assessment:** Is there compelling evidence of customer support for the proposed adjustment?

Three companies (Bristol Water, Portsmouth Water, and SES Water) originally applied for a company-specific adjustment to their cost of capital in their initial business plans.

In January 2019, we decided as part of our initial assessment of business plans that Portsmouth Water had passed all three assessments, with sufficient evidence in support of its proposed uplift to its allowed cost of capital. We decided that Bristol Water and SES Water had not passed all three assessments, and so there was insufficient evidence supporting their application.<sup>122</sup>

In July 2019, as part of our draft determinations, we considered new evidence provided by Bristol Water and SES Water in support of their applications. We again decided that these companies did not pass all three assessments.<sup>123</sup>

---

<sup>122</sup> Ofwat, 'Initial Assessment of Plans: Technical Appendix 4: Company-specific adjustments to the cost of capital', January 2019

<sup>123</sup> Ofwat, 'PR19 draft determinations: Cost of capital technical appendix', July 2019, Annex A1

In their responses to our draft determinations, both of these companies have notified us that they wish us to reconsider their case for a company-specific adjustment at final determinations. They are joined by South Staffs Water, which indicates in its representation that it is now seeking a company-specific adjustment.

The summary outcome of our latest assessment for final determinations is set out in table A1.1. For ease of comparison, and to reaffirm that our decisions remain valid, we have featured all four companies applying for an uplift in our analysis for final determinations.

Portsmouth Water and South Staffs Water pass all three assessments that are required to be allowed a company-specific adjustment. Our analysis of small company borrowing costs indicates that the appropriate uplift for a notional small company relative to our allowances is 35 basis points on embedded debt and 25 basis points on new debt, or 33 basis points on the overall cost of debt, at our notional 20% share of new debt (see section A1.2).

**Table A1.1: Our final determinations assessment of claims for a company-specific adjustment:**

<b>Assessment:</b>	<b>Bristol Water</b>	<b>Portsmouth Water</b>	<b>SES Water</b>	<b>South Staffs Water</b>
<b>Level of uplift:</b>	Pass	Pass	Pass	Pass
<b>Customer benefits:</b>	Fail	Pass	Fail	Pass
<b>Customer support:</b>	Pass	Pass	Fail	Pass
<b>Overall decision:</b>	Fail	Pass	Fail	Pass

We explain the rationale for our assessment decisions in the rest of this annex, which is structured as follows:

- **Section A1.2 ‘Levels assessment’**, sets out our findings on the evidence that the companies’ proposed level of uplift is appropriate.
- **Section A1.3 ‘Benefits assessment’**, sets out our findings on the evidence that customers are adequately compensated for the cost of providing the uplift.
- **Section A1.4 ‘Customer support assessment’**, sets out our findings on the evidence that each company’s customers support funding the uplift.

## A1.2 Levels assessment

This section considers company proposals on the level of uplift, our view on their appropriateness, and our final determination decision on the level of uplift to be applied for successful applicants over 2020-25.

- **Bristol Water** proposes an uplift of 38 basis points, based on 40 basis points on embedded debt and 30 basis points on new debt, and our draft determinations share of new debt of 20%.
- **Portsmouth Water** proposes a 30 basis point uplift to its overall cost of debt without specifying proposed uplifts for new and embedded debt.
- **SES Water** proposes a 25 basis point uplift to its overall cost of debt without specifying proposed uplifts for new and embedded debt.
- **South Staffs** proposes a 40 basis point uplift to its overall cost of debt as the top end of our 25-40 basis point range used in our levels assessment for initial assessment of plans and draft determinations. The company has not specified proposed uplifts for new and embedded debt.

In the following sections we discuss company representations on our draft determinations concerning the appropriate level of uplift, our response, and our final determination decision.

### a) Levels assessment: allowed cost of equity

No company has formally applied for a cost of equity uplift, though Bristol Water argue that evidence supports such an uplift, and signals that it could in future seek such an uplift, dependent on the outcome of its final determination.

In support of its representation, Bristol provides a report commissioned from Economic Insight which advocates for an uplift to the asset beta estimated for listed WaSCs in the range 5%-26%, noting that:

- Academic studies from contestable sectors confirm a link between higher operational gearing and higher equity betas.
- The lower demand risk in the water sector compared to contestable sectors is irrelevant, as it still means that relatively higher operational gearing will increase exposure to this category of risk.
- On two measures (Operating cash flow / revenue, and Return on capital & RCV run-off / revenue), Bristol Water has a higher ratio than listed WaSCs by 5% and 26% respectively.

- Therefore sector equity beta should be adjusted for differences in operational gearing, this gives a range of uplift of 5%-26%, with a point estimate of 16% preferred by the consultancy, as the midpoint of the range.

We firstly note that the textbook definition of operational gearing refers to a high share of fixed costs in total costs. We found it difficult to reconcile this definition with the measures used by Economic Insight, which relate to cashflows - not costs. The consultancy did not justify in theoretical terms why having cashflow ratios different to those of listed companies should drive greater exposure to cyclical risks.

Reverting to the textbook definition of operational gearing, it is far from clear to us that a high share of fixed costs should increase regulated water companies' exposure to cyclical risk. In competitive sectors it stands to reason that this is the case - a high share of fixed costs means that costs cannot easily be reduced, amplifying the impact on returns of a fall in demand. This is not true of the water sector, however. Demand risk is minimal due to revenue correction mechanisms that underpin recovery of efficient wholesale costs irrespective of demand. Cost risk is the main cyclical risk. In this context, a high proportion of fixed costs reduces risk (and cyclicity), as it leaves only a small proportion of costs exposed to risk of change. This aspect of relatively higher operational gearing could therefore be expected to reduce systematic risk exposure, and hence place downward pressure on beta for affected companies.

As noted in our draft determinations, the empirical evidence for a beta premium in smaller companies is weak. If asset betas really were materially higher, we would expect to see evidence of comparatively lower econometric estimates of equity beta, lower gearing, and lower market-to-asset ratios in equity transactions. In our submission to the Competition and Market Authority's re-determination of Bristol Water's price control we submitted evidence that Dee Valley Water did not exhibit an asset beta demonstrably higher than that of listed WaSCs.<sup>124</sup> In addition, we do not observe systematically lower levels of gearing for water only companies,<sup>125</sup> or systematically lower market-to-asset ratios in market transactions for water only companies.<sup>126</sup>

Finally, even if we are convinced that higher operational gearing is a real phenomenon affecting small companies, and that it increases exposure to cyclical risk, this would not be sufficient reason on its own to uplift the allowed cost of equity.

---

<sup>124</sup> Ofwat, 'Ofwat's response to Bristol Water's Price Determination Statement of Case dated 11 March 2015', p88-89

<sup>125</sup> The arithmetic average of March 2019 company-reported gearing levels is 67.9% for WaSCs and 70.1% for WoCs.

<sup>126</sup> Recent examples of premia to RCV include 53% for Affinity Water in 2017 and 50% for Dee Valley Water in 2016. The average premium for Severn Trent and United Utilities over 2016-17 was 22%.

A firm can influence its operational gearing through choosing to invest in fixed-cost inputs rather than variable-cost ones. An efficient company deciding to increase its operational gearing should therefore rationally decide to do so only if there is some offsetting benefit (e.g. lower costs, or lower cost risks). Compensating a company for operational gearing risk in spite of these offsetting benefits would therefore seem to be unnecessary.

In conclusion we retain our view, set out in Appendix 12 of the PR19 methodology, that there is no need for a company-specific adjustment to the allowed cost of equity on account of a company's small size.

### Levels assessment: allowed cost of debt

As a starting point for our examination of company requests for a cost of debt uplift, we first consider our allowed cost of embedded debt against the latest company-reported interest cost from 2019 APRs (table A1.2). While most companies applying for a cost of debt uplift have a reported cost of debt that is higher than WaSCs, we note that three WaSCs<sup>127</sup> report higher borrowing costs than Bristol Water as at March 2020.

**Table A1.2: Indicative weighted average nominal interest cost and our allowance**

	Sector allowed cost of embedded debt	March 2019 reported cost of debt	Difference
Bristol Water	4.47%	4.73%	0.26%
Portsmouth Water	4.47%	5.84%	1.37%
SES Water	4.47%	5.97%	1.50%
South Staffs Water	4.47%	5.22%	0.75%

Source: Ofwat analysis of 2019 annual performance reports and IHS Markit data

Of the three companies still seeking an uplift to their allowed cost of capital, only Bristol Water submitted detailed analysis in support of its proposed level of uplift, with other companies tending to justify their estimate with reference to its position within our plausible range of 24-40 basis points. Bristol Water's point estimates are underpinned by KPMG analysis of the spread-to-iBoxx for bonds with comparable

<sup>127</sup> Welsh Water (5.04%), Southern Water (5.56%), and Yorkshire Water (4.91%)

credit rating, from which Bristol Water identifies the following plausible ranges for the small company debt premium:

- Embedded debt: 41-45 basis points
- New debt: 33-34 basis points

In our draft determinations we raised concerns about KPMG's analysis. We restate the issues we raised and our review of the response provided by KPMG in Bristol Water's representation in table A1.3 below:

**Table A1.3 – Issues raised with KPMG's small company premium analysis and our review of KPMG's response**

Issue raised and KPMG's response	Our response
<p><b>Low number of WaSC comparator bonds:</b> KPMG compared WoC borrowings using a sample of only 43 WaSC bonds. The number of WaSC bonds actually being compared to WoC borrowings reduced to as low as eight bonds under KPMG's preferred selection criteria.</p> <p>In representations, KPMG defended their approach, arguing that it was better to compare relevant bonds rather than irrelevant ones, even at the expense of sample size.</p>	<p>We note that Bristol Water's proposed range is underpinned by a comparison in KPMG's analysis to only 8 WaSC bonds. We consider this to be too few bonds to have confidence in the applicability of the sample's WaSC spread to that of the sector.</p> <p>Following receipt of KPMG's dataset and a request for explanation of how the dataset had been derived from source data, it was not clear how it had arrived at its sample of 43 WaSC bonds. We had concerns about placing reliance on a dataset containing a clearly lower number of WaSC bonds (43) than those which we identified as outstanding from the period 2000-18 (129), without a clear explanation as to why particular debt instruments were omitted.</p>
<p><b>Inconsistencies with other KPMG evidence:</b> KPMG's analysis assessed Artesian borrowing as exhibiting spreads to gilts in the range 156-206bp. However, its 2015 analysis of Artesian accounts cited a range of spreads for Artesian tranches in the range 52-85bp.</p> <p>In representations, KPMG explained this inconsistency by stating that its 2015 analysis quoted direct estimates of the spread at issuance while its more recent work builds on the PwC work using effective real interest rates.</p>	<p>PwC's analysis identified that the effective interest rate for Artesian tranches was generally lower than the coupon-based yield at issuance due to issuance proceeds tending to be higher than the face value of borrowings. Moving to using PwC's figures for effective yield would logically therefore result in a lower spread to gilts for the more recent analysis relative to the 2015 analysis – not a higher one – as the yields of instruments being compared would have reduced.</p>
<p><b>Aggregation of Artesian tranches:</b> KPMG's original analysis assumed that all Artesian issuance occurred in three tranches (Artesian I, Artesian II, and Artesian III), whereas companies in practice drew down debt from the Artesian financing vehicles in tranches. We consider that reflecting the timing of drawdown</p>	<p>KPMG revised its analysis to reflect the impact of tranches. We consider that this change improves KPMG's analysis.</p> <p>We have however identified a material error in KPMG's measurement of WoC spreads to the iBoxx. KPMG use WoC spreads reported in</p>

Issue raised and KPMG's response	Our response
<p>of tranches is essential to properly compare the differential cost of borrowing faced by small companies against the different benchmarks used by KPMG.</p> <p>In representations, the consultancy notified us that it had revised its analysis to reflect disaggregated tranches, but that its updated analysis still supported Bristol Water's proposed uplift.</p>	<p>PwC's analysis at PR14, interpreting these spreads as a spread to the iBoxx A/BBB, whereas they are in fact spreads to the embedded debt benchmark used at PR14 of the iBoxx minus 15 basis points. This has the effect of overstating the spread to iBoxx for Artesian debt by 15 basis points.</p>

The issues we identified in KPMG's analysis from Table A1.3 mean that we do not consider it necessary to place any weight on the consultancy's analysis in deriving our final decision on the level of uplift.

In addition to updated analysis from KPMG, Bristol and its consultants (Economic Insight) also suggest that our increase in the 'outperformance wedge' from 15 to 25 basis points should be reflected in our plausible range for the appropriate level of uplift.

We agree with Bristol Water and Economic Insight that we should align our approach for estimating the 'outperformance wedge' with the process for estimating company-specific adjustments. This implies setting an allowance based on the difference between this sector benchmark spread to the iBoXX A/BBB, and the average yield-at-issuance for small WoC bonds. Table A1.4 sets out the results of this analysis.

We find a historical yield-at-issuance spread to the iBoxx A/BBB of 10 basis points on average for small WoCs. This is very close to the premium of 11 basis points identified by the Competition and Markets Authority in 2015.<sup>128</sup> As our embedded cost of debt allowance is set at the iBoxx A/BBB minus 25 basis points for embedded debt, and our new cost of debt allowance is set at the iBoxx A/BBB minus 15 basis points, this implies a small company cost of debt premium of 35 and 25 basis points on embedded and new debt, respectively. At our notional share of 20% new debt, this implies an uplift of 33 basis points to the overall cost of debt.

**Table A1.4 – Revised calculation of allowed uplift for successful company-specific adjustment claims**

	Embedded debt	New debt
Sector benchmark spread to the iBoxx A/BBB ('outperformance wedge')	-0.25%	-0.15%

<sup>128</sup> Competition and Markets Authority, "Bristol Water PLC, A reference under section 12(3)(a) of the Water Industry Act 1991", October 2015, Appendices A10(1)-23

	Embedded debt	New debt
Small company average spread to the iBoxx A/BBB	+0.10% <sup>129</sup>	+0.10%
Implied small company debt premium (rounded):	0.35%	0.25%
Weighting	80%	20%
Allowed uplift to overall cost of debt	0.33%	

We note the consistency of our analysis with previous estimation exercises by PwC in 2014 and the CMA in 2015 which informed the 25-40 basis point range used in previous iterations of our levels assessment. These exercises yielded very similar estimates of WoC average spread-to-iBoxx at issuance.<sup>130</sup> That these exercises estimated a different small company cost of debt premium to our allowed uplift of 33 basis points does not undermine our approach – it is merely due to PwC and the CMA picking a different ‘outperformance wedge’ assumption.<sup>131</sup> Given that we have picked an ‘outperformance wedge’ assumption different to that featured in both of these exercises (and that we feature a different split of new to embedded debt), it is logical that our allowed uplift for small companies passing our three assessments should also be different.

The uplift that was proposed by each of the companies was reasonably close to our allowed uplift of 33 basis points. Portsmouth Water and SES Water, at 30 and 25 basis points respectively, proposed an uplift a little lower than this figure. Bristol Water and South Staffordshire Water, at 38 and 40 basis points respectively, proposed an uplift that was slightly higher.

In our assessment, having regard to the calculation in table A1.4 above, the level of the adjustment requested by each of the companies was appropriate. With regard to those companies that requested an uplift higher than our own final calculation, we take into account that they were entitled to factor into their calculations an ‘outperformance wedge’ for new debt of 0.25% in line with our draft determinations; we do not expect them to have anticipated its reduction to 0.15% in the final determinations, with its consequent impact on our calculation.

<sup>129</sup> Based on the midpoint of the simple average (+0.08%) and weighted average (+0.12%)

<sup>130</sup> PwC found an average spread of 0.12%, while the CMA’s analysis found in favour of 0.11%.

<sup>131</sup> PwC used an estimate of 0.15%, while the CMA used an estimate of 0.26%.

Consequently, we are therefore satisfied that each of the companies should be assessed as having passed the Levels Adjustment test.

In the event that any of the companies also passes the other two tests necessary to qualify for a company-specific adjustment, we apply a 33 basis points uplift in line with our own calculations, rather than any different uplift (whether higher or lower) that was requested.

We are satisfied that this treats all four applicant companies equally and fairly in respect of the levels assessment.

### **A1.3 Benefits assessment**

In this section we consider whether there is compelling evidence of benefits that adequately compensate customers for the increased cost of funding the uplift.

For draft determinations we followed the approach set out in our PR19 methodology, assessing benefits in three areas:

1. **Assessment of beneficial impact on our cost benchmarks** (base water totex and retail totex) - where we quantified benefits by re-calculating upper-quartile challenge without the small company concerned, and comparing the new totex allowance with the baseline allowance.
2. **Assessment of beneficial impact on our service benchmarks** (supply interruptions, leakage, water quality contacts, unplanned outages) - where we quantified benefits by re-calculating the upper quartile/median challenge without the small company concerned, and comparing 'stretch' in resulting service levels with the baseline.
3. **Benefits in other areas** (e.g. innovation) - this was based on our review of company submissions.

We set out in table A1.5 below company representations on the approach we took to our benefits assessment for draft determinations:

**Table A1.5 - Summary of representations on our benefits assessment and our response**

Issue	Raised by	Our response
<p><b>Benefits (base totex)</b> - Ofwat's modelling should not assume that small companies will not merge with each other – historically this type of merger is not uncommon. Correcting this assumption would increase benefits.</p>	<p>Bristol Water/ KPMG</p>	<p><b>No change:</b> Our analysis focuses on the benefits of averting a merger through providing an uplift. We set out in our initial assessment of plans publication on company-specific adjustments how an uplift conditional on remaining a small company could affect the probability of being acquired by a larger entity. The same logic does not apply if the acquirer is small enough that the merged entity might still attract a small company premium. Even if the two largest small WoCs (Bristol Water and South Staffs Water) merged, it would result in a merged entity RCV of c.£1bn – around 1/3 the size of the smallest WaSC (Wessex). We therefore continue to consider our assumption reasonable.</p>
<p><b>Benefits (Retail)</b> - Ofwat's calculation of the single period post-merger benchmarking challenge (based on the upper quartile/median performance commitment values) is overly simplistic and does not reflect the overall effects of a merger. For retail, KPMG's more detailed approach indicates £70m benchmarking benefits (NPV)</p>	<p>Bristol Water/ KPMG</p>	<p><b>No change:</b> KPMG simulates different mergers involving Bristol Water by adding the firm's historic retail costs to those of other firms and re-running our entire modelling suite with the merged company (i.e. re-estimating econometric models, and deriving efficiency scores). We consider this approach has limited read-across to our current exercise as: - KPMG's analysis applies efficiency challenge as a function of the forward-looking upper quartile. For final determinations, we use an average of the historic and forward-looking upper quartiles of efficiency scores. - The analysis could also understate the efficiency of the merged company and hence its impact on efficiency scores (adding costs implies no synergies from the merger, which seems implausible).</p>
<p><b>Benefits (service levels)</b> - Benefits for all of the service elements only include a selective set of companies where Ofwat has intervened – this should be corrected for.</p>	<p>Bristol Water / KPMG</p>	<p><b>No change:</b> Our analysis focuses on benchmarking benefits – i.e. where a company's performance has allowed us to increase the level of 'stretch' which applies to the sector. We consider it appropriate that benefits should only be scored for companies where we have intervened to set (or where companies subsequently submitted) more ambitious targets, due to a benchmark set using Bristol Water's data. The claim that other companies' original submissions are more ambitious due to Bristol Water's data requires justification,</p>

Issue	Raised by	Our response
		and this was not provided as part of Bristol Water's submission.
<b>Benefits (non-base totex)</b> - Scaling factor of 50% of PR19 benefits applied for each subsequent price control is a judgment and should have sensitivities applied.	Bristol Water/ KPMG	<b>No change:</b> KPMG recognise the 50% as 'not unreasonable' and consider a sensitivity of 75%. Notwithstanding our view that 50% is a reasonable assumption, the results of our benefits assessment are robust to an increase of the scaling factor to 75% - for instance, NPV for Bristol Water from our forward-looking approach would still be negative.
<b>Benefits (non-base totex)</b> - Benefits of future price reviews that are calculated based on the current profile do not capture a company's current contribution to the upper quartile in future price reviews.	Bristol Water/ KPMG	<b>No change:</b> Bristol Water object to the scenario where forecast performance is upper quartile in 2025, but that the base figure for forecasting benefits in future controls (i.e. before scaling factor is applied) is benchmarking benefits for 2020-25. It proposes multiplying the final year of PR19's benefits by 5 to derive the starting point before applying a scaling factor for future controls. We do not agree that this change to our approach is liable to increase the accuracy of results. We consider it more defensible to model future period benefits based on their actual profile over PR19 rather than a hypothetical one which forces the unrealistic assumption of constant (final-year of PR19) benefits in each year.
<b>Benefits (precision)</b> - Ofwat are wrong to not include precision impacts in their benefits analysis. The CMA was clear that some adverse impact would result. KPMG estimate the impact of losing one company at £34.09m over 5 years.	Bristol Water/ KPMG	<b>Minor change:</b> While recognising the CMA's position for the South West Water – Bournemouth Water merger that losing a comparator results in adverse impact, we also note that: - The CMA stated the precision impact could not be interpreted as a direct measure of customer detriment (imprecision could lead to higher or lower customer costs), but was rather indicative of the extent to which Ofwat might in future be susceptible to accepting company-proposed cost adjustments that make price determinations less demanding. - The CMA did not attempt to monetise the impact of Ofwat's susceptibility to cost adjustments, but stated that the move from 18 to 17 companies did not constitute a significant adverse impact (unlikely to affect Ofwat's ability to set stretching benchmarks or contest company-specific cost claims). We consider accordingly that KPMG's precision impact estimate is not directly comparable to other benchmarking benefits, and cannot be used directly in our cost-benefit analysis. We have however qualitatively

Issue	Raised by	Our response
		considered this factor amongst others when considering companies' outstanding gap to positive net benefits.
<b>Benefits (other)</b> – It was incorrect to discount the submitted estimate of £1m for providing water refill stations, as this was an NPV calculation rather than a cash figure.	Bristol Water	<b>Minor change:</b> We have considered this factor amongst others when considering companies' outstanding gap to positive net benefits.
<b>Benefits (other)</b> - Customer research suggests customers seek on average at least £20 of benefits to compensate for any merger. Grossed up across Bristol's customer base, the company reports this represents c.£20m. KPMG argued that we were wrong to omit this benefit from our analysis, as our use of stated preference in other areas of PR19 (e.g. to calibrate reward rates) supported the use of this approach.	Bristol Water/ KPMG	<b>No change:</b> We do not agree that customers' views of required compensation in case of a merger can be straightforwardly used as an estimate of that company's benefits. Unlike outcome service levels which are simpler to define and hence value, the impacts of a merger are varied and influenced by multiple factors (e.g. which merging entities are involved). We consider it unlikely that asking such a complex question could elicit reliable answers, particularly as (in a regional monopoly) most customers could not be expected to have experienced a change in supplier.
<b>Benefits (other)</b> - Consistent with how merger references are conducted, Ofwat should consider how the company in question is unique in various respects of regulation which could represent best practice to be disseminated to other companies.	Bristol Water/ KPMG	<b>No change:</b> KPMG propose that on the following areas there may be some evidence of best practice: — Customer engagement; — Regulatory reporting; — Setting PCs and ODIs; and — Financeability and board assurance. This judgment is essentially based on the areas where Bristol Water scored 'B' for high quality and convincing evidence at our PR19 Initial Assessment of Plans. We note that in no cases did Bristol Water achieve an 'A' for 'high quality and innovative'. We also did not find compelling evidence of best practice in Bristol Water's approach in our initial assessment of plans. We do not assess there to be sufficiently strong evidence of benefits in this area to incorporate in our cost-benefit analysis.
<b>Benefits (other)</b> – Ofwat should reflect SES Water's status as one of the first companies with a social tariff, and is an upper quartile performer on social tariff penetration.	SES Water	<b>Minor change:</b> The impact is hard to quantify and thus to compare against the cost of providing the uplift, as it represents transfers from one customer group to another rather than a pure gain to customers. We have considered this factor amongst others when considering companies' outstanding gap to positive net benefits.
<b>Benefits (supply interruptions)</b> – Ofwat should reflect the company's strong performance during 'Freeze	SES Water	<b>No change:</b> We have not used current-period performance to directly inform our benchmarks. However,

Issue	Raised by	Our response
Thaw' – only 4 customers experienced loss of supply for longer than 12 hours.		some benefit will have been captured in our analysis due to SES Water's forecast supply interruptions performance (it is upper quartile on this measure).
<p><b>Benefits (other)</b> - EY were commissioned to establish evidence that smaller companies deliver benefits to society. They identified 4 possible hypotheses from theoretical evidence:</p> <ul style="list-style-type: none"> <li>• Small local firms have more agile decision-making structures</li> <li>• Small local firms are better at innovation</li> <li>• Small local firms are more consumer oriented</li> <li>• Customers prefer products and services from a local company</li> </ul>	SES Water / EY	<p><b>Minor change:</b> We did not include EY's analysis in our quantified comparison of costs and benefits as:</p> <ul style="list-style-type: none"> <li>- The analysis provides a framework for further quantification of benefits of a small local company, but no actual monetised estimates of benefits.</li> <li>- Many of the theoretical examples pointed to by EY are from outside the water sector and so might only have relevance to competitive settings.</li> <li>- The EY analysis identifies examples of good practice in small WoCs but is insufficiently comparative against WaSCs, meaning it is not clear that these benefits would be lost in any merger.</li> <li>- Some hypotheses of the report seemed inconsistent with company data – e.g. SES Water's average Service Incentive Mechanism score over the last 3 years is 16th out of 17 companies).</li> </ul> <p>We have considered this factor amongst others when considering companies' outstanding gap to positive net benefits.</p>

We have updated the models used to assess benefits with the following changes:

- **Data updates:** Our modelling of costs and benefits reflects our final view on performance commitment levels, outcome delivery incentive rates, base totex efficiency scores, modelled base totex, and RCV over 2020-25.
- **Interventions on outcomes and 'stretch':** Our analysis reflects the latest PR19 decisions on 'stretch' applied to performance commitment levels, for instance the shallower glide path for supply interruptions relative to draft determinations.
- **Per capita consumption:** We added this common performance commitment to our analysis of service benchmarking benefits, as we noted that companies were expected to achieve upper quartile percentage improvement, and therefore that upper quartile companies would provide benchmarking benefits.

We provide below a brief description of the approach we have followed to estimate benchmarking impacts in each area of the price control.

- **Base water totex:** We use a model which forecasts a company's efficiency rank at future price controls based on its current position and historical rank changes. For each control the model uses forecast rank to generate an estimate of the benchmarking benefits provided by the company concerned. The model is unchanged from our draft determinations version, save for reflecting the updated cost assessment and RCV data from our latest modelling run. More details on the model are available in our initial assessment of plans document.<sup>132</sup>
- **Retail totex:** We base our estimate of retail benchmarking benefits on a static analysis of retail efficiency scores, considering by how much the sector retail totex allowance would change if we removed the small company concerned.
- **Supply interruptions:** We apply a shallower glide path that assumes companies will achieve the 2024-25 upper quartile service level by 2029/30. Our estimate of benchmarking benefits provided by a given company is based on comparing the implied improvement in service commitment levels in this scenario with a counterfactual whereby the upper quartiles informing the glide path were calculated without that company's data.
- **Leakage:** We set out an expectation that companies should achieve upper quartile performance on leakage or at least a 15% reduction over 2020-25. We estimate that the benchmarking benefit provided by a given company can be assessed by dropping the company concerned from the data used to estimate the upper quartile for 2024/25, and assuming that below upper-quartile companies would achieve the same level of convergence towards the new upper quartile as before. The difference in service levels for affected companies can then be monetised using willingness-to-pay evidence.
- **Water Quality Contacts:** For final determinations we are intervening for four companies whose proposals on reducing unwanted contacts about water quality lagged behind the rest of the sector. We are imposing a service commitment which implies that they will achieve the upper quartile percentage level of reduction (34%) between 2019/20 and 2024/25. Our estimate of benchmarking benefit is derived by monetising the difference in implied service levels from the intervention when calculating the upper quartile percentage reduction with and without the company of interest.
- **Unplanned outages:** For final determinations we are intervening to challenge companies to achieve a level of performance informed by the sector median. Our estimate of benchmarking benefit is calculated by monetising the difference in estimated service levels from the intervention when calculating the sector median benchmark; with and without the company of interest.
- **Per capita consumption:** For final determinations we are intervening to challenge seven companies to achieve more ambitious reductions in per capita consumption. We have intervened to assume that these seven companies will

---

<sup>132</sup> Ofwat, 'IAP Technical Appendix 4: Company-specific adjustments to the cost of capital', January 2019

achieve either the absolute upper quartile level of consumption, or the upper quartile percentage reduction from their existing level. Our estimate of benchmarking benefit is derived by monetising the difference in implied service levels from the intervention when calculating the upper quartile; with and without the company of interest.

Table A1.6 draws together our latest single-period assessment of the contribution all four companies have made in terms of increased efficiency and service challenge for the PR19 price control, affecting the period 2020-25. As at our draft determinations, we have applied the simplifying assumption that non-base totex benefits halve relative to their PR19 single-period value at each subsequent control, reflecting the incentive for poorer-performing companies to catch-up and so reducing the benchmarking benefits of upper quartile performers.<sup>133</sup>

These single-period results indicate strongly positive net benchmarking impacts for Portsmouth Water and South Staffs Water, and negative benefits for Bristol Water and SES Water. We do not consider the cost of providing an uplift in our calculation, as the benchmarking impacts for 2020-25 are based on already-submitted data, and would remain irrespective of any impact on merger probability from providing an uplift.

**Table A1.6: ‘Single-period approach’ benchmarking benefits for 2020-25 (£m, 2017/18 prices and values)**

	BRL	PRT	SES	SSC
Base water wholesale totex	-27.1	256.3	-27.1	256.3
Retail totex	-12.5	-12.5	-12.5	-12.5
Supply Interruptions	0.0	25.9	0.0	23.8
Leakage	0.3	-0.7	0.3	-0.7
Water Quality Contacts	2.9	0.0	-0.6	2.9
Unplanned Outages	14.1	-3.3	14.1	14.1
Per Capita Consumption	-0.4	-0.4	1.0	-1.5
<b>Single-period net impacts:</b>	<b>-22.6</b>	<b>265.3</b>	<b>-24.8</b>	<b>282.5</b>

Source: Ofwat analysis of PR19 business plan data

<sup>133</sup> This is consistent with the tendency in our botex model for both high and low-ranked companies’ average rank to gravitate towards the middle of the pack.

As in our draft determinations exercise, we have placed most weight on our forward-looking approach. This is because we consider that any decisions on company-specific adjustment would only have causal effect on our benchmarks in future price controls, but also to reflect that the benchmarking benefit of a company to our controls may change over time. Our results are presented in table A1.7, presented (for consistency with previous exercises) with benefits unscaled for the probability that a merger might happen even if we provide an uplift (or conversely that a merger might not happen if we do not). This means that the benefits figures in table A1.7 should be considered an upper bound.

**Table A1.7: ‘Forward-looking’ estimates of costs and benefits of providing an uplift, 2025-2050 (£m, 2017/18 prices and values)**

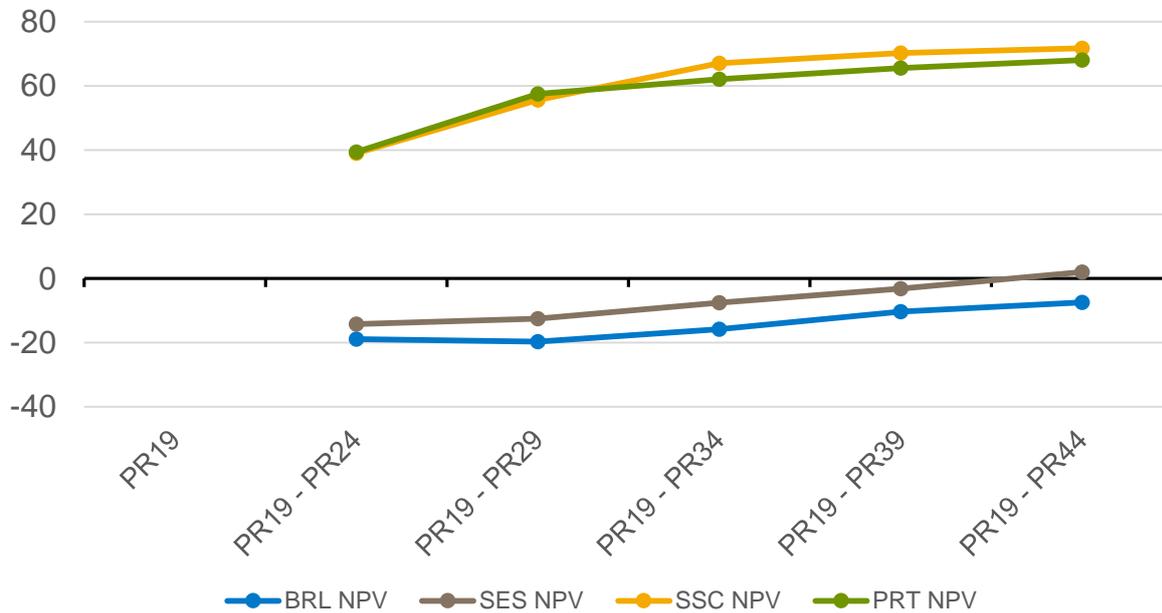
	<b>BRL</b>	<b>PRT</b>	<b>SES</b>	<b>SSC</b>
Base totex benefits	6	68	10	71
Non-base totex benefits	3	6	2	19
Cost of uplift	17	6	10	18
<b>Net Present Value:</b>	<b>-8</b>	<b>68</b>	<b>2</b>	<b>72</b>

Source: Ofwat analysis of PR19 business plan data

We have conducted a sensitivity analysis on our results to assess the impact of varying the forecast horizon used in our estimation. Figure A1.1 plots our estimate of Net Present Value (NPV) including all benchmarking benefits<sup>134</sup> as the number of price controls included in our analysis increases. This provides additional context to table A1.7; for instance that the positive NPV for SES Water depends on a horizon involving five controls.

<sup>134</sup> i.e. base totex directly estimated by our multi-period model, and single-period non-totex benefits extrapolated forward with our 50% decay factor.

**Figure A1.1: Net Present Value of providing companies' requested cost of capital uplift at different forecasting horizons (£m, 2017/18 values and prices)**



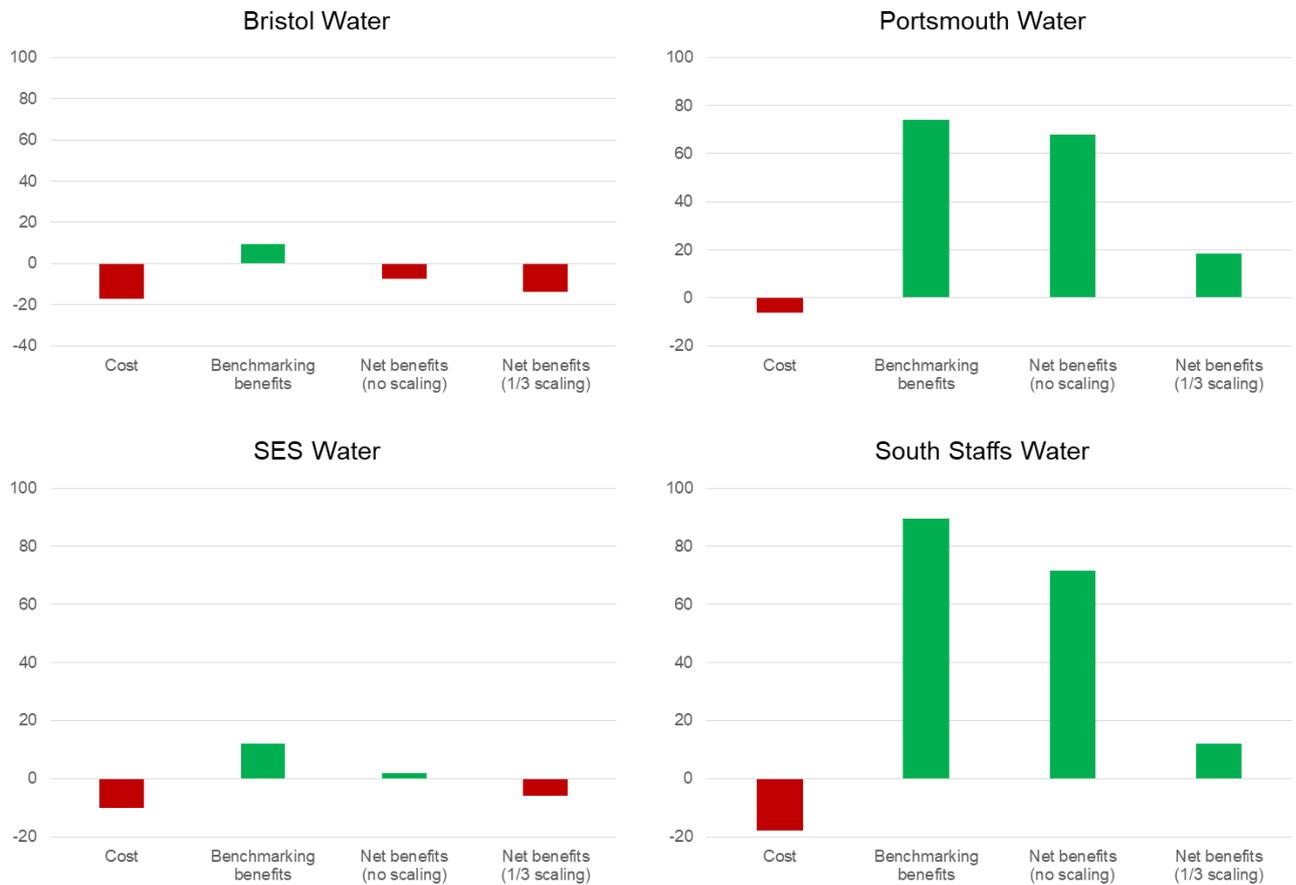
Source: Ofwat analysis of PR19 business plan data

For our PR14 final determinations we assessed the incremental change in the probability of a merger from small companies not receiving an uplift was likely to be marginal, increasing the probability of a merger.<sup>135</sup> This is because of the small scale of the impact on returns from the absence of an uplift and the significance of other factors in determining merger probability. This reasoning was used to justify applying a scaling factor to our estimates of benefits to derive a range against which to compare the cost of funding the uplift.

Figure A1.2. sets out our view of costs and benefits for each company, before and after applying a scaling factor of 1/3. The range denoted by the unscaled and 1/3 scaled NPV is strongly positive for Portsmouth (£19m to £68m) and South Staffs (£12m to £72m), while the equivalent range for Bristol (-£14m to -£7m) and SES Water (-£6m to £2m) is not.

<sup>135</sup> Ofwat, 'PR14 Annex 3 – benefits assessment of an uplift on the cost of capital', December 2014, p5

**Figure A1.2: Net Present Value of benefits under different scaling assumptions over 2025-2050, (£m, 2017/18 prices and values)**



Source: Ofwat analysis of PR19 business plan data

Our analysis thus far has focused on impacts which are easier to quantify and monetise. Bristol Water's representation argued that our exercise from draft determinations did not place sufficient weight on harder-to quantify benefits.

We assess Bristol Water's gap to positive NPV as being at least -£14m. Bristol Water's submission argued that we should include various other non-benchmarking items in our analysis, which we now consider against this gap:

- Loss of precision in totex modelling
- Water refill stations
- Customer stated preference valuation of remaining independent
- Dissemination of best practice

Assessed in the round (and for reasons set out in table A1.5), we did not consider that the collective value to customers of these benefits was likely to exceed £14m in NPV terms, with a high degree of confidence.

We assess SES Water's gap to positive NPV as being at least -£6 million. SES Water did not provide additional material in its representation to support its case in this assessment. At draft determinations, SES Water argued that the following benefits were most relevant:

- Good performance on supply interruptions
- Early mover on social tariffs, with advanced roll-out
- Benefits to being a small, local company cited in EY report

Assessed in the round (and for reasons set out in table A1.5), we did not consider that the collective value of these benefits was likely to exceed £6 million to £8 million with a high degree of confidence.

In summary, our single-period and forward-looking analysis shows a consistent outcome that Portsmouth Water and South Staffs Water demonstrate large and positive net benchmarking benefits which we assess as likely to exceed the cost of providing their uplift (i.e. the 33 basis points). We consider that both of these companies have passed this assessment.

Net benchmarking benefits for Bristol Water and SES Water are negative in our single-period analysis and negative in our forward-looking analysis once scaling factors are applied. We do not consider it likely that qualitative benefits provided by these companies are sufficient to result in net benefits which are positive overall. We consider therefore that neither of these companies has passed this assessment.

## **A1.4 Customer support assessment**

This section considers whether company submissions represent compelling evidence that their customers support the proposed adjustment.

**Bristol Water** passed this assessment at draft determinations, as it demonstrated compelling evidence of customer support for funding its proposed uplift, with 87% of its survey sample (451 customers) indicating they were content to unconditionally fund the £1.80 per year cost of funding the company's proposed uplift. We had no material concerns about the methodology or question formulation in the survey commissioned by Bristol Water. As the uplift we propose to allow for all successful applicants (33 basis points) is lower than Bristol Water's latest proposal (38 basis points), we continue to consider that this evidence is compelling proof of customer support, and that Bristol Water passes this assessment.

**Portsmouth Water** passed this assessment at our initial assessment of plans in January 2019. We decided that it had demonstrated compelling evidence of customer support for funding its proposed uplift. The company commissioned focus group workshops, and a survey of 508 households, with 88% of those surveyed stating they were very or fairly content to pay for the proposed uplift, at a bill impact of £0.80 per year. The bill impact of Portsmouth's uplift has not changed materially; we continue to consider that this evidence is compelling proof of customer support, and that Portsmouth Water passes this assessment.

**SES Water** did not pass this assessment at draft determinations. We decided that the company had not supplied sufficiently convincing evidence that its customers supported funding its proposed uplift. SES Water's resubmitted customer acceptability testing asked a survey of 539 customers: *'Overall, are you supportive of continuing to pay an additional £1.75 per year to be provided with water services from a small local company?'*. While SES Water reported that 86% of respondents gave positive responses, we consider that the question wording misleadingly presented the uplift as a bill item customers were paying for already, rather than an addition. As SES Water has not submitted additional customer support evidence or explained why they think our decision was wrong, we assess that SES Water still has not passed this assessment.

**South Staffs Water** carried out a survey of 409 customers surveyed across the South Staffs and Cambridge service areas. Respondents were asked about the acceptability of a £1.00 per year and £2.00 per year increase to fund their uplift. We estimate the nominal impact on South Staffs average bill to be around £1.20 per year. We had no material concerns about the methodology or question formulation in the survey commissioned by South Staffs. Overall, 81% of those surveyed found paying £1 per year acceptable or very acceptable; this figure fell to 59% for a £2 per year bill increase. We assess that the evidence is sufficient evidence of customer support and that South Staffs Water therefore passes this assessment.

## Annex 2: Company representations and our response

Cost of equity issues raised in draft determination representations			
Issue raised	Who raised the issue?	Our consideration of the issue	Change to our approach?
The cost of equity should be calibrated to allow companies to achieve minimum ratios for an investment grade rating with some headroom.	ANH, UUW, WSH, NES, TMS	We consider that the appropriate approach is to set an allowed return on the basis of market data in the first instance. We subsequently consider how measures available to us to improve cashflow (e.g. adjusting PAYG rates) can address financeability pressures under the notional financial structure. (See 'Aligning risk and return technical appendix').	No change
Ofwat's use of the CAPM is too mechanistic, not adequately reflecting current turbulence and future macroeconomic and geopolitical risks. To compensate it should use longer trailing averages or pick estimates from the high end of ranges.	ANH, WSH, NES, Invesco	Our use of the CAPM is not reliant on short periods of data. For instance, our total market return estimate draws on 118 years of historical equity returns data.  We consider that several CAPM components (e.g. risk-free rate) already embed forward-looking market expectations. By introducing measures reflecting a company view (e.g. that financing conditions will be less benign than currently expected in 2020-25) we adopt a position that companies know better than the market. But we do not consider there is a sound evidential basis for this being the case.	No change
Increased skewness and breadth of RoRE ranges suggest a higher cost of equity than the CAPM estimate may be appropriate.	WSX, TMS, ANH, UUW	We are not convinced an adjustment to the cost of equity is required as:  - RoRE risk ranges substantially reflect idiosyncratic factors which do not require compensating yield under the CAPM framework.	No change

		<ul style="list-style-type: none"> <li>- RoRE expectations have a poor track record in predicting future returns – risk ranges from PR14 proved to be too pessimistic, with a downside skew that has not materialised.</li> <li>- Correcting for excessive ‘stretch’ in cost efficiency and outcomes should not be done at the level of the sector return, due to diluting incentives and poor targeting of customer funds.</li> <li>- We have as part of final determinations recalibrated the penalty several outcomes and reduced stretch on costs.</li> </ul>	
<p>Our allowed return does not reflect top-down cross-checks, which indicate a higher allowed cost of equity is appropriate.</p>	<p>Frontier, WSX, SWB, TMS</p>	<p>We identify various issues in Frontier’s cross-checks which would increase the consistency of the outputs with our CAPM-derived allowed return estimate, if addressed.</p> <ul style="list-style-type: none"> <li>- DDM analysis: share prices have subsequently increased, and dividend growth assumption looks high</li> <li>- Equity/debt premium analysis: Europe Economics’ review of Frontier’s comparison of the implied debt premium and equity premium for a notional company that is 100% equity financed finds errors. Correcting for these shows that the differences in these premia are not unusual compared to historical (and Frontier’s own) WACC estimation exercises.</li> </ul> <p>Our own cross-checks (FTSE returns, Market-To-Asset Ratios, financial analyst expectations) broadly support our choice of point estimate for final determinations.</p>	<p>No change</p>

<p>Ofwat's low allowed cost of equity is not consistent with its high frontier shift and real price effect assumptions in cost assessment.</p>	<p>WSX, BRL, Economic Insight</p>	<p>We recognise productivity forecasts for the wider UK economy are relatively low, but we consider our productivity growth estimates that drive our efficiency assumptions are consistent with forecasts for comparator sectors, and are consistent with our assumptions for real price effects. In their advice to us, Europe Economics use the same OBR forecasts for labour productivity growth and labour productivity, we consider there to be no inconsistency in the analysis. Further detail is set out in the 'Securing cost efficiency technical appendix'</p>	<p>No change</p>
<p>Ofwat inappropriately places all weight on index-linked gilts when deriving the risk-free rate.</p>	<p>WSH, BRL, Economic Insight</p>	<p>Our analysis indicates an inflation risk premium of 40 basis points in nominal gilts, and a negligible liquidity risk premium in RPI-linked gilts. By definition a risk-free rate should not be subject to a risk-premium. We therefore opted to use RPI-linked gilts.</p>	<p>No change</p>
<p>RPI-linked gilts should not be used to estimate the risk-free rate, as RPI is a discredited inflation measure</p>	<p>HDD, SVE, SSC</p>	<p>We agree with the view of the Office for National Statistics that RPI in its current form is a flawed measure, liable to overstate consumer price inflation, but cannot however overlook our conclusion that there is an inflation risk premium embedded in nominal gilts, which it would be inappropriate to reflect in company returns. however ignore evidence that basing our calculations on nominal gilts inappropriately embeds an inflation risk premium in our allowed cost of equity. In the absence of CPI or CPIH-linked gilts, this leaves RPI-linked gilts as the only alternative source of data not affected by this issue.</p>	<p>No change</p>
<p>Yields on RPI-linked gilts are distorted by scarcity and</p>	<p>WSH, YKY, SWB, TMS, WSX,</p>	<p>We consider it is arbitrary to discount some factors (e.g. scarcity value) in the price discovery process which produces the market</p>	<p>No change</p>

regulatory requirements.	Frontier Economics	yield. We note that the CMA in 2014 rejected the notion that prevailing market yields were not a suitable guide to future returns.	
A negative risk-free rate is inconsistent with economic theory.	WSH, YKY	Both UKRN Study authors and Europe Economics in its advice to us state that a negative real-terms risk-free rate is consistent with economic theory, particularly if a) future consumption growth is expected to be negative or (b) individuals experience and are averse to uncertainty about future consumption or (c) there are financial market frictions which depress the risk-free return.	No change
A long-run historical average for the risk-free rate should be used as in previous controls.	SEW, TMS	To rely on longer trailing averages is to implicitly assume that the prevailing risk-free rate in 2020-25 will be more like its historical level than recent spot rates. There is weak evidence to suggest that spot rates tend towards a historic mean. We consider that averaging over longer periods, by using old and out of date information, is liable to introduce inaccuracy in the estimate of the risk-free rate, and that this could undermine the legitimacy of the regulatory framework.	No change
Using yields on 15 year gilts directly is preferable to taking an average of 10 and 20 year gilts.	SWB, TMS, WSX, Frontier Economics	We have considered this proposal, and conclude that it has merit. In cases where the yield curve is convex or concave between the 10 and 20 year yields, the yield for 15 year gilt rate derived from the yield curve will be different to the average of 10 and 20 year gilts. We consider that using the direct reading has advantages, as it is generated using a more sophisticated line of best fit.	Change: We adopt this approach to derive our point estimate for the risk-free rate.
Ofwat has opportunistically	WSX	We do not accept this portrayal of our approach. While our point estimate for TMR from our 'early	

<p>shifted between approaches to engineer a low figure for TMR.</p>		<p>view' was lower than our 'ex post' range, this was supported by both dividend discount model evidence and Market-To-Asset Ratio analysis. We recognise that spot outputs from our dividend discount models have increased in recent months but have been consistent since our 'early view' in placing predominant weight on 5-year trailing averages, which continue to support our point estimate for TMR.</p>	
<p>Ofwat's ex-post analysis places excessive weight on the Jacquier Kane Markus estimator.</p>	<p>SWB, TMS, WSX</p>	<p>We prefer the Jacquier Kane Markus (JKM) estimator to the Blume estimator due to its more realistic distributional assumption (lognormality) and also the conclusion of the authors in their 2005 paper that their optimal estimator is more efficient than their unbiased estimator (which is very similar to the Blume estimator in terms of construction and results).</p>	<p>No change</p>
<p>TMR) Ofwat's use of a new CPI-based inflation dataset is inappropriate / unreliable.</p>	<p>SWB, SVE, WSX, YKY, BRL, SEW</p>	<p>We continue to consider that the Bank of England's CPI series is preferable to the alternative of using the inflation series from the 2019 Yearbook. This is due to there being greater consistency and comparability of the Bank's CPI series over time (a point made by the UKRN study's authors), and also the flaws in the Cost of Living Index (COLI) used in the 2019 Yearbook for inflation in years between 1914 and 1947. Issues with the weights in the COLI are recognised by the Office for National Statistics.</p>	<p>No change</p>
<p>TMR) Using a CPI-deflated historical returns series to derive TMR undermines the principle of a value neutral transition to</p>	<p>WSX, SWB, TMS</p>	<p>Neither CPI nor RPI data exists before 1947, therefore we would face the same choice between using the Bank of England's inflation series and that contained in the 2019 Yearbook for the period 1914-1947 even if we focused on using RPI to deflate historical returns (the Bank's historical RPI series is identical to its CPI</p>	<p>No change</p>

CPIH as it lowers returns		series for this range, as both series draw from the same source). We consider that the Bank of England's data is liable to capture inflation more accurately over this period.	
Ofwat's assumed holding period of 5-10 years is too long.		Our 5-10 year range for holding periods is consistent with a 5 year control with a fixed TMR assumption. It is also consistent with the advice to regulators from the UKRN Study (which endorses a 10 year holding period), investor surveys, and also regulatory decisions. We maintain that it is a reasonable assumption, in line with available evidence.	No change
TMR) The dividend growth rate used in Ofwat's DDMs is too low.	SRN, BRL, YKY	Historically, the GDP growth assumptions used to set the growth rate of dividends in our DDM analysis have been higher than actual dividend growth (so may overstate true dividend growth in the future). Alternatives such as using analyst forecasts of dividends are unsatisfactory due to the wide literature indicating the presence of an optimism bias in these forecasts.	No change
TMR) Ofwat's DDMs should be uplifted by a volatility adjustment.	SRN	We continue to maintain our position that such an adjustment is unnecessary because of PwC analysis which shows that the higher volatility of capital growth compared to dividend growth (which provides the rationale for the adjustment in Fama & French's 2002 paper) has reversed in recent years. As set out by Europe Economics, it is also not clear why GDP growth cannot directly proxy for capital growth, implying a volatility adjustment is not necessary.	No change
Trailing average periods are inconsistent across	SEW	Our choice of averaging periods reflects previous analysis and evidence reviews suggesting that:	No change

<p>cost of equity parameters.</p>		<ul style="list-style-type: none"> <li>- 5 year trailing averages of DDM outputs have superior predictive power of future output levels</li> <li>- Spot rates for gilt yields have the best predictive power of future gilt yields</li> </ul> <p>Therefore although these two periods are inconsistent, it is unclear why this is a more material consideration than an estimate which is more likely to represent the level of allowed return parameters over 2020-25.</p>	
<p>Ofwat should update its Market to Asset Ratio analysis entire MARs dataset or remove MARs from its analysis</p>	<p>SVE, HDD</p>	<p>The purpose of the exercise PwC carried out for us in 2017 was in part to understand the extent to which the past allowed return on equity was in excess of the required return by investors. We have not therefore attempted to update the MARs analysis and agree that it should not inform our overall TMR range.</p>	<p>Change. We agree with this representation and no longer feature MAR analysis in our plausible 'forward-looking' range.</p>
<p>Ofwat should conduct beta analysis including Pennon and companies in other sectors (e.g. SSE, NG)</p>	<p>UUW, WSH, SRN, SEW</p>	<p>We do not need to use beta data from other sectors as we have essentially 'pure play' companies which are likely to provide a better proxy for the beta of a notional water company than comparators whose beta reflects non-water risks.</p>	<p>No change</p>
<p>Ofwat should place more weight on longer-duration betas than 2 years, and lower frequencies than daily.</p>	<p>WSH, HDD, UUW, SVE, TMS, WSX, YKY, BRL, SES, SEW, SSC</p>	<p>We continue to consider that 2 year beta strikes an appropriate balance between achieving sufficient datapoints to achieve precise estimates, and not including excessive amounts of obsolete data. In addition, as we are interested in a forward-looking beta (i.e. the best estimate of that which will prevail over 2020-25), it is relevant to consider which betas have the greatest predictive power over similar timeframes. Analysis carried out by Europe</p>	<p>Change: our beta estimate for final determinations places more weight on 5 year beta data</p>

		<p>Economics indicates that 2 year betas are typically better at predicting the future average value of 2 year beta in an ensuing 5 year period compared to spot betas estimated on other time horizons (e.g. 1-year, 3-years, and 5-years).</p> <p>We are however partially persuaded by representations which recommended more weight should be placed on longer trailing window, as we could not rule out that the price review process itself could be affecting water company returns and gearing, and agree that this could in principle result in 'feedback effects'</p>	
Ofwat's approach to estimating beta does not capture future risks and warrants picking beta estimates from the high end of the plausible range.	SWB, TMS, WSX, Frontier Economics	<p>We do not consider there is a sufficiently convincing evidential basis for picking beta from the high end of our range. Betas are forward-looking, reflecting the market view on risks and how likely they are to crystallise – we consider it is arbitrary to discount lower beta estimates, as we consider that the impact of market expectations on share prices will have an impact on all frequencies and durations of beta.</p> <p>In addition, we consider that the particular drivers of additional beta risk cited in representations may have ambiguous or unproven impacts on beta.</p>	No change
Ofwat should retain enterprise value gearing.	SWB, TMS, WSX, SES	We retain our approach as part of our in-the-round cost of equity assessment, however we recognise there are other approaches to gearing which would point to a materially lower beta than that used in our final determinations	No change
Ofwat's estimate of debt beta is too high.	SEW, BRL	While regression evidence at some frequencies and durations of beta produce estimates of debt beta which are statistically insignificant, this is a commonly returned result. An assumption that	No change

		debt beta truly is zero suggests that the entire debt premium is attributable to idiosyncratic default risk – this is not borne out by current default rates. Historic determinations by the Competition Commission recognise the decompositional method as an appropriate approach to estimating debt beta.	
--	--	--	--

<b>Cost of debt issues raised in draft determination representations</b>			
<b>Issue raised</b>	<b>Who raised the issue?</b>	<b>Our consideration of the issue</b>	<b>Change to our approach?</b>
Ofwat assumption for notional share of new debt is too high.	ANH, NES, UUW, SVE, SWB, TMS, WSX, SEW	We have considered different approaches to estimating new debt share. While company-submitted data implies a new debt share of around 15%, we have concerns that this does not reflect the latest allowed totex figures from final determinations and is not consistent with various assumptions from our notional approach to setting cost of debt allowances. More notional approaches using assumptions relating to our notional company produce estimates of the new debt share sufficiently close to our draft determinations point estimate of 20% to not warrant moving from this assumption.	No change
Use of an average new:embedded ratio penalises companies with low investment programmes – we should consider a company-specific assumption	SEW	Lumpy investment means small companies in particular may have an atypical new debt share versus the sector. We consider that underperformance will be balanced out by outperformance when the company's point in the investment cycle means it has an atypically higher share of the type of debt (new or embedded) which is cheapest. Over the long term therefore we consider our approach is reasonable.	No change

<p>The 'outperformance wedge' should be calculated controlling for tenor and credit rating.</p>	<p>SEW, WSX, TMS, SWB, Frontier Economics</p>	<p>We do not consider it necessary to control for tenor or credit rating, as our aim is to set an allowance for the cost of new debt which is reflective of efficient borrowing costs and which does not materially overcompensate companies for these costs. Consistent outperformance of the iBoxx A/BBB indicates that making an adjustment to the level of this index is consistent with this aim. We note that the CMA in its 2015 redetermination of BGT's allowed return did not adjust for tenor or credit rating.</p>	<p>No change</p>
<p>Our cost of new debt allowance does not reflect the credit rating of the notional company</p>	<p>ANH, NES, SVE, HDD, SEW, WSH, UUW, SRN, WSX, YKY, AFW, SSC</p>	<p>We agree there is some prospect that our lower allowed return may reduce some comfort previously enjoyed by debt investors, which may result in higher required yield on new debt.</p> <p>We do not agree this needs to be reflected in our choice of benchmark index, but rather in the level of outperformance wedge. On balance, considering both current traded yields versus the level of the iBoxx and comparison of spreads before and after downgrades, we do not consider there is a case for removing the 'outperformance wedge' on new debt entirely.</p>	<p>Change: we reduce the level of our 'outperformance wedge' on new debt from 25bp to 15bp</p>
<p>Ofwat should consider allowing for some headroom in our ex-ante allowed cost of new debt allowance as it will be returned to customers in full.</p>	<p>ANH</p>	<p>While we recognise that such a move may improve cashflows, it is also effectively a loan from customers to companies. Given that significant numbers of customers struggle with paying their bills, and are likely to face higher borrowing costs than a water company, we do not view this measure as consistent with fulfilling our statutory duties.</p>	<p>No change</p>
<p>Ofwat's assumption of an 'outperformance</p>	<p>WSH</p>	<p>We do not agree with this portrayal of our stance. We have decided to focus on an allowance based on the iBoxx due to the improved incentive</p>	<p>No change</p>

wedge' is inconsistent with its view that the efficient cost of debt should be derived using the iBoxx A/BBB.		properties of setting an allowance with reference to some external benchmarks.	
The iBoxx A/BBB is an arbitrary benchmark, not relevant to a regulated utility	YKY	This was not the view of attendees at a 2017 workshop held on cost of debt indexation. We consider that our choice of a 15 year index is not arbitrary, being guided by the sector's historic debt issuance patterns.	No change
Ofwat should not exclude swaps and non-standard instruments when calculating its allowed cost of debt.	WSH, YKY, ANH, BRL, Economic Insight	<p>It is standard practice in UK economic regulation to exclude swaps. The bespoke nature of swaps makes it difficult to make comparisons and assess if they have been efficiently incurred and there is a risk they might be used by companies to mitigate risks arising from high risk financial arrangements unrelated to the notional financial structure.</p> <p>Non-standard instruments are excluded for a variety of reasons – either having equity-like characteristics, double counting returns from our issuance and liquidity costs allowance, or because it is unlikely that an efficiently-financed notional company would contemplate them as a relatively high cost option.</p>	No change
Ofwat's cost of embedded debt allowance should reflect company-specific factors.	YKY	We do not agree. Our notional approach of setting a single cost of embedded debt for the sector represents long-standing practice. It is widely recognised as offering better incentives to issue debt cost-effectively compared with an approach which passes through actual debt costs – companies absorb the cost of underperforming the sector allowance, and so are strongly incentivised to outperform. In addition, this	No change

		<p>approach means that customers do not bear all the risk associated with company financing decisions.</p>	
<p>Embedded debt assumption should place more weight on WoC cost of embedded debt</p>	<p>SVE, SSC, HDD</p>	<p>The four smaller WoCs account for less than 2% of embedded debt in our analysis. We maintain our view that applying the median for all companies as our benchmark would apply a disproportionate upwards skew to our allowed cost of embedded debt, resulting in an allowance significantly higher than that required by the representative company.</p>	<p>No change</p>

Ofwat (The Water Services Regulation Authority) is a non-ministerial government department. We regulate the water sector in England and Wales.

Ofwat  
Centre City Tower  
7 Hill Street  
Birmingham B5 4UA

Phone: 0121 644 7500  
Fax: 0121 644 7533  
Website: [www.ofwat.gov.uk](http://www.ofwat.gov.uk)  
Email: [mailbox@ofwat.gov.uk](mailto:mailbox@ofwat.gov.uk)

December 2019

© Crown copyright 2019

This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit [nationalarchives.gov.uk/doc/open-government-licence/version/3](http://nationalarchives.gov.uk/doc/open-government-licence/version/3).

Where we have identified any third party copyright information, you will need to obtain permission from the copyright holders concerned.

This document is also available from our website at [www.ofwat.gov.uk](http://www.ofwat.gov.uk).

Any enquiries regarding this publication should be sent to us at [mailbox@ofwat.gov.uk](mailto:mailbox@ofwat.gov.uk).

