The role of international benchmarking in developing rail infrastructure efficiency estimates ☆

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ABSTRACT

International cost efficiency benchmarking played a central role in informing the Office of Rail Regulation's (ORR) determination of Network Rail's future funding during the 2008 periodic review (PR08) of the company's finances. This paper sets out how international benchmarking can inform a regulator's decisions on efficiency and, in particular, how international econometric studies can be used alongside other evidence in the regulatory context. We start by reviewing the use of previous international benchmarking work. We then set out the data, methodology and results in respect of the two separate econometric studies carried out as part of PR08. The further work that was done in support of the econometric results is then described. The paper shows that top-down econometric techniques, combined with bottom-up engineering analysis produced a robust comparison between Network Rail and its peers. We conclude by outlining how the econometric results were used, in conjunction with other evidence, to reach a final efficiency determination, and how we consider that international benchmarking can be applied by other regulators.

1. Introduction

This paper constitutes part of the output from the Centre for Competition and Regulatory Policy workshop hosted by City University on 23 January 2009. It is based primarily on the econometric analysis completed by the Institute for Transport Studies (ITS), University of Leeds and the Office of Rail Regulation (ORR) as part of ORR's 2008 periodic review (PR08) of Network Rail's outputs and funding for 2009–2014. As part of the periodic review, ITS and ORR undertook extensive international benchmarking work. This work formed an integral part of ORR's judgement regarding the scope for Network Rail, the owner and operator of the British rail infrastructure, to improve its efficiency performance, and in turn on the company's allowed funding. International benchmarking is particularly important in the case of Network Rail, as there are no domestic comparators against which to judge its efficiency.

This paper summarises the policy and technical aspects of ORR's work on international benchmarking and how this work informed ORR's final determinations on efficiency. Although we present our preferred econometric results in this paper, we reference Smith et al. (2008) and Smith (2008) for a full explanation of the technical aspects behind the work done by ITS and ORR and the wide range of other econometric models estimated. As well as discussing the role of international benchmarking in PR08, we also generalise and comment on the circumstances in which international benchmarking is likely to be most appropriate and practical for other economic regulators.

The remainder of the paper is organised as follows. Section 2 places international benchmarking into context and outlines previous work done by ORR to benchmark Network Rail against its peer infrastructure managers. Sections 3 and 4 describe the dataset and methodology used for the main econometric work based on the International Union of Railways' (UIC) Lasting Infrastructure Cost Benchmarking (LICB) dataset, which was provided by the UIC for use in this work. Section 5 presents the results from that analysis. Section 6 shows the results of a supporting econometric study conducted using geographically disaggregated data (within each country) for a different sample of infrastructure managers. This data was collected directly by ORR and ITS.

Section 7 provides examples of additional, supporting studies conducted or commissioned by ORR and discusses how ORR combined the results of the different studies to form its overall judgement on the scope for Network Rail to improve its efficiency over the five year control period starting on 1 April 2009. Section 8 offers our conclusions.

2. International benchmarking in context

Assessing efficiency is an important part of an economic regulator's work. Regulators are required to take a view on the regulated industry's potential for efficiency savings as part of any price control or periodic review. ORR, like other regulators, faces a problem in that Network Rail is a natural monopoly. In order to ensure that Network Rail operates, maintains and renews the network efficiently, ORR regulates Network Rail using a form of conventional 'RPI-X' incentive regulation.

Assessing the X factor is not a straightforward task. In the most basic sense, X represents the total factor productivity (TFP) growth that a regulated firm can achieve over and above that which is achieved by the economy as a whole (which is implicit within RPI).[1] Potential TFP growth may be further broken down into that resulting from technical progress (e.g. the introduction of new technology), changes in scale, and catch-up efficiency relative to some appropriate benchmark (for example, international best practice) if the company is not at the efficiency frontier.

The scope for catch-up efficiency as compared to relevant benchmarks has been the main focus of the analysis during PR08, given the very sharp rise in costs after the Hatfield accident[2] in 2000. There are various methods that a regulator uses to take a view on potential catch-up efficiency. Using 'bottom-up' analysis, individual initiatives are identified, and their efficiency impact aggregated into an overall efficiency target. Within 'top-down' analysis the regulator forms a view on potential efficiency by benchmarking the company against its peers in the sector, usually either other regulated firms in the same country, or internationally, typically using econometric analysis. Internal benchmarking between different parts of the company can also by employed.

Usually the 'bottom-up' approach is expected to underestimate the potential for improvement. Within the top-down approach, internal benchmarking is likely to show lower potential for efficiency gains than methods based on external comparisons (e.g. other regulated firms or international best practice).

During previous periodic reviews, ORR conducted work to establish the scope for employing international benchmarking as part of its efficiency assessment (see NERA, 2000). This work largely focused on North American, Australian and East Asian railways, although the report concluded that there was insufficient data in the public domain to draw meaningful conclusions on comparative efficiency levels. However, the report did produce some evidence on trend total factor productivity growth which was used by ORR alongside other evidence on productivity and unit cost trends in UK regulated industries.

ORR also conducted work on international benchmarking as part of the 2003 access charges review though from a bottom-up perspective (see LEK et al., 2003).

In late 2005, ORR and ITS began the process of developing a 'top-down' international benchmarking methodology with a view to producing useable results for PR08 and the longer term. The first study, carried out in conjunction with Network Rail and the UIC, undertook work to benchmark the company against 12 other West European infrastructure managers.

One of the biggest hurdles to overcome in international benchmarking is ensuring that one is comparing like for like. The UIC has gathered data on these infrastructure managers for 11 years, and during that time work has been done to ensure the comparability of the data through, for example, the specification of common data definitions. Representatives from each participating company also meet regularly and the data is used as part of UIC's own benchmarking analysis. UIC agreed to provide this data for the purpose of econometric work in support of PR08, on the basis that only results for Network Rail would be published and the confidentiality of other infrastructure managers' data and relative efficiency respected. The UIC dataset covers: costs; network size; outputs such as passenger and freight train kilometres; and network characteristics such as the proportion of track electrified and numbers of points units per track km.

ORR and ITS also worked with five other rail infrastructure managers in Europe and North America to develop a new dataset. This includes data on costs, outputs, and network characteristics at the regional level within each country. Thus, although the number of companies included is smaller than in the LICB dataset, the sample size is expanded via the use of regional data within companies. It is still new and emerging and we are working to expand the coverage and improve the harmonisation of definitions.

Having access to an existing, good quality dataset from UIC allowed the ORR to give international benchmarking an important position in its final decision making on the scope for Network Rail's efficiency improvement. Likewise, given time, the use of the regional international dataset, which ITS and ORR collected from scratch, demonstrates that good progress can be made if regulators and companies aim to develop a benchmarking framework over a number of years, working between periodic reviews, rather than having to rely on studies commissioned at each review within a constrained timeframe.

3. The LICB dataset

As part of its own benchmarking analysis the UIC has developed a very useful dataset. It consists of data for 13 national rail infrastructure companies in western Europe, or infrastructure divisions within integrated companies over a period of eleven years.

As noted above, we have reason to be relatively confident in the consistency of the LICB data, given the efforts made to standardise definitions. UIC uses this dataset in its approach to international benchmarking (see UIC, 2007 and ORR's 2008 final determinations for further details). The availability of multiple years for the same companies is also highly advantageous, as it avoids the danger of focusing on a single year snap-shot which might be impacted by year-to-year fluctuations in expenditure unrelated to efficiency. Furthermore, the dataset contains a wide range of variables in addition to the key measures of track length and traffic volumes.

Below we list the key variables from the LICB dataset used in the econometric analysis.[3] The data provided by UIC contained in excess of thirty variables. The variables that were ultimately included in our analysis are listed below. These were the variables for which there was sufficient coverage of the data across the different companies and years. Table 1 summarises the coverage of the UIC dataset.

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[1] Regulators also may make adjustments to the extent that a regulated firm faces different input price trends to those experienced in the general economy.

[2] A train derailment, resulting from defective track, which resulted in four people being killed.

[3] The dataset was taken largely as given, although a small amount of data cleaning was carried out. See Smith (2008).