

Profits and Productivity in the Privatized English and Welsh WaSCS:1991-2015

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Brief Background of the WaSCs Regulation and Privatisation (1)

1989/90 FY– the WASCs are privatized and RPI+K regulation introduced with 10 year regulatory period

1994 Price Review - caps reopened due to excess profit concerns and a 5 year regime is established

1999 Price Review -significantly tighter price caps implemented for first time

Brief Background of the WaSCs Regulation and Privatisation (2)

Since circa 2010 increased emphasis on increasing competition

Concerns with regard to high equity returns and high gearing

In 2015 the industry's regulator moved from a cost assessment framework based on total economic costs, to one with greater reliance on TOTEX(CAPEX+OPEX) which is essentially cash flow based and not based on an economically consistent definition of costs

Commentators such as the National Audit Office (2015) the first water regulator (Byatt,2017) and the Financial Times (2017) are raising concerns with regard to the performance and appropriateness of the industry's model, returns to investors, and consumer outcomes.

Profits and Regulatory Cost Determination from Privatisation until 2015

ex ante Regulatory Cost
Determination and *ex post* estimates
of Economic Costs and Profitability
in the English and Welsh Water
Industry: 1991-2015

ex ante Regulatory Cost/Revenue Determination

- ▶ Following Weyman-Jones, et al's (2003), discussion of a building blocks approach to *ex ante* regulatory cost determinations under price cap regulation in the UK

$$RCD_{R,t} = OPEX_{R,t} + D_{R,t} + wacc_{R,t} RCV_{R,t}$$

- ▶ $RCD_{R,t}$ = *ex ante* regulatory total cost assessment
- ▶ $OPEX_{R,t}$ = *ex ante* assessment of operating expenditures
- ▶ $D_{R,t}$ = *ex ante* assessment of depreciation
- ▶ $WACC_{R,t} RCV_{R,t}$ = *ex ante* assessment of the required return on capital
 - ▶ $WACC_{R,t}$ the *ex ante* regulatory estimate of the weighted average cost of capital
 - ▶ $(RCV_{R,t})$ should be the regulator's *ex ante* estimate of the required capital stock

IN PRINCIPLE REGULATOR SETS REVENUE CAPS EQUAL to the EX ANTE ASSESSMENT OF “POTENTIAL EFFICIENT” COSTS, VIA RPI+K formula for 5 year regulatory period

ex post regulatory total cost assessment

Based on an *ex post* assessment of realized regulated costs

$$C_t = OPEX_t + D_t + wacc_t K_t$$

- ▶ C_t = *ex post* estimate of realized economic costs
- ▶ $OPEX_t$ = is equivalent to the standard definition of total operating expenditures in Ofwat's regulatory accounts (at least until 2015)
- ▶ D_t = is equivalent to the sum of IRC and current cost depreciation charges which Ofwat allowed for in regulated costs (until 2015)
- ▶ $WACC_t K_t$ is an *ex post* assessment of the financial opportunity cost required to fund the firm's actual capital investment.
 - ▶ $WACC_t$ is an appropriate *ex post* estimate of the effective financing cost of capital
 - ▶ K_t is the realized stock of invested capital

Empirical implementation of the ex post regulatory total cost assessment

Consideration of the WACC

For the $WACC_t$ we largely accept the underlying assumptions built into Ofwat's price reviews

OFWAT'S REAL TERM ASSUMPTIONS WITH REGARD TO COST OF CAPITAL AT PRICE REVIEWS (Assuming Mid Range where a range of estimates was provided in PR)

Cost of equity	Price Reviews				
	Privatisation	1994	1999	2004	2009
Equity beta	0.50	0.90	0.80	1.00	0.90
	7%				
		6%			
Cost of debt					

	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015
IMPLIED Price Review Estimated WACC post tax	5.86%	5.31%	4.64%	4.78%	4.65%

Empirical implementation of the ex post regulatory total cost assessment

But we calculate a realized nominal WACC for all WaSCs where realized risk free rates, gearing, and effective tax rates are employed

METHODOLOGY ACCEPTED IN MANY ACADEMIC PUBLICATIONS BUT ALSO BY OFWAT FOR STONE AND WEBSTER (2004), AND BY SEVERN TRENT WATER ON WORK ON SCOPE AND SCALE ECONOMIES

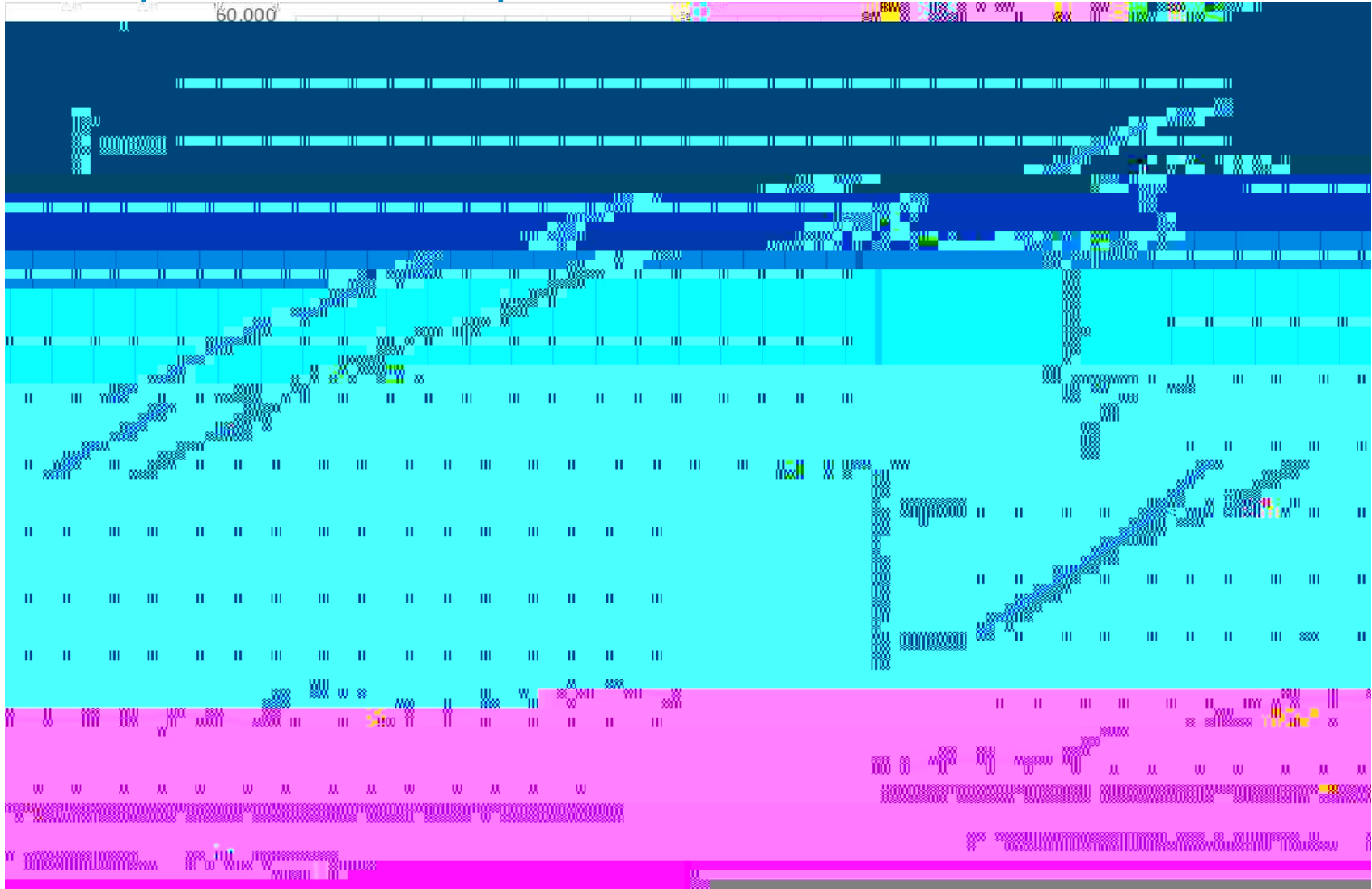
Estimates of Ofwat's intended Realized Nominal WACC after Realized RPI protection versus realized WACC with Gilt based risk free rate and observed taxation and gearing.

- ▶ Ofwat's assumptions were built into its

***Empirical implementation of the ex post
regulatory total cost assessment***

Consideration of the Stock of Invested Capital

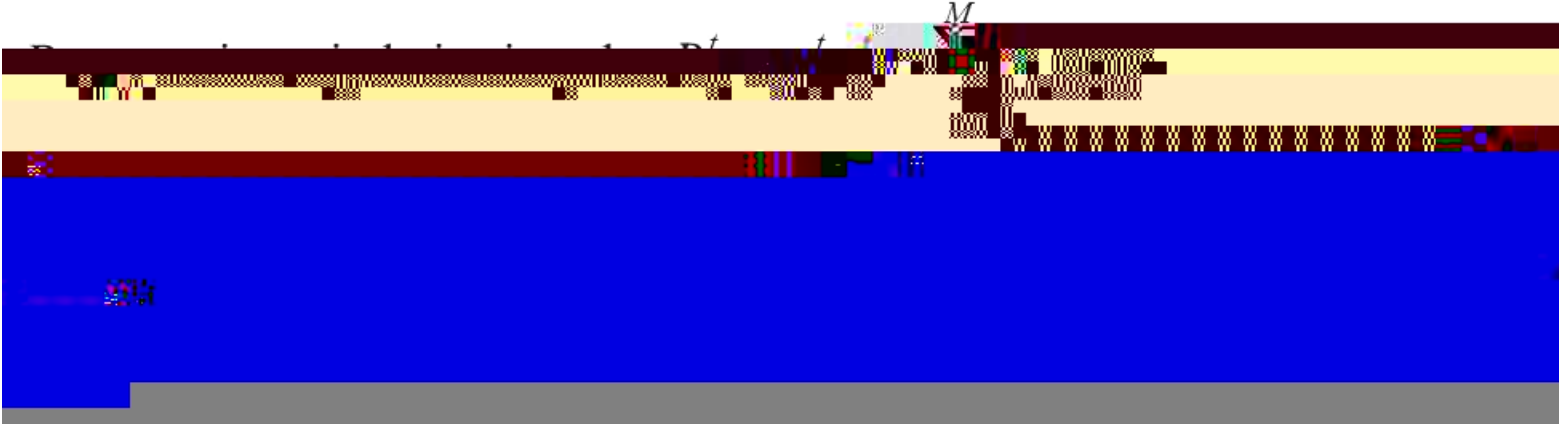
The Estimated Cash Flow Based RCV for the WaSCs, suggests a 17.3 percent bias in the official RCV in 2013, This bias peaked at 22.7 percent in 1998 but remains substantial



Decomposing the Sources of Changes In Economic Profitability

Profitability - Defining Profitability

Revenues



Profitability in base period $t = b$ can be expressed as

$${}_b \frac{R^b}{C^b} = \frac{p^b y^b}{w^b x^b}$$

Profitability in any other period t can be expressed as

$${}_t \frac{R^t}{C^1} = \frac{p^t y^t}{w^t x^t}$$

Profitability is determined by:

- ▶ Output Prices (Determined by Price Reviews)
- ▶ Input Prices
- ▶ The amount of output(s) produced
- ▶ The amount of input(s) employed

Profitability - Defining Profitability Change

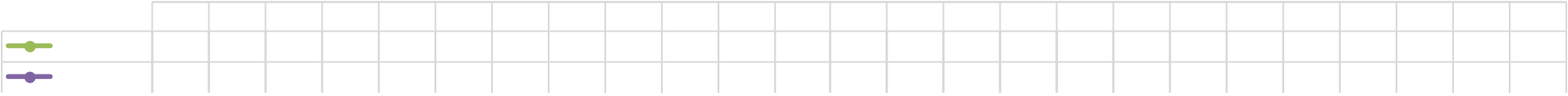
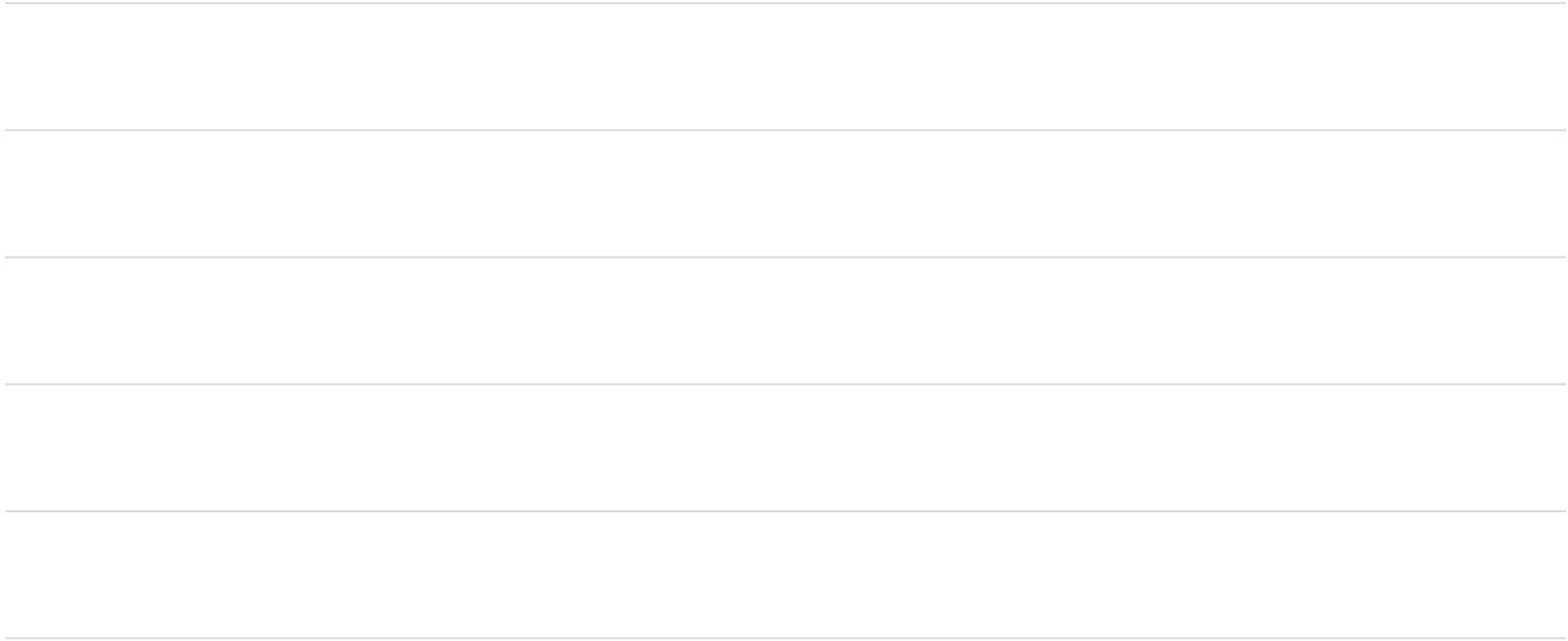
Profitability change can be expressed as

$${}_{t,b} \frac{p^t}{w^t} \frac{y^t}{x^t} = TPP^{t,b} TFP^{t,b}$$

- ▶ TPP Measures Total Price Performance and Indicates Output Prices Change Relative to Input Price Change
- ▶ TFP measures Total Factor Productivity and Measures Changes in Productivity as the ratio of output growth to input growth

Decomposition of Profitability Index: Impact During Each Regulatory Period

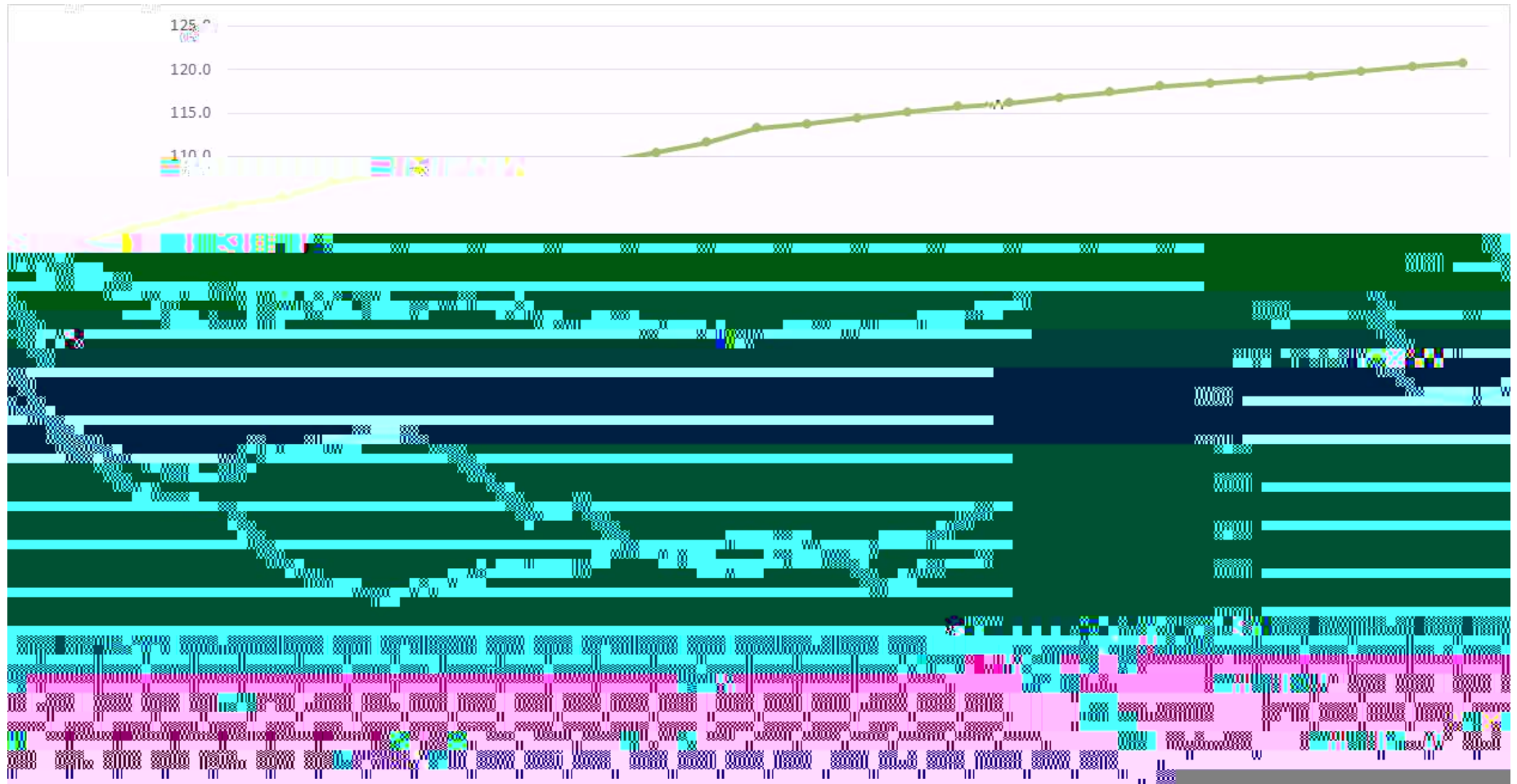
Decomposition of Profitability Index by Year: 1991=100



- ▶ 2015 TFP was 29.7 percent above 1991 levels , supported by a reduction of the aggregate input index to 93.2 percent of 1991 levels despite a 20.8 percent increase in the output index based on connected water and sewerage properties

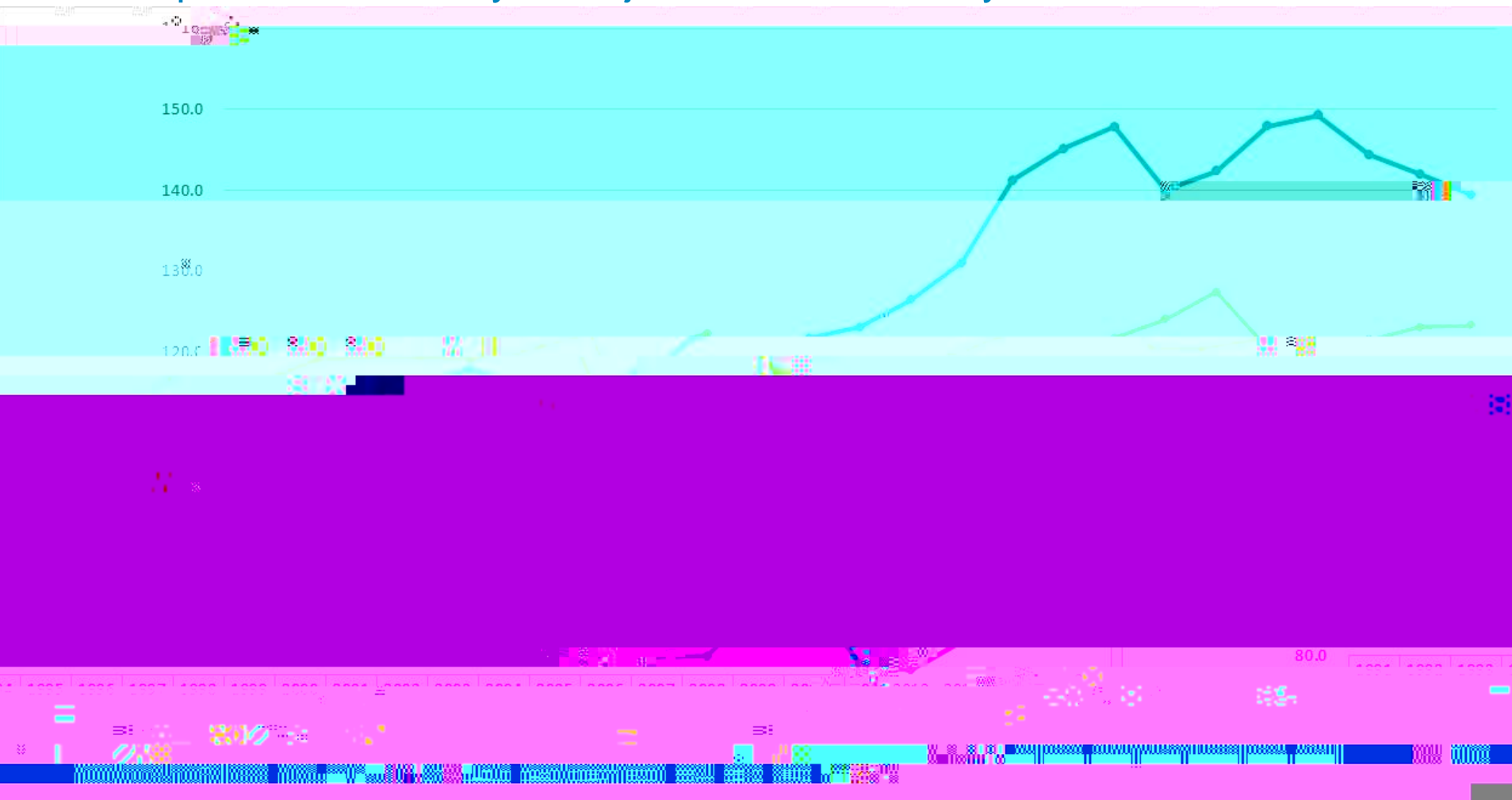


Aggregate Input Usage Index and its Components: 1991=100



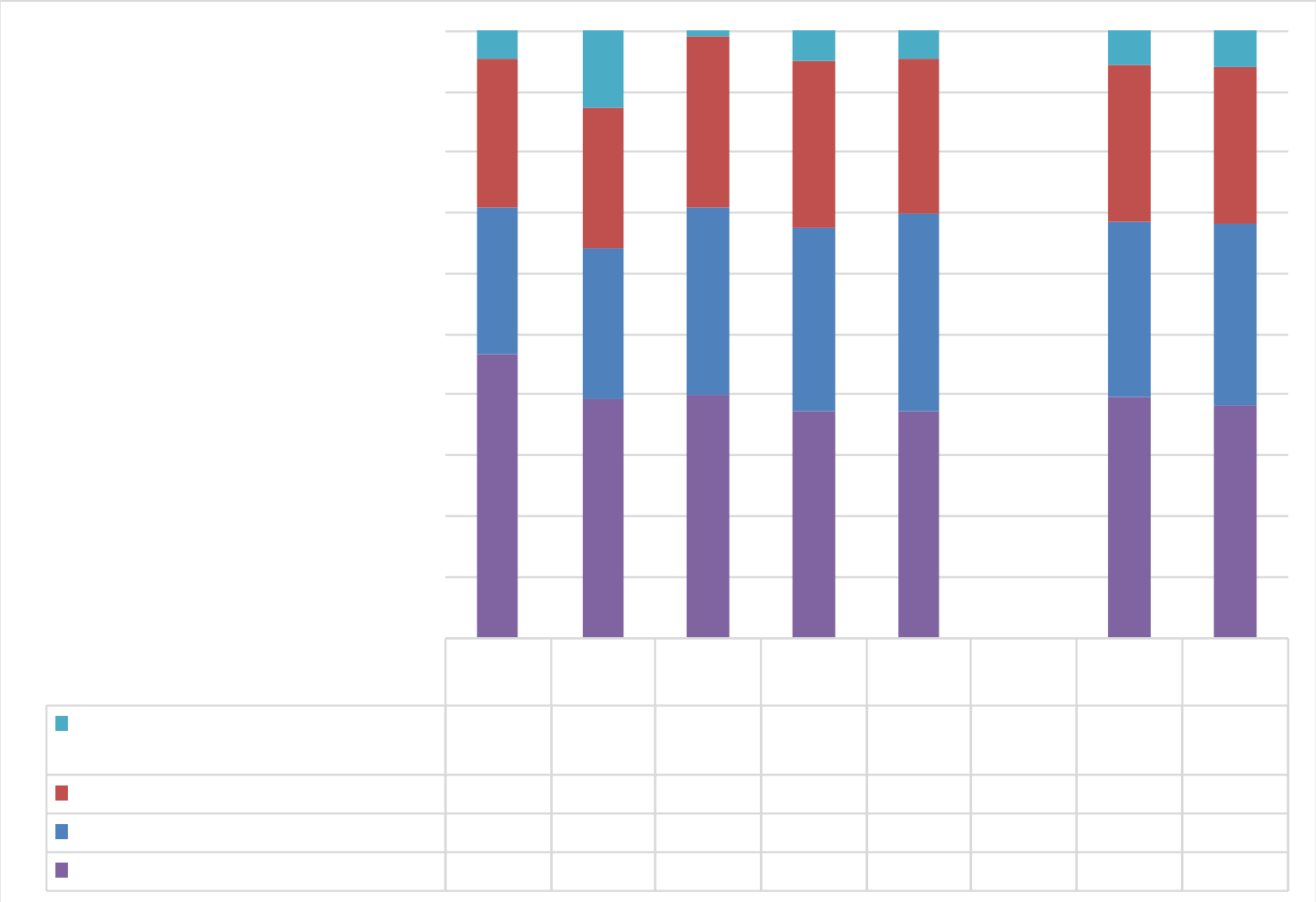
- ▶ The reduction in the aggregate input index is based on the offsetting of 20.7 percent increase in adjusted MEA capital stock, by a respective reduction of labour and other input usage to 63.5 and 69.0 of their 1991 levels
- ▶ The rate of capital stock growth is notably lower after the 1999 price review
- ▶ Aggregate Input Usage has been increasing since 2010

Decomposition of Quality Unadjusted TPP Index by Year: 1991=100



- ▶ Quality unadjusted output prices are 21.4 percent higher now than in 1991, and have recovered virtually all the decline that occurred in 2001.
- ▶ Aggregate Real Input price Index Growth halted post financial crisis, driven by decline in realised WACC, and supported by real wage declines

Share of Revenue Attributable to Cost Components and Economic Profits by Regulatory Period



Haven't Price Increases in the Water Industry Been Necessary to Fund Substantial Post Privatisation Capital Investment in a Cash Negative Industry?

Insights from Integrating Cashflow and Economic Cost Analysis

Cash Expenditures

- ▶ Cash Expenditures for a Regulated Company Can be Defined as Falling into Three Main Components

$$CASH_t = OPEX_t + CAPEX_t + FINEXP_t$$

- ▶ OPEX=operating costs
- ▶ CAPEX=Gross Capital Investment net of contributions and grants
- ▶ FINEXP=expenditure on capital servicing, company taxes and related payments

$$FINEXP_t = Int_t + Div_t + Tax_t$$

Reconciling Cash Flow and Regulated Costs

Subtracting realised regulatory total cost (slide 6) from realised cash expenditure (slide 23) and rearranging terms yields the following expression .

- ▶ This illustrates the two most important distinctions between cash flow and economic costs.
- ▶ The first term indicates that cash flow will exceed (underestimate) economic costs when net investment is positive (negative).
- ▶ The second term indicates that cash flow will exceed (underestimate) economic costs when the realized average effective rate of capital finance related payments exceeds (is below) an appropriate wacc representing the realized economic opportunity cost of capital to the firm.

1996-2015 period saw a 27 percent 2.1 billion per year cumulative excess of cash expenditure to costs

- 16 percent or 1.24 billion per year due to net investment
- 11 percent or 859 million per year due to capital financing expenditures in excess of the WACC.

Scottish Water and its Predecessors

- Profitability Decomposition 2001-2013
- Reconciled Difference Between Cash Expenditure and Realised Costs 1997-2013

Empirical implementation of the ex post regulatory total cost assessment :

Consideration of the WACC

- ▶ In **Scotland**, we are taking an approach that we believe is fully consistent with the stated *ex ante* assessment of the WACC by WICS in the 2006-10 reviews, as well as the “true” underlying *ex ante* assessment underlying the 2010-15 price determination.
- ▶ E.g. we are measuring the realized nominal WACC so it reflect the realized yield on inflation linked gilts, and also allowing for realized RPI Inflation and a 0.30 premium on the resulting nominal inflation protected yield.

Profitability Index Decomposition for Scottish Water and its Predecessors

Decomposition of Profitability Index

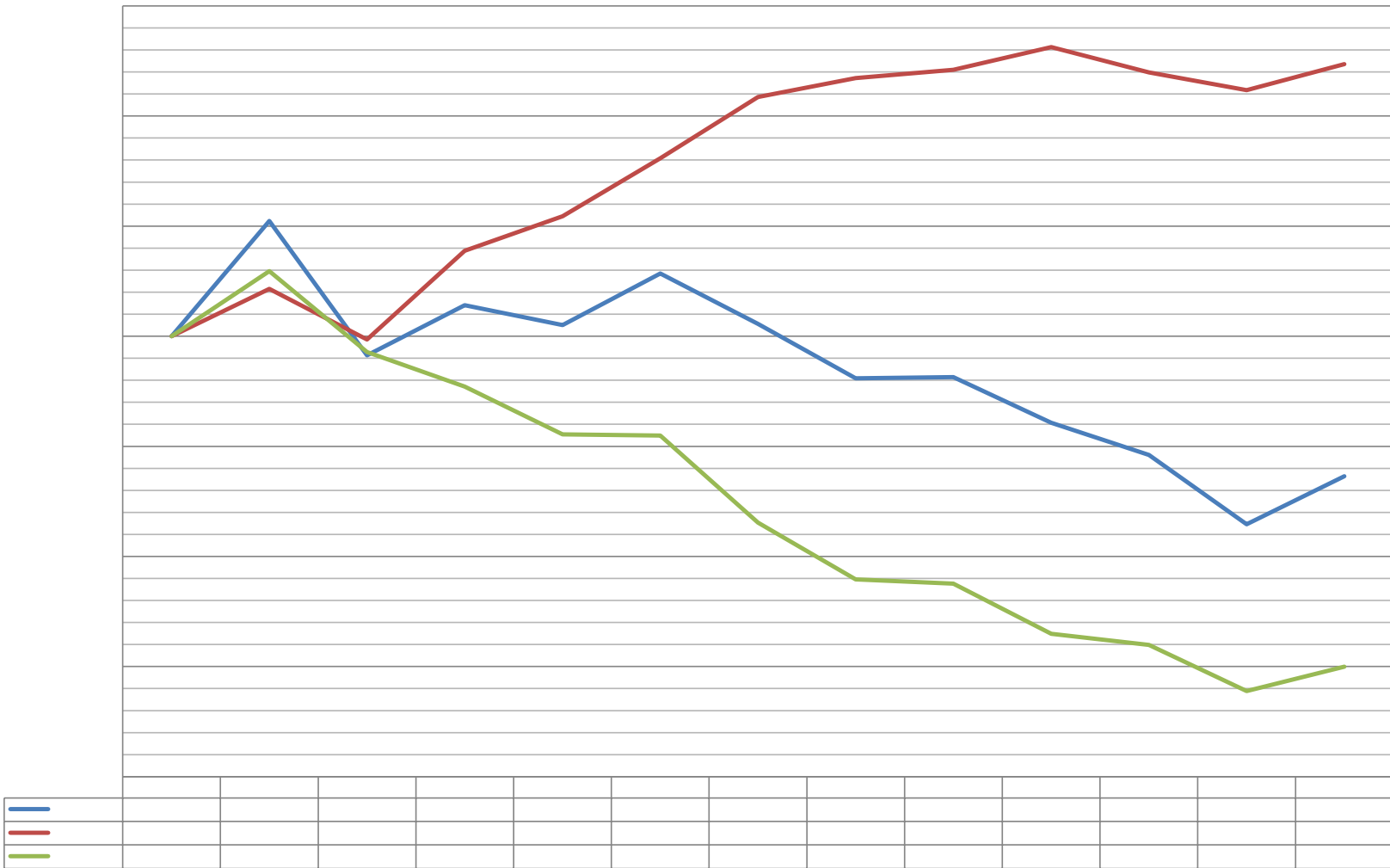
Decomposition of Profitability Index (2001=100)

	2002	2006	2010	2013
Profitability	110.46	105.7	92.1	87.3
TPP	105.91	91.0	73.0	70.0

- **Quality Unadjusted TFP growth of 24.7 percent for the 12 years between 2001 to 2013**
- **While TFP Growth Rates exceed 2 percent before 2010, they have been negative since 2010, with slow output growth and input usage increases.**

- **WaSC Productivity Comparison**
- 1991-2015 29.7 percent TFP growth
- 1991-2005 24.2 percent TFP growth

Profitability, TFP, and TPP 2001=100



- TFP growth rates were positive until 2010, but a substantial decline occurred until 2012 before recovery began in 2013.
- Profitability trends show a steady decline between 2006 and 2012 when recovery in both TFP and TPP increased profitability

	1997-2002	2003-2006	2007-2010	2011-2013	1997-2013	2007-2013
Total Cash Expenditures	1,076.6	1,202.3	1,219.0	1,053.5	1,135.6	1,148.1
Calculated Economic Costs	758.5	952.5	995.9	1,047.2		

- In contrast to the WaSCs, over the 1997-2013 period Scottish Water's 25 percent excess of cash expenditures to economic costs was entirely attributable to net investment as follows:
- 26 percent or 233.2 million per year due to net investment
- -1 percent or -8.6 million per year due to capital financing expenditures less than that assumed in the WACC.

Summary and Conclusions (1)

- **What Does Profitability Decomposition Reveal about the Determinants of Performance in the Water Industry?**
- **Quality Unadjusted TFP increased fairly steadily until 2010 but subsequently TFP has fallen** (We emphasise the need for the development of stronger quality controls and TFP models to improve these estimates as noted in the Frontier report for Water UK)
- **Profitability has remained relatively high and recovered substantially since the 2001-2005 period impacted by PR 1999**

Raises the Question Going Forward-

How have pro-competitive reforms beginning circa 2010 , and the change to a TOTEX based system in PR 2014 (with false aggregation of opex cost data and capex investment data) really influenced industry trends in productivity and profitability?

Summary and Conclusions (2)

- **Have Price Increases in the Water Industry Been Necessary to Fund Substantial Post Privatisation Capital Investment in a Cash Negative Industry?**

Yes they have, but analysis of the 27 percent excess of cash flow to economic costs during the 1996 to 2015 period when Ofwat set prices suggests that only 16 percent of this is due to net investment

In contrast, for Scottish Water, of the 25 percent excess of cash flow to economics cost during 1997 to 2013, 26 percent is due to net investment and -1 percent is due to capital financing expenditures less