

<b>Institution:</b> Loughborough University		
<b>Unit of Assessment:</b> C17 – Business and Management Studies		
<b>Title of case study:</b> Impacting the Decisions and Policies of Three Regulatory Bodies and Anglian Water in the Determination of Regulated Revenues in the Great Britain Water Industry		
<b>Period when the underpinning research was undertaken:</b> 2007 to present		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b>	<b>Role(s) (e.g. job title):</b>	<b>Period(s) employed by submitting HEI:</b>
David Saal	Professor of Microeconomics	April 2014 to present
Maria Nieswand	Lecturer in Economics	February 2017 to present
Tom Weyman-Jones	Professor of Industrial Economics	November 1973 to May 2014
<b>Period when the claimed impact occurred:</b> September 2018 to December 2020		
<b>Is this case study continued from a case study submitted in 2014?</b> No		
<b>1. Summary of the impact</b> (indicative maximum 100 words)		
<p>The revenues of regulated water companies in Great Britain are set in advance, with Ofwat having set 2020-2025 prices for England and Wales in December 2019 and the Water Industry Commission for Scotland (WICS) having set 2021-2027 prices in December 2020. Productivity and cost assessment research at Loughborough University played a major role in informing these complex regulatory decisions. It contributed to Ofwat's and WICS's decisions to reduce by around GBP2.7 billion the allowed regulated revenues paid by all water service customers in Great Britain. It improved Anglian Water's cost assessment modelling and thereby shaped the company's Regulatory Business Plan submission, its response to Ofwat's Draft Determination and its appeal against Ofwat's Final Determination. Moreover, it influenced the Competition and Markets Authority's September 2020 provisional appeal judgment, adding GBP46 million for the provision of resilient services to Anglian's six million customers.</p>		
<b>2. Underpinning research</b> (indicative maximum 500 words)		
<p>Water companies in Great Britain are subject to regulated revenues that are set in advance for five years by Ofwat in England and Wales and for six years by WICS in Scotland. Revenues are set based on the regulator's prediction of future cost requirements, which means each firm's cost improvement potential must be assessed as part of the process.</p> <p>When determining the potential for cost improvement, Ofwat and WICS both consider general productivity trends in the industry to set a continuing efficiency challenge for all regulated firms. In addition, Ofwat compares the relative cost efficiency of firms and allows lower revenues for those it deems less cost-efficient.</p> <p>In 2015 the Competition and Markets Authority (CMA) was highly critical of Ofwat's previous relative cost-efficiency methodology, as a result of which Ofwat developed a new approach for its December 2019 determinations. English and Welsh water companies also developed alternative cost assessment models. These were used not only to provide evidence supporting their projected 2020-2025 costs in their Regulatory Business Plan submissions but to challenge the appropriateness of Ofwat's methodology via formal responses to its</p>		

initial and draft regulatory determinations and, ultimately, via appeal against Ofwat's Final Determinations. Given this context, research at Loughborough by Professor David Saal, Dr Maia Nieswand and Professor Tom Weyman-Jones has provided essential insights relevant to regulatory cost assessment modelling.

The research report co-authored by Saal for Water UK [R1] provided English water industry productivity estimates for 1993 to 2017 and found evidence of a substantial slowdown in productivity growth after 2011. This report is often referred to as the Water UK and Frontier Economics report. Research by Saal and Weyman-Jones [R2] provided evidence on the impact of privatisation and regulation, along with other drivers, on water industry productivity trends from 1985 to 2000. Collectively, this work also demonstrated the need to include water and sewage outputs to accurately measure productivity growth if firms produce both.

Further research modelled the water operations of English and Welsh water companies for the period from 1996 to 2010, highlighting the need to control for water delivered, leakage (water scarcity), connections and supply area in modelling [R3]. Research also demonstrated the presence of cost interactions between upstream and downstream activities that should be controlled for [R2, R3, R4]. Moreover, by proving that cost model parameters differ for integrated electricity companies that both generate and distribute electricity relative to firms that generate or distribute it separately, the research revealed potential assessment bias if the costs of multiple output firms are modelled with a single output [R4].

Research also provided sophisticated econometric models using logged and translog specifications in which the meanings of parameter values need to be carefully interpreted [R2, R3, R4]. This demonstrated that further operating characteristic controls are necessary to properly assess a firm's costs. In addition, it was shown that operating characteristic controls are still necessary even when employing econometric techniques controlling for unmodelled company characteristics [R2] or company-specific efficiency differences [R3].

Regulators may fail to implement efficient cost levels and revenue caps by not properly accounting for operating characteristics [R5, R6]. This was first demonstrated in the case of regulated Norwegian electricity companies [R5] and then reinforced by a methodological piece that applied simulation analysis and thereby showed how assessment can be extremely sensitive to different approaches to controlling for such characteristics [R6].

### 3. References to the research (indicative maximum of six references)

**R1** Wright, J, Huggins, M, and Saal, DS (2017): *Productivity Improvement in the Water and Sewerage Industry in England Since Privatisation: Final Report for Water UK*  
<https://www.water.org.uk/wp-content/uploads/2018/11/Water-UK-Frontier-Productivity.pdf>

**R2** Saal, DS, Weyman-Jones, T, and Parker, D (2007): 'Determining the contribution of technical, efficiency and scale change to productivity growth in the privatized English and Welsh water and sewerage Industry: 1985-2000', *Journal of Productivity Analysis*, volume 28, issues 1-2, pages 127-139  
<https://doi.org/10.1007/s11123-007-0040-z>

**R3** Brea-Solis, H, Perelman, S, and Saal, DS (2017): 'Regulatory incentives to water losses reduction: the case of England and Wales', *Journal of Productivity Analysis*, volume 47, issue 3, pages 259-276  
<http://dx.doi.org/10.1007/s11123-017-0496-4>

**R4** Triebs, TP, Saal, DS, Arocena, P, and Kumbhakar, SC (2016): 'Estimating economies of scale and scope with flexible technology', *Journal of Productivity Analysis*, volume 45, issue 2, pages 173-186  
<http://dx.doi.org/10.1007/s11123-016-0467-1>

**R5** Bjørndal, E, Bjørndal, M, Cullmann, A, and Nieswand, M (2018): 'Finding the right yardstick: regulation of electricity networks under heterogeneous environments', *European Journal of Operational Research*, volume 265, issue 2, pages 710-722  
<http://dx.doi.org/10.1016/j.ejor.2017.07.059>

**R6** Nieswand, M, and Seifert, S (2018): 'Environmental factors in frontier estimation – a Monte Carlo analysis', *European Journal of Operational Research*, volume 265, issue 1, pages 133-148  
<http://dx.doi.org/10.1016/j.ejor.2017.07.047>

R2 to R6 were published in journals with international editorial board membership and a rigorous peer-review process. R1 was produced for Water UK, an association representing all UK water and wastewater service suppliers in England, Scotland, Wales and Northern Ireland. Water UK commissions high-quality studies of relevance to its members and required the report to meet rigorous academic standards and be subject to internal and academic peer review before publication. It has recently been cited in internationally recognised journals such as the *Oxford Review of Economic Policy* (2020) and *Competition and Change* (2020).

#### 4. Details of the impact (indicative maximum 750 words)

Regulators and water companies used the research to support their competing positions on determining regulated revenues. The research has impacted policymakers at Ofwat, WICS, Anglian Water and the CMA, as well as water company shareholders and all users of water services in Great Britain. Ultimately, revenues, profits, quality of service, prices and bills are all directly impacted by the outcomes of these regulatory processes. Specific examples are detailed below.

• **Contributed to a GBP2.7 billion reduction in the regulated revenues paid by all water service customers in Great Britain**

The research on productivity trends influenced Ofwat's regulatory expectations on performance. In October 2018, the regulator's Chief Executive cited the evidence of recent low productivity growth [R1] as justifying the need to require substantial productivity improvements in the 2020-2025 period [S1]. Ofwat's December 2019 Final Determination documents [S2] directly reported the research's estimates to support the final determination of a cost productivity improvement challenge of 1.1% per annum for 2020-2025, amounting to a total reduction in regulated bills of approximately GBP2.5 billion.

Similarly, WICS's October 2020 Draft Determination document [S3] cited the research [R1] to justify the requirement to impose a 1.0% per annum efficiency challenge on Scottish Water. This reduced the company's GBP8 billion 2021-2027 revenue allowance by GBP0.2 billion [S3]. This draft determination was subsequently sustained in WICS's December 2020 Final Determination.

• **Improved Anglian Water's relative cost-efficiency modelling and its use as evidence in Anglian's regulatory submissions throughout the price determination process**

In 2017-2018, at the company's request, Saal and colleagues produced an academically informed review of Anglian Water's Phase 1 regulatory cost assessment work and then worked with Anglian on improved models. These activities drew heavily on the underlying research with regard to cost assessment modelling [R1 to R6] and were annexes to Anglian's September 2018 Regulatory Business Plan submission to Ofwat [S4] and its April 2020 Statement of Case for its appeal against Ofwat's Final Determination [S7].

The academic insights and the models developed from them were repeatedly cited by Anglian in these documents, as well as in further submissions the company made to Ofwat

as part of the regulatory process [S5, S6]. In April 2019 Anglian's Regulation Director indicated that the contribution of the research was fundamental to the company's Regulatory Business Plan, stating: "The insights... influenced our approach to regulatory cost assessment and every cost model we employed. They significantly influenced the GBP6.8 billion expenditure requirement we put forward as part of our regulatory business plan." [S10]

In January 2019 Ofwat published its initial assessment of Anglian's Regulatory Business Plan, suggesting Anglian's efficient expenditure requirements amounted to only GBP5.5 billion. In April 2019 Anglian published its response, which included an academic-based review of Ofwat's cost assessment model, authored by Saal, which Anglian used as evidence in rejecting the appropriateness of Ofwat's modelling [S5]. Anglian stood by the cost assessment models Saal and Nieswand helped it develop. The company's Regulation Director stated in April 2019: "The insights drawn from your academic research have influenced our strategy in responding to Ofwat's initial assessment of plans and provided a significant part of the evidence base we have submitted to Ofwat." [S10]

In July 2019 Ofwat published its draft PR19 determinations for Anglian and other companies, making no significant changes to its cost assessment models. In August 2019 Anglian responded in its Draft Determination Representation [S6], largely retaining its original Regulatory Business Plan. The reply to Ofwat included further substantial reference to insights drawn from the research, as well as an annex authored by Saal [S6]. Anglian also referenced new water cost assessment models derived particularly from R3, developed by Saal as alternatives to Ofwat's models.

In December 2019 Ofwat published its final PR2019 determinations and again made no significant changes to its cost assessment models. In February 2020 Anglian was one of an unprecedented four water companies to appeal their PR19 price determinations. In April 2020 Anglian's Statement of Case to the CMA included four reports written by Saal and Nieswand, with a substantial amount of the discussion featured in the statement based on these [S7].

In June 2020 Anglian responded to Ofwat's comments on the company's Statement of Case and again substantially cited Saal and Nieswand's insights, as drawn from their research. Anglian's response [S8] also cited and incorporated a set of alternative wastewater cost assessment models developed by Saal and Nieswand for consideration by the CMA, with this modelling again informed by R2 to R6. In December 2020 Anglian's Regulation Director confirmed: "Anglian Water's Statement of Case to the CMA, our response to Ofwat's response to our Statement of Case and our October 2020 response to the CMA's provisional findings relied significantly on models and arguments that build directly from your recently published research." [S10]

**• Influenced the CMA provisional appeal decision, thus increasing the resources available to provide resilient services to Anglian's customers**

In its September 2020 Provisional Determinations the CMA removed one of the sewage collection cost assessment models used by Ofwat, as its parameters were counterintuitive. This decision was responsible for a GBP46 million increase in allowed costs and hence revenues for Anglian [S9].

The decision was made in response to evidence provided in Anglian's Statement of Case, [S7], which was based on the scientific understanding of logged functional forms developed by the research team. It replicated arguments made in Saal and Nieswand's review of Ofwat's models, based on insights from R2 to R4, which Anglian had included in its response to Ofwat's initial assessment of its Regulatory Business Plan [S5].

As noted by Anglian's Regulation Director in December 2020: "The CMA's rejection of one of Ofwat's sewage collection cost models was based on evidence drawn from the insights of your academic research using logged and translog modelling... The significance of this particular impact of your research is demonstrated by the fact that it alone closed 20% of the gap between the expenditure we believe is required to maintain the resilience of our sewage networks for our customers and the resources that Ofwat allowed us in its final determinations." [S10]

#### 5. Sources to corroborate the impact (indicative maximum of 10 references)

All material at web-links is also provided to REF as PDFs.

**S1** *Why Change Is Needed?* – speech by CEO, Ofwat, October 2018 (see page 2)  
<https://www.ofwat.gov.uk/publication/why-change-is-needed-speech-by-rachel-fletcher-moodys-uk-water-and-regulated-networks-10-october-2018/>

**S2** *PR19 final determinations: overall stretch on costs, outcomes and cost of capital policy appendix*, Ofwat, December 2019 (see page 16)  
<https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Overall-level-of-stretch-across-costs-outcomes-and-allowed-return-on-capital-appendix.pdf>

**S3** *Strategic Review of Charges 2021-27: Draft Determination*, WICS, October 2020 (see pages 77 and 79)  
<https://tinyurl.com/y68nejew>

**S4** *Our Plan – 2020-2025*, Anglian Water, September 2018 (see page  
<https://www.anglianwater.co.uk/siteassets/household/about-us/01-pr19-our-plan-2020-2025.pdf>

**S5** Response to initial assessment of business plan, Anglian Water, April 2019 (see main document pages 26, 30 and 31 and appendix 5a)  
<https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/2020-2025/initial-assessment-of-plans/>

**S6** PR19 Draft Determination Representation, Anglian Water, August 2019 (see main document pages 106-107 and appendix 7a)  
<https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/2020-2025/draft-determination/>

**S7** *PR19 CMA Redetermination Statement of Case*, Anglian Water, April 2020 (see pages 133-142 and paragraphs 583-587)  
<https://tinyurl.com/rw984w6d>

**S8** *Executive Summary: Reply to Ofwat's Response to Anglian's Statement of Case*, Anglian Water, June 2020 (including unpublished annex REP14) (see pages 7, 18-19 and 22)  
<https://tinyurl.com/c9c6fbsp>

**S9** *Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: provisional findings*, Competition and Markets Authority, September 2020 (see paragraphs 4.226-4.227)  
<https://tinyurl.com/jf78euae>

**S10** Testimonials from Regulation Director, Anglian Water, April 2019 and December 2020