



Household retail input price inflation at PR19

A report for Thames Water

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1. Executive summary

This report, written for Thames Water, is designed to support the development of a methodology for allowing for inflationary pressures within retail household at PR19. Giving regard to Ofwat's primary duties, we review the approach taken at PR14 and suggest how it might be further developed for PR19.

The main conclusions of this report are:

- (i) To be consistent with Ofwat's primary duties and its stated principles for setting price controls, Ofwat should have regard to, and take account of, input price pressures. In particular, the net effect of input price inflation and efficiency should be reflected in price limits.
- (ii) In light of the potential introduction of competition to household retail, we see the issue of input price inflation as even more pertinent.
- (iii) Empirical evidence suggests that household retail has experienced material input price inflation in the past, and that this is expected to continue. However, forecasts are inherently uncertain.
- (iv) We recommend that household retail costs are indexed to CPI/CPIH at PR19. This will avoid relying on uncertain forecasts.

The purpose of this report for Thames Water is to assess how input price inflation could be treated within household (HH) retail at PR19. The overall aim is to support the development of a methodology for the next price control.

This report sets out a framework for considering input price inflation in HH retail that is consistent with Ofwat's primary duties and its stated principles for setting price controls. We then use this framework to review the PR14 approach and, importantly, make suggestions as to how it could be further developed for PR19.

We note that, although Ofwat has recommended that competition should be introduced into HH retail, we believe that accounting for input price inflation will still be a relevant consideration at PR19. This is because it seems likely, even if competition is to be introduced, *some* form of price control (e.g. default tariffs) will be applied during the next price control period (AMP7). In the context of default tariffs, it will be important to ensure that there is an appropriate margin to promote competition. Accordingly, by not accounting for input price inflation properly, the prospect of a competitive HH retail market could be put at risk. Consequently, the question of whether and how to allow for input price inflation is even more pertinent, given the potential introduction of competition.

The main findings of this report are summarised below.

The framework that we have developed suggests that any regulatory approach should take account of input price inflation

Ofwat's primary duties and principles for setting price controls mean that any approach to input price inflation should have regard to the outcomes of efficient companies in competitive markets. In a competitive market firms will pass on inflation, net of efficiency gains. In the context of regulated markets, this equates to:

Net change in prices = Input price inflation – efficiency 'catch-up' – frontier shift

Furthermore:

- input price inflation may differ across companies;
- the efficient mix of inputs may change as a result of input price inflation; and
- the reasonable rate of return will depend on inflation risk.

The implications of our framework are also supported by regulatory precedent. All price controls we have reviewed use indexation, which protects against input price inflation, to a degree. Some regulators have also made further adjustments for input price inflation, where it is expected to differ from the indexation measure.

Empirical evidence suggests that input price inflation has materially affected HH retail in the past, and is expected to continue to do so

The costs of HH retail activities primarily relate to staff and doubtful debt. ONS data suggests that these cost categories, and others, have experienced material positive inflation in the recent past. Moreover, such inflation is expected to continue. Indeed, in relation to doubtful debt costs, as these are (in no small part) a function of the wholesale bill size, the fact that wholesale price controls will likely be indexed by CPI/CPIH means, by definition, that this inflationary pressure will exist for retailers over AMP7.

Based on current forecasts by the Office of Budget Responsibility (OBR), we estimate that gross (i.e. before any deductions for efficiency) input price inflation could be around 1.1% pa over the next five years. The impact of this on allowed revenues, for a notionally efficient company with HH retail costs of £100m per annum, would be £17m over the five-year period. This is equivalent to 3.4% of HH retail costs (over the five-year period).

However, as is demonstrated by the historical variation between forecasted inflation and outturn inflation, forecasts are inherently uncertain. Therefore, the above figures should be treated with caution – and are 'indicative' at this early stage in developing an approach for PR19. This 1.1% pa estimate of 'gross' inflation compares to the gross figure we estimated (for

Yorkshire) at PR14 of 2.8% pa. The difference largely reflecting the changed economic environment now facing the UK. Clearly, a more detailed quantification, using the latest available forecasts, could be undertaken closer to the time of the price determination.

We have identified three aspects of the PR14 approach to HH retail that appear inconsistent with our framework

There appears to be an inconsistency between our framework and the PR14 approach in three areas:

- » **No automatic allowance for input price inflation.** Firms in a competitive market, irrespective of capital intensity or relative efficiency, will face input price inflation. Not allowing for input price inflation is also inconsistent with the wholesale side and other regulated sectors. It risks conflating efficiency assessment and input price inflation – which could result in allowed revenues not being set at the ‘correct’ level.
- » **Only allowing an input price inflation allowance for upper quartile efficient companies.** This introduces an internal inconsistency to the approach – all companies face input price inflation, irrespective of whether they are in the group of efficient firms. To align with competitive market outcomes and precedent, companies should be allowed the net of inflation and efficiency. We emphasise that, for ‘less’ efficient firms, this ‘net effect’ would likely be negative (i.e. their efficiency challenge would be greater than any allowed inflation). Ultimately, the sign of the net effect will depend on the magnitude of input price inflation and the efficiency challenge.
- » **Choice of comparator used for setting the allowed margin.** As noted above, whether inflation risk is borne by companies or customers, it impacts the balance of risk. Therefore, it is important that the basis on which any ‘margin’ is set for retail HH at PR19 is consistent with the approach to inflation risk allocation. At PR14 there was an inconsistency in this regard, because the benchmarks relied upon by Ofwat in setting

the margin related to cases where companies did not bear inflation risk. All else equal, this might mean that the allowed margin was ‘too low’ (although we note that a range of factors were taken into account by Ofwat when determining the appropriate margin).

Ultimately, these factors risk companies not being able to recover appropriate costs, and subsequently not being able to provide customers with a suitable service.

An approach consistent with our framework would include an explicit allowance for input price inflation, take account of the relationship between input price inflation and efficiency, and set a margin that is reflective of the risks faced

We suggest the approach at PR19 should have the following features:

- » **An explicit allowance for input price inflation.** To calculate allowed costs, an approach should make an allowance for input price inflation. As we show, input price inflation has affected companies in the past and is expected to do so in the future. The mechanism should, however, allow for the case of zero (or even negative) input price inflation.
- » **A holistic approach to input price inflation and efficiency challenges.** Consistent with the above, any approach should jointly consider both input price inflation and efficiency challenges – allowing for the net of these two components. For companies that are less efficient, the net of these two factors could be negative. The approach may take into account changes in the mix of inputs as a result of varying rates of inflation for the different inputs.
- » **A margin that is reflective of the risks faced.** The margin should reflect the risks that the company faces. If inflation risk is allocated to companies (e.g. because of an ex-ante allowance) the return should include a premium for inflation risk. If inflation risk is allocated to customers (e.g. because of indexation or ex-post adjustments) the return should not include a premium for inflation risk.

We recommend that HH retail costs are indexed to CPI/CPIH at PR19

There are various options as to: (i) the inflation measure used; and (ii) the mechanism to provide an allowance for input price inflation. Based on the benefits and drawbacks of each, we recommend that HH retail costs are indexed to the CPI (consumer price index) or CPIH (an alternative consumer price index) at PR19. This is for a number of reasons, including:

- » CPI/CPIH reflects both frontier shift and changes in the efficient mix of inputs. That is, as it is a measure of final prices, it reflects the fact that firms pass on efficiency improvements. It is considered a robust measure of general inflation in the economy.
- » Given Ofwat's decision to migrate to CPI/CPIH indexation in the wholesale controls at PR19, the majority of the price paid by customers at PR19 will be indexed to CPI/CPIH. One of the main costs of HH retail, doubtful debt, can therefore be expected to rise in line with CPI/CPIH in any case. This increase in 'price' will be offset by efficiency improvements (e.g. through improved collection), but this is an issue to consider in relation to the appropriate efficiency challenge.
- » There is a large degree of uncertainty in inflation forecasts, and as such, methods based on an ex-ante allowance are not ideal. Companies would have to be compensated for this risk through the allowed margin.
- » Companies will have the incentive to manage costs and 'beat' the CPI/CPIH measure.

Indexation to CPI/CPIH is more consistent with the outcomes efficient firms would experience, compared to the PR14 approach.

We also considered a more bespoke measure of inflation, and see this as a potential alternative to CPI/CPIH. The advantage of this is that it could potentially be more reflective of the input mix of HH retail. The drawback, however, is that a suitable measure may not be readily available, and constructing a bespoke measure would involve making subjective judgements about what the efficient inputs, and the efficient mix of inputs are, in advance.

Companies may require quantitative and qualitative information

If an 'automatic' CPI/CPIH indexation approach is adopted, companies would not need to supply evidence to 'prove' the existence of inflationary pressure in retail HH at PR19.

However, if Ofwat adopted an alternative approach (e.g. a developed ex-ante approach, or a true-up mechanism), companies might need to develop both quantitative and qualitative evidence to demonstrate inflation.

- » Quantitative evidence may include the cost split of the HH retail business, expected rates of input price inflation, and efficiency benchmarking evidence.
- » Qualitative evidence, which was particularly supportive of claims at PR14, may include internal benchmarking work, details of contract management and efficiency monitoring processes.

As summarised above, and detailed in the remainder of this report, we suggest that the PR14 approach to setting HH retail revenues is reassessed, and an approach consistent with our framework be implemented at PR19.



2. Framework for taking account of input price inflation

This section sets out Ofwat's stated objectives, how inflation affects firms in competitive markets, regulatory precedent and empirical evidence in relation to how inflation is expected to affect companies (for retail HH).

A summary of our framework is as follows.

- (i) Ofwat's primary duties and principles for setting price controls suggest that any approach to accounting for input price inflation should be reflective of outcomes faced by firms in competitive markets. In such a case, firms will pass on to customers the net of input price inflation and efficiency.
- (ii) Empirical evidence suggests that companies have faced material input price inflation in the past, and will continue to do so. Over the next five years, input price inflation could be reasonably expected to increase companies' total HH retail costs by 3.4%.

2.1. Purpose of the framework

During the last price review (PR14), Ofwat set cost allowances for the HH retail price control based on an average cost to serve (ACTS) approach, as detailed in the annex to this report. Ofwat's PR14 approach did not include an automatic link to inflation – and instead companies were required to meet a set of criteria in order to be awarded an allowance for input price inflation. Ofwat is yet to publish details of its proposed approach for PR19, but this is expected in July 2017.

Competition may be introduced into HH retail in the future, which will potentially affect whether input price inflation should be taken into account in the regulatory regime. However, as we discuss in section 2.2.3, we believe that the treatment of input price inflation will still be an important consideration at PR19.

In the above context, Thames Water asked Economic Insight to review the PR14 approach and make suggestions as to how the PR19 approach could be further developed. In particular, this report is designed to answer the following questions:

- » How does input price inflation fit with Ofwat's objectives and primary duties?
- » How did it compare to precedent in other regulated sectors?
- » What input price inflation would a notionally efficient company be expected to face?

- » What is the potential magnitude of these effects and how could they vary by region/company?
- » How should productivity gains be reflected in an input price inflation framework?
- » What are the implications of only allowing an input price allowance if a company is in the upper quartile of efficiency?
- » What evidence should companies need to provide to support an input price inflation claim?

In order to answer these questions, we have developed a framework for considering input price inflation, as set out in this chapter. We identify the relevant Ofwat objectives, the outcomes experienced by firms in competitive markets, regulatory precedent and empirical evidence.

At the bottom of this page are some of the key definitions and terminology used in this report; and the rest of this section comprises:

- implications of Ofwat's stated objectives;
- the outcomes experienced by firms in competitive markets;
- regulatory precedent of accounting for price inflation;
- empirical evidence of the potential effect of input price inflation for HH retail; and
- summary of our framework.

Input price inflation

Input price inflation is the increase in the price level of companies' inputs. For example, firms could face input price inflation if the market wage rate (the price of labour input) increases.

Efficiency catch-up

Within the water industry there are varying levels of efficiency (i.e. the amount of resources required to deliver a service). Efficiency catch-up is the degree to which an individual firm's efficiency 'catches-up' to the most efficient firms'.

Frontier shift

The most efficient firm is (typically) at the efficiency 'frontier'. All firms, including the most efficient firm, can be expected to make efficiency improvements over time – which is referred to as 'frontier shift'.

2.2. Implications of Ofwat's stated objectives

The starting point for our framework is the objectives of the regulator. Ofwat's primary duties and the principles it has set for PR19 do not *specify* how input price inflation should be treated, but they do have *implications* for how it should be treated.

2.2.1. Ofwat's primary duties

Ofwat's primary duties are set out in the following box.

Figure 2. Ofwat's primary duties

Under section 2 of Water Industry Act 1991, Ofwat must carry out most of its work as an economic regulator in the way that it considers will best:

- further the consumer objective to protect the interests of consumers, wherever appropriate by promoting effective competition;
- secure that water companies (meaning water and sewerage undertakers) properly carry out their statutory functions;
- secure that water companies can (in particular through securing reasonable returns on their capital) finance the proper carrying out of their statutory functions;
- secure that licensed persons properly carry out their licensed activities and statutory functions; and
- further the resilience objective to secure the long-term resilience of water companies' water supply and wastewater systems and to secure they take steps to enable them, in the long term, to meet the need for water supplies and wastewater services.

Source: Ofwat

Of relevance to the treatment of input price inflation is how Ofwat interprets its financeability and consumer duties. Specifically:

- » Ofwat interprets its financeability duty in terms of ensuring that a '**notionally efficient**' company can carry out its functions.¹ That is to say, it will not fund inefficient activities, but should fund the efficient level of costs.
- » In terms of the consumer duty, Ofwat interprets it as reflecting outcomes consistent with a **competitive market**.

2.2.2. Ofwat's principles for setting price controls

Further to its primary duties, Ofwat set out high-level principles that it intended to use to guide its approach to setting price limits at PR14.² Since then, within the 'Towards Water 2020' discussion document, Ofwat stated that it plans to retain the principles for PR19, as they remain consistent with its duties and strategy.³ Therefore, the principles are both relevant for our assessment of the PR14 approach and suggested developments for the PR19 approach.

The six principles, that are given in the diagram overleaf, imply the following.

- » Price controls should reflect the **economic characteristics** of the relevant parts of the businesses. The form of control should differ *where the economic characteristics suggest the competitive outcomes would differ*.
- » Ofwat's approach should be **transparent and predictable**. Any changes to the regulatory framework should be based on clear evidence and sound economic rationale.

2.2.3. Introduction of HH retail competition

Also of relevance is the potential introduction of competition to HH retail. In September 2016, Ofwat delivered its final report to Government on the costs and benefits of introducing competition in the HH retail market. Ofwat concluded that competition in the HH retail market would likely result in a net benefit to

¹ See for example '*Financeability and financing the asset base – a discussion paper*', Ofwat, (2011).

² '*Future price limits – statement of principles*', Ofwat, (May 2012).

³ '*Towards Water 2020 – meeting the challenges for water and wastewater services in England and Wales*', Ofwat, (July 2015).

customers,⁴ but it is now for Government to decide how to proceed.

Although competition may, over time, remove the need for the regulator to make a judgement on input price inflation, we believe that under most likely models at PR19, it will still be a relevant factor for consideration. For example, default tariffs, such as those that will be introduced in non-HH retail, may be used. Input price inflation would only not be relevant if Ofwat ‘fully deregulated’ the retail HH market at the start of PR19, which we think is highly unlikely. As such, we foresee that input price inflation will be a relevant factor to take account of at PR19.

2.2.4. Implications for accounting for price inflation

Ofwat’s primary duties and its principles for setting price controls, as set out above, suggest that any approach to dealing with price inflation should have a number of features. In particular, we suggest the following characteristics:

» **Reflective of outcomes faced by firms in competitive markets.** This will facilitate a framework that allows notionally efficient companies to be able to earn a reasonable return and display allocative, dynamic and productive efficiency. Regulatory mechanisms should differ where relevant economic characteristics differ.

Figure 3. Ofwat’s principles for setting price controls

Targeted price controls	We will target our price control regulation appropriately, including: <ul style="list-style-type: none"> • using appropriate tools for different parts of the businesses where the economic characteristics of those businesses are different; • focusing incentives carefully to deliver desired outcomes; and • reducing or removing regulation where it becomes unnecessary over time.
Proportionate price setting	We will use our risk-based approach to compliance to ensure that we focus our regulation where it matters and reduce any unnecessary burdens.
Effective incentives	We will develop clearer, simpler and more effective incentives that drive allocative, dynamic and productive efficiency in the sectors.
Ownership, accountability and innovation	We will continue to set price controls in a way that gives companies ownership of and accountability for delivery of what customers want and need, and to ensure they remain resilient.
Flexibility and responsiveness	We will design and use our regulatory tools in a way that is future proof and capable of adapting to support the sectors in delivering sustainable water and wastewater services as the environmental and other challenges change over time.
Transparency and predictability	We will continue to regulate in a way that is transparent and predictable, and changes we make to the regulatory framework will be based on clear evidence and subject to consultation with all stakeholders so that we can build trust and confidence in the sector.

Source: Ofwat

⁴ ‘Costs and benefits of introducing competition to residential customers in England’, Ofwat, (September 2016).

- » **Consistency.** The regulatory approach should be consistent both within the industry and, where appropriate, with other government regulators.
- » **Transparency.** Regulations should be simple, transparent and predictable. The rationale for decisions should be clear and any changes should be based on evidence.

2.3. Outcomes experienced by firms in competitive markets

In a competitive market, prices will reflect both input price inflation and improvements in efficiency.

2.3.1. Competitive firms pass on inflation and efficiency gains

Firms will pass on to customers, through higher output prices, the input price inflation that they face. For a market that is competitive, if firms face an increase in costs and do not pass on the price inflation to customers, the companies will be loss making. To return to making normal profits (the competitive market outcome), firms must raise their prices in line with the price inflation.

However, companies can also be expected to make efficiency gains over time, and competitive firms will pass on these efficiency savings through prices. An individual firm has the incentive to reduce its prices slightly in order to increase its share of the market and profit. Furthermore, each firm will reduce its prices slightly until the full efficiency savings are passed on through prices.

The above is put succinctly by Bernstein and Sappington (2000):⁵

“Competitive forces compel firms to realize productivity gains and to pass these gains on to their customers in the form of lower prices, after accounting for unavoidable increases in input prices. Therefore, if all industries in an economy were competitive, output prices in the

economy would grow at a rate equal to the difference between the growth rate of input prices and the rate of productivity growth. ”

Put another way, output prices in a competitive market can be expected to increase by the difference between price inflation and efficiency gains.

Furthermore, this is the very notion of RPI-X regulation – the basis of network utility price caps since the 1980s. The ‘textbook’ RPI-X approach is discussed in the box on the following page. In practice, however, regulators’ approaches tend to be variations on the stylised RPI-X framework, as discussed further in section 2.4.

In the following sections we discuss three further outcomes of efficient companies in competitive markets.

⁵ ‘How to determine the X in RPI-X regulation: a user’s guide’, Bernstein and Sappington, Telecommunications Policy, (2000).

Figure 4. RPI-X regulation

RPI-X regulation is an approach to setting prices based on the difference between the general rate of inflation in an economy (e.g. RPI) and an adjustment factor, X. The X-factor is set to reflect both: (i) the efficiency savings the firm is expected to make relative to the average firm in the economy; and (ii) inflation in the firm's input prices relative to the average firm in the economy.

The measure of inflation used can be based on the aggregate price level in the economy – such as RPI or CPI – or on a measure more specific to the input prices faced by the company. Importantly, the X-factor will depend on the choice of inflation measure as it has to reflect the inflationary pressure experienced by the firm relative to the wider inflation measure. If the inflation measure is specific to the company, the X-factor will represent only efficiency savings.

In practice, the application of RPI-X regulation is a complex process involving efficiency assessments, profitability assessments, and forward-looking expenditure plans. It has been applied, in various forms, in energy, telecoms, rail and water sectors in the UK.

2.3.2. Input price inflation may vary across companies

The level of input cost inflation may vary across industries, and also within industries. Glejser (1965)⁶, for example, points to the following three sources of inflation:

- demand changes (e.g. higher demand for call centre staff in the local or national economy);
- supply changes (e.g. fewer individuals in the local area willing or able to work in a call centre); and

- government policy (e.g. the statutory minimum wage, immigration levels, or price regulation of postage).

These different sources can give rise to varying levels of input price inflation for water companies. Furthermore, companies may vary in the mix of inputs – each of which may have different and varying sources of inflationary pressures.

2.3.3. Input mixes may change as a result of inflation

Related to the above, input price inflation may result in an efficient firm changing its input mix. That is, in a scenario in which the prices of inputs rise at different rates, firms may substitute towards the input that is experiencing lower price inflation. For example, if the price of labour increases substantially compared to the price of running an automated telephone system, a competitive retailer may change their input mix – decreasing the use of labour and increasing the use of the automated system. The net effect on its costs will be a weighted average of the inflation rates for the two inputs.

“ In the longer term, the service provider may be expected to mitigate the adverse impact of rising input prices through capital labour substitution... ”

The degree to which a competitive firm will substitute between inputs will depend on: (i) the relative inflation rates of the inputs; and (ii) the extent to which the inputs are substitutes i.e. the marginal rate of technical substitution.⁸

This substitution effect has two implications for setting regulated prices:

- » If an approach is taken where inflation measures for individual cost lines are used, there may be a need to assess how the efficient mix of inputs changes as a result of relative inflation rates.
- » On the other hand, a more high-level approach could be taken that utilises a

⁶ 'Inflation, productivity, and relative prices – a statistical study', Glejser, *The Review of Economics and Statistics*, (1965).

⁷ 'The Treatment of Input Price Inflation in Price Control Reviews', *Regulated Industries Commission*, (2011).

⁸ The marginal rate of technical substitution between two inputs, k and l , is a measure of the additional amount of input k that is required to keep output constant if input l is reduced by one unit – see for example 'Microeconomic Theory', Mas-Colell et al., Oxford University Press, (1995).

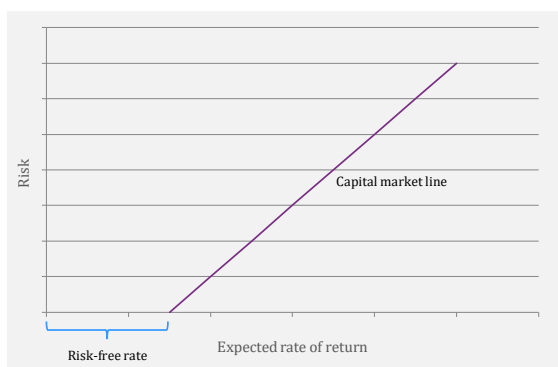
consumer price index e.g. RPI or CPI. Such inflation measures will take into account the input substitution discussed above as competitive firms will naturally substitute between inputs and reflect this in their end prices.

This also raises the practical question as to whether a regulator should, or would have to, make a judgement as to what input mix an efficient company would employ. Empirical evidence is presented in section 2.5 in relation to the input mix of firms and the historical inflation rate of different inputs.

2.3.4. The reasonable rate of return will depend on the allocation of inflation risk

In addition to being compensated for the expected costs that will be faced in HH retail, firms in a competitive market will earn revenues that also allow for a 'reasonable return'. Such a return will consist of a risk-free rate (compensating the investor for the opportunity cost of investing in a risk free asset) and a risk premium. The greater the risk faced by the investor, the greater the expected return it will receive in a competitive market. This relationship is shown in the figure below.

Figure 5. Risk-return relationship



Source: Sharpe (1964)⁹

In line with the above, PwC (2014)¹⁰ suggests a number of sources of risk that a water retailer may face:

- price variability;
- political risks;

- risks relating to the introduction of competition (e.g. stranded assets due to loss of market share);
- major operational failures; and
- reputational damage.

Such risks would be compensated for in a competitive market.

In addition to the above, in a competitive market firms would earn a return that compensates for inflation risk,¹¹ which we define as: the risk of outturn inflation being different to what is expected. The relevance of including an inflation risk premium in the return set by a regulator is illustrated by two examples below.

- » **Example 1.** Regulated prices are set in real terms and adjusted for outturn inflation (the actual level of inflation experienced). The company does not face any inflation risk, and therefore would not be allowed an inflation risk premium as part of allowed revenues.
- » **Example 2.** Regulated prices are set in nominal terms based on *expected* inflation rates, and there are no adjustments for outturn inflation which could be above or below the expected rate. Due to the added uncertainty compared to example 1, an inflation risk premium would be included within the allow rate of return i.e. allowed revenues would be higher.

Therefore, if inflation risk is faced by a company it will require a higher expected rate of return compared to a scenario where inflation risk is faced by customers, as is typical in a competitive market.¹²

« *Indexation of tariffs by RPI-X therefore protects consumers from the risk that monopolies will raise their prices in real terms over time, but also protects regulated companies from the risk that input costs, which may not be fully within*

⁹ 'Capital asset prices: a theory of market equilibrium under conditions of risk', Sharpe, *The Journal of Finance*, (1964).

¹⁰ 'Water retail net margins', PwC, A report for Ofwat, February (2014).

¹¹ However, typically firms in a competitive market do not face inflation risk, as it is passed on to customers.

¹² 'Inflation measures in economic regulation', UKRN, (2016).

*management control, will rise in line with unexpected movements in inflation.*¹³ »

A regulatory approach consistent with the outcomes discussed above therefore needs to take account of input price inflation.

2.4. Regulatory precedent of accounting for input price inflation

Regulatory precedent is consistent in providing an allowance for inflation, although to varying extents. There has been much discussion of *how* to account for input price inflation, “*but there has been relatively little debate about the need for some kind of inflation link*”.¹⁴

Ofwat’s approach for wholesale controls at PR14 was to limit price increases to RPI plus or minus a K factor – consistent with the general RPI-X framework. For retail controls, though, no automatic indexation was allowed. In contrast to this approach for retail, the table overleaf illustrates that the other major UK economic regulators have all made allowances for input price inflation, in one way or another, in their recent determinations (further details are provided in the annex). In particular, we have identified three broad approaches:

- » **Indexation to general inflation.** The simplest approach that allows for input price inflation is to index revenues or prices against a general inflation index such as RPI or CPI (consistent with RPI-X regulation). All recent price controls that we have reviewed include this feature.
- » **Additional ex-ante allowance for specific input price inflation.** In addition to indexation to general inflation, regulators often make specific ex-ante allowances for where input price inflation is expected to differ from general level of inflation. An adjustment is made based on expected input price inflation when the price control is set, whilst annual prices/revenues are still indexed to outturn inflation. Without an ex-post allowance for specific input price inflation (discussed next), the regulated firm

faces input price inflation risk that is above/below general inflation. As can be seen, all the regulators make some sort of additional allowance for input price inflation.

- » **Ex-post allowance for specific input price inflation (specific indexation).** Further to the above two mechanisms, there is some precedent for making ex-post adjustments for the outturn of specific input price inflation. In such cases, the regulated firm does not face input price inflation risk.

We recognise that all but one (Ofcom’s maximum price of Royal Mail’s 2nd class stamps) of the determinations relate to ‘wholesale’ sectors, rather than retail. Therefore, naturally a question arises as to how relevant these examples are for input price inflation in HH retail. However, there is no economic rationale for why input price inflation would affect wholesale markets and not retail markets. For example, retail businesses are typically labour intensive and will therefore pass on wage inflation. Indeed, as discussed in section 2.3, all firms in competitive markets will face input price inflation. Therefore, we see the regulatory precedent as highly relevant.

¹³ ‘Indexation of future price controls in the water sector’, Oxera, prepared for Ofwat, (2016).

¹⁴ ‘What is the impact of ORR’s inflation proposals on Network Rail?’, Oxera, prepared for Network Rail, (2012).

Figure 6. Other regulators' approaches to input price inflation

Regulator and price control	Indexation to general inflation	Additional ex-ante allowance for specific input price inflation	Ex-post allowance for specific input price inflation (specific indexation)
ORR – PR08 and PR13	Yes (allowed revenues indexed to RPI)	Yes At PR08, positive ex-ante adjustments for forecast input price inflation over and above RPI were made for operating, maintenance and renewals expenditure. At PR13, input price inflation was not forecast to be significantly different to general inflation forecasts, and therefore no additional allowance was made.	Mixed At PR08, in addition to the ex-ante allowances (see opposite) renewals were indexed due to significant variance in forecasts. The ORR considered a range of options for indexation, and decided to use the infrastructure output price index (IOPI) for both simplicity and the fact that it broadly reflected Network Rail's mix of costs.
Ofgem – RIIO-T1/GD1/ED1	Yes (allowed revenues indexed to RPI)	Yes Expenditure adjusted for real price effects (RPEs) which reflect forecasted increases (or decreases) in input prices relative to RPI.	No Indexation was considered for ED1 due to the uncertainty in RPEs, but was decided against due to the late stage of the price control. Ofgem intend to further explore options at future price controls.
CAA – Heathrow and Gatwick Q6	Yes (annual revenue yield adjusted by RPI)	Partial The CAA judged that an additional allowance for construction input price inflation was not necessary as it was not forecast to differ substantially from RPI. Ex-ante adjustments were made for anticipated wage inflation.	No
Ofcom – LLU & WLR, MCT, and 2nd class stamps	Yes (prices indexed to CPI)	Mixed For LLU & WLR and MCT, adjustments were made for various inputs that were forecast to experience inflation different to the general price level. No input specific adjustments were made in setting the maximum price for 2 nd class stamps (although the limit is imposed more to protect vulnerable customers, rather than be binding or be an accurate reflection of efficient costs).	No

Source: Economic Insight review of regulatory determinations – see annex

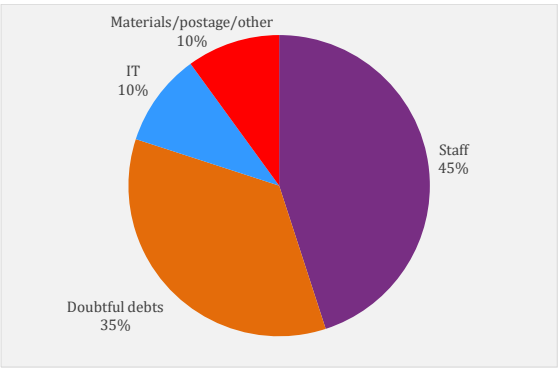
2.5. Empirical evidence of the potential effect of input price inflation for HH retail

This section presents empirical evidence in relation to what types of costs may be relevant in the HH retail sector, what previous rates of inflation have been, and what forecast inflation rates are. The evidence suggests that companies have faced positive input price inflation in HH retail, and that this could be reasonably expected to continue. However, there is uncertainty in any forecasts. At the end of this section we present evidence in relation to the potential magnitude, in monetary terms, of the effect of input price inflation on companies.

2.5.1. Staff and doubtful debt are the main cost categories in HH retail

As demonstrated by First Economics (2013),¹⁵ which surveyed a sample of companies, staff and doubtful debt costs are the two major constituent cost categories of HH retail for water companies. This is broadly consistent with our published analysis for Yorkshire Water at PR14.¹⁶

Figure 7. Industry HH retail cost split



Source: First Economics (2013)

¹⁵ ‘Assessing Potential Changes in Retail Costs, 2015 to 2020’, First Economics, (2013).

¹⁶ See ‘Retail HH input price pressure and benchmarking analysis’, Economic Insight, (2014).

¹⁷ There is no specific price measure for doubtful debt. CPI is used as a proxy because water bills, and therefore the ‘price’ of defaulting, are expected to increase by a similar

2.5.2. Input costs have experienced material inflation

The main cost categories of HH retail have experienced material inflation over the last five years and, furthermore, each of the cost categories has experienced different levels of inflation.

The table below shows the increase in the price level of the relevant cost categories over the past five years, along with the weighted average of these rates based on the cost split given in Figure 7.

Figure 8. Inflation over the last five years

Price measure	% increase in price level between beginning of 2011 and end of 2015
Wages	4.6%
Doubtful debt ¹⁷	11.9%
IT	0.0%
Materials / postage / other ¹⁸	25.4%
Weighted average of cost categories	8.8%
CPI	11.9%

Source: Economic Insight analysis of ONS data

Assuming the cost split represents an efficient mix, the above rates of inflation suggest that **an efficient company would have faced (gross) input prices 8.8% higher at the end of the five-year period compared to the start.**¹⁹ This is equivalent to 1.7% input price inflation annually.

Notably, these calculations suggest that water companies experienced input price inflation below CPI. Importantly, this finding is dependent on the inflation indices that we have used being accurate reflections of the prices faced by water companies. The measure for wages, for example, represents the general wage

rate (about 90% of bills are expected to be indexed to CPI or CPIH).

¹⁸ The inflation rate for this category is based on an average of materials, postage and CPI (a proxy for other).

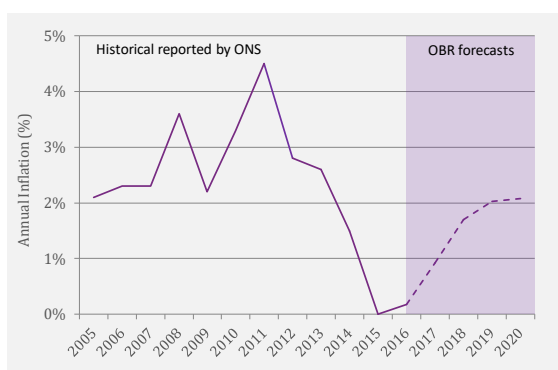
¹⁹ This is calculated as the weighted average of the inflation rates based on the assumed cost split.

level, whereas a more precise measure would reflect the relevant 'types' of labour used and associated staff mix. Our work for Yorkshire Water at PR14, for example, was based on more granular cost categories and detailed analysis of its staff mix.

2.5.3. Positive inflation is expected to continue

Further to the evidence of companies experiencing input price inflation for HH retail in the past, positive inflation is also expected to persist in the future. For example, the following chart shows the OBR's latest forecasts for CPI inflation.

Figure 9. OBR CPI inflation forecasts



Source: Economic Insight analysis of ONS (2016) and OBR (March 2016) data

These forecasts suggest that the general price level will be 8.7% higher in five years' time (i.e. at the end of 2020, compared to the start of 2016). This is equivalent to 1.7% inflation per annum.

Consistent with the historical data, if the general price level increases, it can also be expected that at least some of the inputs to HH retail will also experience inflation. Suitable forecasts for the individual cost categories are not, however, readily available.

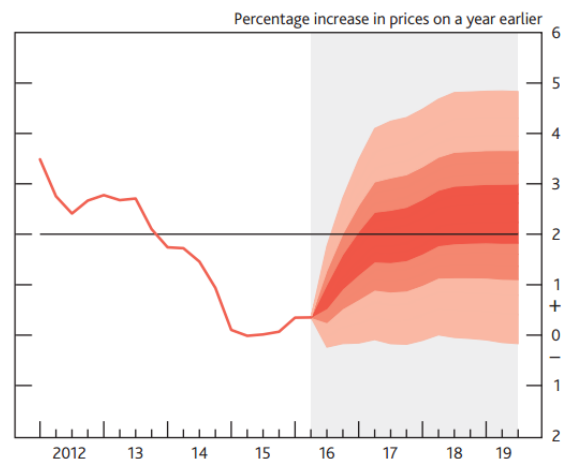
2.5.4. Forecasts are uncertain

Although positive inflation is expected to continue, any forecasts are subject to uncertainty.

For example, the Bank of England produces 'fan charts' to illustrate the range of possible outturn inflation rates that it anticipates. Its August 2016 forecast²⁰ for CPI, as shown in the

following figure, gives a 60% probability that annual CPI inflation will lie between about 1% and 3.5% in 2019. The Bank of England therefore assigns relative large 'confidence intervals' to its forecasts.

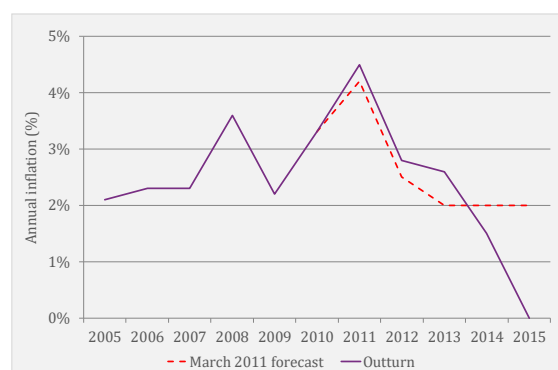
Figure 10. Bank of England CPI forecasts



Source: Bank of England (August 2016)

Another way to assess uncertainty is to compare previous forecasts to actual outturn rates of inflation. The chart below shows the OBR's CPI forecasts from March 2011 compared to the actual outturn levels of inflation.

Figure 11. OBR March 2011 CPI forecasts and outturn inflation



Source: Economic Insight analysis of ONS (2016) and OBR (March 2011) data

As can be seen, the OBR was relatively accurate in its short-term forecasts. However, in the longer-term accuracy decreased; and in 2015 there was a difference between the forecast and outturn rates of two percentage points.

²⁰ 'Inflation report, August 2016', Bank of England, (2016).

2.5.5. Effect of input price inflation on a notional company

Based on (i) the historical relationship between input price inflation and CPI and (ii) CPI forecasts, we can calculate an *indicative* estimate of the future effect of input price inflation on a notional company. This is based on the high-level cost split presented in Figure 7, and could be expected to differ if a more granular approach (such as the one we used at PR14) is taken. The calculation for the forecast rate of input price inflation for an assumed efficient company is given in the table below.

Figure 12. Indicative calculation of input price inflation forecast

Input price inflation per annum (2011-2015)	1.7%
CPI inflation per annum (2011-2015)	2.3%
'Wedge' between above historical rates	-0.6%
Forecast CPI inflation per annum (2016-2020)	1.7%
Forecast input price inflation per annum (sum of above two figures)	1.1%

Source: Economic Insight analysis using ONS 2016 data and OBR March 2016 forecasts

As can be seen, our indicative estimate is that, over the next five years, an efficient company could face (gross) input price inflation of 1.1% per annum (i.e. before any deduction for efficiency). Assuming a notional company with real HH retail allowed costs of £100m per annum, input price inflation would result in an additional £16.82m of nominal costs over five years, equivalent to 3.4% of costs, as shown in the following table.

Figure 13. Indicative calculation of input price inflation £ effect on costs

Year	Real costs (£m)	Price level	Input price inflation effect
Baseline	£100	1.0000	
1	£100	1.0111	£1.11
2	£100	1.0222	£2.22
3	£100	1.0335	£3.35
4	£100	1.0449	£4.49
5	£100	1.0565	£5.65
Total effect (£m)			£16.82
Total effect (% of costs)			3.4%

Applying a 1% margin (consistent with PR14), would increase the total monetary effect for the notional company to £16.99m.

We note, however, that this estimate is particularly subjective, due to the following:

- » Forecasts are inherently uncertain, and outturn inflation could be materially above or below what is expected.
- » Forecasts are based on the five years up to the end of 2020. The economic environment, and therefore inflation rates, could be very different for the period covered by PR19.
- » The effect of input price inflation on allowed revenues will turn on Ofwat's approach to PR19.

Notwithstanding the above, our calculations demonstrate that input price inflation can have a material impact on companies, even in the current low inflation environment.

2.6. Summary of framework

Based on the above sections, our framework consists of: (i) a set of characteristics consistent with Ofwat's stated objectives; and (ii) relatedly, the outcomes experienced by firms in competitive markets.

In particular, Ofwat's primary duties and principles for setting price controls suggest that any approach to input price inflation should be:

- reflective of the outcomes experienced by firms in competitive markets;
- consistent; and
- transparent.

Economic theory suggests that firms will pass on the net of input price inflation and efficiency improvements. Furthermore:

- » Input price inflation may differ across companies.
- » The efficient mix of inputs may change as a result of input price inflation.
- » The rate of return will depend on the allocation of inflation risk.

The framework is also supported by regulatory precedent and empirical evidence.



3. Review of PR₁₄ approach against our framework

This section compares Ofwat's PR₁₄ approach to our framework. We identify aspects of the PR₁₄ approach that could be reconsidered when developing the PR₁₉ approach.

We identify three aspects of the PR₁₄ approach that may warrant further consideration when developing the PR₁₉ approach:

- (i) No automatic allowance for input price inflation.
- (ii) Only allowing an input price inflation allowance for upper quartile efficient companies.
- (iii) Choice of comparator used for setting the allowed margin.

We have identified three aspects of the PR14 approach that are not wholly consistent with our framework set out in the preceding section, and may therefore warrant consideration when the PR19 approach is designed. These three aspects are:

- » No automatic allowance for input price inflation.
- » Only allowing an input price inflation allowance for upper quartile efficient companies.
- » Choice of comparator used for setting the allowed margin.

Firstly, though, we note that the PR14 approach is to *some* extent consistent with our framework. This is because it included a mechanism for companies to receive an allowance for input price inflation through an ex-ante special factor claim. However, as set out in the sections below, it is not *wholly* consistent with our framework.²¹ Building on this review of the PR14 approach, section 4 of this report makes a suggestion as to

the potential approach that could be used at PR19, which is consistent with our framework.

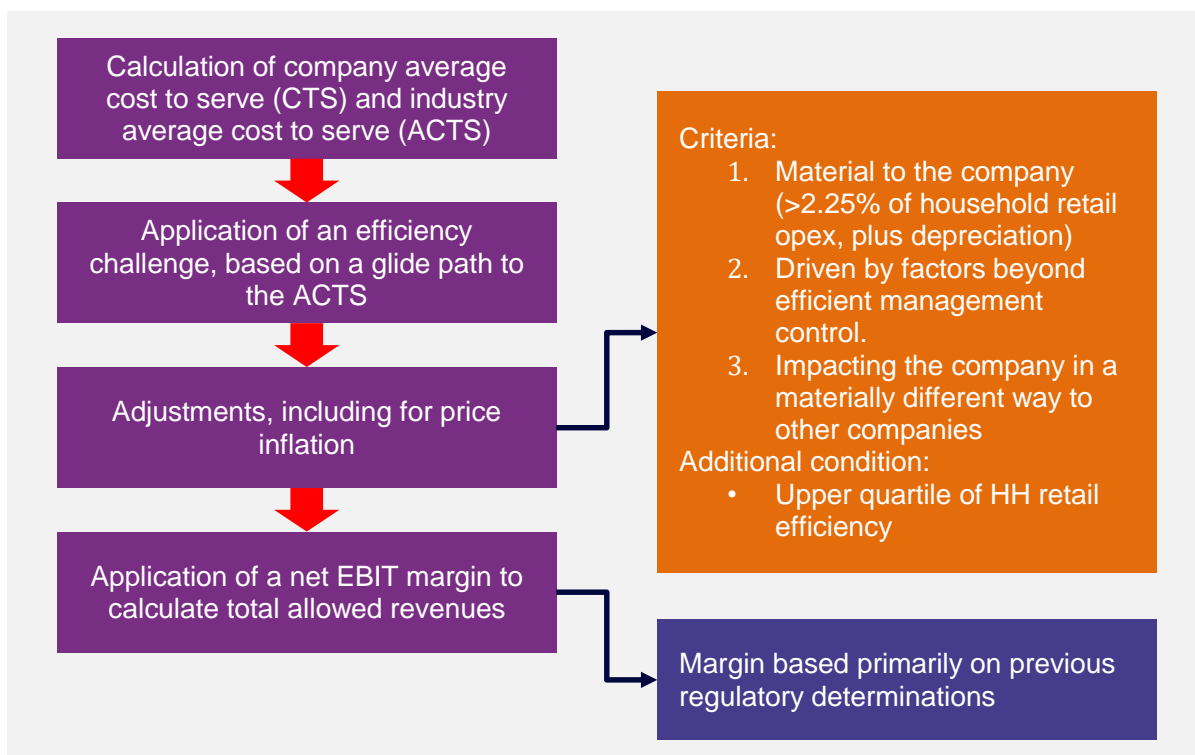
Ofwat's PR14 approach is summarised in the diagram at the bottom of this page and detailed further in the annex.

3.1. No automatic allowance for input price inflation

Firstly, not allowing an automatic link to input price inflation does not appear **consistent**, with either Ofwat's approach in other elements of the value chain, nor with approaches taken in other regulated sectors. Price controls for the wholesale side of the water industry include indexation, which in part protects against increases in input prices. Regulatory precedent is also consistent in the use of indexation.

Secondly, the approach risks not being completely **transparent**, in that there is a danger that efficiency and input price inflation become conflated. One reason for not allowing

Figure 14. Overview of PR14 approach



Source: Economic Insight

²¹ Notably, the PR09 approach provided an implicit allowance for HH retail input price inflation because there was an

integrated price control (no distinction between retail and wholesale), which was indexed to RPI.

input price inflation could be that firms are inefficient and therefore not wanting to increase allowed costs. However, the transparent mechanism for doing so is through an efficiency challenge based on actual and efficient costs. To calculate efficient costs, input price inflation needs to be taken into account.

Thirdly, not allowing for input price inflation is, in our view, inconsistent with **competitive market outcomes**. To accurately calculate reasonable allowed revenues, input price inflation should be taken into account. As demonstrated in section 2.5, empirical evidence suggests that HH retail businesses have faced, and will continue to face, input price inflation.

Whilst the retail side of the water industry is very different to the asset-intensive wholesale side, it will still face input price inflation. There is no economic rationale as to why asset-light businesses will not face input cost inflation. For example, retail businesses are typically labour intensive and therefore face wage inflation.

We recognise the three original criteria set out by Ofwat to allow any input price inflation claims (as set out in Figure 14). The first, *materiality*, is a pragmatic condition (i.e. limiting resource if the effect is not material). The second, *beyond management control*, is a reasonable condition to reflect only efficient cost changes. In a competitive market, firms avoid price increases if they are able to do so. Therefore, only inflation that is beyond management control is faced, and passed on to customers.

However, the third criteria, *impacting the company in a materially different way to other companies*, does not appear consistent with competitive market outcomes. That is, firms may face input price inflation irrespective of whether other firms do.

It could be the case, for example, that all firms face the same level of input price inflation, which would then be passed on to customers. In practice, different firms could reasonably face different input price inflation, for example due to

different input mixes.²² However, a difference between firms is not a precondition to being affected by input price inflation. Therefore, the criterion, in our view, is not consistent with competitive market outcomes.

3.2. Only allowing an input price inflation allowance for upper quartile efficient companies

In addition to the three criteria discussed above, Ofwat also introduced the condition that only companies in the upper quartile of efficiency could be allowed input price inflation claims. In our view, this does not align with **competitive market outcomes**, and is not internally **consistent** or **transparent**.

An upper quartile rule imposes a cut-off point (which is not based on any economic rationale) for which an allowance for input price inflation is given or not. However, in practice, all firms may face input price inflation, irrespective of whether they are efficient or not. There is a continuum of both input price inflation and efficiency, and companies should be made an allowance based on the net of these two aspects.

An upper quartile rule therefore introduces an internal inconsistency. That is, a hypothetical firm marginally above the upper quartile would be given an input price inflation allowance (consistent with our framework), whereas a firm marginally below would not be given such an allowance. **In simple terms, this might mean that firms with very similar levels of actual efficiency in retail, could have very different levels of 'efficiency challenge' and therefore 'allowed costs' set by the regulator over time.**

For example, a hypothetical firm may face input price inflation of 2% per annum, and be reasonably expected to make efficiency savings of 1% per annum. An approach consistent with our framework would allow costs to *increase by 1% i.e. the net of the two effects (2%-1%)*. However, under an upper quartile rule consistent with Ofwat's PR14 approach, if the firm was not in the upper quartile of efficiency

²² For example, a company that has higher average levels of deprivation in its supply area may, efficiently, have a higher proportion of HH retail costs that are doubtful debt.

the firm's allowed costs would *decrease by 1%* per annum i.e. there would be no allowance for input price inflation, despite the economic 'facts' being no different to the first scenario.

The effect of such a rule is equivalent to setting a more severe efficiency challenge for firms not in the upper quartile of efficiency, providing the company faces positive input price inflation. This poses a number of problems:

- » Firstly, without taking account of input price inflation it is not possible to determine whether the allowed costs are set at the 'correct' level. That is, if not allowing for input price inflation is used as a mechanism to increase the efficiency challenge for less efficient firms, the 'overall efficiency challenge' (stated efficiency challenge plus the effect of input price inflation) cannot be known – and subsequently, there is a risk that the 'overall efficiency challenge' is not set at the 'correct' level. Furthermore, if companies face different levels of input price inflation, firms outside the upper quartile of efficiency will face varying 'overall efficiency challenges', without economic rationale.
- » Secondly, using the upper quartile rule, in effect, to set more severe efficiency challenges is not transparent. It complicates any analysis of what the 'correct' efficiency challenge is, and increases regulatory burden.
- » Thirdly, it can lead to inconsistency in the level of allowed costs for different companies.

To illustrate the above point, we extend the worked example used above. Suppose that **Company A:**

- has allowed costs of 100 at the beginning of the price control period;
- is in the upper quartile of efficiency;
- is expected to experience input price inflation of 2% per annum; and
- is set an explicit efficiency challenge of 1% per annum.

As the company is in the upper quartile of efficiency it is given an input price inflation allowance, and allowed costs *increase by 1%* each year of the price control.

Further suppose that **Company B:**

- has allowed costs of 105 at the beginning of the price control period;
- is not in the upper quartile of efficiency;
- is expected to experience input price inflation of 2% per annum; and
- is set an explicit efficiency challenge of 1% per annum.

As Company B is not in the upper quartile of efficiency, it is not given an input price inflation allowance, and allowed costs *decrease by 1%* each year of the price control.

In this scenario, Company B will be given allowed costs, in the latter part of the price control, that are at a lower level than Company A's. This is despite it being less efficient in the first instance. This result is illustrated in the following figure.

Figure 15. Example of more severe 'overall efficiency challenge'



Source: Economic Insight

In effect, Company B is given a more severe 'overall efficiency challenge', but it is so severe that it is expected to achieve a lower level of costs (in the latter part of the price control) than the company that is more efficient at the beginning of the price control period. This is inconsistent because if Company B can be expected to achieve a certain level of costs, then another company that is, all else equal, more efficient at the beginning of the period, could also be reasonably expected to achieve the same level of costs.

A more transparent approach, which is consistent with competitive market outcomes, is to allow for the net of input price inflation and an efficiency challenge, for all companies. The net effect for companies towards the lower end of the efficiency scale will likely be negative, and

for those at, or close to, the frontier it will likely be positive.²³

3.3. Choice of comparator used for setting the allowed margin

The evidence used to determine the allowed margin does not appear **consistent** with the treatment of input price inflation in setting allowed revenues. As a result, it could have underestimated the reasonable return.

The allowed EBIT margin for HH retail was set at 1% based on regulatory precedent. Each of the regulatory determinations, as illustrated in the following table, included both an allowance for inflation and set efficiency targets (i.e. inflation risk was borne by the customer).

Figure 16. Allowed costs in determinations used to set allowed return

Determination	Inflation allowed?	Efficiency targets?
Commission for Energy Regulation (2012)	Yes	Yes
NIAUR (2011)	Yes	Yes
Commission for Energy Regulation (2010)	Yes	Yes
Utility Regulator Northern Ireland (2009)	Yes	Yes
WICS (2005)	Yes (RPI-X)	Yes
Ofgem / Offer (1998)	Yes (RPI-X)	Yes
Monopolies and Mergers Commission / Scottish Hydro (1995)	Yes	Yes

Source: Economic Insight review of regulatory determinations

Therefore, inconsistently, the allowed return was set on the basis of determinations that

allowed for inflation, whereas allowed revenues were set without an automatic link to inflation.

This may have underestimated the revenues that a company would have to generate to earn a reasonable return, for two reasons:

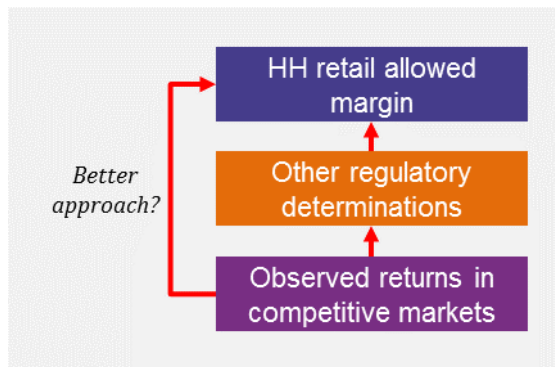
- » Firstly, in a scenario where *no allowance* is made for input price inflation in allowed operating costs, the regulated margin could be set to compensate investors for any expected inflation. However, the margin set at PR14 was based on comparators that did not include a return for input price inflation. The comparators that were used allowed for input price inflation within the allowed costs, rather than in the allowed margin. As such, the comparator margins would have been too low for the PR14 approach.
- » Secondly, determinations based on approaches that index revenues will also underestimate the reasonable return. Indexation reduces the risk that the company faces, and lowers the expected return that investors will require. Therefore, basing the allowed return on determinations that place inflation risk with customers will underestimate the reasonable return based on the PR14 approach.

We note, however, that this does not necessarily mean that the margin was set 'too low' at PR14, as the regulator took into consideration a range of factors. Rather, that there was an internal inconsistency in the PR14 approach.

Further to the above, consideration should also be given to whether the allowed margin should be set based on previous regulatory determinations, or based on observed returns in competitive markets. Previous determinations may themselves be set based on observed returns in competitive markets, but a better approach may be for Ofwat to set the allowed margin based directly on observed returns in competitive markets, as illustrated in the following figure.

²³ Ultimately, the sign of the net of input price inflation and an efficiency challenge will depend on the magnitude of both components. For example, if the frontier company is

expected to make 0.5% per annum frontier shift gain, and face 2% input price inflation, the net will be positive (1.5%).

Figure 17. Source of comparators

Source: Economic Insight

Setting HH retail allowed margins based directly on observed margins in competitive markets may allow the evidence to be more tailored to the specific market, and potentially be a more transparent approach. On the other hand, relying on previous determinations may provide consistency.

Following the aspects of the PR14 approach discussed above, the next section outlines various options for how input price inflation could be dealt with at PR19, along with a suggested approach.



4. An approach consistent with our framework

This section sets out the criteria of an approach that would be consistent with our framework, and recommends an approach for PR19. In addition, we detail the evidence that companies could be expected to provide.

In this section we:

- (i) Identify different types of inflation measures and mechanisms that could be used to provide an allowance for input price inflation at PR19.
- (ii) Recommend, in light of the benefits and drawbacks of each approach, HH retail costs are indexed to CPI/CPIH at PR19.
- (iii) Discuss what information may be required from companies in making claims for input price inflation.

In this section we set out features of an approach that are consistent with our framework, and make a recommendation for PR19. In turn, we discuss:

- features of an approach that are consistent with our framework;
- criteria to assess potential PR19 approaches;
- potential PR19 approaches; and
- our recommended approach.

Furthermore, at the end of this section we describe what evidence companies may be expected to present to Ofwat to support any allowance for input price inflation at PR19.

4.1. Features of an approach that are consistent with our framework

We suggest any approach to input price inflation should have the following features.

- » **An explicit allowance for input price inflation.** To calculate allowed costs any approach should make an allowance for input price inflation. As we have shown, input price inflation has affected companies in the past and is expected to do so in the future. The mechanism should, however, allow for the case of zero or even negative input price inflation.
- » **A holistic approach to input price inflation and efficiency challenges.** Any approach should jointly consider both input price inflation and efficiency challenges – allowing for the net of these two components. For companies that are less efficient, the net of these two factors is likely to be negative. The approach may take into account changes in the mix of inputs as a result of varying rates of inflation for the different inputs.
- » **A margin that is reflective of the risks faced.** The margin should reflect the risks that the company faces. If inflation risk is faced by the company (e.g. because of an ex-ante allowance) the return should include a premium for inflation risk. If inflation risk is faced by customers (e.g. because of indexation

or ex-post adjustments) the return should not include a premium for inflation risk.

All of these features are designed to allow a company to earn a reasonable return, be transparent and consistent, and align with competitive market outcomes – and therefore be consistent with Ofwat's duties and principles.

4.2. Criteria to assess potential PR19 approaches

In practice, there are multiple approaches that are consistent with our framework and the features set out in the section above. Allowances for input price inflation can be either ex-ante (e.g. setting a specific allowance, in monetary terms, at the beginning of a control period) or ex-post (e.g. indexation or a 'true-up' mechanism). We have identified criteria to assess these different approaches by.

Ofgem developed five criteria when considering alternative approaches to an ex-ante allowance,²⁴ which are summarised in the table overleaf. We also consider them to be fit for our purpose.

These criteria demonstrate that the choice of mechanism can represent a balance. For example, an approach that only exposes a company to risks that are within its control may be more complex and resource intensive to implement. Further to the Ofgem criteria, we suggest that consideration could also be given to the following:

- » **Protecting customers.** Any approach should ensure that customers do not face excessive costs or undue risk. Although none of the approaches we identify appear to pose significant risks to customers.
- » **Fairness.** Ensuring that there are 'fair' outcomes, although this can be particularly subjective. All the approaches we suggest we would judge as 'fair', although some could be considered more 'fair' than others.

²⁴ 'Consultation on the treatment of real price effects for RIIO-ED1 slow-track electricity distribution network operators', letter from Ofgem, (August 2014).

Figure 18. Ofgem's criteria for assessing approaches to treating input price inflation

Criteria	Description
Exposure to risk	Inflation risk can be transferred between customers and the companies. The degree of risk that the company faces will affect the relevant reasonable rate of return for it.
Incentives	Related to the above, exposing companies to some inflation risk may incentivise them to better manage their costs. That is, for example, if companies cannot recover increasing wage costs through increasing revenue, they might negotiate harder to limit wage increases.
Balance of charges between current and future customers	For example, a true-up mechanism in the next price control would place additional charges on future customers that relate to current costs. Whereas, in a competitive market current customers will face the cost of providing the current service.
Complexity and unintended consequences	Complexity can hinder transparency and potentially result in unintended consequences.
Resource costs	Relatedly, more complex approaches can be more resource intensive, and place greater burden on both the regulator and regulated companies.

» **Accuracy.** Customers and companies should face costs that are accurate. This is closely related to the concept of risk, as, for example, an increase in potential forecast error ('inaccuracy') will increase the risk premium component of the allowed margin. All approaches are designed to be accurate in expectation.

4.3. Potential PR19 approaches

In the sections below we present: (i) an overarching model for setting HH retail revenues that is consistent with our framework; (ii) a discussion of the efficient mix of inputs; (iii) types of inflation measure; and (vi) three general approaches to accounting for input price inflation within the overarching model.

4.3.1. Overarching model

To be consistent with our framework, we suggest that the PR19 approach should set HH retail costs based on the net of:

- input price inflation;
- a 'catch up' efficiency challenge; and
- frontier shift.

An allowed margin will be added to allowed costs to give allowed revenue.

Given the purpose of this paper we focus on the treatment of input price inflation, but due to its interrelation with other aspects, we consider the whole model for setting allowed revenues. Therefore, building on the PR14 approach, we suggest allowed revenues should be set according to the following process:

- » Baseline costs established (using whatever method Ofwat ultimately deems to be appropriate, whether that be an assessment of CTS, or by econometric benchmarking).
- » The net of input price inflation, an efficiency challenge and frontier shift applied.
- » Application of a net EBIT margin to calculate total allowed revenues.

As discussed at the end of section 4.4, the timing of the different aspects of this process will be affected by the choice of approach.

The key difference between this, and the PR14 approach, is that an allowance for input price inflation, along with frontier shift, is specifically built in. Adjustments, for example for pension deficit repair costs, could be made in addition, as at PR14.

A range of approaches could be used to determine the relative efficiency of a company, including unit cost analysis (e.g. the ACTS

approach used at PR14), or econometric benchmarking type methods (we do not comment on the relative merits of the different potential approaches).

The allowed return should be set in relation to the level of risk that is faced by the companies. That is, if inflation risk is faced by the company the allowed return should reflect an inflation risk premium.

4.3.2. Efficient mix of inputs

Within the above overarching model, consideration should be given to the relationship between input price inflation and efficiency. As set out in section 2.3.3, the efficient mix of inputs may change as a result of varying levels of input price inflation.

There are two general scenarios what may apply to the HH retail sector:

- » There may not be substitutes for the various inputs. For example, a certain amount of staff may be necessary, and no alternative inputs are substitutes. In such a case, efficiency and input price inflation could be treated entirely separately.
- » Alternatively, different inputs may be substitutes for each other. Automated phone systems could be used as a substitute for call centre staff, for example. The efficient mix of inputs will then depend on the relative price of automated phone systems and call centre staff. In such a case, efficiency and input price inflation may have to be taken into account jointly.

If, however, inputs were substitutes but the current and future expected cost differences between them were so large, it could be that efficiency and input price inflation could be treated independently.

The quality of the HH retail services is also of relevance to this discussion. For example, whilst the lowest cost approach to delivering call centre services may be to automate the whole system, customers may be willing to pay for the higher quality service of being able to speak to a human. Therefore, any judgements about the efficient input mix will have to take into account the quality of the service being delivered.

4.3.3. Choice of inflation measure

The choice of inflation measure can, however, negate the need to make a judgement about the efficient mix of inputs. General price indices reflect both input price inflation and efficiency improvements. For example, CPI/CPIH measures the change in price of a basket of goods and each producer of the goods will take into account their own input price inflation, optimise their mix of inputs and pass on any efficiency frontier shifts. Therefore, an overall measure of inflation will represent both input price inflation and frontier shift.

The 'best' inflation measure to use in a regulatory context would be one that represents the outputs of the sector of focus. This will reflect both the efficient level of input price inflation and efficiency gains. However, in practice, such measures of inflation relevant to regulated markets are not available.

We therefore see three broad types of inflation measure that could be used:

- » **Aggregate measures**, such as CPI or CPIH, that measure consumer price inflation. These measures will take account of input price inflation, changes in the efficient mix of inputs and frontier shift. They are used extensively in a variety of contexts, are seen as reliable, and data is available on a monthly basis. The limitation of such measures in the context of HH retail is that they may not reflect all of the inputs being used i.e. predominantly labour.
- » **Intermediate measures**. Other regulated sectors use measures that reflect outputs aligned with the sector. For example, the ORR has previously used the infrastructure output price index (IOPI). This type of measure will also reflect input price inflation, changes in the efficient mix of inputs, and frontier shift. The limitation of this approach is also the lack of alignment to the HH retail sector.
- » **Bespoke composite measure**. To reflect the specific input mix of HH retail, a bespoke composite measure could be used, as in section 2.5.2. Specifically, a weighted average of the inflation rate of individual cost lines (e.g. labour, IT, postage, etc.). The benefit of this approach is that it is reflective of the input mix (and could be tailored for each

company), but the drawback is that it does not reflect changes in the efficient mix of inputs or frontier shift. Using such an approach would require a judgement about the efficient mix of inputs. Furthermore, this option may be more resource intensive.

Each of these types of cost measure could be used with the approaches to accounting for input price inflation discussed in the next section.

In particular, we note that Ofwat is planning to use either CPI or CPIH (a consumer price index that also includes owner occupiers' housing costs) to index wholesale revenues at PR19.²⁵

4.3.4. Accounting for input price inflation

To incorporate input price inflation (and potentially efficiency changes as discussed above), we set out three possible approaches. All of them share the benefit of being consistent with our framework, in that they specifically allow for input price inflation.

For each of the approaches, we discuss the main benefits and drawbacks in reference to the criteria set out in section 4.2. Instead of detailing how each approach performs in relation to each criterion, for succinctness we identify only what we see as the main benefits and drawbacks.

Ex-ante allowance

An ex-ante allowance would work in much the same way as the adjustments for input price inflation at PR14 did. That is, a monetary allowance would be made at the start of the price control based on forecast levels of input price inflation.

Figure 19. Ex-ante allowance – benefits and drawbacks

Benefits
<ul style="list-style-type: none"> » Companies will have the <i>incentive</i> to limit input price inflation as they will face inflation risk i.e. they won't be compensated if inflation is higher than forecast, and will benefit if it is lower than forecast. » <i>Current customers</i> will pay for the expected costs of the services delivered to them. They will not face any inflation <i>risk</i>.
Drawbacks
<ul style="list-style-type: none"> » The allowed return will have to reflect the inflation <i>risk</i> that the companies bear. » Relatedly, the inflation allowance may not be <i>accurate</i>, and companies could recover more or less revenue than could be seen as <i>'fair'</i>.

²⁵ 'Water 2020: Regulatory framework for wholesale markets and the 2019 price review Appendix 1 Securing legitimacy

of future price controls - further evidence and analysis', Ofwat, (May 2016).

Indexation

Allowed costs would be indexed in each year. Due to the availability of data, allowed costs in period t would have to reflect the level of input price inflation in the previous period, $t-1$.

Figure 20. Indexation – benefits and drawbacks

Benefits
<ul style="list-style-type: none"> » Companies will have the incentive to ‘beat’ the index. » Companies will not face inflation risk as allowed costs will be indexed to outturn inflation. The allowed return will therefore not have to include an inflation risk premium. » Current customers will pay for the actual costs of the services delivered to them. » Given an accurate index, companies will only recover the efficient costs they face – which could be seen as a ‘fair’ outcome.
Drawbacks
<ul style="list-style-type: none"> » Annual updates may increase complexity of the price control and require greater resource from both the regulator and companies. » Customers will face inflation risk (although this is normal for competitive markets, and true for the wholesale element of bills).

True-up mechanism

Under a true-up mechanism ex-post adjustments would be made to allowed revenue to take account of outturn input price inflation. That is, if inflation was above that allowed for ex-ante, allowed revenue would be increased in the next period to ensure allowed for inflation was equal to actual inflation.

A true-up mechanism could, for example, be implemented at the beginning of each price control to compensate for any misalignment between allowed inflation and outturn inflation over the previous price control.

Figure 21. True-up mechanism – benefits and drawbacks

Benefits
<ul style="list-style-type: none"> » Companies will not face inflation risk and the cost of capital will not have to include an inflation risk premium. » There may be a lower resource requirement compared to the indexation approach as adjustments are made less often.
Drawbacks
<ul style="list-style-type: none"> » Companies may face a lower incentive to control costs compared with the other two approaches as it may be difficult to determine what was outside of management control. » If the true-up is only applied in line with price control periods customers in period $t+1$ will pay part of the cost of the services delivered in period t. That is, current customers will not pay specifically for the services delivered to them. » Making adjustments across price controls may add complexity.

4.4. Our recommended approach

On balance, **we recommend that HH retail costs should be indexed to CPI/CPIH**.²⁶ This is for the following reasons:

- » CPI/CPIH is regarded as a robust reflection of general inflation in the economy and incorporates both changes in the efficient mix of inputs and frontier shift. For example, any benefits of substituting local labour with other national or international labour would be reflected, in part, in the index. A judgement as to what the efficient mix of inputs is not required.
- » Doubtful debt is a major part of HH retail costs and the ‘price’ of which reflects overall bill levels. About 90% of bills will be indexed to CPI/CPIH, means that it should be a

²⁶ The choice of CPI or CPIH would reflect Ofwat’s choice between the two measures for wholesale controls at PR19.

relatively good proxy for doubtful debt inflation.

- » There is a large degree of uncertainty in inflation forecasts. Any ex-ante allowance would inevitably be 'wrong'.
- » Relatedly, if an ex-ante allowance was given, companies would face a large degree of inflation risk, which would have to be compensated through the allowed margin. Using indexation reduces the inflation risk, which avoids having to calculate an inflation risk premium (for which comparators may be hard to identify).
- » Companies will have the incentive to 'beat' the index and minimise input price inflation. This incentive may be less if a bespoke measure was used on an ex-post basis through a true-up mechanism.
- » CPI/CPIH indexation is consistent with the wholesale price controls and therefore should not be overly resource intensive for Ofwat or the companies. A true-up mechanism, on the other hand, may add unnecessary complexity.
- » Customers will pay for the cost of the services they receive. There will be no generational issues.

We also considered a more bespoke measure of inflation, and see this as a potential alternative to CPI/CPIH. The advantage of this is that it could potentially be more reflective of the input mix of HH retail. The drawback, however, is that a suitable measure may not be readily available, and constructing a bespoke measure would involve making subjective judgements about what the efficient inputs, and the efficient mix of inputs are, in advance.

In practice, our proposed approach has a number of timing implications, as nominal allowed revenues can only be set for the coming year (real allowances for the price control period can be set at the final determination stage). In particular:

- » At the final determination stage real cost allowances can be determined. This would include an explicit efficiency challenge being applied to current costs. Frontier shift would

not be included in the explicit efficiency challenge, as this is included in the CPI/CPIH index.

- » Any special factor cost claims would also be addressed and set at the final determination stage.
- » In advance of each year of the price control period, based on outturn inflation the nominal allowed costs could be set for the coming year. This would be the previous year's level of allowed costs 'indexed up'.
- » The allowed margin would be applied the allowed costs in each year to give allowed revenue. The allowed margin would be set at the final determination stage.

4.5. Evidence required from companies

Under our recommended approach, companies would not need to supply evidence in relation to input price inflation. However, recognising that this is only a suggested approach, in this section we outline what information may be required under an alternative approach.

In particular, we set out what evidence was used to support successful input price inflation claims at PR14. Ofwat published a copy of the consultancy report (written by Economic Insight) that Yorkshire Water used to successfully claim an allowance for input price inflation.²⁷ The purpose of sharing the report was to support other companies in their representations on the draft determinations. We therefore use this as the basis of what evidence was required at PR14.

The quantitative evidence consisted of the following:

- » Forecasts of input price inflation for individual cost categories (e.g. wages, IT, postage etc.). Forecasts were primarily based on the historical relationship between: (i) ONS inflation series that aligned with the cost line; and (ii) RPI inflation. Significant focus was placed on identifying relevant occupations for which wage inflation data was available. The weighted average of the

²⁷ 'Retail HH input price pressure and benchmarking analysis', Economic Insight, (2014).

different forecast rates of inflation provided the 'gross' input price inflation that the company would face.

- » Within industry benchmarking was conducted to identify an appropriate efficiency catch-up rate. This consisted of aggregate unit cost benchmarking, line item unit cost benchmarking, and econometric analysis.
- » Cross-industry benchmarking was also used to support the estimate of the reasonable efficiency catch-up rate. In particular, we compared Yorkshire to mobile virtual network operators. However, we suggest the comparability of any cross-industry benchmarks should be closely considered if used in the future.
- » Frontier shift was estimated based on total factor productivity estimates of the UK market economy over a historical period of 15 years.

Further to the above, qualitative evidence was supplied to demonstrate the management's attempts to control, as best it could, inflationary pressures. This included information in relation to:

- salary benchmarking;
- choice of call centre location;
- debt management processes;
- call centre efficiency monitoring;
- manpower modelling and forecasting;
- frequent retendering of contracts;
- in-house mail sorting; and
- use of debt collection agencies.

It is our understanding that this qualitative evidence was particularly important in demonstrating to Ofwat that input price inflation was beyond management control, and was therefore an unavoidable cost that the company should be compensated for.

If an alternative approach is adopted at PR19, i.e. not the PR14 approach or our recommended approach, elements of the above evidence may be required.

4.6. Summary of potential PR19 models

As is set out in the sections above, we suggest that, to be consistent Ofwat's primary duties and stated objectives, an explicit allowance for input price inflation should be made at PR19 for retail HH. Critical aspects of an approach consist of:

- the choice of inflation measure, which represents a trade-off between how reflective it is of the input mix and whether it incorporates improvements in efficiency; and
- the mechanism to allow for input price inflation i.e. an ex-ante allowance, indexation, or a true-up mechanism.

There are benefits and drawbacks of any approach. On balance, we are of the view that indexation to CPI/CPIH would be the best approach for PR19.

In light of the potential introduction of competition to HH retail, this approach remains relevant. That is, we expect some form of price control for HH retail during AMP7. If a default tariff approach is adopted (either at the beginning of the period or part way through), there is still a question as to how input price inflation should be treated. In such a case, it would be important to ensure that the margin is sufficient to promote competition, and therefore properly accounting for input price inflation is critical. Indeed, if there is not sufficient margin available the prospect of a competitive HH retail market is put at risk. Consistent with the implementation of a 'full' price control, we suggest that costs could be indexed to CPI/CPIH to properly account for input price inflation in a default tariff approach.

Depending on the form of control, a range of information may be required at PR19 to successfully gain an allowance for input price inflation. Qualitative information may be particularly useful in demonstrating efficient control of costs.



5. Appendix

This appendix sets out, in turn:

- Ofwat’s stance on input price inflation at PR14;
- Ofwat’s PR14 approach to the HH retail price control; and
- Other regulator’s treatment of input price inflation.

5.1. Ofwat’s stance on input price inflation at PR14

Ofwat’s consultation paper on the PR14 approach²⁸ sets out its rationale for not allowing for input price inflation in HH retail. It first notes that in previous controls, it has addressed input price inflation by allowing companies to increase prices automatically every year by the change in RPI, with an adjustment for expected efficiency (the K factor). This reflected its view that RPI was a good proxy for the input price inflation faced by a vertically-integrated water company, taking account of the significant proportion of capital costs and the need to ensure recovery of the costs of long-lived assets in future time periods.

However, retail services differ to wholesale services in that a different input mix is required, consisting of a much lower proportion of capital costs. Assets for retail services also have much shorter lives. As a result of these differences, Ofwat did not think it appropriate to index costs in HH retail – and likened this to the reality of most retail businesses across the economy.

Ofwat’s expectation was that companies would manage their costs by seeking lower prices and optimising their mix of inputs.

Ofwat suggested three approaches to deal with input price inflation, which it sought views on:

- no explicit allowance for input price inflation, based on an assumption that companies can control and manage all the relevant risks;
- to ensure that the non-household retail control over the period 2015-20 has sufficient net margin to cover the risks of

unexpected, uncontrollable changes in input prices; and

- a pre-set measure that reflects the future changes in relevant efficient costs of a retailer providing non-household services.

Contrary to the responses to the consultation, which mostly suggested indexing costs to RPI,²⁹ Ofwat decided that there would be no automatic indexation for inflation in HH retail.

5.2. Ofwat’s PR14 approach to the HH retail price control

PR14 was the first price review in which separate price controls were set for HH retail services. Ofwat’s approach consisted of setting overall allowed revenues based on an average cost to serve methodology. In particular, the approach consisted of the following four steps:

- » Calculation of *company* average cost to serve (CTS) and *industry* average cost to serve (ACTS).
- » Application of an efficiency challenge, based on a glide path to the ACTS.
- » Adjustments, including for price inflation.
- » Application of a net EBIT margin to calculate total allowed revenues.

We discuss each of these steps below.

5.2.1. Calculation of CTS and ACTS

Ofwat calculated an industry ACTS by taking an unweighted average of companies’ actual CTS using 2013/14 data (the latest available data at the time). The CTS calculations contained two industry-wide adjustments:

- metering costs were excluded, due to varying penetration levels across companies and a material influence on costs; and
- the denominator in the calculation, ‘unique customers’, included an adjustment factor of 1.3 for dual service customers, to reflect economies of scope.

The additional cost to serve metered customers was calculated separately, based on a company’s

²⁸ ‘Setting price controls for 2015-2020 – framework and approach. A consultation’, Ofwat, January (2013).

²⁹ ‘Setting price controls for 2015-2020 – final methodology and expectations for companies’ business plans’, Ofwat, (July 2013).

metering costs - and number of unique customers.

5.2.2. Efficiency challenge based on glide path

Having identified companies' relative CTS position, Ofwat applied an efficiency challenge based on its ACTS measure. Specifically:

- for companies whose actual CTS was *below* the ACTS in any given year, they were only allowed their CTS;
- for companies whose actual CTS was *above* ACTS in the years 2015/16, 2016/17 or 2017/18, they were allowed costs consistent with a three-year glide path down to the ACTS; and
- for 2018/19 all companies were only allowed the *lower* of their forecast CTS, or the ACTS.

5.2.3. Adjustments, including for price inflation

Companies could seek additional adjustments if they were able to demonstrate with sufficient and convincing evidence that the costs were:

1. Material to the company (greater than 2.25% of household retail opex, plus depreciation over 2015-20).
2. Driven by factors beyond efficient management control (i.e. having taken all the possible steps to control those costs).
3. Impacting the company in a materially different way to other companies.

In particular, with regard to price inflation, Ofwat said “*we do not consider that automatic indexation is appropriate for the less asset and capital-intensive retail businesses. This is more consistent with the arrangements that would be expected elsewhere in the economy where retailers do not see prices automatically indexed to RPI. We have required companies to make an evidence-based case to allow additional revenue for future input price pressures in 2014-15 and beyond...*”³⁰ Furthermore, Ofwat expected

efficiency to be demonstrated compared to benchmarks ***beyond the water sector***.

In addition to the three criteria set out above, Ofwat also introduced a condition (applied at the final determination stage) that price inflation claims would only be allowed if the company was in the upper quartile of HH retail efficiency, based on its own ACTS calculations.

These four hurdles to being allowed an input price inflation claim are illustrated in the below extract from Yorkshire Water's final determination.

Figure 22. PR14 criteria for price inflation claims³¹

Adjustment	Value (£m over 2015-20)	Materiality ²	Our final assessment ¹		
			Beyond efficient management control	Impact company in materially different way	Value of adjustment appropriate
Input price pressure	18.7	Pass	Pass	Efficiency benchmarking evidence: Pass	Pass
				Upper quartile: Pass	

5.2.4. Application of a net EBIT margin

Following the above steps, total allowed revenue was then calculated by applying a net EBIT margin to total retail turnover (i.e. expressed as a % on total revenues, including wholesale charges).

Ofwat's assessment of the appropriate EBIT margin was informed by a report by PwC³², which provided a range of suitable values. In its Risk and Reward Guidance, Ofwat ultimately decided that for HH retail, a net EBIT margin of 1.0% was appropriate. In reaching this view, Ofwat stated that “*our assessment of appropriate household retail net margins relies primarily on benchmarking regulatory determinations. The regulatory benchmarks provide a better guide to margins, as they relate to determinations with little or no competition.*”³³

³⁰ ‘Final price control determination notice: policy chapter A5 – household retail costs and revenues’, Ofwat, (December 2014).

³¹ ‘Final price control determination notice: company-specific appendix – Yorkshire Water’, Ofwat, (December 2014), table A4.4. The final column relates to whether Ofwat judged the amount claimed to be appropriate.

³² ‘Water retail net margins a report prepared for Ofwat’, PwC, (February 2014).

³³ ‘Setting price controls for 2015-20 – risk and reward guidance’, Ofwat, (January 2014).

5.3. Other regulator's treatment of input price inflation

5.3.1. ORR

The ORR is the economic regulator for Britain's railways and is responsible for setting the levels of access charges paid by train operators to Network Rail for use of its infrastructure. Below we detail its approach to input price inflation at the last two price controls it conducted.

PR08 / control period 4 (CP4) – 2009-14³⁴

In CP4 Network Rail's access charges and the network grant payments (which governments in England & Wales and Scotland will pay to Network Rail in lieu of access charges) were rebased by the retail price index (RPI) each year. This was to protect the company against general inflation risk.

The revenue requirement for Network Rail in relation to operating, maintenance and renewals (OM&R) expenditure was set as the net of:

- » Catch-up efficiency: the efficiency improvement that Network Rail was expected to make in order to close the gap between itself and benchmarked companies.
- » Frontier-shift efficiency: the continual improvement in efficiency (above that reflected in RPI) that would be expected from even the best performing companies.
- » Input prices: the impact of expected input price inflation on Network Rail's cost base (above that reflected in RPI).

The frontier shift and input price measures were relative to RPI because:

- RPI was used to rebase annually Network Rail's access charges and revenue requirement; and
- RPI already reflects general, economy-wide productivity growth and input price inflation.

The ORR considered the treatment of input prices in the context of the overall package, since Network Rail would benefit from a range of protections against unforeseen cost or revenue

shocks in the CP4 price control framework, which could be caused or exacerbated by input price inflation. These included the risk buffer and the re-opener provisions.

The regulator had some concerns that the analysis for Network Rail identified that both a substantial part of the historic potential input price inflation experienced and the projected input price forecast for CP4 was due to labour cost inflation. There was no explanation as to how much of the increases are due to an ability by management to moderate wage growth (e.g. compared to benchmarks) and how much was due to genuine movements in the market.

In general, the ORR let Network Rail bear the risk of inflation in input prices in CP4 (above that reflected in RPI) because it was at least partly controllable by the company, and the regulatory framework provided various protections to deal with cost shocks. However, due in part to the significant variance in inflation forecasts, renewals were indexed.

Four options for the index were considered:

- » Using Network Rail's consultant's model.
- » Developing a simple index that would combine a limited number of indicators or indices for key categories of cost.
- » Using one of the two independent and publicly available indices of broad price trends in the construction/infrastructure sector. The two indices were BERR's construction output price index (COPI) and the infrastructure output price index (IOPI), which is a subset of the COPI.
- » Adjust for Network Rail's actual incurred input prices.

The ORR decided to use IOPI for both simplicity and the fact that it broadly reflected Network Rail's mix of costs.

An annual calculation was made in order to determine the amount of renewals expenditure to be added or subtracted to the regulatory asset base (RAB) as a result of outturn inflation. IOPI (like COPI) combines both productivity and

³⁴ Based on 'Periodic review 2008, Determination of Network Rail's outputs and funding for 2009-14', ORR, (October 2008).

input prices, whereby any element of input price inflation is reduced by annual productivity gains. An adjustment for this was therefore made to give a more valid measure of input prices. The mechanism was also symmetric, recognising both the upside and downside, for input price inflation increases and decreases.

In particular, the adjustment was equal to the difference between IOPI (expressed in annual percentage change), less actual RPI, plus the determination input price assumption, less frontier-shift assumptions. Or:

Renewals price adjustment = IOPI – (RPI + PR08 input price assumption – frontier shift assumption)

An adjustment was only made if a final index value was greater or less than the input price assumption in the determination by 1%.

PR13 / control period 5 (CP5) – 2014-19³⁵

The ORR's approach to input price inflation changed in PR13. Whilst allowed revenue was indexed to RPI, no further allowance was given for input price inflation (it was essentially assumed to be zero). Furthermore, an efficiency challenge of 0.2% was added to account for previous underperformance in control input price increases.

The ORR's approach reflected the view that: (i) general inflation is not efficiently controllable by Network Rail; and (ii) that the more specific input price changes are efficiently controllable by the company and are taken into account, ex-ante, in the expenditure assessment.

Allowed revenues continue to be indexed to general inflation.

In relation to specific input price inflation, the ORR found that during CP4, the actual levels of input price inflation that Network Rail experienced were likely to have been significantly lower than the assumptions that we used to adjust the PR08 efficiency assumptions. Network Rail therefore financially benefited from these variations.

Given the following considerations, the ORR decided to make no explicit adjustments to its efficiency assumptions for input price inflation:

- » Network Rail has assumed a low level of input price inflation over CP5 on renewals and no input price inflation over CP5 on support, operations and maintenance expenditure.
- » The uncertainty in forecasting and measuring input price inflation.
- » The approach to funding risk, i.e. the financial framework did not provide Network Rail with upfront funding for risks.

Furthermore, the ORR applied a 0.2% per annum increase to its efficiency assumptions across Network Rail's CP5 support, operations, maintenance, renewals and enhancement costs as a result of consultant report, commissioned by the ORR, that found that Network Rail had a 'performance gap' of approximately 25% in its management of inflation compared to the industry average.

5.3.2. Ofgem

In 2010 Ofgem completed RPI-X@20, a detailed review of energy network regulation. The result was a move away from the more 'classical' RPI-X framework that it had used in the past to the specially designed RIIO (revenue = incentives + innovation + outputs) model.

The RIIO handbook³⁶ sets out that price controls will be indexed to provide investors in network companies with protection against general price inflation which is outside their control. Expenditure in the price control will be adjusted for real price effects (RPEs) which reflect forecasted increases (or decreases) in input prices relative to RPI (although Ofgem recognised there may be a case to moving to CPI in the future).

The final approach taken to input price inflation in the different RIIO price controls is described below.

³⁵ Based on 'Periodic review 2013: Final determination of Network Rail's outputs and funding for 2014-19', ORR, (October 2013).

³⁶ 'Handbook for implementing the RIIO model', Ofgem, (October 2010).

RIIO-T1 and RIIO-GD1³⁷

Whilst allowed revenues are indexed to RPI, it was expected that the price of several inputs, most notably labour, would not change in line with RPI inflation. To account for this differential Ofgem provided an ex-ante allowance based on forecasted differences between economy-wide inflation, as measured by the RPI, and input price inflation. The RPE assumptions take account of the inputs that each sector purchases, i.e. RPE assumptions vary between the network sectors.

RPEs were calculated based on three steps:

- » Firstly, measures of input price trends relative to the RPI for labour, materials and a range of other costs relevant to the inputs purchased by the network companies were constructed.
- » Secondly, these input price trends were then weighted together based on the assumed proportion of labour, materials, etc. in the cost areas of opex, capex, repex and totex.
- » Thirdly, monetary allowances were calculated by multiplying the above measure by the network companies' expenditure allowances.

The general approach to establishing a forecast of input prices was to draw on the long-term (c. 20 years) real trend of relevant indices. This was predicated on the assumption that there is a long-term relationship between input prices and RPI, and input price will revert to the historical long run real average.

To derive opex, capex and repex RPE indices for the gas distribution networks (GDNs) Ofgem assumed a notional structure, i.e. the same weightings of labour, materials and other inputs for each GDN. This was based on an unweighted average of structures in companies' business plans.

For the two transmission companies, structures were assumed in line with what the network companies' stated in their business plans. This

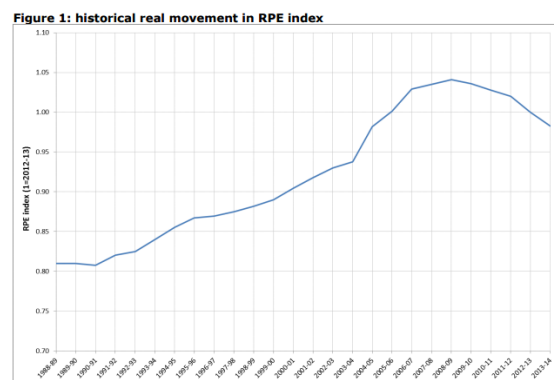
was due to the lack of comparators on which to base a notional structure.

RIIO-ED1

In August 2014 Ofgem issued a consultation on the treatment of real price effects for RIIO-ED1 slow-track electricity distribution network operators (DNOs).³⁸ The consultation was a result of Ofgem recognising that there may be increased uncertainty in a forecast of RPEs, which subsequently cast doubt over the use of a fixed ex-ante forecast for an eight-year control.

As shown in the following figure, over the recent past the RPE index had both risen and then fallen. Ofgem therefore thought that it may be difficult to set an eight-year forecast with confidence that it would not provide undue gains or losses to DNOs or customers.

Figure 23. Ofgem's RPE index for DNOs



Source: Ofgem

Ofgem developed a set of criteria against which to assess the need for a different mechanism for RPEs:

- » Exposure to risk – consideration should be given to whether the mechanism protects both DNOs and customers against risk. In certain circumstances if a DNO's exposure to risk reduces, then the cost of capital it faces to finance its activities can also fall.
- » Impact on incentives – the incentive on DNOs to manage costs and invest efficiently should not be weakened.

³⁷ Based on 'RIIO-T1/GD1: Real price effects and ongoing efficiency appendix', Ofgem, (December 2012) and 'RIIO-T1/GD1: Initial Proposals – Real price effects and ongoing efficiency appendix', Ofgem, (July 2012).

³⁸ 'Consultation on the treatment of real price effects for RIIO-ED1 slow-track electricity distribution network operators', letter from Ofgem, (August 2014).

- » Balance of charges between current and future customers – ideally, input price changes should be reflected in allowances when DNOs are exposed to them so customers pay for the services provided to them.
- » Complexity and unintended consequences – the design of uncertainty mechanisms should limit additional complexity in the price control.
- » Resource costs – the design of uncertainty mechanisms should limit additional costs on Ofgem and on DNOs.

Ofgem consulted on four alternatives to maintaining the ex-ante allowance:

- » One-year lagged RPE index – set RPE value for next year using index data from past six months.
- » Two-year lagged RPE true-up – true-up allowance for outturn index data with two-year lag.
- » True-up at set window(s) – true-up allowance for outturn index data at set points during ED1.
- » True-up at RIIO-ED2 – set an RPE allowance and true-up at the RIIO-ED2 for outturn index data.

Ofgem also considered the different indices available, and the potential of using different mechanisms for different cost types.

In its final determination³⁹, however, Ofgem chose to retain ex-ante allowances for RPEs. This was because Ofgem thought that there was a significant risk of unintended consequences due to the challenges of designing an RPE index and appropriately addressing its interaction with other areas of the price control settlement at a late stage in the price control process. Furthermore, it recognised the importance of stable regulation.

Ofgem intends to explore alternatives to the current approach at future price control reviews.

5.3.3. CAA

The Civil Aviation Authority (CAA) has the powers for the economic regulation of operators of airports in the UK that pass a market power test. The CAA currently sets economic regulation for Heathrow and Gatwick.

Heathrow 2014-2018⁴⁰

For Heathrow, the CAA uses the typical 'building block' approach to set prices. It indexes maximum revenue yield per passenger to RPI.

In the past the CAA has included an extra allowance to provide for the tendency of construction prices to rise faster than RPI. However, the COPI forecasts that the CAA reviewed for Heathrow did not robustly suggest that construction inflation would outstrip RPI – and indeed construction prices may fall relative to the general price level.

After considering the available evidence, the CAA believed that, on balance, setting an allowance for construction price inflation in excess of RPI could enable HAL significantly to over-recover. The CAA did not, therefore, include an allowance for construction price inflation in excess of RPI in its final proposals.

The CAA did, however, make ex-ante adjustments based on anticipated wage inflation. In the final proposals, the CAA stated that the recent improvement in the economic outlook could mean that wages in the general economy could rise faster than inflation, reducing the scope for "efficiency savings". On this basis the CAA reduced the proposed efficiency from 15.5% to 14.5% of staff costs.

After the final proposals, new forecasts from the OBR indicated that average earnings growth was likely to remain below inflation over the control period on a cumulative basis. This was based on lower outturn wage growth and low productivity growth. As a result, the CAA increased the wage cost reduction from 15.5% to 17.5%.

³⁹ 'Reasons for our decision on the treatment of real price effects for RIIO-ED1 slow-track electricity distribution network operators', Ofgem, (November 2014).

⁴⁰ 'Economic regulation at Heathrow from April 2014: Notice granting the licence', CAA, (2014).

Gatwick 2014-2021⁴¹

In relation to Gatwick, which was found to have lesser market power, the CAA accepted a set of commitments rather than a full price control. This included a commitment not to raise prices by more than RPI+0%. However, the CAA will monitor Gatwick to identify whether it is consistent with the CAA's view of a 'fair price' of RPI-1.6%. The CAA also requires Gatwick to undertake a shadow regulatory asset base (RAB) calculation in case tighter regulation needs to be reintroduced.

In determining the fair price, the CAA undertook a similar approach to that used to set allow prices for Heathrow. In relation to construction price inflation, the CAA considered it inappropriate to make a separate additional allowance given: (i) COPI forecasts were broadly in line with RPI forecasts; and (ii) the uncertainty involved in the COPI forecasts and its volatile nature, which were also noted by the Competition Commission in its Q5 review.

The CAA also took into account forecast wage inflation, along with efficiency improvements, when assessing the reasonable level of employee costs that Gatwick would incur.

5.3.4. Ofcom

Ofcom, the UK communications regulator, currently imposes three charge controls:

- local loop unbundling (LLU) and wholesale line rental (WLR);
- mobile termination rate (MTR); and
- safeguard cap for second class stamps.

The treatment of input price inflation in each is disused below.

LLU and WLR – 2014-2017⁴²

These markets cover access connections used to provide telephone and broadband internet services to residential and business customers.

For both technologies Ofcom has set CPI-X charge controls to align charges with forecast efficient costs. To estimate efficient costs, Ofcom took specific account of input price inflation on the basis of:

- pay cost inflation of 2.8%;
- non-pay cost inflation was set using a weighting of 3% for accommodation costs, a forecast of electricity prices for electricity costs, RPI for cumulo costs and CPI for all other non-pay costs; and
- for asset price inflation, it assumed copper and duct assets within the Cost Model are inflated at RPI (consistent with the RAV model). All the remaining asset costs were projected forward at 0%.

MCT – 2015-18⁴³

MCT is a wholesale service provided by a mobile communications provider (MCP) to connect a call to a recipient on its network. When fixed or mobile communications providers enable their customers to call a UK mobile number, they pay the terminating MCP a wholesale charge, called a 'mobile termination rate'. MTRs are set on a per-minute basis and are currently subject to regulation.

Ofcom apply price-cap regulation in the form of an inflation indexed control, in which the cap is updated annually for CPI inflation minus an adjustment (i.e. CPI-X). The reason for using an inflation index in the charge control formula was to protect the regulated firms and customers from inflation forecast error.

Input cost trends are assessed within the financial model. Some input prices were assumed to remain fixed in real terms (i.e. rise in line with CPI), whilst others were assumed to increase in real terms (i.e. increase above the rate of inflation).

BT objected to the assumptions of constant real prices as a significant proportion of the cost base

⁴¹ *'Economic regulation at Gatwick from April 2014: Notice granting the licence', CAA, (2014).*

⁴² *'Fixed access market reviews: wholesale local access, wholesale fixed analogue exchange lines, ISDN2 and ISDN30 – Volume 2: LLU and WLR Charge Controls', Ofcom, (June 2014).*

⁴³ *Based on 'Mobile call termination market review 2015-18', Ofcom, (March 2015) and annex 8 'MCT review 2015-2018: Mobile network cost modelling', Analysys Mason for Ofcom, (2015).*

relates to electronic equipment, which tends to become cheaper in real terms over time.

2nd class stamps – 2012-2019⁴⁴

Ofcom removed the significant majority of regulatory controls on Royal Mail's prices as part of its review of the regulatory framework for the postal sector which concluded in March 2012. However, to ensure that a basic universal postal service is available to all, Ofcom capped the prices that Royal Mail can charge for Second Class stamps up to 2kg. This cap is expected to be in place for the seven years of the current regulatory framework (i.e. until March 2019).

The price cap was set at 55p in April 2012 and allowed to increase by CPI annually. Royal Mail considered that this level would give it the pricing freedom it needed to respond to adverse changes in market conditions by re-optimising pricing, whereas a lower cap would be likely to constrain its pricing freedom in the medium term. Royal Mail also noted that limiting price increases to no more than CPI was very restrictive and it was therefore important that it had some pricing flexibility built into the level at which the cap is initially set.

The cap is the maximum that Royal Mail is allowed to charge, although the current price it has set is below this level.

Ofcom also introduced a safeguard cap on second class large letters and packets. This was based on the approach and level set for letters.

⁴⁴ *'Securing the Universal Postal Service, Decision on the new regulatory framework', Ofcom, (March 2012).*

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