Water and Sewerage Service
Price Control 2015-2021

PC15 Annex O
The Rate of Frontier Shift Affecting Water Industry Capital Costs

A report prepared for the Utility Regulator

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1. Introduction

The Utility Regulator has commissioned First Economics to produce estimates of the natural rate of cost increase in UK water companies' capital programmes during the period 2014/15 to 2020/21.

This is a companion report to the Utility Regulator's previous work on opex frontier shift. In this case we are interested in the rate at which a frontier company's capital unit costs should increase over time. Elsewhere in the UK economy there are some industries whose costs move naturally on an above-RPI trend, while other sorts of firms tend to see costs increase less quickly than RPI. Our objective is to understand which of these categories water and sewerage company investment fits into.

The report is structured into six main parts:

- section 2 outlines the methodology which we think can best address the above issues;
- section 3 and 4 contain estimates of the rates of input price inflation and productivity growth that are likely to impact upon costs between 2014/15 and 2020/21;
- section 5 gives forecasts of RPI-measured inflation;
- section 6 brings our analysis together into our overall estimates of capex frontier shift; and
- section 7 provides a number of cross-checks on our calculations.

Note: the analysis set out in this paper makes use of economic data published up to and including March 2014.

2. Methodology

The PC15 review will make projections of NI Water's investment and outputs to 31 March 2021. When thinking about the 'purchasing power' of the company's capex allowance during this time, regulator and company will need to consider:

- input price inflation – how much more will NI Water have to pay in future for the labour, materials and equipment that it requires in order to run its businesses; and
- productivity improvement – what opportunities are there to make reductions in manpower or other inputs so as to improve the overall efficiency with which activities are carried out?

These factors can be combined as follows:

Capital cost inflation ≈ input price inflation *minus* productivity improvement (1)

Both of these terms will depend to some extent on NI Water's comparative efficiency and the potential for catch-up to the standards of cost of control exhibited by the best performing companies in Great Britain. After accounting for this catch-up, there is then a residual amount of change in costs which regulators label 'frontier shift' in their periodic review consultation papers, i.e.:

Frontier shift ≈ industry input price inflation *minus* natural long-term rate of productivity improvement (2)

Restated in real terms – the convention for all of the Utility Regulator's price control analysis – the definition of frontier shift is:

Frontier shift in real terms ≈ input price inflation *minus* productivity improvement *minus* forecast RPI-measured inflation (3)

The analysis that follows is directed at obtaining estimates of this frontier shift. Our analysis proceeds by:

- identifying the input mix that can be found within the frontier company's capex;
- investigating the price trends affecting each individual input before forecasting input price growth for each input through to 2020/21;
- aggregating the line-by-line estimates obtained into an overall measure of input price inflation; then
- benchmarking the scope for productivity growth by reference to a database on productivity growth trends in different types of UK industry; and finally
- subtracting expected productivity growth from expected input price inflation to give an overall estimate of capital cost inflation.

3. Input Price Inflation

3.1 The input mix

The expenditures within water and sewerage company capital unit costs comprise mainly labour, materials and plant/equipment costs. During work carried out in PR14,[1] companies in England & Wales have guided us that these inputs combine in the proportions set out in table 3.1.

Table 3.1: Input mix for a representative water company

Input	% of expenditure
Wholesale capex	
Labour – general	30
Labour – specialist	15
Materials – parts/equipment	10
Materials – civils	15
Plant and equipment	25
Other	5

We use these generic input types and associated weights in the calculations that follow.

3.2 Macroeconomic outlook

Our forecasts start with a brief summary of the current economic outlook. As in previous First Economics reports, we rely on Office for Budget Responsibility (OBR) and Bank of England projections of GDP growth. Table 3.2 and figure 3.3 reproduce figures that may be found in the OBR's March 2014 economic forecasts and the Bank of England's February 2014 Inflation Report.

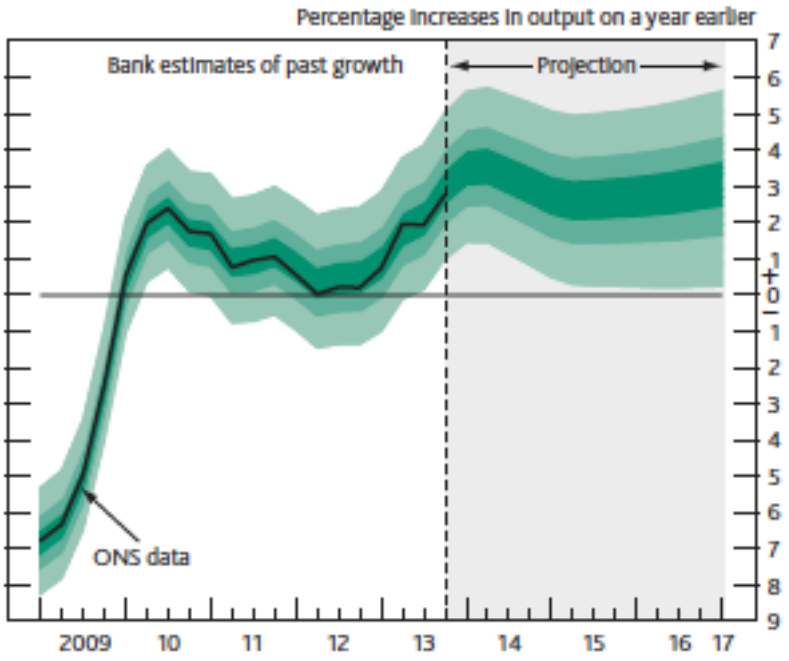
Table 3.2: OBR's March 2014 forecasts of GDP growth

	Percentage change on a year earlier, unless otherwise stated						
	Outturn	Forecast					
	2012	2013	2014	2015	2016	2017	2018
UK economy							
Gross domestic product (GDP)	0.3	1.8	2.7	2.3	2.6	2.6	2.5
GDP level (2012=100)	100.0	101.8	104.5	107.0	109.7	112.6	115.4
Nominal GDP	2.0	3.4	5.0	4.0	4.4	4.6	4.5
Output gap (% potential output)	-2.8	-2.2	-1.4	-1.1	-0.7	-0.3	0.0
World economy							
World GDP at purchasing power parity	3.1	2.9	3.8	3.9	4.1	4.2	4.2
Euro area GDP	-0.7	-0.4	1.0	1.4	1.7	1.9	2.0
World trade in goods and services	3.0	3.2	5.2	5.8	6.0	6.1	6.1
UK export markets[5]	2.0	2.1	4.7	5.2	5.3	5.4	5.4

Source: OBR.

[1] Our reports for five England & Wales companies were submitted to Ofwat on 2 December 2013.

Figure 3.3: The Bank of England's February 2014 forecasts of GDP growth



Source: Bank of England.

The two sets of numbers tell a fairly consistent story about the path which the UK economy is set to follow. In both cases, there is a great deal of optimism that the UK has finally turned a corner and that recent quarterly GDP growth can be sustained into the medium term. The numbers suggest that there will still be strong growth in 2014 followed by a year of consolidation in 2015. Thereafter the recovery gathers pace through 2015 and the economy starts to exhibit consistent growth of 2.5% to 3% per annum from late 2015 onwards.

The Bank of England helpfully identifies the key uncertainties around the central case. The main downside risk is around the challenges within the eurozone, but there are also continued concerns about household and government balance sheets. The key variable is productivity growth, insofar as a revival in productivity will permit the economy to grow without generating inflation and without triggering an early tightening of monetary policy, whereas weak productivity growth will inhibit the economy's ability to grow beyond the rates identified in the central forecasts.

As far as the global economy is concerned, the figures in table 3.2 show a strengthening in world GDP growth in 2014 as other western economies also go through a period of sustained recovery. Thereafter, GDP growth looks very healthy right through the forecast period.

Looked at side-by-side, the implication of these forecasts is that we need to make forecasts of input price inflation during a period of strong economic growth.

We now consider to what extent this is apparent in recent data and what the prognosis is for the 2014/15 to 2019/20 period.

3.3 Detailed input-by-input forecasts

3.3.1 Wages – general labour

Our analysis of wage increases for the majority of people that water companies employ draws on the ONS' average weekly earnings index. Figure 3.4 plots the series for private sector wages including and excluding bonuses.

Figure 3.4: Private sector wage inflation

Source: ONS.

The chart shows a marked shift in wage pressures due to recession. After growing at an average annual rate of just over 4% on both measures between 2000 and 2008, wages declined in absolute terms in 2009, after accounting for the effects of withdrawn bonuses, and then grew by only 1.5% to 2.5% in 2010, 2011, 2012 and 2013. The latest monthly data from January 2014 shows continuing weakness, with annual private-sector wage growth at 1.4% including bonuses and 1.3% excluding bonuses.

Looking forward, the expectation is one of subdued wage growth stretching over a period of up to 3 years. This is based to a large extent on historical experience which shows that pay increases typically lag behind the growth in GDP by several quarters, mainly because recession creates a pool of unemployed workers who compete vigorously for jobs once economic activity picks up and firms resume hiring. Although this recession resulted in fewer redundancies than previous recessions, there are still up to 1m more individuals than normal in unemployment and many more who have been forced onto part-time hours or into jobs that they might not otherwise have taken. This should mean that employers, including water companies, will for a period find that they do not need to offer significant pay increases in order to attract and retain good staff with transferrable skills.

The OBR's March 2014 forecast gives a sense of what sort of increases firms should expect to have to pay during the next five years.

Table 3.5: Labour market forecasts

	Percentage change on a year earlier, unless otherwise stated						
	Outturn	Forecast					
	2012	2013	2014	2015	2016	2017	2018
Labour market							
Employment (millions)	29.5	29.9	30.4	30.6	30.9	31.2	31.4
Wages and salaries	2.8	2.9	3.8	4.1	4.6	4.7	4.5
Average earnings[4]	2.0	1.5	2.5	3.2	3.6	3.7	3.8
LFS unemployment (% rate)	7.9	7.6	6.8	6.5	6.1	5.7	5.4
Claimant count (millions)	1.59	1.42	1.20	1.13	1.06	0.98	0.94

Source: OBR.

The projections have average earnings growth accelerating from 2.5% in 2014 towards 4.0% by the end of the forecast period.

We use the financial year equivalents of the OBR numbers as the best available estimates of the wage inflation for general workers employed by an electricity DNO in the period to 2018/19. We also for the first time follow the CC's practice[2] of adjusting the OBR's figures to a measure of hourly earnings. In the forecast period, the OBR has hours worked per employee falling significantly due to a change in the mix of full-time and part-time jobs. This brings down the OBR's measure of 'average earnings' growth, which is defined simply as the change in wages per employee. Our adjusted measure looks through this change in pattern of employment and gives a forecast of the average wage increase that will be paid to an employee working constant hours.

From 2019/20 onwards we think it is prudent to allow for pay increases in line with the pre-recession 2000-07 growth of average weekly earnings including bonuses of 4.25% per annum.

Table 3.6: General wage inflation

	Average earnings growth
2014/15	2.7%
2015/16	4.0%
2016/17	4.7%
2017/18	4.3%
2018/19	4.5%
2019/20 and thereafter	4.25%

3.3.2 Wages – specialist

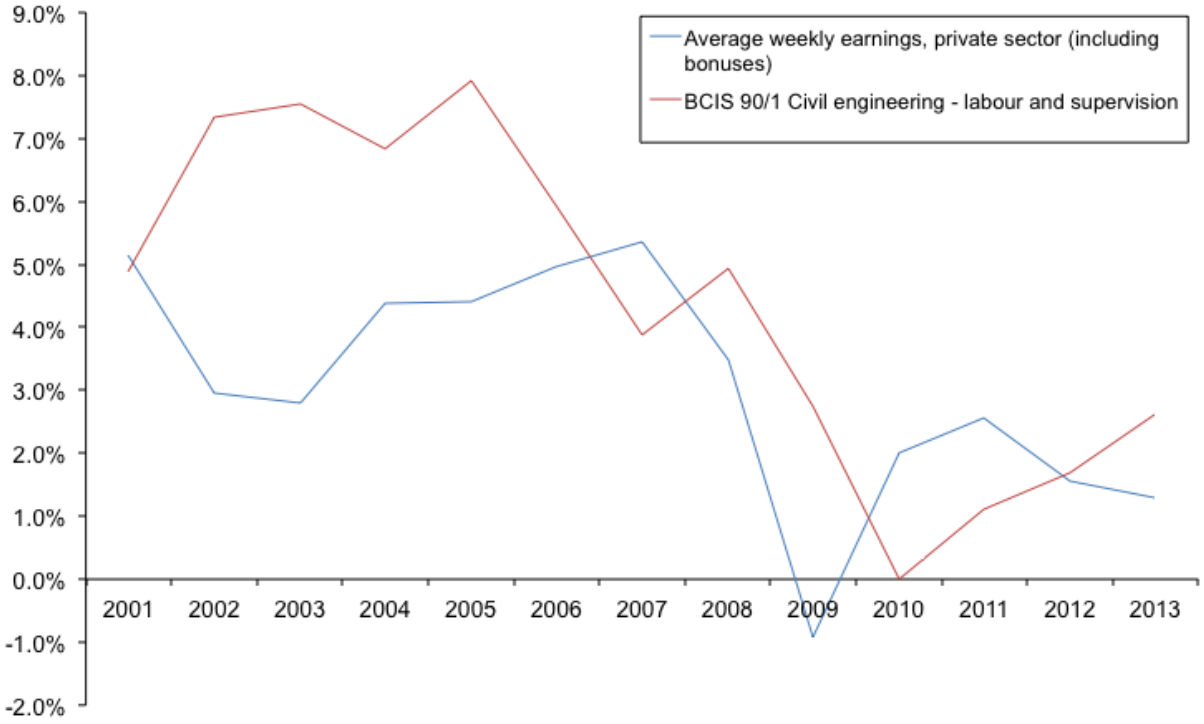
In previous First Economics reports we have argued that certain types of worker – most notably labour with specialist infrastructure skills like civil engineers, project managers, estimators and surveyors – will be able to extract above-average wage increases. Our contention has been that the coincidence of the ramp up in expenditure and investment that is occurring simultaneously in the different infrastructure industries and the continued existence of skills shortage in a number of the skilled professions, create a mismatch in supply and demand that gives significant bargaining power to the specialist labour that water

[2] See paragraph 11.53 in the CC's provisional determination document.

companies require. We assumed in the forecasts that we produced that this bargaining power would translate in to a premium of up to 1.5% per annum.

As evidence of these pressures, figure 3.7 compares increases in a BCIS index tracking civil engineering wages to average earnings growth.

Figure 3.7: Wage inflation among civil engineers



Source: ONS, BCIS.

The chart shows that wage increases on the BCIS measure significantly exceeded economy-wide average earning growth between 2002 and 2009. Since 2010, the BCIS measure has increased at a slower rate, mainly due to the contraction of the construction sector.

Going forward, the government has promised £100 billion of expenditure on infrastructure between 2015 and 2020 as part of its comprehensive spending review. Periodic reviews in the energy and rail sectors have provided for a further ramp up in expenditure and the expectation at the time of writing is that PR14 will see investment in the water sector at least remain at current levels. This comes at a time when organisations like Civil Engineering Contractors Association,[3] the Institution of Engineering and Technology[4] the Royal Academy of Engineering[5] are warning of skills shortages.

As a consequence of this competition for specialist skills, wage inflation for specialist labour is almost certain to outstrip average earnings growth. Our reading of figure 3.7 is that it remains prudent to add 1.25% to the base trend in average earnings for the specialist workers in the water sector input mix. This gives inflation expectations for this type of labour set out in the table below.

[3] http://www.ceca.co.uk/media/108089/press_release_-_ceca_-_rising_costs_a_threat_to_growth_-_immed._19th_august_2013.pdf
[4] http://www.theiet.org/factfiles/education/skill-survey-page.cfm?origin=/skills
[5] http://www.raeng.org.uk/news/publications/list/reports/Jobs_and_Growth.pdf

Table 3.8: Wage inflation for workers with specialist skills

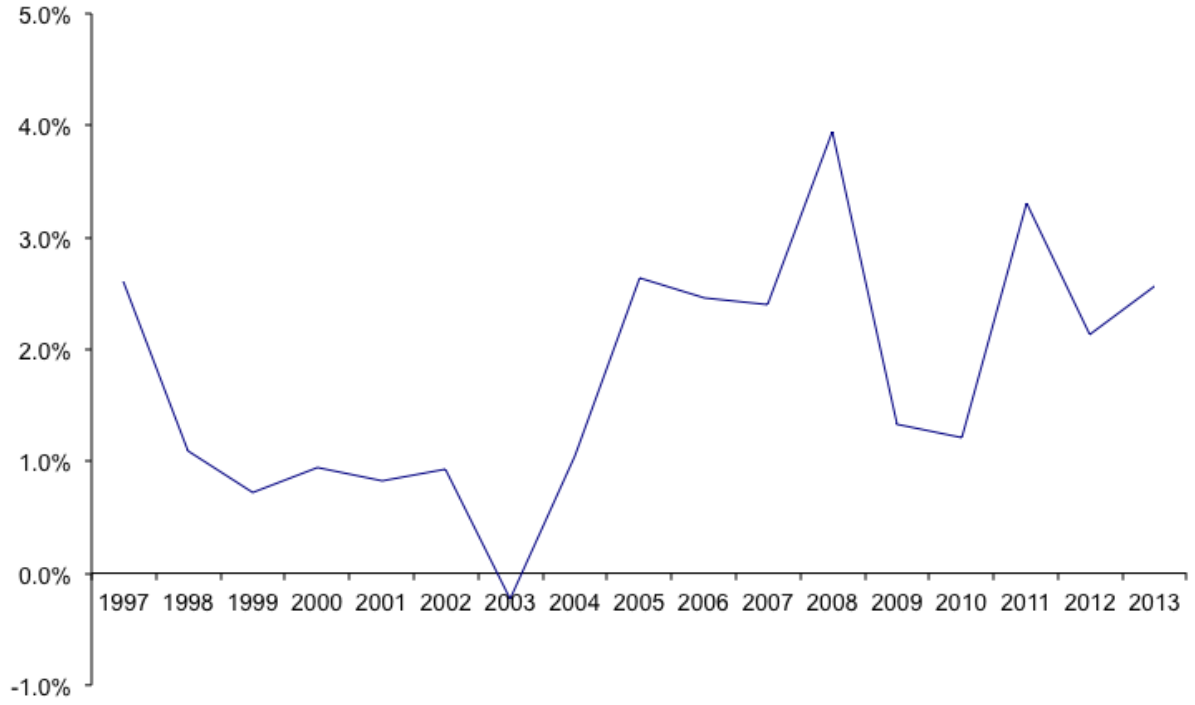
	Specialist wage growth
2014/15	3.95%
2015/16	5.25%
2016/17	5.95%
2017/18	5.55%
2018/19	5.75%
2019/20 and thereafter	5.5%

3.3.3 Materials – parts and machinery

Our analysis of materials input price inflation comes in two parts. We look first at pieces of machinery which are installed on the network. An indication of cost trends in this area can be obtained by looking at the prices that UK firms in general are paying for plant and machinery.

Figure 3.9 plots the annual change in the machinery and equipment component of the ONS's producer input prices index.

Figure 3.9: Annual change in the price paid by firms for machinery and equipment



Source: ONS.

The picture here is very different from the analysis of labour costs. The chart shows that prices have increased quite steadily in recent years even as the UK economy has been in recession. This is to a large extent a reflection of the depreciation of sterling and the consequent 'imported inflation' which buyers of goods have been suffering across the economy.

In making projections of prices during through to 2020, we think it is prudent to assume that cost increases will continue at a similar rate to the inflation that we have typically seen in the last ten years. We therefore allow for annual prices increases of 3% per annum.

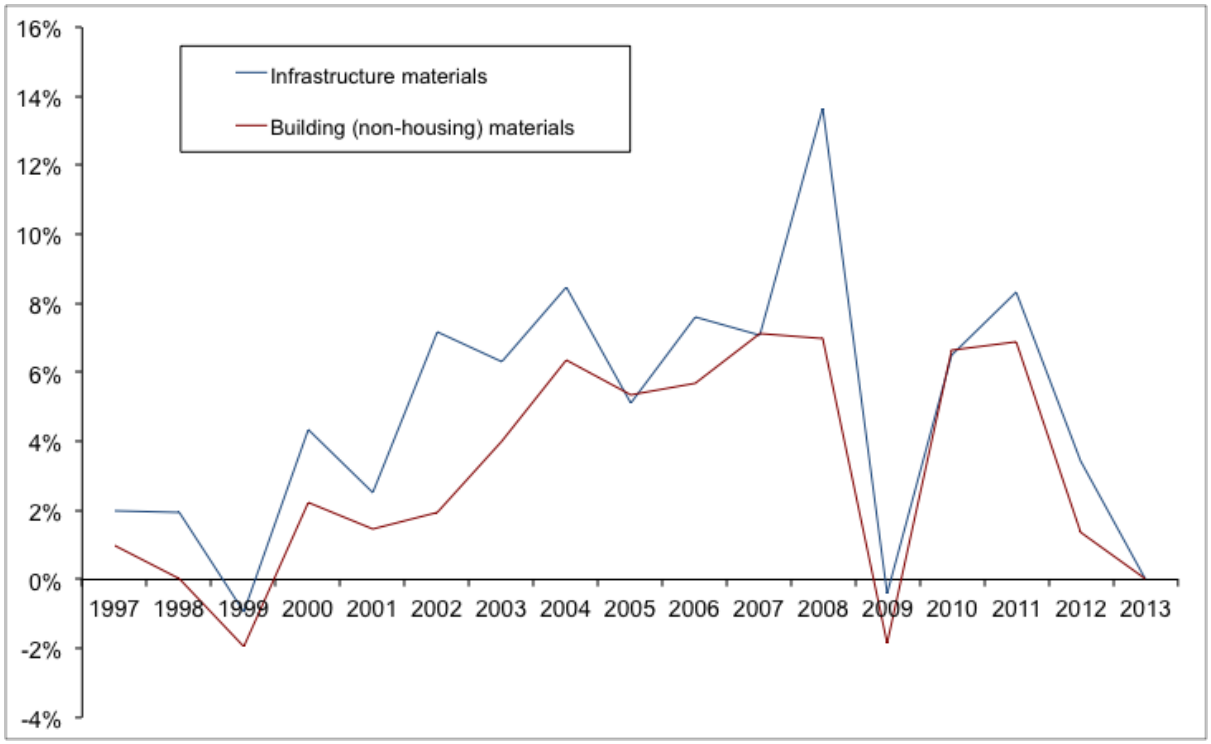
Table 3.10: Forecasts of materials/machinery inflation

	Materials/machinery cost increases
2014/15 and thereafter	3%

3.3.4 Materials – general/civils

A second category of materials comprises the bricks, concrete, metal and plastics that water companies use in construction work. Figure 3.11 plots the BIS cost of infrastructure materials and cost of construction (non-housing) materials series over the period 1996 to 2013.

Table 3.11: Materials costs



Source: BIS.

The chart shows that inflation has been subdued during 2012 and 2013. Prior to that, cost increases had been running at above 4% for most of the last decade.

Ofgem, the Competition Commission and First Economics have all previously assumed that the rate of increase of general materials costs in steady state is around 4.5% and we continue to take the view that this is a reasonable medium-term benchmark to factor into forward-looking calculations.

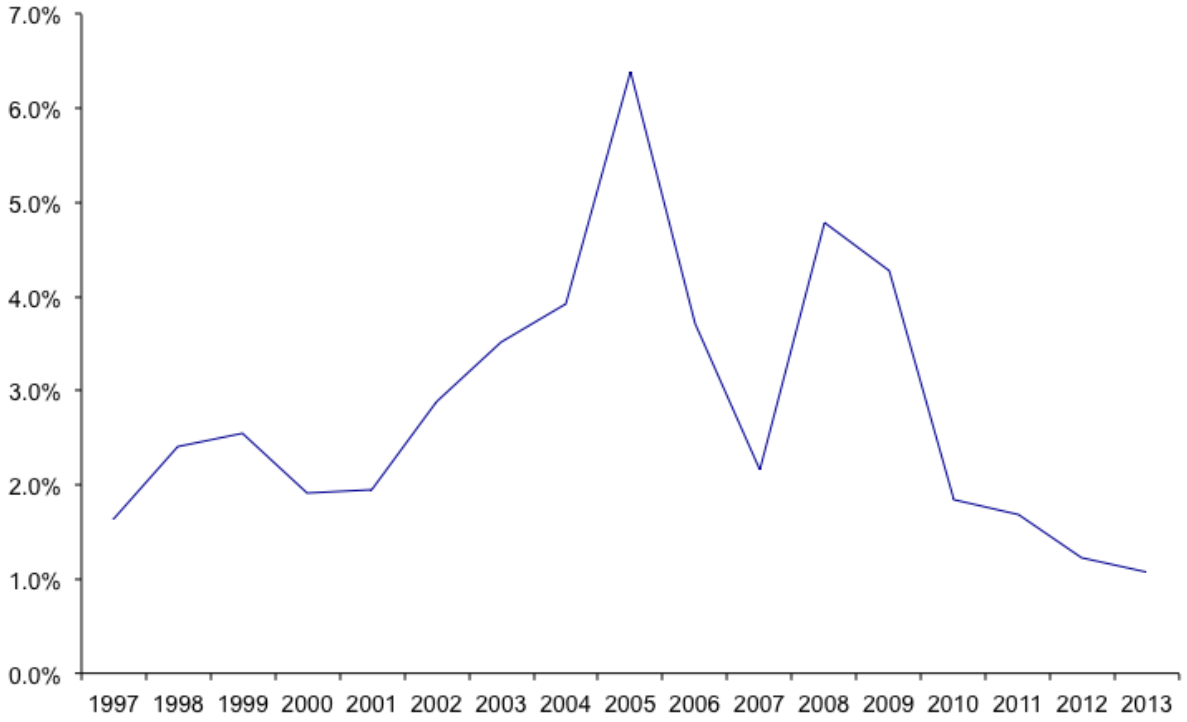
Table 3.12: Forecasts of general/civils materials inflation

	Materials cost increases
2014/15 and thereafter	4.5%

3.3.5 Plant and equipment

The best indicator of the cost pressures impacting on the plant and equipment that water companies use to repair and extend their networks is the BCIS plant and road vehicles index. Figure 3.13 plots the annual change in this index over the period 1996 to 2013.

Figure 3.13: Plant and equipment cost increases



Source: BCIS.

The chart shows a discernible slowing of price pressures in the period 2010-13. This probably reflects redundancy in the construction sector generally, which has been of benefit to all purchasers/leasers of plant and equipment that is used for the purposes of transporting and installing materials.

On the basis of pre-2008 experience, we have suggested in previous reports that it is prudent to allow for comparable price increases of 4% per annum in the medium term. In light of recent data, we now think it is appropriate to moderate this estimate so as not to give undue weight to relatively high readings of the BCIS measure in a handful of years (2004-05 and 2008-09). Our revised forecast is 2.5%.

Table 3.14: Plant and equipment cost inflation

	Plant and equipment cost increases
2014/15 and thereafter	2.5%

3.3.6 Other

Other, miscellaneous expenditure comprises a very small percentage of capital unit costs. To simplify the analysis, we assume that these costs escalate in line with RPI inflation.

3.4 Summary

Table 3.15 summarises the estimates that have been given in the preceding analysis.

Table 3.15: Summary of input price inflation forecasts (%)

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20 and thereafter
Labour – general	2.7	4.0	4.7	4.3	4.5	4.25
Labour –specialist	3.95	5.25	5.95	5.55	5.75	5.5
Materials – machinery	3.0	3.0	3.0	3.0	3.0	3.0
Materials – civils	4.5	4.5	4.5	4.5	4.5	4.5
Plant and equipment	2.5	2.5	2.5	2.5	2.5	2.5
Other	RPI	RPI	RPI	RPI	RPI	RPI

4. Productivity Growth

The extent to which productivity growth can be expected to offset the input price pressures identified in section 3 depends on a number of factors, including:

- the pace of technical progress in the sector;
- the availability of opportunities to reduce overheads; and
- companies' ability to bring better working practices to bear on their operational activities.

Evidence of historical rates of productivity growth in the water industry (and elsewhere in the utility sector) gives some sense of the industry's potential in these areas, but is distorted by a step change in productivity after privatisation and by the impact of a large ongoing quality programme thereafter. A better source of information is the historical total factor productivity (TFP) improvements achieved by competitive sectors of the UK economy which are in some way similar to the water and sewerage industry. The most up-to-date source for this type of data is the EU KLEMS project which looked at economic growth, productivity and technological change for all European Union member states during the period 1970 to 2007. A database released to the public in 2008 and updated in 2010 allows researchers to analyse TFP growth on an industry-by-industry basis and to compare/benchmark the historical performance of UK companies against firms from elsewhere.

We have been able to identify three competitive sectors of the economy – construction, manufacturing and machinery production – which constitute potential comparators to the activities that make up a typical water industry investment project. In all three industries, companies are taking raw materials and assembling them into a finished product using both labour and capital inputs.

Table 4.1 shows the average annual TFP growth rates in this industry for the 1970 to 2007 period as a whole and for the more recent 1990 to 2007 period. The definition of TFP growth that we have used is value-added TFP growth, consistent with the measure used in most other periodic reviews.

Table 4.1: Annual total factor productivity growth (%) by sector

UK Sector	1970 to 2007	1990 to 2007
Construction	0.7	0.6
Manufacturing	1.8	1.9
Machinery production	1.2	2.3

Source: EU KLEMS.

It is apparent from table 4.1 that perceptions of the water industry's productivity improvement potential depend on which of the periods is seen as providing the best guide to future performance and on which of the industries are considered to be the best comparators.

On the first of these points, we have a strong preference for using up-to-date information. It is not at all clear to us how data on productivity growth from the 1970s and, to some extent, the 1980s can act as a reliable indicator of what might be expected of companies in the period to 2020. Although there are difficulties with any approach that seeks to extrapolate from the past to predict the future, we are much more confident in using data from the most recent business cycle (i.e. 1990 to 2007) in such an exercise.

On the second issue, our judgment is that it is appropriate to put most weight on data for the construction sector. Water industry capex shares a number of characteristics with

construction – including the way in which activity is carried out at site-specific locations, the broad mix of labour, materials and equipment, and even the identity of some of the contractor firms involved – whereas there are fewer similarities with the processes and final products in the other sectors.

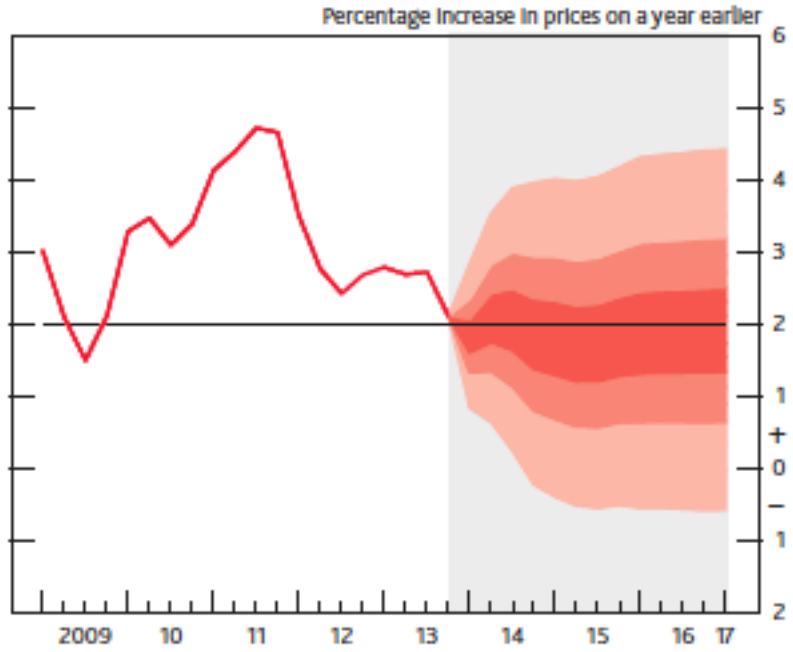
For these reasons, we use a 0.6% per annum figure for productivity growth as the best available benchmark for frontier productivity growth in the water sector. To put this estimate in perspective, the historical rate of productivity improvement for the UK economy as a whole over the same 1990-07 period was 0.7% per annum. As such, it is by no means a soft target to expect companies to meet.

5. RPI-measured Inflation

The final component of equation 3 from section 2 is a forecast of RPI-measured inflation.

Having opted to anchor our analysis to the GDP forecasts prepared by the OBR and the Bank of England, it is only logical that our forecasts of RPI are derived from the same sources. Figure 5.1 and table 5.2 reproduce the inflation projections found the Bank's February 2014 Inflation Report and in the OBR's March 2014 economic forecasts.

Figure 5.1: Bank of England August 2013 CPI forecast



Source: Bank of England.

Table 5.2: OBR March 2013 inflation forecasts

	Percentage change on a year earlier, unless otherwise stated						
	Outturn	Forecast					
	2012	2013	2014	2015	2016	2017	2018
Inflation							
CPI	2.8	2.6	1.9	2.0	2.0	2.0	2.0
RPI	3.2	3.0	2.6	3.2	3.6	3.8	3.9
GDP deflator at market prices	1.7	1.6	2.3	1.6	1.8	1.9	2.0

Source: OBR.

As always with these forecasts, CPI-measured inflation is assumed to come more or less into line with the government's 2% target two years from now and stay at 2% thereafter. In the intervening 24 months, the forecasts have CPI-measured inflation slightly below but otherwise very close to target too.

The most interesting part of the numbers is the forecast of RPI-measured inflation that sits alongside the CPI numbers. In 2014 RPI-measured inflation moves in broadly the same way as CPI-measured inflation. Thereafter, a noticeable wedge opens up between the RPI and CPI inflation rates.

We have explained in previous reports that this surprisingly large gap is attributable to two main factors:

- a temporary divergence between the two measures of inflation caused by the upward movement in mortgage interest rates (which are included in the RPI basket but not the CPI basket) back to 'normal' levels; and
- a more permanent widening of the gap that naturally exists between CPI- and RPI-measured inflation from around 0.5 to 0.8 percentage points historically to around 1.4 percentage points going forward.

These things mean that CPI inflation of 2% per annum is likely to translate to RPI inflation well in excess of 3% throughout the PC15 period.

Our RPI forecasts follow the March 2013 OBR financial year projections up to 2018/19. Thereafter we assume RPI inflation of 3.4% per annum, in line with the OBR's calculation of the long-term wedge between RPI inflation and 2% CPI inflation. The assumptions are as set out below.

Table 5.3: RPI-measured inflation forecasts

	RPI-measured inflation
2014/15	2.7%
2015/16	3.3%
2016/17	3.6%
2017/18	3.8%
2018/19	3.9%
2019/20 and thereafter	3.4%

6. Overall Frontier Shift Calculation and Cross Checks

6.1 Frontier shift calculation

Table 6.1 combines our estimates of input price inflation, productivity growth and RPI-measured inflation into an overall estimate of frontier shift.

Table 6.1: Frontier shift calculation, nominal terms (%)

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20 and thereafter
Input price inflation	3.1	3.8	4.1	3.9	4.0	3.9
Productivity growth	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)
Frontier shift	2.5	3.2	3.5	3.3	3.4	3.3

An alternative way of presenting these numbers is to strip them of RPI and calculate capital cost inflation in real terms.

Table 6.2: Frontier shift calculation, real terms (%)

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20 and thereafter
Input price inflation	3.1	3.8	4.1	3.9	4.0	3.9
Productivity growth	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)
RPI inflation	(2.7)	(3.3)	(3.6)	(3.8)	(3.9)	(3.4)
Frontier shift	RPI – 0.2	RPI – 0.1	RPI – 0.1	RPI – 0.5	RPI – 0.5	RPI – 0.1

The tables show that capital unit costs can be expected to escalate just below RPI inflation over the PC15 period, with some perturbations along the way during the recovery from recession and as RPI oscillates from year to year. In the long term, we forecast capital unit cost escalation of RPI – 0.1% per annum or 3.3% per annum in nominal terms.

7. Cross-checks

7.1 Regulatory precedent

In our work analysis of opex frontier shift, we have used evidence of companies' actual cost increases and regulatory precedent to sense check our frontier shift estimates. The same depth of evidence is not available in the case of capex frontier shift. First, water companies have not been required to give Ofwat capital unit cost numbers on an annual basis, meaning that there is no time series of historical data to use for benchmarking purposes. And second, far fewer regulators make capex frontier shift estimates in their periodic reviews.

The cross-checks that we can offer come in two parts. First is the capital cost inflation allowances that companies and regulators in Great Britain have been making in parallel price review exercises to PC15. Table 7.1 gives the relevant numbers.

Table 7.3: Capital cost inflation allowances in periodic reviews (%, nominal)

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
First Economics frontier shift, April 2014 report	3.2%	3.5%	3.3%	3.4%	3.3%	3.3%
Scottish Water	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%
WIC	2.75%	2.75%	2.75%	2.75%	2.75%	2.75%
Ofwat	4.4%	4.4%	4.5%	4.3%	4.1%	4.1%

Second are the estimates of capex frontier shift that Ofgem and the Competition Commission have put forward in recent energy-sector determinations. The numbers are summarised in table 7.2.

Table 7.2: Ofgem's and Competition Commission capex frontier shift estimates (%)

	First Economics April 2014 report NI Water 2014/15 to 2020/21	Ofgem Gas distribution 2011/12 to 2020/21	Ofgem Gas transmission 2011/12 to 2020/21	Ofgem Electricity transmission 2011/12 to 2020/21	CC NIE 2014/15 to 2016/17
Real input price inflation	RPI + 0.4%	RPI + 0.5%	RPI + 0.4%	RPI + 0.8%	RPI + 0.2%
Productivity growth	(0.6)	(0.7)	(0.7)	(0.7)	(1.0)
Frontier shift	RPI – 0.2%	RPI – 0.2%	RPI – 0.3%	RPI + 0.1%	RPI – 0.8%

The two preceding tables show that our estimates are a very middle-of-the-pack estimate of the capital cost escalation affecting a regulated company. We take this to be a high-level corroboration of our estimates.

7.2 COPI

One of the reasons that there is a limited amount of historical capital unit cost data and limited regulatory precedent on capex frontier shift is that several regulators use COPI as their preferred indicator of the rate of change in capital unit costs.

About COPI

COPI is an index that the ONS has used to deflate construction output from current prices to constant prices. It is compiled by a private-sector organisation, BCIS, using actual tender prices and other information collected by government departments.

Regulators in infrastructure industries find COPI interesting because COPI tries to measure the cost of a unit of construction output at any given point in time. This means that the rate of change in COPI can be regarded as a measure of frontier shift in the construction sector – a near-comparator to the water and sewerage industry.

To see this, consider what might cause prices of construction output to change There are two main factors: first, the labour, materials and equipment that firms use to build projects get more expensive; and second, there are opportunities to improve building processes and reduce the quantities of labour and capital that are used to construct each unit of output.

At least over the very long term, it is not unreasonable to look at COPI as follows:

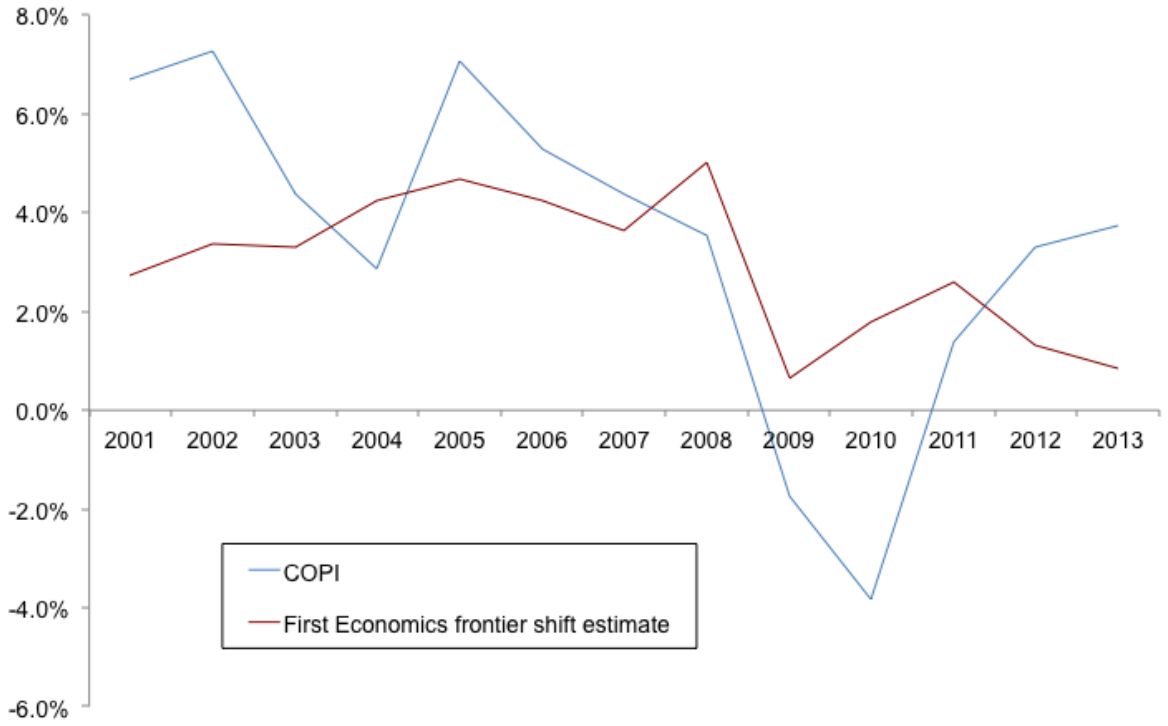
COPI	=	input price inflation productivity growth	*less*

This is comparable to the definition of frontier shift:

Frontier shift	=	input price inflation productivity growth	*less*

It is interesting, therefore, to compare our measure of capex frontier shift and COPI. Figure 7.2 plots the historical data since 2000.

Figure 7.2: Annual change in COPI vs First Economics frontier shift estimate



Source: BIS and First Economics calculations.

The two lines on this chart are at a broadly comparable level but follow paths on a year-to-year basis that can be quite different. It is noticeable, in particular, that COPI has been much more volatile, oscillating between annual growth of +7% and -4%, while our estimate of frontier shift has been more stable at between +5% and +1%. Over the full 2000-13 period, the average annual growth rates are 3.4% vs 2.9%, which constitutes a very close match.

We are not overly concerned by the differences that are apparent in figure 7.2. In recent years, a great deal of criticism has been levelled at COPI as both a measure of actual construction industry output price inflation and a proxy for water industry cost escalation. The dissatisfaction with COPI was summarised in a recent UKWIR study in the following terms:[6]

> There appears currently to be a deep-rooted distrust of the index borne out of a combination of:
>
> - the apparently counter-intuitive readings that the index has given in recent years;
> - the 2010 decision by the UK Statistics Authority to withdraw temporarily its designation of COPI as a national statistic on the grounds, among other things, of concerns about the robustness of the index;
> - the major revisions that BCIS and ONS made to the index in 2011, which had the effect of revising significantly projections of the end-of-period adjustment to AMP5 capital allowances; and
> - the general lack of transparency that BCIS exhibit in their stewardship of the index.

In light of these concerns, it would be surprising, and perhaps even disconcerting, to find that our estimate of frontier shift exactly matched annual changes in COPI.

[6] UKWIR (2012), Alternative measures of inflation in the regulatory framework.

We do, however, find it reassuring that, when measured over longer periods of time, our measure of frontier shift broadly reconciles to the rate at which Ofwat, the WIC and the Utility Regulator have historically indexed company's capital cost allowances. This implies that a switch of focus from COPI to our measure of frontier shift would cause no loss or gain in value over the long term.

7.3 Conclusion

Having performed the cross-checks set out above we are content that our estimates of input price inflation and productivity growth combine to give a reasonable and robust estimate of the capital cost escalation that frontier companies are likely to have to deal with during the next eight years. We therefore recommend that the figures in section 6 should be included in the Utility Regulator's PC15 price control calculations.

First Economics

First Economics is an economic consultancy that advises regulators, companies and government bodies on a wide range of regulatory, economic and financial issues.

For further information, go to: www.first-economics.com