

# RAIL FREIGHT: THE BENEFITS AND COSTS OF VERTICAL SEPARATION AND OPEN ACCESS

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## 1. INTRODUCTION

### 1.1 Context

Network industries, such as rail, have traditionally been vertically integrated because of the economies of scope from minimising transaction costs and the economies of scale of having single operator. However, this model has been challenged since the late 1980s on the grounds that the benefits of competition can more than offset the higher costs. Many countries have since unbundled some network industries.<sup>2</sup>

In some industries a consensus has emerged on the best way to reform:

- in the power sector, the transmission network should be vertically separated
- the telecommunications industry should remain vertically integrated with competition provided by operators having open access to facilities owned by another operator.

There is no consensus on the optimum structural model for the railway industry.

Although open access is quite common, vertical separation has been limited to a few mixed railways in Europe, long distance freight in Australia and some developing and transition countries<sup>3</sup>. In North America, both the vertical separation and open access models have been rejected. The argument is that, for most markets, there is competition from road and source competition (e.g. between different sources of coal for a power station). In addition, this can be supplemented by rail – rail competition between adjacent lines in specific circumstances (as for telecommunications). Similarly, vertical separation and open access have been rejected for the passenger dominated railways in Japan.

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<sup>2</sup> Unbundling refers to the separation of different parts of the industry, such as infrastructure and train operations in rail.

<sup>3</sup> Romania separated infrastructure from operations in 1997, Kazakhstan in Central Asia passed legislation in 2001 paving the way for compete vertical separation and competition, and South Africa plans to vertically separate by 2010.

Also the findings of academic research on vertical separation and open access are inconclusive and contradictory. There is therefore a need to clarify the trade-offs attached to different options for railways with different characteristics.

## **1.2 Content of paper**

This paper reviews and analyses the benefits and the costs of the principal models for introducing competition in railways: (1) the vertical separation of the natural monopoly, infrastructure, from operations; and (2) the introduction of competition through open access on a non-discriminatory basis, whilst retaining vertical integration. The focus of the analysis is on rail freight.

Following a literature review, the paper compares the impact of reform on rail freight in the three countries in Europe that have liberalised most: Sweden, Germany and Great Britain (GB).<sup>4</sup> A Case Study on GB then examines in more detail the experience and benefits of restructuring for rail freight in terms of the development of competition, average rates and traffic growth.

## **2. LITERATURE REVIEW**

### **2.1 Industry Comparisons**

Gomez –Ibanez (2003) considered unbundling in different network industries, comparing the benefits of introducing competition with the costs of increasing co-ordination. He suggests that the **benefits of unbundling** should increase in line with two factors: (a) the share of industry costs in activities where competition is sustainable and (b) the potential for productivity improvements. The share of industry costs in potentially competitive activities is high in the rail freight industry (60-80%) but only moderate (50-60%<sup>5</sup>) in the rail passenger industry. He considered the potential for productivity improvements is relatively low in rail because of the limited scope for technological change.<sup>6</sup>

Gomez –Ibanez considered that the **costs of unbundling**, relative to the power and telecommunications industries, are high for passenger rail (because of infrastructure's high share of total cost and product heterogeneity, both of which increase transaction costs<sup>7</sup>) but moderate for freight railways.

This analysis may explain why fewer countries have unbundled their railways than have their power and telecommunications industries. On the basis of this analysis, however, it would be expected that more freight railways would have been vertically separated than

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<sup>4</sup> The railways in Northern Ireland, also part of the UK, remain state owned.

<sup>5</sup> Gomez-Ibanez includes in this category mixed railways (passenger and freight).

<sup>6</sup> The only network industry with high potential is telecommunications.

<sup>7</sup> To these could be added regulation and subsidy, both of which are common in passenger railways and add to contractual complexity.

passenger or mixed railways. No such pattern has emerged since vertical separation on Europe's mixed railways are primarily a result of EU policy on the single market.

## **2.2 Research in the US**

Evidence from the US is contradictory. There is empirical evidence that, beyond some 'minimum efficient size', there are constant returns to scale (Caves et al, 1987). This implies that, providing the railways are large enough to support more than one operator without losing economies of scale, competition with or without vertical separation may not lead to increased costs. Also Ivaldi and McCullough (2001) found no cost complementarities between operations and infrastructure, implying that there are no inherent disadvantages in vertical separation.

In contrast, Bitzan (2003) demonstrated that vertically separating infrastructure from operations would increase costs and that having more than one operator would also increase costs<sup>8</sup> since railroads are "natural monopolies over their own networks" (because of economies of density). Ivaldi and McCullough (2004) found a 20-40% loss of technical efficiency if rail freight operations were separated from infrastructure. They found an additional 70% loss of operational efficiency if there were more than one rail transport operator. Much of the US evidence revolves around the loss of economies of density if traffic were split between more than one operator (this might reduce the ability to run longer trains and through services, for example). However, by simply estimating cost savings if activities were taken away from vertically integrated railroads or if operations were split, neither paper took into account that:

- the interfaces can be managed to reduce the costs of vertical separation (a major focus in GB and the Netherlands at present) – the base case against which costs were compared presumably already had costs managed down to efficient levels;
- there may be benefits from greater management focus/specialisation;
- competition should reduce costs and rates.

## **2.3 Research in the EU**

Whilst much has been written for and against vertical separation and open access in the European Union, there is little convincing analysis to back up the arguments. This is because few countries had carried out these reforms until recently, because of difficulties with obtaining comparable data and because of difficulties with measuring the extent of reform and isolating the impacts from other factors.

Friebel, Ivaldi and Vibes (2003) used panel data<sup>9</sup> to analyse the effect of the reforms (vertical separation, the introduction of third party access and the creation of independent regulatory institutions) on passenger railway efficiency in several EU

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<sup>8</sup> These are known as subadditivity tests.

<sup>9</sup> Panel data is a form of econometric analysis combining time series and cross-sectional data.

countries over 20 years. They concluded that these reforms increased efficiency but only if they are introduced sequentially.

Rivera-Trujillo (2004) also analysed European data using a translog function with staff, rolling stock and track as inputs. He found that competition increases efficiency but vertical separation reduces it.

Nash (2004) noted that the Friebel paper failed to take into account the lags between passing legislation and actually carrying out reforms. He also noted that there are doubts about consistency of data in the Rivera-Trujillo paper and that open access was very limited for passenger services.

## **2.4 Views of European Railways and Others**

Many European railways have resisted radical restructuring and particularly complete vertical separation. A paper by German Railways (Ksoll 2003) concluded that integration is on balance more favourable in countries such as Germany because of its co-ordination advantages and economies of scale, and because intra modal or rail-rail competition is not necessary as there is competition from road. Ksoll suggests that the balance of arguments is different in Sweden where traffic patterns are less complex and road competition weaker. SDG (2004), in a study for the EU, makes a similar point that a single operator may be better suited than multiple operators for short journey lengths with high densities.<sup>10</sup>

On the other hand, high densities may be better able to support multiple operators because economies of scale may be obtained for all operators. Economies of density and scarcity of capacity are therefore factors to consider in deciding whether to vertically separate. Their relative importance depends also on specific technical factors relating to particular traffics. For example, for very high density ore and high speed passenger lines, the cost of vertical separation and competition may be too high because of the critical need to co-ordinate investment, maintenance and scheduling.

## **3. RAILWAYS INTERNATIONALLY**

### **3.1 The Status and Impact of Railway Restructuring**

The vertically integrated model for railways began to be replaced in the late 1980s. First in 1988, there was separation of infrastructure from operations in Sweden. Since then, many countries have begun to restructure their rail industries.

The state of restructuring worldwide in 2005 is summarised in Table 1:

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<sup>10</sup> These comments are made in the context of passenger services which operate at times when track capacity is often scarce. As discussed later in this paper, at the time of privatisation in the UK, the opposite conclusion was drawn for freight.

**Table 1: State of Railway Restructuring Worldwide**

Structure	Ownership of Infrastructure	
	Private	Public
Fully separated	UK private operators and infrastructure company limited by guarantee not equity.	Bulgaria, Denmark, Norway, Netherlands, Portugal, Romania <sup>11</sup> , Spain, Slovakia, Sweden, Australia (interstate freight only).
Separation of capacity allocation <sup>12</sup>		France, Czech Republic, Finland, Slovenia.
Holding Company structure		Germany, Austria, Poland, Italy.
Fully integrated	US, Canada (freight only), most of Latin America, Japan (passenger only), Estonia.	Rest of world (including China, Russia, India).

Note: This table is adapted from CER (2005) Table 1.

Most railways internationally remain fully vertically integrated and publicly owned. GB is the only country to have privatised railway infrastructure.

The privately owned fully integrated railways are either freight dominated like the US and Canada or passenger dominated like Japan. This may be partly because the case for vertical separation increases with a mixed railway since both freight and passenger services need access to the same infrastructure.

### **3.2 European Union**

EU Directive 91/440 began the process of introducing competition in rail across all member states, partly to help create a single market in railway services with no discrimination against companies from other member states. Although only a few countries took early practical steps to liberalise, rail freight has experienced a significant turnaround compared with the previous long period of decline, as shown in Table 2:

<sup>11</sup> The Ministry of Transport has a strong co-ordinating function similar to a holding company (CER, 2005).

<sup>12</sup> As well as other functions (in the case of France, RFF is responsible also for infrastructure investment planning).

**Table 2: Change in rail freight tonne km**

	<b>1970-2004</b>	<b>1970-1993</b>	<b>1993-2004</b>
Germany	-24%	-43%	33%
Sweden	21%	7%	12%
UK	-8%	-44%	64%
Others	-3%	-15%	15%
EU15	-10%	-27%	24%

Source: Energy and Transport in Figures, various years.

After a decline of 27% between 1970 and 1993, when vertical separation and open access began to be introduced in some countries, rail freight traffic began to increase for the EU as a whole and the 2004 figures were some 24% above those in 1993. However, it is unclear how much of this increase can be attributed to these changes since “other” less liberalised countries have also experienced a turnaround since 1993 (traffic increasing by 15%).

Of the three countries that have reformed most (Sweden, Germany and the UK<sup>13</sup>) the largest increase since 1993 occurred in the UK, where traffic grew by 64% between 1993 and 2003 (although traffic is still 8% below its 1970 peak<sup>14</sup>). Rail freight in Germany has grown by 33% since 1993. Traffic in Sweden has increased by only 12% (less than countries that have reformed least) although, unlike other countries, traffic had already grown before 1993. However, other factors are likely to have affected traffic growth and so it is difficult to draw firm conclusions from this comparison.

### **3.3 Sweden**

In 1988, Sweden became the first country in the world to create a separate state owned infrastructure authority, Banverket, to manage national railway track. The main objectives were to provide a “level playing field” between road and rail through having rail infrastructure funded directly by government in the same way as road infrastructure and to reduce the burden of railways on the state (Nilsson 2002).

Open access was introduced for freight in 1996 and there are now six freight operators. Some of the services offered by new entrants are complementary rather than competitive to SJ’s freight business (Green Cargo) as they operate on a small scale, often acting as subcontractors to Green Cargo on peripheral parts of the network (Nilsson, 2002).

Industrial firms have been slow to take advantage of the opportunity of open access although they have used the threat of entry to obtain reduced rates (Alexandersson and Hulten 2005).

<sup>13</sup> Source: IBM/Kirchner (2005).

<sup>14</sup> The increase in the UK began in 1997 following privatisation. Modal share in the UK is still below the EU average but this probably reflects geographical characteristics rather than a failure of the railways.

Third party freight operators now have a 25% market share and competition or the threat of competition has led to reduced rates and improved service quality. However, this is at the cost of worsening the financial performance of Green Cargo which has become loss making. Also separation of infrastructure has been expensive for Government which funds most investment. According to Nilsson (2002), investment levels increased five fold in the early 1990s and poor investment decisions have been made, partly due to political intervention but also due to the disconnection between customer and infrastructure owner. Projects are being financed without any certainty that there will be operators willing and able to run commercial services on them (Alexandersson and Hulten 2005).

Alexandersson and Hulten also concluded that the reforms have allowed investment to take place that would not otherwise have happened (though not through private financing but through government funding). They consider that fragmentation of the railway may have caused some sub-optimisation and loss of scale economies. Overall they conclude that the reforms have benefited customers but that taxpayers have borne increased costs.

### **3.4 Germany**

The retention of the incumbent state owned rail monopoly organisation was the notable feature of the German model. This was because the principle of a fair playing field for on track competition was not considered as important as the improvement in DB's financial and operational performance.

Open access was also introduced in 1994 but initially entry was limited due to various obstacles, some allegedly erected by DB to keep out the competition. These obstacles included difficulty with obtaining access to the network at the time required, including obtaining information about paths available. There is still a residual concern that DB may discriminate against other operators and potential new entrants (IBM/Kirchner, 2005).

In rail freight, DB's freight business, Railion, which has merged with railways in several neighbouring countries and bought a major logistics company, remains dominant, particularly in the unit freight train markets. Open access operators carried only 10% share of the total rail freight tonne km in 2004 (DB 2005). Also, although the profit margins have apparently fallen (IBM/Kirchner, 2005), this may be due more to competition from road, than from new rail operators (DB 2005).

The German model is held up by some as combining the advantages of non-discriminatory third party access with the integration of track and operations to retain co-operation. Rail's decline has been reversed thereby achieving one of the Government's original goals. Also restructuring did not involve any major expenditure. It appears overall that the reforms have been successful, although they might have produced greater benefits if open access had been accompanied by vertical separation.

## **4. CASE STUDY: GREAT BRITAIN**

### **4.1 *The Structural Options***

The main options considered for the privatisation of British Rail were to:

1. privatise the railways as a single unit;
2. break them into separate companies based on regions;
3. break them into separate vertically integrated companies based on its existing market 'sector' businesses (e.g. intercity passenger);
4. separate infrastructure from the operation of train services
5. Some hybrid of the above.

Option 3 was preferred by the passenger businesses of British Rail as they would generally control the infrastructure. The freight businesses were against this option for the same reason. A working group concluded in 1991 that a hybrid structure should be adopted: vertical separation throughout most of Britain and vertical integration in the London commuter area where congestion was considered to preclude much competition. As we have seen, the argument for retaining vertical integration on congested networks has been a recurring theme in railway restructuring internationally.

### **4.2 *The Chosen Structure***

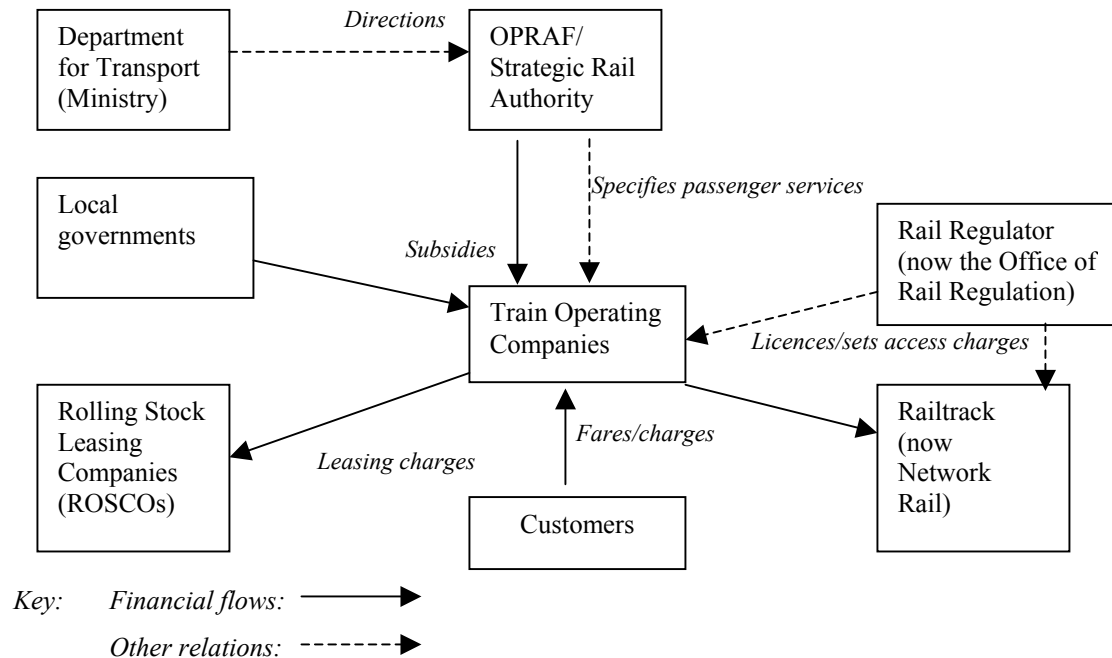
The hybrid was later abandoned in favour of full vertical separation (Option 4) largely to provide for the possibility of competition. However, later, open access was largely abandoned for the passenger railway in order to protect the effective monopolies of franchised train companies and thereby minimise subsidy requirements.

Restructuring involved the dismantling of the vertically integrated national railway operator (British Rail) and the creation of nearly 100 separate organisations linked to each other in a regulatory and contractual matrix. Managerial relationships within British Rail were therefore replaced by regulatory and contractual ones.

Some organisations (Railtrack, which later became Network Rail, and passenger franchises) were subject to economic regulation whilst others (freight and rolling stock companies) competed with each other. The main elements of the structure are illustrated in Figure 1:



**Figure 1: Structure of the Railways in GB<sup>15</sup>**



### 4.3 Freight

The pre-privatisation debate about structure had largely revolved around the passenger railway (Clarke 2000 p182-4), which represented about 80% of revenue in 1993/4<sup>16</sup>, was politically more important and did not receive operating subsidies. The rail freight businesses were sold rather than franchised since it was not considered necessary to allow the public sector to specify what freight services it requires.<sup>17</sup>

British Rail's freight customers had argued at privatisation that the rail freight business should not be sold off as a monopoly (Department of Transport, 1993). Trainload Freight, the largest and only profitable rail freight company, was considered to have two distinct bulk freight markets:

- Short distance, high volume traffic, which is relatively free-standing and for which resources can be dedicated without loss of economies of scale – this market could be fragmented and opened up to competition;
- Longer distance, lower volume traffic which use resources distributed along the line and which can be served most economically by combining flows – this is a

<sup>15</sup> The Office of Passenger Rail Franchising (OPRAF) was replaced by the Strategic Rail Authority (SRA) in 2001. SRA was abolished in 2005 and most of its functions taken over by the Department for Transport.

<sup>16</sup> Trainload Freight, Railfreight Distribution and Parcels had combined revenue of £669million in 1993/4, out of total turnover for British Rail of £3,645 million.

<sup>17</sup> Franchising has continued for profitable passenger operators because government wishes to control the services provided because of scarcity of network capacity and externalities.

natural monopoly since it requires a system to operate it effectively and there would be loss of economies of scale if it were broken up.

Because part of the market constituted a natural monopoly, the government decided that splitting by commodity or customer would lead to greater loss of economies of scale (Clarke p190). In order to optimise the trade off between the benefits of competition and the loss of economies of scale, it split Trainload Freight into three regional companies in late 1994. The decision to have three companies was based on empirical evidence from U.S. railroads (Caves et al, 1987) that, beyond some 'minimum efficient size', there were constant returns to scale.

The Department's consultants recommended that open access should be introduced only for the short distance, high volume business but in practice it was introduced for all markets (Gourvish p416).

When the three Trainload Freight companies were put up for sale, much the most attractive bid was from a consortium led by Wisconsin Central, a regional railroad in the US, for all three companies. Wisconsin argued that the key competitor to rail was road haulage and that it did not make sense to have three companies competing for a small proportion of the total market than use rail (Clarke p195). The consortium bought all three companies in late 1995 and also bought Railfreight Distribution (non-bulk freight) and Parcels, forming English Welsh and Scottish Railways (EWS). EWS then had nearly 90% of the overall rail freight market.

Freightliner, the sixth rail freight company, was sold to a management buyout. It only ran intermodal (container) services and there was therefore no competition between EWS and Freightliner initially.

Since privatisation, two open access operators have emerged: DRS, a subsidiary of the Nuclear Decommissioning Authority, was first established to provide specialist services to its parent, and has begun to provide services to third parties; and GB Railfreight, now a subsidiary of First Group, has expanded from serving only Network Rail to serving other customers, including the Royal Mail which had previously used EWS. DRS and GB Railfreight between them now have about 5% of the market.

National Power, then GB's largest power generator and consumer of coal, sold its own account operation back to EWS in 1998 but was able to retain the benefits of competition through lower rates (Clarke 2000 p 197).

Table 3 summarises trends in market shares in GB:

**Table 3: Market share of rail freight revenue by operator, 1997- 2004**

	Market share			
	EWS	Freightliner	DRS	First GB
1997	86.4%	13.6%	0.0%	0.0%
1998	81.0%	18.7%	0.3%	0.0%
1999	79.9%	19.3%	0.7%	0.0%
2000	77.4%	20.8%	1.8%	0.0%
2001	77.3%	20.7%	2.0%	0.0%
2002	74.4%	22.8%	2.0%	0.8%
2003	70.9%	24.9%	2.7%	1.5%
2004	68.8%	26.4%	2.8%	2.0%

Source: TAS various years.

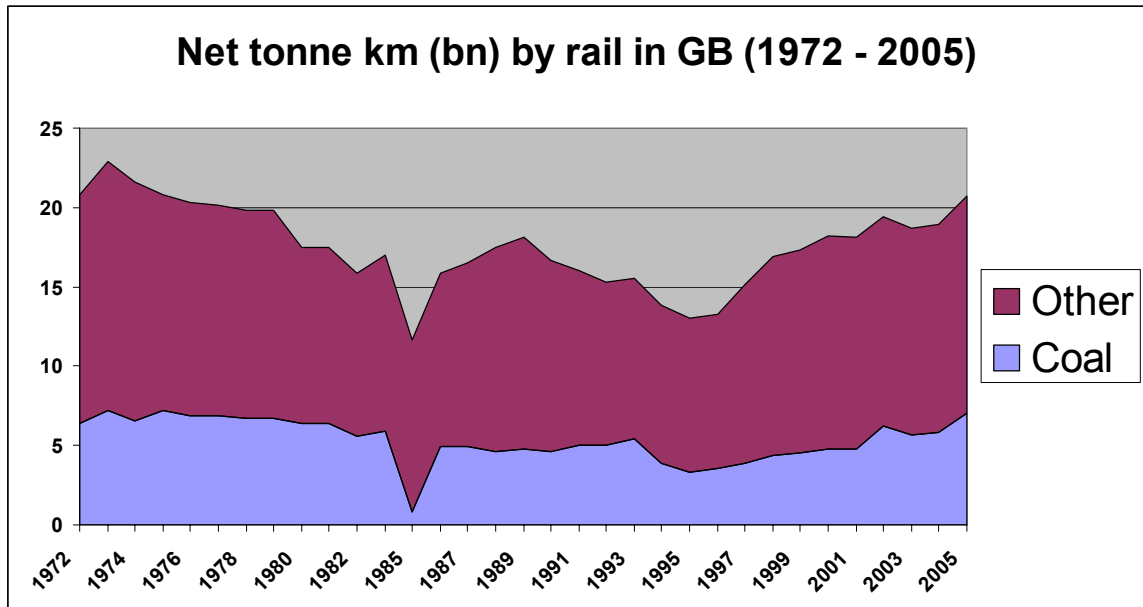
The greatest challenge to EWS's rail monopoly has been from the other privatised company, Freightliner, which has expanded its share of the rail freight market from 14% in 1997 to 26% in 2004. Freightliner first expanded its own business, intermodal services carrying containers from deep sea ports. In 1999, it established Freightliner Heavy Haul (FHH) to compete with EWS in carrying bulk freight. It has been successful in taking business away from EWS, essentially by providing a different type of service: whereas EWS acts as full service provider of large volumes of bulk transport with stops *en route* at marshalling yards to consolidate wagons and minimise costs (a hub and spoke system), FFH has provided a point to point scheduled service, using dedicated assets, which it claims has faster and more reliable transit times.

Later EWS began to compete with Freightliner in providing Intermodal services. However, EWS has steadily lost market share from 86% in 1997 to 69% in 2004.

However the overall size of the market has grown. After declining from 23 bn net tonne km in 1972<sup>18</sup> to 13 bn net tonne km in 1996, rail freight traffic has grown to 21 bn net tonne km, an increase of 56%, as shown in Figure 2:

<sup>18</sup> It had been nearly 40 billion net tonne km in the early 1950s.

Figure 2: GB - Trends in rail freight



Source: Gourvish (2002) for years 1972- 97, SRA (2005) for 1998- 2005.

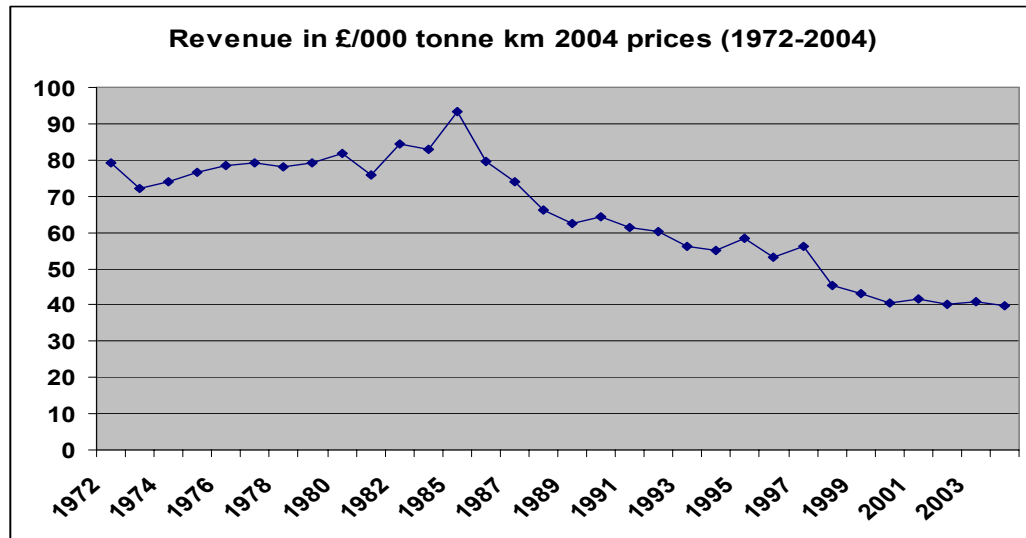
Rail freight also grew relative to road freight, with rail's share of total tonne km by road and rail increasing from 8.5% to 11.5%. This was from a low base, rail freight traffic having fallen: in the 1980s as British Rail raised rates and during the privatisation period in the mid 1990s because of the uncertainty created by the process. There was therefore some catching up to do. However, traffic is still some 15% higher than in the economic boom of 1989 and almost at the level of the mid 1970s.

There are external reasons for the growth in traffic, including the changes in the power industry which led to imported coal being transported longer distances from ports than they had from coal mines. Increasing road congestion and road haulage cost increases are also factors.

Some of the increase can however be attributed to the consequences of reform. For example, considerable investments have been made by the private rail freight industry and its customers, the cost of which is estimated at over £1bn. Also, average rail freight rates in constant prices, which had fallen by less than 2% p.a. between 1972 and 1997<sup>19</sup>, fell by 19% between 1997 and 1998 and have continued to fall gradually since then, as shown in Figure 3:

<sup>19</sup> Average rates actually increased in the mid 1990s due to British Rail's pulling out of loss making markets where its rates had been high.

**Figure 3: GB - Trends in average rail freight rates**



Source: Revenue: Gourvish (2005) for 1972-94, British Rail Report and Accounts for 1995-96 and TAS for 1997-2004. Tonne km: Gourvish (2005) for 1972-96, TAS 1997-2004. Author's calculations.

It is however difficult to be certain how much of this reduction in rates was due to competition as the mix of traffic has changed over the years. Also, to the extent that competition reduces rates, it brings disadvantages. The railway operators are no longer able to extract monopoly rent out of some of their freight customers to cover their fixed costs since to do so would invite in a competitor. As a result, despite efforts at reducing costs and expanding the market, the rail freight industry is not sufficiently profitable to provide a normal return on capital invested: EWS's profit margins have been about 10% since privatisation, despite it having invested more than £500 million, mainly in new rolling stock, and Freightliner was until 2002 making a loss.

#### **4.4 Re-integration and the Rail Review**

Problems with the privatised structure were emerging by the late 1990s. Railtrack was funded to carry out infrastructure maintenance and renewal (M&R) but not to expand capacity substantially. Unexpected growth in demand for both freight and passenger services put strains on infrastructure capacity, but the process of negotiating capacity enhancement bilaterally between Railtrack and train operators did not prove workable and there was need for support from government. Also Railtrack was experiencing difficulties in managing its costs. Following the accident at Hatfield in 2000, measures to prevent its recurrence precipitated a loss of control of railway infrastructure costs. In the following two years, average annual industry costs were 49% higher in real terms than during the immediate post privatisation period (Smith 2005).

In 2001, in response to problems of co-ordination, SRA began to attempt to replicate integrated management through co-operation between industry players. This included the establishment of 'Virtual Boards' comprising representatives of Railtrack route regions, the train operators on those routes and the track maintenance companies. These

were aimed at improving co-ordination across the interface between Railtrack (now Network Rail) and operators.

Also, the Government commissioned consultants to obtain the industry's views of the state of the railways (Mercer Management Consulting 2002 p15-6). One of the key problems identified in the report was poor industry relationships. The fragmentation of the industry was felt to have "made working relations difficult and inefficient". The problems were due to a lack of commercial maturity, poor contracts set up at privatisation and conflicting incentives, particularly in the structure of access charges and the performance regime (by which operators are compensated by Railtrack/Network Rail for delays it causes).

However the industry was divided on whether vertical re-integration was the best solution to these problems because many considered that most TOCs lacked the capability for infrastructure management. Some interviews identified a more difficult problem: that an integrated operator (which on main lines would be one of the larger passenger operators) might discriminate against freight operators and smaller passenger operators.<sup>20</sup>

The rail freight industry remained opposed to vertical integration. This was because any attempt to fragment the industry by region would make it more difficult for freight services (which generally cross regional boundaries) and would increase, not decrease, the number of interfaces freight operators would have to deal with.

The White Paper following the 2004 Rail Review accepted these arguments and decided against reintegration. It proposed to continue with 'Virtual Integration' which was supported by many in the industry who argued that the interface problem could be resolved by integration of operational functions (Bartle, 2005 p42). However, the White Paper did not exclude vertical integration on an experimental basis and for any micro-franchises.

## **5. Conclusions**

The case for vertical separation of railways appears to be weaker than that for electricity and telecommunications. Unlike in these industries, there is no emerging consensus on the best way to structure railways and academic research on this issue is ambiguous. This may explain why less reform has taken place.

Despite the apparently stronger case for vertical separation on freight railways than for mixed or passenger ones, most vertical separation and open access has been on the mixed railways of Europe, driven mainly by EC policy initiatives.

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<sup>20</sup> The assumption was that vertical integration would be in the form of Option 3 above with infrastructure managed by the largest operator which would almost always be a passenger operator.

In Sweden and GB, where there is vertical separation, non-dominant freight operators carry more than 25% of rail freight traffic. Competition is strongest and traffic has grown most in GB. The Case Study on GB shows that average freight rates have fallen significantly, bringing benefits to shippers. However, both countries have experienced problems with increasing costs.

Restructuring in GB differed from that in other countries in that freight operators were privatised and there were two incumbents, one for bulk freight and another for containers, which have begun to compete with each other. In other countries, there was only one incumbent operator (which remained state owned) and the development of competition has been dependent on new entrants. Given that new operators only transport 5% of traffic in GB, it seems likely that, without a second incumbent, competition would have developed far less in GB.

Despite the apparent benefits of vertical separation for freight in GB, this cannot be assessed in isolation from the railways as a whole for which costs, including transaction costs, have increased and for which operating performance has declined. In order to complete a fuller analysis, these effects also need to be taken into consideration.

In Germany, the focus has been on open access. Infrastructure management and the incumbent operators are still under a single holding company. Competition has merged slowly with the dominant freight operator carrying 90% of traffic in 2004, far more than in GB or Sweden. On the other hand, restructuring has not had any obvious costs.

Advocates of the German approach of open access argue that it retains the benefits of integration (low transaction costs) whilst allowing competition. This also applies to a variation on the third party access model that has been adopted in France (and permitted by the EU) - a vertically integrated operator but an independent body to allocate capacity.

The choice of approach to reform needs to take account of a number of factors, including:

- The institutional capacity for regulation.
- The markets: e.g. freight v passenger.
- Potential loss of economies of scope.
- The density of flows which relate to Minimum Efficient Scale.
- Network capacity constraints and other technical constraints.

Since some of these factors may vary within a country, a single model may not always be appropriate for all railways in a country. For example, for congested parts of the network, it may be more difficult to optimise use of capacity with more than one operator. On the other hand, because in this case there may be sufficient demand to retain economies of scale in operation with more than one operator, it may be worthwhile trying to design organisational arrangements to manage the interfaces.

Disentangling the costs and benefits of vertical separation and open access from those of other changes is difficult, especially as some changes, such as increased investment, may be consequences of the reforms. In designing reforms for other countries, the challenge is to include only those separable elements of reform for which the benefits may be expected to exceed the costs, taking account of the specific characteristics of the railway concerned.



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