PRODUCTIVITY AND PERFORMANCE IN THE BRITISH RAIL FREIGHT INDUSTRY SINCE PRIVATISATION

Jonathan Cowie, SEBE/Transport Research Institute, Edinburgh Napier University, 10 Colinton Road, Edinburgh, EH10 5DT, United Kingdom. Email: j.cowie@napier.ac.uk

ABSTRACT

This paper briefly outlines the main changes brought about by the Railways Act 1993 with regard to the rail freight sector and then examines development of the sector since that time. It finds that although rail freight levels have increased, these in the main have been as a result of changes that have occurred outside of the industry. It also finds little evidence of new operator entry into the rail freight business despite the removal of legal barriers to operation. The paper then gives an overview of the main medium and longer term effects of rail freight reform, principally through a literature review on US railroad deregulation, before examining productivity and scale effects within the British industry since privatisation. What it finds is that in the case of the former productivity has been rising from negative values at the start of the period reviewed, and economies of scale whilst significant should not be viewed as a major barrier to entry and hence do not account for the low level of entry that has occurred since privatisation. The over-riding conclusion is that policy needs to do more and be more innovative in incentivising the industry otherwise long term decline could very quickly set back in.

Keywords: rail freight, productivity, privatisation, US railroad deregulation

INTRODUCTION

With open access to rail freight operations introduced in the early 1990s and full privatisation of the industry attained in 1996, now seems a relevant time to examine the performance and production economics of rail freight operation in Great Britain. Britain is the first, and to date the only, European country to fully privatise its rail operations, including freight. The privatised industry can now be viewed as being in a medium to long term state and hence of a more mature nature. Any effects or characteristics can therefore be considered to be longer lasting rather than short term impacts following market liberalisation and privatisation. It also makes an interesting industry to study in itself, as whilst there exists significant literature on the economics of US railroads, very little research on rail freight has been undertaken outside of North America.

This paper therefore will begin by giving a brief overview of rail freight as part of the nationalised British Rail, consider the reforms implemented as a consequence of the Railways Act 1993, give a broad overview of development of the industry since privatisation, examine the US experience with deregulation introduced in 1980, and finally analyse production performance in the post privatisation era.

BRITISH RAIL FREIGHT IN THE NATIONALISED ERA

Rail freight in the nationalised era, like most countries throughout Europe, saw substantial declines in outright tonnage and, more markedly, market share. Trends since 1953 for tonne kilometres on the four main modes are given in Figure 1.

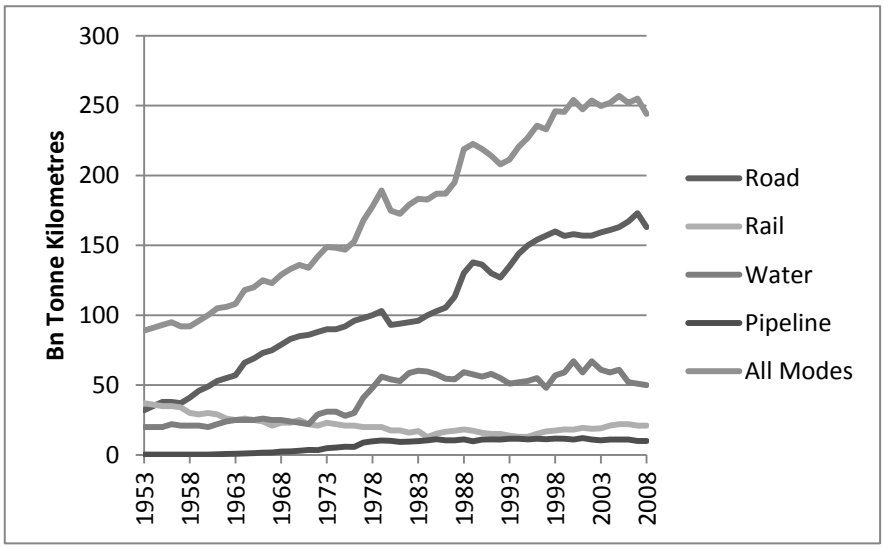

Figure 1 – GB Freight Transport Modal Trends 1953 to 2008

This shows the massive increase in total tonne kilometres in the post war period since 1953 which almost perfectly correlates with rises in real GDP. All of this growth however has come from increases in road haulage, which have dominated freight markets for some time. It should also be noted that of all of the measures of the level of freight transport activity that can be used, those presented above show rail freight in their most favourable light. For example, similar figures for the US relating to 2005 show rail freight with a 45% share of tonne kilometres, however only a 10% share of goods lifted and an even smaller 3% of value (US Department of Transportation, 2006).

With regard to rail freight, what Figure 1 clearly shows is an industry in long term decline. In 2008, the level of freight going by rail was around half the level it was in 1953, and as regards tonnes lifted, around a third. The main reasons for this decline are firstly major structural change in the British economy away from industries where carriage was well suited to rail freight and thus the mode economically competitive, secondly the move from Fordism production to post-fordism production with the need for flexibility and the idea of just-in-time

logistics, and finally a suspicion of an inefficient nationalised operator where passenger operations have historically received priority.

Within the nationalised framework, rail freight was split into four sectors, Trainload Freight, Freightliner (container traffic), Rail Express Systems (parcels) and Rail Freight Distribution (Channel tunnel operations). Under British Rail's 'Organising for Quality' initiative, each of these operated as separate profit sectors within the corporation. Rail freight was completely unsubsidised, with grants only available under the Railways Act 1974 to third parties to install sidings, however on most parts of the rail network rail freight only paid the marginal cost of its infrastructure charge due to BR's division (and costing) of the whole network by prime user. The re-organisation of BR into Business Sectors was aimed at giving more focus for each profit centre on the market, and while for rail freight this seemed to have little effect on carriage, it did have a massive effect on productivity.

This can be illustrated through the estimation of an albeit very rough and simple Cobb Douglas production function, specifically of the form:

$$\text{Ln } Q = a + b1X_L + b2X_W + b3X_T + b4X_D + b5t \qquad [1]$$

Where:

Q	=	Tonne kilometres
X_LL	=	Total staff
X_W	=	Number of Wagons
X_T	=	Length of Track
X_D	=	Number of Depots
T	=	Time trend

The following equation for the period 1979 to 1989 was estimated, with t values shown in brackets underneath:

$$\begin{aligned} \text{LnQ} = {} & -11.71 + 1.39X_L + 0.28X_W + 0.94X_T - 0.12X_D + 0.11t \qquad [2] \\ & (-0.5499)\quad (2.8799)\quad (1.2618)\quad (0.4611)\quad (-0.8363)\quad (3.6162) \end{aligned}$$

F = 26.3271, df = 11, p = 0.0035, R2Adj = 0.9268

Whilst this is a very rough estimate due to arbitrary divisions being made with regard to staff and locomotive stock used for rail freight operations, what the production function shows is massive productivity improvement over the period. This was a classic case of increased focus on the market, where BR withdrew from the less than wagonload market, disposed of countless excess wagons (around 120k) and closed a large number of depots that were simply uneconomic. This whole process led to the eradication of massive inefficiencies in the whole operation, and thus produced very high productivity gains over a very long period. In this example what this shows is the full effects of a switch from a structure which

contained all of the 'bads' associated with public ownership to one that was far more driven by business principles.

BRITISH RAIL FREIGHT PRIVATISATION

British rail freight privatisation was relatively straightforward, certainly in comparison to rail passenger privatisation. Under the provisions of the Railways Act 1993, BR freight was split into seven companies, each of which was offered for private sale. These companies were basically the BR freight sectors, with Trainload Freight, by far the largest of the sectors, divided into 3 separate companies, although it was recognised very early on that it would be difficult to sell these as three separate entities, which indeed proved to be the case. The first sold was Rail Express System, to English, Welsh and Scottish Railways (EWS - formed by a consortium led by Wisconsin Central), at the end of 1995, quickly followed by the three trainload companies and Rail Freight Distribution also to EWS. Freightliner was sold as a management buyout in 1996 and set up its heavy haul business in competition to EWS in 1999. Canadian National bought Wisconsin Central in 2001 and sold EWS to DB Schenker (formerly known as Railion) in 2007.

Market Analysis

Whilst rail privatisation with regard to passenger services has been heavily criticised, with cost escalations and substantial increases in subsidy being the two main areas of criticism, the one area where privatisation can almost without question be deemed to be a success is in getting more people to use the railway. Patronage has increased significantly since privatisation in 1997. The question therefore is, has privatisation had the same impact upon freight levels? For comparative purposes, Figure 2 presents figures for both total passenger and total tonne kilometres to answer the above question.

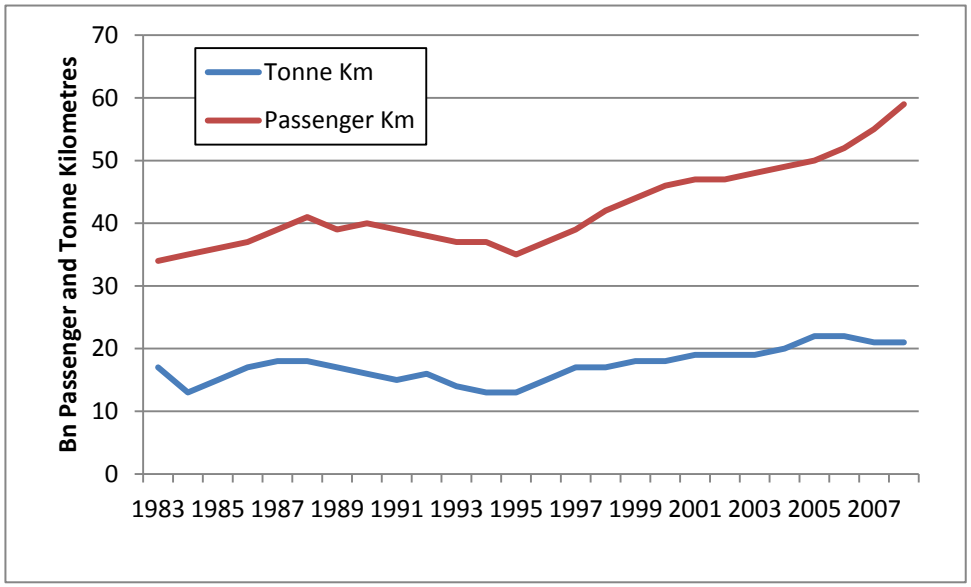

Figure 2: Passenger and Freight Tonne Kilometres, 1983 to 2008

Source: Compiled from DfT (2009)

Taking 1995 as the point of the 'new structure' as the privatised rail industry, then in terms of overall increases in patronage since that time the two charts present a very similar picture, with a total increase in passenger traffic of 68% and in freight of 61%. The profile of these two trends however is very different, with most of the increases in freight occurring in the immediate post privatisation era (around 40%), and only small increases since that time. With regard to passengers however, increases have occurred at a steady rate over the whole period. This would indicate that whilst in both cases the effect of the privatisation has been to increase patronage, in the case of freight this was mainly a short term impact which has not been maintained into the medium and longer terms. It should be highlighted however that producing a modal shift in freight is far more difficult than in passenger transport[1], as freight in almost all cases is part of a longer logistical chain and hence is far more tied in to existing transport modes. There is also a natural reluctance to change individual modes within the chain due to the critical nature of each individual component.

Most of the increase in freight carriage has come in coal and intermodal traffic, which in the case of the former is building on 'traditional' rail freight markets. Much of this increase however has come from the switch from domestic to imported coal, and this has involved increased distance rather than increased tonnage. This accounts for a significant proportion of the short term increase, suggesting the above short term gains were more due to market driven factors outside of the industry rather than the impact of the private sector, i.e. would have occurred anyway. The increase in intermodal traffic has been consistent over the period, and this accounts for a large percentage of the medium and longer term increases. Nevertheless, these longer term increases are at a lower rate than the total market has grown over the same period.

In terms of market shares for the individual rail freight companies, Figure 3 presents the respective figures in terms of operating revenue for 1996/7 and 2006/7.

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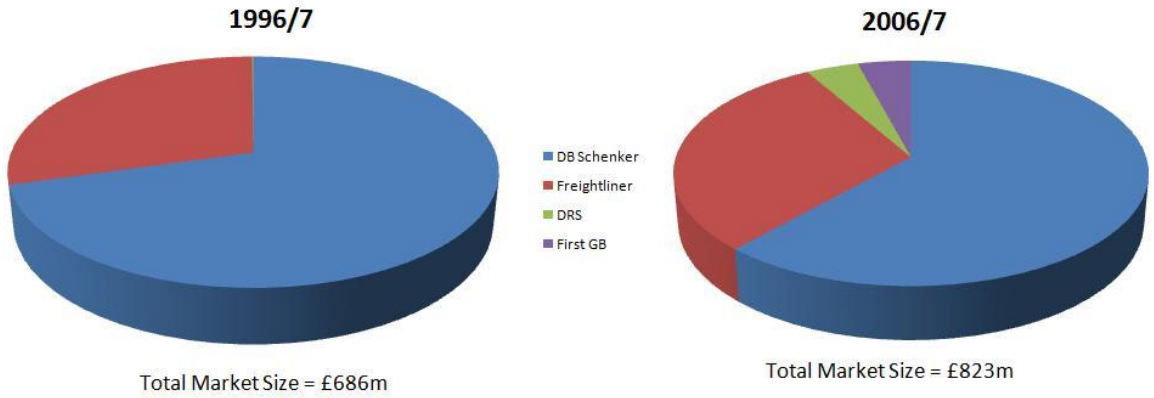

Figure 3: Market shares, 1996/7 and 2006/7, total market sizes given in constant 2007 pounds

[1] Which of course in itself is not exactly easy!

The figure illustrates well the changes over the ten year period reviewed. Basically, in terms of value the 'pie' has increased in size by around 20%, which contrasts radically with the increase in tonne kilometres highlighted above (61%). Freightliner has made some inroads into DB Schenker's dominant position in the Heavy Haul sector of the market. The chart also highlights the very low level of new entrants into the market, with only two small firms making a limited impact over the ten year period. In addition to those mentioned, two other companies entered the market during this period. Firstly Advenza Freight, which operated a short lived pallet service between London and Glasgow in 2004, and secondly Jarvis Fastline who commenced operations in April 2008 after securing a contract to transport coal to E On power stations. In terms of the Herfindahl Index, the effect of the above changes has been to reduce this from 0.584 in 1996/7 to 0.474 in 2006/7, which suggests some decrease in market power over the period but an industry which is still characterised by very high seller concentration, and one that could be only ever be described as oligopolistic in nature.

The chart also highlights that very little impact has been made with competing against road haulage, as the economics of doing so remain unfavourable to rail freight. The one positive is that the privatised industry has stopped the long term decline, although as stated above, rail freight levels have stagnated since 2000. To put these figures/market shares into context with US railroads, both DB Schenker and Freightliner would be classified as Class I railroads based on current AAR definitions.

THE US EXPERIENCE WITH RAILROAD DEREGULATION

Most, if not all, research carried out in the area of rail freight production economics relates to the US experience, and in particular the impact of deregulation on the industry. US railroad deregulation was brought about by the Staggers Act 1980 as a response to major problems within the industry at the time. Ellig (2002) for example notes most US railroads in the 1970s were earning far less than their cost of capital. MacDonald and Cavaluzzo (1996) further highlight that at the time of the passing of the Act, many industry observers expected that it would allow railways to raise rates, and thereby increase profitability and thus investment, and hence address the chronic financial problems facing the industry. This was not however what occurred, and by far the largest impacts of the Act surrounded productivity improvements and mergers in the pursuit of scale economies.

With regard to productivity, most studies on the topic generally concur that this increased significantly in the period following deregulation, and furthermore, that it was such gains that led to the reduction of rail freight rates. Berndt et al (1993) for example found productivity gains to be substantial and that overwhelmingly most of this improvement was directly as a result of deregulation rather than the high level of mergers that also occurred following the Staggers Act. Chapin and Schmidt (1998) similarly found substantial improvement in the technical efficiency in the post deregulation period, however also found strong evidence of decreasing returns to scale, thus a significant number of firms were found to be operating above the optimal production point. Wilson (1997), in reviewing US Class I railroad performance over the period 1978 to 1989, found that by the end of the period reviewed productivity rates had returned to their pre-Staggers levels at around 3% or less, but that

these had risen to higher levels of around 6/7% in the period immediately following deregulation. This would indicate that in the main productivity improvements had been short term and one off type effects which were not sustainable into the medium and longer terms. This is similar to the findings of Cowie (2009) for the British passenger rail industry, where productivity gains in the period immediately following privatisation were found to be almost all as a result of technical change, whilst latterly such gains were due to efficiency improvements (catch up). Nevertheless, the short term effects identified by Wilson's research can be considered as significant, as the author further shows that costs by the end of the period reviewed were some 40% lower than they would have been under the regulated regime.

Within a European concept, most productivity improvements in a 'revisionist' era would be as a result of a reduction of the inputs, namely labour, or by working the existing inputs harder, namely capital. In the case of US railroads however, Wilson (1997) identifies that costs fell in the post deregulation period due to innovative pricing methods such as contract and multiple car rates that all reduced costs (Macdonald and Cavalluco, 1996), the considerable simplification of line abandonment procedures that led to the closure of costly lines and the relaxing of merger guidelines. Gellman (1986) and McCabe (1977) also highlight the limiting effect that the regulatory regime's control over rates had on companies' abilities to invest in rolling stock, thereby limiting technical change. Ellig (2002) however highlights that most productivity improvements were brought about by railroads shedding excess capital and labour. Between 1980 and 1998, trackage of Class I railroads fell by 28%, with most, but not all, of these lines being sold to Class II & III railroads. Even larger reductions were achieved in staffing, with employment falling from 458332 down to 178222, however some of that was due to the outsourcing of activities to third parties, such as the maintenance of locomotives to manufacturers.

MacDonald and Cavaluzzo (1996) argue that most cost savings in the industry were as a result of a move from high costs methods of shipment to low cost methods of shipment. They also highlight that after Staggers rates fell on high density routes and rose on light density routes, thereby encouraging shippers to use particular corridors. This traffic consolidation allowed economies of density to be realised for line haul operations and also economies of scale in terminal operations. They also highlight that traffic consolidation allowed the railroads to work the rolling stock harder, with the average railcar in 1980 making 13 trips per year, however by 1990 this had risen to 17.6, and that with considerably longer average haul lengths. This of course is a basic economy of density.

With regard to scale economies, Wilson (1997) finds that these have been decreasing over time, with an average value of 0.93 for the pre-Staggers period and an average value of 0.99 for post-Staggers. This latter figure was achieved when average firm size had almost doubled, however may be explained through differences in market conditions and also confirming Chapin and Schmidt's research that a significant number of firms were operating above the minimum efficiency scale.

Bitzan and Wilson (2007) examined the effect of mergers in the US railroad industry and the impact that this has had upon efficiency for all Class I railroads over the period 1983 to 2003. Their results suggest considerable economies of scale within railroad operation, and hence they place a value of around 11% reduction in costs that can be associated with the 'typical'

merger, although results tend to vary considerably between individual mergers. This would indicate a very strong incentive for industry consolidation. The authors draw a clear distinction between economies of density and economies of (firm) size, and cite evidence that suggests that whilst most studies have found the former to be increasing, few studies have found evidence of economies of scale and in some cases evidence of diseconomies have been found. Hence mergers that are end-to-end only increase firm size, whilst mergers that are parallel will produce efficiency gains due to the rationalisation of operations.

It has been stated elsewhere by this author that of all the transport modes, rail freight operations around the world must be considered to be the most diverse in terms of form and structure (Cowie, 2010). In simple terms therefore, such findings cannot be considered to be generalisable to other situations. Nevertheless, the US experience with deregulation does point to two particular areas of significance – productivity and economies of scale. Thus the remainder of this paper considers if such productivity changes and scale effects have been replicated, or could be replicated, within the British rail freight industry since privatisation.

PRODUCTIVITY AND ECONOMIES OF SCALE IN THE BRITISH PRIVATISED RAIL FREIGHT INDUSTRY

In order to estimate the size of productivity gains since privatisation and the potential size of economies of scale, a Translog cost function has been employed. The general form of the thsi function with a single output Q and J inputs and factor prices P_j over t time periods is given as equation 3 below:

$$\begin{aligned} \text{LnC}_t = {} & \alpha + \beta_j \ln Q_t + \delta_j \tfrac{1}{2}\left(\ln Q_t^2\right) + \sum_{j=1}^{J} \gamma_j \ln P_{jt} + \sum_{j=1}^{J} \omega_j \tfrac{1}{2} \ln P_{jt}^2 + \sum_{j=1}^{J}\sum_{k=1}^{J} \phi_{jk} \ln P_{jt} \ln P_{kt} \\ & + \sum_{j=1}^{J} \eta_j \ln P_j \ln Q_t + \lambda T + \rho \tfrac{1}{2} T^2 + \sum_{j=1}^{J} \upsilon_j T \ln P_{jt} + \mu T \ln Q_t + e_i ; j \neq k \end{aligned} \quad [3]$$

A minimum requirement for the function to be well behaved is that it must be positive and homogeneous of degree one in input prices, i.e. an increase in input prices will lead to the same proportionate increase in total cost. The following restrictions are therefore implied to impose the conditions of homotheticity as well as symmetry:

$$\sum_{j=1}^{J} \gamma_j = 1, \qquad \sum_{j=1}^{J} \phi_{jk} = \sum_{k=1}^{J} \phi_{kj} = 0, \qquad \sum_{j=1}^{J} \eta_{jk} = \sum_{k=1}^{J} \nu_{kj} = 0 \quad [3a]$$

In order to operationalise the model, the following share equations are also normally added, where S_j relates to the proportional share of costs of input j:

$$S_j = \frac{\partial \ln C_i}{\partial \ln P_j} = \gamma_j + \delta_j \ln P_{jt} + \varpi_{jk} \ln P_{kt} + \eta_j \ln Q_i + \upsilon_j T \ln P_{jt} \quad [3b]$$

These are simply calculated by taking the partial derivatives of the cost function for each of the specified inputs, and represent the input derived demand functions, commonly known as Shepherd's lemma. Imposition of the first restriction listed under [3a] ensures that the cost shares sum to unity. The function itself was estimated using the seemingly unrelated regression method in Limdep.

Estimation of economies of scale can be derived from equation [3] by taking the partial derivative of the output with respect to costs. This gives the rate of change in total cost to the rate of change in output and is formally specified as:

$$EOS = 1 - (\partial \ln C / \partial \ln Q) \qquad [4]$$

Positive values therefore indicate economies of scale and negative values diseconomies. Following McGeehan (1993), the same logic can be applied with respect to time to give total factor productivity (TFP):

$$TFP = -(\partial \ln C / \partial T)/(\partial \ln C / \partial Q) \qquad [5]$$

In order to estimate the function, data was collected from a number of sources. All cost and labour figures were taken from the Rail Industry Monitor, published annually by the TAS Partnership (see for example TAS 2008). Rolling stock figures however proved more problematic to assemble. These were drawn from a range of sources, namely an estimate of the rolling stock inherited on privatisation, purchases of locomotive stock since privatisation from Wikipedia, and finally withdrawals were estimated based upon the introduction of new rolling stock and traffic levels. Whilst not exact, the estimates made are believed to be reasonably accurate. A single output was specified, namely operating revenue, which is used as a proxy for the level of freight carried. This is not without its problems, most notably that the measure will be heavily influenced by changing market power. Thus for example 'productivity' gains could simply be a sign of increasing market power and vice versa. In this case however, there is no indication of any significant change in market positions within the industry, mainly due to competition from road haulage. This has resulted in profit margins remaining fairly consistent over the period, and if anything falling slightly, hence the function will tend to slightly underestimate productivity gains and scale effects.

Two inputs were used in the estimation of the above equation, labour and rolling stock. The price of labour was calculated from wages divided by staff numbers, and capital costs, always problematic in such studies, from interest plus depreciation plus leasing charges – within the British industry there is a mix of rolling stock ownership forms, with DB Schenker, Direct Rail Services and First GBRF all owning their own locomotives, whilst Freightliner leases its rolling stock, hence the use of a combination variable for capital costs.

The exact form of the Translog to be estimated therefore is:

$$\begin{aligned} LnC_t = {} & \alpha + \beta_j \ln Q_t + \delta_j \tfrac{1}{2} \ln\left(Q_t^2\right) + \gamma_l \ln P_{lt} + \gamma_k \ln P_{kt} + \omega_l \tfrac{1}{2} \ln P_{lt}^2 + \omega_k \tfrac{1}{2} \ln P_{kt}^2 \\ & + \phi_{lk} \ln P_{lt} \ln P_{kt} + \eta_l \ln P_l \ln Q_t + \eta_k \ln P_k \ln Q_t + \lambda T + \rho \tfrac{1}{2} T^2 \\ & + \upsilon_l T \ln P_{lt} + \upsilon_l T \ln P_{kt} + \mu T \ln Q_t + e_i \end{aligned} \quad [6]$$

With the restrictions and share equations as specified above in equations 3a and 3b.

Translog Function

The results from estimating the Translog cost function are given below in Table 2.

Table 2: Output of Translog Cost Function

Variable	Definition	Estimate	T Value	Prob.
Constant	Scaler	9.4535	4.7570	0.0000
PK	Price of Capital	0.4464	4.4200	0.0000
PL	Price of Labour	0.5536	5.4810	0.0000
Q1	Output	-1.6033	-4.6440	0.0000
QQ1	Output Squared	0.2316	7.7320	0.0000
PL2	Price of Labour Squared	0.1276	9.1710	0.0000
PK2	Price of Capital Squared	0.1276	9.1710	0.0000
PLPK	Labour/Capital	-0.1276	-9.1710	0.0000
QPK	Output/Capital	-0.0346	-4.2950	0.0000
QPL	Output/Labour	0.0346	4.2950	0.0000
T	Time	0.0736	0.7140	0.4751
T2	Time Squared	-0.0160	-1.5490	0.1214
TQ	Time/Output	-0.0014	-0.1830	0.8552
TPK	Time/Capital	0.0125	2.4830	0.0130
TPL	Time/Labour	-0.0125	-2.4830	0.0130

R^2 = 0.9583, F = 63.41, df = 24 p = 0.0000

There is very little to say about the actual translog cost function itself, as in general it is a system of equations used to model production and operating costs. The only points to briefly note are firstly that most of the terms are found to be statistically significant, although the time components appear to be marginal. The Rbar^2 presents a very high level of fit, however high R^2 values should be expected in such analysis. Direct interpretation of the individual parameters is not possible due to the cross product terms and is normally undertaken through either evaluation at the mean or more commonly by taking first partial derivatives. Thus in this context what is of real interest in the translog is to use it to estimate the effect of time on productiivty and to examine the issue of economies of scale.

Results on Productivity and Economies of Scale.

We begin with the results on economies of scale, and these are shown graphically in Figure 4.

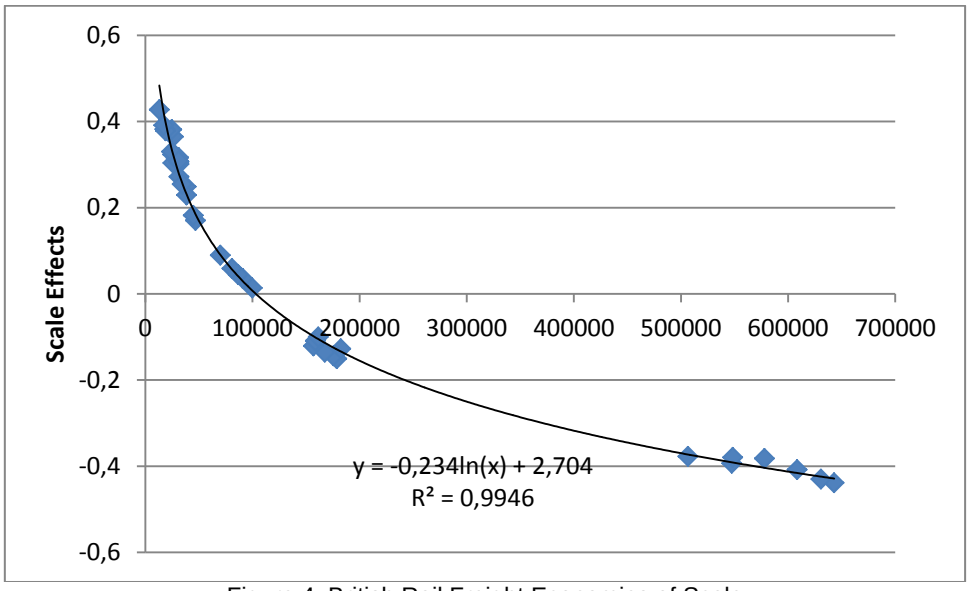

Figure 4: British Rail Freight Economies of Scale

What the results in Figure 4 show is that all economies are exhausted at a relatively low level of output. The fitted line, which fits the data very well, suggests an MES point associated with an annual revenue figure of just over £100m a year. In a total market size of £888m, this would suggest that the market could and should support competition. Such a result is contradictory to the 'traditional' view of the railway as an industry with very large MES points due to the high level of capital stock used. The main reason for this finding is that within Great Britain, freight flows tend to be point-to-point or on an individual route basis, and thus tend to have relatively few economies. Most research shows that the breakeven point for rail v road with regard to freight is somewhere between 300 and 500 kilometres (Cowie, 2010), and such distances in Britain are generally only possible in north-south flows, and, realistically speaking, there are very few even of these. Thus most services tend to be point-to-point rather than network or hub and spoke type operations, and this would account for such a relatively low MES point. Furthermore, the results are consistent with the US research for line haul traffic, which similarly had considerably fewer economies than for interlining (network) traffic. On the surface therefore, size would not appear to be a major barrier to entry within the British rail freight market, and thus the lack of uptake of opportunities that reform within the industry presented would thus appear to lie elsewhere. In other respects however it may be more of a structural barrier to entry, as entering at the MES point or above would require considerable resources in generating and maintaining such traffic flows.

Overall however, these results suggest that scale effects will have a far smaller impact on the British market than they have had in the US.

RESULTS ON PRODUCTIVITY

The results on productivity are presented in Figure 5:

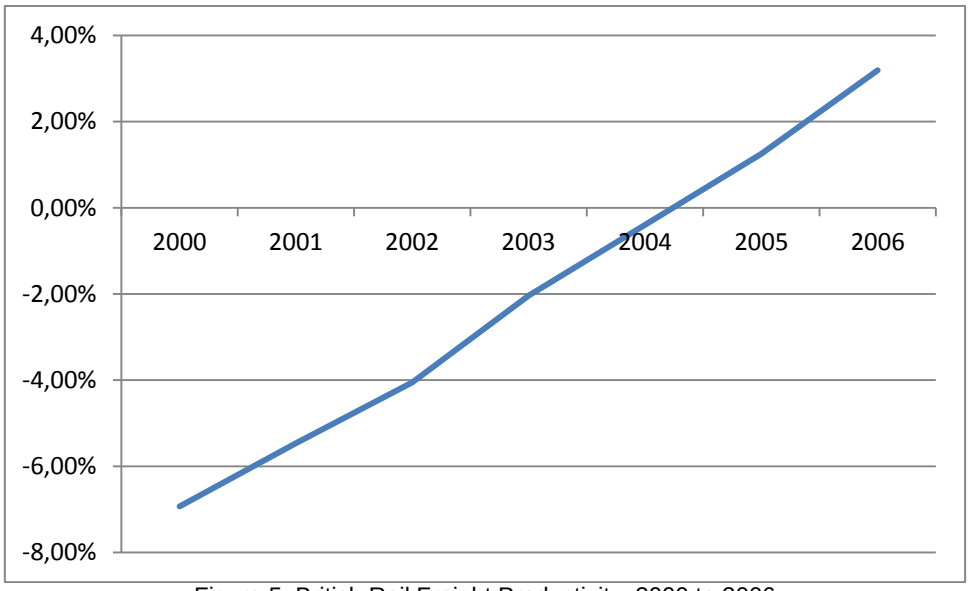

Figure 5: British Rail Freight Productivity, 2000 to 2006

Again what this shows is an unexpected result, with negative productivities in the early period rising to positive productivities by the end. Whilst the time period analysed does not include the immediate post privatisation period, it is nevertheless the case that most privatisations have been associated with productivity improvement not decline, and furthermore that many such improvements occurred even before the industry was privatised, termed the 'anticipation effect' by Bousaffiane et al. (1997). It should be noted however that the 'productivity' of freight operations over time is not as easily interpretable as the productivity of passenger services, as the modal mix can change and hence comparisons can become meaningless. Overall aggregated figures on commodities carried however from the DfT (2009) would indicate that there has not been any significant changes in the modal mix that would explain on its own negative productivity. The other obvious reason would be the use of revenue as a proxy for output, and hence competition may drive down haulage prices and thus where used would produce negative productivity. Whilst profit margins have fallen slightly over the period, this in itself would also not appear to account for such a result.

One reason for the above productivities is that freight train operating companies have over time kept capital inputs that may not always be utilised directly in revenue earning service but rather held in reserve. This can and has involved large numbers of rolling stock units, and this is particularly the case where these units are replaced by new stock. Such units are thus 'mothballed' and used where necessary. Over time, these have eventually been reduced, and this may explain the surprising results with regard to productivity. It may well be the case that in the latter part of the period inputs better match outputs, as few of the inherited locomotives remained in service, thus better enabling freight operators to take productivity gains forward.

CLOSING DISCUSSION AND CONCLUSIONS

The first conclusion is to briefly consider productivity gains in the private and public sectors, even if only to dismiss such a comparison. Rail freight in the early 1980s within the nationalised British Rail contained all of the economic 'bads' associated with public ownership – x-inefficiency, complete lack of purpose, lack of incentives and focus entirely on the activity rather than on the market. Productivity gains under the sectorisation era which preceded privatisation were therefore phenomenal, but this reflects the very low starting position rather than any organisational impact. To compare such gains with what has been achieved since privatisation therefore are largely meaningless.

The second conclusion is with regard to economies of scale, which in the rail industry are usually assumed to be very large and hence a major barrier to new entrants. Indeed, this was one of the reasons railways were originally nationalised. The findings from this study however suggest that economies of scale within rail freight whilst significant, should not in itself represent a barrier that destroys all competition and produces a monopoly. For example, in terms of annual revenue the estimated MES point is well below the US classification of a Class I railroad. The very low level of market entry that has occurred since privatisation in 1995 is therefore not due to cost structures or firm size. Reasons for the low level of entry would appear to lie elsewhere. Furthermore, it would appear that the US findings on economies of scale for line haul operations are transferable to the British context, but not the findings for interlining traffic. As most British traffic is point-to-point, this provides a constituency in the results. It also suggests that scale effects have had, and will continue to have, a far less profound effect on the British industry than it has had in the US.

The third conclusion is that whilst major reform in the US railroad industry in the form of deregulation brought in by the Staggers Act had a massive and long lasting effect on the industry, it could be argued that rail freight reform in the UK brought in by the Railways Act 1993 has actually had very little impact. Whilst the two industries are very different in form and nature, the comparison does bring into focus an important characteristic, and that is the basic difference in the reforms; in the US it was deregulation whilst in the UK it was privatisation. Importantly, through the Organising for Quality initiative of the mid to late 1980s, BR was already market focused, hence simply privatising the industry appears to have made little difference, i.e. the classic Vickers and Yarrow (1988) proposition. This would perhaps suggest that BR had basically maximised the possibility of working within that framework, i.e. exploited all of the possible opportunities in which rail freight had a pure cost advantage and failed to make any progress in areas where it had a cost disadvantage. Simply privatising the industry appears to have made little difference to that basic position. Whilst this is a debateable conclusion as there is always a feeling that more could be done, that is not borne out by the data. There is more freight going by rail, but most of that increase is due to structural economic changes elsewhere in the economy rather than due to renewed management dynamism. This is in marked contrast with the passenger sector, where real gains have been achieved. It thus appears that under existing market conditions management has very little influence over the levels of freight going by rail. If true, this is a situation of real concern, and if continued into the medium and longer terms could lead to further long term decline. It also strongly suggests that policy needs to look at ways to truly

'incentivise' rail freight operators, and this needs to be done in innovative ways rather than simply tax road or subsidy rail freight. Certainly, the market in its current state does not appear to be producing such incentives.

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