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# Aiming high in setting the WACC: framework or guesswork?

**What is the role of the weighted average cost of capital (WACC) for regulators in promoting the right level of investment by the industry? Regulators around the world have often chosen to 'err on the side of caution'—in other words, to choose a high estimate when setting the WACC, in order to offset perceived risks of underinvestment. What are the reasons behind this approach, and is it likely to achieve its intended outcome?**

One of the key assumptions in any regulatory decision—indeed, in any investment decision—concerns the required rate of return on investment. Previous *Agenda* articles have looked at aspects of this calculation.[1] Estimating the WACC involves both **judgement** (choosing between options we know—e.g. the maturity of debt) and **uncertainty** (dealing with things we don't know—e.g. the forward-looking equity market risk).

This article considers the approach taken by regulators in resolving the uncertainty in WACC estimation—which generally follows two steps.

- Step 1: identify a range of credible options for the WACC.
- Step 2: pick a number (i.e. a 'point estimate') from the given range for setting prices.

The choice of WACC can have a material effect on the prices paid by users of essential services. So why, in Step 2, would the regulator not pick the lowest possible WACC that is justifiable from the data, in order to meet its duty to keep prices low for customers?

In practice, economic regulators around the world have tended to choose a point estimate for the regulatory cost of capital (i.e. the WACC) that is above the midpoint of the estimated range. The typical justification for this approach is that the total costs to society of setting a low WACC will include a risk of underinvestment. Therefore, the total costs to users of setting the WACC 'too low' are considered to be greater than the costs of setting the WACC 'too high' (in the form of higher prices and potential overinvestment).

In its 2007 review of airports, the UK Competition Commission (now the Competition and Markets Authority) stated:

> If the WACC is set too high then the airports' shareholders will be over-rewarded and customers will pay more than they should. However, we consider it a necessary cost to airport users of ensuring that there are sufficient incentives for BAA to invest, because if the WACC is set too low, there may be underinvestment from BAA or potentially costly financial distress…Most importantly, we note that it is difficult for a regulator to reduce the risks of underinvestment within a regulatory period. Taking these factors into account, we concluded that the allowed WACC should be set close to the top of our range.[2]

However, with a few exceptions, the choice of the point estimate within the regulator's range has been based on judgement. This raises the question of whether the practice of 'aiming up' is supported by evidence on the associated benefits and costs, and if so, whether the adjustments assumed are too high or too low.

## What is the case for 'aiming up' when setting the WACC?

In simple terms, the approach of setting the WACC towards the higher end of any range could be understood to be providing insurance against the risk of underinvestment in the networks that provide essential services.

This risk of underinvestment can be characterised as an 'underinvestment problem'. There is a possibility that the approach of price regulation, which has assumed returns on investment of around 3–4% (real) in recent UK price controls, will provide poor incentives to invest, particularly in potentially speculative or risky technologies.

This is illustrated in Figure 1, which depicts a scenario where the choice of WACC could result in an underinvestment problem.

## Is the underinvestment problem the same as the 'overinvestment problem'?

If the WACC is set too high, this could have the opposite effect to the underinvestment problem. Setting the WACC above the actual cost of capital could result in more investment than is required, and therefore higher prices. This indicates that there are two essentially similar risks resulting from the WACC being too high or too low.

The regulatory approach of setting a higher WACC may, however, be justified where risks are not symmetrical, but the wider costs of underinvestment are greater than the costs of overinvestment. In particular, underinvestment can have wider effects on network users. These include:

- network failures;
- lack of supply to new areas or new technologies;
- lack of innovation and managed decline in the networks.

Such effects are not unique to regulated markets. In competitive markets, it is likely that the quality of services provided and level of production will be economically efficient. However, where there are either positive externalities (e.g. innovation with social or private benefits to users) or negative externalities (e.g. social costs of quality failure or pollution), outcomes may not be socially optimal.[3]

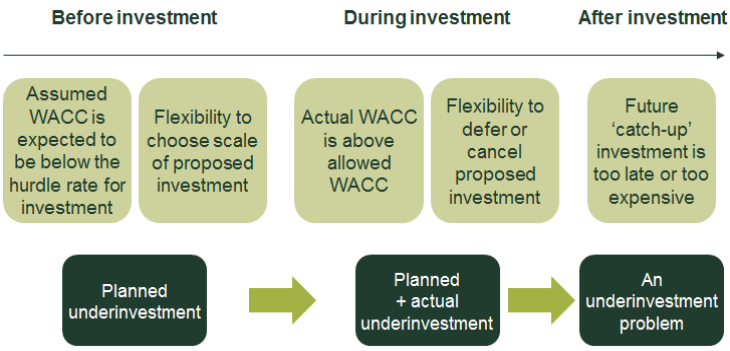
The aims of regulators in industries that manage essential services would normally include encouraging socially optimal levels of investment. There may therefore be a case for diverging from the notional 'competitive equilibrium' to reflect such wider social and economic benefits.

This is illustrated in Figure 2, which demonstrates that there may be an asymmetric distribution of effects for regulated businesses due to the assumed WACC being different from the actual WACC. The scale of the asymmetry will depend on the ability of the regulator to offset the risks of underinvestment through other forms of regulation.

In practice, this means that there is greater justification for a high WACC where:

- **there is a material risk of network failure**. Underinvestment can lead to an increase in network failures (e.g. blackouts), which can have significant costs. The costs of setting the WACC too low can therefore be large; *or*
- **there is material potential for innovation**. It has been found that there is a risk that regulation can stifle innovation;[4] *and*

### Figure 1 What is the source of an 'underinvestment problem'?

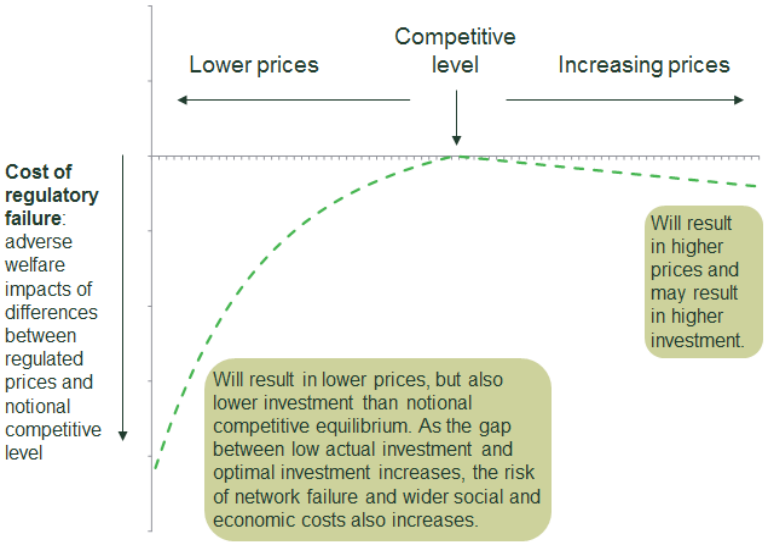



Source: Oxera.

- **there is flexibility to choose the level of investment**, where the firm will be more likely to increase investment if shareholders receive higher returns; *and*
- **the impact of deferring investment cannot be adequately reversed after the period**. Underinvestment translates into an underinvestment problem only if the impact of any shortfall in investment cannot be readily rectified after the period—otherwise, the wider effects of underinvestment could be mitigated by future regulatory action.

The way in which 'aiming up' on the WACC is transferred to regulated tariffs is also important. The relevant test for the firm and its shareholders in considering the benefits of new investments will be the reasonable expectation of returns on investment over the life of that investment, not just over the next regulatory period. Any premium to the WACC that is intended to promote investment should therefore be applied

### Figure 2 What are the costs of regulatory failure?




Source: Oxera.

to all assets in the regulatory asset base (RAB)—and applied consistently across periods—if it is to be a reasonable expectation of this return on new investments.

On the other hand, if the WACC is set at a higher level on current assets, but there is an expectation that this will be a 'one-off' effect that will be reversed in future periods, this could have the opposite effect of further weakening the incentives to invest in assets that will generate revenues beyond the current period.

The previous *Agenda* articles cited above highlighted uncertainty around how the assumptions in the calculation of the WACC should be set. In the case of the beta, for example, there is at best an unbiased estimate (i.e. a 'fair bet', or 50th percentile estimate) of the true beta, which will have a range of uncertainty around it.

The box shows how, in New Zealand, the regulatory framework reflects this explicitly through the use of a point estimate from a statistically defined range for the WACC. While the choice of parameters for the range still requires some judgement, the New Zealand framework has two advantages:

- it reduces the risk that the WACC will be biased downwards (i.e. that the assumed WACC will be below the actual WACC);
- it provides increased certainty that investment in the current period will earn a 'premium' within the WACC, and therefore that any incentive to invest that is linked to the WACC will be effective.

## Framework or guesswork?

As stated above, regulators have generally taken the risk of underinvestment into account qualitatively in the choice of the WACC. The nature of regulation is that it reflects an 'in-the-round' assessment of the right level of prices for network businesses. Choosing from a range can therefore be part of a regulator's judgement in setting the WACC. For example, the UK Competition Commission made this use of judgement explicit in its assessment of returns for Stansted Airport:

> In order to make recommendations to the CAA on the level of the price cap that should apply at Stansted, we needed to select a single point estimate from within our range...Ultimately, the estimate that we made was a matter of judgement, in which we balanced the likelihood of outcomes with their cost implications.[5]

Figure 3 overleaf shows UK precedent on the choice of the point estimate from the WACC range identified by the regulator. It illustrates that there has not been consistency about either the size of the range, or whether the WACC is set at or above the midpoint—although there are no examples of the WACC being set below the midpoint. The figure compares the range and point estimates assumed under this case-by-case approach with the analytical approach used in New Zealand.

Each regulator is likely to argue that the choice is not 'guesswork'—but the different sizes of the ranges for what are effectively the same calculation do demonstrate the lack of a unified approach towards the assumptions used.

**The New Zealand approach: using the '67th percentile'**

In 2014, Oxera reviewed the rationale for the choice of WACC percentile for the New Zealand Commerce Commission, drawing on the approach of assessing the risk of an underinvestment problem. This review highlighted that, while no economic framework could determine a single optimal choice for the WACC, it could inform the choice from a range.

Oxera recommended the use of the 60th to 70th percentile, given the specific legal framework within New Zealand, and the Commission subsequently revised its approach from using the 75th to the 67th percentile. Oxera's estimate gave weight to:

- the size of wider economic benefits, assuming that a higher percentile reduces the probability of underinvestment leading to network failure (outages);
- the cost to users of promoting investment through a higher WACC (given the expected level of pass-through).

In the case of New Zealand energy, Oxera's estimate gave less weight to:

- innovation—since in New Zealand the benefits from innovation in energy networks are assumed (as in the UK) to be better managed through specific incentives;
- overinvestment—Oxera estimated that the costs of overinvestment for the proposed adjustment would be relatively small, as additional investment would improve network operation and reduce investment needs in future periods (i.e. Oxera assumed that there are at least some offsetting benefits to additional investment).

The New Zealand Commerce Commission's 'Further work on WACC' is available at: http://www.comcom.govt.nz/regulated-industries/input-methodologies-2/further-work-on-wacc/. This includes Oxera's report: Oxera (2014), 'Input methodologies: review of the "75th percentile" approach', prepared for New Zealand Commerce Commission, 23 June.

Source: Oxera.

## Figure 3 UK precedent: WACC ranges and point estimates


Note: CAA, Civil Aviation Authority; CC, Competition Commission; NZCC, New Zealand Commerce Commission; ORR, Office of Rail Regulation; Ofwat, the economic regulator of the water industry in England and Wales; Ofgem, the energy regulator for Great Britain. All values are shown on a nominal, vanilla basis (pre-tax cost of debt, post-tax cost of equity). All UK regulators (except Ofcom) use a real WACC; however, to enable comparison with New Zealand, the allowed real values have been converted to nominal using an appropriate inflation assumption. The Commerce Commission does not explicitly have a range for the WACC—the high and low values shown in the figure are based on the 95% confidence interval using the Commission's estimates of the standard error for the WACC.

Source: Various regulatory determinations, and Oxera analysis.

In practice, the choice of a range tends to be based around the specific questions faced in a review. This is understandable where regulatory judgement is clearly required, but given the level of accuracy involved in parts of the regulatory determination, there is also a case for a more rigorous approach to be (at least) considered when addressing uncertainty in the choice of the WACC.

A review of the New Zealand case against regulatory precedent in the UK shows the material difference in the overall approach taken to derive and justify the level of the cost of capital.

The UK approach can be characterised as a 'case-by-case' analysis where the primary focus is the specifics of each regulatory review. The New Zealand approach is designed to be more long-term and to provide greater certainty.

Both have potential advantages.

- The **case-by-case approach** is sufficiently flexible to allow the regulator to use the choice of WACC as part of an in-the-round approach to regulation—i.e. as part of a balanced approach to the overall settlement, given that many of the assumptions in a price control are uncertain. In that context, such an approach can promote incentives to invest in network companies by ensuring that the overall package is financeable on a case-by-case basis.

- The **longer-term approach** is more consistent with resolving the specific underinvestment risk, since it provides more certainty about the return on new investments through a form of regulatory commitment—not just to the RAB itself (which is now a well-established form of commitment), but also to the return on capital assumption.

## Conclusion

The choice of WACC is a complex issue and, despite the extensive literature and expertise dedicated to the subject, there remains a need for judgement. Some of the assumptions, such as the level of the beta, cannot be observed directly and have to be estimated. Others, such as the choice of maturity of debt, require judgement from a range of options.

This article has highlighted that, in practice, and for good reasons, regulators tend to take a conservative approach—i.e. to set a relatively high WACC—in order to mitigate perceived underinvestment risks. However, it has also highlighted that the way in which adjustments are implemented is important. The review of the New Zealand example indicates that the following could be considered in an effective approach to setting the WACC.

- **Explain the adjustments and their purpose**—and particularly whether they represent short-term, 'in-period' adjustments to offset financeability risks in the specific price control period, or whether they are part of a longer-term approach to provide investment incentives.

- **Consider the benefits of an analytical framework**—judgement cannot be avoided throughout the regulatory process, but, as elsewhere in the approach to the most material regulatory assumptions, it is appropriate to balance it against the benefit of an analytical framework. This will improve transparency around the purpose and likely future approach to making adjustments to the WACC, and therefore provide an effective balance when considering the costs of underinvestment.

[1] For example, the cost of debt was considered in Oxera (2013), 'Debt in depth: the cost of debt in regulatory determinations', *Agenda*, April, available at: http://www.oxera.com/Latest-Thinking/Agenda/2013/Debt-in-depth-the-cost-of-debt-in-regulatory-dete.aspx; the treatment of risk in Oxera (2013), 'Up in flames, down the drain: accounting for risk in regulated networks', *Agenda*, August, available at: http://www.oxera.com/Latest-Thinking/Agenda/2013/Up-in-flames,-down-the-drain-accounting-for-risk-i.aspx; and the impact of financial stress in Oxera (2013), 'What WACC for a crisis?', *Agenda*, February, available at: http://www.oxera.com/Latest-Thinking/Agenda/2013/What-WACC-for-a-crisis.aspx.

[2] Competition Commission (2007), 'BAA Ltd: A report on the economic regulation of the London airports companies (Heathrow Airport Ltd and Gatwick Airport Ltd)', presented to the Civil Aviation Authority, 28 September, paras 4.106–8.

[3] The relationship between competition and innovation is complex, and can be affected by industry-specific factors. For example, an 'inverted-U' relationship was identified in Aghion, P., Bloom, N., Blundell, R., Griffith, R. and Howitt, P. (2005), 'Competition and Innovation: an Inverted-U Relationship', *The Quarterly Journal of Economics*, **120**:2, pp. 701–28. The presence of externalities has been highlighted in the context of climate change—see Helbling, T. (2012), 'Externalities: Prices Do Not Capture All Costs', IMF Finance & Development.

[4] See, for example, Ofgem's decision on network innovation. Ofgem (2012), 'Decisions on the Network Innovation Competition and the timing and next steps on implementing the Innovation Stimulus', March.

[5] Competition Commission (2008), 'Competition Commission report: Stansted Airport Ltd – Q5 price control review – presented to the CAA 23 October 2008', Appendix L, paras 115 and 117.