

**SUBSIDY AND PRODUCTIVITY IN THE PRIVATISED BRITISH
PASSENGER RAILWAY**

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ABSTRACT

This paper gives a brief overview of subsidy arrangements in the privatised passenger rail industry in Britain before focusing on productivity performance across the first four years under the new privatised structure. Subsidy reductions are analysed in terms of the average annual percentage increases required in passenger revenues to offset these reductions for each train operating company. These are found to range from 2% to 21%. It is highlighted however that such 'gains' could equally be achieved through cutting costs, hence subsidy cuts are also specified in relation to cost reductions and found to range from 1% to 10%. Productivity is then examined through the use of a Translog productivity index, with passenger train kilometres specified as the output, and labour, traction rolling stock and infrastructure specified as the inputs.

For the network as a whole, it is found that total productivity has risen on average by 4% p.a. over the initial privatisation period. Most of these gains have been achieved through labour reductions and increases in output resulting from improved utilisation of existing inputs. Comparisons are then made with the performance of the nationalised British Rail over a number of time periods. The overriding conclusion is that gains made in the early period of private sector management, although appearing

to be of a sufficient size to offset subsidy reductions, are not as high as those made in the later period of public sector management. It would appear therefore that it is ownership structure, towards a more market orientated organisation, rather than ownership form per se, that is the key component in productivity gains.

1. Introduction

In the White Paper of July 1992 “New Opportunities for the Railways”, the then Conservative government stated its intention to “see better use made of the railways, greater responsiveness to the customer, and a higher quality of service and better value for money for the public who travel by rail” (DoT, 1992, p1). It was argued that these benefits to the rail system would arise from the introduction of private sector management and through liberalisation of the market. The overall rationale was that the introduction of competition into the rail system and the provision of appropriate incentives to all parties would provide greater economic efficiency (Foster 1994). This paper examines this issue in the form of productivity changes that have occurred in the passenger sector of the industry since privatisation.

2. Background

The long held view concerning the economics of railway operation is that both infrastructure and services are indivisible components that constitute a natural monopoly, and hence returns to scale are significant and inexhaustible given the market size. An alternative view is that returns to scale and natural monopoly effects are solely associated with the infrastructure and not in the operation of services (Bradshaw and Aveline, 1996), sometimes referred to as the revisionist view (Preston, 1994). Following this logic, any restructuring of the industry should not be based around the necessity to maintain the infrastructure and services under the control of a single organisation, as an equally efficient (and hence productive) system can be produced under a more fragmented framework. The structure that subsequently emerged from privatisation of the British industry is unique and the most radical in Western Europe and broadly embraces the revisionist view. The actual framework is

well documented elsewhere (see for example Curwen, 1997 and Nash, 1993), hence to briefly summarise, the industry consists of a matrix of contracts between a large number of different companies, but a single supplier of infrastructure, Railtrack. Passenger services are divided into 25 time let individual units or franchises, 24 of which currently receive subsidy, and freight services are now split into two different companies by commodity. On privatisation, rolling stock was apportioned between three rolling stock leasing companies (ROSCOs), infrastructure maintenance into 14 units, and as stated above, the infrastructure was transferred into a single company that was subsequently floated on the stock exchange.

The whole privatisation process netted some £5.2bn to the Treasury (Economist, 1999), with Railtrack (£1.9bn) and the ROSCOs (£2.6bn) raising the vast bulk of this sum. It also resulted in a considerable increase in the annual level of grant required to run passenger services, rising from a final year 'old' structure subsidy of £908m to a 'new' structure level of £2,264m, an increase of almost 150%.

3. The Role of Subsidy in Productivity Improvements

Subsidy has a vital role to play under the privatised structure. Firstly, as in the past, it is used to preserve socially desirable services that otherwise would not be profitable in the open market. This is consistent with the notion of a public service obligation under the old nationalised framework. Secondly, through negotiating year-on-year reductions in the levels of subsidy over the lifetime of the current franchises, train operating companies (TOCs) are actively encouraged to (a) increase revenue to make up for the loss in subsidy received and/or (b) reduce costs, again to make up for the subsidy decline. Thirdly, although the passenger franchise system can be argued to be

consist with the theory of contestability (Baumol, 1982), a further motivation behind the division of the industry was to open up the possibility of competing passenger and freight services on significant sections of the network (Glaister 1995). This it was argued would further enhance efficiency gains, lower prices and service improvements through competitive on line pressures. Jones (2000) however has noted a distinct shift in policy away from this promotion of on line competition towards ensuring that subsidy reductions are maximised. This shift has also been reinforced by the (Shadow) Strategic Rail Authority's (SRA) recently stated policy of only considering on-line competition in the forthcoming re-franchising process where passenger and tax payers interests are protected (SRA, 2000). It may be implied therefore that the SRA seek to minimise public funds spent on the rail system, albeit at the possible expense of productivity improvements that may have arisen out of the pressure of direct competition.

Table 1 reports a number of figures relating to subsidy. Firstly, the agreed opening franchise payments, the payments in year 7 of the franchise (which is the lifetime of 14 of the 25 franchises), the difference between the two and the length of the franchise let. Secondly, the revenue and costs in year 1, i.e. 96/97, of the new structure. The last two columns report the net percentage gain in passenger revenue and the percentage decrease in costs required to make up the reduction in annual subsidy over the first seven years. All financial figures are expressed in 1997 pounds and train operating companies are divided between the former passenger business sectors of the nationalised British Rail.

Table 1: Subsidy Payment, Costs and Revenue, British Passenger Railway

| Franchise | Subsidy | | | | Financial Figures Year 96/97 | | Cumulative % of | |
|----------------------------------|-------------|-------------|------------|-------------|---------------------------------|-----------|-----------------|-------|
| | 96/97 £m | 03/04 £m | Diff £m | Time Yrs | Costs £m | Rev £m | Revenue | Costs |
| Former Intercity | | | | | | | | |
| Anglia Railways | 41.0 | 6.3 | 34.7 | 7 | 82.6 | 41.4 | 9.1% | 7.5% |
| Cross Country Trains | 130.0 | 40.5 | 89.5 | 7 | 246.1 | 120.7 | 8.2% | 6.3% |
| First Great Western | 61.9 | 35.4 | 26.5 | 10 | 294.7 | 181.7 | 2.0% | 1.3% |
| Gatwick Express | -4.1 | -13.3 | 9.2 | 15 | 27.1 | 28.4 | 4.1% | 5.7% |
| Great North Eastern | 67.3 | 0.0 | 67.3 | 7 | 282.6 | 194.7 | 4.3% | 3.8% |
| Midland Main Line | 17.6 | -6.3 | 23.9 | 10 | 87.6 | 52.0 | 5.6% | 4.4% |
| West Coast Trains | 94.4 | -52.7 | 147.1 | 15 | 369.8 | 250.8 | 6.8% | 7.0% |
| All Former Intercity | 408.1 | 9.9 | 398.2 | | 1390.5 | 869.7 | 5.5% | 4.7% |
| Former Network South East | | | | | | | | |
| Chiltern Railways | 17.4 | 0.4 | 17.0 | 7 | 46.9 | 28.9 | 6.8% | 6.2% |
| Connex South Central | 92.8 | 5.3 | 87.5 | 7 | 223.2 | 132.8 | 7.5% | 6.9% |
| Connex South Eastern | 136.1 | 27.6 | 108.5 | 15 | 291.3 | 186.5 | 6.8% | 6.4% |
| First Great Eastern | 41.3 | -9.5 | 50.8 | 7 | 164.4 | 130.3 | 4.8% | 5.1% |
| Island Line ¹ | 2.3 | 1.0 | 1.3 | 5 | 3.1 | 0.8 | 21.5% | 10.4% |
| LTS Rail | 31.1 | 18.2 | 12.9 | 15 | 83.7 | 54.9 | 3.1% | 2.4% |
| Silverlink | 55.0 | 16.9 | 38.1 | 7 | 112.8 | 56.2 | 7.7% | 5.7% |
| South West Trains ¹ | 63.3 | 35.7 | 27.6 | 6 | 358.3 | 221.2 | 2.0% | 1.3% |
| Thames Trains | 43.7 | 0.0 | 43.7 | 7½ | 129.4 | 131.6 | 4.2% | 5.7% |
| Thameslink | 18.5 | -28.4 | 46.9 | 7 | 127.3 | 127.0 | 4.6% | 6.4% |
| West Anglia Grt. Nrtn. | 72.6 | -25.5 | 98.1 | 7 | 193.3 | 129.2 | 8.4% | 9.6% |
| All Former NSE | 574.1 | 41.7 | 532.4 | | 1733.7 | 1199.3 | 6.6% | 5.6% |
| Former Regional Railways | | | | | | | | |
| Cardiff Railway ² | 22.5 | 13.6 | 8.9 | 10½ | 29.6 | 6.4 | 13.3% | 5.0% |
| Central | 204.4 | 132.6 | 71.8 | 7 | 246.1 | 71.5 | 10.4% | 4.8% |
| MerseyRail | 87.6 | 60.8 | 26.8 | 7 | 80.2 | 16.3 | 14.9% | 5.6% |
| Northern Spirit | 231.1 | 145.6 | 85.5 | 7 | 303.4 | 75.0 | 11.5% | 4.6% |
| North West | 192.9 | 125.5 | 67.4 | 10 | 230.5 | 47.3 | 13.5% | 4.8% |
| ScotRail | 297.1 | 202.5 | 94.6 | 7 | 370.7 | 109.9 | 9.3% | 4.1% |
| Wales & West ² | 84.6 | 39.2 | 45.4 | 10½ | 138.5 | 48.3 | 9.9% | 5.5% |
| All Former Reg. Rails | 1120.2 | 719.8 | 400.4 | | 1399.0 | 374.7 | 10.9% | 4.7% |
| All Railways | 2102.4 | 771.4 | 1331.0 | | 4523.2 | 2443.8 | 6.4% | 4.9% |

- Notes
- Note that for Island Line and South West Trains the 'closing subsidy' under the column headed '03/04' actually refers to financial years 01/02 and 02/03 respectively, hence the cumulative reductions are calculated on 5 and 6 years respectively.
 - These franchises were extended by a maximum of 3 years and one month before they will be incorporated into the new Wales and Borders franchise (SRA, 2001).

Sources: Compiled from OPRAF (1997) and TAS (2000).

The cumulative percentage of revenue is the year-on-year increase in revenue required to offset the reduction in subsidy. This is lower than the simple average percentage increase. As an example, Chiltern Railways would require an 8.4% increase in revenue calculated on a simple basis (as shown in Cheek, 1997), compared to a 6.8% year-on-year cumulative increase.

Table 1 shows that annual improvements in revenue required to meet subsidy reductions produce an overall average of 6.4% p.a. to the financial year 03/04, with the former Regional Railways as a group required to make a particularly severe 10.9% average annual improvement. Given the industry is regulated on an RPI-1% basis, such increases in the main will have to come through increasing passenger numbers, and have been describe by Nash (1997) as ambitious.

These figures however ignore the extent that revenues cover costs (cost recovery ratios - CRR) in different parts of the network. As an example, for the financial year 1995/96, these were 0.63, 0.69 and 0.27 for the former Intercity, Network South East and Regional Railways groups respectively. Using Northern Spirit's 0.247 CRR as an example, the 11.5% annual improvement of revenue required to offset the decline in subsidy could equally be achieved through a 4.6% year-on-year decrease in costs or increases in productivity. This relatively higher figure in relation to revenue than the CRR would suggest is because such gains must be achieved on a decreasing base every year, revenue gains on the other hand are calculated on an increasing base.

Performance in relation to subsidy reductions however cannot be simply assessed by isolating increases in revenue, productivity gains and reductions in costs and

offsetting these against decreases in subsidy, as in order to increase revenue a TOC may have to increase costs. Nevertheless, if unit costs and passenger numbers were to remain unchanged, subsidy reductions would require TOCs to achieve increases in productivity of between 1.2% and 7.3%, with a network average of 4.9%, in each of the first seven years of the new structure.

4. Productivity Assessment

Productivity may be assessed using a number of alternative methods, either by simple univariate measures, such as labour productivity, or more complex multivariate measures that give an assessment of total factor productivity (TFP). Problems with the first group are well-known and well documented, see for example Cowie and Riddington (1996), and clearly a measure that gives an assessment of overall productivity changes that include the majority of inputs is preferable. The approach taken here is through calculation of a productivity index, and such methods have been commonly used in the assessment of railway productivity (see for example Trethaway et. al., 1997). The figures shown in Table 2 relate to the average annual Total Factor Productivity (TFP) changes between the financial years 1995/96 and 1998/99 i.e. across four financial years but three time periods. It therefore includes an element of shadow running i.e. where franchises were operated by the residual parts of the publicly owned British Rail. The actual indices were calculated using the Tornqvist or translog index formula (Hensher and Waters II 1993). In simple terms, this weights changes in output by their relative importance to revenue and sets these against changes in inputs weighted by their relative share of total costs to give a measure of the change in productivity. The formal index is shown below as equation 1:

$$\ln\left(\frac{TFP_k}{TFP_l}\right) = \sum_{i=1}^M \bar{R}_i \ln\left(\frac{y_{ik}}{y_{il}}\right) - \sum_{j=1}^N \bar{S}_j \ln\left(\frac{x_{jk}}{x_{jl}}\right) \quad [1]$$

where there are M outputs and N inputs, \bar{R}_i indicates the mean passenger revenue share of output y_i between years k and l, and \bar{S}_j the mean cost share of input x_j between years k and l.

This was calculated using labour, traction rolling stock and size of network as the inputs, as examination of the annual accounts revealed that these three inputs accounted for around 85% of TOC's costs over the period reviewed. Train kilometres were used as the only output, as the two major sources of income, passengers and the SRA, are both highly dependent on the production of train kilometres. Furthermore, specification of such an output better reflects what TOC's attempt to achieve. In an industry characterised by strict price regulation, public sector contracts and network congestion in many areas, TOCs are prevented from profit maximising through the production of technically efficient passenger kilometres, hence will attempt to sales maximise through the production of technically efficient train kilometres.

The actual data on train kilometres and network size were taken from the OPRAF annual reports (see for example OPRAF, 1999). Numbers employed and traction rolling stock figures were obtained from the relevant Railway Gazette Directories (e.g. Bushell, 1998) and confirmed by the Rail Industry Monitor (TAS, 2000).

Finally, all financial figures came from the individual Annual Reports. The associated costs used for the three inputs were salaries and wages, ROSCO leasing charges and Railtrack access charges respectively.

Before presenting the results, Tretheway et. al. (1997) make two important practical observations regarding such productivity measures. Firstly, as output and input growth varies from year-to-year what is important is the overall trend over a number of years, as this best reflects TFP. Secondly, strong TFP growth does not necessarily correlate with comparable financial performance; the former relates quantities of output to quantities of input, whilst the latter relates the value of output to the cost of input. Most of the following analysis therefore concerns trends, either across the four years reviewed or over the twenty-five TOCs. Some loose relationship between TFP performance and financial performance is however also identified.

The results from TFP estimation are shown in Table 2. This gives the figures over the periods 1996/97, 1997/98 and 1998/99, for each franchise again grouped under the previous British Rail sectors. Shown in the final column of Table 2 are the average changes in total productivity for each franchise over the whole period, and as such are the average changes in each year. The results are also given for the average for the 25 franchises (simple), and the results for the total network, which was found by adding the outputs, inputs, revenues and costs for all 25 franchises.

Table 2: Productivity Improvement, Passenger Rail Franchises, 1995/96 – 1998/99

| Franchise | 1996/97 | 1997/98 | 1998/99 | Period |
|----------------------------------|----------------|----------------|----------------|---------------|
| Former Intercity | | | | |
| Anglia Railways | 2.0% | 1.6% | 2.3% | 2.0% |
| Cross Country Trains | -0.4% | 1.3% | 12.2% | 4.2% |
| First Great Western Railway | 4.7% | 7.0% | 2.5% | 4.7% |
| Gatwick Express | 5.1% | 1.6% | 5.3% | 4.0% |
| Great North Eastern Railway | 3.0% | 5.9% | 3.1% | 3.9% |
| Midland Main Line | 5.6% | 5.2% | 2.6% | 4.4% |
| West Coast Trains | 2.1% | 5.5% | 5.1% | 4.2% |
| All Former Intercity | 3.1% | 4.0% | 4.7% | 3.9% |
| Former Network South East | | | | |
| Chiltern Railway Company | 8.1% | 15.7% | 2.1% | 8.6% |
| Connex South Central | 3.4% | 9.1% | 13.6% | 8.6% |
| Connex South Eastern | 4.4% | 5.2% | 2.3% | 4.0% |
| First Great Eastern | 0.9% | 4.9% | 9.0% | 4.9% |
| Island Line | 0.7% | 2.8% | -0.5% | 0.9% |
| LTS Rail | 3.5% | 6.0% | 3.2% | 4.2% |
| Silverlink Train Services | -0.8% | 5.2% | 4.9% | 3.1% |
| South West Trains | 7.6% | 0.9% | 0.9% | 3.2% |
| Thames Trains | 5.8% | 8.2% | 1.2% | 5.0% |
| Thameslink | 2.4% | 4.3% | 4.1% | 3.6% |
| West Anglia Great Northern | -0.9% | 0.2% | 2.8% | 0.7% |
| All Former Network South East | 3.2% | 5.7% | 4.0% | 4.2% |
| Former Regional Railways | | | | |
| Cardiff Railway Company | 2.3% | 4.3% | 3.6% | 3.4% |
| Central Trains | 2.5% | 5.2% | 8.5% | 5.4% |
| First North Western Trains | 2.2% | 5.7% | 14.9% | 7.4% |
| Merseyrail Electrics | 4.2% | 2.6% | 4.7% | 3.8% |
| Northern Spirit | 3.7% | 7.4% | 1.5% | 4.1% |
| ScotRail Railways | 2.7% | 7.1% | 5.9% | 5.2% |
| Wales and West | 2.4% | 5.3% | 2.4% | 3.3% |
| All Former Regional Railways | 2.8% | 5.4% | 5.9% | 4.2% |
| Mean (Simple) | 3.1% | 5.1% | 4.7% | 4.3% |
| Mean (Network) | 3.2% | 5.5% | 5.2% | 4.6% |

Over the time periods shown, all TOCs have seen improvements in total factor productivity, ranging from an annual average figure of 0.7% on the West Anglia

Great Northern to just under 9% on Connex South Central. For the whole passenger network, total productivity has increased by an average of 4.4% per annum since 1996. Within the rail industry however, major developments have historically tended to occur over a relatively long period of time. The productivity results shown in Table 2 on the other hand reflect short term gains, as despite the use of a multi-input index, in most cases these are as a result of adjustment of only one input, namely labour. This has been reflected in significant reductions in staffing levels in TOCs since privatisation, with virtually all companies reducing staff in 1996, all except five in 1997 and finally only nine companies maintaining or increasing staff levels in 1998. Over the period reviewed, across all TOCs this has resulted in an average decrease in staff of around 4% per annum. Early indications are however that this trend has been reducing, with staff levels only decreasing by 2% in the last year reviewed. This also suggests that possibilities for continued improvements in total productivity using this measure are declining and hence TOCs may have to look at other measures if these trends are to continue in the medium to longer term.

With regard to the rolling stock input, rolling stock levels have remained almost static over the period. This has occurred despite strong commitments at the time of the franchise lets for investment in new rolling stock. This rise in expected investment has been highlighted as one of the major advantages of privatisation of the railways (Cheek, 1997). It was argued that having been freed from the financial constraints of the public sector, railway companies would be far more able to raise the required finance for such investment projects. Under the new structure however, there have been substantial problems in introducing new rolling stock onto the network. Indeed, over the whole period reviewed only 40 new traction rolling stock units were

introduced, as against the 100 odd new units planned under the franchise lets. The limited sources of productivity gains therefore are not solely related to the relative shortness of the period reviewed, but also operational problems in the new industry structure. It also highlights however that TFP improvements have been achieved despite ageing rolling stock, on what was already relatively old stock.

Gains in productivity however can equally arise from production of more output utilising the same level of input. TOCs have been fairly active in this respect, by increasing service frequencies to successfully generate increases in passenger numbers, hence producing more train kilometres. Examining Table 2, the six companies that have achieved the highest gains in productivity are the same six companies that have expanded output by the most. In other words, have implemented the largest increases in train kilometres and by implication have pursued the most 'expansionist' policies. This suggests that output increases are a key factor in productivity gains. Interestingly, such actions are not consistent with the aim of reducing (total) costs, but perhaps are more reflective of a 're-investment' of productivity improvements. In part this goes against one of the major pre-privatisation fears that given such low CRRs, in many cases TOCs would concentrate more on cost reductions through providing minimal services rather than revenue increases to meet subsidy shortfalls.

It should also be highlighted that TOCs are not entirely responsible for these productivity figures, as one of the inputs, infrastructure, is not directly under their control. This input could, and perhaps should, be dropped from the analysis, but given that it is a major determinant of productivity and the largest single cost to TOCs

(45% in 1997), this makes little sense. Clearly Railtrack has a central role to play and in particular its actions directly effect the productivity of TOCs. Concerns were raised early on by the TOCs themselves (see for example Financial Times 10/12/98) regarding the position of Railtrack. It was argued that as the infrastructure company was making large profits from routine track operation and track access charges there may be a temptation for it to avoid the financial risks involved in more innovative rail schemes that increase track capacity. In order in part to alleviate such concerns, an investigation by the Office of the Rail Regulator set a ceiling on Railtrack's profits of between 5-6% on its assets (ORR, 1998). This however was followed by a full-scale review of Railtrack's incentives framework (ORR, 2000). In the current context, the new framework proposes two significant changes. Firstly, to alter the criteria for payments made to Railtrack for improved operational performance - in other words, the punctuality of services. Those that were in place were recognised to be ineffectual. Clearly less network delays would increase TOC productivity. Secondly, to empower TOCs to engage third party contractors to undertake network enhancements after Railtrack has rejected the opportunity to match any such bid. This document therefore in part addresses the role of Railtrack in productivity improvements, but at the time of writing (June 2001) is still at the consultation stage and has only partially been implemented.

Whether the productivity improvements shown in Table 2 are of a sufficiently large quantity to meet the financial requirements of the franchise agreements remains to be seen. Purely on the cost reduction 'targets' shown in Table 1 however, in terms of productivity improvements nine TOCs exceed these and another four are within one

percent¹. This is also reflected in profitability, with figures from TAS (2000) suggesting that taken as a whole TOCs made a 3.7% operating profit on turnover in 1997/98, an increase from 1.7% in 1996/1997. Four companies recorded losses, these including three of the six poorest TFP performers. Under the privatised regime therefore, improving productivity would appear to be one of the key determinants to profitability.

5. Comparisons with the Nationalised British Rail

For comparative purposes, Table 3 gives figures for the cumulative average annual growth in total factor productivity for the privatised rail network between financial years 1995/96 and 1998/99 shown along with the performance of the nationalised British Rail (BR) over a number of relevant time periods.

Table 3: Average Annual Total Factor Productivity Changes, Privatised and Publicly Owned Rail Systems.

| | Total Factor Productivity Changes |
|----------------------------------------|-----------------------------------|
| Britain's Passenger Rail (1995 – 1998) | 4.4% |
| British Railways (1985 – 1990) | 6.7% |
| British Railways (1980 – 1985) | 0.9% |
| British Railways (1972 – 1980) | -0.2% |

Small, negative, factor productivity changes in BR during the 1970s reflect the perception of the railways at that time being in significant decline due to low levels of investment (Henshaw, 1994), general industrial unrest in Britain during that period

¹ Interestingly, it is the former BR regional railways TOCs that perform best under this measure, with five of the seven being at least within 1% of their respective 'targets'.

and falling passenger numbers (see for example DoT 1980). Particularly strong improvements followed sectorisation however, i.e. the re-structuring of BR into business units, in the latter half of the 1980s; TFP grew typically by 6.7% p.a. during that period. This is consistent with the findings of Nash and Preston (1992), who indicated that the scope for private sector improvements in productivity in BR (or any subsequent hybrid) would be limited due to strong performance in the public sector. Furthermore, these results suggest that productivity improvements may be better explained by organisational reform, re-orientating management away from operations towards the market, rather than the introduction of private sector management per se. It is arguable therefore that the productivity gains achieved since privatisation may well have been equally attainable in the public sector.

6. Relationship of Subsidy to Productivity

This section attempts to identify if a relationship exists between relative subsidy cuts and changes in productivity in the privatised passenger railway. In order to test this simple hypothesis, productivity gains are regressed upon relative subsidy cuts and the relative change in passenger numbers, by using ordinary least squares to estimate the following equation:

$$\ln(\text{TFP}_i) = a + b_1 \ln(\text{S}_i) + b_2 \ln(\text{J}_i) \quad [2]$$

Where:

TFP = average growth in total factor productivity for TOC_i

S_i = reduction in subsidy as a percentage of revenue for TOC_i

J_i = average growth in passenger journeys for TOC_i

Average growth in passenger numbers is included as a control variable, as companies may increase revenue through carrying more passengers as an alternative/in addition to decreasing costs through TFP gains. The preceding analysis would suggest that any such action would require better utilisation of inputs and therefore would increase productivity, hence a priori, a positive coefficient for b_2 may be expected. If there is a relationship between subsidy cuts and productivity gains, then a positive (significant) estimate would also be expected for b_1 in equation 2. The actual results from this regression are given below as equation 3 with t-values shown in parenthesis below:

$$\text{Ln(TFP}_i) = -2.7947 - 0.03112 \text{ Ln}(S_i) + 0.1885 \text{ Ln}(J_i) \quad [3]$$

$$(-4.8241) \quad (-0.1784) \quad (2.5520)$$

$$n = 25, \bar{R}^2 = 0.1625, F = 3.3291, p = 0.0546$$

The regression suggests that, as expected, increases in productivity are positively related to increases in journeys, and the parameter estimate is found to be statistically significant at the 5% level. The co-efficient for subsidy cuts however is not in the expected direction i.e. it suggests that smaller subsidy cuts lead to larger gains in productivity, but the actual parameter value is very small and not statistically significant. Overall, the regression statistics are poor, with low R^2 values and F statistics, indicating that there are other factors not included in the regression that would help 'explain' productivity improvements.

Although this analysis may be limited and only included for discussion purposes, it does suggest that there is no relationship between cuts in subsidy and improvements

in productivity. Taken to the extreme, cuts in subsidy do not provide a motive for increasing productivity, because if this was the case, then it would be expected that TOCs with the highest relative subsidy cuts would be the TOCs with the largest gains in productivity. This analysis is however simplistic and it is difficult to believe that this is indeed the case. Inevitably, basic economic logic would suggest that TOCs, particularly given the plc status of most of these firms, are driven by profit, which will be significantly effected by reductions in subsidy. This must, at a general level, motivate cost reductions and productivity gains.

Taken together with the previous analysis, it would appear that in the short term at least, TOCs do not require to meet the subsidy reduction 'targets' shown in Table 1 in order to maintain profitability. This would also explain why no relationship could be found between subsidy cuts and productivity gains at the specific level. The longer term however, particularly with the cumulative impact of subsidy reduction, may well produce a different result.

7. Conclusions

Four broad conclusions can be drawn from the preceding analysis. Firstly, these initial results suggest that TOCs over the period reviewed have been successful in increasing productivity, hence as a group have maintained profitability. Companies have earned profitable, but not excessive, returns from passenger rail operations. There has been however a strong suggestion of a subsequent shift in policy towards primarily promoting subsidy reduction after the franchises were let, and hence also protecting TOCs from direct on-line competition. Furthermore, whether these positive productivity trends can be continued (as they need to be) for the remainder of the

franchise lets is questionable, given that most have been achieved through short run measures.

Secondly, Railtrack has a large potential impact on TFP improvement on the passenger railway, however it is 'protected' from the primary market by TOCs. In other words, it has little 'demand' risk. This has long been recognised by the industry as a major weakness in the privatised industry structure, but initial actions by the Rail Regulator to rectify this position have proven ineffectual. The new financial incentive framework has only recently been put out to consultation, and due to being overtaken by other events, the very latest being the collapse of Railtrack's share price, large sections await implementation. If implemented as proposed, it should increase TOC productivity through operational improvements and give TOCs greater power with respect to line enhancements. However, the whole future of Railtrack at this point in time is uncertain.

Thirdly, comparisons with the nationalised British Rail strongly indicate that TFP gains have not significantly improved since privatisation, indeed performance has not been as strong as in the later years of nationalisation. It appears that the re-focusing of BR in the mid to late 1980s towards a more market orientated structure achieved gains in productivity better than that achieved by the (passenger) industry since formal privatisation. Alternatively, it may suggest that at the time of privatisation most of the immediate productivity gains in BR had already been achieved in the public sector. Gains since that time may simply be a continuation of this trend (albeit at a lower level). The actual change of ownership in the short term therefore does not appear to have improved productivity performance. In the longer term however,

productivity improvements should arise far less from labour reductions and more from increased investment in both infrastructure and rolling stock. Both however are dependent upon satisfactory resolution of the problems currently facing the industry, particularly Railtrack's position.

Finally, to date under the privatised regime subsidy cuts do not appear to have had a significant impact upon TOC productivity performance i.e. at the specific TOC level, no relationship could be found between relative subsidy reductions and productivity improvements. This should not be taken as a general rule that these reductions have not impacted upon productivity change, but rather it may indicate that in the short term TOCs have concentrated upon other means to recoup these financial losses.

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