

Agenda

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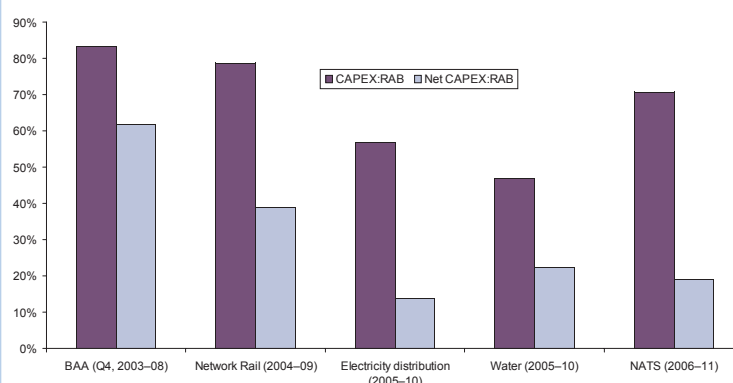
Incentivising infrastructure investment: the role of regulators

Infrastructure firms in the UK are facing large investment programmes to renew ageing networks, add new capacity, or comply with more stringent environmental obligations. A number of incentive mechanisms have been adopted by regulators to facilitate the efficient delivery of investment. While some of these approaches may provide useful lessons in other regulatory contexts, it is crucial to consider industry characteristics

While delivery of efficient investment has always been a central objective of the regulatory framework, the focus on exactly how regulators should facilitate large investment programmes has become increasingly important in recent years. This reflects the trend towards high, and in many cases persistent, growth in the level of required investment across infrastructure industries in the UK. Whether considered in gross or net terms, the level of investment required across these sectors is substantial in relation to the size of the companies, as indicated in Figure 1.

The factors driving the patterns of investment are wide-ranging. For example, in the case of BAA (the owner of seven UK airports including the three main airports serving London), this has been the result of the need to deliver new terminal capacity at congested airports such as Heathrow. In recent years, Network Rail has had to accelerate the level of spending on renewing and upgrading assets compared with that of its predecessors. In the electricity sector, the network infrastructure which is nearing the end of its life expectancy needs to be replaced,¹ and in the upstream business there is a need for new generation capacity (although this is not subject to price control regulation). Finally, in the water industry, a continual programme of renewals and enhancements to

Figure 1 Net CAPEX-to-RAB ratios in regulatory determinations



Note: CAPEX, capital expenditure; RAB, regulatory asset base. Net CAPEX-to-RAB ratio shows the size of all planned CAPEX—after accounting for depreciation allowances—relative to the existing RAB. Hence, Figure 1 illustrates the extent of capital intensity in the utility sectors shown.

Sources: Various regulatory documents and Oxera calculations.

comply with EC Directives has necessitated large amounts of investment by companies, in excess of £16 billion in this control period.²

Given the importance of ensuring that such programmes are delivered efficiently, what options are available to refine the regulatory framework?

To provide adequate incentives for companies to undertake substantial investment in infrastructure, two broad groups of methodological options can be applied.

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- Reduce the risk taken on by the company during a price control period under the regulatory regime—eg, through mechanisms that mitigate the uncertainty about the remuneration from investments, or through explicit provisions for uncertainties surrounding the outturn cost of substantial projects.
- Increase the potential rewards for the companies undertaking investment in infrastructure. This can be done through specific rewards for bearing particular risks, or isolating and rewarding high-risk elements of infrastructure projects.

Some common approaches adopted by regulators across regulated utility sectors in the UK are examined below, and include:

- contingency allowances;
- cost-pass-through options;
- volume risk mitigation;
- trigger mechanisms;
- returns premia for bearing certain risks.

Contingency allowances

There is a growing body of evidence of the magnitude and frequency of cost overruns in large CAPEX projects. For example, a study on construction performance of large projects by Flyvbjerg, Bruzelius and Rothengatter (2003) suggested that over-optimistic forecasts are the norm for major investments in transport infrastructure, where cost overruns of 50–100% (75% average) are common.³ In addition, in the sample of large projects analysed by Flyvbjerg, Holm and Buhl (2002), 90% of the 258 large transportation projects examined experienced cost overruns (of 28% on average).⁴

Contingency margins incorporate a proportion of the risk of cost overruns into price limits. Such margins are set in advance to provide headroom so that there is less exposure to the risk that the costs of investment projects exceed forecasts.

In the UK utilities sector, one example of such a mechanism is the introduction by the Office of Rail Regulation (ORR) of a cost contingency margin—over and above engineering cost estimates—for Railtrack's enhancement schemes, to reflect the potential for cost overrun. The ORR separated simple, small schemes from complex, larger schemes to provide appropriate guidelines for the uplift:

- for schemes under £100m, the ORR considered a 15% uplift appropriate. This uplift would, however, decline over time;
- for more complex schemes exceeding £100m, the regulator decided that the allowed margin should be greater since it would be more difficult to identify risks

for such projects. It allowed a contingency margin of up to 25%, with an expected decline over time.⁵

Ofcom, the UK communications regulator, has also considered the use of contingency allowances within the regulatory framework in its recent consultation on risk and return.⁶ In its discussion, the possible role for contingency allowances is very explicit. Ofcom argues that the cost of capital, reflecting the systematic risks of the project, should be applied to the mean or expected costs of that project. However, as the examples cited above show, deriving an accurate forecast of expected costs is often difficult due to the presence of specific risks. In particular, unquantified downside project risks (of failure) may be higher than the unquantified upside risks (of succeeding beyond the initial expectations), leading to initial project appraisals underestimating the expected or actual project costs. In light of this, Ofcom suggests that, in certain cases, contingency allowances may be a justifiable means of reaching an accurate forecast of mean expected costs. However, to date, there does not appear to have been any concrete example in which Ofcom has applied an explicit contingency allowance.

A central issue concerning the application of contingency margins is whether such mechanisms still provide the incentives for a company to outperform cost forecasts. Furthermore, to what extent are contingencies there to provide headroom, and should companies be able to benefit from any allowed contingencies if outturn costs are such that they do not 'need' the allowance? Balancing the trade-off between offering protection against unanticipated (perhaps uncontrollable) risks and preserving pressure on companies lies at the heart of this debate.

Cost-pass-through options

In recognition that certain cost elements may be beyond the control of the firm, several price cap mechanisms allow for the transfer—pass-through—of such cost elements to consumers.⁷ Cost-pass-through options aim to incentivise unpredictable investment between periodic reviews by reducing the cost risk faced by companies. There are several approaches to implementing cost pass-through mechanisms, with varying degrees of effectiveness in reducing risk, and compatibility with efficiency incentives. These approaches include:

- '*logging up*'—a basic cost-pass-through mechanism is the logging-up of unexpected costs between periodic reviews and compensating companies by increasing allowed revenues at subsequent periodic reviews;⁸
- *interim determinations*—these enable companies' price limits to be revisited between periodic reviews;
- *error-correction mechanisms (ECMs)*—automatically triggered price-adjustment procedures to prevent

companies from bearing the effects of cost changes that are beyond their control.

The benefits of these pass-through mechanisms will depend on the particular situation that generates the risk. For example, while it might be argued that interim determinations provide a greater degree of flexibility to deal with unexpected costs than ECMs, this would have to be balanced with the possible concern that they tend to be more discretionary.

In addition to making allowances for CAPEX, cost-pass-through mechanisms are often adopted in the treatment of pension costs. National Air Traffic Services (NATS) is a key example, where the Civil Aviation Authority (CAA) has agreed to pass through changes in pension deficit contributions that are outside of management control. Postcomm, the UK postal services regulator, has also recently proposed that, in the event of significant changes to the assessment of Royal Mail's pension deficit, allowed revenues should also be adjusted.

The application of CAPEX pass-through approaches raises a number of issues, such as uncertainty about the overall impact on incentives, and the cost of capital. While such mechanisms may offer protection from cost shocks, they could undermine incentives for efficient and timely delivery of the investment programme. Regulators must consider which approach is in the longer-term interest of customers.

Volume risks

A further issue is how regulators treat volume risk. Volume risk relates to the fluctuation of outturn volumes around those forecast by the regulator at the time of the regulatory determination. In some cases the regulated company bears this risk; in other cases the impact of variation in volumes is largely offset through changes in the allowed level of prices. Examples of mechanisms designed to address this form of risk are outlined below.

Since 2002, NATS has had its hybrid regime complemented with an automatic adjustment mechanism designed to lessen exposure to extreme reductions in volume. Where volumes fall below a threshold level, the revenue cap component is increased to compensate. The CAA's recent review of NATS maintained this risk-sharing approach.

A similar example in the postal sector can be seen in Postcomm's recent final proposals for Royal Mail.⁹ Postcomm proposes a risk-sharing mechanism whereby deviations in volumes of more than 2% from its central forecast lead to an adjustment in the following year's price caps. Where delivered volumes are more than 2%

higher than forecast, Postcomm proposes that the price caps should be adjusted such that 40% of the extra revenue is passed back to customers. However, where delivered volumes are more than 2% lower than forecast, the regulator proposes that the price caps should be adjusted to enable Royal Mail to recover from customers 40% of the lost revenue. At a high level, the costs of the business are estimated to be 40% fixed:60% variable; the intention, therefore, is that this mechanism should ensure that Royal Mail's fixed costs are always recovered.

As with the mechanisms considered above, one issue raised by the application of mechanisms for mitigating volume risk is that their impact on investment incentives is not always clear. For example, if the company's focus is on avoiding downside risk, the mechanism could reduce exposure to asset stranding. However, if the company receives relatively little benefit from the additional output delivered (whether this be units of electricity distribution, flights, or passengers), this may raise questions about incentives to deliver new capacity.

Trigger mechanisms

Where the price-setting process establishes a guaranteed level of revenues based on projected levels of CAPEX, companies may have an incentive to delay such investment (since revenues are locked in) in order to back load financing costs. Such a perverse incentive may have a detrimental impact on consumer welfare.

One mechanism through which regulators have attempted to address this problem is through the use of triggers. A recent example is the CAA's approach to remunerating the cost of Heathrow Airport's Terminal 5 (T5). A central factor in the regulatory treatment of T5 relates to the addition of the CAPEX to the RAB. A common regulatory approach is to allow an increase in the RAB on completion of the project when users can benefit from it. However, BAA argued that, during construction, it would face substantial financing problems due to the mismatch in the timing of its financing costs and the revenues from T5. Furthermore, as T5 would increase the RAB and thus raise BAA's price cap, concentrating the increase in a one-off adjustment in the RAB would lead to a substantial jump in users' costs. The CAA concluded that this would result in an inefficient profile of pricing, with weak investment incentives for BAA.

The solution was to allow a step-wise increase in the RAB, with milestones in the construction process for T5. Reaching these milestones 'triggers' the increase in the RAB. In addition, the mechanism has provisions for penalising BAA for failure to meet the milestones.

Key questions that arise in the application of trigger mechanisms include how to derive a precise definition of the triggers at the outset of complex projects and thus avoid ambiguity in the choice of milestones, which could lead to disputes. The CAA has raised a number of concerns about continuing to use CAPEX triggers in the next control period to incentivise timely investment.

Returns premia for bearing risks

Typically, regulators allow a single rate of return across the regulated activities,¹⁰ but is this approach appropriate? There may be different levels of risk across activities, and business elements may face different regulatory treatment.

Furthermore, where the driving force is the need to provide incentives to undertake a particular type of investment which may be consistent with public policy, an alternative approach might be to reward companies directly for bearing such risks. For example, Ofgem (the UK energy regulator) has introduced a two-part incentive framework for the regulation of distributed generation connections to distribution networks. It remunerates capital costs via a pass-through element funded by the price control, together with an incentive rate based on the quantity of distributed generation connections. Ofgem has adopted an 80% pass-through rate for the incentive scheme, with the pass-through element, less the level of any direct connection charges, being recovered over the 15-year assumed asset life. This level of pass-through CAPEX is then remunerated through the asset base, earning a return equivalent to the cost of capital.

Thus, in addition to the pass-through element, Ofgem has provided a supplementary revenue-based incentive rate driven by the amount of distributed generation capacity connected. On the basis of the average costs of distributed generation schemes reported by the distribution network operators, and recognising the high degree of uncertainty surrounding these figures, Ofgem has set the level of the incentive rate at £1.5/kW per year.¹¹ This incentive level, applied over the assumed average asset life, together with the recovery of pass-through capital costs, would imply that the average distributed generation scheme could earn a return of around 1% above the cost of capital.

The combined use of pass-through and incentive-rate elements for the distributed generation regulatory framework is designed to mitigate uncertainty with respect to revenue and cost recovery, while also

providing strong incentives to deliver efficient investment in new capacity.

In the 2003 price control review for BAA, the Competition Commission's recommendations to the CAA for BAA's cost of capital included a specific Heathrow T5 cost of capital premium.¹² This allowance was intended to reflect the impact of such a large capital project on overall risk—for example, on increased gearing and the risks of not meeting price control triggers. The T5 uplift was applied to the whole of BAA, not just Heathrow Airport, partly because the Commission considered that the risks associated with T5 affect the whole of BAA.

A crucial question that might arise in the application of similar approaches elsewhere is whether such incentives are consistent with the underlying risk characteristics of the required investment.

Concluding comments

The issue of providing adequate incentives for investment has been at the forefront of utility regulation since privatisation in the UK. During this time, regulated utility companies have faced increasing CAPEX requirements, and regulators have responded to the need to incentivise investment in infrastructure through a variety of approaches aimed at mitigating risk and enhancing returns to companies for bearing certain risks.

As regulators readily acknowledge, further efforts need to be made in this regard. Indeed, Ofwat and Ofgem have published a joint paper on prominent issues affecting the UK water and electricity industries.¹³ Key among these are the impact of gearing on companies' management and on incentives for efficient investment, and regulatory commitment that arises due to the timing mismatch between the price-setting cycle and the long-term nature of financing infrastructure businesses. The paper notes that 'regulators have already adopted some flexibility mechanisms to address unanticipated changes in certain costs.'

It is clear from this review of infrastructure incentives that a 'one-size-fits-all' approach is not appropriate, given the risk characteristics and future priorities facing each industry.

There is another side to the financing of infrastructure investments, including market mechanisms and alternative approaches that companies may adopt. A forthcoming *Agenda* article will consider these in detail.

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- ¹ See 'Staying Switched On: The Cost of Energy Security', in this month's *Agenda*.
- ² Ofwat (2004), 'Future Water and Sewerage Charges 2005–10: Final Determinations', December, p. 21.
- ³ Flyvbjerg, B., Bruzelius, N. and Rothengatter, W. (2003), *Megaprojects and Risk: An Anatomy of Ambition*, p. 44, Port Chester, NY: Cambridge University Press.
- ⁴ Flyvbjerg, B., Holm, M.K. and Buhl, S.L. (2002), 'Understanding Costs in Public Works Projects: Error or Lie', *Journal of the American Planning Association*, **68**:3, summer, pp. 279–95.
- ⁵ ORR (2000), 'The Periodic Review of Railtrack's Access Charges: Final Conclusions', October.
- ⁶ Ofcom (2005), 'Ofcom's Approach to Risk in the Assessment of the Cost of Capital', August.
- ⁷ In principle, cost pass-through can be partial or complete.
- ⁸ Logging up can be applied with or without simultaneously including the associated financing costs. Where the mechanism includes these financing costs, a company is allowed to recover unexpected costs and also earn a return on those costs.
- ⁹ Postcomm (2005), 'Royal Mail Price and Service Quality Review: Final Proposals', December.
- ¹⁰ Ofcom's recent disaggregation of BT's allowed rate of return across different businesses is a recent case of a deviation from the norm.
- ¹¹ Scottish Hydro Electric has been set a higher incentive rate (£2/kW per annum) to reflect the higher level of distributed generation unit costs (including shared and strategic assets).
- ¹² Competition Commission (2003), 'BAA Plc: A Report on the Economic Regulation of the London Airports Companies', November, p. 179.
- ¹³ Ofwat and Ofgem (2006), 'Financing Networks: A Discussion Paper', February.

If you have any questions regarding the issues raised in this article, please contact the editor, Derek Holt: tel +44 (0) 1865 253 000 or email d_holt@oxera.com

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