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**Aiming up on the WACC and prices – the welfare and
incentive impacts for the water industry**

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1. Executive summary

The Competition and Markets Authority (CMA) propose ‘aiming up’ in setting the assumed WACC for the water industry on grounds that the true WACC is uncertain and setting the WACC too low involves higher social/consumer costs than setting it too high in terms of the impact on investment.

Whilst the precise argument for aiming up in the water industry is not set out by the CMA; some weight is placed on the modelling literature in relation to aiming up alongside consideration of aiming up in relation to other sectors. However, the literature on aiming up starts from a number of assumptions, which do not necessarily hold in general and do not hold for the water industry in particular. Further, the market circumstances and regulatory approach in, say telecoms, differ fundamentally from those in water.

In telecoms Ofcom have allowed for prices for fibre to be uncapped (equivalent to infinite aiming up) to allow for the possibility of excess returns for a time in order to offset the risk that demand is insufficient to allow cost recovery, even absent price regulation (an approach referred to as the ‘fair bet’). This is a different motivation, and one that does not apply in the water industry since if investment is agreed there is a vanishingly small risk that it could not be recovered due to a lack demand (demand is price inelastic and the industry is subject to revenue caps).

Under the modelling assumptions in the literature, the starting point for analysis is that investment would be sub-optimal absent aiming up. Aiming up increases the likelihood that the anticipated return from investment is sufficient to trigger worthwhile investment, whilst aiming up cannot result in investment beyond the optimal level. Further, the price set by the regulator is set based on an understanding of expected supply and demand in the industry and is not linked in any way to actual or planned investment (there is no RCV).

In relation to the starting point of the modelling, the CMA have not set out any evidence that current or projected investment is below optimal levels absent aiming up. Further, given that planned and actual investment feed into allowed prices in the water sector aiming up could conceivably result in excess, inefficient and gold-plated investment – it is all good for shareholders, but not necessarily consumers, if agreed.

In reality the level of investment in the water sector is primarily driven by an investment planning process and price review incentive mechanisms relating to expenditure and outcomes. Further, these mechanisms have been re-calibrated over time where investment was thought to be sub-optimal, either too high or too low or not sufficiently focused on priorities.

Recent experience in the water industry shows how the regulatory framework can adjust to promote investment better aligned with customers’ interests. At PR14 a shift to a Totex (Capex plus Opex) approach was made in order to reduce the bias towards capex-based solutions, rather than aiming down in relation to the WACC to reduce the capex bias. Further, a greater focus on security of supply following an assessment of the asymmetric costs of excess capacity versus a shortfall led to ‘aiming up’ in relation to investment planning for security of supply, rather than aiming up in relation to the WACC.

There are sound reasons to consider that existing investment is broadly aligned to the optimal level without aiming up, and therefore that there is no welfare asymmetry in terms of a little more or less investment. The fact that more investment is in general proposed than agreed reinforces this conclusion. Further investment can be expected to be appraised by companies from a long-run perspective taking account of current and future reviews, the possibility of

error correction and other incentives alongside the current estimate of the WACC. Knife-edge dependence of investment on the current WACC estimate appears most unlikely.

However, sustained aiming up, at future and successive reviews, could encourage companies to propose additional investment, though not necessarily efficient investment. However, whether additional investment eventuates depends on the approval of proposed investment and on incentives to undertake such investment.

Aiming up would not change the appraisal of investment by Ofwat and the Environment Agency if appraisal were based on cost benefit considerations alone, but to the extent that affordability is a consideration aiming up would reduce investment by increasing bills to cover the extra return on past investment as well as raising the cost of proposed new investment for consumers.

Finally, companies ultimately decide whether to invest or not having regard to overall incentives including outperformance incentives and output and outcome related incentives. These broader

incentives are likely to dominate the impact of aiming up (for plausible levels of aiming up).

Aiming up at successive reviews would also have a high cost to customers and deliver a significant windfall in terms of excess profit to companies. Such a windfall might in turn prove destabilising for the RCV based approach to regulation and therefore of a reasonable prospect of recovery of long-lived investment. Were that to prove the case, or be anticipated, it could harm prospects for investment and the ability to raise finance at reasonable cost.

Aiming up for the water industry has not been justified on theoretical or empirical grounds, would have a high cost to customers, would have an uncertain and potentially harmful impact on investment and is inferior to other policy options should it be concluded that planned investment is inefficient.

In short, aiming up is a blunt and costly instrument in pursuit of a problem that has not been shown to exist.

2. Introduction

‘Aiming up’ refers to a decision to set the assumed weighted average cost of capital (WACC), utilised in setting price controls, above the expected or central, but uncertain, estimate of the true WACC.

Ofwat, in determining price controls for the water industry, aimed straight; whereas in its interim determination the Competition and Markets Authority (CMA) aimed up on grounds that doing so would promote investment in the water industry generally and support the financeability of the sector. The CMA note that:¹

“There are well-established arguments that underinvestment caused by a cost of capital being set too low damages the overall welfare of consumers (and potentially the wider economy) materially more than the welfare lost through bills that may be slightly too high.” Paragraph 9.667

There are two distinct potential motives for aiming up in relation to the WACC:

- To offset asymmetric regulatory-investment risk in relation to anticipated revenues when demand for new investment is uncertain. When future revenues from investment are uncertain regulation may cap returns in the good state of the world whilst investors would be unable to fully recover their investment in the bad state of the world even if prices were not capped. Aiming up is one way of attempting to offset asymmetric returns risk by allowing ‘excess’ returns if the investment succeeds.
- To promote investment where the consumer and social costs of more versus less investment are asymmetric, for example where insufficient investment might involve insufficient supply leading to

shortages or significant environmental harm. In this case aiming up is one way of compensating for the asymmetry of consequences of not investing.

Aiming up might be motivated by either of these concerns. This paper, and the CMA, focus on the second. Nevertheless, the first motive is considered to ensure the distinction is clear.

Aiming up to offset asymmetric regulatory-market risk

An illustration example of an effort to compensate for demand risk is provided by telecoms regulation. Ofcom sought to allow upside in relation to fibre investment by forbearing from applying price controls for a period of time.

The approach, referred to as the ‘fair bet’ approach, in effect involved infinite aiming up for fibre for a period of time. A degree of price constraint nevertheless exists since fibre had to compete with regulated copper loop prices, consumer demand and willingness to pay were uncertain and potentially low and there was competing fibre investment. Other motivations for forbearing from applying price controls to fibre included the large initial uncertainty over the parameters required to set a price cap and a desire to leave incentives for investors to make welfare maximising choices given that both costs and willingness to pay for different technologies were uncertain and might differ significantly.

The circumstances in the water industry are very different and these rationale for aiming up do not apply. Competing co-existing products do not exist, there is very limited competition and, provided investment is agreed, returns are reasonably assured since even a shortfall in demand is most unlikely to threaten the scope to recover costs via revenue caps.

¹ CMA, Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations – provisional findings, 29 September 2020. <https://www.gov.uk/cma-cases/ofwat-price-determinations>

Aiming up to offset asymmetric social costs relating to investment

That leaves the second motive, to promote investment given a view that the welfare costs of less investment exceed those of more investment and given uncertainty over the cost

of capital. This rationale for aiming up might in principle apply to any regulated industry, and it is this rationale in relation to water that is appraised in this paper.

3. Appraisal of the asymmetry argument for aiming up in the water industry

The literature in relation to the asymmetric costs of investment decisions includes Wright *et al* (2003) and Dobbs (2011)². A review for UK Regulators Network³ (2018) also considered the question, as have applications, for example, by Oxera in relation to Heathrow Airport Limited.⁴

However, the assumptions made for modelling purposes suggest that the literature has limited, if any, relevance to the water industry. Dobbs (2011) notes that:

“Before proceeding, it is perhaps worth emphasizing that the argument that the AROR [allowed rate of return] should be set above the expected value of the WACC distribution arises from two key ‘second best’ features. Firstly, the assumption that the firm has control over new investment and its timing, and secondly, the assumption that the AROR and the associated price caps and controls are fixed for the duration of the regulatory review period (RRP).”

The first assumption does not hold for the water industry where allowed investment is largely determined via a process of engagement between the industry and Ofwat and the EA. The second assumption also does not strictly hold since there are mechanisms for modifying a price control between reviews.

Further, the conclusion in the economic literature on asymmetric social costs and aiming up rests on the assumption that investment is

initially low compared to the optimal level and that aiming up would correct, but not overcorrect, this. A further implicit assumption in applying the modelling results to policy is the assumption that aiming up would be the first best response versus alternatives.

The modelling approach also assumes there is no information asymmetry other than regarding the true cost of capital (only an uncertain estimate is available to the regulator), and a price is set by the regulator and investment either proceeds or not, or proceeds in part, to meet demand. There is no process of agreement regarding investment and investment is not an input to price setting.

The modelling approach might therefore have some relevance to telecoms where a transition to new network technologies with new capabilities is a prospect and where price controls may be set based on the cost of a hypothetical replacement network rather than actual costs including investment costs.

In contrast, in the water industry, evidence has not been put forward to demonstrate that existing and planned investment might be sub-optimal; new investment is scrutinised and planned via a process involving industry, Ofwat and the Environment Agency and agreed investment feeds into the determination of prices. The implications of these differences are now considered.

² Dobbs, Modelling welfare loss asymmetries arising from uncertainty in the regulatory cost of finance, Journal of Regulatory Economics, February 2011.

https://www.researchgate.net/publication/227347375_Modeling_welfare_loss_asymmetries_arising_from_uncertainty_in_the_regulatory_cost_of_finance

³ Wright, Burns, Mason, Pickford and Hewitt, Estimating the cost of capital for implementation of price controls by UK Regulators, 2018. <https://www.ukrn.org.uk/wp-content/uploads/2018/06/2018-CoE-Study.pdf>

⁴ Oxera, Is aiming up on the WACC beneficial to customers?, April 2020. <https://www.northernqasnetworks.co.uk/wp-content/uploads/2020/09/Oxera-2020-Is-aiming-up-on-the-WACC-beneficial-to-customers-prepared-for-Heathrow-Airport-7-April.pdf>

Existing investment is aligned with the optimal level

In reality the level of investment in the water sector is primarily driven by an investment planning process and price review incentive mechanisms relating to expenditure and outcomes. Further, these mechanisms have been re-calibrated over time where investment was thought to be sub-optimal, either too high or too low or not sufficiently focussed on priorities.

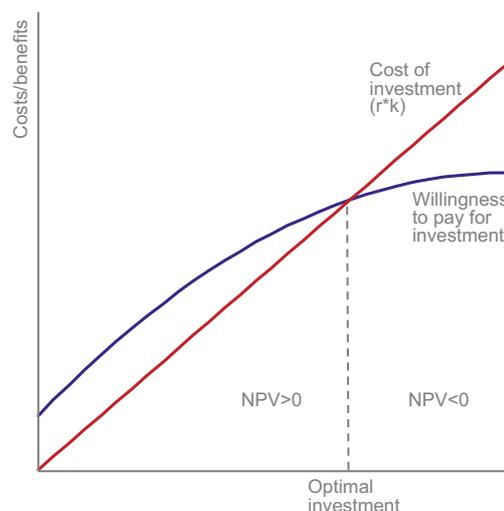
Recent experience in the water industry shows how the regulatory framework can adjust to promote investment better aligned with customers' interests. At PR14 a shift to a Totex (Capex plus Opex) approach, but not to aiming down in relation to the WACC, was made in order to reduce the bias towards capex-based solutions⁵. A greater focus on security of supply following an assessment of the asymmetric costs of excess capacity versus a shortfall led to 'aiming up' in relation to investment planning for security of supply⁶, but not to aiming up in relation to the WACC.

If existing investment is optimal why aim up?

If existing investment is considered optimal (within the bounds of uncertainty and information asymmetry constraints), then there is no welfare asymmetry in relation to an increment of more or less investment.

Figure 1 illustrates diminishing returns to the payoff from more investment versus the cost of investment which is illustrated as a linear function of investment and the cost of capital ($r \cdot k$). The intersection of the curve and the line is the optimal level of investment.

Figure 1: Optimal investment



If investment is some way below the optimal level, then investing more is beneficial and there is an asymmetry in terms of welfare with regard to investing versus not investing. However, if the starting point is optimal then a little more or less investment is equally harmful and there is no asymmetry. The latter arguably better reflects the counterfactual for the water industry (and evidence that it does not have not been put forward by the CMA).

Nevertheless, it is conceivable in principle that setting the WACC estimate too low could lead to a collapse in investment involving asymmetric welfare costs. However, in practice this seems most unlikely, given existing approaches to estimation of the WACC and aiming straight in setting price controls.

Investment can be expected to be appraised by companies from a long-run perspective taking account of current and future reviews, the possibility of error correction and other incentives alongside the current estimate of the

⁵ David Gray, Review of Ofwat and consumer representation in the water sector, July 2020.

<https://www.gov.uk/government/publications/review-of-ofwat-and-consumer-representation-in-the-water-sector>

⁶ Based on National Infrastructure Commission (NIC) advice. NIC, Preparing for a drier future - England's water infrastructure needs, April 2018. <https://nic.org.uk/app/uploads/NIC-Preparing-for-a-Drier-Future-26-April-2018.pdf>

WACC. Knife-edge dependence of investment on the current WACC estimate appears unlikely.

Another way of illustrating asymmetry versus symmetry is to consider supply and demand diagrams where investment can be thought of as increasing supply (alongside other inputs).

Figure 2 illustrate the modelling assumption underpinning aiming up, namely the starting point is known with certainty to involve too little investment with aiming up increasing investment towards the optimum, but not beyond the optimum. Price setting under the modelling approach is based on a view regarding future supply and demand and actual or proposed investment does not enter into the setting of the price control. Aiming up 'too much' would not therefore motivate excess investment under the modelling assumptions.⁷

Figure 2: Asymmetry if more investment is good, and aiming up cannot induce over-investment

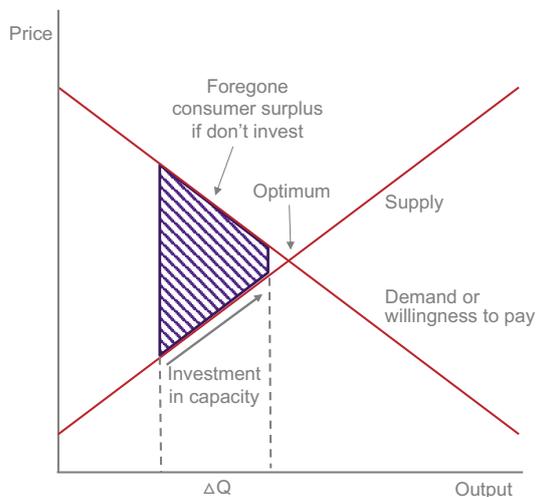
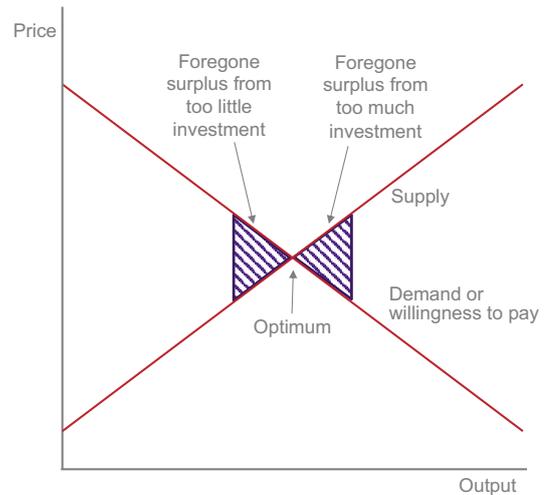


Figure 3 illustrates a counterfactual for the water industry where the starting point is uncertain but is believed to approximate optimal investment and aiming up could result in a shift towards or away from optimal investment.

Figure 3: Symmetry if existing investment is optimal



The reason that aiming up could result in too much investment in the water industry is that agreed investment is an input to price setting, there are information asymmetries and investors may be motivated to propose investments that are not socially worthwhile or worthwhile but gold-plated, given the prospect of excess returns with aiming up.

Further, aiming straight is also most unlikely to result in a collapse in investment given that companies appraise investment over the current and future reviews and that there, there are checks on financeability and there is scope for error correction by the regulator should evidence of underinvestment emerge.

A more detailed examination of incentives in the water sector later in this paper also shows that aiming up could in principle result in reduced investment and harm in terms of financeability.

Aiming up involves a price related welfare loss for consumers

Under the economic modelling approach asymmetric losses in relation to investment are

⁷ Beyond the point at which aiming up motivated optimal investment increasing the price cap further would reduce investment by suppressing demand and allowing the regulated firm to price closer to the unconstrained monopolists price.

weighed against the loss of either total surplus or consumer surplus from higher prices. However, if there is no asymmetry in relation to investment then there is nothing to weight up, we are left with consumer losses from higher prices alone i.e. aiming up is unambiguously harmful.

A further consideration is that regulation in practice is focussed on consumers interests,

including in the water industry affordability which is amongst the government's strategic priorities for water regulation⁸. This reinforces a conclusion that aiming up would be inconsistent with regulatory duties and strategic priorities in the water industry.

⁸ Department for Environment, Food and Rural Affairs, The government's strategic priorities and objectives for Ofwat, September 2017.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/661803/sps-ofwat-2017.pdf

4. The impact of aiming up in practice

Planning and incentives under existing water regulation

In reality the level of investment in the water sector is primarily driven by an investment planning process and price review incentive mechanisms relating to expenditure and outcomes.

Investment planning

- Investment is proposed and appraised in dialogue with Ofwat and the EA.
- In aggregate more capital expenditure is proposed than approved.
- The affordability and customer acceptability of proposed investment is considered.
- Environmental and water quality regulation drives around 70% of enhancement regulation.
- The regulators established RAPID in 2020 to facilitate ringfenced investment to promote resilience.
- Drivers of capital expenditure such as security of supply are based on a prior assessment of uncertainty and the upside and downside economic and social costs of a shortfall of supply. Consideration of asymmetry is embodied in investment plans over time.

Price review incentive mechanisms

- Companies face a mix of incentives including, but not limited to, the return they can expect to earn if investment proceeds and is rewarded as part of the regulatory asset base, namely depreciation and the current and future WACC.
- They are expected to deliver various outcomes with 70% of performance commitments covered by financial incentives (ODIs). ODIs are set to return funding for large investment projects that companies fail to deliver.

- Sharing rules for under and over expenditure provide incentives for investment cost minimisation.
- Companies have legal obligations to provide and maintain service and can be subject to large penalties for breaching those obligations.
- Companies can request a reopening of the control for material investment that is the result of a new or changed legal obligation (Interim determinations).
- There is also a clause allowing a reopening of the control for substantial effects (with a net present value of at least 20% of turnover).

The totality of investment planning, incentives and outcomes in the water industry should be considered in deciding whether any change is justified, and what impact aiming up might have versus alternative policy options if there is evidence of a problem.

Impacts of aiming up at each step in the investment decision process

Further considerations of the likely impact of aiming up on investment is therefore required. Aiming up might change investment via three channels:

- i. By increasing incentives for companies to propose investment in future business plans
- ii. By changing incentives in relation to agreement to proposed investment by Ofwat and the EA
- iii. By decreasing incentives for companies to underspend compared to investment plans

In relation to the (i), in general companies propose more investment than is agreed, without aiming up. So, whilst aiming up might encourage companies to propose more investment, whether such investment would

occur depends on (ii) and (iii). Further, if existing investment is broadly optimal promoting more investment would be sub-optimal.

In relation to (ii) there are two polar ways of characterising investment plan approval by Ofwat and the EA. First, that is based on an assessment of the costs and benefits of investment and that all net present value positive projects are permitted without regard to the total cost and impact on bills. Second, that it is a process driven by a view regarding overall affordability in which the best projects within a budget cap are permitted.

Given the objectives of regulation in the water industry it is likely that reality is in between these two extremes, with changes in views regarding the balance of costs and benefits implemented over multiple reviews rather than as abrupt changes in investment and bills (as is the case in relation to security of supply).⁹

If investment approval were purely cost-benefit based, aiming up would not be expected to change approvals since the discount rate for appraisal would remain unchanged. This conclusion is likely to hold even if more investment were proposed due to (i) since one would expect additional proposed investment to be of lower quality, to include more investment that is not worthwhile, to that proposed in the absence of aiming up.

However, if affordability and a budgeting approach to investment is driving decision making, then aiming up would decrease agreed investment. The reason for this is two-fold:

- First, new investment is now more expensive for consumers given the higher WACC, so for a given budget fewer projects would be agreed.

- Second, the cost to consumers of existing investment is increased so the affordability constraint is even tighter before considering new investment.

At best, therefore, aiming up would have no impact on approved investment under the cost-benefit assumption, whilst at worst it could significantly decrease agreed investment.

Finally, in relation to (iii) it is insightful to consider the incentives in relation to underspend. Under the counterfactual the expected present value of investment is zero, whilst companies retain 45% of underspend. Companies also face incentives to deliver desired outputs. Aiming up would reduce but not eliminate incentives for underspend but also reduce but not eliminate incentives for efficient spend.

Overall the impact of aiming up on incentives to propose, approve and invest could be positive or negative. If positive it may involve inefficiency in terms of too much emphasis on capex solutions, promotion of projects with negative social returns or simply 'gold plated' investment. Further, in comparison with other planning and incentive mechanisms in the sector the impact of aiming up on investment is likely to be weak, whilst the impact on customers' bills could be large.

Aiming up and regulatory stability

The economic modelling focusses on welfare impacts rather than transfers from consumers to producers. However, aiming up involves higher prices, a transfer from consumers to producers and excess profitability in expectation. The distributional impact of aiming up is also more pronounced given that it applies to existing as well as new investment, and the former is almost

⁹ It is also the case that companies, including those in competitive industries, rely to some extent on budget processes and not just cost-benefit analysis in deciding investment plans, in part to manage agency problems within the firm and between management and owners. Strategic shifts in investment do occur but are subject to greater scrutiny by the Board and investors and may be justified by expectations of higher demand and/or prices in future rather than funded via higher prices today.

an order of magnitude larger relative to the latter.

Excess profitability, particularly excess profitability on investment made prior to a policy shift to aiming up, could be expected to be a focus of, if not the regulator, consumer groups and potentially politicians. The legitimacy of regulation¹⁰, and the assurance of recovery of investment which depends on such legitimacy¹¹, may therefore be undermined over time by aiming up.

Not only could this undermine incentives for investment, it could also undermine the financeability of the sector.

The balance of costs and benefits of aiming up versus alternative policy options

Aiming up increases the cost to consumers of existing investment as well as new investment. It also has an impact on overall investment

incentives that is ambiguous, ranging from weakly positive to strongly negative in terms of delivered investment.

Even were the net impact on investment incentives positive, the incentive to propose socially inefficient investment is increased, whilst incentives to invest efficiently are reduced. Further, there are alternative policy options available if there are sound grounds for believing the industry is likely to underinvest over time.

If it were concluded that more (or less) investment were desirable then planning guidelines, the investment appraisal process and output related incentives could be adjusted accordingly.

Aiming up is a blunt and costly instrument in pursuit of a problem that has not been shown to exist.

¹⁰ Williamson and Mumssen, Economic Regulation of Network Industries, 1999.

<https://www.treasury.govt.nz/sites/default/files/2007-10/twp00-05.pdf>

¹¹ BIS, Principles for economic regulation, 2011.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/31623/11-795-principles-for-economic-regulation.pdf