frontier economics

Bulletin

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Comparing apples with apples

INTERNATIONAL BENCHMARKING AS A REGULATORY TOOL

Uncertainty about the efficient level of costs is part of an economic regulator's life. However, tools have been developed to decrease this uncertainty, or at least reduce its importance. This bulletin explores the use of benchmarking to ease the regulatory task.

Benchmarking is a useful tool for companies in assessing both their own efficiency and the performance of their competitors. By the same token, it has its place in the regulator's toolbox: a robust benchmarking model can be used to determine the relative efficiency of different companies and to set them reasonable targets. It can therefore be used as the first step towards "yardstick competition". But it is not without its difficulties, both conceptual and practical. In this bulletin we draw on Frontier's experience to describe how to develop a robust approach.

Setting price controls is a crucial part of the process of regulating privatised monopolies, companies with substantial market power and/or those providing public infrastructure. →

Without benchmarking, prices may be set at levels that oblige customers to pay for the inefficiency of utilities whose services they have no choice but to use.

Assuming that the regulatory job is not seen simply as achieving a politically-acceptable compromise, or setting prices related to what they have been in the past, the regulator can adopt one of two approaches.

- The first is to attempt a bottom-up construction of a hypothetical company that carries out the same services as the company under review. The costs of this hypothetical entity are then used as an efficient comparator. This approach was pioneered in Chile through the construction of "model" companies.
- The second is to benchmark the company under review against other real companies. This approach has been applied in several European countries and Australia, and it is increasingly popular elsewhere.

However, regulators frequently have to deal with companies for which there may be few or no domestic comparators. High-voltage transmission of electricity, for example, is typically carried out by a single company serving an entire country. In small countries, there may be only one or two electricity distributors. A further difficulty arises from the fact that all the companies operating in one country may be inefficient, and such weakness will not be shown up by purely domestic benchmarking. This will often be the case with newly-privatised industries. The solution we outline in this bulletin is to use international comparators. The methodology can, of course, also be applied to domestic comparisons.

START AT THE BEGINNING...

A very simple method of comparing the efficiency of companies is to look at specific ratios – for example, the ratio of the number of customers to the company's operating cost. The table below ranks a selection of companies on this basis. These are drawn from Frontier Economics' database of information on over 40 companies in a range of countries.

Company	Country	Customers / US$1000
Caribbean Utilities Company	Cayman Islands	11.77
Tenaga National Berhad (TNB)	Indonesia	2.42
Singapore Power	Singapore	1.20
Manila Electric Railway and Light Co. (MERALCO)	Philippines	1.13
Eskom	South Africa	0.58
National Electric Power Authority (NEPA)	Nigeria	0.52
Budapest Electricity Supply	Hungary	0.35

Source: Frontier Economics 2003

Note: based on published company accounts and Frontier assumptions

The table illustrates a number of problems thrown up by this attractively simple approach.

First, the choice of ratios. Had we selected total cost, rather than operating cost, as the denominator then the Caribbean Utilities Company would have dropped well down the list, while TNB would have achieved the best score. Second, the differences in the operating environment. The top-scoring company serves a very small, concentrated population, while the lower-scoring companies tend to be those that serve large, dispersed populations. Such factors can distort comparisons heavily.

The first problem can be solved by using well-established models that incorporate several different ratios, chosen to define the services carried out by the company and the

inputs required. The figure below illustrates such an approach. The two-dimensional analysis generates a frontier–an efficient level across both ratios–against which all other companies can be measured. A line can be drawn from the origin through the company's point on the chart to the frontier. The "efficiency score" is the ratio between the length of the line from the company point to the origin, and the total length of the line.

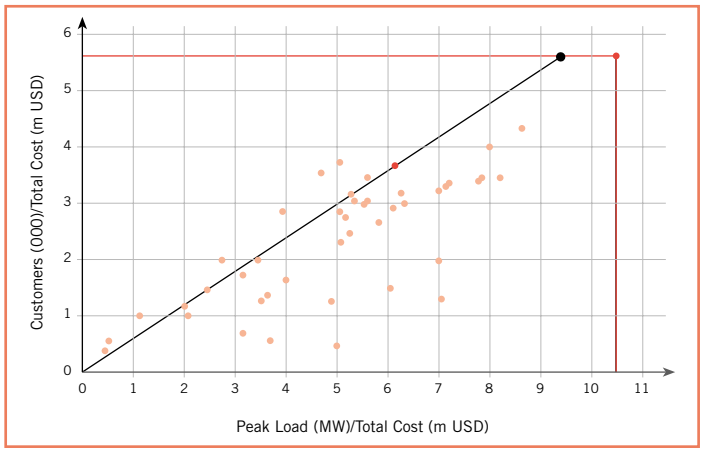

Figure: Two dimensional efficiency analysis

Source: Frontier Economics 2003

…DEVELOP A MODEL…

This two-dimensional analysis can be readily extended to multiple dimensions (adding more ratios) and to control for differences in the operating environment. Benchmarking has been greatly enhanced by the use of this multiple-ratio, linear-programming approach, known as Data Envelopment Analysis (DEA). Regulators often use regression techniques instead. But although these may be better at determining the cost drivers, they are not as effective at determining efficiency levels.

An obvious way to enhance the model is to include ratios that reflect the range of outputs, or services, produced by the company – for example, in the case of electricity networks, transporting electricity, meeting peak demand and connecting customers. On the input side, we can sub-divide costs. However, in international comparisons there are strong arguments in favour of sticking with total cost ratios: the relative costs of labour and capital differ between countries, which may lead to differences that arise from companies making efficient choices based on local costs.

The second question is how to control for different operating environments. At Frontier we have developed engineering-based network models to provide summary measures of network complexity that can feed into benchmarking analysis. If insufficient information is available for this then variables under the companies' control, such as line length, can be used.

In adding extra ratios, the difficult problem is knowing when to stop. Companies that score low will always argue for more to be included, increasing the risk that the benchmarking may fail to differentiate between them effectively. Consequently, the burden of proof should rest with those arguing for new ones to be included.

This approach highlights a number of issues:

(1) **How should costs be estimated?** The capital cost component of total costs presents particular difficulties, because companies will use different accounting practices, depreciate assets at different rates and have networks of varying ages. Frontier has developed a model to generate consistent asset bases.

(2) **How should exchange rates be incorporated?** Purchasing power parity rates can be used, or average exchange rates over a period of time; but in either case, it is important to test whether different exchange rate assumptions would invalidate the conclusions.

(3) **What about differences in wages?** International wage differentials affect the

estimation of efficient costs less than might be imagined, because capital and labour are substitutes. Ideally, econometric analysis can be used to identify the appropriate substitution rates. If a lack of data prevents this, then at least a range can be set by comparing costs with no adjustment for wage rates and with a full adjustment.

(4) **How can the network elements of vertically integrated companies be compared?** Using company management accounts it is often possible to separate out costs associated with network operation. Moreover, as part of the process of reform, companies are often required to keep separate accounts for each main element of their business.

Once the full model has been developed, there are a number of software packages – including Frontier's tailor-made version – that can be used to derive results. The table below applies to the same group of companies the model described above (with a control for local conditions in the form of line length). The company that is the most efficient on any of the ratios is given a score of 100; scores below that therefore indicate relative inefficiency. For example, a score of 80 indicates that the company should be able to decrease costs by 20% and still provide the same level of service. This analysis gives a rather different ranking.

Company	Country	Efficiency Score
MERALCO	Philippines	100
Caribbean Utilities Company	Cayman Islands	97.6
Singapore Power	Singapore	80.43
Eskom	South Africa	77.84
TNB	Indonesia	53.79
Budapest Electricity Supply	Hungary	25.68
NEPA	Nigeria	13.97

Note: data from published sources and public accounts. Analysis by Frontier using Frontier Analyst (a commercial DEA package) and model specifications described above. Results intended to be illustrative only and not to be interpreted as a final view of Frontier Economics or its staff.

IT'S ALL IN THE APPLICATION

Such benchmarking exercises are useful to companies trying to identify the areas where efficiency could be improved. The analysis can also be used to determine which other companies are ahead, and why. However, most of the applications of benchmarking for which Frontier is hired follow from its use as part of price control reviews.

Our task is often to assess the way in which such techniques have been used by the regulator, and our experience confirms the view that they are too often poorly applied. This has given rise to serious criticism of the use of such techniques. The lesson we would draw, however, is that they should be refined rather than abandoned. Without them, consumers may find themselves obliged to pay for inefficiency, while with them, regulators can progress to a regime of yardstick competition that would substantially decrease the costs of regulation, and provide a transparent regulatory framework with clear incentives for efficiency improvement.

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