

COMMENTS WELCOME

Information, Accounting and the Regulation of Concessioned Infrastructure Monopolies

Phil Burns

(London Economics)

and

Antonio Estache

(World Bank and

European Center for Applied Research in Economics)

We would like to express our gratitude to Ian Alexander for useful comments and suggestions. This paper represents the view of the authors and should not be attributed to any of the institutions to which they are affiliated with. In particular any factual or conceptual mistake is ours and ours only!

1. Introduction

The regulation of monopolies is often characterised by economists as a “game” between the regulator and the service provider in which the two players do not share the same information. The regulator is assumed to initially have poorer information regarding the scope of future efficiency gains, and the size and timing of future investment plans than the service providers themselves. But the regulator can learn more about the efficiency of the private operator but to be successful at this, an effective regulator should ensure over time that its information basis increases, and that its ability to process that information effectively also improves, so that regulatory targets will evolve to become more realistic.

However, this is a costly process: the initial ineffectiveness of regulation resulting from information gaps creates allocative inefficiencies but just as importantly carries political and social ramifications which can endanger the stability of the regulatory regime. In developing countries, this influences the incentives to operate efficiently and the cost of investment and often ends up threatening the sustainability of the increased role of the private sector in the delivery of infrastructure services and ultimately, the foundations of the overall reform process itself.

The various ways in which information can and should be generated, in particular through the accounting requirements a regulator can impose on the concessionaires is the main focus of this paper. It should be clear that this paper does not regard concessioning and regulation as substitute activities. For typical concessions of infrastructure services of twenty years or more, it is inevitable that the expectations of the market at the time of the bidding process will differ from the outcomes. Regulatory reviews will be required at periodic intervals to adjust prices to reflect the underlying cost structure of the business, in order to maintain the business’ viability in the face of unfavourable outcomes, and to share benefits with customers when the outcomes are better than expected. Consequently, the concessioning process should be seen as a complement to future regulatory processes

The paper is structured on the following lines. Section 2 summarises the basic objectives that regulators must be able to focus on, emphasising the need to encourage efficient behaviour and some of the trade-offs they need to address. Section 3 describes how regulators typically set tariffs in order to illustrate the onerous information requirements. Section 4 discusses the role of information in some of the basic features of contract design. This covers the information flows that should exist at the time of the concession - first from the government or regulator to the bidders, and then from the bidders to the government. Section 5 draws the analysis together and shows how the information can be used at subsequent regulatory reviews. Section 6 concludes.

2. Information and choices of regulatory objectives

At the broadest level the regulatory objectives are to:

- Protect customers’ interests regarding prices and quality of service

- Ensure that the business, operating efficiently, can finance its activities
- Promote efficiency
- Fulfil obligations as decided initially by policymakers (such as a national uniform tariff)
- Ensure that the regime is sustainable and robust

Most of these objectives are obvious, but that of promotion of efficiency reveals the tensions at the heart of regulation. There are three aspects of efficiency that regulatory regimes should aim to promote: static productive efficiency, allocative efficiency and dynamic efficiency.

- *productivity gains* can be made from:
 - improvements in the performance of existing assets. For generation plant, for example, this would be in terms of improved availability, thermal efficiency and flexibility of running;
 - reduction in manning levels; and
 - more cost effective procurement.
- *allocative efficiency gains* can be made from cost reflective pricing
- *dynamic efficiency gains* can be made from:
 - the introduction of new technology; and
 - rationalisation of investment in new capacity.

Some regulatory regimes may not satisfy all of these objectives. For example, a regime that focused too strongly on incentives to promote allocative efficiency may prejudice productive efficiency gains, and also distort investment incentives. On the other hand, a regime that offered strong profit incentives to improve efficiency would not be allocatively efficient and could engender popular discontent about the conduct of regulation. This may render the regulatory system unstable, increasing the risk of asset expropriation by regulators, resulting in a level of investment well below the needs.

If the regulator had complete information about the scope for efficiency improvements and the optimal timing and level of investment, he could set tariffs accordingly and there would be allocative, productive and dynamic efficiency. However, these conflicts and trade-offs exist because the regulator is ill-informed about both these costs. This lack of information is the reason why regulation ends up striking a balance between the three efficiency objectives.

The spectrum of possible regulatory regimes ranges from very high powered incentive contracts (where the regulatory rules give strong incentives for improved performance) to very low-powered regulatory regimes (where incentives on the concessionaire to improve performance is low). The regulatory and institutional ingredients that make up a low powered monopoly regime are:

1. Bureaucratic, rigid and intrusive regulatory structures implying a lack of flexibility and adaptability.
2. Complex and contradictory objectives devolved to management by the regulator.

3. Prices based largely on the firm's own costs, implying frequent profits confiscation (cost plus or rate of return).

Those which make up a high powered regime are:

1. Managerial objectives are ring-fenced from public policy objectives, so that the running of the business is decentralised to the managers, within a well-defined framework.
2. Tariff controls which are based on exogenous information, and where the business is able to retain the profits of improved efficiency (price caps).

Two broad characteristics therefore define the incentive power of a regulatory regime for monopoly businesses- the amount of control that is de-centralised to management; and how far prices are decoupled from costs. The extent to which the mechanism of regulation is high-powered or low-powered depends to a large extent on whether regimes are likely to be sustainable. Low-powered regimes are not particularly efficient, but the extent to which high-powered regimes are sustainable enough to deliver efficiency gains is an important question. Starkey and van Pelt (1995) draw attention to the key premise underlying high powered regimes which is that:

increased profits for the firm will be viewed by regulators and their constituency as something other than a failure of regulation itself. If this premise is false then the regulators will be under constant pressure to recontract when the firm reports higher profits.

The information requirement that can be embodied in the concessioning processes may relieve some of these tensions, but first we consider precisely where the sources of information asymmetry lie by considering how tariffs are typically set by a regulator.

3. How much information is needed to set a tariff?

There is a range of choices of regulatory instrument available to the regulator of monopolies, and as well as determining the efficiency and sustainability of the regime, these choices have profound implications for the informational burden placed upon the regulator. In this section we briefly describe the process by which the regulator sets tariffs at different points in the spectrum of price control options.¹

3.1 Pure price control or Price Caps

Under this regime, the regulator sets (and re-sets) a CPI-X target from the existing price level, where X is the regulator's best estimate of future productivity growth. This was the

¹ These regime also differ along other dimensions. Most importantly maybe for developing countries is that they imply different distributions of risks between the investors, the government and the users. Simplifying somewhat, the differences can be summarised as follows. Under price caps, risk is borne by the investor, under the other regimes, risk are shared with either the government or with the users.

starting point for regulation in various sectors Argentina and in all sectors in the UK and offers maximum incentives for the business to improve efficiency. This can be a light handed form of regulation--also under many of its designs it can be as demanding as the regimes discussed below. Under a very simple design in which prices of the various products are capped individually, as in gas or electricity in Argentina, it simply require the regulator to forecast future productivity growth, and not to adjust prices for past excess profits. The regulator can look backwards at the firm's historic achievements, or can use comparative information from other similar businesses (yardstick competition). Since the setting of this type of control requires only the most basic of checks to ensure that the profits resulting from the application of the control are reasonable, this type of control may lead to sustainability problems described above.

3.2 Price control with frequent adjustments to ensure that profits are normal *ex post*

The guarantee that *ex-post* profits reach certain levels is what is achieved through rate of return regulation. This regime is representative of the US system as it evolved in the 1970s. It gives little incentive to operators to cut cost but it has the interesting feature of protecting investors in risky environments and may end up convincing some of them to bid for deals they would have not otherwise considered given the levels of risks involved. The problem is that the information requirements are demanding, and in order to allow the regulators to retain control, especially over investment decisions, this regime virtually places regulators in a position to run the business. This confuses the roles of managers and regulators.

3.3 Price control which attempts to achieve, *ex ante*, a normal rate of return for the firm²

Neither of the previous two models may provide the basis for a sustainable and efficient model of regulation. An intermediate scheme is one in which regulators attempt to set prices which recover an efficient level of costs, *ex ante*, but *ex post*, the firm is given incentives to beat the control because it will not be reviewed for a period of time. However, when the price control is reviewed, the regulator returns the benefits of efficiency improvements to the customer from then on.

Regulators proposing this form of control use an accounting approach in which asset values, capital expenditure, depreciation and operating expenditure profiles are forecast, along with a cost of capital, in an attempt to deliver, *ex ante*, a fair distribution of returns between shareholders and customers. This broadly reflects UK regulation as it has now evolved and is served as a model in Argentina and Brazil for instance where the main implementation problems centre around the informational requirements.

² For a more detailed description of the exact steps that have to be followed, see Green, R. and M. Rodriguez-Pardina, "Resetting Price Controls for Privatized Utilities: A Manual", forthcoming in 1998 EDI Technical Paper.

The remainder of this section describes the informational requirements in some depth. To ensure that there is a fair division of gains between customers and shareholders, the targets implicit in price controls need to be realistic and measurable. The first step for the regulator is to establish the allowable revenue of the business on which to base a price control. This is required in order to be able to implement the specific control the reformers have selected.³

3.3.1 The calculation of allowable revenue

There are two equivalent methods to calculate allowable revenue: the *cash flow* approach and the *traditional accounting* based method.

In the more traditional accounting based method, over the price control period, revenues should be expected to cover:

1. Operating costs; plus
2. Depreciation; plus
3. A return on capital

The cash-flow approach sets regulated revenues over a price control period equal to:

1. the present value of operating and capital expenditures over the period; plus
2. the present value of the change in the asset value over the period.

The first of these components ensures that the business can conduct its on-going activities; the second maintains the value of existing assets. Any expropriation of asset value is made transparent. Box 1 illustrates how this approach was used by the U.K. regulator to calculate transmission revenues to be earned by the National Grid Company.

3.3.2 The inputs into the allowable revenue calculation

The inputs into the allowable revenue calculation under either method are:

1. Operating Costs
2. Capital Expenditure
3. An opening asset value
4. Depreciation
5. Cost of Capital

We will briefly review each of these in turn

³ The regulator can opt to set a control on price per unit sold, a control on revenue, or a hybrid of the two. For multi-product businesses, the regulator may set a price limit on a basket of prices and products, or simply set an average revenue yield constraint. A discussion of the exact form of the price control, and their implications for economic efficiency is beyond the scope of this paper.

Box 1: The Cash-flow approach used by Offer in the NGC price review

The table reports the calculation of transmission revenues (severe case) to be earned by the National Grid Company in Britain, made by the regulator in his 4th Consultation Paper. The regulator eventually based his price control on a slightly more lenient revenue allowance.

Calculation of transmission business revenues⁴					
	1997/8	1998/9	1999/0	2000/1	Total
Operating Costs	350	342	323	304	
Capital Expenditure	194	155	154	213	
Total	544	497	477	517	
PV of outlays at 6.5%	527	452	408	414	1801
PV of asset values	4040			-2971	1069
PV of costs					2870
Unregulated Revenue	128	116	118	108	
PV at 6.5%	124	106	101	87	418
Regulated Revenue	735	705	677	650	
PV of regulated revenue	712	641	578	521	2452
PV of revenues					2870

The derivation of the closing value is shown below. The opening asset base of £4040m is rolled forward by expected capital expenditure less the allowed depreciation to obtain a closing value of £3823m. This is discounted back to the present by dividing by $\frac{1}{(1+r)^4}$ where r is the regulator's estimate of the cost of capital (6.5%) and raising to the fourth power reflects the fact that the control lasts for four years. The discounted closing value is therefore $3823/1.2865=2971$.

Derivation of the asset value				
	1997/8	1998/9	1999/2000	2000/1
Opening Value	4040	4007	3930	3849
Depreciation	-227	-232	-235	-239
Capital Expenditure	194	155	154	213
Closing Value	4007	3930	3849	3823
PV of Closing Value	4007			2971

⁴ The Transmission Price Control Review of the National Grid Company. Offer 4th Consultation Paper. Offer: UK

Operating expenditure

The regulator needs to evaluate:

1. the current levels of operating costs; and
2. the efficient level of operating costs

Operating expenditure forecasts may be based on either exogenous information or firm-specific information (either historical or current). Regulators cannot observe directly this information and may find it difficult to build up a reliable picture of firm-specific costs. The financial components of the bidding documents will often cover some of this information but in most developing countries, these models will have to be revised by the private operators once they get a better idea of the value of the assets. It may be worth to point out that if the regulator uses firm-specific information based on these models, it may be tempting for the company to change some of the accounting outcomes to affect regulatory behaviour. This is why it is often suggested that using exogenous information will provide the regime with sharper incentive properties.

In Chile's water sector or in Spain's electricity sector, model companies provide a benchmark to which the performance of actual companies is compared. This model companies take into account technology, asset age and reasonable operating conditions. Another benchmark can be obtained through the introduction of yardstick competition. This can be a particularly effective form of regulation combining firm-specific information with exogenous information. Under this approach, a regulated business is regulated by reference to its actual -- rather than fictitious -- peers, thus, if all firms are expected to achieve the same rate of productivity growth, then those firms which do best, make the greatest profits, whilst poorer performers make lower profits. Such a form of regulation is predicated on the assumption that a sufficient number of comparators exist for each business to be regulated in this way. We discuss yardstick competition in more detail in section 3.4.

Capital expenditure

Expectations of the level and speed of future capital expenditure are crucial in such capital intensive businesses. Whilst operating productivity trends are reasonably stable over time, capital expenditure is different. Investment is both lumpy, and can be postponed or brought forward by the operator. Two major problems emerge - *ex ante*, how is investment forecast, and *ex post*, how does the regulator deal with divergences between expected and outturn capital expenditure at each review.

Engineers' reports, benchmarking against other businesses and the submission of business plans can assist in forecasting investment requirements, but it is inevitable that there will be divergences between expectations and outcomes. The crucial issue in providing investment incentives is the treatment of investment over-or-under-spend relative to forecasts at each regulatory review. We deal with this issue in section 3.3.3 below.

Asset valuation and depreciation

This has proved an extremely controversial area, especially in countries where the privatisation and regulatory experience is still relatively new. Regulatory asset valuation should be the fixed point of any regulatory system - the rules should be clear and transparent in order to minimise the risk to shareholders that their investments will be expropriated by an opportunistic regulator. The problem in privatised businesses is that utility assets are usually sold at a value which is quite different from (usually less than) the current cost (CC) valuation of the assets used. The important question is, do regulators use the current cost value of the assets, or another value which reflects the price at which the assets have been sold? Where possible, regulators have steered away from using current cost values as a basis for regulation and instead have derived a regulatory value, based upon the flotation value of the assets, and then rolled forward by net investment. The depreciation profile reflects this choice of asset valuation, for it is charged on the regulatory, rather than CC value. This avoids giving investors a return on assets valued at a higher price by the regulator than was actually paid by investors.

For a concessionaire which has paid a transfer to the government to operate a business at a pre-determined set of prices, these issues could be important. Regulatory disputes could emerge regarding what the concessionaire actually bought with that transfer - a stream of future earnings or a return on the pre-existing and future asset base. Issues relating to the depreciation profile of old as well as new assets therefore assume a particular importance, and should be signalled by the government during the bidding process. Where the success criteria for a bid is determined by which rival can offer the lowest customer prices, then old assets are explicitly written down to zero, but there will still need to be regulatory treatment of any exit payments to concessionaires for the value of underappreciated assets. On the other hand, if the rivals bid a lump sum to run a franchise, then the outgoing concessionaire could receive the highest bid, since this reflects the value of the assets as they currently exist. However, this value is based upon the future stream of earnings, which is determined by the price set by the regulator throughout the forthcoming franchise. If the regulator unreasonably ratchets down prices for the period of the new concession, then this effectively expropriates the value of the assets built in the previous concession. Generally, therefore, new investment undertaken by the concessionaire needs to be transparently treated by the regulator at each review, as part of the process of rolling forward the asset base, and charging depreciation upon it.

Cost of capital

The cost of capital has also been a contentious issue in regulation. It is necessary to compute the weighted average cost of total (debt plus equity) capital to provide a return to investors and sustain the asset base. The cost of debt capital can be observed from published information, but the cost of equity capital needs to be estimated from market data using techniques such as the capital asset pricing model (CAPM).

A particular problem quite common in developing countries is that a concessionaire may not be a listed company so that market data is not available. Another problem with market based data is that it is part of a larger conglomerate, implying that market data will include not only the regulated activity, but also the characteristics of the other activities the firm is involved with. In most recent Latin American privatisations, a few large local groups involved in multiple activities would join foreign investors and operators in a consortium and very little information on the infrastructure segment of their activities can be extracted from the local stock markets.

These problems can be overcome through a number of alternatives. A common solution is to rely on close comparators. Other domestic or regional companies quoted locally or similar international companies can provide useful comparators in some sectors as telecoms for instance where private operators are common in many regions of the world. The alternative is to use benchmark ratios based on international best practice. This information is increasingly available from various international organisations or watchdogs in every sector. For water, the Asian Development Bank and the World Bank are for instance putting together a data base which includes some data on the cost of capital. In telecoms and energy, many publications are available on the market that generate this information. The quality of the data is not always ideal but it certainly provides a feeling for what the international experience is. No solution is of course perfect and in the end, a mixture of approaches, depending on the types of problems faced, is likely to provide an acceptable range for the allowed rate of return.

Box 2: How to compute the cost of capital?

The standard approach adopted by regulatory agencies and governments is to use the weighted average cost of capital (WACC). Formally, WACC can be estimated by:

$$WACC = [(1 - g) \times r_d] + [g \times r_e],$$

where g is the level of gearing/leverage in a company, i.e. the proportion of debt in the total capital structure (i.e. debt + equity); r_d is the cost of debt finance. This is simply measured as risk free rate, r_f plus a debt premium over this rate, p_d . The premium is either measured directly from the yield of a company's bond or through comparator information—yields on new bonds are listed in the Financial Times at the date of issuance and are available from commercial information sources on a daily basis-- and r_e is the cost of equity finance; its estimation raises bigger problems and yet for privatised infrastructure monopolies, it is quite important since access to debt finance can be quite restricted for many developing countries privatisation projects. One of the common approaches adopted to measuring the cost of equity is the Capital Asset Pricing Model (CAPM). This estimates the cost of equity as:

$$r_e = r_f + b_e (r_m - r_f)$$

where: r_e is the cost of equity finance; r_f is the risk-free return; b_e is the equity beta which measures the relative riskiness of the company's equity (and sometimes the sector's riskiness) compared to the market as a whole; its value depends on the type of regulation used; r_m is the level of market return; and $r_m - r_f$ is the market risk premium. Establishing the values for each of these items is relatively straight-forward when developed capital markets exist and companies are quoted on a stock exchange.

Approximations have to be used in most less developed countries. The average asset beta in infrastructure (which accounts for the leverage in the capital structure of the projects) is around 0.7 for high powered incentive regimes and around 0.3 for low powered incentive regimes.

Note: for quick review of how to estimate this cost of capital, see Alexander, I and A. Estache (1997), “A back-of-the-envelope approach to assess the cost of capital for network regulators”, mimeo, The World Bank, December; for a more detailed analysis, see Alexander, I, C. Mayer and H. Weeds (1996), Regulatory Structure and Risk in Infrastructure Firms: An International Comparison”, Policy Research Working Paper 1698, World Bank

3.3.3 Re-setting price controls and the treatment of capital expenditure

The price control will periodically need to be reset. It is preferable to specify this period *ex ante* to preserve incentives in the absence of profit sharing mechanisms built into the formula. Prices may be reset by moving the regulated price level to the prevailing level of costs (through a so-called P_0 cut), and thereafter a new X factor would apply. Thus, companies keep the profits from extraordinary or unanticipated efficiency improvements for up to five years, when the gains are transferred to customers through lower prices. Alternatively, the regulator could choose not to impose a P_0 cut and instead set the X factor so that expected economic profits are zero at the end of the period rather than throughout the period, thus allowing the company to enjoy the profits of its efficiency gains for rather longer. In either case, a kind of inter-temporal profit sharing system operates.

During the price control period, however, the treatment of capital expenditure poses some rather difficult questions. Investment can be postponed or even cancelled--often because demand is overestimated by the bidders on a new concession based on the information made available by the governments because typically public enterprises have very little relevant information on demand. It is also often lumpy rather than occurring uniformly over a number of years, and the assets invested in are long-lived. This makes forecasting investment extremely difficult for regulators and it is almost inevitable they will make errors in the early years of concessions. Indeed, having made that forecast, the incentive is on the firm to pass the cash that would have been used for investment to shareholders, thus boosting the value of the business. For example, in the UK, the Northern Ireland Electricity spent £50m less on investment than was anticipated at the time of privatisation.

However, the regulatory treatment of this problem has implications for the incentive to invest. When the regulatory asset base is updated from one price review to the next there is an issue of whether the *ex ante* or *ex post* data is used. The choice of value has implications for the level of incentives for the company to undertake the investment at a lower price than that forecast. These incentives are summarised in Table 1. It shows that the decision between whether to use *ex ante* or *ex post* data, or a possible compromise between the two which might allow efficiency savings to be kept for a maximum of 10 years rather than five⁵, depends on a number of factors. These include:

- the overall importance of the investment program;
- the expected level of efficiency savings; and
- the ability of the regulatory body to establish the efficient level of investment for the company.

5 This is the system that is being put in place in the water industry in England & Wales.

Table 1 : Incentive effects of alternative valuations of new investment

Approach	Positive incentives	Negative incentives
<i>Ex ante valuation</i>	<ul style="list-style-type: none"> Since savings are kept forever there is the maximum incentive to push the actual cost of investment down as low as possible. There is an incentive to delay those projects that should be delayed 	<ul style="list-style-type: none"> There is an incentive to quote high prices for investment to maximise the savings. This makes intrusive regulation more necessary.
<i>Ex post valuation</i>	<ul style="list-style-type: none"> There is an incentive to undertake investment as cheaply as possible since the gain is kept for a maximum of five years. Efficiency savings are only kept for the lifetime of the project and so there is a bias to undertaking investment early in the control period which may be quite good when the need to expand coverage fast is important. 	<ul style="list-style-type: none"> Small efficiency gains may not be sought after if the additional return to the company is minimal. The incentive to delay investments is minimised which may lead to unnecessary investment being undertaken.

Clawback of capital investment under-spend

An important concern in developing/reforming countries where one of the main reasons for privatisation is to attract private investment to meet the pressing needs to expand service coverage is the risk that these investors will face incentives to under-invest. In Argentina's toll road concession program, one of the major issues was that investment has been from the beginning behind schedule. This issue is in fact also relevant in some developed countries. It was recently debated in the UK by the Monopolies and Mergers Commission with respect to the price review of Northern Ireland Electricity (NIE) by regulator and the debate provides a useful conceptualisation of the problem.

The issue at stake was whether under-spend on investment should be clawed back. In principle clawing back unspent money goes against the philosophy of incentive based regulation - this should be seen as being different to employing *ex post* investment figures in the updating of the regulatory asset base since the incentive to be efficient is not affected by this decision. The first step is to understand the reasons for underinvestment.

There are three possible reasons why a company would under-spend on capital expenditure (or even operating expenditure):

- owing to unanticipated efficiency savings the money was not needed (except as an incentive to be more efficient);

- the expenditure was delayed for a variety of reasons that may not be equally valid, or
- the company was successful at fooling the regulatory body as to the level of expenditure that was required.

The first reason is entirely acceptable to justify the existence of underspend. The final reason, while not acceptable, is the fault of the regulatory body (or its design) and so is to an extent part of a learning process that should be accepted but definitely not repeated. It should tell the regulator that some rules and processes need to be clarified.

The second explanation is more subtle. It can be interpreted in two ways:

- capital expenditure was not undertaken because it was possible to delay the project and achieve the desired output from a cheaper alternative; or
- capital expenditure was not undertaken because the company simply did not get around to it.

The first of these options is an acceptable efficiency saving while the second is unacceptable. It was the latter reason that NIE put forward for some of its under-spend on capital expenditure— or, at least, the fact that management were distracted from investing by the need to concentrate on the privatisation of the company. Since the under-spend was in excess of £50m both Ofreg, the regulator, and the MMC decided that some clawback of this money was required, especially as it was unclear whether NIE had included the delayed projects in its new capital expenditure forecast.

Clawing back money does, however, create perverse incentives for companies. If there is an expectation of unspent money being clawed back, companies will ensure that they spend all that they are forecast to, so removing the incentive to become efficient. There are ways of overcoming this which are primarily concerned with the establishment of unanticipated efficiency savings. Work is being developed on how companies should report their annual investment out-turn figures to provide the regulatory body with sufficient information to determine the levels, and possibly the causes, of unanticipated savings.

While this approach may seem intrusive, the point being made in this section is that there is a trade-off between allowing companies to keep what may be significant amounts of under-spend, creating perverse incentives through arbitrary claw-back, requiring intrusive regulation at the price review, or requiring annual reporting. Once more the core issue is the design of the information needed to support effective and fair decisions by the regulators.

3.4 Yardstick Competition

Under yardstick competition, the price charged by a regional monopolist is determined by the costs of the other regional monopolists. Assuming that the businesses are perfectly comparable, then setting prices for each business at the average level of costs in the industry gives strong incentives for businesses to reduce their costs, which obviously has the effect of reducing costs and prices in the industry as a whole. If businesses differ in some respects (because of their geographical or topological characteristics), but the manner in which they

differ can be unambiguously identified, then the regulator may simply adjust the prices for each business by the extent of the costs which are outside their control.

If the extent to which the costs of firms differs due to inefficiency and due to factors beyond their control cannot be separately identified with certainty, then measurement problems enter into a yardstick regime. In this case, particular econometric techniques need to be used to separate inefficiency from factors beyond the firms' control. The measurement of efficiency in this context is not a trivial task. The two principle methods to measure productivity and efficiency are to estimate the cost function of the businesses using econometric techniques, or to use mathematical programming techniques to measure the movement of the production function over time. Burns and Weyman-Jones (1994,1996) employed both methodologies to obtain efficiency and productivity estimates in the England and Wales electricity distribution business.

However, these models cannot precisely measure relative efficiency because the simple representations of firm behaviour are only approximations to the true cost function of the business. The data simply do not exist to identify all the firm-specific characteristics of the activity being considered, and therefore it is very difficult to decompose efficiency (over which the firm has control) and factors which cause the incurrence of costs, but over which the firm has no control. Thus, it may not be possible to adopt a strong form of yardstick competition when businesses are heterogeneous in their characteristics.

This does not mean that these approaches are useless, it simply means that it will take time before the investment in good data payoffs. The Australian government has undertaken a series of international benchmarking overviews which compares the performance of Australia's infrastructure performance to those of the rest of the world. In that context it has developed a series of data bases which can be consulted by any regulator in the world. Australia's Industry Commission has a site on the Internet and all of its data can help any regulator a first comparative look. This is not sufficient however and more formal techniques are essential in order to obtain meaningful comparisons.

To get a handle and accept the use of the more technical approaches, a few facts may be have to be appreciated. It is important to recognise for instance that if the factors outside of the control of the business are stable over time, then estimates of productivity over time will generally be reasonably robust. It is then legitimate to argue that although the regulator does not know the efficient *level* of costs, econometric and data envelope analysis should enable him to gain a reliable estimate of the *rate of productivity growth* that the firm should be able to attain. On that basis, the regulator can adopt a weaker form of yardstick competition, which is to set a price reduction target that is equal for all businesses, on the grounds that whatever level of prices and costs comprise the starting point, all the businesses should be able to achieve the same rate of reduction in prices without encountering financial difficulties. This appears to be the position of the UK electricity regulator, who has constructed the price control such that since privatisation, all the distributors in England and Wales have been required to achieve an annual average real reduction in prices of around 3% per year. This is despite the fact that distributors have achieved quite different productivity growth since privatisation, as Table 2 illustrates. However, this is likely to be due to differences in the timing of efficiency

improvements rather than any differences in the inherent ability of most of the business to achieve the same levels of productivity growth in the medium term.⁶

Table 2: Productivity growth amongst distributors in England and Wales, 1971-1993 (% p.a.)

Company	1971-1993	1971-1990	1991-1993
London	4.2	4.2	4.5
Seaboard	2.8	2.7	3.9
Southern	3.6	3.6	3.6
South West	2.1	2.2	1.2
South Wales	2.7	2.2	6.1
Manweb	3.2	2.5	7.8
Eastern	3.8	2.5	11.7
East Midlands	2.2	2.4	2.0
Norweb	2.2	2.2	2.2
Yorkshire	2.1	2.1	1.7
Northern	2.3	2.4	1.6
Industry Average	2.2	1.9	4.5

Source: P. Burns and T.G. Weyman-Jones (1994) *The Performance of the Electricity Distribution Business in England and Wales, 1971-1993*. CRI Discussion paper No. 8. Cipfa: UK.

4. Generating information while designing a concession

In addition to ensuring that it meets the main fiscal and other economic objectives assigned to the privatisation process, the design of the concession rules should:

- Attract a sufficient number of bidders to facilitate a competitive process;

...but also....

- Facilitate the provision of sufficient information by the authorities to reduce both market and regulatory risk and

6 Similar applied research on yardstick competition is currently under way in Brazil for the water sector. See for a rough draft, Crampes, Diette and Estache (1997), "What could regulators learn from yardstick competition? Lessons for Brazil's water and sanitation sector", mimeo, The World Bank, currently being significantly improved by the Planning Ministry in Brazil.

- Extract sufficient information from the bidders which can be used at future regulatory reviews.

These objectives are interactive: the number of bidders is important to ensure the generation of information is adequate. It is however important to recognise that information generation is a two way street and that the government needs to provide enough relevant information is provider to the potential bidders to ensure the success of the concessioning strategy.

4.1 The number of bidders

The larger the number of bidders, the better the chances of generating useful information for the regulators of the eventual winning monopoly. More data becomes available, comparisons of the various evaluations of the business can provide some robustness to the initial information the regulators will have to get ready for price revisions and conflict resolutions. The experience in developing and reforming countries suggest however that this source of information is not as effective as it sounds

In certain circumstances there may not be intense competition for concessions. Consider the experience of the transport sector in reforming and developing economies. The number of bidders in all transport concessions in Latin America have tended to be quite small. In Argentina, one of the reasons was the requirement that foreign investors had to join local partners in a consortium to be eligible to bid and they were not that many local partners to pick from. In Brazil, the government wanted to avoid a strong monopoly and imposed an upper limit of 20% of shares allowed for any single company in the bidding consortium. This forced many of the potential companies to work together and hence reduced the number of actual bidders. In transport privatisations in Eastern Europe, the limited number of bidders were explained by different factors--which are in fact quite common to all infrastructure privatisation in particular in Africa and some of the poorest regions of Latin America. When a project is relatively small, the transactions costs of putting together a bid are large, or if the project has sometimes been perceived to be risky because of the broader political, economic and legal environment. In such situations it may sometimes be preferable for authorities to negotiate a concession with operators chosen on the basis of their international experience.

Bidding processes may be also be unrealistic if particular clauses in the draft concession foreclose the process to potential bidders. For example, the Bulgarian government recently planned to award a concession for the maintenance of the existing gas pipeline and construction of a new pipeline for the transit of Russian gas both direct to the Bulgarian market and through Bulgaria to the Balkans and Turkey. A clause in the draft concession required that the concessionaire had to be able to guarantee the delivery of Russian, and consequently the market was foreclosed to all bidders except the consortium associated with Gazprom. Although one option would have been to drop the clause and treat the sale of gas by Gazprom as a separate issue to the construction of the pipeline, it was decided to abandon the tender process in favour of direct negotiations with Gazprom.

A bidding process may favour particular players over others. For example, Trinidad and Tobago (T&T) utilities policy required a rapid introduction of private sector participation in the water sector, but the information that could be provided to bidders was sparse - there were no audit reports, no least cost expansion plans or demand forecasts. Therefore T&T

adopted a two-stage process, whereby a 3 year interim operating agreement (IOA) would be awarded to operate the system and to gather information and data on the business and its prospects, which would form the basis for the tender for the Permanent Operating Agreement (POA). This clearly puts the Interim Operator at a distinct advantage in a tender for the POA, but on the other hand, the experience gained by the interim operator has value, so to exclude it from the bid for the POA carries a cost. Consequently, T&T decided to abandon the tender for the POA and negotiate directly with the interim operator for the POA.

So there do exist a number of reasons why a competitive bidding process may be unfeasible. However, when the competition of the bidding process is removed, it is all the more important for the authorities to elicit as much information from the potential concessionaire as possible through the negotiation process. The information flows however have to be bi-directional. They have to flow from the government to the bidders first in order to make sure that the government can make the most of the information that will then have to flow the bidders to the government and eventually the regulator.

4.2 Information flows from the government to the bidders

The information provided by the authorities to bidders at the time of the bidding process should include the following:

- The process and the success criteria
- The duration of the contract
- The scope of the contract - operational or investment
- The regulatory framework that will apply
- The targets for the outputs (including quality)
- The information to be received from bidders

This information is required by bidders so that the rivals can form a reasonable set of expectations about the future shape of the business and its costs. If there is uncertainty relating to the regulatory framework, or the nature of the targets, for example, then this is a risk for the bidders that will be reflected in the bids.

4.2.1 The process and the success criteria,

Although there are multiple variants, most concessioning processes normally have broad three stages: first, there is a pre-qualification assessment. Prior to the tender being formally opened, the authorities define the minimum requirements that bidders should comply with, such as relevant experience as a utility business, financial ability with experience and resources to invest in and operate the system.

Next, a number of groups are invited to bid to run the system. The technical submission covers a wealth of information and it is in making the information requests that fill the technical bid, that the process will have a significant impact on future regulation. The technical

bid will contain engineering reports that reveal how the bidder intends to meet the targets set down in the draft concession. The technical bid will also contain financial information relating to expected operating and capital expenditure which we discuss in section 4.3. Finally, each rival submits a bid to run the system, which can be either the amount they are willing to pay to operate the system, or the price they would be willing to charge to customers.

4.2.2 The duration of the contract

Some of the most extreme defenders of competition for the market (the ‘Chicago’ school) suggests that the process should be repeated frequently, and the concession given to the bidder that offers to supply on the best terms, thereby allowing the regulator to select the most efficient supplier at any point in time. Two objections are usually raised- first that the incumbent has an advantage over other bidders, but also that the incumbent has incentives to invest less than the social optimum because the bidding process will treat all past investment as sunk. Consequently, where little investment is required, the contract length can be short to promote productive and allocative efficiency, but where major investment programmes are required, the contract length needs to be longer to promote efficient investment behaviour.

The actual importance of the contract duration is most obvious in the recent wave of contract renegotiations in transport in Latin America. Whether in Argentina or in Mexico, one of the key aspects of the renegotiation has been the duration of the contract. Many operators want more time to recover their investments--i.e. longer amortisation periods-- so that they can allow for lower and hence politically more viable prices for their services. It is also one of the options being considered in the renegotiation of the Buenos Aires Water Concession. In fact, in many of these early contracts, it is becoming apparent that the risk of not extending the contracts to adjust to the new information generated by the private operation of the service will be either that investment plans will not be met or that investment quality may have to be adjusted downward.

4.2.3 The scope of the contract

When major investment programmes are a feature of utility businesses and there is little room for adjustments in the concession duration, one option is to consider splitting off investment and operations. In France it is increasingly common practice for local authorities to retain control of long term investment but to auction affermage contracts to operate the system and undertake shorter term investments.

Whilst the system does not work badly in France there are two drawbacks with this approach. The first is that private finance does not fund the investment programme, which is one of the reasons why governments wish to award concessions in the first place. The second is that unless the framework of controls is properly established, such a split between investments and operations could create perverse incentives. An example of this is water concessioning in Guinea. The concessionaire (SEEG) is responsible for maintenance and the state owned water company (SONAG) is responsible for investment. The concessionaire can increase profits by reducing its maintenance expenditure, leading to a faster deterioration in the quality of the network and an increased need for new investment.

The only way around the problem is to maintain a detailed asset inventory and rehabilitation schedule and again this information need to be spelled out ex-ante in the contract.

4.2.4 The output targets

The authorities should clearly define the output targets required to be met by the concessionaire. The targets will vary across industries and over time. Targets for a water and sewerage concession will cover:

- Coverage of the network;
- Requirement to offer a continuous water supply;
- Improvements to the network
- Drinking water quality standards;
- Environmental standards;
- Service quality standards; and
- Penalties for non-performance

For electricity, targets will cover

- Connection to the system;
- Electrification programmes;
- Quality, such as number and frequency of interruptions;
- Environmental control of emissions (for concessions to operate power stations); and
- Safety standards

The concession should specify the time-frame over which the targets are to be met, with penalties for non-compliance in particular cases. In setting the targets, the regulator must decide the appropriate mechanism of regulation as well as the appropriate level of the target. Some targets may take the form of a command and control, whilst others will be decentralised to the business within a framework of penalties and rewards. Whilst mechanisms may vary, it is vital that quality is regulated, since under an incentive contract without any quality standards, quality can be diminished in order to reduce costs.

4.2.5 The Regulatory Framework

In designing the regulatory framework it is important to identify to concessionaires what falls under legislation, the Articles of the Concession, the regulator's control, and the remit of any appellant bodies. If regulation was entirely rules based there would be no need for a regulator - the rules would be enshrined in law or in the concession. However, regulators exist because events occur which require the regulator to act with discretion. However, if regulators have too much discretion then bidders will price regulatory risk into their bids, so consequently, regulators should exercise discretion but within a well understood and transparent framework.

The key concerns of regulated businesses are whether their assets will be expropriated, whether changes in exogenous factors are recognised by the regulator; and how long they are able to keep the benefits of efficiency improvements. It is, of course, impossible to write a complete regulatory or concession contract which covers every eventuality because the monitoring and enforcement of the contract would be costly and encourage game playing by the concessionaire. Consequently, it is inevitable that a number of aspects will be resolved over the course of the concession. However, it is important that the information provided by the government gives clear signals to the bidders on the set of principles that will apply to the resolution of these issues.

As far as the treatment of investment is concerned, the regulatory framework should clearly signal the principles underlying regulatory asset valuation and depreciation policy. If there is a risk that assets will be expropriated *ex post*, then incentives to undertake the right amount of investment will be diminished. Consequently, the policy on asset valuation must be well established, but perhaps the most effective way of reducing risk on both sides - for the government in realising that insufficient investment has been undertaken, and for the company concerned about expropriation, is to profile the expenditure programme so that the bulk of it occurs towards the middle of the franchise - this would allow the business to raise cash in the early years of the franchise, but would allow the regulator to observe the effectiveness with which that cash was spent on investment.

For example, the concession for the Manila Water franchises stipulated the principles of re-basing of price to cost at each review. If prices were below cost by the time of each review, then prices would be adjusted upwards immediately, whereas if prices are above costs, then a glide-path would be put in place so that prices would fall to cost over time. This provides financial safeguards to the concessionaire, whilst at the same time gives incentives to make efficiency improvements through being able to keep the profits of those improvements for longer. An important issue, however, is the appropriate definition of cost, in order that prices rising to costs does not reward inefficiency - to establish this requires the provision of relevant information during the bidding process as discussed later

Bidders will also need to be assured that the principles of regulation established throughout the process will protect the concessionaire from certain unforeseen shocks and events such as changes in the law that effect the business, amendments to service obligations, and so on. The process should clearly establish the reporting requirements on the business - the extent to which it is ring-fenced from other activities it may be involved in, and the regulatory accounts for each business. It should also be made clear that the regulatory framework will take account of the output targets achieved or not by the concessionaire - examples of these are given in the next section. The purpose of giving signals at the outset is to eliminate as much regulatory risk as possible in order that bidders do not build a significant risk premium into their bid, causing higher prices/lower bids than would otherwise be the case.

4.3 Information flows from the bidders to the government

In the previous section we described the range of information that is required to flow from the government or regulator to the bidders at the time of the concession in order to

mitigate many of the regulatory risks that could result in higher prices/lower bids than would otherwise be the case. In this section we draw attention to the concerns of the regulator that it does not wish to be duped by the concessionaire at each regulatory review.

Ideally, the regulator would wish the bidding process to reveal each bidders expectations of the future in order that they can be benchmarked against outcomes. If the outcomes are the same as the expectation, then good information provided at the time of the bid will prove that this has been the case, and will enable the regulator to resist any demands by the business to relax the regulatory regime.

If, on the other hand, the outcomes are different to expectations, then the information provided will enable the regulator to act reasonably to change the regulatory parameters within the framework of regulation laid down. The regulator should therefore request from the bidders all the information that any sensible business would itself make use of before committing itself to a 25 year investment.

Consequently, the government should request from the bidders, for each year of the concession:

1. volume forecasts by customer type
2. number of customer connections by customer type
3. the cost of connection
4. disaggregated operating cost information
5. disaggregated investment information
6. key financial ratios
7. sensitivity analyses

Since the costs will be commensurate with the regulatory targets and with the bidders own expectations of volumes and connections, relevant information should also be forthcoming on cost estimates under alternative volume scenarios. The cost information should be as disaggregated as possible. The Ofwat regulatory accounting guidelines (RAGs) provide a benchmark of good regulatory practice.⁷ These 5 RAGs deal with:

1. Accounting for current costs
2. Classification of infrastructure expenditure
3. Contents of regulatory accounts
4. Analysis of operating costs and assets
5. Transfer pricing between businesses

⁷ They can easily be requested from OFWAT and are worth going through, considering that they are probably more of an upper limit on what a regulator can ask for rather than strict model or benchmark.

RAG 4 is particularly useful as a potential model for other regulators. It distinguishes between 5 business activities and 3 service activities. The service activities are: water resources and treatment, water distribution, sewerage, sewage treatment and sludge treatment whilst the business activities are: customer services, scientific services and costs of regulation. The separation of these activities allows a clear identification of the various profit and cost centres, including the cost of complying with regulatory demands.

Pro-forma accounts for each business, including standards for the allocation of fixed and common costs, attempt to extract relevant comparative information from all the businesses to be used at regulatory reviews. These accounts cover not only operating costs but also existing assets and investment to a disaggregated extent. In England and Wales, these are used to facilitate ongoing regulation - in a franchising context, these accounts represent the bidders' expectations of their future set of accounts, against which their actual accounts can be compared.

Of particular importance is the treatment of ongoing investment, and again, the information received in the pro-forma accounts that the business expects to fill in can also be compared to the actual accounts. The purpose of this information is to be able to evaluate the financial implications of any unforeseen events that the business should be protected from, but also, to properly account for any sharing of out-performance between the firm and the regulator.

Finally, the regulators should also obtain financial information from the bidders to evaluate their financial soundness throughout the course of the concession. The cost information they provide, together with the turnover information should be unified in a financial model to provide forecasts of:

1. the debt profile, both short-term and long-term debt
2. Liquidity
3. Dividend policy
4. Targeted minimum rate of return
5. Equity rate of return
6. Interest cover
7. Debt-equity ratio

To summarise, the array of financial investment can therefore be used:

1. To compare outcomes to expectations;
2. To evaluate the cost of adverse shocks that may warrant a relaxation of the regulatory regime;
3. To evaluate whether lower costs than expected is due to better performance or the diminution of the outputs; and
4. To properly evaluate the asset base and charge for the consumption of capital

5. Conclusions

This paper has argued that the information can be and should be used to address very technical issues and to monitor the overall performance of the provider of privatised infrastructure services. But to reduce the risks of abusive behaviour, the information generated should also be used to increase the accountability of regulators and companies alike. In Chile for instance, the privatisation of monopolies did lead to significant gains in efficiency but it took a long time before even a portion of these gains were passed on to the users.⁸ Neither the firms nor the regulators have been held accountable for this situation until recently when the Congress became reluctant to endorse a new wave of privatisation in the water and ports sector, arguing that consumers did not benefit enough from earlier waves of infrastructure privatisation.

More information makes it easier to scrutinise regulatory decisions and assessments because it makes it easier to understand who gains and who loses from regulatory decisions. This in turn makes it easier to understand the politics underlying decisions and the incentives the various players have to pull strings. More information should then be used to increase the transparency of regulatory decisions and reduce the risk of capture of the regulators by the private providers. Ultimately, what this paper has tried to show is that more transparent decisions are not only possible--i.e. the tools exist-- but also desirable because they will mean fairer and often more efficient decisions.

⁸ See Bitran, Estache, Guasch and Serra (1997)

References

- Alexander, I, C. Mayer and H. Weeds (1996), "Regulatory Structure and Risk in Infrastructure Firms: An International Comparison", Policy Research Working Paper 1698, World Bank
- Alexander, I and A. Estache (1997), "A back-of-the-envelope approach to assess the cost of capital for network regulators", mimeo, The World Bank, December
- Bitran, E., A. Estache, J.L. Guasch and P. Serra (1997), "Privatizing and Regulating Chile's Utilities: Successes, Failures and Outstanding Challenges", paper presented at the Seminar on Chile Development Lessons and Challenges, The World Bank, Washington, D.C. December 17-18,
- Burns, P. and T.G. Weyman-Jones (1994), *Regulatory Incentives, Privatisation and Productivity Growth in UK Electricity Distribution*, CRI Technical Paper No. 1. Cipfa: London.
- Burns, P. and T.G. Weyman-Jones (1996), Cost Functions and Cost Efficiency in Electricity Distribution: A Stochastic Frontier Approach, *Bulletin of Economic Research*. Vol. 48, No. 1, pp. 41-64.
- Crampes, C., N. Diette and A. Estache (1997), What could regulators learn from yardstick competition? Lessons for Brazil's water and sanitation sector", mimeo, The World Bank,
- Offer, "The Transmission Price Control Review of the National Grid Company - 4th Consultation Paper, Office of the Electricity Regulator, Birmingham, U.K.
- Shleifer, A. (1985), "A Theory of Yardstick Competition", *Rand Journal of Economics*. Vol. 16, pp. 319-327.
- Starkey, M. and J. van Pelt (1995), "Productivity measurement and price cap regulation: Issues for local exchange carriers in the USA", *Telecommunications Policy*. Vol. 19, No. 2, pp. 151-160.