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VERTICAL INTEGRATION, COMPETITION AND EFFICIENCY — THE CASE OF THE RAIL INDUSTRY —

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This paper conducts an examination of the economic, structural and organisational issues underlying rail reform and privatization. The structural nature of the rail industry is addressed and the merits and demerits of vertical integration are assessed. It is viewed that vertical integration in the rail industry may have more economic benefits, in terms of efficiency, than is generally thought. Methods that reformers should consider for introducing competition into the industry, with either vertical integration or separation, are then considered and evaluated.

I. Introduction

The reform of publicly-owned firms and the appropriate regulation of firms with market power have been issues faced by governments globally during the past two decades. Those state-owned enterprises in relatively competitive markets could simply be sold to the private sector with the expectation that this transfer of ownership would itself stimulate efficiency improvements.¹⁾

The reform of firms with a significant degree of market power, however, has been a much less straightforward process. These industries are those with naturally monopolistic network activities that have been publicly owned and implicitly regulated in some countries or privately owned, but subject to explicit regulation, in others. Most notable of these are the utility industries — telecommunications, gas, electricity and water supply — and their networks that are clearly natural monopolies — local telecommunications, gas pipelines, electricity grids and water and sewerage infrastructure.²⁾

To these industries can be added two more with network characteristics — the rail industry and postal services — but which, in most countries, have until relatively recently typically been less the subject of reform and

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- 1) This paper does not address the issue of privatization per se. Nevertheless, it is acknowledged that privatization can improve efficiency through: the reduction of political interference in decision-making; giving firms access to private capital markets; increasing the pressure on managers to raise efficiency because of the influence of shareholders, takeover threats and, in extreme cases, potential bankruptcy. See Parry (1996).
 - 2) These industries are examined in Armstrong et al. (1994).

analysis than the four "traditional" utilities. The relatively slow pace of reform in the rail and postal industries can be attributed to the fact that the former is usually a perennial net loss-maker, making it harder to find buyers, while the latter's single price structure, and consequent bias toward rural areas, makes reform very politically sensitive. More precise analysis would suggest that both industries incorporate a substantial degree of cross-subsidization from a small number of profitable services (in and between large urban areas) to a large number of unprofitable services, so that any reforms must face the question of the restructuring of rural services with the political implications this necessarily brings.

This paper examines the issues underlying the reform of the rail industry and addresses the options available to governments and policy-makers and their implications.

The structure of this paper is as follows. Section II establishes the framework of analysis and Section III considers issues relating to vertical integration. Section IV then addresses the options for competition in the rail industry and Section V offers some concluding remarks.

II. Framework of Analysis

The rail industry, as with the traditional utilities, is a combination of a natural monopoly (the fixed infrastructure of the rail network) and potentially competitive activities (the provision of train services). Thus, any policy-maker contemplating reform should consider mechanisms for introducing competition into the industry. Essentially this involves one of two broad options.

One is for vertical separation, the division of the fixed infrastructure from responsibility for train operations, with regulation of the network as a natural monopoly, and the introduction of competition into the provision of train services — principally through franchising or open access.

The other is for the retention of the vertical integration of fixed infrastructure and train services and the introduction of competition in the form of yardstick competition between regionally separated, but nevertheless vertically integrated, rail systems.

However, the nature of the rail industry means that it is more difficult to introduce competition on the network than in the case of the utilities because the product is not homogeneous and use of the network by competing companies raises significant problems of co-ordination. Thus it is necessary to consider the implications of vertical integration and separation for efficiency in the rail industry and this is done in the

following section.

Furthermore, this unusual character of the rail industry means that the introduction of competition to improve efficiency is more complicated than for the utilities. For this reason the merits and demerits of various possible mechanisms for the introduction of competition into the rail industry are addressed in Section IV.

III. Vertical Integration

The question of whether a railway system should be vertically integrated or be separated into infrastructure and train operations is perhaps the first that should be addressed by governments considering reform of the rail sector. The answer to that question will then determine whether competition is introduced primarily in the form of franchising of train services or as yardstick competition between horizontally separate but vertically integrated networks.

The issue of vertical integration in the rail industry is, however, not as clear-cut as in other network-based industries where the product is more homogeneous. For example, in the gas or water industries, given the nature of the products it does not matter which company actually supplies the units consumed by customers. What does matter is the payments made by customers to companies for their inputs of standardized products into the pipeline network.³⁾

The rail industry, though, has a considerable degree of product differentiation in product services incorporating such features as different destinations, departure times, speeds of travel and classes of service (Adamson et al. ,1991). This variety means that vertical separation in the rail industry is much more complicated than that in other network-based industries. Consequently, a consideration of those aspects of integration that are unique to the rail sector is necessary.

Firstly, a brief explanation is given of why the railways developed as a vertically integrated industry. Secondly, a review is made of those general economic arguments pertaining to vertical integration that have some relevance for the railways and finally the potential advantages and disadvantages of vertical integration and vertical separation in a modern, reformed rail system are considered.

3) The introduction of price discrimination, e.g. in the form of peak-load pricing, complicates this analysis to some extent.

1. A Brief History of Vertical Integration in the Rail History

Passenger rail networks have, until relatively recently, been operated almost universally by vertically integrated companies. This arrangement, however, was not that which was expected at the beginning of the railway age. It is, therefore, informative to examine the early history of the railways and see why vertical integration became the norm.

When the railway era began as a commercial activity, dating from the passenger services of the famous Stockton to Darlington Railway in 1825, it was assumed that railways would function in a manner similar to that of the turnpike roads and canals of the era. Railway lines were constructed and operated by independent private companies, each authorised by individual Acts of Parliament with the intention that any person or private coach operator would have a right of access to the lines, subject to the payment of a toll, for use as a mode of transportation (Transport 2000, 1991).

However, experience of railway operations demonstrated that the right of access on railways created practical difficulties that were not typically encountered on the turnpike roads or commercial canals of the period. This was simply because the nature of the railway infrastructure did not allow rival operators (some with different varieties of steam power and some horse-drawn) to pass each other and, in places with only single track provision, operators travelling in opposite directions would confront each other, sometimes with violence (Kirby, 1995).

Based on this experience the Liverpool to Manchester Railway in 1830 began operations as a vertically integrated system, the same company having responsibility for both the track and the train operations. Notwithstanding this, the Acts of Parliament that authorised the construction and operation of railways in subsequent years retained the idea that these lines were rights of way available to any operator that paid a toll to the owner. Furthermore, an examination of some of the remarkably farsighted — in terms of their awareness of economic issues — parliamentary debates of the period reveals that many parliamentarians were concerned with the apparent lack of competition in the industry and the great potential for monopoly power of the railway developers.⁴⁾

In reality, however, the practical problems of scheduling and operating trains of competing operators on the same tracks proved too difficult and, though there was some subcontracting of track maintenance and other

4) For an interesting review of some of these parliamentary debates see Foster (1992).

services, by 1840 there is no evidence of the persistence of the vertical separation of track ownership from operations (Foreman-Peck and Millward, 1994). Indeed, in 1839 a Parliamentary Committee reported that, "the safety of the railway requires that upon every line of railway there should be one system of management under one superintending authority....the company should possess a complete control over their line." (Bradshaw, 1996).

This formula for a vertically integrated railway was subsequently adopted worldwide, at least for passenger services. Indeed the history of the British railway, until its most recent reforms, can be seen as a movement, through amalgamations and nationalisation, to become an ever more comprehensive, vertically integrated rail network.

The model of a vertically integrated railway remained largely intact until the implementation of reforms in Sweden in 1988, though there had been limited examples in the UK of trains operated by private sector companies running on the British Rail network.⁵⁾ In Sweden, responsibility for the infrastructure was given to a new organisation, Banverket (BV) while the state railway company, Statens Järnvägar (SJ) retained authority over train services, rolling stock, signalling and timetabling.

In July 1991 the Council of Ministers of the (then) European Community strengthened awareness of issues of verticality when it passed Directive 91/440/EEC to become effective from the beginning of 1993. The directive required railways to maintain separate accounts for rail infrastructure and operations. In addition, the directive required fees for the use of rail infrastructure and that access be granted to EC rail systems for certain defined categories of operators, such as firms engaged in international combined transport.

In the UK vertical separation has been implemented with the infrastructure being owned by a newly privatised company, Railtrack, the rolling stock for passenger services being owned by three private companies and leased as the passenger trains being operated in the form of 25 franchises.

The UK and Sweden, though, remain the only significant examples of vertical separation on major rail networks.

2. The Characteristics of Vertical Integration and Separation

An examination of the view of vertical integration and separation found

5) For examples of these, see Parry (1996).

in many railway analyses reveals that opinions opposed to separation focus on the potential obstacles faced by network users, typically through-ticketing (travel on trains of different operators with one ticket), use of discount cards across a network, and the provision of unbiased information by train operators about rivals' services. The ATOC⁶⁾ organisation in the UK has found that these fears were perhaps overstated.

Opinions in favour of separation emphasize the accounting clarity, reduction of possibilities for cross-subsidisation and, mainly, increased opportunity for the introduction of competition into the industry. However, it can be thought that there has been insufficient consideration of general economic arguments with regard to railways, in particular with the overall welfare implications for integration and separation.

The trend is increasingly in favour of separation. Economic assessments of vertical integration often see it as extending market power but there are also valid economic arguments in favour of integration which have not received sufficient attention and there is a need for these to be addressed.

A review of the economic rationales for vertical integration, based on the approach of industrial economics has been conducted.⁷⁾ Those that can be deemed to be applicable to the rail industry are considered here.

Traditional railway companies, as they developed from the early days of the industry, were vertically integrated in the sense that "the entire quantity of one intermediate input into the 'downstream' process (i.e. the provision of train services) is obtained from part or all of the output of the 'upstream' process" (adapted from Perry, 1989). In railway terms one firm encompasses two single-output production processes, the provision of rail infrastructure (upstream) and the operation of trains (downstream) in which the infrastructure provided is part or all of an input necessary for the downstream operations.

Vertical integration takes place for a variety of economic reasons. Incentives exist for both forward and backward integration to attempt to impose or capture some market power in sellers' or buyers' markets. However, there can also be cases in which vertical integration increases social welfare and it is these instances which should be of interest to railway reformers.

6) Association of Train Operating Companies.

7) Useful reviews of the rationales for vertical integration can be found in Perry (1989) and Williamson (1986).

3. Economic Arguments for and against Vertical Integration in the Rail Industry.

Many of the economic arguments relating to the question of vertical integration in the rail industry have perhaps been overly neglected, particularly those concerning the potential benefits of integration. These arguments are considered, with an application to the rail industry of the relevant approaches to vertical integration developed in industrial economics.

3.1. The Arguments for Integration in the Railways

Transaction Costs and the Holdup Problem

From the perspective of transaction cost economics the vertical integration of a production process represents an internalisation of a process that is simply an alternative to contractual exchange between separate firms. Therefore, in considering the merits of vertical integration, transaction cost economics examines the relative costs of contractual versus internal exchange. One of the serious ramifications of transactions costs for the rail industry relates to the so-called "holdup problem" which will briefly be considered.

A bilateral relationship between upstream and downstream firms, such as that between a railway infrastructure provider and a train operator, can be enhanced, and is often dependent upon, investments in assets which are specific to the relationship – those with large sunk costs. This is particularly true of investment in the physical capital of the infrastructure and of the human capital that may be specific to train operations on a certain line or in a certain geographical region.

The existence of such asset-specific investments in a production process of mutual interdependence leads to the possibility of exploitation. The infrastructure provider could raise track access charges substantially or, where there was no immediate possibility of competition to the train operator, the incumbent operator could reduce its payments to the infrastructure provider.

The possibility of this opportunistic behaviour (the extraction of what Klein et al. (1978) term the "appropriable quasi-rents" – the difference between the value of an asset in this use and the value in its next best use) is what has been called the holdup problem (Goldberg, 1976). The effect of this is underinvestment in asset-specific capital resulting in productive

inefficiency with a consequent under-provision of rail capacity and/or increased prices, both producing a reduction in social welfare.

This problem could, theoretically, be solved by the introduction of long-term contracts, with or without regulatory input, to govern the relations between the firms and remove the scope for opportunism after costs had been sunk into an investment. These contracts would have to include features such as price indexing clauses and arbitration provisions though the complexity of the contracts, and therefore the transaction costs involved in their preparation and implementation, would necessarily increase with the degree of asset specificity.

In the UK rail privatization case, with the need for contractual relations between the infrastructure provider and 25 passenger train operators, freight operators and maintenance companies the figure of 75,000 bilateral contracts has been cited. Clearly, this would lead to enormous transaction costs.

Vertical integration of the production process (i.e. integration of infrastructure provision and train operation) would enable the internalisation and the reduction of the transaction costs associated with the need for contractual exchange. Furthermore, vertical integration would also eliminate the possibility of opportunistic behaviour and thus solve the holdup problem, thereby enabling the integrated firm to invest in the optimal levels of physical and human capital so as to maximise productive efficiency and network capacity use, benefiting social welfare.

Capacity Under-Utilization and Overpricing

The vertical separation of infrastructure from the provision of train services can, potentially, adversely affect passengers through a reduction in train services and an increase in prices, and adversely affect social welfare through an under utilization of network capacity. This potential arises because the infrastructure provider and the train operator are both monopolists (at least in the case where operators have exclusive franchising agreements).

The infrastructure provider receives income from the track access charges paid by operators. In the absence of regulation the provider has an incentive, as a monopolist, to maximise this income through a reduction in output (the supply of train paths) and an increase in prices (access charges to train operators).

Implementation of this policy over time would cause the provider to make infrastructure investments sufficient only for the supply of train

paths that maximised its income stream. This reduction in output from the upstream firm with an increase in access charges would translate into increased input costs for train operating companies with a consequent increase in ticket prices and a reduction in the train capacity provided.

Conversely, a vertically integrated railway company, with monopoly status, would be concerned with maximising the net joint income from *both* its upstream and its downstream operations. Consequently, the access charges made to the downstream operator would be lower than in a vertically separated industry and so the operator's output would be higher and the ticket price lower. This result has some similarity with the incentives for backward integration by manufacturers considered by McGee and Bassett (1976) and Perry (1978). For the rail industry Foreman-Peck (1997) gives some examples of the difference in price and output between vertically integrated and vertically separated rail companies facing linear demand curves.

The implication is that vertical separation in the rail industry causes higher prices and reduced service output for passengers, with negative externalities for society as a whole in terms of road congestion and possibly pollution.

These consequences of vertical separation could, of course, be ameliorated through regulation, particularly of access charges, and the imposition of capacity and service requirements. However, this would incur transaction costs and problems of information asymmetry.

Land Use

The rail industry differs from most other industries in that long term changes in land use patterns can significantly affect demand as well as the externalities of congestion and pollution.

This suggests that an integrated company is more likely to be able to promote development that is socially beneficial than vertically separated companies. This is because an integrated company, responsible for both infrastructure investment and train operations, is more likely to undertake investment near its lines that stimulates train usage.

This investment would include facilities to encourage transfers between trains and other modes of transport (e.g. bus terminals and car parking areas), and commercial and leisure developments near stations. Much of this form of investment has been seen through the history of private, but vertically integrated, railways in Japan. Society as a whole gains from reductions in road congestion and potential pollution.

Spillovers and Positive Externalities

In industries where wholesalers or retailers of a product have spatially isolated monopolies, as might be the case of horizontally separated and/or franchised operators of rail services, the structure may act through advertising so as to limit the welfare of consumers. Mathewson and Winter (1984) show that, when sellers must advertise in order to inform consumers about the existence of the product, while an increase in the advertising by one seller will inform more consumers (i.e. passengers) in that firm's market area it will also inform consumers in the market areas of other sellers.

This advertising spillover, though a positive externality for consumers reduces the incentive of individual sellers to advertise, with a detrimental effect on both consumers and the manufacturer of the good. In terms of a vertically separated rail industry, with spatial separation through franchising, this reduction in the incentive to advertise would reduce the total number of passengers on the network and thus reduce the possible income received by the infrastructure provider. Furthermore, this might also detrimentally affect social welfare because potential rail passengers could opt instead to travel by road with possible negative externalities in terms of increased congestion and pollution.

In this situation of spatially distinct train operators a vertically integrated system would be able to internalize the positive externalities, thereby increasing advertising expenditure and rail usage to the benefit of both the vertically integrated company and society as a whole.

Uncertainty and Access to Private Information

Vertical integration can be a mechanism for eliminating the uncertainties that can result from lack of access to information about the activities of firms.

Similarly, vertical integration can enable the employment of monitoring mechanisms that reveals private information about the use of inputs in production processes (Williamson, 1975). The control mechanisms available to a disintegrated firm, namely the use of contracts or market exchanges, are weaker because they are restricted to measurable outputs rather than the inputs themselves. A regulatory agency would also face this problem.

In railway terms, the infrastructure provider in a separated network would be able to exaggerate costs and demand higher access prices from

train operators (or the regulatory authorities) leading to inefficient production and under utilization of the infrastructure. The better access to private information on cost structures which vertical integration could give to train operators should reduce access costs and costs to passengers and cause an increase in capacity utilization with consequent beneficial externalities.

3.2. Criticisms of Vertical Integration in the Rail Industry

The criticisms of vertical integration, as it is applied to the rail industry, are now briefly considered.

Criticisms of the structure of vertical integration in the railways have been heard increasingly in recent years. These principally concern two concepts: the possibility of improving efficiency by the introduction of competition and the opportunity that vertical separation would afford for greater clarity and accountability in the activities of management.

The vertical separation of the operation of train services, which are not necessarily a monopoly, from the fixed infrastructure, which is clearly a natural monopoly because of the enormous sunk costs involved in building a network, has been promoted as a method of facilitating competition in the rail industry among operators. This argument implicitly criticises vertical integration as a structure that prevents competition.

Crucially, therefore, the wisdom of vertical separation in the rail industry in terms of improving efficiency depends upon the extent to which any gains in efficiency derived from competition outweigh the potential advantages of vertical integration described above. The possibilities for the introduction of competition are examined in Section IV where it is indicated that, for practical purposes, the success of vertical separation depends upon the effectiveness of franchising in inducing efficiency improvements.

Vertical separation's other main benefit is better managerial accountability. For governments and any shareholders the principal advantage of this would, perhaps, be the enabling of a clearer identification of where any subsidies are needed in the industry. This has the potential for the elimination of any wasteful cross subsidies in an integrated network and would allow a better discussion in societies of the wisdom of any subsidies a government might make to support individual companies or services.

IV. Competition in the Rail Industry

The options for introducing competition into the rail industry will now be considered. Firstly, the possibilities for contestability and open access, that could in theory be effective with or without vertical integration, are addressed. However, it is thought that, because of the practical difficulties of operating an integrated train service, open access would at most be effective as a minor adjunct to the services of a more substantial company. Given this practical requirement for the integration of train services, two options are then reviewed – franchising, which permits the introduction of an element of competition into the operation of trains on a vertically separated network, and yardstick competition, which is a form of indirect competition between horizontally (i.e. geographically) separated, but themselves vertically integrated, rail companies.

1. Contestability and Open Access

The effectiveness of the concepts of contestability and open access for introducing competition into the rail industry can briefly be addressed.

The concept of open access implies a general right in law for any qualified operator to demand access to a train path⁸⁾ under circumstances in which it may be contrary to the commercial interests of the host railway to sign such an agreement. The theory of contestability postulates that incumbent firms in an industry will be compelled to operate efficiently merely by the potential threat of entry of new firms into the market, presumably through open access.

Developed by Baumol (1982) and in subsequent writings, contestability depends on a number of assumptions. Firstly, that potential entrants have the same information about market conditions and available technologies as incumbent firms. Secondly, that entry is costless and, thirdly, that it is immediate.

While it is conceivable, though highly unlikely, that the first of these conditions could be satisfied and also the second, given the availability of leased rolling stock as in the UK's reforms that remove many of the sunk costs of entry, the third condition is likely to be unfulfilled in the case of the rail industry.

This is simply because the nature of the rail industry requires that a

8) A train path is a timetabled allocation of space in a railway that allows a train to proceed at a particular speed.

timetable for operations must be drawn up well in advance of implementation. Thus, an incumbent rail operator, whether vertically integrated or vertically separated, would necessarily know about the intentions of a prospective entrant and be able to react to these intentions to make the projected entry economically unviable, for example by proposing a directly competing train service itself.

Although contestability is a mechanism that is unlikely to impact upon the rail industry, open access itself has greater potential as a means of introducing competition. Nevertheless, the implementation of open access is far from straightforward.

In its purest form, open access would involve the purchase of train paths by operators in a bidding process. However, a successful bid would influence the availability and value of other train paths and unsuccessful bidders would have to bid for their second and subsequent choice train paths in an iterative process. Even if such a cumbersome bidding process could be completed it would be highly unlikely to produce a network of co-ordinated and integrated services.

Moreover, given the nature of rail travel, poor performance by one operator, such as delays or mechanical failure, would adversely affect the performance of other companies using similar train paths. Elaborate systems of financial compensation would need to be developed but would be extremely costly and time consuming to implement.

Open access also has the potential to affect network integration in a negative manner. This refers to issues such as the difficulty of implementing a national timetable, through-ticketing (on trains of different operators) and the use of rail passes, and the provision of impartial information. Given that rival companies would be operating trains, companies might be unwilling to operate services that would feed passengers into trains operated by rivals. Recent UK experience, though, with different, albeit franchised, operators suggests that these co-ordination difficulties are not necessarily insurmountable.

One reality of any limited scheme is that the right of open access would likely only be exercised in the case of the most profitable services and train paths. This practice, known as "cream-skimming", would necessarily reduce the profitability of any incumbent operators and would probably require increases in public subsidies to the incumbents in order for them to continue providing a full range of services.

These potential difficulties associated with open access indicate that if it is introduced it is only likely to be as an adjunct to the wider operations of a vertically integrated company or to the package of services operated by

a franchisee.

2. Franchising

Franchising in the rail industry is a mechanism for introducing an element of competition in a manner that is consistent with the nature of the rail business, with its need for precise scheduling of trains on a given section of track and for a relatively fixed package of services to meet the demands of various passengers, which produces co-ordination problems with unlimited open access as was shown by the experience in the earliest days of the industry. Franchising enables the introduction of competition into the operation of train services on a vertically separated railway. It is on the effectiveness of franchising in inducing efficiency improvements that the merits of vertical separation in the rail industry must be evaluated.

A brief description of the concept of franchising, with its potential benefits and drawbacks, can now be given.

Franchising was originally proposed as a way to enjoy the benefits of single-firm production without suffering from monopolistic behaviour. It introduces competition – in the form of an auction – with several firms bidding for the right to be the monopoly producer. The concept was originally proposed by Chadwick in 1859 and developed by Demsetz (1968) as an auction in which firms compete *for* the market (or “field” in Chadwick’s terminology) rather than *in* the market.

The application of franchising to the rail industry, as developed by Starkie (1984), is for the franchise to operate a package of train services, with the prices and service levels defined, to be awarded to the highest bidder or, in the case of most UK franchises, the bidder requiring the lowest subsidy. It is believed that this auction process will induce efficiency improvements in the industry because the most efficient prospective operator will make the highest bid, or require the least subsidy. Dnes (1993) examines different bidding processes.

Criticisms of Franchising

The UK experience with franchising to date suggests that franchisees expect to produce considerable improvements in efficiency over British Rail’s performance (Harris and Godward, 1997). Franchising, though, is not without its potential problems and some general criticisms of franchising can be reviewed (based on Domberger, 1985 and Vickers and Yarrow, 1988).

Firstly, through time the franchisees, as incumbent firms, gain information and experience that is not available to outsiders. At the next round of bidding potential challengers, fearing that incumbents will make bids that accurately reflect the costs and revenues of the franchise, will be discouraged from bidding. Any likely challenger will know that too low a bid will be unsuccessful and that too high a bid will face the problem of the "winner's curse" — the franchise will be won but the size of the bid will produce a net loss for the franchisee. Thus competition will be reduced or eliminated as rounds of bidding proceed.

The efficiency of operations can also be affected by the duration of the franchise. A short franchise period will make the operator reluctant to carry out investment necessary to improve efficiency, on the grounds that the expenditure on the investment will not be recovered before the next round of bidding, when the franchise may be lost. Conversely, a long franchise period will remove the imminent threat of the non-renewal of the franchise and the discipline that this would impose on the franchisee to improve performance and maintain good relations with any franchising authority. The degree of monopoly power that a long franchise period would confer on the operator would encourage a tendency to have higher prices and a lower quality of service.

Moreover, incumbent firms will be subject to changes in market conditions and must therefore have some flexibility to alter prices and services, creating difficulties of contract specification (see Williamson, 1976). In turn, this flexibility will require regulation, if monopoly power is not to be exploited. This implies a return to the type of regulated operation that would typically be called for in the case of a vertically integrated railway.

One further difficulty with franchising that is particularly applicable to the rail industry is the sunk costs of human capital. A large company that held a franchise but was faced with its loss could move its personnel experienced in the franchise operation to its other divisions. Given the geographically specific nature of the rail industry, the loss of these staff could seriously affect the operations of the next franchisee. Even the potential for such a transfer of human capital would be likely to discourage any bidders in subsequent rounds of franchise renewal, thereby reducing the scope of a competitive franchise bidding process to induce efficiency improvements.

The existence of a large number of franchisees has been identified as a potential cause of problems with the provision of through-ticketing and the provision of impartial information about rail services (see Travers and

Glaister, 1993). However, UK experience with 25 passenger franchise operators has shown that these criticisms were, perhaps, exaggerated.

3. Horizontal Separation with Yardstick Competition and Competition by Emulation.

Finally, yardstick competition, with competition by emulation — a method for promoting competition while maintaining vertically integrated networks — can be considered.

This method stimulates indirect economic competition between vertically integrated companies that are horizontally separated by geographical region. It has the potential of retaining the benefits of vertical integration, set forth in Section III, while creating efficiency benefits that can be derived from competition.

In examining the issue of indirect competition between horizontally separated networks and its impact on efficiency three points require some analysis: the question of whether there is an optimal size for rail networks; the exact nature of yardstick competition and its potential for application to the rail industry; and the meaning of competition by emulation, which is often (wrongly) described as yardstick competition but which has a surprising potential for producing improvements in performance in its own right.

Network Size

The question of the optimal size of rail networks is clearly important in an examination of the promotion of competition by horizontal separation because this separation itself requires the creation of regional networks that are necessarily smaller than a national network. If it were found that the larger the network, the more efficient it would be (i.e. that rail networks exhibit increasing economies of scale) then horizontal separation would clearly act to reduce efficiency.

This area was addressed by Shires et al. (1994) who survey a number of studies of the efficiency of railways conducted in a variety of countries. A comparison of the results of these surveys reveals that rail networks exhibit constant returns to the scale of rail services, though showing, as might be expected, increasing returns to density (the train kilometres operated on a certain length of track infrastructure). The conclusion is that "horizontal separation will not reduce a rail operator's ability to produce at minimum cost. In other words that rail operations exhibit

constant average costs." (Shires et al., 1994 p.35).

Preston (1994) found in his study of 15 western European railways that the smallest operators displayed increasing returns to scale. This suggests that there may be a minimum optimal size for rail networks but, provided that network size is not reduced below this minimum, the creation of vertically integrated regional networks will not adversely affect productive efficiency.

The establishment of horizontally separated networks enables the promotion of indirect competition between them by two possible mechanisms: yardstick competition and competition by emulation. The distinction between these is not always appreciated and so it is useful to consider them in turn.

Yardstick Competition

Yardstick competition is a method of regulating several regional monopolies to promote competition through the regulatory mechanism. In the case of the rail industry, while regional networks would not have substantial market power because of competition from other modes of transportation, it is likely that regulation would be important, if only because a degree of monopoly exists in the markets within and between conurbations.

Regulators face the problem of a lack of information about the operations of the companies to be regulated. Yardstick competition allows the regulators to overcome this information asymmetry somewhat by making the price that a firm is permitted to charge conditional not only upon that firm's observed costs but also on the observed costs of other firms. This gives each firm an incentive to "compete" against other firms by making efforts to reduce its own costs, thereby generating higher profits if other firms do not reduce their costs, and makes regulators less dependent upon the private information about firms' cost structures. In this manner regulation by yardstick competition can drive efficiency improvements in train operators.

The mechanism of yardstick competition was included in Littlechild's (1986) recommendations for the UK water industry. Okano (1989)⁹⁾ shows its application to rail reform in Japan where the reformed structure of the passenger rail industry, having six horizontally separated

9) Examined in Parry (1993).

companies, particularly lends itself to this form of regulation. As Shleifer (1985) indicates, however, the effectiveness of yardstick competition as a form of regulation increases with the degree of correlation in the cost conditions of the firms involved. The greater the similarity in the structure and market conditions of the separate networks, the more that yardstick competition, regulating price based on the costs of other firms, can be employed to induce competition.

Competition by Emulation

Finally, a brief consideration can be made of the concept of competition by emulation. This is the competition which is stimulated by the desire of the management and workforce of horizontally separated companies to equal or outdo the performance of other, similar companies.

It is, perhaps, difficult to explain this phenomenon in terms of rational economic behaviour. Indeed, it bears more resemblance to a Hegelian desire for public recognition or acclamation. Nevertheless, it has certainly been effective in inducing an improved quality of service.

Companies as diverse as those in the reformed Japanese rail industry (Parry, 1994) and the deregulated British bus industry report the influence of the desire to exceed the performance of geographically separated "rival" companies on improvements in visible areas such as the attitude of employees to customers and the introduction of new models of rolling stock and vehicles.

Horizontal separation thus has the potential in a number of ways for improving performance and efficiency in the rail industry.

V. Conclusion

This paper has addressed some of the options for the reform of the rail industry. In many network-based industries, where the network itself is a natural monopoly, competition has been introduced by the vertical separation of the network infrastructure from the "downstream" distribution function.

However, the unique nature of the rail industry means that vertical integration can be beneficial in terms of economic efficiency while vertical separation, though not without potential benefits, can itself cause inefficiency and loss of social welfare. If it is felt desirable to introduce competition with vertical separation, then competition through franchising is the best option for governments and policy-makers. Conversely, if the

retention of a vertically integrated network is felt to be desirable, then the preferred option is the introduction of competitive pressure by means of horizontal separation and yardstick competition.

Some of these options have been introduced in a number of countries and others are likely to follow. It is expected that an examination of these experiences, and the practical advantages and difficulties of various options for reform that they reveal, will be beneficial to policy-makers and also assist in a deepening of the understanding of the economic nature of the rail industry.

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