# ANALYSIS OF RESPONSES TO "REVIEW OF RAILTRACK EFFICIENCY"

## A Report for the

## Office of the Rail Regulator

## by

## Europe Economics

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# 1 INTRODUCTION

In December 1999, Europe Economics completed a report for the Office of the Rail Regulator (the "Regulator") into the results of a "top down" analysis of the potential for Railtrack to make efficiency gains, by particular reference to the efficiency improvements that have been achieved by comparable industries in comparable circumstances (Europe Economics, 1999).[1] We concluded that the evidence suggested that Railtrack can reduce its expenditures, defined as explained in the report, as those required to provide a constant level of output, by of the order of 3 – 5 per cent a year in real terms.

These results were used by the Regulator, in conjunction with other evidence, to inform his provisional conclusion that "Railtrack should be able to achieve savings of 3 – 5 per cent a year over the next price control period".[2] For the purposes of his provisional conclusions, the Regulator assumed savings of 5 per cent a year, at the top end of the proposed range. The Regulator viewed these savings as challenging but achievable.

Interested parties were invited by the Regulator to comment on his provisional conclusions. A number of responses were received, including from Railtrack, train operating companies, and funders. Of these, the responses from Railtrack and its consultants (OXERA) are the most substantial in terms of the volume of material submitted. Railtrack criticises both the Europe Economics report and the way in which it has been used by the Regulator. Europe Economics has been asked by the Regulator to consider all of the responses insofar as they relate to the analysis of the scope for efficiency improvements and the application of efficiency assumptions.

This present report contains our analysis of the responses on efficiency. It is structured as follows:

- Section 2 provides a brief reminder of the content and conclusions of Europe Economics' December 1999 report *Review of Railtrack Efficiency*.
- Section 3 describes and discusses Railtrack's criticisms of the Europe Economics report.
- Section 4 describes and discusses Railtrack's criticisms of how the Europe Economics report appears to have been used by the Regulator.
- Section 5 discusses the June 2000 report, *Establishing a cost reduction target for Railtrack based on top-down approaches*, prepared by OXERA for Railtrack.
- Section 6 reports and analyses responses received on efficiency from interested parties other than Railtrack, and comments made by City analysts.
- Section 7 contains our conclusions.

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1 "Review of Railtrack Efficiency", Europe Economics, December 1999.

2 "The Periodic Review of Railtrack's Access Charges: Provisional Conclusions on Revenue Requirements", Office of the Rail Regulator, December 1999, page 6.

We do not discuss international comparisons, which are being considered separately by the Regulator. We also do not comment on the costs of specific items within the cost base; the Regulator's consultants on these issues are Booz-Allen and Hamilton.

# 2 SUMMARY OF THE EUROPE ECONOMICS REPORT

## 2.1 Overview

For its December 1999 report, *Review of Railtrack Efficiency*, Europe Economics was asked by the Regulator to provide a "top down" analysis of the potential for Railtrack to make efficiency gains, by particular reference to the efficiency improvements that have been achieved by comparable industries in comparable circumstances.

The approach we adopted was broadly as follows:

- Identify comparable industries.
- Evaluate the evidence relating to the efficiency improvements achieved in comparable industries.
- Assess the implications of this evaluation for an assessment of the scope for Railtrack to reduce its expenditures.

We then explained how this figure would be affected by factors such as capital substitution, economies of scale due to demand growth, changes in the quality of outputs, and changes in real input prices.

## 2.2 Comparator Industries

In order to identify comparator industries, we considered the nature of work undertaken by Railtrack and the regulatory and commercial environment within which it operates. We concluded that the potential for Railtrack to improve its efficiency is best informed by the following two main features of its business:

- It is among a relatively small number of major firms in the economy whose prime activity is the management of infrastructure networks facing limited direct competition.
- It is among a relatively small number of major firms in the economy which have been privatised and are now subject to economic regulation.

We therefore viewed the achievements of other UK privatised infrastructure network businesses over a comparable phase of their post-privatisation histories as being likely to provide the best means of judging the potential for Railtrack to improve its efficiency. This is a similar approach to that adopted by Europe Economics in an earlier report for OFWAT (Europe Economics, 1998).[3]

[3] The 1998 Europe Economics report for OFWAT also considered, as an additional approach, disaggregating functional activities and comparing each of those with similar activities in the economy. However, the results from this exercise were rejected as the best source of comparisons in favour of the efficiency gains that had been achieve in other privatised industries, a methodology which is also adopted here.

## 2.3 Evidence from Comparator Industries

We considered two principal sources of evidence from comparator industries.

*First*, we calculated the cost reductions achieved by other privatised companies managing infrastructure networks. These results are reproduced in Table 2.1 and Table 2.2 below.

**Table 2.1**

**Unit Operating Cost[4] Reductions Achieved by Comparators (%)**

| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Water | | | | | | | -1.0 | -3.1 | -4.4 | -4.5 | -4.1 |
| Sewerage | | | | | | | 0.9 | -2.7 | -8.2 | -3.9 | -5.0 |
| Electricity transmission | | | | | 15.6 | -6.1 | -15.0 | -14.4 | -7.0 | -6.4 | -11.1 |
| Electricity distribution | | | | | -3.3 | -1.5 | 1.8 | -5.8 | -12.5 | -14.4 | -8.9 |
| Gas transportation | -10.1 | 1.4 | -18.1 | 1.0 | 27.4 | -17.7 | -12.2 | -21.2 | -8.8 | -12.8 | -19.9 |

**Table 2.2**

**Compound Annual Reductions (%)**

| | |
|---|---|
| Water | - 3.7 |
| Sewerage | - 4.1 |
| Electricity transmission | - 6.5 |
| Electricity distribution | - 6.8 |
| Gas transportation | - 9.1 |

As discussed on page 16 of our December report, evidence on unit operating cost reductions can only be used as a guide to the rate which aggregate operating costs can be reduced, and account must be taken of any economies of scale due to demand growth. Ignoring the observation from gas transportation, which was likely to have been significantly distorted due to strong growth in throughput,[5] we found that such companies had been able to reduce real unit operating costs (excluding depreciation) by about 3 – 7 per cent a year, with no sign of the rate of cost reduction declining with the length of the period since privatisation.[6]

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4 Excluding depreciation.

5 However, we note that even if the number of meters is used as the output measure for BG transportation/Transco, reductions in unit costs are still very substantial, for instance 10.5 per cent a year over 1993-1998.

6 For the remaining industries, water and electricity, demand was by definition constant for the water/sewerage base service, and had been increasing only modestly (by about 1 per cent a year) for electricity transmission/distribution. Offset against this, there is evidence that falling unit costs in these industries have been accompanied by improving service quality, which would mean that unit costs reductions considered in isolation would tend to understate the overall improvements in efficiency that have been achieved. Taking these effects together, we considered that unit operating cost reductions in these industries provided a reasonable guide to the rate at which aggregate operating costs could be reduced.

In moving from this conclusion for aggregate operating costs to the implications for overall expenditures (including renewals), account also needs to be taken of any ongoing substitution of capital costs for operating costs within these comparator industries, consistent with whole economy trends. This is discussed further in Section 3.2.2 of the present report.

*Second*, we summarised the estimates from the academic literature of productivity improvements made by privatised companies. Although the privatisation literature is somewhat dated (and therefore does not take account of the achievements of recent years), it points to substantial total factor productivity improvements by privatised industries, broadly in the range 2 – 6 per cent a year. This is substantially in excess of the total factor productivity improvement in the economy as a whole (estimated to be about 1 per cent a year), and implies substantial real cost reductions per unit of output in these industries.

## 2.4 Assessment of the Implications for Railtrack

We then assessed the implications for Railtrack. We concluded that it seemed reasonable to assume that Railtrack should be able to achieve efficiency gains of a similar order of magnitude to those which have been achieved by its closest comparators:

- Railtrack has been privatised relatively recently, and the experience from other sectors suggests that it is unlikely to have fully caught up with the management and operational practices of private sector firms and competitive markets.

- This is Railtrack's first regulatory review since privatisation, and experience from other sectors suggests that companies are able to produce significant achievements in efficiency at this stage in their regulatory history.

- Railtrack has had little exposure to product market competition, which both the academic literature and the experience of other sectors suggests is a very significant driver of efficiency improvement, and may therefore be expected to be less efficient than some of the comparators.

- The nature of Railtrack's business, principally infrastructure management, gives rise to what are sometimes referred to as "scope economies" (meaning better identification of the scope of work required), on top of improvements in the efficiency with which tasks are undertaken. Our understanding of the quality of data held by Railtrack about its assets suggests that this source of savings is unlikely to have been fully exploited in the past.

- A significant proportion of Railtrack's costs were contracted for before privatisation, to firms that in many cases were also previously part of British Rail, at a time when the suppliers' market was immature.

These considerations lead us to the view that it would be reasonable to assume that Railtrack has scope to improve efficiency at a rate towards the upper end of the range suggested by comparator industries.

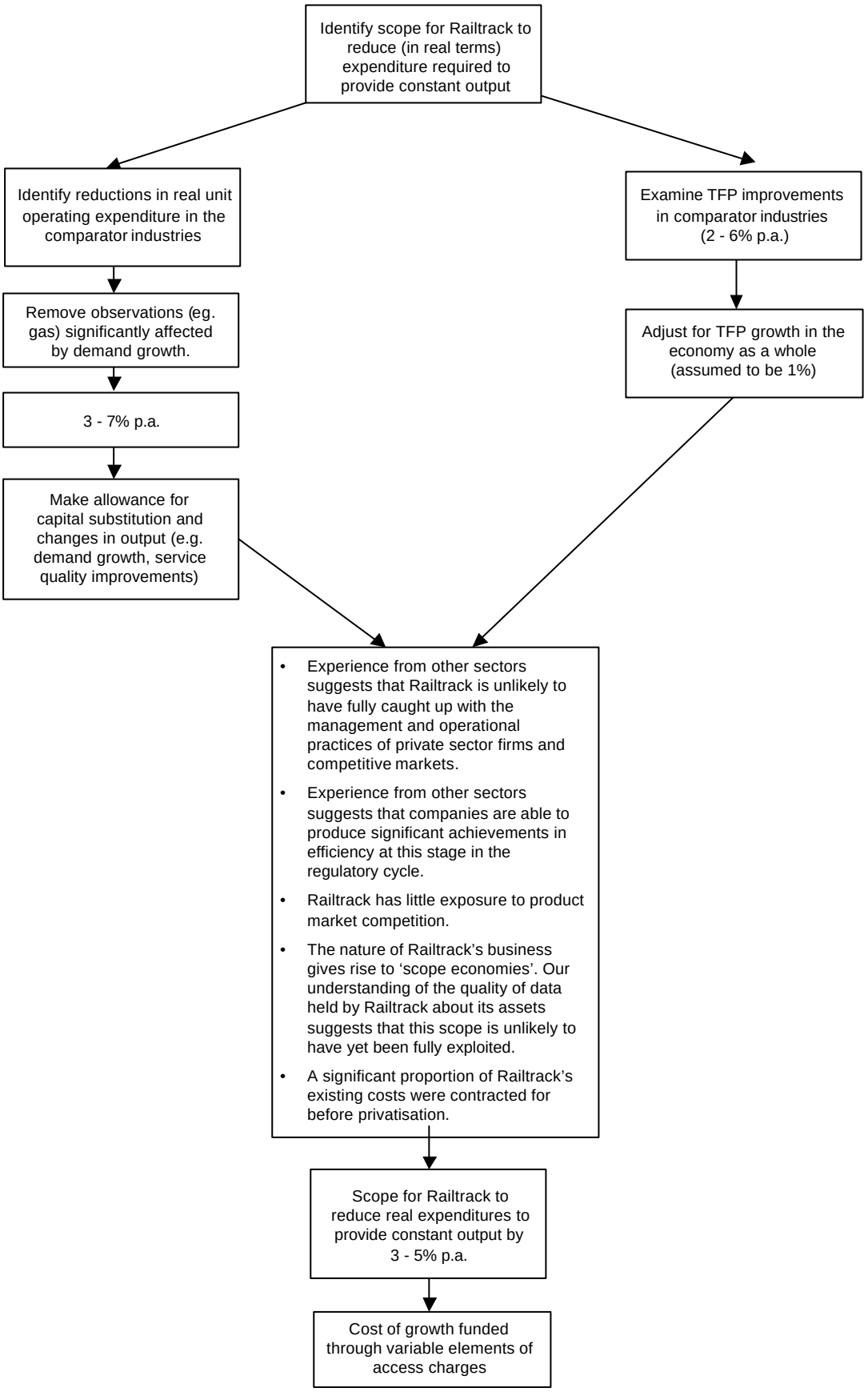
We therefore concluded that Railtrack can reduce its expenditures by of the order of 3 – 5 per cent a year (in real terms). By expenditures, we meant the level of Railtrack's expenditure viewed

by the Regulator as necessary to provide constant outputs.[7] The costs of growth and other enhancements to the network would be separately allowed for by the Regulator.

In its April 2000 response, Railtrack provides a diagrammatic representation (its Figure 1) of potential differences in definitions of efficiency, and suggests (page 5) that Europe Economics analysis contains two shortcomings. First, "their failure to normalise for the impact of economies of scale". Second, "their application of an operating efficiency benchmark to total costs". As is evident from the summary of our methodology shown in diagrammatic form in Figure 2.1, both of these criticisms are misplaced.

[7] The Regulator's December 1999 document makes clear that where past expenditure has not, in the view of the Regulator, been sufficient to maintain the condition of assets, this base figure may include an allowance for "additional activity" to bring it up to a more sustainable long-term level.

**Figure 2.1: Methodology Adopted by Europe Economics**



## 2.5 Ensuring Consistency

We then described how further adjustments could be made, where appropriate, to our proposed range of 3 – 5 per cent a year, to reflect capital substitution, demand growth, performance improvements and movements in real input prices affecting Railtrack over the next control period. These factors are considered in Sections 6.3 – 6.6 of our December 1999 report:

- Our recommendation was relevant to a "base" measure of outputs (constant quantity of output), and additional revenues would need to be allowed to cover the costs of the demand growth implicit within the "baseline" outputs in the Network Management Statement. In other words, we have made no adjustment for growth. We understand that it is the Regulator's intention that the cost of growth be self-financing through the variable elements of access charges. This would be consistent with an approach relying on our report in order to determine fixed charges.

- Similarly, the costs of improvements in performance and other outputs would need to be separately allowed for by the Regulator. Alternatively, if the base level of costs includes the cost of improving performance, and if our efficiency assumption is applied to that base figure, then this would include an allowance for continuing improvements in performance.[8]

- Our recommendation was based in part on the unit operating cost reductions made in other industries, adjusted for any volume growth and for any substitution of capital for operating expenditure in those industries, so as to make it suitable for use as a "total cost" efficiency assumption. Since it was applied to Railtrack's total expenditures, rather than to a subset of them, no further adjustment is necessary to reflect the possibility of substitution between factor inputs within Railtrack.

- We considered that no adjustment was necessary for any potential differences between the input prices which Railtrack faces and those faced by comparable industries, given the similarities between the nature of their work and their regulatory/commercial environment.

[8] However, the implied rate of performance improvement may be less than implied from the base year, if there are diminishing marginal returns to investment in performance.

# 3 RAILTRACK'S CRITICISMS OF THE EUROPE ECONOMICS REPORT

## 3.1 Introduction

Railtrack formally responded to the Regulator's provisional conclusions in February 2000.[9] Comments on efficiency and expenditure are contained in Section 3 of that response. Railtrack also subsequently provided in April a more detailed response specifically focussed on the Europe Economics report.[10] Railtrack are critical both of the Europe Economics report and of the way in which the Regulator has used it in reaching his provisional conclusions.

In this section we review and comment on the criticisms directed at the Europe Economics report. Criticisms relating to the Regulator's use of our report are described and analysed in Section 4. In each section, references in brackets following the description of each of Railtrack's criticisms refer to its February 2000 response, although we also address issues raised in its April 2000 response.

Railtrack subsequently submitted a further report, prepared by OXERA, in June 2000. This is discussed in Section 5 of the present report.[11]

## 3.2 Efficiency Measures

### 3.2.1 Unit or overall costs?

*Railtrack argue that Europe Economics looked at evidence of unit cost reductions, but the evidence has been applied to overall cost reductions (section 3.60 of Railtrack's February 2000 response).*[12]

Railtrack is correct to observe that we looked at the unit cost reductions achieved in comparator industries as part of our overall assessment of the scope for Railtrack to improve its efficiency. To ensure that this information could be used to inform the aggregate cost reductions that Railtrack could be expected to achieve, we disregarded data on unit cost reductions from comparator industries that had been materially affected by demand growth in those industries. As described on page 26 of our report, the cost savings achieved in gas transportation (9.1 per cent a year), where demand growth has in some periods been rapid, were excluded when reaching the conclusion that comparator industries had reduced real unit operating costs (excluding depreciation) by 3 – 7 per cent a year.

The exclusion of gas transportation from the list of closest comparators leads to a conservative estimate of the scope for Railtrack to reduce its expenditures. As Table A6 of our original report suggests, in recent years (1996 – 98), when gas volume growth has been much less rapid (below 5 per cent a year), Transco has still reduced real unit operating expenditure at a rapid rate: by

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9 "The Periodic Review of Railtrack's Access Charges: Provisional Conclusions on Revenue Requirements: Railtrack's Response", February 2000.

10 "The Periodic Review of Railtrack's Access Charges: Railtrack's Response to the Europe Economics report", April 2000.

11 OXERA (2000), *Establishing a cost reduction target for Railtrack based on top-down approaches.*.

12 In actual fact, Railtrack made this criticism of the Regulator, rather than of Europe Economics, suggesting our conclusions had been misapplied. Since this is a misunderstanding on Railtrack's part the Regulator has proposed to apply our conclusion as we had intended – it is necessary to address this issues in this section as a criticism of the Europe Economics report.

16.4 per cent a year (taking gas throughput as the output measure) or 16.9 per cent a year (taking the number of meters as an output measure). This implies a reduction in total operating expenditure over this period of relative demand stability of well over 10 per cent a year. Even over the nine-year period 1987 – 1996, when demand increased by 91 per cent, real total operating expenditure still *fell* by 5 per cent.

Of the remaining industries which were considered as the closest comparators, demand has been by definition constant for the water/sewerage base service, and has grown only modestly in the case of electricity (by about 1 per cent a year). At the same time, there is evidence, described in page 16 of our report, that falling unit costs in these industries have been accompanied by improving service quality. This would mean that unit cost reductions considered in isolation would tend to understate the overall improvements that have been achieved. Furthermore, as described in Section 4.3.2 of our report, OFWAT has indicated that the cost reductions quoted for water and sewerage may understate those achieved by the network elements (water distribution, sewerage) which are most comparable to Railtrack.

This means that overall real total operating expenditures for the water and sewerage base service fell at the same rate (3.7 and 4.1 per cent a year respectively) as real unit operating expenditures. In electricity, real total operating expenditures have typically fallen by about 5 per cent a year over the period 1991 -98, despite the modest demand growth the industry has experienced.

Both the selection of comparators and subsequent adjustments, where necessary, to take account of the impact of economies of scale allowed evidence on unit cost reductions in comparator industries to be used to inform the scope for Railtrack to reduce its aggregate expenditures. Railtrack is therefore mistaken if it believes that it was not our intention that our recommendations be applied to the total expenditures necessary to sustain constant outputs.

### 3.2.2 Operating costs or total expenditures?

*Railtrack argues that Europe Economics looked only at operating expenditure, whereas the evidence has been applied to all of Railtrack's expenditures (including some capital elements). According to Railtrack this creates two specific problems. First, to the extent that efficiencies on capital maintenance expenditure are generally lower than on operating expenditures, the potential for efficiencies on all controllable expenditures will be lower. Second, the potential for capital substitution, whereby productivity gains are achieved by substituting operating expenditure with capital expenditure, will tend to overstate efficiencies on operating expenditure alone (para 3.60).*

As described in Section 2 of this report, Europe Economics looked at evidence from two principal sources:

- Reductions in real unit operating expenditure (excluding depreciation) achieved by other privatised infrastructure network companies, excluding observations materially affected by demand growth (3 – 7 per cent a year).

- Estimates from the academic literature of total factor productivity (TFP) improvements made by privatised companies (2 – 6 per cent a year).

In the case of the latter, TFP estimates incorporate both improvements in operating efficiency and in capital efficiency. Hence, there is no need to adjust TFP for capital substitution if, as in this case, it is being applied to total expenditures.

However, reductions in real unit cost (excluding depreciation) achieved in other privatised industries do need to be adjusted for capital substitution. This is because reductions in operating inputs due to improved efficiency will be augmented by reductions in operating inputs due to capital substitution. Thus, operating cost reductions will tend to overstate total factor productivity.

In our report, we recommended that Railtrack should be assumed to be able to reduce total expenditures by up to 5 per cent a year, even though comparators had achieved reductions in real unit operating expenditures by up to 7 per cent. This difference is partly attributable to the impact of growth on real unit costs in other industries, as discussed above, and partly by any impact of capital inputs substituting for operating inputs. We now also consider any evidence that would inform the magnitude of the adjustment for capital substitution, which was not explicitly quantified in our original report.

*First*, in order to introduce a capital element into our calculation, we have reproduced our calculations of the reductions in real unit operating expenditure (excluding depreciation) achieved in privatised utilities but for real unit operating cost (including depreciation). This has been achieved by adding current cost depreciation back to the expenditure measure used for our original calculations.[13] The results are reported in full at Annex 1 of the present report. We find that whereas comparator industries have reduced real unit operating expenditure (excluding depreciation) by 5.6 per cent on average (page 37 of our original report), they have reduced real unit operating cost (including depreciation) by 4.1 per cent on average. Although there may be a number of simple biases arising from the use of depreciation as a proxy for capital maintenance expenditure, this method suggests the capital substitution adjustment may be of the broad order of 1 - 2 per cent a year.

Railtrack, in its April 2000 response, undertook a similar calculation which it claimed showed that "total expenditure" in water (1993-98) had fallen by only 2.1 per cent a year, while total unit costs in electricity distribution and transmission respectively had fallen by 3.2 per cent a year and 5.4 per cent a year respectively over 1991-98. Railtrack concludes (page 8) that "the correct benchmark to adopt would be the change in total unit cost (total efficiency) which ranges from 2.1 to 5.4 per cent rather than that based on unit operating cost which ranges from 3.6 to 6.8 per cent".

[13] Current cost depreciation from regulatory accounts was used whenever available.

We believe Railtrack's calculations understate the capital efficiency improvements achieved in comparator industries, due to the use of measures of capital expenditure in excess of that which will have been spent to maintain the base level of service (constant quantity and quality). For example, Railtrack's values for capital expenditure in electricity and distribution appear to relate to *overall* capital expenditure, which would include any capital expenditure on improving quality and levels of service. Railtrack's values for capital expenditure in water and sewerage seem to be for total capital maintenance, a measure which will not reflect the increase in capital maintenance expenditure that would be expected to arise, in the absence of efficiency improvements, as a result of the increase in the capital base of the industry that has occurred over the period in order to meet higher quality standards. If appropriate adjustments were made to reflect these considerations, we would expect higher estimates of the total efficiency improvements made in comparator industries, for constant quantity and quality of service, which would be more in line with our own estimates.

Similarly, using depreciation as a proxy for capital maintenance is likely to underestimate the impact of improved efficiency since capital efficiencies take many years to feed through to current cost depreciation charges.

*Second*, we have applied the method used to adjust for capital substitution that was used in Europe Economics (1998), referred to by Railtrack in its response. In that report, we found that figures for water companies' operating productivity had to be offset by 0.63 per cent a year before being applied to TFP. We have now developed that analysis and applied it to Railtrack. The results of so doing are reported at Annex 2. We conclude that this methodology suggests that an adjustment of the order of 0.5 to 1 per cent a year is necessary to convert operating expenditure reductions from other industries into TFP estimates (output volumes and input costs being separately adjusted for if necessary).

Both methods suggest the approach used in our original report to adapt evidence from operating cost reductions in comparator industries would lead to reasonable or even cautious assumptions as to Railtrack's ability to reduce overall expenditures.

Railtrack also asserts that it is inherently more difficult to make efficiencies on capital expenditure than on operating expenditure. While it is true that capital efficiencies, as reported, tend to be lower than operating efficiencies, as reported, this is due to the effect on relative operating and capital inputs resulting from capital substitution. Other utilities provide considerable evidence of the scope for capital efficiencies:

- In the recent review of electricity distribution charges, the then electricity regulator OFFER reported that actual capital expenditure in electricity distribution in 1998 is generally running 10 – 20 per cent below the projections assumed when price controls were set in 1994 (which themselves included an assumption of improving efficiency), and up to 50 per cent in the case of Seeboard.[14]

- In a 1997 report, the then Monopolies and Mergers Commission (MMC) found that Northern Ireland Electricity had underspent by a third against capital investment

[14] OFFER (May 1999), "Review of Public Electricity Suppliers 1998 – 2000: Distribution Price Control Review: Consultation Paper". See Figure 4.6.

projections, half of which could be attributed to efficiency gains in excess of those assumed when the price control was set.[15]

- In a recent report on water companies' financial performance, OFWAT reported that "Companies have achieved greater efficiencies in their capital programmes compared to the assumptions made in 1994 price limits. The extent of savings made varies by company and across services, but some companies expect savings of over 15 per cent for the 1995 to 2000 period as a whole".[16]

Railtrack quotes evidence that unit total costs in water and electricity have reduced by only 2.1 per cent and 3.8 per cent respectively. In the case of water, as noted above, this calculation appears not to be based on the base service alone, and so would include the costs associated with the substantial investment that the industry has been required to undertake in order to meet higher quality and environmental standards. It will therefore substantially understate the efficiency improvements achieved in the water/sewerage base service, which is the relevant source of comparisons for our purposes. For electricity, we note that the total cost efficiencies which, according to Railtrack, have been achieved in the electricity industry lie close to the centre of our proposed range for prospective reductions in Railtrack's base expenditure.

A further consideration is that the operating costs used in assessing productivity improvements in comparator industries include "non-controllable" elements, such as business rates, whereas the Regulator has applied the efficiency assumption for Railtrack to "controllable" expenditure only. Whilst we did not make an adjustment for this difference in approach, we note that such an adjustment is, in principle, required. To the extent that business rates, for example, have risen in real terms for the comparator industries, the scope for Railtrack to reduce expenditures on controllable costs will have been understated.

## 3.3 Choice of Comparators

*Railtrack argues that Europe Economics has restricted itself to a narrow set of comparators (other recently privatised network monopolies). A better approach, according to Railtrack, would be to look in more detail at Railtrack's functions (an approach which Europe Economics itself adopted in an earlier report). Railtrack find it particularly surprising that Europe Economics has overlooked the construction and engineering sectors (paras 3.61 and 3.62).*

Choosing the most appropriate comparators is clearly a matter for judgement. We took the view that comparators should be those firms or industries most likely to reveal the scope for Railtrack to improve its efficiency, given its functions, and the regulatory and commercial environment within which it operates. We therefore chose comparators - other privatised infrastructure network business - which undertake similar functions *and* have a similar regulatory and commercial environment.

To ignore the regulatory and commercial environment - for example, by following Railtrack's suggestion and using only the construction and engineering sectors - would have given rise to a significant risk that the potential for Railtrack to improve its efficiency would be substantially

[15] MMC (1997), "Northern Ireland Electricity plc". See paragraph 2.66.
[16] OFWAT (1999), "Financial Performance and Expenditure of the Water Companies in England and Wales". See page 41.

understated. The construction and engineering sectors are competitive – it is unlikely that less efficient companies would have been able to survive in such an environment.

## 3.4 Distinguishing Factors

*Railtrack argues that there are a number of distinguishing factors between it and other utilities which Europe Economics have inadequately taken into account. These include: (i) the scale of outsourcing of maintenance and renewal activities; (ii) the commitment to delivering substantial improvements in network outputs; (iii) the importance of labour inputs in Railtrack's total cost base; (iv) the balance between operating and capital expenditure and the impact this has on the scope for capital substitution; (v) the relatively slow rate of technical change; and (vi) the scale of the capital investment programme to be undertaken over the next 10 years and the associated outputs which have to be delivered (paras 3.63 and 3.64)*

Despite their similarities, there are naturally some differences between Railtrack and other privatised infrastructure network businesses. Of the possible factors listed above, (i), (ii), (iv) and (vi) are addressed elsewhere in this report. Here we consider (iii) the importance of labour inputs in Railtrack's overall cost base and (v) the relatively slow rate of technical change.

With regard to *labour inputs*, it seems likely that Railtrack, in common with most other firms, will have some choice over the relative use of labour and other inputs, and that in the process of improving its efficiency and taking advantage of technological developments, labour inputs will be progressively substituted by other inputs. Such substitution occurs throughout the economy and explains why labour productivity improvements, as reported, are generally in excess of total factor productivity improvements. However, as shown in Table 3.1 below, there appears to be no correlation between labour intensity and the rate of TFP improvement.

**Table 3.1:**
**TFP Growth and Labour Share (%)**

| | TFP Growth (1973-95) | Wages as a proportion of value added |
|---|---|---|
| Electricity/gas/water | 2.87 | 40.6 |
| Agriculture | 2.92 | 49.0 |
| Food/drink/tobacco | 2.62 | 51.6 |
| Financial & business services | 0.98 | 55.5 |
| Chemicals | 4.05 | 56.4 |
| Other manufacturing | 2.83 | 70.5 |
| Distributive services | 0.43 | 72.9 |
| Mining | -2.15 | 73.3 |
| Construction | 2.15 | 75.2 |
| Textiles | 3.32 | 78.1 |
| Metals | 1.86 | 78.4 |
| Transport & communication | 3.06 | 78.4 |
| Miscellaneous personal services | 1.21 | 85.4 |
| Engineering | 3.08 | 86.0 |

Source: O'Mahoney (1999)

However, input prices generally rise faster for labour than for other inputs. Ascertaining the labour intensity of Railtrack's activities relative to comparator industries is complicated as some labour costs are contracted out to third parties in both cases. Nevertheless, if the Regulator took the view that Railtrack's operating, maintenance and renewal activities are fundamentally more labour-intensive than the operating activities of the comparator industries, and that evidence from comparator industries should be used to inform a total factor productivity improvement assumption for Railtrack, then a small adjustment to our range of efficiency improvements might be appropriate, based on the relative labour-intensity of the industries. However, we are not aware of any evidence which suggests that Railtrack's business is substantially more labour-intensive than our chosen comparators.

With regard to *technical change*, our December 1999 report observed (page 9) that the rail industry seems unlikely to have the same scope for technological improvement as some other sectors of the economy, such as telecommunications and electronic media. Nevertheless, there are areas of operation, notably signalling and asset information systems, where use of new technologies could be beneficial. It is not clear that the scope for technical change is less for railway infrastructure than for our chosen comparators, and our conclusions are not dependent on an assumption that the scope for technological change within Railtrack was significant. Indeed, they might be considered conservative in the light of the evidence presented by EWS and others (see Section 5) that Railtrack is not at present exploiting certain technological innovations introduced by overseas railways.

## 3.5 Starting Point at Privatisation

*Railtrack argues that unlike other privatised industries, Railtrack was created as a new entity with a clean sheet on costs. (para 3.83, 3.115)*

This argument was considered as part of the discussion on pages 18 – 19 of our December 1999 report. We considered the evidence from the academic literature on British Rail's productivity performance before privatisation, which was generally poor in comparison with other previously state-owned enterprises.

Railtrack refers to Bishop and Green (1995) in support of its contention that it was more efficient at vesting than other privatised companies.[17] However, we could find only limited references to British Rail in that document, which is mainly concerned with evidence from firms which had already been privatised at the time it was written (Railtrack was not privatised until 1996). Commenting on British Rail's (and British Coal's) productivity performance over 1989-94, the authors say that "*neither British Rail nor British Coal improved their TFP by much*" (page 29). They continue, "*extensive restructuring holds out the prospect of significantly faster TFP growth in future*". The only evidence quoted as to the effect of restructuring on costs is "*early evidence from the first operating franchise, Gatwick Express*" (page 30), and so drawing strong conclusions for Railtrack does not seem appropriate.

Furthermore, any benefits from restructuring would be likely to have been concentrated in head office and zonal management costs which make up only a small proportion of the total cost base.

[17] Matthew Bishop and Mike Green (1995), "Privatisation and Recession – the Miracle Tested", CRI Discussion Paper 10.

## 3.6 Interpretation of Evidence from Comparator Industries

### 3.6.1 Economies of scale

*Railtrack argues that, in looking at evidence from other industries, Europe Economics ignores the economies of scale implicit in a definition of efficiencies based on unit costs (paras 3.67 and 3.71).*

See Section 3.2.1 above.

### 3.6.2 Capital substitution

*Railtrack argues that, in looking at evidence from other industries, Europe Economics ignores the possibility of capital substitution (paras 3.67 and 3.74 – 3.77)*

As explained in Section 3.2.2, our report emphasised the need to take account of capital substitution (as well as economies of scale and changes in real input prices) when assessing the scope for efficiency improvement. This is also reflected in our conclusions (page 26):

> "For the group of what we regard as the closest comparators, all of whom have been privatised far longer than Railtrack, real unit operating costs (excluding depreciation) have been consistently reduced by broadly in the range 3 – 7 per cent a year (see Tables 4.1 and 4.2). Since there is likely in these industries to have been substitution of capital inputs for operating inputs, consistent with trends in the economy as a whole, the reductions in overall expenditures are likely to have been somewhat less rapid than this."

While the adjustment was not explicitly quantified, capital substitution was one of the factors taken into account in moving from this evidence to our conclusion that total expenditures could be reduced by 3 – 5 per cent a year. An attempt at quantifying the adjustment is described in Section 3.2.2; the methods considered suggest that the adjustment implicit in our December 1999 report was reasonable.

### 3.6.3 Other Regulators' Assumptions

*Railtrack argues that the summary of efficiency targets assumed by other regulators at periodic reviews includes companies that Europe Economics acknowledge are not comparable with Railtrack (para 3.79)*

Europe Economics (1999) reported the efficiency assumptions adopted by other regulators at regulatory reviews (pages 45 – 46). This is reproduced at Table 3.2. Most of the assumptions were in the range 2 – 4 per cent a year, but with some exceptions (for example, the 5 per cent a year assumption for National Grid for 1993 – 1997).

We noted that, in comparison with the actual cost reductions achieved in these industries, it appeared that other regulators have generally under-estimated the scope for efficiency improvements, which may have contributed to the popular perception that these companies have, at times in the past, made "excess profits". (On the other hand, allowing regulated companies to retain some of the benefits of unanticipated efficiency gains, before those benefits are passed to

customers in the form of lower prices, is sometimes necessary as an incentive for firms to make the efficiency gains in the first place.)

**Table 3.2**
**Summary of Efficiency Assumptions Adopted by Other UK Regulators**

| *Company*[18] | *Duration* | *Real Reduction* | *Cost Category* |
|---|---|---|---|
| British Gas (1991) | 1992-1997 | 2.5% pa | Total non-gas costs |
| BG Transco (1996) | 1997–2002 | 3.1% pa (OFGAS) | Operating expenditure[19] |
| | | higher opex allowances (MMC) | |
| British Gas Trading (1996) | 1997–2000 | 4% pa | Unit supply costs |
| BT (1988) | 1989-1993 | Not clearly stated | - |
| BT (1992) | 1993–1997 | 3% pa | Unit costs |
| BT (1996) | 1997–2001 | 3% – 4% pa | Unit operating costs |
| NGC (1992) | 1993–1997 | 5% pa | Operating costs |
| NGC (1996) | 1997–2001 | 2.5% pa | Operating expenditure |
| REC distribution (1995) | 1995–2000 | 2% pa | Unit operating costs |
| REC distribution (1999) | 2000-2005 | 2.3%pa | Operating costs |
| REC supply (1993) | 1994–1998 | 2% pa? | Unit operating costs? |
| REC supply (1997) | 1998–2000 | 2% pa | Operating costs |
| Scottish Hydro (1994) | 1995–2000 | 2% pa (MMC) | Operating costs |
| Scottish transmission (1993) | 1994–2000 | 2% pa | Controllable operating costs |
| NIE distribution (1997) | 1997–2002 | 1.7% pa (OFREG) | Operating costs |
| | | 3% pa (MMC) | Operating costs |
| NIE supply (1997) | 1997–2001 | 1.5% pa (MMC) | Operating costs |
| BAA (1991) | 1992-1997 | 3.3% pa | Employees/passengers |
| BAA (1996) | 1997–2002 | 4% pa | Employees/passengers |
| Manchester Airport (1997) | 1998–2003 | 4.6% pa | Staff cost/passenger |
| Water/Sewerage (1994) | 1995-2000 | 2% pa | Operating expenditure |
| Water/Sewerage (1999) | 2000-2005 | 2.7% pa | Base operating expenditure[20] |
| | | 10% – 12% $P_0$ | Capital maintenance[21] |
| | | 13% $P_0$ | Enhancement capex |

We therefore do not find persuasive Railtrack's argument that focusing only on the closest comparisons would have produced a figure in the range 2 – 3 per cent a year. Furthermore, for water/sewerage and electricity distribution, regulators have used higher values than these averages for those companies that they have judged to be particularly inefficient compared to their peers.

18 The date in brackets after the company name indicates the date of determination of price limits.
19 Transco's operating expenditure allowance was subsequently increased by the MMC.
20 Figures shown are averages. Efficiency assumptions were in the range 1.4 – 4.9 per cent a year for water and 1.4 – 4.3 per cent a year for sewerage.
21 10 per cent for water and 12 per cent for sewerage. "$P_0$" is used here to refer to a one-off reduction in costs at the start of the formula period.

### 3.6.4 Privatisation comparators

*Railtrack argues that Europe Economics' conclusion that there is no "strong cause to believe that British Rail (BR) before privatisation was any more or less efficient than other nationalised industries at the time they were privatised" is made using comparators that Europe Economics does not consider appropriate comparators for Railtrack. According to Railtrack, no evidence is presented that Railtrack is less efficient than its comparators (para 3.83 and 3.84).*

We reported the conclusions of two papers, Bishop and Thomson (1992) and Haskel and Szymanski (1993), which had estimated productivity growth in previously state-owned enterprises. We did so in order to attempt to shed light on the relative efficiency of Railtrack at privatisation: below average productivity growth before privatisation might lead to a greater potential for productivity growth after privatisation, and vice versa. These results are reproduced in Tables 3.3 and 3.4 below. On the basis of this evidence, we concluded that British Rail appeared to have been something of a productivity laggard (although we did not rely on this conclusion in assessing the scope for efficiency savings).

Railtrack place a different interpretation on the two papers, stating that:

> "one shows that BR achieved greater total factor productivity than British Gas during the 1980s, the other paper that BR achieved higher labour productivity growth than British Gas, Electricity Supply companies and the Regional Water Authorities during the same period".

We believe that this is a somewhat partial interpretation of the data. As Table 3.3 shows, the first study suggests that BR's TFP did not increase between 1970 and 1990 (a 1.7 per cent a year decline between 1970 and 1980 was followed by a 1.2 per cent a year increase between 1980 and 1990). All of the other industries show an increase in TFP over this period. British Rail is also the worse performer in terms of labour productivity growth over the full period.

The second study (Table 3.4), which looks only at labour productivity, does, as Railtrack state, show British Rail performing better than some of its comparators in some periods, but it is still difficult to see how it could be used to reach a conclusion other than that British Rail was, at best, average among comparable firms in terms of its productivity performance before privatisation.

**Table 3.3**
**Estimates of Historical Productivity Growth, Bishop and Thomson (1992)**

| | Labour productivity growth (% pa) | | TFP growth (% pa) | |
|---|---|---|---|---|
| | **1970 – 1980** | **1980 – 1990** | **1970 – 1980** | **1980 – 1990** |
| British Airways | 8.1 | 6.0 | 7.9 | 2.7 |
| BAA | 0.6 | 2.7 | 4.8 | 0.3 |
| British Telecom | 4.3 | 7.2 | 4.6 | 3.2 |
| British Coal | -2.4 | 8.1 | -2.2 | 2.8 |
| Electricity Supply | 3.7 | 2.5 | 2.3 | 1.4 |
| British Gas | 4.9 | 4.9 | 4.2 | 1.0 |
| Post Office | -0.1 | 3.4 | 0.0 | 2.2 |
| **British Rail** | **-2.0** | **3.2** | **-1.7** | **1.2** |
| British Steel | -1.7 | 13.7 | -2.7 | 7.0 |

**Table 3.4**
**Estimates of Historical Labour Productivity Growth, Haskel and Szymanski (1993)**

| Company | 1972 – 1980 | 1980 – 1988 |
|---|---|---|
| BAA | -1.2 | 3.8 |
| British Airways | 7.7 | 6.3 |
| British Coal | 0.3 | 9.5 |
| British Gas | 6.5 | 4.2 |
| **British Rail** | **1.6** | **5.5** |
| British Steel | -3.4 | 15.5 |
| British Telecom | 6.2 | 3.4 |
| Electricity Supply | 1.7 | 4.2 |
| London Regional Transport | -3.1 | 7.8 |
| Post Office: posts | -1.4 | 2.6 |
| Regional Water Authority | 0.5 | 3.3 |
| Scottish Transport Group | 0.03 | 0.7 |
| **Average** | **1.3** | **5.6** |
| **Whole economy** | **1.7** | **2.3** |

### 3.6.5 Privatisation literature

*Railtrack argues that the privatisation literature points to TFP growth in privatised utilities in the range 0.4 – 2.6 per cent a year, not the 2 – 6 per cent a year range taken by Europe Economics. Europe Economics themselves came up with a lower range (2 – 3 per cent a year) when interpreting the identical evidence for OFWAT.*[22] *(paras 3.85 – 3.88)*

Railtrack's alternative TFP range (0.4 – 2.6 per cent a year) appears to mix indiscriminately evidence from before and after privatisation. For example, it is surprisingly to find two studies reporting British Rail's productivity improvements in the 1980s contributing to the TFP performance of *privatised* companies in Railtrack's analysis. Pre-privatisation performance in also used by Railtrack in the case of electricity companies', whose 2.6 per cent a year TFP performance over 1971—1990 is the basis for the top end of Railtrack's range. We therefore find Railtrack's analysis of little value in determining the TFP improvements in utilities *since* privatisation.

Railtrack also highlights what it sees as a difference in our interpretation of the data in Europe Economics (1999) compared to that in an earlier report for OFWAT. However, the productivity literature was intentionally used slightly differently in each study. In the report for the Rail Regulator, we found that there had been few recent additions to the literature, which as a result meant that it was somewhat dated. We therefore gave greater emphasis to the more recent and more easily measurable cost reductions that have actually been delivered in other industries according to their published accounts. Water companies, by contrast, have been privatised for a number of years, and since we were using the TFP data more directly in deriving the efficiency assumption we disregarded some of the observations at the top end of the 2 –6 per cent a year range. We believe that Railtrack, for which this is the first periodic review since privatisation, is

[22] "Water and Sewerage Industries: General Efficiency and Potential for Improvement", A Report by Europe Economics for OFWAT, October 1998.

more likely to be able to deliver exceptional improvements in efficiency than water, given their respective stages in the development of the regulatory regime for a private-sector company.

## 3.7 Contracting

### 3.7.1 Importance of contracting

*Subcontracting covers a larger part of Railtrack's expenditure than for comparator industries, and "division of expenditure and controlling authority over delivery of specific works makes it more difficult to co-ordinate the introduction of new methods and practices that would deliver efficiencies" (para 3.94)*

A significant proportion of Railtrack's costs are accounted for by its payments to contractors to maintain and renew the network. As noted in our earlier report, there is no statutory or other reason why Railtrack needs to continue to manage its operations this way; it could, for example, chose to undertake maintenance work in-house, or contract out the whole responsibility for its assets (leaving renewal decisions to the maintenance contractor). If its reliance on contracting in its current form were leading to problems in cost control and in delivering improvements in working practices, we would expect Railtrack to consider radical alternatives.

In other industries, increased sub-contracting has been used as a means of reducing costs and introducing greater flexibility. If it is the case that sub-contracting leads to increases in costs for the reasons Railtrack has cited, such as difficulties in changing working practices, this may suggest that contracts are poorly designed, or that there is a lack of competition in the market. We would expect Railtrack to work towards alleviating any such problems, and providing it with an incentive to address any such inefficiencies seems a more appropriate way for the Regulator to address the issue than allowing them to perpetuate, with their cost paid for by customers.

### 3.7.2 Contract lead-times

*The lead time for rolllover of contracts means that Railtrack can capture efficiencies only when new contracts are bid for (para 3.95).*

Railtrack argues that the lead-time for rollover of contracts is long, usually around five years, and that it can only capture efficiencies when new contracts are bid for.

This argument could only apply to unforeseen efficiency improvements, as projected efficiencies would be expected to be incorporated into infrastructure management contracts, for instance through indexation provisions in RT1A contracts or year-on-year changes in the reference price in IMC2000 contracts. Given that, fundamentally, our advice to the Regulator on efficiency relates solely to projected efficiency improvements, lags in the transfer of outperformance to Railtrack do not appear to be a relevant consideration.

We also note that the data provided by Railtrack (Table 3.5 of its submission) suggests that by the first year of the price control two-thirds of its expenditures will fall under the new IMC2000 contracts, increasing to 100 per cent of costs shortly after the middle of the price control period. We also note that where Railtrack shares in cost risks, as we understand is the case for IMC2000 contracts, it benefits from "scoping efficiencies" identified by contractors.

We therefore do not consider that the lead time for rollover of contracts should have any impact, positive or negative, or the efficiency assumption for Railtrack's total expenditures.

### 3.7.3 Cost-savings from re-contracting

*Railtrack states that initial results from the recontracting process are inconsistent with the Regulator's assumptions (para 3.104)*

Railtrack states that overall results from the IMC2000 contracts are similar to Railtrack's efficiency assumptions and inconsistent with the Regulator's assumptions. However, although Railtrack appears able to quote these overall results, it claims (in its February 2000 response) that they "will not be available immediately". We are therefore unable to assess Railtrack's claim. There are important differences in scope and risk allocation between RT1A contracts and IMC2000 contracts, which would need to be adjusted for before meaningful comparisons from recontracting can be drawn. We also note the views of some train operators that much more significant savings are being delivered by the new contracts than Railtrack claims (see Section 6 of this report).

Furthermore, we would caution the Regulator against establishing a precedent of taking account of very recent actual cost data in determining access charges: doing so could lead to incentives on Railtrack to delay the achievement of efficiencies until after the determination, and to seek to overstate its costs during the periodic review process.

Railtrack's claims with respect to recent tender results for infrastructure contracts do not therefore affect our analysis of the scope for future efficiency improvements.

## 3.8 Other Claimed "Inhibitors" of Efficiency

*Railtrack argues that growth constrains the scope for efficiency, as it leads to congestion on the network and puts pressure on the supplier market (paras 3.111 – 3.113)*

The recommendations in our original report assumed that any additional expenditure that is required to meet growth in demand will be allowed for separately by the Regulator. We understand that it is the current intention to allow growth to be financed through the variable elements of access charges.

There may be economies of scope between maintenance/renewal and enhancement activities, for example if output improvements can be obtained by bringing forward renewals. Conversely, there may be diseconomies of scope between growth and maintenance/renewal, for example if the greater utilisation of the network makes possessions shorter and/or more expensive for Railtrack, or for other reasons as identified by Railtrack. In either case, our analysis, which focuses on the expenditures associated with the provision of constant outputs, assumes that these economies and/or diseconomies would be taken into account in setting usage and other variable charges, and in approving prices for network enhancements.

*Railtrack argues that safety constrains the scope for efficiency due to the need to maintain stability in safety procedures (para 3.114)*

Our findings assumed that any additional expenditure on safety that is identified by the Regulator as being required will be separately financed. Reliance on our report will therefore have no impact on Railtrack's ability to deliver the improved safety standards which may be required of it.

If it is the case that (as Railtrack argues) the current environment is such that Railtrack can not introduce changes to working practices with the same degree of freedom as comparator industries, we would expect this to be taken account of by the Regulator in assessing our conclusions, alongside other evidence available to him. It should be noted, however, that safety considerations are also a major issue in other utilities.

*Railtrack argues that the importance of signalling staff in train performance and safety makes it difficult to achieve savings in this area of costs (the offer currently tabled by Railtrack "implies that Railtrack will increase wages for signalling staff by a weighted average of 6 – 7 per cent"). (para 3.116)*

Any assessment of the impact of a wage settlement on unit labour costs would also require an analysis of any other aspects of the agreement, such as changes to working conditions or practices, and so we would caution against placing too much reliance on wage increases considered in isolation.

In any case, to establish a precedent of setting the efficiency assumption on the basis of actual wage settlements might provide Railtrack with incentives to influence wage levels in the future in a way that does not minimise total costs. There is some academic literature which discusses the role of privatisation and the regulatory system in providing incentives to privatised companies to address inefficient working practices that have been inherited from the pre-privatisation era.[23] Similar improvements will only be achieved by Railtrack if it is provided with good incentives to control its costs.

An adjustment would however be required if the Regulator took the view that wage increases in some specialist skills, such as those of signalling staff, were to differ from wage increases in the economy as a whole and that they could not be offset by further productivity gains (eg, through new technology).

[23] Ogden, S (1994), "The Reconstruction of Industrial Relations in the Privatised Water Industries", British Journal of Industrial Relations.

# 4 RAILTRACK'S CRITICISMS OF HOW THE REPORT HAS BEEN APPLIED

## 4.1 Introduction

Railtrack's criticisms of the way in which the Regulator has applied the findings of the Europe Economics report are summarised in turn, followed in each case by our assessment of the criticism.

## 4.2 Base Level of Costs

### 4.2.1 Roll forward v zero-based approach

*The Rail Regulator proposes to apply the efficiency target to a base level of costs derived from past levels of expenditure (a "roll forward" approach). Railtrack argue that this is, in principle less appropriate than on an objective assessment of what will be required over the next control period (a "zero-based" approach), and should only be used as a reasonableness check of the zero-based approach (paras 2.14, 3.3, 3.46 – 3.52).*

We believe that both a roll forward approach and a zero-based approach can be a reasonable way of determining the base level of costs. With a roll forward approach, adjustments need to be made to historical levels of costs to ensure that they represent what it is reasonable to assume for the future (for example, exceptional or non-continuing costs need to be removed). However, some care needs to be taken with a rolled forward approach to avoid giving the regulated company an incentive to overstate its costs towards the end of a control period, or defer efficiency improvements until after the review, in an attempt to raise the base level of costs with respect to which its revenues for the next control period are determined.

We note that relying on a roll forward methodology to assess the expenditures required to provide current outputs, with a more bottom-up approach used to estimate the costs of enhancements and growth, would be consistent with the approach used by other UK economic regulators, such as OFWAT.

### 4.2.2 Adjustments with roll forward approach

*Railtrack argue that the adjustments which the Regulator has made to the rolled forward level of expenditures in order to reflect differences between the past and the future are inappropriate or inadequate (paras 3.7 – 3.45).*

We are unable to comment on the precise adjustments to the base level of costs that the Regulator has made and which Railtrack proposes—the Regulator has taken advice from Booz-Allen & Hamilton on these issues. However, we did comment in our report on the definition of the base level of costs to which our efficiency assumption ought to be applied. This was:

> "the level of Railtrack's expenditure that is judged by the Regulator to represent the level of expenditure necessary, at existing levels of efficiency, to sustain the network in steady state (by which we mean constant quality and quantity of output)."

Our reading of the Regulator's provisional conclusions is that it is his intention that the base level of costs be consistent with this definition.

### 4.2.3 Use of efficiency assumption between 1999 and 2001

*The Rail Regulator proposes to apply the efficiency target at 5 per cent a year from 1 April 1999 (two years before the commencement of the second control period). Railtrack says that this would be retrospective and would have no basis in relation to current and projected rates of efficiency improvement (paras 3.5, 3.55, 3.58, 3.118 – 3.122).*

Our advice to the Regulator was focused on the efficiency improvements that a company in Railtrack's circumstances could reasonably be expected to achieve. To the extent that the efficiency assumption informed by our work is used by the Regulator to assess the expenditures that Railtrack is projected to require over 2001 – 2006 in order to meet constant outputs, an assessment of the base expenditures to be rolled forward from 2001 is required. In order to so do, the Regulator has relied on 1998/99 expenditures, and made adjustments as described above.

It seems clear that in order to estimate precisely required expenditures in 2001, it is more appropriate to use an assumed efficiency derived from recent information than an assumption made in 1995. It is also important to avoid providing Railtrack with an incentive to overstate its forecasts of its expectations of its costs between now and 2001 or to defer actual savings until after 2001. However, in translating expenditure projections into access charges, the Regulator may wish to be mindful of the incentives that his chosen approach could give to Railtrack in future. In particular, the incentive to outperform original efficiency assumptions might be distorted if it is assumed that the same approach would be adopted at the next review. OFWAT, for example, has used specific mechanisms to alleviate this problem, by allowing an "incentive allowance" in the price control related to outperformance in the previous control period. We note here the intention of the Rail Regulator to consider how to strengthen the incentive for improved efficiency in his Spring 2000 provisional conclusions on the incentive framework (Provisional Conclusions, paragraph 1.22).

## 4.3 Interpretation of Europe Economics' figure

### 4.3.1 Unit v aggregate costs

*The Rail Regulator has applied the 3 – 5 per cent a year efficiency target to aggregate costs, whereas Europe Economics figures were (according to Railtrack) for unit operating efficiencies (paras 3.57, 3.65).*

See Section 3.2.1.

### 4.3.2 Efficiency at privatisation

*The Regulator has taken Europe Economics' conclusion that there is no "strong cause to believe that British Rail (BR) before privatisation was any more or less efficient than other nationalised industries at the time they were privatised" to mean that "there is no evidence to suggest that at privatisation Railtrack was any more efficient than the other former nationalised industries" (para 3.82).*

Our conclusion that Railtrack could be expected to reduce expenditures by 3 – 5 per cent a year was based, in part, on our assessment that there is no strong cause to believe that British Rail (BR) before privatisation was any more or less efficient than other nationalised industries at the time they were privatised. The Regulator, when making efficiency assumptions, will consider other evidence and take his own view of the evidence we present. However, we do not believe that the minor difference in phraseology highlighted by Railtrack reflects a fundamental difference in interpretation of the evidence between the Regulator and ourselves on this point.

### 4.3.3 Whole economy TFP growth

*Railtrack state that the Regulator does not appear to have allowed for the need to subtract 1 per cent a year in TFP growth in the general economy from TFP growth for individual companies, to reflect that the former is reflected in the RPI (para 3.89).*

As noted in Section 2.3 of our original report for the Regulator, TFP improvements within the economy as a whole are already implicit within published price indices. We found that it is a reasonable rule of thumb to assume TFP growth for the whole UK economy of about 1 per cent a year. This means that Railtrack would have to achieve TFP growth in excess of 1 per cent a year in order to achieve real unit cost reductions.

As Section 6.2 of our report described, we found that the privatisation literature pointed to substantial TFP improvements by privatised industries, broadly in the range 2 – 6 per cent a year. We noted that this is substantially in excess of the total factor productivity improvement in the economy as a whole (1 per cent a year), and so should have led to substantial real cost reductions per unit of output in these industries. For example, TFP improvements of 6 per cent would be consistent with real total cost reductions of 5 per cent a year. This adjustment is shown in Figure 2.1.

TFP growth in the economy as a whole was thus taken into account by Europe Economics in deriving our conclusions. We expressed our findings in terms of a range for the rate of reductions in expenditures necessary to meet constant outputs, and the Regulator appears to have used our results as such.

We therefore disagree with Railtrack's statement that the Regulator does not appear to have allowed for the need to subtract 1 per cent a year in TFP growth in the general economy from TFP growth for individual companies—for the Regulator to have made an additional adjustment to the 3 – 5 per cent range recommended by Europe Economics, which already includes such an adjustment, would have constituted double-counting.

### 4.3.4 Time profile of efficiency savings

*Railtrack argue that it is not reasonable for the Regulator to assume that Railtrack should be able to achieve all of the theoretical reduction in spend over the second control period (paras 3.106 – 3.107)*

Meeting an efficiency assumption in the 3 – 5 per cent a year range would involve Railtrack making above-average improvements in efficiency over a number of years, until it has delivered the improvements in efficiency that other privatised firms have shown to be achievable; it is therefore inherently a "phase-in" approach.

Railtrack argues that the Regulator's proposed approach compares unfavourably to that adopted by the water regulator, where the less efficient companies are expected to bridge only 60 per cent of the gap between them and the most efficient company during the next control period. However, this relatively conservative treatment can be explained by the uncertainties inherent in the econometric modelling of relative efficiency in the water industry. That is, the residuals resulting from OFWAT's econometric analysis may have explanations additional to differences in relative efficiency, and hence it seems reasonable to assume that not all of the measured residuals are due to relative efficiency differentials. The 60 per cent catch-up applied in water may be regarded more as of a reflection of the extent to which residuals could be interpreted as inefficiency than of OFWAT taking a view of what rate of catch up is appropriate in conceptual terms.

### 4.3.5 Selection of efficiency assumption within the range

*The Regulator has set efficiency targets at the top end of the range, whereas (according to Railtrack) Europe Economics had advocated taking the lower end of their range in their report to OFWAT (paras 3.125 – 3.126).*

In contrast to Railtrack's assertion, Europe Economics' May 1999 report made no recommendation in its work for OFWAT that the lower end of the suggested range should be adopted.[24] Railtrack quoted Europe Economics as follows:

> "These arguments…[some of the more persuasive arguments made by water companies in response to our original report]…might point a cautious Regulator towards the lower end of the range for efficiency improvements suggested in our original report".

The remainder of our conclusions in the OFWAT report, which are not quoted by Railtrack, continued as follows (page 32):

> "On the other hand, any underestimate of output quality improvement in the studies of comparator industries would justify some increase to the estimate of the scope for efficiency improvement…we consider that any such adjustment would tend to offset the impact of some of the more persuasive company arguments referred to above".

[24] "Water and Sewerage Industries General Efficiency and Potential for Improvement: An Update", A Report by Europe Economics for OFWAT, May 1999.

Hence, our conclusions remained unchanged, in the form of the range originally proposed without a recommendation that any part of the range should be preferred.

*Railtrack claim that "Europe Economics also state…that regulatory targets should allow scope for out-performance" (para 3.80).*

In fact, our comments fall some way short of such a definitive statement. We merely note (page 21) that "allowing regulating companies to retain some of the benefits of efficiency gains … is sometimes necessary as an incentive for firms to make the efficiency gains in the first place".

Incentives are one of the factors that we expect the Rail Regulator to consider alongside the evidence presented in our report and that derived from elsewhere when setting efficiency assumptions for Railtrack.

# 5 JUNE 2000 OXERA REPORT FOR RAILTRACK

## 5.1 Introduction

The preceding sections have focused on Railtrack's February 2000 response to the Rail Regulator's *Provisional Conclusions* document and its April 2000 response to Europe Economics' report *Review of Railtrack Efficiency*. In June 2000, Railtrack submitted a further report to Railtrack, prepared by its consultants, OXERA, on the subject, *Establishing a cost-reduction target for Railtrack based on top-down approaches*.[25]

Many of the arguments are similar to those put forward in earlier Railtrack submissions. However, less emphasis is given to the suggestion that Europe Economics' methodology is flawed, and OXERA's report focuses instead on analysis that might inform the magnitude of the efficiency assumption given the methodology we have adopted.

Nevertheless, we believe that important shortcomings remain in the way in which some of the data has been interpreted by OXERA and the relative emphasis given to data from different sources, with the effect that the scope for Railtrack to improve its efficiency is under-estimated.

## 5.2 OXERA's Approach

OXERA examine a range of sources of data:

- A sectoral analysis, which involves breaking down Railtrack's costs into separate functions and selecting comparator sectors for each cost heading.
- A review of the academic literature on productivity.
- The most recent price reviews by the water and electricity regulators.
- A review of actual performance of privatised industries.

OXERA reports the results of its analysis as summarised in Table 5.1:

**Table 5.1**

**Summary of cost reduction estimates**

| Source | Total cost reduction estimate |
|---|---|
| Sectoral analysis | 1.7 – 2.0 (TFP) |
| Academic literature review | 1.0 – 2.7 (TFP) |
| Other regulators' assumptions | 2.4 – 2.7 |
| Actual performance of privatised industries | 2.0 |

Source: OXERA

[25] Some of the arguments in the OXERA report were subsequently emphasised in a presentation given by Railtrack to the ORR and Europe Economics on 22 June.

## 5.3 Sectoral Analysis

OXERA's sectoral analysis takes TFP growth data from O'Mahony (1999), adjusts it for volume growth, and forms a comparator group of sectors based on a 'nature of work' approach.[26] This involves breaking down Railtrack's costs into separate functions and selecting comparator sectors for each cost heading. The total weights for each comparator are based on the weight of each of the appropriate cost headings, and the number of comparators for each cost heading. The range of 1.7 – 2 per cent was created by calculating estimates either including or excluding the West Coast Main Line (WCML) project, and either adjusting or not for volume growth.

This approach follows very closely an approach considered, but ultimately rejected, in Europe Economics' 1998 report for OFWAT. It was rejected by Europe Economics because it effectively produces a weighted average of productivity improvements made by firms which are operating in competitive sectors, such as the construction sector. It takes no account of the fact that the water and rail industries have recently been privatised, which evidence from other privatised utilities and the academic literature both suggest is likely to be the most crucial determinant of the scope for efficiency improvements in these industries at the present time.

The economic theory explaining the potential impact of privatisation, competition and regulation on productivity is described in Section 3.2 of our December 1999 report for the Rail Regulator. We concluded that the privatisation of firms which had previously been in the public sector is likely to improve the efficiency of firms, by clarifying objectives and by sharpening incentives, including introducing the threat of take-over or bankruptcy. However, the extent to which potential gains are translated into actual gains in performance depends in part upon the ability to monitor the effectiveness of managers. Where privatised firms operate in product markets with little or no competition, as Railtrack does, it may be difficult to monitor performance. In these circumstances, the regulator has an important role to play in imitating the effects of competition in order to promote improvements in efficiency.

An important finding from the academic literature, discussed in full in our December 1999 report, is that privatised industries have achieved productivity growth significantly faster than the economy as a whole, and generally faster than they managed before privatisation. It has not always been clear whether this has been the result of transfer of ownership or whether the same effect could have been achieved simply by changing public sector objectives. Either way, the literature suggests that privatised industries had significant room to catch-up, in terms of their efficiency, on firms operating in the wider, competitive economy. Furthermore, this effect has generally been reinforced whenever product market competition faced by the firm is increased.

In view of these findings, we conclude that the actual performance of other privatised industries is likely to be far more informative as to the scope for Railtrack to improve its efficiency than sectoral analysis of the type undertaken by OXERA, which effectively simply weights whole economy TFP figures without taking account of the recent privatisation of the industry.

[26] O'Mahony (1999), *Britain's Relative Productivity Performance, 1950 – 1996 – An International Perspective*, National Institute for Economic and Social Research.

## 5.4 Academic Literature Review

For its December 1999 report, Europe Economics reviewed the academic literature on privatisation and productivity. We concluded that the literature was somewhat dated, and so does not take account of the achievements of the most recent years. Nevertheless, the literature shows that privatised industries have achieved productivity improvements broadly in the range 2 – 6 per cent a year. However, these figures need to be interpreted in context.

OXERA reviewed the same material, and concluded that it provided a basis for assuming that Railtrack could reduce its total costs by only 1.0 – 2.7 per cent a year. OXERA states that its interpretation differs from that of Europe Economics in two important respects (page 16):

- "TFP is affected by volume growth – high volume growth in industries such as gas and telecoms significantly improves raw TFP estimates, as acknowledged by Europe Economics…The unadjusted TFP growth rates are irrelevant to benchmarking Railtrack's potential for future cost reductions on the steady-state network, and should be ignored.

- TFP performance is affected by exogenous factors and business cycles – this has resulted in both very high and very low (in some cases negative) TFP growth rates for specific periods. Again, such outlying TFP growth rates are irrelevant to assessing Railtrack's potential for future total cost reductions at steady state."

Both of these points have merit, and justify some caution in the interpretation and application of TFP estimates from the literature. However, it would be easy to overstate the importance of economies of scale in driving productivity performance: far from all of the industries have been characterised by rapid volume growth, and even where volume has growth has been rapid the existence of substantial scale economies is required before TFP results are significantly distorted.

We would also caution against the selective elimination of observations. For example, OXERA argues that a number of comparators included in the Martin and Parker (1997) study are not relevant to Railtrack. In the case of British Steel, it argues that "to take this latest TFP estimate as a comparator to Railtrack would suggest that Railtrack has potential for a major restructuring programme, including substantial job losses" (page 13). Similarly, Associated British Ports is regarded by OXERA as less relevant, as many of its efficiencies have resulted from improvements in working practices and tackling the power of trade unions.

Clearly, Railtrack is not directly comparable in every respect to any particular comparator, but they may nevertheless provide some useful pointers to the areas in which Railtrack may improve its efficiency. The use of a simple average of a set of results, as adopted by Europe Economics, does of course risk that some slightly less relevant comparators are included, but at the same time it helps ensure that no results are accorded undue weight.

## 5.5 Other Regulatory Price Reviews

As with Europe Economics (1999), OXERA view other regulatory price reviews as providing a check on what might reasonably be expected of Railtrack. However, OXERA limits its comparisons to the most recent reviews in the electricity distribution and water sectors, which it judges as sufficient to provide its range of 2.4 – 2.7 per cent. Relatively inefficient companies were given more demanding targets. In both cases, this is the second price review for the companies concerned, who have been privatised far longer than Railtrack, for whom this is the first price review.

As noted in our original report for the Rail Regulator, some experience in other sectors suggests that companies are able to produce significant achievements in efficiency shortly after their first price control review. For this reason, the National Grid Company's first price review, at which the company was set an efficiency target of 5 per cent a year, would seem at least as relevant as the electricity distribution and water reviews.

OXERA makes three comments on the Europe Economics analysis (page 17). First, it claims that maintenance and renewals do not necessarily have the same potential for cost reduction as operating expenditure. We do not understand why this should be assumed to be the case, although it is true that capital substitution can have the effect of causing *reported* operating expenditure to fall more quickly that the corresponding capital elements. Nor, contrary to OXERA's assertion, is its argument borne out by the recent price review in water, where the cost savings assumed by the regulator for capital elements were, when expressed on an annualised basis, of a similar magnitude to those demanded of operating expenditure.[27]

Second, OXERA argues that allowing the regulated company to retain some of the benefits of efficiency improvements is necessary if it is to have an incentive to make efficiency improvements. This is an observation with which we agree, as our original report makes clear. It leaves the question however as to the point at which the incentive is appropriate, which will be a matter for the Regulator to determine as part of the review alongside other elements of the incentive regime.

Finally, OXERA argues that it is unreasonable for Railtrack to be given the same efficiency target as relatively inefficient water companies, as there is no evidence to suggest that Railtrack is relatively inefficient. This argument sets aside a number of important considerations, such as those set out in Section 6.2 of Europe Economics' original report:

- Railtrack has been privatised relatively recently, and the experience from other sectors suggests that it is unlikely to have fully caught up with the management and operational practices of private sector firms and competitive markets.

- This is Railtrack's first regulatory review since privatisation, and some experience from other sectors suggests that companies are able to produce significant achievements in efficiency at this stage in the regulatory cycle.

[27] The annual reduction of 2.7 per cent a year for opex for the average company is broadly equivalent to the one-off reduction of 10 – 12 per cent assumed by OFWAT for capital maintenance – see Table 3.2 of the present report.

- Railtrack has little exposure to product market competition, which both the academic literature and the experience of other sectors suggests is a very significant driver of efficiency improvement.

- The nature of Railtrack's business, principally infrastructure management, gives rise to what are sometimes referred to as 'scope economies' (meaning better identification of the scope of work required), on top of improvements in the efficiency with which tasks are undertaken. Our understanding of the quality of data held by Railtrack about its assets suggests that this scope is unlikely to have yet been fully exploited.

- A significant proportion of Railtrack's existing costs were contracted for before privatisation, to firms that in many cases were also previously part of British Rail, at a time when the suppliers' market was immature.

For these reasons, we believe it reasonable to assume Railtrack has considerable scope to improve its efficiency. The data presented by OXERA in Table 4.2 of its report does not constitute persuasive evidence of the efficiency performance of Railtrack since privatisation. As OXERA later argues in relation to data presented by Europe Economics for Transco, it seems reasonable to discount the figure as it based on only two years data. Furthermore, the data are likely to be distorted by the effects of privatisation and restructuring, and passenger-kilometres may be a less suitable output measure for Railtrack than, say, track-kilometres.

In addition, slides presented by Railtrack to ORR on 22 June, at which the OXERA report was discussed, state that "Europe Economics had incorrectly used 5 per cent as top of range for National Grid Company: correct figure for NGC is 4 per cent." However, the statement issued by OFFER at the time of the 1992 NGC review said:

> "I believe there is scope for reducing capital expenditure, particularly by keener purchasing. Also, although NGC already plans to reduce operating costs by some 3 per cent a year, I believe that additional savings of some 2 per cent a year should be achievable". [28]

The OXERA / Railtrack argument that NGC received an efficiency target of 4 per cent may, in any case, relate to the 1996 NGC price review, rather than the 1992 NGC price review. In its "accompanying notes" to the slides presented at the 22 June workshop, Railtrack states:

> "At the last review of the National Grid Company, OFFER's consultants suggested potential reductions of controllable opex in the range of 4 – 6 per cent. OFFER used assumptions of 4 per cent…"

It is clear from this that efficiency improvements of the magnitude suggested here for Railtrack would not be unprecedented, contrary to the impression given by Railtrack.

[28] OFFER (1992), *Future Control on National Grid Company Prices* , A statement by the Director General of Electricity Supply, July.

## 5.6 Actual Performance

OXERA also reviews Europe Economics' analysis of the performance of other privatised industries in reducing costs, which showed that real unit operating costs (excluding depreciation) have been consistently reduced by in the range 3 – 7 per cent a year.

OXERA does not dispute these figures, but claims that this can be consistent with total cost reductions of only 2 – 3 per cent a year. As discussed in Section 3.2.2 of this report, this adjustment, which OXERA sources to Railtrack in the note to Table 4.1 of its report, appears to have been made using inflated measures of the capital element. Railtrack's capital measures relate to the total capital expenditure in comparator industries, potentially including that required to accommodate volume growth and quality enhancements, rather than the capital inputs required to provide the base service.

As a result of this shortcoming, OXERA's total costs are overstated, and total cost reductions are understated. As discussed in Section 3.2.2, our analysis suggests the adjustment for capital substitution should be of the order of 1 per cent.

In its accompany note to the slides presented to the ORR on 22 June, Railtrack acknowledges (page 2) that the upper end of the Europe Economics 3 – 5 per cent a year range is supported by experience in the electricity industry, after adjusting appropriately for volume growth and capital substitution effects. Railtrack notes that the upper end of the range is highly sensitive to which method for incorporating capital substitution is used: on one of the methods of adjustment that it reports, a figure of 6.3 per cent a year could be supported by evidence from the electricity industry.

As noted above, evidence from the gas industry, interpreted in context, also supports the top end of our range, and perhaps even above it. The efficiencies achieved by the water industry seem somewhat lower. However, the reported figures may not fully reflect levels of service improvements in the water industry and may in any case be explained by lesser competitive pressures in that industry. In the case of Railtrack, which is essentially a natural monopoly, the regulator can act as a surrogate for competition.

OXERA also claims (Table 4.3 of its report) that a reduction in real total unit costs of 5 per cent a year is equivalent to a reduction in total costs of 2 per cent a year, given volume growth. It refers to earlier analysis presented by Railtrack in Table 1 of its April 2000 response, which was based on a projection of demand growth of about 4.5 per cent a year, and which indicates that each 1 per cent increase in demand leads to an increase in Railtrack's costs of the order of 0.2 per cent.

However, on these assumptions, a reduction in the costs of providing a constant output of 5 per cent a year would be consistent with total cost reductions of about 4 per cent a year, not the 2 per cent a year claimed by Railtrack / OXERA.

We therefore do not understand the basis for OXERA's calculations, which are given further emphasis in the conclusion to its paper, that Railtrack's 2 per cent a year projected total efficiency savings are equivalent to about 5 per cent a year reduction in the cost of providing constant outputs (the base service).

## 5.7 Conclusions

The OXERA report is a useful contribution to the debate on efficiency. However, we believe it does not give an appropriate weight to the different sources of data:

- The 'nature of work' comparisons, while interesting, take no account of the fact that Railtrack has been privatised relatively recently, which we believe is likely to the most important determinant of its scope to improve efficiency.

- OXERA makes rather selective use of the academic literature on productivity improvement, which in any case is now rather dated. We believe the academic literature can support a wider range of outcomes for Railtrack, and can provide important lessons for areas where Railtrack may improve its efficiency, even from industries which would not normally be regarded as direct comparators.

- OXERA does not appear to dispute Europe Economics' principal finding that Railtrack's closest comparators (even excluding gas transportation) have reduced unit operating expenditure at a rate of between 3 and 7 per cent a year in real terms.

There also appear to be two important methodological shortcoming in OXERA's report:

- The first relates to the way in which operating expenditure reductions are translated into total cost reductions, by allowing for capital expenditure (OXERA's Table 4.1). As described above, the approach adopted by Railtrack / OXERA has the effect of significantly understating the scope for Railtrack to reduce its total costs for provision of a base service assuming constant outputs.

- The second relates to the way in which total costs for the base service are translated into total cost reductions, taking account of demand growth (OXERA's Table 4.3). Adopting Railtrack's own assumptions on volume growth and the variability of its costs, this analysis appears to be significantly understate the scope for Railtrack to reduce its total costs (including the costs of growth).

OXERA's report also ignores a number of factors which we consider important to the scope for Railtrack to improve its efficiency, which are reproduced in Section 5.5 above.

# 6 OTHER VIEWS

## 6.1 Other Responses to the Provisional Conclusions

In addition to the response received from Railtrack, more than 20 other responses to the provisional conclusions document were received. These responses came from a variety of parties, including train operators and funders. In this Section, we consider the comments made in relation to efficiency and expenditure. Not all respondents commented explicitly on this issue.

*Shadow Strategic Rail Authority (sSRA)*

The sSRA's response made the following brief comment on efficiency:

> "On the evidence which you have published, and taking into account also the opinions of train operators, I believe Railtrack has substantial scope to improve the overall efficiency of its operations".

*Freightliner*

Freightliner believes that the Regulator has underestimated the scope for Railtrack to improve its efficiency:

> "We are disappointed with the modest efficiency savings which you believe Railtrack is able to make. Not only does the international benchmarking suggest that there are substantial economies to come from the proper management of the network, but we also have information which suggests that Railtrack is already letting its track maintenance and renewal contracts at prices up to 40 per cent lower than those prevailing at the time of privatisation; the effects of these savings may be disguised in the current accounts but are likely to pass through as soon as your review is completed. Further, the rates of efficiency proposed are below those claimed by Railtrack itself for its infrastructure activities in its Annual Reports. We believe that there is no need to phase in the efficiency improvements, and that you should commit to the 5 per cent figure for each year of the review period."

International benchmarking is being separately considered by the Regulator. The suggestion that savings of up to 40 per cent are being made on the maintenance and renewals contracts is at odds with Railtrack's assertion that only 10 per cent savings can be made. We have seen no detailed evidence from either source to enable either estimate to be verified.

*English, Welsh and Scottish Railway (EWS)*

EWS believe that the scope for Railtrack to improve its efficiency is under-estimated in the provisional conclusions:

> "EWS believes that the rate of efficiency allowed for by the Regulator in his provisional conclusion (equivalent to 3 – 5 per cent a year savings) significantly under-estimates both the levels of efficiency Railtrack has already planned to

> implement in the next control period and further initiatives that it would adopt in the next control period given a sufficient incentive".

This is justified as follows:

- International benchmarking studies provided by EWS to the Regulator. EWS states that, since deregulation, the US Class 1 Railroads have improved track and structures productivity by an average of 6.7 per cent each year for 17 years.
- EWS claims that Railtrack already have in place several initiatives designed to reduce the cost of maintenance and renewals in the next control period.
- EWS would expect Railtrack's market position to lead to equally significant reductions in factory gate materials prices.
- EWS also believes that greater medium and long term savings can be exploited by use of high quality track components, revised methods of work and the adoption of an efficient renewals strategy.

Commenting specifically on the Europe Economics report, EWS argues that Europe Economics under-estimates the amount of technological improvement open to Railtrack.

*Rail Freight Group (RFG)*

RFG welcome the attempt by the Regulator and his consultants to compare the different regulated utilities on an objective basis:. However, it also believes the scope for efficiency improvements by Railtrack has been under-estimated:

> "We believe that…[7 per cent a year for 17 years is achievable], but that there might be benefit in reducing this rate for the first two years to allow Railtrack time to set the process in motion. A slightly higher rate in subsequent years would balance this".

The considerations this view is based on include the following:

- International benchmarking and technological innovations that have been adopted overseas (especially in the US).
- Failure by Railtrack in the first control period to deal with problems arising from union power and a public sector culture.
- Shortcomings in Railtrack's procurement methods and signalling policy.

*HSBC*

HSBC comment as follows:

> "While we agree that it should be possible for Railtrack to achieve efficiency savings in its core business within the Regulator's range of 3 – 5 per cent a year,

> the ability to do so at a level of 5 per cent a year inclusive of savings on enhancements is hard to contemplate given the uncertain nature of enhancement investment. Failure to achieve the Regulator's target would ultimately be damaging to the perceived business position of the company".

We are unclear what HSBC mean by "inclusive of savings on enhancements", and the comment may suggest that HSBC have misunderstood our report. We specifically excluded the cost of enhancements from the scope of our analysis, and hence enhancement expenditure should not impact on the ability of Railtrack to deliver the 3 – 5 per cent a year efficiency savings which HSBC agree could otherwise be achieved. On the contrary, to the extent that there are economies of scope between enhancements and the base service, a greater efficiency saving in the base service may be achievable (if such economies are not reflected in the costs of enhancements). This was discussed in Section 6.7 of our report.

*Chiltern Railways*

Chiltern Railways supports the Regulator's provisional conclusions in respect of efficiency:

> "We believe that the assumed rate of efficiency achievement of 3 – 5 per cent a year ought to be achievable, not only for the reasons given but also because we believe that there is greater scope for the better dissemination of best practice within Railtrack".

*Merseyrail Electrics (MEL)*

MEL also broadly supports the Regulator's approach, but advocates a figure towards the centre, rather than at the upper end, of the Europe Economics' recommended range of 3 – 5 per cent a year:

> "MEL concurs with the Regulator's opinion that Railtrack should be able to achieve considerable cost savings. However, from the comparative information contained within paragraph 3.41, MEL has reservations as to whether Railtrack would be able to sustain savings of 5 per cent a year. Perhaps a more achievable range, again based on paragraph 3.41, would be 4 per cent a year".

This is in part based on MEL's view that Railtrack has only a poor understanding of its assets, and that it is therefore yet to benefit from the economies it would be likely to achieve if it had a better understanding of its assets.

*West Yorkshire PTE*

West Yorkshire PTE comment that:

> "Given that other European privatised utilities have achieved efficiencies in the range 2 – 6 per cent a year, …[the Regulator's proposals for efficiency]…seem reasonable. However, given levels of growth in the industry expected, it may be reasonable to assume savings at the higher end of the range due to economies of scale that will be available to Railtrack. It may also be advantageous to examine more data and allow the required savings to be based on actual experience as if

> the savings are reached early in the control period there could be little incentive for Railtrack to further improve efficiency".

As with Railtrack, West Yorkshire PTE appears to have slightly misunderstood the Europe Economies methodology with regard to the treatment of output growth. The 3 – 5 per cent a year efficiency savings recommended by Europe Economics applies to total expenditures required to provide existing outputs. The costs of additional outputs will be allowed for separately by the Regulator. The rate at which Railtrack can reduce its unit costs will therefore depend on the costs of providing additional outputs, and so need not be of the same magnitude as the rate at which total expenditures to provide the base service can be reduced. (If, as seems likely, marginal costs are below average costs, unit costs will reduce at a faster rate than base service expenditures).

*Prism Rail*

Prism are concerned that the proposals for efficiency are too demanding:

> "We are concerned with the provisional conclusion of the Regulator that assumed efficiency savings of 5 per cent a year should be built into the pricing review. Whilst we note the Regulator's basis for supporting this in paragraph 3.39, the reality is that levels of maintenance and expenditure of all types are going to increase dramatically over the next review period and, against that climate, it is simply not realistic to assume that efficiency savings will or can always be a top priority. Our own gut feeling is that an assumed rate of 5 per cent a year is too high, on top of all the other things that Railtrack will have to achieve to deal with investment requirements generally and with increased passenger growth".

We do not agree with Prism's analysis. The costs of enhancements and growth will be allowed for separately by the Regulator and hence should not impact on Railtrack's ability to improve the efficiency with which it provides the base service.

*National Express Group*

National Express fear that the scope for efficiency has been understated, and advocate that the Regulator undertakes further analysis to clarify the matter:

> "As to efficiency, your Europe Economics reports made encouraging reading. But even discounting the entry for gas transportation, we were surprised, given the contents of Table 3.4, that the overall conclusion was of savings of only 3 – 5 per cent a year in real terms. We are also aware of the substantial body of work undertaken by freight operators, EWS in particular. From what we understand of this work, the efficiency reserves could be substantially in excess of the 5 per cent a year you are provisionally allowing. But we note that you are undertaking further investigation before July, and hope to hear that there is indeed more to be had".

*Nexus*

Nexus supports the Regulator's approach:

> "The approach of the Regulator in determining a rate of efficiency improvement to be taken into account in assessing Railtrack's future expenditure requirements is welcomed. Operators will be aware of any need to increase maintenance and renewals activity necessary to maintain the current condition and capability of the network. With the increasing level of use of the network it is important that no deterioration occurs in the condition of track and stations."

*South West Trains*

South West trains agrees that Railtrack is inefficient in certain practices, but cautions the Regulator against setting efficiency targets in such a way that Railtrack's ability to improve the network is undermined.

*Strathclyde PTE*

Strathclyde PTE comments favourably on the Regulator's approach:

> "STPE is not, of course, in a position to comment on a first-hand basis on the details of either the range of expenditure projections or the assumed rate of efficiency improvement postulated in the consultation paper. Nevertheless, the evidence which has been gathered by the Regulator through the consultancy studies which he has commissioned as part of the review, and the parallels from other sectors and other railway administrations, appear to provide a considerable weight of support for the base scenario figures in the document and the assumed efficiency savings. Moreover, although the growth assumptions which are referred to in the consultation paper are excluded from the calculations relating to the "sustained network" outputs, it seems not unreasonable to assume that the opportunities for scale economies which this growth will create will themselves facilitate the achievement of efficiency savings. The would reinforce the Regulator's conclusion in paragraph 3.40 that efficiency savings towards the upper end of the proposed range, while challenging, would be achievable."

However, for the reasons stated in response to West Yorkshire PTE, demand growth would impact on unit costs but not on Railtrack's ability to reduce expenditures to provide the base service (which was the focus of our analysis).

*Virgin Trains*

Virgin restricts its comments on efficiency to the following:

> "The range of 3 – 5 per cent a year feels appropriate as indicated by the review but an improved network also feels more appropriate".

For our purposes, the question of efficiency was separated from the question of specification of the outputs that Railtrack should be required to deliver. Of course, greater efficiencies reaps a

benefit that can be distributed in a number of ways (eg, on network improvements, on increased profits for Railtrack, on price reductions for customers). Distribution of the "efficiency dividend" was outside the scope of our report.

*S. D. Box*

Mr Box expresses some misgivings about the efficiency assumption, which he regards as "bold":

- "Worst" and "best" case scenarios should be examined (eg, assumptions of efficiency gains significantly less or more than those proposed by the Regulator) and an indication of the priorities to be expected from (or imposed on) Railtrack if expenditure requirements to sustain the network are greater than anticipated.

- The efficiency assumption should be separated into that due to technological gains and that due to managerial gains, and justified in "real" terms.

- The assumption of efficiency gains seems to be based on extrapolations of experiences elsewhere in different industries and different countries.

*Reverend Long*

Reverend Long commented as follows:

> "Scenarios 1-4 (Figure 3.1) are an adequate range. Efficiency improvements 3 – 5 per cent—especially to tackle management costs. There is a need to increase maintenance and renewal of the network".

## 6.2 Statements Made by City Analysts

### 6.2.1 Introduction

The Rail Regulator has provided us with a number of reports by City analysts which were produced following the publication of his *Provisional Conclusions* last December. Comments on the efficiency assumption are summarised below.

### 6.2.2 ABN Amro (20 December 1999)

"Whilst the sizeable capex programme gives Railtrack the chance to exceed targets, the company has a limited track record in delivering major enhancement projects either on time or to budget. Backing existing management to do so could be a risky policy. To its advantage, Railtrack is a young company that has yet to attack its cost base aggressively – the 5 per cent efficiency gains per annum is a realistic target in our view".

### 6.2.3 Charterhouse Securities (February 2000)

"We view these targets as tough, but if the Regulator has done his job well, then Railtrack should still have the potential to outperform".

### 6.2.4 Credit Suisse First Boston (February 2000)

"In estimating the likely efficiency savings, the regulator has consulted Railtrack and analysed the performance of other regulated utilities. Railtrack argues that it has achieved like-for-like efficiency of 3.9 per cent. However, some of the savings are due to the 'X' factor incorporated in its contracts with suppliers. Once this is adjusted for, the actual level of efficiency savings is lower. Europe Economics, the consultant working for the ORR, argue that Railtrack should be able to reduce controllable costs by between 3 – 5 per annum real. In his preliminary determination, the regulator accepted this view, arguing that Railtrack should be able to achieve efficiencies of 5 per cent a year. The efficiencies will be driven by a number of factors: better understanding of its assets, new contracts structures (for example, IMC2000 maintenance contracts) and the fact that a substantial capex programme is likely to lead to further economies. This is on controllable costs, which do not include cumulo rates, BT police and ORR licence fees.

We believe that there is scope for the regulator to move his target for efficiency savings down from the top of the range to a figure more in line with Railtrack's historical performance"

### 6.2.5 Donaldson, Lufkin & Jenrette (January 2000)

In its December 1999 preliminary regulatory conclusions, the ORR called on Railtrack to deliver annual efficiency gains of 5 per cent in unit costs. Railtrack objected to this assumption, claiming that a 5 per cent efficiency gain would not be possible during a period of significant investment and network growth. However, we believe that investors should not be concerned by the level of the proposed efficiency gains for two reasons. Firstly, during our meeting with the ORR it became clear that the 5 per cent efficiency gain is at the top end of the Regulator's 3 – 5 per cent range. Furthermore, allowances will be made for the level of growth and investment required by Railtrack when the ORR publishes its final conclusions in July 2000.

Secondly, the 3 – 5 per cent range is in line with annual efficiency gains delivered by other regulated utilities post-privatisation…Our analysis clearly shows that, despite similar company statements that efficiency gains were impossible to achieve, companies have consistently outperformed their original projections and in most cases have also outperformed the regulator's demands".

# 7 CONCLUSION

In its December 1999 report for the Rail Regulator, Europe Economics concluded that Railtrack had scope to reduce its expenditures to supply existing outputs by of the order of 3 – 5 per cent a year in real terms. In its various responses, Railtrack has made a number of criticisms of the Europe Economics report and the way it had been applied by the Regulator.

For the reasons explained in this present report, we believe these criticisms are without foundation. Many of Railtrack's criticisms appear to follow from its belief, expressed most strongly in its earlier submissions, that Europe Economics' conclusions were to be applied to unit costs rather than to overall expenditures. We can confirm that this was not our intention and that it appears to us that the Regulator is proposing to apply our conclusions appropriately in this regard.

Railtrack was also concerned that we had arrived at a figure using evidence from comparator industries without taking account of the effect of any demand growth or capital substitution in those industries. However, as Figure 2.1 shows, in reaching our conclusions:

- Reductions in real unit operating costs (excluding depreciation) achieved by other privatised infrastructure network monopolies were adjusted, where necessary, to take account of capital substitution and demand growth in those industries.

- Improvements in total factor productivity achieved by privatised companies were adjusted to reflect the total factor productivity improvement in the economy as a whole.

In reaching our 3 – 5 per cent a year recommendation for reductions in real expenditures we also took account of the other considerations listed on page 27 of our original report (factors such as past inefficiencies in Railtrack's contracting, and the fact that this is Railtrack's first price review since privatisation).

Railtrack raised a number of other issues, each of which is considered in this paper. Of most merit may be Railtrack's argument that it faces greater labour costs than comparators. This partly depends on the Regulator's view as to the degree to which certain labour costs result from factors external to the company. Any adjustment that could be justified for such an effect would be difficult to quantify and, in any case, we expect, would be minor. Our assessment therefore remains that Railtrack has scope to reduce its expenditures on delivering a "base" level of service by about 3 – 5 per cent a year in real terms.

Other respondents to the provisional conclusions also raise substantive issues. Many support the Regulator's assessment of the scope for Railtrack to improve its efficiency (excluding enhancement costs), or believe that it has been understated. Some respondents point to the results of international benchmarking studies, which the Regulator is considering separately, and to the cost savings that they believe are achievable or achieved through retendering of infrastructure maintenance contracts.

# A1 COST REDUCTIONS IN PRIVATISED UTILITIES

## A1.1 Real Unit Operating Expenditure (excluding Depreciation)

**Table A1: Changes in RUOE Since Privatisation**

| Company | Year Privatised | Change in RUOE from the year of privatisation to latest year | CAGR from the year of privatisation to latest year |
|---|---|---|---|
| British Airports Authority[29] | 1987 | -15.9% | -1.6% |
| British Airways | 1987 | -26.6% | -2.5% |
| British Gas[30] (to 1996) | 1986 | -50.2% | -7.5% |
| Transco (from 1996) | 1996 | -30.1% | -16.4% |
| British Steel | 1988 | -1.1% | -0.1% |
| British Telecom[31] | 1984 | -25.5% | -4.8% |
| Water services[32] | 1989 | -15.9% | -3.7% |
| Sewerage services | 1989 | -17.7% | -4.1% |
| PowerGen[33] | 1991 | -36.3% | -7.3% |
| National Power | 1991 | -17.3% | -2.7% |
| National Grid Company | 1990 | -38.5% | -6.8% |
| Eastern Electricity | 1990 | -37.1% | -6.4% |
| East Midlands Electricity | 1990 | -25.7% | -4.2% |
| London Electricity | 1990 | -43.1% | -7.8% |
| Manweb | 1990 | -33.5% | -5.7% |
| Midlands Electricity | 1990 | -32.2% | -5.4% |
| Northern Electric | 1990 | -16.6% | -2.6% |
| Norweb | 1990 | -37.4% | -6.5% |
| Seeboard | 1990 | -47.7% | -8.9% |
| Southern Electric | 1990 | -53.6% | -10.4% |
| SWALEC | 1990 | -35.5% | -6.1% |
| SWEB | 1990 | -42.7% | -7.6% |
| Yorkshire Electricity | 1990 | -36.7% | -6.3% |
| Scottish Power | 1991 | -12.9% | -2.0% |
| Scottish Hydro-Electric | 1991 | 9.8% | 1.4% |
| Northern Ireland Electricity | 1993 | -36.4% | -8.6% |
| Unweighted average | | | -5.6% |

Source: Annex A1.3 of Europe Economics' December 1999 report to ORR.

[29] Up to and including 1998. Figures for BAA for 1999 are misleading due to a major acquisition.
[30] The former British Gas split up in 1996 into BG plc and Centrica plc. Transco is BG's gas transportation business.
[31] For BT, the output measure used here is the minutes for all calls. These data are available since the financial year ended the 31 March 1993.
[32] For the water and sewerage industry, RUOE reductions have been computed over the period 1993 – 1998.
[33] For Powergen, RUOE reductions have been calculated for the period 1991 – 1997.

Few of the companies present a regular trend over the period, and some year-to-year changes are substantial, as shown in Table A2 overleaf.

**Table A2: Changes in RUOE Since Privatisation**
**% Change on Previous Financial Year**

| Financial Year Ending | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| British Airports Authority | . | . | . | -6.6 | -10.1 | 2.8 | 13.2 | 6.5 | -14.9 | 9.6 | -6.0 | -3.3 | 0.7 | -5.2 | 8.0 |
| British Airways | . | . | . | -7.6 | -3.7 | 1.7 | 1.0 | -1.1 | -4.2 | -3.4 | -4.7 | 4.1 | -0.1 | -4.8 | -7.0 |
| The former British Gas TransCo[34] | . | . | . | -10.1 | 1.4 | -18.1 | 1.0 | 27.4 | -17.7 | -12.2 | -21.2 | -8.8 | . -12.9 | -19.9 | |
| British Steel | . | . | . | . | 2.3 | 0.6 | 5.9 | -3.9 | 0.6 | -11.6 | -1.9 | 19.0 | 0.0 | -10.1 | 1.1 |
| British Telecom[35] | -0.5 | -0.1 | 3.8 | -5.4 | -2.6 | -3.9 | -2.9 | -2.3 | 6.8 | -8.5 | -2.2 | -8.1 | -5.9 | -4.1 | 0.5 |
| Water services | | | | | | | | | | -1.0 | -3.1 | -4.4 | -4.5 | -4.1 | |
| Sewerage services | | | | | | | | | | 0.9 | -2.7 | -8.2 | -3.9 | -5.0 | |
| PowerGen | . | . | . | . | . | . | . | 1.9 | -6.2 | -20.5 | 2.2 | -13.1 | -5.7 | | |
| National Power | . | . | . | . | . | . | . | 1.5 | 12.3 | -25.7 | -6.6 | -11.7 | 12.3 | 5.5 | |
| National Grid Company | . | . | . | . | . | . | . | 15.6 | -6.1 | -15.0 | -14.4 | -7.0 | -6.4 | -11.1 | |
| Eastern Group Electricity | | . | . | . | . | . | . | -4.3 | 5.6 | 0.7 | -11.4 | -0.9 | -17.0 | -15.1 | |
| East Midlands Electricity | . | . | . | . | . | . | . | -6.5 | -4.6 | -0.7 | -1.6 | -3.8 | -7.8 | -3.8 | |
| London Electricity | . | . | . | . | . | . | . | -9.0 | -5.2 | -3.0 | 12.2 | -19.5 | -11.6 | -14.8 | |
| Manweb | . | . | . | . | . | . | . | -7.4 | -2.1 | 6.4 | -14.0 | -0.1 | -16.5 | -3.9 | |
| Midlands Electricity | . | . | . | . | . | . | . | -0.9 | -3.7 | -1.9 | -9.5 | -15.7 | -1.9 | -3.3 | |
| Northern Electric | . | . | . | . | . | . | . | 1.0 | -3.3 | 12.6 | 2.5 | -6.0 | -11.6 | -11.0 | |
| Norweb | . | . | . | . | . | . | . | -3.9 | -8.8 | 3.9 | 3.1 | -19.0 | -8.8 | -9.8 | |
| Seeboard | . | . | . | . | . | . | . | -0.8 | 3.8 | -4.3 | -5.6 | -10.3 | -39.3 | 3.2 | |
| Southern Electric | . | . | . | . | . | . | . | -6.6 | -2.0 | 3.8 | -18.2 | -27.1 | -5.4 | -13.5 | |
| SWALEC | . | . | . | . | . | . | . | 3.9 | -8.2 | -5.0 | 6.1 | -18.2 | -21.8 | 4.9 | |
| SWEB | . | . | . | . | . | . | . | 0.5 | 8.5 | 9.8 | -2.6 | -10.2 | -36.6 | -13.7 | |
| Yorkshire Electricity | . | . | . | . | . | . | . | 0.4 | 1.9 | 3.4 | -18.9 | -15.9 | 2.6 | -14.5 | |
| Scottish Power | . | . | . | . | . | . | . | 4.2 | -14.0 | 6.6 | 4.6 | -3.1 | 0.9 | -10.7 | |
| Scottish Hydro-Electric | . | . | . | . | . | . | . | 8.4 | 2.0 | -5.6 | 8.3 | 0.0 | 0.4 | -3.0 | |
| Northern Ireland Electricity | . | . | . | . | . | . | . | . | . | -8.3 | -8.6 | -7.6 | -10.4 | -8.3 | |

[34] The financial year for Transco ends on 31 December.
[35] For BT, data availability necessitated the use of lines connected as the output measure until 1993, and all minutes of conversation from 1994 to 1998.

## A1.2 Real Unit Operating Cost (including Depreciation)

The figures in Table A3 are derived from regulatory accounts and refer to operating costs including current cost depreciation (except for the water and sewerage sectors for which depreciation data relating to the base service are not available and the figures refer to operating expenditure excluding depreciation).

**Table A3: Changes in RUOC Since Privatisation**

| Company | Year Privatised | Change in RUOE from the year of privatisation to latest year | CAGR from the year of privatisation to latest year |
|---|---|---|---|
| British Airports Authority[36] | 1987 | -13.42% | -1.30% |
| British Airways | 1987 | -25.57% | -2.43% |
| British Gas[37] (to 1996) | 1986 | -48.44% | -7.10% |
| TransCo (from 1996) | 1996 | -30.26% | -16.49% |
| British Steel | 1988 | -0.6% | -0.1% |
| British Telecom[38] | 1984 | 5.06% | 0.83% |
| Water services[39] | 1989 | -15.9% | -3.7% |
| Sewerage services | 1989 | -17.7% | -4.1% |
| PowerGen[40] | 1991 | -23.42% | -4.35% |
| National Power | 1991 | -0.85% | -0.12% |
| National Grid Company | 1990 | -27.23% | -4.44% |
| Eastern Group Electricity | 1990 | -25.83% | -4.18% |
| East Midlands Electricity | 1990 | -19.68% | -3.08% |
| London Electricity | 1990 | -35.44% | -6.06% |
| Manweb | 1990 | -23.59% | -3.77% |
| Midlands Electricity | 1990 | -24.80% | -3.99% |
| Northern Electric | 1990 | -14.52% | -2.22% |
| Norweb | 1990 | -28.14% | -4.61% |
| Seeboard | 1990 | -37.71% | -6.54% |
| Southern Electric | 1990 | -40.75% | -7.20% |
| SWALEC | 1990 | -28.83% | -4.74% |
| SWEB | 1990 | -30.61% | -5.09% |
| Yorkshire Electricity | 1990 | -26.60% | -4.32% |
| Scottish Power | 1991 | -11.29% | -1.70% |
| Scottish Hydro-Electric | 1991 | 10.99% | 1.50% |
| Northern Ireland Electricity | 1993 | -31.57% | -7.31% |
| Unweighted average | | | -4.1% |

[36] Up to and including 1998. Figures for BAA for 1999 are misleading due to a major acquisition.

[37] The former British Gas split up in 1996 in BG plc and Centrica plc. TransCo is the BG branch for gas transportation.

[38] For BT, the output measure used here is the minutes for all calls. These data are available since the financial year ended the 31 March 1993.

[39] For the water and sewerage industry, RUOE reductions have been computed over the period 1993 – 1998. Data on depreciation within the base service are unavailable, so the figures reported here for water and sewerage refer to the operating expenditure excluding depreciation.

[40] For Powergen, RUOE reductions have been calculated for the period 1991 – 1997.

**Table A4: Changes in RUOC Since Privatisation**
**% Change on Previous Financial Year**

| Financial Year Ending | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| British Airports Authority | . | . | . | -8.3 | -2.0 | -3.4 | 11.8 | 8.7 | -13.3 | 7.4 | -5.6 | -2.7 | 0.8 | -4.7 | 9.6 |
| British Airways | . | . | . | -7.5 | -2.4 | 1.2 | -0.2 | -0.7 | -3.2 | -3.1 | -5.0 | 3.6 | -0.1 | -4.6 | -6.5 |
| The former British Gas TransCo[41] | . | . | . | -7.5 | -1.1 | -16.2 | 1.2 | 24.9 | -16.0 | -12.4 | -20.6 | -9.0 | . -14.8 | -18.1 | |
| British Steel | . | . | . | . | 2.6 | 0.6 | 6.3 | -2.6 | 0.0 | -11.3 | -2.5 | 18.1 | -0.2 | -9.9 | 1.4 |
| British Telecom[42] | -1.5 | 1.0 | 5.7 | -3.5 | -3.4 | -3.6 | -2.4 | -1.5 | 5.3 | -3.20 | 2.20 | -1.32 | -0.11 | 1.27 | 6.38 |
| Water services[43] | | | | | | | | | | -1.0 | -3.1 | -4.4 | -4.5 | -4.1 | |
| Sewerage services | | | | | | | | | | 0.9 | -2.7 | -8.2 | -3.9 | -5.0 | |
| PowerGen | . | . | . | . | . | . | . | 1.8 | -4.2 | -17.1 | 0.6 | -1.9 | -4.0 | | |
| National Power | . | . | . | . | . | . | . | 2.8 | 12.5 | -20.2 | -1.0 | -9.5 | 10.9 | 8.1 | |
| National Grid Company | . | . | . | . | . | . | . | 12.7 | -1.0 | -8.4 | -10.6 | -9.3 | -2.7 | -9.8 | |
| Eastern Group Electricity | | . | . | . | . | . | . | -1.7 | 5.7 | -1.1 | -9.0 | -2.4 | -7.7 | -12.0 | |
| East Midlands Electricity | . | . | . | . | . | . | . | -2.1 | -2.5 | -0.6 | -1.0 | -4.3 | -7.6 | -3.3 | |
| London Electricity | . | . | . | . | . | . | . | -4.7 | -3.9 | -2.6 | 7.5 | -15.4 | -9.6 | -11.9 | |
| Manweb | . | . | . | . | . | . | . | -2.0 | 0.3 | 3.7 | -10.0 | 10.5 | -21.6 | -3.9 | |
| Midlands Electricity | . | . | . | . | . | . | . | 1.6 | -2.5 | -1.2 | -7.9 | -11.4 | -3.3 | -2.5 | |
| Northern Electric | . | . | . | . | . | . | . | 4.5 | -4.4 | 6.8 | 1.2 | -4.7 | -10.5 | -7.2 | |
| Norweb | . | . | . | . | . | . | . | -4.3 | -7.5 | 1.7 | 0.3 | -13.9 | 0.2 | -7.7 | |
| Seeboard | . | . | . | . | . | . | . | 5.1 | 1.6 | -5.3 | -4.8 | -9.1 | -28.8 | 0.1 | |
| Southern Electric | . | . | . | . | . | . | . | -3.2 | -1.5 | 2.4 | -13.5 | -19.7 | -3.7 | -9.2 | |
| SWALEC | . | . | . | . | . | . | . | 6.2 | -1.0 | -0.7 | -0.3 | -18.5 | -16.9 | 0.9 | |
| SWEB | . | . | . | . | . | . | . | 3.6 | 4.4 | 6.7 | -1.4 | -7.6 | -28.4 | -7.8 | |
| Yorkshire Electricity | . | . | . | . | . | . | . | 3.4 | 1.2 | 2.0 | -14.3 | -11.6 | 1.9 | -11.0 | |
| Scottish Power | . | . | . | . | . | . | . | -0.1 | -12.0 | 3.9 | 6.4 | -0.6 | 1.1 | -9.2 | |
| Scottish Hydro-Electric | . | . | . | . | . | . | . | 7.4 | 2.6 | -2.0 | 3.9 | 3.0 | 0.7 | -4.4 | |
| Northern Ireland Electricity | . | . | . | . | . | . | . | . | . | -6.3 | -6.3 | -11.9 | -7.8 | -4.1 | |

[41] The financial year for Transco ends on 31 December.
[42] For BT, data availability necessitated the use of lines connected as the output measure until 1993, and all minutes of conversation from 1994 to 1998.
[43] Data on depreciation within the base service is unavailable, so the figures reported here for water and sewerage refer to the operating expenditure excluding depreciation.

# A2 CAPITAL SUBSTITUTION TRENDS

Consider a two-factor world in which the factors of production are operating expenditure ("OE"), which might be assimilated to labour, and capital costs ("K"), encompassing both capital maintenance and return on capital. Outputs are assumed to be held constant, or, alternatively, costs refer to unit costs with an output measure that does not give rise to economies of scale.

Let:

- AK = K/(K+OE) be the proportion of capital costs in total costs,
- GTFP be the growth in total factor productivity,
- GK be the growth in capital productivity, and
- GOE be the growth in operating productivity.

GK and GOE can also be seen as the rates of capital cost and operating expenditure reduction respectively, corrected by any changes in input prices.

The following identity results from these definitions:

$$GTFP = (1 - AK)\, GOE + AK\, GK. \qquad (A2.1)$$

This equation can be rewritten as:

$$AK = (GOE - GTFP)/(GOE - GK). \qquad (A2.2)$$

We define the rate of capital substitution DAK as the *absolute* change in the proportion of costs accounted for by capital costs. For instance, if capital costs go from being 50 per cent to being 51 per cent of total costs over a one-year period, then DAK = 0.01.

Since the rate of reduction in total costs OE + K, net of growth in input prices, is GTFP, and the rate of reduction in capital costs K, net of growth in input prices, is GK, the differential of:

$$AK = K/(K + OE)$$

is

$$DAK = -K\, GK/(K + OE) + GTFP\, K/(K+OE) = (GTFP - GK)\, AK \qquad (A2.3)$$

Using (A2.1) and (A2.3) we find that:

$$DAK = GTFP\, AK - (GTFP - (1 - AK)\, GOE) = (1 - AK)\, (GOE - GTFP) \qquad (A2.4)$$

It follows that:

$$GOE = GTFP + DAK/(1 - AK). \qquad (A2.5)$$

There is limited evidence relating to either GK or DAK in comparator industries, due to the difficulty inherent in disentangling the capital requirements to provide constant outputs from capital expenditure required to enhance outputs. It is therefore not practicable to estimate the difference between GOE and GTFP by direct reference to comparators.

In Europe Economics' 1998 report for OFWAT, the data for GK, GOE and GTFP shown in Table A2.1, which relate to the whole UK business sector over the period 1980-90, were used:

**Table A2.1. Data used in Europe Economics (1998)**

GTFP = 0.016

GK = 0.004

GOE = 0.021

Source: Englander & Gurney (1994); GOE figure refers to labour productivity

This gives AK = 0.005/0.017 = 0.294 using equation (A2.2), and DAK = 0.0035 using equation (A2.3). In Europe Economics (1998), it was assumed that the same value of DAK would apply to the comparators used for the water industry as to the UK business sector, and for the comparators on aggregate it was estimated that AK = 0.46. This led to GOE = GTFP + 0.0065 using equation (A2.5), that is, an increase of the rate of unit operating expenditure reduction by 0.65 per cent as a result of capital substitution.

Alternative approaches might be considered. For instance, if the *relative* change in the importance of capital inputs is thought to be a better measure than the absolute change, then DAK/AK might be assumed to be the same for the chosen comparators as in the UK business sector, leading to an adjustment to real unit operating expenditure (compared to TFP) of 1.0 per cent instead of 0.65 per cent. Conversely, if the relative change in the importance of *operating expenditure* were taken as the reference, the adjustment would be 0.5 per cent. The method used in Europe Economics (1998) appears the most natural one and is used for other sensitivity tests below.

In order to test the robustness of the figures assumed above, we have performed the sensitivity tests using different data sets for productivity improvements and costs reductions. The results are shown in Table A2.2.

**Table A2.2. Sensitivity Tests**

| | Business Sector | | | | | Comparator | |
|---|---|---|---|---|---|---|---|
| **Data set** | **GTFP** | **GOE** | **GK** | **AK** | **DAK** | **AK** | **GOE – GTFP** |
| **UK 1974-79** | 0.5% | 1.5% | -1.6% | 32.3% | 0.7% | 46.0% | 1.3% |
| **UK 1980-85** | 1.5% | 2.4% | -0.5% | 31.0% | 0.6% | 46.0% | 1.1% |
| **UK 1980-90** | 1.6% | 2.1% | 0.4% | 29.4% | 0.4% | 46.0% | 0.7% |
| **UK 1986-90** | 1.6% | 1.7% | 1.4% | 33.3% | 0.1% | 46.0% | 0.1% |
| **UK 1986-93** | 1.5% | 1.9% | -0.5% | 16.7% | 0.3% | 46.0% | 0.6% |
| **France 1980-90** | 1.5% | 2.4% | -0.2% | 34.6% | 0.6% | 46.0% | 1.1% |
| **Germany 1980-90** | 1.0% | 1.7% | -0.5% | 31.8% | 0.5% | 46.0% | 0.9% |
| **USA 1980-90** | 0.2% | 0.6% | -0.7% | 30.8% | 0.3% | 46.0% | 0.5% |

Source: Europe Economics calculations using Englander & Gurney data

The final column in Table A2.2 shows the implied adjustment, given the assumed capital intensity of 46 per cent for the water industry. Focusing on those observations over sufficient timescale so as to be less likely to be distorted by the economic cycle, an adjustment of between 0.5 per cent and 1 per cent to the figures from the water industry appears reasonable.

The implied adjustment increases if the assumed capital intensity increases, as shown in Table A2.3.

**Table A2.3. Effect of Differences in Capital Intensity**

| | Business Sector | | | | | Comparator | |
|---|---|---|---|---|---|---|---|
| **Data set** | **GTFP** | **GOE** | **GK** | **AK** | **DAK** | **AK** | **GOE – GTFP** |
| **UK 1980-90** | 1.6% | 2.1% | 0.4% | 29.4% | 0.4% | 50.0% | 0.7% |
| **UK 1980-90** | 1.6% | 2.1% | 0.4% | 29.4% | 0.4% | 55.0% | 0.8% |
| **UK 1980-90** | 1.6% | 2.1% | 0.4% | 29.4% | 0.4% | 60.0% | 0.9% |

Source: Europe Economics calculations using Englander & Gurney data

So for electricity distribution, which appears to be more capital intensive than water, the adjustment may be closer to 1 per cent.[44] Similarly, for electricity transmission, an adjustment of almost 1 per cent may be required.[45]

[44] For example, Eastern 2000/2001 projections show a return on capital of £69 million, depreciation of £97 million, and operating expenditure of £126 million, ie AK = 0.57.

[45] Since the value of AK (capital intensity) for NGC is approximately 60 per cent (operating expenditure in 1998 was about £550 million out of a turnover of approximately £1,400 million, after adjusting for transmission services schemes revenues and costs).