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The Motivations of a Debate

Edoardo Marcucci

Railway policy is a controversial or, shall we say, is still a controversial issue. In fact, it has been, is, and probably will continue to be a highly debated question for various reasons, the most important of which are the:

1. relevant social impact railway policy has on people's everyday lives, on the social welfare of millions of passengers/citizens and on the competitiveness of companies using the railway system to move their inputs and outputs;
2. substantial financial repercussions transport subsidies have on the public purse;
3. considerable consequences transport policies have on the environment;
4. socially controversial and politically sensitive issue of employment, retribution and unionisation in the sector.

Given its well known structural characteristics (high irreversible capital investment, dedicated labour supply, costly technical innovation, high coordination requirements among the various activities at all levels, etc.) the railway sector is not naturally prone to accommodating rapid and low cost modifications of adopted working procedures and regulatory regime under which it operates.

In other words one should never expect rapid structural (technological, organisational, regulatory, etc.) changes in this industry.

Restructuring a declining industry

The structural reform effort promoted and sustained at the European level and, with varying degrees of enthusiasm and perseverance, endorsed at the national level is a product of the progressive worsening of the structural and financial conditions of the sector. In fact, given that in 1970 within the fifteen member states the railway system moved 32% of the total freight transported while in 1994 the percentage was below 15% and, for passengers in the same period the percentage fell from 10.3% in 1970 to 6.2% in 1994, the Community assumed that structural changes had to be implemented to stop and reverse this trend.

The railway sector crisis may be analysed and considered under various points of view. Among the most relevant one should consider:

1) it is a structural crisis of the whole sector that is linked to the intrinsic characteristics of the railway system. In fact, structural changes in the economy attributable to the transformation produced by the increasing relevance of information and communication technologies produced a substantial change in the evaluation of transport attributes. The increase in demand, both for passenger and freight, progressively and steadily shifts towards other competing modes in general, and to road in particular;

2) the monopolistic organisation of the market seems to contrast with the diversification of services required by the market as well as with the re-organisation and harmonisation that has begun in all public utilities at the European level;

3) the positive results in terms of increased competition, reduced costs and increase in demand brought about by combined liberalisation and deregulation in air transport seem impossible in the railway sector exactly because of its staunch monopolistic characteristics. The most evident effect of a full fledged vertical separation (as in the British case), is the substantial increase in demand;

4) the Italian situation presents some peculiarities with respect to other European cases since the low tariff level is not merely attributable to market decisions but rather to welfare considerations. However, the logic adopted, and the absence of an even minimally business oriented attitude, coupled with a public monopoly structure has induced a swell up of production costs led by labour costs.

Great attention to market demand appears necessary if a truly structural re-organisation is desired. A precondition to pursuing this objective was the provision of better quality services, that is, increasing commercial speed, flexibility, and reliability while, at the same time, reducing costs. The all-purpose instrument to be adopted is competition. The deplorable situation characterising the railway sector can be *de facto* attributed to the unsuitable market and institutional structure. In fact, until the early '90s the all-encompassing characteristic of the various European railways was its management by public monopolists of a vertically integrated sector.

The role of independent research

One should never underestimate the force of research in shaping policy. In fact, it is this belief that allows independent and high quality research the possibility of influencing and redirecting policy by: evidencing specific technical problems, suggesting possible solutions, independently analysing strategic interactions among the various actors directly involved in the process of defining objectives, strategies for acheiving them, and assessing the results. This independent form of judgement characterising academic research is always desirable and it is particularly valuable in a sector such

as rail, where regulatory capture is highly likely.
Independent economic analysis can work for the "public good" because it contributes to the knowledge and understanding of those issues that need to be debated and discussed in a process of transition from one market structure and organisation to another - such as, for example, transaction costs, infrastructure charging, strategic institutional analysis, etc. Dodgson, in a recent issue of the Journal of Transport Economics and Policy[1] dedicated to the railway sector, enumerates several important issues where economic analysis can contribute. They are: cost productivity measurement, demand modelling, pricing final and intermediate products, optimal industry structures, competition policy issues, franchising/auctioning, asset valuation, and investment appraisal. All of the above mentioned issues are important areas where economic analysis might have something to say and could usefully be taken as a benchmark for defining a well accomplished editing work. In our case the scope is different. In its theoretical aspects the present work is less comprehensive, even if the analyses proposed on specific issues are detailed and up to date. In its practical and institutional aspects, however, it is wide ranging and differentiated.

The conceptual structure of the issue
The main theoretical questions considered are:
1. *The relevance and calculation of transaction costs in defining the desirability of a vertically separated industry structure*. Preston in his article uses transaction cost economics to estimate the reciprocal advantages and disadvantages of vertical separation between railway infrastructure and operations. In fact, if on the advantage side one finds greater specialisation and scope for competition among operators, capital costs transparency, and clear path allocation procedures, on the disadvantage side one can see abuse of monopoly power at the strategic, tactical, and operational levels. The trade off investigated concerns production and governance costs; given the highly dedicated nature of the most relevant types of investments, a certain degree of vertical integration is considered desirable.
2. *The setting of rail infrastructure charges is not only difficult and controversial but also relevant in terms of the pursuit of different, and some times contrasting, objectives that the decision makers have in mind*. Nash and Matthews tackle this important question, confronting the pros and cons of the two polar approaches to infrastructure charging. In fact, whereas short-run social cost maximises infrastructure use, it does not recover total cost, thus opening up a financing issue. The use of efficient mark-ups and two-part tariffs are commonly suggested for striking a balance between the two contrasting objectives of infrastructure use maximisation and total cost recovery. The cost of the compromise is paid in terms of potential distortions to competition between train operators. The authors conclude that the most relevant issue to be investigated in order to achieve marginal social cost pricing for rail infrastructure is connected to the desire for rail infrastructure managers to cover their total cost from charges. This will in turn provoke the need for two-part tariffs or for tariffs differentiated according to willingness to pay.
3. *The presence of an institutional and regulatory environment conductive to a well behaved incentive structure for the various operators*. In this respect: Ponti, Erba and Marcucci analyse, from different although co-ordinated perspectives, the present situation in Italy. Venezia researches the strategic implications of transfer pricing in a partially regulated monopolistic environment, and Polidori describes and analyses the role and perspectives that a Rail Transport Authority might have. In more detail, Ponti and Erba, adopting a public choice approach, analise the European railway policy so far produced by the Commission and evidence the role that cross subsidisation might play in a monopolistic context. The unfulfilled expectations are explained as a special capture case arising from cross subsidisation as one of the biggest problems of public governance in a still monopolistic environment. On the closely related issue of transfer pricing, Venezia describes the analogies and dissimilarities between multinational corporate companies and multidivisional monopolistic companies. The strategic implications and possible solutions to the predatory use of transfer pricing are analysed with respect to the Italian case. Marcucci, in analysing the most recent institutional and legislative evolutions in the Italian railway sector, discusses their likely effects on the regulatory framework. The Author proposes an evaluation of the coherence between the instruments adopted, the institutional framework within which the reform process is taking place, and the widely advertised objectives pursued not only at the national but also at the European level. Special attention is paid to regulatory capture since it plays a fundamental strategic role in determining the possible outcomes of the reform process. The main conclusions relate to the need of further regulatory institutions, such as an Agency or an Authority and the consistent risk of regulatory capture and slackening of competitive incentives given the pre-competitive constraints new entrants have to face in the present institutional and regulatory scenario. Polidori, with

reference to the Commission's action programme, discusses some critical points concerning the institution of a European Railway Agency with the aim of clarifying what role such an Agency might have in terms of creating a European regulatory Authority. In fact, independently of the method adopted to promote competition, there will always be a strong need for a regulatory Authority in order to promote the Commission's free competition policy. An Authority is usually needed when the restructuring process of a former vertically integrated industry is carried out via a separation approach. Such an organisation, in order to respect its mandate, has to at least have access to a critical mass of information, dispose of competent and highly skilled staff, and be endowed with inquiry and sanctionatory powers. In fact, the above mentioned characteristics represent only the minimum requirement since, as experience attests, in order to be truly effective, antitrust action requires clear rules for courts concerning the use of technical information and evidence.

4. *The analysis of the possible market evolutions in the railway sector at the European level given the present regulatory framework*. Forte and Del Vecchio try to envisage the likely scenarios that might materialise in the railway sector. The Authors suggest that after an initial shock that might provoke an increase in the number of train operating companies, one should expect a consolidation in the ensuing phase giving rise to a re-verticalisation process. The efficiency and regulatory problems might be reduced by individuating dedicated transport lines (passenger and freight) as in the case of Australia and New Zealand.

5. *Concerning the issue of risk perception in a deregulated railway market, Nuti discusses the role that risk assessment and perception plays in deciding which mode of transportation people choose*. The question is not only discussed in terms of train safety assessment *per se* but also comparatively, that is in terms of rail safety versus other modes of transport. Risk and safety perception are not only at the base of the estimation of the consumer's willingness to pay but also play a role in terms of redirecting resources from other modes towards the railways. These two elements are not univocally influenced by a vertical separation process that increases the number of independent actors interacting with one another, thus diffusing the governance of the system and potentially rendering each single actor less responsible towards the end user. The whole problem is augmented when considering that people sometimes perceive risk very differently from a statistically rational point of view, giving rise to dilemmas in risk regulation.

From an empirical and practical point of view, the main issues considered are:

1. *Privatisation of national railways and vertical separation in metro systems are analysed by White and Ball*. Following previous work on the net financial impacts of rail privatisation in England, they examine the outcomes of the first five full years of franchised operation which have disclosed much more information on trends in ridership and financial performance. Great attention is paid to separating the external effects influencing industry performance from those only ascribable to privatisation and vertical separation. Furthermore, the effects of privatisation and deregulation are also kept separate in order to assess the effective impact of each single phenomenon. In order to perform this social cost benefit accounting it is important that a comprehensive inventory of assets is created when either ownership and/or responsibility for infrastructure is transferred to the private sector. There also has to be a clearly defined interface between train operators and the infrastructure needs as well as between infrastructure providers and subcontractors to clarify responsibility in the event of safety issues and delays effecting final users. Carlucci in his contribution provides a *continental* view of the privatisation and vertical separation process taking place in the UK. Departing from a theoretical reconstruction of the motivations and theoretical underpinnings of the various forms of intervention that have been adopted throughout the world, Carlucci concentrates on the events that have characterised the vertical separation process in the UK. The main conclusion is that the railway sector cannot do without some sort of public intervention. The case of Railtrack testifies that an infrastructure–funding scheme relying exclusively on the private sector cannot stand the market test. Furthermore, in line with what Preston has clearly suggested in his paper, Carlucci underlines the potential detrimental effects that ensue from a privatised and vertically separated railway sector, thus suggesting the need for a certain level of vertical integration, on one side, and for a cautious approach for Italy, on the other.

2. *Cowie concentrates on production economics in passenger service provision, as organised in the British case, where infrastructure is separated from operations*. The interesting result is that the size of train operating companies is important and all the Train Operating Companies (TOCs) are operating below the minimum efficient scale. In another context it is therefore important to consider carefully the maximum number of TOCs allowed to operate on the network. As in the British case, Cowie suggests that it would be interesting

to consider possible productivity gains via acquisition to increase firm size.

3. *From different points of view, Shoji and Killeen, Musso and Ferrari, and Torbianelli all treat the issue of vertical separation on local and regional transportation, providing a cross-related perspective on the issue*. Concentrating on the Japanese experience, Shoji and Killeen evidence that, notwithstanding the highly concentrated market typical of Japan, train operating companies are profitable also in less populated areas. The two most important points suggested by the Authors to explain the specific characteristics of the regional railways in Japan are: a) railway companies are private and behave commercially, deciding both the level and type of service offered, and b) have substantially differentiated their businesses in harmony with trackside communities prompting systematic regional development due to thier long-term commitment. Musso and Ferrari analyse the implications that vertical separation might have for regional transportation in the Italian case. Departing from an institutional and quantitative description of the present situation in Italy, Musso and Ferrari describe both the potential opportunities and the risks involved with the specific process of adopted vertical separation. Among the most important aspects to be clarified and further researched, the authors note the following: a) poorly defined roles among the different actors producing either conflict or collusion; b) absence of pro-competitive actions, and c) scarce planning capacities associated with an insufficient financial and taxation capacity for the regions.

4. *Maggi and Giuntini provide an historical perspective of the privatisation and deregulation process that characterise Italy in this specific period*. Describing the social, economic, and political scenario in which the then private railway companies were brought in the public realm, the paper provides a logical benchmark against which to evaluate some of the considerations that are now spurring ahead the privatisation and deregulation progress. The contrast between the reasoning that induced the nationalisation of the service then and the opposite view now pushing for privatisation and vertical separation is self evident. The most important result of this paper is the stimulation of critical reasoning on both the justifications proposed to support nationalisation as well as those suggested in support of vertical separation and privatisation.

[1] Journal of Transport Economics and Policy, vol. 33, part 1, January, 1999.

The Transaction Cost Economics of Railways

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1. Introduction

The debate concerning the vertical structure of the railways is almost as old as the railways themselves (see, for example, Lardner, 1855). In this paper, we attempt to review the arguments by utilising some elements of transaction cost economics. The appropriate theory is briefly reviewed below. In section 2, some of the advantages of vertical separation will be outlined. In section 3, some of the disadvantages will be reviewed. In section 4, some suggested solutions are examined. In section 5, some limited empirical evidence will be assessed. Finally, in section 6 some conclusions are drawn.

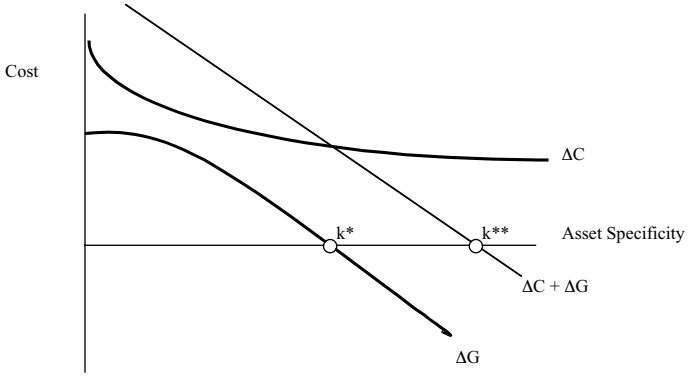
In this paper we will concentrate on the British configuration of both privatised train operating companies (TOCs) and a privatised infrastructure authority (Railtrack), whilst acknowledging that at least three other configurations are possible - see Figure 1. In particular, Sweden, where both operations and infrastructure are, in the main, publicly owned will act as a useful counterpoint.

		Infrastructure	
		Public	Private
Operations	Public	Sweden (Banverket/SJ)	North America (Amtrak, Via Rail)
	Private	New Zealand Latin America	GB (Railtrack, TOCs)

Source: Brooks, M., and K., Button, (1995), Separating Transport Track from Operations: a typology of international experience , *International Journal of Transport Economics* , Vol. 22, n¡ 3, pp. 235-260.

Figure 1: Taxonomy of Vertical Separation in Railways

Perhaps the most appropriate theoretical tool for examining vertical integration is that of transaction cost economics, which is associated with Oliver Williamson[1]. Williamson sees a key trade off being between contractual market governance (which implies vertical separation) and bureaucratic internal governance (which implies vertical integration). Given economies of scale and scope, it is argued that the production costs of market governance (MC(k)) will always be lower than the production costs of bureaucratic governance (BC(k)), for any degree of asset specificity k. In other words, if we define ΔC as BC(k) - MC(k) we might expect this to be positive but declining with asset specificity because the potential for scale economies across firms is reduced as assets become more specific. This is illustrated by Figure 2. By contrast, we might expect governance costs to be lower under market governance than under bureaucratic governance where asset specificity is low – which we might write as BG(k)>MG(k). By contrast, where asset specificity is high we might expect market governance costs to be higher than bureaucratic governance costs – MG(k)>BG(k). If we denote ΔG as BG(k) - MG(k) we might postulate that this too declines with asset specificity, but switches from being positive to being negative at point k*. However, if we vertically sum ΔC + ΔG we see that the crossover point is k**. To the left of this point, market governance will be most cost effective. To the right, bureaucratic governance will be most cost effective. The question then becomes where might railways be located on this Figure. In the case of railways in Britain, where there has been a switch from vertical (and horizontal) integration to vertical (and horizontal) separation, the resultant changes in costs may provide an important indicator of asset specificity, if the analysis underpinning Figure 2 is correct.



Source: Williamson, O., (1985), *The Economic Institutions of Capitalism,* The Free Press, New York. Figure 4-2, p. 93.

Figure 2: Comparative Production and Governance Costs

Asset specificity may include site specificity, physical asset specificity, human asset specificity and dedicated assets. The latter occurs where a discrete investment in generalised production capacity would not occur but for the prospect of selling a significant amount to a particular customer. This may be a realistic scenario for rail infrastructure whilst it should also be clear that much rail infrastructure is site specific and many physical and human assets are specific to the railways. Asset specificity is particularly important when transactions are recurrent. Table 1 suggests that the rail industry may well be thought of as one in which there is site specific transfer of intermediate product across successive stages and hence unified governance (i.e. vertical integration) might be preferred but this would need to be validated by detailed case studies. Unfortunately what empirical evidence there is on transactions costs tends to be concentrated on traditional manufacturing industries[2].

2. Advantages of Vertical Separation

The first advantage of vertical separation, at least in the British context, was not economic but political in that it permitted privatisation. It has become clear that a policy priority of the 1992 to 1997 Conservative Government was to privatise the railways quickly and in a manner that could not easily be overturned by subsequent Governments[3]. The way

		Investment Characteristics		
		Nonspecific	Mixed	Idiosyncratic
Frequency	Occasional	Purchasing Standard Equipment - Market Governance	Purchasing Customised Equipment — Trilateral Governance	Constructing a Plant — Trilateral or Unified Governance
	Recurrent	Purchasing Standard Material — Market Governance	Purchasing Customised Material — Bilateral Governance	Site specific Transfer of Intermediate Product across Successive stages — Unified Governance

Based on Williamson, O., (1985), *The Economic Institutions of Capitalism,* The Free Press, New York. Figures 3-1 and 3-2.

Table 1: Illustrative Transactions and Efficient Governance

this was done was to split British Rail into some 100 different companies. Subsidy would be directed to the 25 passenger Train Operating Companies (TOCs) but the remaining businesses would be fully commercial so that they could be privatised by direct sale or, in the case of Railtrack, by flotation. By restructuring the railways in this way the Government raised some £4.4 billion in privatisation proceeds, with the process completed by the May election of 1997[4].

The railways could have been privatised in a different manner. If Railtrack was directed to base its access fees on short run marginal cost and received the appropriate subsidy from Government to do so, it is likely that many of the 25 TOCs would be profitable and could therefore be privatised. However, this would take a prolonged period of shadow running to establish revenue and hence profit flows, which in any event, would be difficult to forecast far into the future. There also would be the possibility of a large residual part of the railway remaining in public ownership, providing a base for any subsequent re-nationalisation. With hindsight, it is easy to see why the Conservative Government acted in the way it did[5].

The second advantage of vertical separation is that it puts the railways on a similar organisational setting as the rest of the transport sector. The air, road and sea sectors are, in the main, vertically separated. By separating infrastructure from operations, one could permit different operators to compete against each other on a third party's tracks just as buses, coaches and lorries compete with each other on the road. Such an analysis fails to recognise the greater degree of asset specificity in the rail sector than in the road sector. In any event, substantial on-track competition has not been permitted in Britain. The Office of the Rail Regulator moderated competition so that in Stage I, which remained in force up to October 1998, new open access competition was limited to flows that accounted for less than 0.2% of a TOC's revenues. In Stage II, which in practice was not introduced until the 1999/00 winter timetable, open access competition was permitted on up to 20% (by revenue) of a TOC's flows registered for protection with the Rail Regulator and on all non-protected flows. Stage II is due to come to an end on 31 March 2002 but in a statement issued in April 2001 the Rail Regulator envisaged an Interim Period in which the Stage II arrangements remained in force except where benefits to the public were deemed sufficient to outweigh the legitimate interests of the incumbent. Although there have been some interesting developments such as the Hull Trains services, competition has largely been limited to routes where there was historic competition between BR profit centres. The renaissance of the rail system based on open access competition as envisaged by Gylie[6], Starkie, (1986) and Irvine[7] (although only the latter envisaged privatisation of the track authority) was not allowed to happen. In part this was because such competition would have had a negative impact on the franchising process, leading to politically unacceptable delays in letting contracts. However, we have noted elsewhere that even if competition were permitted it could well be wasteful. Simulation work we have undertaken in Great Britain suggested that, with infrastructure charges based on full cost recovery, the most likely form of competition would be cream skimming on the main inter city routes[8]. Similar work we have recently undertaken in Sweden suggests that where infrastructure charges are based on short run marginal costs, head-on service and fare competition becomes feasible, but tends to result in more service than is socially optimal[9].

The third advantage of vertical separation is that it allows specialisation which may assist in minimising production and governance costs. In retrospect, these arguments appear most relevant to operations. For example, if the industry had remained vertically integrated it is possible that there would have been less involvement in the industry by bus operators who appear to have been successful in controlling train operating costs and increasing revenue. Similarly, one would have thought that an organisation focused on the provision of rail infrastructure would rapidly develop a body of specialist expertise. In the case of Railtrack, that does not seem to have been the case, possibly due to an over reliance on contracting out.

The fourth advantage of vertical separation is that it facilitates the greater transparency of the capital costs of infrastructure and path allocation procedures. Market governance would then be able to drive cost down to efficient levels. A number of practical issues arise here. The first is how to estimate the capital costs of rail infrastructure. Rather than use historic cost or replacement cost methods (or capital expenditure as a proxy), modern equivalent asset valuation was used to determine an initial valuation of Railtrack's assets. This approach estimated replacement costs taking into account the latest and most cost-effective technical possibilities, economies from reconfiguration and spare capacity. However, this required detailed knowledge of future operational requirements; knowledge which was not possessed by Railtrack or its accountants. The subsequent growth in passenger and freight traffic (passenger kms up 29%, freight tonne kms up 43% between 1993/4 and 2001/02 (see table 2) was not predicted. Nonetheless, using this approach Railtrack's assets were valued at £6.5 billion, although Railtrack argued that £3 billion was more realistic. In the event, the market valuation of the company at flotation in 1996 was £1.9 billion. In March 2002, these assets were revalued at £500 million.

	93/4	94/5	95/6	96/7	97/8	98/9	99/00	00/01	01/02	Change 93/4 – 01/02
Passenger Kms (billion)	30.4	28.7	30.0	32.1	34.7	36.3	38.5	38.2	39.1	+29%
Freight Kms (billion)	13.8	13.0	13.3	15.1	16.9	17.3	18.2	18.1	19.7	+43%
Train Kms (million)[1]	350.2	340.2	353.5	360.0	376.3	405.1	418.4	427.2	435.9	+24%

Source: Strategic Rail Authority, (2002), "National Rail Trends 4. 2001-02". SRA, London.
[1] Before 1997/8 train kms from Preston and Root (1999).

Table 2: Trends in Passenger and Freight Transport by Rail in Britain 1993/4 –2001/2

A second issue relates to determining the appropriate rate of return for rail infrastructure capital. Initially a rate of return of 5.1% was set for Railtrack, increasing to 8% over four years[10]. This was despite evidence that average private sector rates of return in the UK between 1972 and 1992 were 6.6%. The Railtrack charges for rail services in 1994/5 were £2146 million[11], compared to £1760 million in 1993/4[12] – a nominal increase of 22%. Subsequently the Rail Regulator required these charges to be reduced by 8% immediately, followed by a 2% per annum reduction up to the year 2000[13]. This was equivalent to a 17% reduction over the Control Period – returning access charges to broadly their 1993/4 levels. For Control Period 2 (2001-2006), a base level increase in franchised track access charges of 2.5% was proposed in 2001/2[14] based on a 7.5% return on the regulatory asset base. The Regulator also proposed that usage charges should be based on assumed levels of efficiency gains over the next control period. This was estimated to be equivalent to a 4.2% reduction per annum in controllable costs or a 10% reduction in total costs over Control Period 2. However, following consultation, the present value of Railtrack's revenue requirements was increased by a further 7% (following on from a 40% increase in the draft conclusions covered mainly by grants from the SRA), based on a rate of return of 8% and efficiency gains of 3.1% per annum. Base track access charges would reduce by 11.2% in 2001/2 but then increase year on year by RPI+5% so that they would be 6.5% higher in 2005/6 than in 2000/1[15]. The figure are complex but suggest that total track access charges in Control Period 1 were an average of 10% higher than under the previous regime, rising to around 40% in Control Period 2. With respect to Figure 2, this seems to confirm our suspicion that rail infrastructure in Britain is located somewhere to the right of point k**.

A third issue is the determination of efficient cost levels for rail infrastructure. This is very difficult, with the main approach applied to date that of international benchmarking. For example, NERA[16] compares Railtrack's ways and structure costs with those of railways in Australia, Canada, Japan, Sweden and the United States. However, the railways in Australia and North America are predominantly long haul freight railroads, whilst the railways in Japan are predominantly high frequency passenger railroads. Only in Sweden is there a mix of passenger and freight operations as in Britain, although even here freight operators are much more important in Sweden than in Britain. Moreover, up until 1995 capital expenditure by the Swedish track authority (Banverket) was depreciated in the year of purchase. Depreciation charges only refer to assets purchased since 1996, and as a result capital expenditure is used as a proxy for depreciation. From Table 3, it can be seen that Railtrack and Banverket's costs are broadly similar. Banverket's costs per track mile are 4% higher than those of Railtrack. However, Railtrack's costs per train mile are 18% higher than those of Banverket, whilst Railtrack's costs per traffic unit (passenger mile or freight gross ton mile) are 55% higher.

	W&S Cost £ m	Cost per Route Mile (£)	Cost per Track Mile (£)	Cost per Train Mile (£)	Cost per Traffic Unit (£)
Railtrack	2290	217447	107991	7.95	0.051
Banverket	874	128733	112735	6.71	0.033

Derived from, National Economic Research Associates, (NERA), (2000), *Review of Overseas Railway Efficiency*, report for the Office of the Rail Regulator, NERA, London. See text for details.

Table 3: Comparison of Railtrack and Banverket's Ways and Structures (W & S) Costs – 1998

The above suggest that determining actual and optimal costs of rail infrastructure is difficult. Nontheless, the trade press in Britain has highlighted a number of cases in which there have been substantial cost increases. For example, the costs of the West Coach Mainline upgrade have increased from £2.2 billion in 1997, to £5.8 billion in 1999 (but with an upgraded specification), to an estimated £7.5 billion (Rail, 422, November 2001, pp 4-5). Industry analyst Roger Ford believes that costs for upgrades and modernisation projects have increased by 150% and for maintenance costs have increased by 50% compared to British Rail (Modern Railways, 638, November 2001, page 18). The root causes are that '*possessions are limited, contractors are wading through contractual treacle, track safety…is more stringently monitored and so on*'. In other words, the governance costs in a vertically separated railway appear excessive. We shall return to this issue in section 5.

Critics point to the success of Northern Ireland Railways, a vertically integrated operator, in reinstating the Bleach Green-Antrim route on time and on budget at a cost of around £0.7m per km[17]. However, it should be noted that this is a single line with two passing loops and a maximum speed of 90 mph. By contrast, a recent study has suggested that in Great Britain, the average price for upgrading a line to high speed running might be £3.4m per km, whilst the cost of a new high speed line might be £7m per km[18]. Box[19] estimated that a km of new double track in 1991 cost £4m per km under British Rail at 1999/00 prices, with the corresponding price for track upgrading of around £0.8m per km.

These cost increases were exacerbated by Railtrack's status as a commercial enterprise. Therefore prices are set on the basis of full cost recovery. This resulted in a charge of around £6 per train kilometre at the beginning of Control Period 1, declining to around £5 per train kilometre towards the end of Control Period 1[20]. For a natural monopoly, with declining average costs, it is well known that average cost pricing will lead to a deadweight loss. The magnitude of this loss might be gauged from the fact that in Sweden, where infrastructure

access prices are based on short run marginal cost, charges are only around 65 pence per train kilometre. These deadweight losses might be mitigated by Ramsey pricing or multi-part tariffs but are likely to remain substantial.

Sweden	1990	0.882	Great Britain	1994/5	6.032
	2000	0.646		1999/2000	5.039

Sources: Nash, C.A., (1997), The Separation of Operations from Infrastructure in the Provision of Railway Services — The British Experience , ECMT Round Table 103. OECD, Paris.Prognos, A.G., 2000. Assumes increases in RPI 1990/91 to 1999/2000 is 27.8%
(http://www.netaccountants.com/rpi.html).Assumes that € 1 = £0.646 October 1999 (http://www.ecb.int/pub/pdf/mb199912en.pdf).

Table 4: Swedish and British Rail Infrastructure Charges Compared (1999/2000 prices £ per train km)

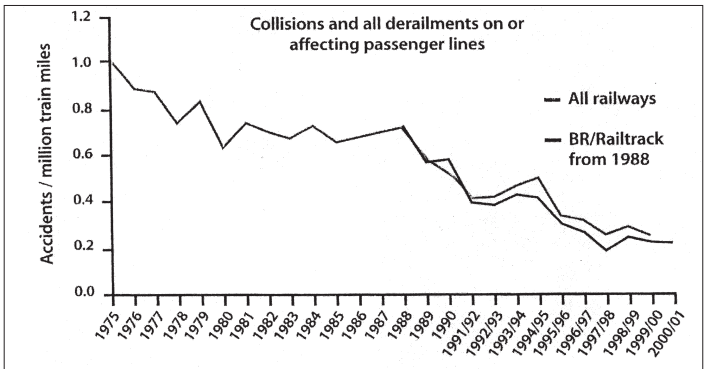
It should also be noted that from Box[21] it can be estimated that infrastructure costs under the old British Rail regime (1991) were around £4.96 per train km (at 1999/2000 prices). This again suggests a cost increase on separation of around 20% and re-inforces the view that the main up-shot of greater cost transparency is the realisation of just how expensive rail infrastructure is. This results in total operating costs per train km in Great Britain in 2000 of around £12 per train km[22]. Box (1992) estimated the corresponding operating cost per train km under British Rail was around £10 per km at 1999/00 prices. Most of this cost increase can be attributed to higher infrastructure and rolling stock costs. Recent work we have undertaken in Sweden suggests total costs per train km of between around £3 to £7 per train km, depending on train type[23].

3. Disadvantages of Vertical Separation

Preston[24] identifies, three broad types of problem connected, with vertical separation, relating to strategic, tactical and operational functions. These will be discussed in turn. It will become apparent that many of these priorities relate to the trade-off between governance and production costs.

3.1 Strategic Functions

One of the areas that critics of the reform process highlighted was safety. Commentators with practical experience, both in the UK[25] and abroad, particularly Japan[26], questioned whether safety standards could be maintained with a fragmented railway. However, the trends in train accident rates and rail fatalities (see figure 3) suggest that past trends towards improvements have continued. There have been a number of high profile fatal rail accidents (Southall (1997), Ladbroke Grove (1999), Hatfield (2000) and Potter's Bar (2002)) where some have argued that the way the rail industry has been reformed was a factor. Initial criticisms of the Health and Safety Executive (HSE) and Railtrack were that they were bureaucratic, slow and costly[27]. Transaction cost economics might suggest that the governance structures were inappropriate. Subsequently, Railtrack has been stripped of some of its safety functions, with further recommendations that HSE takes on responsibility for assessing as well as approving train operators' safety cases and sets up a rail accident investigation branch, whilst the industry as a whole takes responibility for safety standards[28]. The implications in terms of transaction cost economics do not seem to have been considered in any detail.



Source: Railway Safety, Annual Safety Performance Report 2000/01 (compiled from HMRI figures)

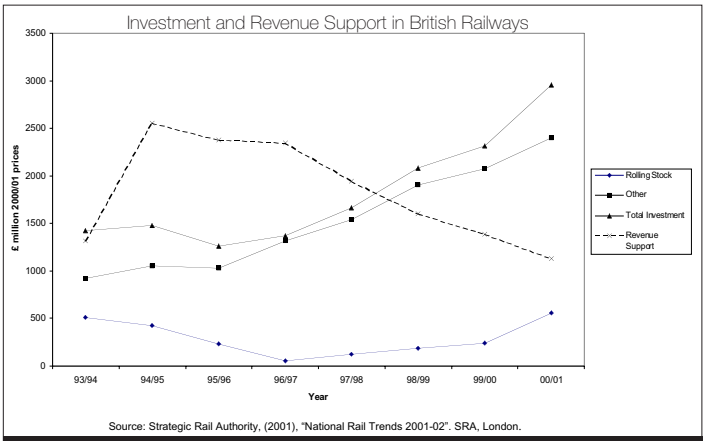
Figure 3: Significant train accident rates (from 1975)

Another area of strategic concern is that of investment. An unregulated natural monopolist will under-invest. This will be exacerbated for intermediate goods in which there is only one consumer, which is often the case for rail infrastructure. The resultant bilateral monopoly in a vertically separated regime will lead to double marginalisation[29]. Such problems can be overcome by regulation although it is possible that price cap regulation can be equivalent to rate of return regulation with a lag, leading to the Averch-Johnson effect of overcapitalisation (and hence over-investment). However, Helm and Thompson[30] argue that where industries have sunk costs, price cap regulation is likely to lead to under-investment. The reasoning is as follows. Suppose Railtrack makes a capital investment so as to reduce costs. The Regulator knows that this investment is sunk and cannot be reversed. In determining the X element in an RPI-X pricing formula, the Regulator will only take into account future cost reductions and not past investments. Railtrack, realising this, will avoid sunk cost investments unless there are large revenue gains (e.g. station redevelopments). The unambitious nature of many of Railtrack's Network Management Statements may reflect this. The incentive to under-invest (and the welfare implications thereof) is likely to be particularly acute in price inelastic markets, such as the London commuting market. This might partly explain why progress on Thameslink 2000 (sic) and Paddington-Liverpool Street Crossrail has been particularly slow.

There are further problems regarding information asymmetries. Only Railtrack knows its true capital costs and can therefore enjoy an information rent[31]. However, only the TOCs know the magnitude of train operating cost savings and revenue growth as a result of capital projects, despite Railtrack's attempts to model demand using programs such as SCORES or RIFF. There may be scope for TOCs to overstate cost savings/revenue growth in order to persuade Railtrack to make sunk cost investments. Subsequently the TOCs would try to negotiate access at marginal rates rather than full cost rates. Knowing this, Railtrack will be reluctant to make sunk investments unless *ex-ante* bilateral (or multilateral) agreements are made (as with Virgin on the West Coast Mainline). However, these are difficult to make when some 15 operators are involved.

The data on investment since privatisation suggests that some of these concerns have not arisen. Figure 4 suggests that

investment in rail infrastructure has doubled since privatisation. The investment victim of vertical separation appears to be rolling stock[32].However, we should be cautious before dismissing the infrastructure investment problem. There is the problem of cost inflation highlighted earlier. If new infrastructure costs have really doubled since privatisation then there will have been little change in the levels of physical investment. There is also the cyclical nature of rail investment. High investment levels in the late 1990s might follow on from low investment in preceding periods. There is the further issue of mega-projects. The Channel Tunnel Rail Link and the West Coast Main Line Modernisation may account for over two thirds of current infrastructure investment.



Source: Strategic Rail Authority, (2001), "National Rail Trends 2001-02". SRA, London.

Figure 4: Rail Investment – Infrastructure and Rolling Stock and Revenue Support

Figure 4 also shows that level of revenue support from Government for the passenger railways in Britain broadly doubled with the implementation of privatisation. This was, in my view, due to a broadly equal combination of one-off transitional governance costs and the increase in capital costs under the new regime. The subsequent reduction in support levels so that they returned to pre-privatisation levels by 2000/01 was due to the elimination of the transitional costs and the efficiency gains made by the TOCs and Railtrack.

Most recently, there is some evidence that revenue support for the passenger railways is beginning to increase as franchisees negotiate more generous contracts with the Strategic Rail Authority.

The last strategic issue to highlight is that of land use. Original proponents of rail privatisation saw property development as the key to a commercially viable railway[33]. The performance of the real estate division of Railtrack has been relatively disappointing (typically only 5% of Railtrack's income has come from property rental), whilst developments have not always complemented rail operations. This is in contrast to the vertically integrated railways of Japan where profits largely come from real estate development and diversification into retail, leisure and other activities. Only 51% of the revenue of major private railways in Japan comes from rail operations, with this figure declining to 38% for minor private railways[34].

The vertically separated railway in Britain has failed to exploit the synergistic benefits of train operations and complementary land-use development.

3.2 Tactical and Operational Functions

Tactical issues such as train length and speed, stopping patterns and vehicle size and type are operational decisions which will be constrained by infrastructure. As with investment generally, optimal decision making concerning timetable co-ordination and capacity allocation within a vertically separated regime may be plagued by information asymmetries and/or excessive transaction costs. Similar arguments pertain to the scheduling of maintenance where the British tradition of concentrating major work on Sundays persists, despite evidence from continental Europe that this may have a high opportunity cost in terms of revenue foregone. For example, in Sweden, daily rail traffic on Fridays and Sundays is double the daily traffic during the rest of the week[35]. Similar issues also arise with respect to operational planning in the event of infrastructure, vehicle or some other failure.

The architects of rail privatisation realised that there might be insufficient incentives to provide the optimal levels of service quality, particularly in terms of punctuality and reliability. This arises because the infrastructure authority and, in some instances, the train operator have a degree of monopoly power. As a result a complex performance regime was developed based on the estimation of a Marginal Revenue Effect (MRE) per passenger of a minutes delay, calculated as[36]:

$MRE = [TR \times MUJT \times E_{GT}] / [Q \times GT]$

where

TR = Total Revenue (£)

MUJT = Multiplier for Unscheduled Journey Time (a typical value was 2.5)

E_{GT} = Generalised Time Elasticity (a typical value is –0.9)

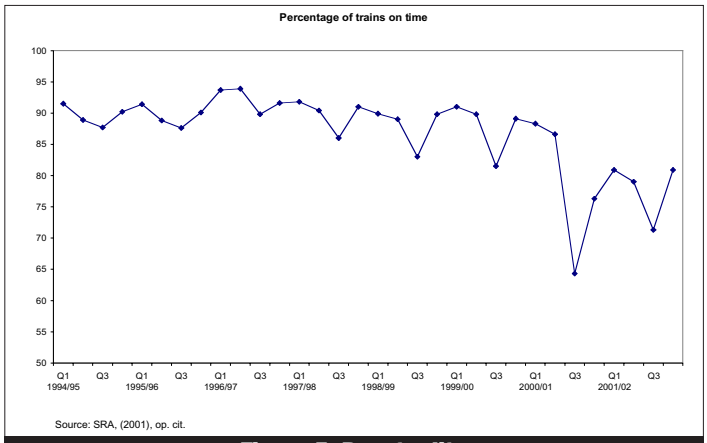
Q = Journeys

GT = Generalised Time (the sum of in-vehicle time, a service interval penalty, an unscheduled delay penalty and an interchange penalty - minutes).

The original rates were between 0 and 15 pence per passenger minute. The governance costs of such a regime were not taken into account nor were the opportunity costs of the resultant financial transfers.

Figure 5 shows that this approach initially had some impact on improving punctuality. Railtrack was particularly incentivised, at least in the short run, because the performance regime represented a significant proportion of Railtrack's variable revenue (or variable costs). The performance regime was less important for the TOCs as it represented only a small proportion of variable revenue/costs. As a result, the improvements in performance bottomed out and there was some indication of a deterioration. The Shadow Strategic Rail Authority's initial response to the decline in punctuality was to double incentive rates[37]. However, the impact of this was overshadowed by the events of 17 October 2000 which triggered the biggest disruption to passenger railways services in Britain in peacetime. The accident at Hatfield that occurred on that date was found to be caused by gauge corner cracking which was found to be endemic across the system. Railtrack (and its contractors) had misjudged the technical life of its main asset – rails. The emergency measures which were put in

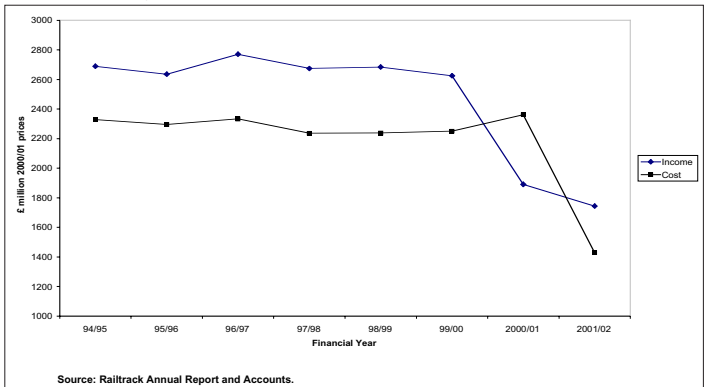
place to overcome this situation led to Railtrack incurring a £2 billion operating cost over-run and £0.5 billion in poor service penalties (DTLR Press Release, 11/10/01). It was Railtrack's gross misfortune that the deterioration in its performance coincided with the introduction of a more penal incentive regime. It was the issue that eventually led to the company's demise.



Source: SRA, (2001), op. cit.

Figure 5: Punctuality

Prior to financial year 2000/01 Railtrack's finances appeared to be sound with the company regularly turning in profits of around £1 million per day (see Figure 6). However, there were some warning signs. Railtrack's total operating costs had only reduced by 3.3% in real terms between 1994/5 and 1999/00, although train kms had increased by as much as 23% over this period (see Table 2), although network kms were broadly unchanged. This may be computed to be equivalent to an efficiency increase of around 4.7% per annum. Cowie estimated that over the period 1995 to 1998 the TOCs increased productivity by 4.4% per annum[38]. The aftermath of Hatfield found Railtrack's income in 2000/01 fall by 26% and its costs increase by 8% in real terms, leading to a large loss of about £0.5 billion. This implies an efficiency loss of 5.8% in this year. The company faced a further deficit of £0.7 billion by 8 December 2001, rising to £1.7 billion by March 2002 (DTLR Press Release, 15/10/01). The provisional figures for 2001/02 suggest an improvement, with an operating profit before extraordinary items of £321 million. However, extraordinary items involved writing down Railtrack's assets by £1,951 million, leading to an extraordinary loss of £1,724 million.



Source: Railtrack Annual Report and Accounts.

Figure 6: Railtrack's Financial Performance

4. Solutions

Railtrack believed it faced three options: restructuring, receivership or renationalisation. In fact, there are a number of other alternatives which might be referred to as the reconsideration of social ownership, Renewcos, reintegrated franchises and redirection of subsidy. These options will be considered below.

Railtrack had already restructured organisationally – with greater emphasis on functional separation (e.g. between safety, maintenance and major projects) and geographical specialisation. What Railtrack now requested was a suspension for up to four years of the regulatory regime plus an injection, in terms of equity, of £3.5 billion from Government. Perhaps unsurprisingly Government rejected this offer and on 7 October 2001 placed Railtrack into receivership.

Moreover, the Government came up with an alternative of its own – the concept of a not for profit trust. The origins of this idea can be traced back to a paper produced by Tony Grayling for the Institute for Public Policy Research in February 2001[39] but which could arguably be traced further back to the concept of social ownership promoted in the late 1980s[40]. It was taken up in a lecture given to the Transport Planning Society by Phil Goodwin in June 2001[41]. It makes use of the criteria for the assessment of whether public or private ownership or a public-private partnership would be preferable in the case of particular industries, based on the work for the Commission on Public Private Partnerships by John Hawksworth[42]. These criteria are:

- The degree of direct competition in the market, with more competition tending to favour private ownership.
- The significance of non-commercial objectives, with such objectives tending to favour public ownership.
- The scale and complexity of the required future investment programme. This may require private sector investment skills, although not necessarily private sector ownership.
- The extent of uncertainty as to required future service provision. The greater the uncertainty, the more flexible contracts will need to be if a public-private partnership option is to be effective.
- The extent to which the business can be broken up without losing significant economies of scale and scope.

Grayling argues that, as applied to Railtrack, these criteria suggest that public ownership is appropriate given its monopoly status, the importance of non-commercial objectives (including safety, reducing road congestion and environmental complexity) and the problematic nature of regulation. However, Grayling suggests that public ownership need not necessarily mean state ownership. For industries that are primarily a natural monopoly and where non-commercial objectives such as safety are an important feature, then a not for profit model may have advantages. It would avoid the perception of any conflict between profit and safety while allowing for the involvement of all stakeholders, including the private sector. A trust would also have access to private finance without changing treasury rules. Possible models

include Welsh Water, Trust ports such as Dover, National Air Traffic Services and housing associations. A not for profit trust need involve no taxpayers' money but could issue private sector bonds, as with Welsh Water. It is estimated that Welsh Water could reduce customers' bills by 10%, all other things being equal, as a result of lower financing costs. This assumes that all other things are equal and there are no adverse financial impacts from transferring risk from shareholder to customers and taxpayers. It should be noted that around 80% of Railtrack's business is with the Strategic Rail Authority and the PTEs. It also assumes that commercial incentives for efficiency are not diluted. This could be avoided through continuation of the regulatory regime, which may be assisted by reduced incentives for secrecy, and sub-contracting. A geographical fragmentation of the trust so as to permit yardstick competition might also be considered.

This policy option resulted in the launch in March 2002 of Network Rail, a not for dividend commercial company, with no shareholders but around 100 stakeholder members. A £500 million bid would be made for Railtrack plus a further £735 million for assets associated with the Channel Tunnel Rail Link. Railtrack shareholders would receive compensation of around £2.50 a share, equivalent to almost £1.3 billion. This acquisition was completed on 3rd October 2002.

There are other alternatives. The re-franchising process might incorporate special purpose vehicles, essentially joint venture companies between Railtrack, SRA, TOCs and Contractors. Such a form of financial engineering, promoted by Sir Alastair Morton and epitomised by the aborted Renewco project, would permit a degree of vertical re-integration, at least for major new projects and upgrades, but it is not clear what impact they would have on the cost of finance. An alternative approach might be to unbundle Railtrack based on geographical zones and sell these mini-Railtracks to the highest bidder[43]. This could set up an important market test for vertical re-integration, with at least two TOCs (Stagecoach's South West Trains and First Great Eastern) expressing an interest, although the Rail Freight Group has voiced opposition.

If the industry is to remain vertically separated, then another alternative might be to restructure the industry to be more in line with Sweden. The new Railtrack would base access charges on short run marginal costs, although there is the none trivial task of determining scarcity costs, which are more likely to be important in Britain than Sweden[44]. Under such a charging regime, it is likely that major inter city routes and long distance commuting routes into London would be profitable and could be operated on an open access basis – although there could, as we have already noted, be a serious risk of wasteful competition. Subsidy would be directed to socially necessary services such as short distance commuting and rural services with an enhanced role for the GLA, the PTEs, the Scottish Parliament, the Welsh Assembly and, in time, English Regional Assemblies and a reduced role for the Strategic Rail Authority.

5. Evidence from Elsewhere

The collapse of Railtrack may be interpreted as important empirical evidence against vertical separation in the rail industry and/or evidence against privatising rail infrastructure. It suggests that for railways total production and governance costs may be greater under market governance than bureaucratic governance. There is little other evidence but such evidence is mixed. Cantos Sanchez has shown that track infrastructure and passenger operations are cost substitutes[45]. Higher track costs will lead to lower operation costs by permitting faster services. By contrast, track infrastructure and freight operations are cost complements. Higher track costs will lead to higher operating costs as higher maintenance costs are not offset by reduced train operating costs through increased speeds. This suggests that there may be benefits from vertical integration, particularly for a passenger railway but also for a freight railway. However, it also suggests that there are diseconomies of scope of providing joint passenger and freight services at least above certain output and quality levels. This reinforces earlier work by Cantos Sanchez[46]. Mizutani and Shoji, in a case study of the Kobe Kosoku Tetsudo railway in Japan, estimated that infrastructure maintenance costs were 6% higher on this vertically separated railway, compared to other vertically integrated railways in Japan[47]. They also note that dealing with train schedule changes is slow and costly.

By contrast, Shires et al. found, based on a translog cost model, that rail operating costs in Sweden reduced by around 10% after separation in 1988[48]. However, this separation was also accompanied by the gradual introduction of tendering which may have been the key cost driver. Similarly, using a stochastic cost frontier approach, Kim and Kim estimated that vertical separation of Seoul's subway system might reduce total costs by 3%[49].

6. Conclusions

There is a temptation to see the failure of Railtrack as an indictment of the privatisation of public utilities. It does seem that, at times, Railtrack put the interest of its shareholders before all other stakeholders, as witnessed by its decision to pay shareholders some £150 million in dividends at the same time as reporting large losses and receiving the first instalment of a £1.5 billion grant from Government. The irony was that this short termism proved ineffective as many of Railtrack's shareholders have suffered substantial losses.

However, if privatisation was really the problem, then why haven't other privatised utilities fallen victim to the failures of myopic profit seeking capitalism? Clearly, Railtrack made some specific, serious strategic mistakes and was not helped by a complex regulatory system and some personality clashes. In my view rail privatisation and competition was essentially about a Williamsonian trade-off between reducing production costs and increasing governance costs. Proponents of privatisation, such as Foster, argued that substantial productive efficiency gains would be made by the reforms, whilst the costs of governance would be minimised through the use of information technology[50]. Reliable empirical evidence is difficult to obtain but there is some suggestion that the unit costs of existing infrastructure increased by 20%

on implementation of the reforms, only falling back to original levels towards the end of Control Period 1 (and this was assisted by increases in traffic density). The unit costs of new infrastructure provision may have increased by an even greater rate (as witnessed by the increased revenue requirement for Control Period 2).

There is the important counter-argument, posited by Foster, that under public ownership rail infrastructure costs in Britain were artificially low, due to the price of capital being below economically efficient levels. This is difficult to refute but comparisons with Sweden suggest that the charging regime adopted may have led to train operating costs that could be around double the optimal levels based on short run marginal costs and that infrastructure costs per train km may be almost 20% higher in Britain. I would argue that some of the modest cost performance of Railtrack is due the underestimation of the governance costs that have resulted from a complex vertical separation. Information technology does not seem to have yet reduced contractual costs. The costless trading of train paths is still some way off, despite the pioneering work with auction theory by the likes of Nilsson[51] and Plott[52].

Thus the Government's apparent favourite solution, a not for profit trust or some variant thereof such as a company limited by guarantee, will only solve the part of the problem associated with the way Railtrack was privatised. It will not solve the problems that stem from vertical separation. I would prefer to see a system that moved towards some form of vertical re-integration, although ultimate ownership of infrastructure could remain with a separate body, who might also have responsibility for major upgrades. Under this model, I would see the not for profit Network Rail split into a number of geographic zones that broadly correspond to the re-franchising map. During a revived refranchising process, bidders could be invited to bid on the basis of just operating trains or operating both trains and infrastructure. An important market test for vertical integration would be established. If my interpretation of Williamson's transaction cost economics is correct then unified governance will be preferred to market governance and the industry will re-integrate. Even if this did not occur, there would be important scope for yardstick competition, as recommended by Dodgson[53].

Access pricing would be based on the efficient component pricing rule. A vertically integrated operator should charge based on the direct cost of infrastructure provision plus the opportunity cost (net revenue foregone) of providing access if additional paths are made available or on the basis of the revenue foregone minus the direct costs if the incumbent is to be supplanted by an entrant[54]. For such a pricing rule to work, detailed information is required concerning infrastructure and train operation costs, whilst a regulatory system is required to enforce this rule. One advantage of a temporary period of vertical separation of ownership is that it has given us a better understanding of rail infrastructure costs, not least through the vertical separation of accounts which would need to be maintained in a vertically re-integrated system, as required by directive 91/440. Moreover, the reforms have also established an appropriate regulatory body in the shape of the Rail Regulator.

Whatever the organisational form adopted in the future the key challenge is going to be to reduce rail infrastructure costs and increase quality. This will require a reduction in the number and complexity of the 2,000 contracts that were said to underpin Railtrack's business[55]. My view is that a vertically re-integrated system based on around 15 longer term re-franchises responsible for the operation of the infrastructure underpinned by a not-for-profit trust responsible for infrastructure ownership may be the best way forward, with special purpose vehicles established for major upgrades. This would need to be combined with a simplification of regulatory structures and some rationalisation of sub-contracting. However, more detailed analysis of the transaction costs involved needs to be undertaken to support this proposition. Although some useful desktop studies could be undertaken, some controlled experimentation with one or two integrated franchises might be more informative.

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NOTES

[1] WILLIAMSON, O., (1985), *The Economic Institutions of Capitalism*, The Free Press, New York, chapters 3 to 5.

[2] KLEIN, B., R., CRAWFORD, AND A.A., ALCHIAN, (1978), "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process", *Journal of Law and Economics*, Vol. 21, pp. 297-326. Classic study of the automotive industry.

[3] SHAW, J., (2000), *Competition, Regulation and the Privatisation of British Rail*, Ashgate, Aldershot.

[4] HARRIS, N., AND E., GODWARD, (1997), "The Privatisation of British Rail", the *Railway Consultancy Press*, London.

[5] WOLMAR, C., (2001), *Broken Rails. How Railway Priviatisation Wrecked Britian's Railways*. Aurum Press, London.

[6] GYLIE, M., (1984), "Alternative Ways to Run Railways", *Transport, January/February*, pp.16-17.

[7] IRVINE, K., (1987), *The Right Lines*, Adam Smith Institute, London.

[8] PRESTON, J., G., WHELAN, AND M. WARDMAN, (1999), "An Analysis of the Potential for On-track Competition in the British Passenger Rail Industry", *Journal of Transport Economics and Policy*, Vol. 33, n° 1, pp. 77-94.

[9] PRESTON, J., AND F., RAJÉ, (2001), "Development of Market Models for Increased Competition in Railroad Passenger Traffic", *Deliverable D4, Final Report*. Confidential Report for AJ AB, Stockholm.

[10] Office of the Rail Regulator, (ORR), (1994), "Framework for the Approval of Railtrack's Track Access Charges for Franchised Passenger Services: A Consultation Document", *ORR*, London.

[11] PRESTON, J., AND A., ROOT, (1999), "Great Britain". In van de Velde, D., (Ed.), *Changing Trains. Railway Reform and the Role of Competition: The Experience of Six Countries*, Ashgate, Aldershot, p. 15.

[12] British Railways Board, (BRB), (1994), *Annual Report and Accounts 1993-4*, BRB, London.

[13] Office of the Rail Regulator, (ORR), (1995), "Railtrack's Charges for Franchised Passenger Services: The Future Level of Charges", *ORR*, London.

[14] Office of the Rail Regulator, (ORR), (2000a), "Periodic Review of Railtrack's Access Charges". Draft Conclusions, Vol. I and II, *ORR*, London.

[15] Office of the Rail Regulator, (ORR), (2000b), "The Periodic Review of

Railtrack's Access Charges": Final Conclusion,. Vol. I. *ORR*, London.

[16] National Economic Research Associates, NERA, (2000), *Review of Overseas Railway Efficiency*, report for the Office of the Rail Regulator, NERA, London.

[17] SALVESON, P., (2001), "Beeching in Reverse. The Case for a Programme of Line and Station Re-openings". *Transport Research and Information Network*, Huddersfield.

[18] AFFUSO, L., J., MASSON, AND D., NEWBERY, (2000), "Comparing Investments on New Transport Infrastructure: Road vs Railways?" *Department of Applied Economics*, University of Cambridge.

[19] BOX, D., (1992), "Costing Passenger Railways" In Harris, N.G., and E.W., Godward, (Eds.), *Planning Passenger Railways*, Transport Publishing Co, Glossop.

[20] Table 4

[21] BOX, D., (1992), op.cit.

[22] AFFUSO, L., A., ANGERIZ, AND M., POLLITT, (2001), "Measuring the Efficiency of Britain's Privatised Train Operating Companies", *Mimeo*, Judge Institute of Management, Cambridge.

[23] PRESTON, J., AND F., RAJÉ, (2001), op.cit.

[24] PRESTON, J., (1996), "The Economics of British Rail Privatization: An Assessment", *Transport Reviews*, Vol. 16, n° 1, pp. 1-21.

[25] BRADSHAW, W., (1996), "The Privatization of Railways in Britain", *Japan Railway Transport Review*, September, pp. 15-21.

[26] SUMITA, S., (2000), "Success Story. The Privatization of Japanese National Railways". Profile, London, pp. xvi - xvii.

[27] BRADSHAW, W., (2000), "Regulation of Railways and Roads: Is the Current Framework Adequate?" In Preston, J., H., Lawton Smith, and D., Starkie, (Eds.), *Integrated Transport Policy. Implications for Regulation and Competition*, Ashgate, Aldershot, p. 146.

[28] Cullen, The Rt. Hon. Lord, (2001), "The Ladbroke Grove Rail Enquiry", *Health and Safety Executive*, London.

[29] ELSE, P.K., (1994), "Privatisation and Vertical Disintegration with particular reference to BR", *UTSG Conference*, University of Leeds.

[30] HELM, D., AND D., THOMPSON, (1991), "Privatized Transport Infrastructure and Incentives to Invest", *Journal of Transport Economics and Policy*, Vol. 25, pp. 231-246.

[31] LAFFONT, J.J., AND J., TIROLE, (1986), "Using Cost Observations to Regulate Firms", *Journal of Political Economy*, Vol. 94, pp. 614-641.

[32] PRESTON, J., (2001), "Franchising and Re-franchising of Passenger Rail Services in Britain". *Transportation Research Record*, n° 1742, pp. 1-9.

[33] BEESLEY, M., AND S., LITTLECHILD, (1983) "Privatisation: Principles, Problems and Priorities", *Lloyds Bank Review*, n° 149, pp. 1-20.

[34] SHOJI, K., AND B.J., KILLEEN, (2001), "Diversification Strategy of the Minor Private Railways in Japan" paper Presented to *the Seventh International Conference on Competition and Ownership in Land Passenger Transport*. Molde, Norway.

[35] PRESTON, J., AND F., RAJÉ, (2001), op.cit.

[36] KPMG, (2000), "Recalibration of Rail Operational Performance Regime". *Report to ORR*, London.

[37] KPMG, (2000), op. cit.

[38] COWIE, J., (2001), "Subsidy and Productivity in the Privatised British Passenger Railway", paper presented to *the Seventh International Conference on Competition and Ownership in Land Passenger Transport*, Molde, Norway.

[39] GRAYLING, T., (2001), "Getting Back on Track", paper for the *Institute for Public Policy Research*, London.

[40] SALVESON, P., (2001), op.cit.

[41] GOODWIN, P., (2001), "The Nine Year Plan for Transport: What Next?", in proceedings of *the Institution of Civil Engineers: Transport*, Vol. 147, n°. 4, pp. 239-246.

[42] HAWKSWORTH, J., (2000), "Labour and Public Enterpise: Does the Government have a coherent approach?" *New Economy*, Vol. 7 n°.3.

[43] PRESTON, J., (2001), op.cit.

[44] NASH, C.A., B., MATTHEWS, AND G., WHELAN, (2001), "Rail Infrastructure Charging in Europe – Principles and Practice", paper presented to *the 9th World Conference on Transport Research*, Seoul, Korea.

[45] CANTOS-SANCHEZ, P., (2001), "Vertical Relationships for the European Railway Industry", *Transport Policy*, Vol. 8, n° 2, pp. 77-84.

[46] CANTOS-SANCHEZ, P., (2000), "A Subadditivity Test for the Cost Function of the Principal European Railways", *Transport Revi*ews, Vol. 20, pp. 275-290.

[47] MIZUTANI, F., AND K., SHOJI, (2001), "Operation-Infrastructure Separation in the Japanese Rail Industry: The Case of Kobe Kosoku Tetsudo". paper presented to *the 9th World Conference on Transport Research*, Seoul, Korea.

[48] SHIRES, J., J.M., PRESTON, C., BORGNOLO, AND M., PONTI, (1999), *Joint Final Report on the Rail Case Study*. SORT-IT, Deliverable D6, European Commission, Brussels.

[49] KIM, M., AND S., KIM, (2001), "An Analysis of the Cost Structure of a Seoul's Rail Tranist Property: A Stochastic Frontier Approach", paper presented to *the 9th World Conference on Transport Research*, Seoul, Korea.

[50] FOSTER, C., (1994), "The Economics of Rail Privatisation". *Centre for the Study of Regulated Industries, Discussion Paper 7*, CIPFA, London.

[51] NILSSON, J.E., (2000), "Towards a Welfare Enhancing Process to Manage Railway Infrastructure Access", *Railroad Conference*, La Defense, Paris.

[52] PLOTT, C., (2000), "Experimental Economics and New Competitive Mechanisms: Applications to Networked Industries", *Railroad Conference*, La Defense, Paris.

[53] DODGSON, J., (1994), "Access Pricing in the Railway System", *Utility Policy*, Vol. 4, n°. 3, pp. 205-213.

[54] BAUMOL, W., (1983), "Some Subtle Issues in Railroad Regulation", *International Journal of Transport Economics*, Vol.10, pp.341-345; Baumol, W., and G., Sidak, (1994), *Towards Competition in Local Telephony*, AEI Studies in Telecommunications Deregulation, MIT Press, Cambridge, Mass.

[55] GRAYLING, T., (2001), op.cit.

BIBLIOGRAPHIC REFERENCES

AFFUSO, L., J., MASSON, AND D., NEWBERY, (2000), "Comparing Investments on New Transport Infrastructure: Road vs Railways?", *Department of Applied Economics*, University of Cambridge.

AFFUSO, L., A., ANGERIZ, AND M., POLLITT, (2001), "Measuring the Efficiency of Britain's Privatised Train Operating Companies", *Mimeo*, Judge Institute of Management, Cambridge.

BAUMOL, W., (1983), "Some Subtle Issues in Railroad Regulation", *International Journal of Transport Economics*, Vol.10, pp. 341-345.

BAUMOL, W., AND G., SIDAK, (1994), *Towards Competition in Local Telephony*, AEI Studies in Telecommunications Deregulation, MIT Press, Cambridge, Mass.

BEESLEY, M., AND S., LITTLECHILD, (1983) "Privatisation: Principles, Problems and Priorities", *Lloyds Bank Review*, Vol. 149, pp. 1-20.

BOX, D., (1992), "Costing Passenger Railways", In Harris, N.G., and E.W., Godward, (Eds.), *Planning Passenger Railways*, Transport Publishing Co, Glossop.

BRADSHAW, W., (1996), "The Privatization of Railways in Britain", *Japan Railway Transport Review*, September, pp. 15-21.

BRADSHAW, W., (2000), "Regulation of Railways and Roads: Is the Current Framework Adequate?" In Preston, J., H., Lawton Smith, and D., Starkie, (Eds.), *Integrated Transport Policy. Implications for Regulation and Competition*, Ashgate, Aldershot, p. 146.

British Railways Board, (BRB), (1994), *Annual Report and Accounts 1993-4*, BRB, London.

BROOKS, M., AND K., BUTTON, (1995), "Separating Transport Track from Operations: a typology of international experience", *International Journal of Transport Economics*, Vol. 22, n° 3, pp. 235-260.

CANTOS-SANCHEZ, P., (2000), "A Subadditivity Test for the Cost Function of the Principal European Railways", *Transport Revi*ews, Vol. 20, pp. 275-290.

CANTOS-SANCHEZ, P., (2001), "Vertical Relationships for the European Railway Industry", *Transport Policy*, Vol. 8, n° 2, pp. 77-84.

COWIE, J., (2001), "Subsidy and Productivity in the Privatised British Passenger Railway" paper presented to *the Seventh International Conference on Competition and Ownership in Land Passenger Transport*, Molde, Norway.

Cullen, The Rt. Hon. Lord, (2001), "The Ladbroke Grove Rail Enquiry", *Health and Safety Executive*, London.

DODGSON, J., (1994), "Access Pricing in the Railway System", *Utility Policy*, Vol.4, n° 3, pp. 205-213.

ELSE, P.K., (1994), "Privatisation and Vertical Disintegration with particular reference to BR", *UTSG Conference*, University of Leeds.

FOSTER, C., (1994), "The Economics of Rail Privatisation", *Centre for the Study of Regulated Industries, Discussion Paper 7*, CIPFA, London.

GOODWIN, P., (2001), "The Nine Year Plan for Transport: What Next?", in proceedings of *the Institution of Civil Engineers: Transport*, Vol. 147, n° 4, pp. 239-246.

GRAYLING, T., (2001), "Getting Back on Track", paper for the *Institute for Public Policy Research*, London.

GYLIE, M., (1984), "Alternative Ways to Run Railways", *Transport,* January/February, pp.16-17.

HARRIS, N., AND E., GODWARD, (1997), "The Privatisation of British Rail", *Railway Consultancy Press*, London.

HAWKSWORTH, J., (2000), "Labour and Public Enterpise: Does the Government have a coherent approach*?" New Economy*, Vol. 7, n° 3.

HELM, D., AND D., THOMPSON, (1991), "Privatized Transport Infrastructure and Incentives to Invest", *Journal of Transport Economics and Policy*, Vol. 25, pp. 231-246.

IRVINE, K., (1987), *The Right Lines*, Adam Smith Institute, London.

KIM, M., AND S., KIM, (2001), "An Analysis of the Cost Structure of a Seoul's Rail Tranist Property: A Stochastic Frontier Approach", paper presented to *the 9th World Conference on Transport Research*, Seoul, Korea.

KLEIN, B., R., CRAWFORD, AND A.A., ALCHIAN, (1978), "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process", *Journal of Law and Economics*, Vol. 21, pp. 297-326.

KPMG, (2000), "Recalibration of Rail Operational Performance Regime". Report to *ORR*, London.

LAFFONT, J.J., AND J., TIROLE, (1986), "Using Cost Observations to Regulate Firms", *Journal of Political Economy*, Vol. 94, pp. 614-641.

MIZUTANI, F., AND K., SHOJI, (2001), "Operation-Infrastructure Separation in the Japanese Rail Industry: The Case of Kobe Kosoku Tetsudo", paper presented to *the 9th World Conference on Transport Research*, Seoul, Korea.

NASH, C.A., (1997), "The Separation of Operations from Infrastructure in the Provision of Railway Services – The British Experience", ECMT Round Table 103. OECD, Paris.

NASH, C., B., MATTHEWS, AND G., WHELAN, (2001), "Rail Infrastructure Charging in Europe – Principles and Practice", paper presented to *the 9th World Conference on Transport Research*, Seoul, Korea.

National Economic Research Associates, (NERA), (2000), *Review of Overseas Railway Efficiency*, report for the Office of the Rail Regulator, NERA, London.

NILSSON, J.E., (2000), "Towards a Welfare Enhancing Process to Manage Railway Infrastructure Access", *Railroad Conference*, La Defense, Paris.

Office of the Rail Regulator, (ORR), (1994), "Framework for the Approval of Railtrack's Track Access Charges for Franchised Passenger Services: A Consultation Document", *ORR*, London.

Office of the Rail Regulator, (ORR), (1995), "Railtrack's Charges for Franchised Passenger Services: The Future Level of Charges", *ORR*, London.

Office of the Rail Regulator, (ORR), (2000a), "Periodic Review of Railtrack's Access Charges", Draft Conclusions, Vol. I and II, *ORR*, London.

Office of the Rail Regulator, (ORR), (2000b), "The Periodic Review of Railtrack's Access Charges", Final Conclusions, Vol. I, *ORR*, London.

PLOTT, C., (2000), "Experimental Economics and New Competitive Mechanisms: Applications to Networked Industries", *Railroad Conference*, La Defense, Paris.

PRESTON, J., (1996), "The Economics of British Rail Privatization: An Assessment". *Transport Reviews*, Vol. 16, n° 1, pp. 1-21.

PRESTON, J., AND A., ROOT, (1999), "Great Britain". In van de Velde, D., (Ed.), *Changing Trains. Railway Reform and the Role of Competition: The Experience of Six Countries*, Ashgate, Aldershot, p. 15.

Preston, J., G., Whelan, and M., Wardman, (1999), "An Analysis of the Potential for On-track Competition in the British Passenger Rail Industry", *Journal of Transport Economics and Policy*, Vol. 33, n° 1, pp. 77-94.

PRESTON, J., (2000), "How Effective is Competition? The Case of Rail Services in Britain". In Preston, J., H., Lawton Smith, and D., Starkie, "Integrated Transport Policy. Implications for Regulation and Competition", Ashgate, Aldershot.

PRESTON, J., (2001), "Franchising and Re-franchising of Passenger Rail Services in Britain", *Transportation Research Record*, n°. 1742, pp. 1-9.

PRESTON, J., AND F. RAJÉ, (2001), "Development of Market Models for Increased Competition in Railroad Passenger Traffic", *Deliverable D4, Final Report*, Confidential Report for AJ AB, Stockholm.

PROGNOS, AG, (2001), "Netzzugang und Trassenpreisbildung im westeuropaischen schienenverkehr". Prognos, AG, Basle.

SALVESON, P., (1989), "British Rail: The Radical Alternative to Privatisation". Centre for Local Economic Strategies, Manchester.

SALVESON, P., (2001), "Beeching in Reverse. The Case for a Programme of Line and Station Re-openings", *Transport Research and Information Network*, Huddersfield.

SHAW, J., (2000), *Competition, Regulation and the Privatisation of British Rail,* Ashgate, Aldershot.

SHIRES, J., J.M., PRESTON, C., BORGNOLA, AND M., PONTI, (1999), *Joint Final Report on the Rail Case Study*, SORT-IT, Deliverable D6, European Commission, Brussels.

SHOJI, K., AND B.J., KILLEEN, (2001), "Diversification Strategy of the Minor Private Railways in Japan", paper presented to *the Seventh International Conference on Competition and Ownership in Land Passenger Transport*. Molde, Norway.

STARKIE, D., (1985), "British Railways: Opportunities for a Contestable Market". In Kay, J.A., C.P., Mayer, and D., Thompson, "Privatisation and Regulation: The UK Experience". Clarendon Press, Oxford.

Strategic Rail Authority, (2001), "National Rail Trends 2001-02". SRA, London.

Strategic Rail Authority, (2002), "National Rail Trends 4. 2001-02". SRA, London.

SUMITA, S., (2000), "Success Story. The Privatization of Japanese National Railways", *Profile*, London, pp. xvi-xvii.

WILLIAMSON, O., (1985), *The Economic Institutions of Capitalism,* The Free Press, New York.

WOLMAR, C., (2001), *Broken Rails. How Railway Priviatisation Wrecked Britian's Railways*, Aurum Press, London.

Implementing Marginal Cost Pricing of Rail Infrastructure-Barriers and Solutions

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1. Introduction

The European Commission's policy of separating railway infrastructure from operations and opening up operations to new entry has given rise to the need for explicit methods of charging for the use of rail infrastructure.

The European Commission sees open access as an important way of improving the efficiency and marketing of rail transport and, hence, of increasing the role of the railways in the European 'Common Transport Policy'[1]. They are keen to see comparable approaches to infrastructure charging being used in all member states, to avoid the distortions that exist when neighbouring countries charge for the use of infrastructure on a totally different basis, and to base these charges on marginal social cost as the most efficient approach to transport pricing[2].

Deriving an appropriate pricing system, however, poses many difficulties and there are numerous barriers to implementation. A fundamental problem is that a number of different objectives for infrastructure charges may be identified when attempting to derive a charging system, and most possible systems score well on some objectives and badly on others. A typical list of objectives[3] would be:

- promoting efficient use of the infrastructure;
- promoting efficient investment in and development of the infrastructure;
- recovering the costs of providing the infrastructure, including adequate funding for investment;
- promoting efficiency of operators, for instance through facilitating competition;
- harmonisation of the terms of competition between modes.

To achieve an objective of maximising the efficiency with which existing infrastructure is used, prices for the use of that infrastructure should be set equal to short run marginal social cost. In terms of railways, this means charging for the incremental, or marginal, cost of use of the existing, i.e. fixed in the short run, infrastructure by the train concerned, given the assumption that all other trains on the network are running. However, charges set equal to short run marginal social cost are not likely to achieve an objective of recovering the costs of providing the infrastructure, due to the decreasing cost nature of the industry which results from it being subject to economies of traffic density[4].

Nevertheless, it is possible to pursue a cost recovery objective whilst at the same time promoting efficient use of the infrastructure via, for example, 'two-part-tariff principles. Two-part-tariffs involve a variable component equal to short run marginal social cost and a fixed component to make up the shortfall between marginal social cost and total infrastructure costs.

However, such a system is somewhat at odds with the objective of promoting competition within the rail sector, as it tends to favour large train operators over smaller entrants.

The relative emphasis given to the different possible objectives varies enormously between member states. For instance, at one extreme, Sweden has espoused the objective of efficiency regardless of cost recovery considerations, whilst at the other extreme Britain, and to a large extent Germany, has organised its rail infrastructure company as a fully commercial organisation requiring complete cost recovery.

This paper seeks to identify the key barriers to implementing short run marginal social cost pricing for the use of railway infrastructure in Europe and to offer suggestions of how these barriers might be overcome. Section two begins by setting out the development of the European Commission's approach to railway infrastructure charging, through the different policy papers and directives of the past decade. Section three considers policy developments in practice in three countries that have taken very different approaches to infrastructure charging – Britain, Sweden and Germany. Section 4 identifies what we see as being the principal barriers to implementing reform of infrastructure charges and section five then discusses these barriers, the extent to which they may pose constraints on policy-makers' opportunities to pursue reform and the ways in which they might be overcome. In these sections, reference is made to work we carried out for the European Commission finded MC-ICAM project. Section five then seeks to draw our conclusions.

2. EC Policy development

For many decades, railways in most of Europe have been seen by the Commission as a problem. They have steadily lost market share and required high and increasing levels of subsidy. Underpinning these problems was thought to lie a number of organisational and control issues[5]. Despite initial attempts by the European Commission in the late 1960s to encourage governments to reorganise railways as autonomous commercial bodies, the Commission perceived continued major problems in the rail transport field.

In the face of these problems, the Commission produced a radical new policy statement late in 1989[6]. From the point of view of this paper, three of the proposals were crucial. Firstly there was a requirement for governments to ensure increased commercial and financial independence and realistic balance sheets for their railways. Secondly, and more controversially was the requirement for rail operators to establish separate divisions for infrastructure and operations, to require the infrastructure to be accessible to other operators, on fair and

equal terms and to implement a system of charging for the use of infrastructure (based on train kilometres, speed, time, axle weight, etc) which facilitates this in the context of fair competition between modes. In other words, for the first time a policy based on separating infrastructure from operations and seeking to attract new entrants to compete in the rail industry was being put forward. Thirdly there was a requirement to replace generalised public service obligations by contracts, spelling out clearly the services to be provided and the prices and subsidies to apply. The key issue is the extent to which a more formal contractual arrangement leads to a more transparent and effective relationship between government and railway.

After much negotiation, a limited version of these proposals was implemented in Directive 91/440. Separation of infrastructure from operations was only required in the form of separate accounts with transport infrastructure charges. Legal rights of access to railway infrastructure in EC countries were established for two types of undertaking: international groupings of railway undertakings - defined as two or more operations from different countries wishing to run international services between the Member States where the undertakings are based, and any railway undertaking wishing to run international combined transport goods services between any Member States.

Despite two follow-up directives relating to licensing, path allocation and charging, relatively little progress had been made in introducing more competition to the railways and virtually no open access operations had emerged by the time the Commission issued its next White Paper on Railways[7]. Many argued that this was because the existing legislation only provided for minimal rights of access for international rail freight operators, and left the administration of those rights, and the charges to be levied, in the hands of the existing rail operators, who had a vested interest in preventing them from being exercised. Accordingly the Commission argued for stronger actions to open up the railways to market forces.

In 1998 a further 'railway package' of proposals was produced, calling for clearer separation of infrastructure from operations, at least into separate divisions, for a gradual extension of access rights and for transparent and non-discriminatory infrastructure charges. However, what was eventually agreed was much more limited. Separation of infrastructure from operations was still only required in terms of accounting by Directive 2001/12, although separate balance sheets as well as profit and loss accounts, and separate accounts for passenger and freight, would now be required. Access for international freight services was to be extended throughout an extensive defined European rail freight network by 2005 and to all routes by 2008. There is an important separation of powers provided for in the form of an independent regulator, and the separation of path allocation and infrastructure charging from any organisation responsible for running rail services. We return to the Directive on infrastructure charges below.

More recently, in January 2002 the Commission adopted a communication (known as the second package) on the further development of the European railways: 'towards an integrated European railway area'. In this, they put forward five specific proposals:

- a new directive on the regulation of safety and investigation of accidents and incidents on the community's railways;
- amendments to two previous directives on interoperability;
- a regulation to establish a new European safety and interoperability agency;
- a recommendation for a council decision authorising the Commission to negotiate the conditions for community accession to the COTIF;
- most fundamentally an amendment to 91/440 so as to open up access to the infrastructure for national services in order to completely open up the rail freight market.

Further measures to open up rail passenger markets to competition are already under discussion, and other proposals would introduce compulsory competitive tendering for all subsidised services.

The issue of open access cannot be separated from pricing policy. To have the right of access, but at whatever price the infrastructure manager chooses, is valueless. It has long been the declared aim of the Commission that pricing policies should be developed which promote economic efficiency. This requires prices based on marginal social cost. Originally, this was seen mainly in terms of charging for the use of infrastructure according to marginal operation and maintenance costs, but more recently the concern with environmental problems has led to an emphasis on the external costs of transport as well - congestion, accidents and environmental costs.

In 1995 the Commission published a Green Paper entitled 'Towards Fair and Efficient Pricing'[8]. The basic argument of this paper was that many elements of cost - congestion, accidents, environmental costs and infrastructure maintenance costs - were either not reflected at all in current prices or were reflected only in part. In total these uncovered costs might be as much as 250billion ecu per year for the Union as a whole. The emphasis on external cost in this paper was a radical departure in EC discussion of infrastructure policy, but - whilst the paper proposed many sensible measures, including urban road pricing, a kilometre based tax for heavy goods vehicles and more differentiated rail infrastructure charges - it did not contain clear proposals for implementation.

In 1998 the Commission published its proposals for the introduction of a common transport infrastructure charging framework, which placed a further emphasis on the marginal social cost pricing approach, whilst allowing non discriminatory fixed charges to be levied where this is not adequate for full cost recovery[9]. The proposals on railway

infrastructure charging emerging from the 1998 railways package were enshrined in Directive 2001/14, on allocation of railway infrastructure capacity and levying of charges[10]. In summary, the directive determines that charges must be based on 'costs directly incurred as a result of operating the train service"[11]. They may include:

- scarcity, although where a section of track is defined as having a scarcity problem, the infrastructure manager must examine proposals to relieve that scarcity, and undertake them unless they are shown, on the basis of cost benefit analysis, not to be worthwhile;
- environmental costs, but only where these are levied on other modes;
- recovery of the costs of specific investments where these are worthwhile and could not otherwise be funded;
- discounts but only where justified by costs; large operators may not use their market power to get discounts;
- reservation charges for scarce capacity, which must be paid whether the capacity is used or not;
- compensation for unpaid costs on other modes;
- non discriminatory mark ups but these must not exclude segments of traffic which could cover direct cost.

In other words, this Directive reflects some quite sophisticated arguments. It seems clear from the list of elements that may be included in the charges that 'the direct cost of operating the service' is to be interpreted as short run marginal social cost. The arguments, however, that this form of pricing may lead infrastructure managers to artificially restrict capacity or to be unable to fund its activities in total or particular investments are all addressed by special provisions. Moreover, there is allowance for second best pricing in the face of distorted prices on other modes. The effect of these provisions (all sensible in themselves) however, is to water down considerably the likely effect of the Directive by giving infrastructure managers various loopholes under which they can argue for the maintenance of previous forms of infrastructure charging. In particular, the degree to which competitive charges for paths involving several countries, based on comparable pricing regimes, will be achieved will inevitably be limited.

In order to consider further the way in which the Directive might be implemented an expert group from the industry was set up. It is understood that this group will be reporting soon, and will thus be in a position to influence the guidance on calculation of marginal social cost which is to be issued along with the forthcoming Framework Directive on Transport Infrastructure Charging.

3. The diversity of approaches within the industry

National governments have, in many cases, sought to pursue their own programmes of railway industry reform over the past two decades. These reforms have generally been in an effort to try to revitalise their national rail system and, in general, have formed part of the wider European policy initiative. Understandably, national programmes of reform have progressed at different rates and have sometimes moved in different directions. Against this setting, the current situation is one in which there is a diversity of approaches in terms of charging, institutional arrangements and competitive structures. In addition, there is a diverse set of stakeholders in the industry, all of whom are inter-linked but often with differing objectives.

We will comment briefly here on the different paths taken by Britain, Sweden and Germany. In Britain the infrastructure is owned and managed by a private sector monopoly, whilst passenger operations are divided into 25 privately owned operating franchises and freight operations are privately owned with open access. An independent regulator issues licenses, and approves track access agreements including charges. Open access for passenger train operators is very limited, both by explicit decisions of the Regulator and by lack of track capacity.

Sweden also has complete separation of infrastructure and operations, but with a publicly owned infrastructure company - Banvehrket. There remain publicly owned passenger and freight train operating companies, but all services requiring subsidy are subject to competitive tender and there is open access for freight. The result is an increasing number of private companies sharing the track with the publicly owned companies.

In Germany, infrastructure and the majority of operations are in the public sector. DBAG, a public limited company with share capital, owned wholly by the Federal Government, forms a holding company for five other companies: two responsible for the infrastructure and three incumbent operators - one for long-distance passenger services, another for regional passenger services and a third for freight services. In addition, some regional services are contracted out by the regional governments and there is open access in both passenger and freight operations. Germany has always had a number of small private railways and these are increasingly operating over DBAG tracks.

The three countries have also taken very different approaches to rail infrastructure charges. For the main franchised operators, Britain has adopted a system of two part tariffs, with the variable element of the tariff based on an estimate of short run marginal cost. We will say more in a later section on its calculation. The fixed element was originally set to meet the full financial needs of Railtrack, but Railtrack now receives funding direct from the Strategic Rail Authority (a government body) as well. Open access passenger (where permitted) and freight operators now only pay the variable element, although previously they paid a negotiated charge on the basis of willingness to pay. By contrast Sweden has a simple charge per train kilometre, which is intended to reflect short run marginal social cost; the degree to which it does is examined in a paper by Jan Eric Nilsson[12].

The situation in Germany is the most complicated. Originally Germany had a system of charges per train kilometre

differentiated by type of train and location and designed to recover total cost, except for those capital costs borne by government. In other words it is essentially an average cost pricing system. Modifications led to the introduction of a two part tariff, in order to meet complaints from regions about the high marginal costs of high frequency services. However, following complaints that the two part tariff favoured large operators, and especially DBAG itself, it has reverted to a single part tariff with a differentiated charge per kilometre.

Thus it may be seen that there are large differences in charging systems between countries. Partly these are philosophical; Sweden for instance subscribes to marginal cost pricing principles, whilst Germany appears to believe that average cost pricing is the basis of efficient allocation. Britain lies between the two, in that – at least at privatisation – it was believed important for efficiency that Railtrack covered its total costs from charges, whilst offering a variable charge related to marginal cost. But there are other reasons for the differences; for instance, the emphasis on open access in Germany makes non discrimination a key issue, whilst the constraints on open access in Britain mean that two part tariffs are more acceptable.

4. Barriers to implementation

We noted earlier that not only are there difficulties in deriving and developing railway infrastructure charging policy, there are also barriers to implementing policy once it has been agreed. We have seen in section 2 above that the European Commission has been very active in the area of railway policy development, particularly throughout the last decade. However, section 3 illustrates that progress with and approaches to implementing reforms have been rather varied across the different member states. A number of reasons for this can be identified and are typically thought to arise out of particular 'barriers to implementation'.

Barriers to implementation may come in a number of different forms. Some barriers may relate to the industry in general, irrespective of the member state or region involved, whereas others will be more country-specific, being linked to the institutions, finances or philosophy of that member state or region[13]. Whilst industry-related barriers are likely to apply more or less evenly across the different member states, country-specific barriers may be very relevant for some member states but much less relevant for others. In addition, barriers may be actual or perceived. Perceived barriers may exist where research is not effectively feeding through to the policy-making community. A failure to disseminate state of the art research on issues affecting the implementation of marginal cost pricing may result in policy-makers perceiving there is a barrier to implementation where there is not. It is important to expose these perceived barriers through effective dialogue between the research and policy-making communities. In the end, the important task is to identify the actual barriers and, subsequently, possible means of overcoming them.

As part of an EC funded project (MC-ICAM), the authors have led the work relating to rail implementation of marginal social cost pricing of rail infrastructure, which has involved reviews of experience with implementing reform in Britain, Sweden and Germany (as well as Hungary), including interviews with some of the key actors in the reform processes; the discussion which follows rests heavily on the British experience, being that with which we are most familiar. From this work, the relevant barriers to marginal social cost pricing in the rail sector appear to be:

1. problems of measurement;
2. complexity of tariffs;
3. financial implications ;
4. equity;
5. technical efficiency;
6. fair competition within the rail sector;
7. fair competition with other modes;
8. acceptability on behalf of train operators and infrastructure managers;
9. acceptability on behalf of end users and the general public.

Problems of measuring the additional costs imposed by a particular train service, given that all other services are operating and are paying for the additional costs which they each impose, have often been cited as a barrier to implementing marginal cost pricing. The costs generated when an additional train uses the infrastructure are comprised of five main elements:

- use-related wear and tear costs;
- congestion costs;
- scarcity costs;
- external accident costs; and
- environmental costs.

In order to implement effective marginal social cost-based pricing, it is, therefore, necessary to be able to derive accurate, disaggregated estimates of these various cost components. Whilst there are difficulties associated with the measurement of each component, problems are especially acute for congestion and scarcity. Other papers for the IMPRINT seminar provide a review of the state of the art on research into the measurement of these costs[14] and particular approaches to measurement of scarcity[15]. Below, we give a brief summary of approaches to overcoming this barrier in Britain.

Tariff complexity arises as a result of marginal social cost varying widely across space and time, as it does in the railways sector. The marginal cost associated with a commuter train, operating during the peak and serving a busy metropolitan area, using the infrastructure is likely to be very different from the marginal cost associated with a rural train service in the middle of the afternoon. The danger is that the tariffs become so complex that they are then difficult to understand and interpret, resulting in the incentive underpinning them being masked. However, despite there

being scope for such complexity within rail infrastructure charges, we view this as probably not being a particularly serious problem, either in terms of infrastructure charges or of tariffs to final users. Infrastructure charges are levied on train operating companies who should have the sophistication and software to handle complex charging structures. For final users the railway industry has employed complex tariff structures already for some time, and can do so because tickets are generally purchased in advance via systems that can handle the complexities involved. There is, however, some evidence that freight operators are having some difficulties with interpreting the new regime of infrastructure charges in Britain, particularly the congestion component of the charges, and there is a long history of complaints that passengers, and even railway staff themselves, do not understand the full complexities of the fares system. So tariff complexity is an issue of some importance.

The financial implications of marginal social cost pricing of railway infrastructure arise as a result of the economies of traffic density which are generally recognised to exist in the rail industry. These economies of traffic density mean that the short run marginal cost of infrastructure use is below average cost and, hence, that marginal cost pricing will result in a financial deficit. Evidence from Sweden and Finland suggests that revenues from charges based on the marginal wear and tear costs recover less than 20% of total maintenance and renewals costs[16]. Whilst the picture is less clear once charges for congestion, scarcity, accidents and the environment are added into the equation, it is likely that pure marginal social cost pricing will still fail substantially to recover total costs. The key question determining whether and to what extent this is a barrier to the implementation of marginal social cost pricing is whether governments are willing and able to provide the necessary subsidies to cover the financial deficits.

One of the factors influencing whether or not governments are willing to provide the necessary subsidies to cover financial deficits in the rail industry is the issue of equity. The argument is that it is unfair to provide subsidies to the rail industry because rail users tend to come from higher income groups. Hence, it is argued that subsidy to the rail industry disproportionately benefits those higher income groups through, for example, lower rail fares than would otherwise be the case and is, in effect, a subsidy to 'the rich'. This is often seen as a major issue, especially where rail users do tend to come from higher income groups[17]. This leads to various forms of mark up over marginal cost so as to minimise subsidy levels in many countries.

Concern regarding technical efficiency is a further reason why governments might be unwilling to use subsidy to cover financial deficits in the rail industry. That is, there is a fear that subsidies lead to technical inefficiency by relieving railway managers of hard budget constraints. This is a long-standing argument in economics against subsidy and some evidence for this in the specific context of railways is found by Oum and Yu[18]. The growing requirements for subsidy within the railway industry in many countries during the 1970s and 1980s may also be seen as more general evidence of this.

Fair competition within the rail sector is a further potential barrier to marginal social cost-based pricing of railway infrastructure use, in a situation in which mark ups are needed for financial reasons. Second best policy involves two part tariffs and/or Ramsey pricing, but can this be done in a way that preserves terms of competition between operators?

Fair competition with respect to other modes is also a potential barrier to implementing infrastructure charges based on marginal social cost. As shown above, the EC Directive permits rail charges to be below marginal social cost if this is the case on competing modes. It is necessary to consider the phasing of reform across all modes of transport where they compete with each other, rather than dealing with any one mode in isolation.

We have already seen that acceptability to local authorities was an issue in the German experience. Acceptability to final users is also an issue, especially where commuter fares are involved, as commuters are regular travellers who seem to be better organised to exert political influence than most groups of rail users.

5. Possible means of overcoming the barriers

The first barrier raised above was that of measurement. As noted above, this has been the subject of considerable research in recent years, both at national and European levels[19].

In Britain, research into the causation and variability of maintenance and renewal costs was undertaken both by the infrastructure manager (Railtrack) and the regulator as part of the periodic review of Railtrack's access charges. The proposals they arrived at for measuring costs and levying charges were, however, somewhat different from one another. The approach to cost estimation put forward by Railtrack was a bottom up approach based on an understanding of detailed engineering relationships and the summation of individual elements of cost caused by additional trains. Somewhat by way of contrast, the Regulator put forward a top down approach which starts by identifying the total planned maintenance and renewal expenditure on different types of asset, then applies the percentage of these costs which vary according to number of trains run so as to derive a total variable cost for each asset type. It then uses detailed engineering relationships to allocate these total variable costs to particular vehicle types. An advantage of the Railtrack approach is that it produces estimates at a level of fine detail for different types of vehicle and infrastructure category. However, the regulator was not happy that all the elements of the Railtrack model were based on adequate evidence, and he was concerned that the charges produced by the model had no direct link with Railtrack's actual expenditure. The charges finally agreed upon were derived using the Regulator's 'top down' approach, though this incorporated Railtrack's findings on the detailed engineering cost causation relationships.

We commented above that one of the most difficult issues to deal with in rail infrastructure charging is that of scarce capacity. Charges need to reflect two different costs; the cost of expected additional delays to other services as a result of running an additional train, and the costs of not being able to obtain a path at the desired time.

The costs of additional delays may be estimated by means of modelling[20]. For instance, the approach taken by Railtrack in Britain was to use historical data on delays and capacity utilisation to specify a function which could replicate the observed delays. This involved identifying appropriate measures of delay and of capacity utilisation, identifying appropriate functional forms and then testing the strength of the relationship between incremental delay and capacity utilisation. The result was a proposed tariff broken down into several thousand track sections and by time of day. However, the Regulator both simplified the structure and halved the level of charges before incorporating this element of costs into the tariff. It seems that he was concerned at the degree to which levying the full congestion charge might reduce demand (and it must be said that the proposed charge was based on existing, rather than equilibrium, levels of congestion. On the other hand, given the expected underlying growth in demand, it may reasonably be expected that congestion will get worse rather than better).

In addition to the expected delays there is the issue of inability to obtain the desired slot. The most attractive solution to this problem in theory is to 'auction' scarce slots. There are many practical difficulties however, including the complicated ways in which slots can be put together to produce a variety of types of service, and the possibility of lack of adequate competition to ensure a competitive price. In practice it is therefore usually accepted that any degree of price rationing of scarce slots will have to be on the basis of administered prices rather than bid prices, although some countries, including Britain allow for a degree of 'secondary trading' in which slots change hands between operators at enhanced prices (strictly, this must take place through Railtrack, so it is not secondary trading in the sense forbidden by the EC Directive). The issue of auctioning is considered in more detail by Nilsson[21].

A second possibility is to simply impose a price and see what happens to demand, and then iterate until demand equals capacity. The risk is, however, that serious distortions may occur whilst the price is adjusting, and that strategic game playing may occur to force the price down by withholding demand, where competition is not strong.

A third approach, recommended by NERA[22], is to identify sections of infrastructure where capacity is constrained and to charge the long run average incremental cost of expanding capacity. However, this is a very difficult concept to measure (the cost of expanding capacity varies enormously according to the exact proposal considered, and it is not easy to relate this to the number of paths created, since they depend on the precise number and order of trains run). It may be argued, however, that more appropriate incentives are given to infrastructure managers if they are allowed to charge the costs of investment they actually undertake, rather than for the scarcity resulting from a lack of investment. Directive 2001/14 seeks to get round this by requiring infrastructure managers to undertake studies to determine the cost of expanding capacity, and to test whether this is justified on cost-benefit grounds, where scarcity charges are levied.

Given the difficulties with all these approaches, it may be thought that the best way of handling the issue is to permit direct negotiation between operators and the infrastructure manager over the price and allocation of slots, including investment in new or upgraded capacity. However, British experience of this approach is that it is complex and time consuming given the number of parties involved and the scope for free-riding. It is also difficult to ensure that this does not lead to the abuse of monopoly power, particularly when the infrastructure manager and the operator are part of the same company. An independent regulator is certainly needed but their job is far from easy.

An alternative is for the track charging authority to attempt to calculate directly the costs involved. For instance, if a train has to be run at a different time from that desired, it is possible to use studies of the value people place on departure time shifts to estimate the value to its customers of the cost involved. Similarly, the costs of slower speeds may be estimated from passengers' values of time.

We comment above that tariff complexity should not be an overriding problem in the case of rail infrastructure or services. Nevertheless, the Regulator did simplify Railtrack's proposals in Britain, reducing the number of track sections for which different prices were charged, and 'banding' the charges, with all low charges for congestion reduced to zero. This appears to have been a judgment as to the appropriate trade-off between giving clear incentives to operators and accurately reflecting costs, rather than an attempt to quantify the costs and benefits, but such trade-offs have to be made. Nevertheless the degree of complexity of existing tariffs in the rail sector suggests that the result can still be tariffs which vary in time and space and which reflect variations in marginal social cost reasonably accurately.

With regard to financial implications, Britain's approach has been to adopt a two-part tariff charging regime for infrastructure use, designed to cover infrastructure costs and provide a financial return on the assets. Nevertheless, government still provided subsidy to the industry but this was, initially, channelled entirely through the franchised passenger operators and specific grants for freight facilities. More recently, subsidy has also been granted to the infrastructure manager, particularly to assist with investment expenditures. Roy[23], indicates that efficient charges on road would more than cover the costs of efficient levels of subsidy to rail infrastructure managers, at least for the sample of countries he has examined. However, there may be other objections to this use of road user charges in terms of equity, particularly where it involves not just cross subsidy between modes but also between regions.

The concern that subsidy may reduce technical efficiency may seem odd, given that all governments do subsidise their railways. The real issue is whether to give the subsidies to the infrastructure manager or the train service provider. Britain started with the latter approach on the basis that it was more efficient if the infrastructure manager was driven solely by the commercial requirements of the train service provider. But in practice, it proved very difficult to achieve agreement for improvements affecting, and being paid for, by a host of different operators. Moreover, increases in access charges approved by the Regulator led to automatic compensation under the terms of franchise agreements. We have now moved to a position where the SRA both contributes to the cost of investment and towards current operating costs, and arguably that gives it more control on efficiency than if it were paying subsidies indirectly.

With regard to fair competition within the industry, Britain's approach for passenger services has been to focus much more on competition for the market, via tendering for train operating franchises, than on competition in the market, via open access operations. This has meant that barriers to entry, as represented by the fixed component of a two-part tariff, have been of less relevance than, for example in Germany where they have sought to promote open access. However, for freight operations in Britain, where there is open access, all operators now pay according to the same tariff, based only on marginal cost. This is possible because of the willingness of the government to subsidise rail freight in order to increase the rail market share and remove some of this traffic from road.

Fair competition between the modes remains a *prima facie* second-best argument for subsidising rail charges below marginal social cost, in particular in urban areas where road is the main competitor mode and which remains substantially under-charged. A recent study found that road users in general are charged less than marginal cost for use of roads in urban areas and on congested motorways and trunk roads; heavy goods vehicles are also undercharged, leading to a case for subsidising rail freight access[24].

On acceptability, the big issue in Britain has always been commuter fares, and in terms of one of the biggest remaining distortions this is the area to look at. Both the franchise agreement, which for commuter season tickets requires that price is typically increased at 1% per annum less than the retail price index (higher increases are allowed where performance is good, and lower where it is bad) and the decision not to pass on all congestion costs in variable access charges tend to hold commuter fares down. This tends to mean that charges are below marginal social cost and that it is difficult for train operating companies to fund investment to cater for additional peak traffic from revenue; indeed, they have an incentive to discourage growth in this area. On the other hand there are good second best reasons for holding these fares down.

Thus, measurement problems should be gradually relieved as estimates of marginal cost improve. Second best reasons for subsidy because of charging regimes on other modes may also be gradually reduced by reform of charging on other modes. It is difficult to see measures that will ease other constraints, particularly financial and equity ones. It is likely that rail infrastructure charges in many countries will continue to need mark ups above marginal social cost for these reasons, and that the argument between two part tariffs and Ramsey pricing (i.e. essentially basing markups on the willingness to pay of the traffic concerned) will continue, despite evidence that a complete reform of transport pricing would leave governments well able to fund rail track charges at marginal social cost.

6. Conclusions[25]

The principal barriers to the introduction of marginal social cost pricing for rail infrastructure are difficulties of measurement (especially for congestion and scarcity), fears that does not give the right incentive for investment, financial constraints and the desire to constitute railways as commercial bodies. The EC Directive on infrastructure charges (2001/14) recognises these issues by permitting non discriminatory markups above marginal cost for financial reasons and to recover the costs of specific investment. It also permits rail infrastructure charges to be below marginal cost for second-best reasons.

No country other than Britain explicithy includes congestion costs in its tariffs, and no country includes pure scarcity costs. Scarcity costs remain a priority for further research. However, we believe that measurement problems can be gradually overcome over time, and second best reasons for subsidy will little by little reduce as prices on other modes are reformed. The crucial issues in achieving marginal social cost pricing for rail infrastructure relate to the desire for rail infrastructure managers to cover their total cost, or a greater proportion of costs than implied by marginal cost pricing, from charges, and the consequent need for two part tariffs or for tariffs differentiated according to willingness to pay.

NOTES

[1] Commission of the European Communities, (1996), *White Paper. A Strategy for Revitalising the Community's Railways,* COM (96)421, FINAL, Brussels.

[2] Commission of the European Communities, (1998), *Fair Payment for Infrastructure Use: A Phased Approach to a Common Transport Infrastructure Charging Framework in the EU*, Brussels.

[3] European Conference of Ministers of Transport, (1998), "Round Table 107 User Charges for Railway Infrastructure", OECD, Paris.

[4] Keeler, T. A., (1974), "Railroad costs, returns to scale and excess capacity", *Review of Economics and Statistics*, Vol. 56, pp. 201-208; Harris, R.G., (1977), "Economies of traffic density in the rail freight industry", *Bell Journal of Economics*, pp.556-564; Caves, D.W., L.R., Christensen, M.W., Tretheway, and R.J., Windle, (1987), "Network effects and the measurement of returns to scale and density for U.S. railroads", in Daughety, A.F., (Ed.), *Analytical Studies in Transport Economics*, Cambridge, Cambridge University Press, pp. 97-120; Kessides, I. N., and R.D., Willig, (1995), "Restructuring regulation of the rail industry for the public interest", World Bank Working Paper 1506, Washington DC.

[5] Nash, C.A., B., Matthews, and G.A., Whelan, (2001),"Rail Infrastructure Charging in Europe: principles and practice", *paper presented at the Ninth World Conference on Transport Research*, Seoul.

[6] Commission of the European Communities, (1989), *Communication on a Community Railway Policy*, COM (89) FINAL, Brussels.

[7] Commission of the European Communities, (1996), White Paper. *A Strategy for Revitalising the Community's Railways,* COM (96)421, FINAL, Brussels.

[8] Commission of the European Communities, (1995), *Towards Fair and Efficient Pricing in Transport*, Brussels.

[9] Commission of the European Communities, (1998), "Fair Payment for Infrastructure Use: A Phased Approach to a common transport infrastructure charging framework in the EU", Brussels.

[10] Commission of the European Communities, (2001), *Allocation of railway infrastructure capacity and levying of charges*, EU Directive 2001/14, Brussels.

[11] Commission of the European Communities, (2001), op. cit.

[12] Nilsson, J. E., (2002), "The institutions of Sweden's railway sector; the Past, the Present and the Future of Pricing for Track Use", *paper presented at the second IMPRINT seminar,* University of Leeds.

[13] Quinet, (2001), "European pricing doctrines and the EU reform", *paper presented at the first IMPRINT seminar,* University of Leeds**.**

[14] Lindberg, G., (2002), "Recent progress in the measurement of external costs and implications for transport pricing reforms", *paper to be presented at the second IMPRINT seminar*.

[15] Nilsson, J. E., (2002), "The institutions of Sweden's railway sector; the Past, the Present and the Future of Pricing for Track Use", *paper to be presented at the second IMPRINT seminar*.

[16] Johansson, P.O., and J.E., Nilsson, (2001), *The marginal costs of track maintenance*, UNITE marginal cost case study, VTI.

[17] Department of the Environment, (1976), "Transport Policy: A Consultation Document", HMSO, London.

[18] Oum, T. H., and C., Yu, (1994), "Economic Efficiency of Railways and Implications for Public Policy: A Comparative Study of the OECD Countries' Railways", *Journal of Transport Economics and Policy*, Vol. 28, n° 2, May, 1994, pp. 121-138.

[19] Sansom, T., C.A.., Nash, P.J., Mackie, J., Shires, and P., Watkiss, (2001), "Surface transport costs and charges Great Britain 1998", *Institute for Transport Studies*, University of Leeds, and Johansson, P.O., and J.E., Nilsson, (2001), *The marginal costs of track maintenance*, UNITE marginal cost case study, VTI.

[20] Gibson, S., (2000), "Charging for the use of railway capacity, Seminar on infrastructure charging on railways", Helsinki.

[21] Nilsson, J. E., (2002), op. cit.

[22] NERA, (1998), *An Examination of Rail Infrastructure Charges*, NERA, London.

[23] Roy, R., (2002), "The fiscal impact of marginal cost pricing: the spectre of deficits or an embarrassment of riches?" *Paper to be presented at the second IMPRINT seminar,* University of Leeds.

[24] Sansom, T., C.A., Nash, P.J., Mackie, J., Shires, and P., Watkiss, (2001),op. cit.

[25] This paper was originally presented at the second seminar of the Imprint thematic network, of which the authors are respectively co-ordinator and project manager, in May 2002. The subsequent takeover of Railtrack by a 'not for profit" company, Network rail, was not significantly changed the situation described above.

BIBLIOGRAPHIC REFERENCES

CAVES, D.W., L.R., CHRISTENSEN, M.W., TRETHEWAY, AND R.J., WINDLE, (1987), "Network effects and the measurement of returns to scale and density for U.S. railroads", in Daughety, A.F., (Ed.), *Analytical Studies in Transport Economics*, Cambridge, Cambridge University Press, pp. 97-120.

Commission of the European Communities, (1989), *Communication on a Community Railway Policy*, COM (89) FINAL, Brussels.

Commission of the European Communities, (1995), *Towards Fair and Efficient Pricing in Transport*, Brussels.

Commission of the European Communities, (1996), *White Paper. A Strategy for Revitalising the Community's Railways,* COM (96)421, FINAL, Brussels.

Commission of the European Communities, (1998), *Fair Payment for Infrastructure Use: A Phased Approach to a Common Transport Infrastructure Charging Framework in the EU*, Brussels.

Commission of the European Communities, (2001), *Allocation of railway infrastructure capacity and levying of charges*, EU Directive 2001/14, Brussels.

Department of the Environment, (1976), "Transport Policy: A Consultation Document", HMSO, London.

European Conference of Ministers of Transport, (1998), *Round Table 107 User Charges for Railway Infrastructure*, OECD, Paris.

Gibson, S., (2000), "Charging for the use of railway capacity, Seminar on infrastructure charging on railways", Helsinki.

HARRIS, R.G., (1977), "Economies of traffic density in the rail freight industry", *Bell Journal of Economics*, pp.556-564.

JOHANSSON, P.O., AND J.E., NILSSON, (2001), *The marginal costs of track maintenance*, UNITE marginal cost case study, VTI.

KEELER, T. A., (1974), "Railroad costs, returns to scale and excess capacity", *Review of Economics and Statistics*, Vol. 56, pp. 201-208.

KESSIDES, I.N., AND R.D., WILLIG, (1995), "Restructuring regulation of the rail industry for the public interest", World Bank Working Paper 1506, Washington DC.

LINDBERG, G., (2002), "Recent progress in the measurement of external costs and implications for transport pricing reforms", *paper to be presented at the second IMPRINT seminar*.

NASH, C.A., B., MATTHEWS, AND G.A., WHELAN, (2001),"Rail Infrastructure Charging in Europe: principles and practice", *paper presented at the Ninth World Conference on Transport Research*, Seoul.

NILSSON, J. E., (2002), "The institutions of Sweden's railway sector; the Past, the Present and the Future of Pricing for Track Use", *paper to be*

presented at the second IMPRINT seminar.

NERA, (1998), *An Examination of Rail Infrastructure Charges*, NERA, London.

Office of the Rail Regulator, (2000), "Periodic review of Railtrack's access charges: final conclusions". *ORR*, London.

OUM, T.H., AND C., YU, (1994), "Economic Efficiency of Railways and Implications for Public Policy: A Comparative Study of the OECD Countries' Railways", *Journal of Transport Economics and Policy*, Vol. 28, n° 2, May, pp. 121-138.

Quinet, (2001), "European pricing doctrines and the EU reform", *paper presented at the first IMPRINT seminar*.

ROY, R., (2002), "The fiscal impact of marginal cost pricing: the spectre of deficits or an embarrassment of riches?" *Paper to be presented at the second IMPRINT seminar*.

SANSOM, T., C.A., NASH, P.J., MACKIE, J., SHIRES, AND P., WATKISS, (2001), "Surface transport costs and charges Great Britain 1998", *Institute for Transport Studies*, University of Leeds.

The Process of Railway De-Verticalisation in Italy: State of the Art and Possible Evolutions

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1. Introduction

This paper analyses the most recent evolutions that have taken place in the railway sector in Italy and discusses the likely effects of the evolutions of the regulatory framework. The paper addresses the following basic questions: 1) are the declared objectives coherent with the instruments adopted? and 2) is the institutional framework, within which the reform process is taking place, appropriate to reach the widely advertised objectives proposed not only at the national but also at the European level? After a synthetic description of the economic and strategic features common to different network utilities, comprising a specific examination of the regulatory/commitment network, the paper recalls the evolution of the regulatory reform of the railway sector in Italy. The historical reconstruction of the reform process provides the background against which the analysis of the present situation is carried out. Subsequently the regulatory framework is analysed using game theory in order to evaluate the coherence between incentives given and objectives assigned to the different agents. The investigation method proposed should clarify both the missing points of regulation, as we think there are some, and the most likely effects the situation might produce. Special attention is dedicated to the issue of regulatory capture[1] since it plays a fundamental role, for strategic reasons, in determining the possible outcomes of the reform process. In fact, as seems likely for the local public transport reform, there is the substantial possibility that the reform is formally respected but produces little or no real change. The relevance of the capture issue is not only demonstrated by academic works[2] but also by various antitrust cases[3]. The main conclusions provided relate to: a) the evident change of pace in the liberalisation process that has begun in this sector in Italy since the early '90s, b) the need of further regulatory institutions, such as an Agency or an Authority[4], c) the consistent risk of regulatory capture and slackening of competitive incentives given the pre-competitive constraints new entrants have to face under the present institutional and regulatory settings.

2. Network utilities: the basic economic and strategic characteristics

In many respects, Railways can be thought of as a network utility, similarly to energy, telecommunication and other industries. These utilities usually are capital intensive, long-lived and immovable and are usually significant both in terms of mere size as well as function. They have been used as examples of natural monopoly as is in all those cases where a single firm can serve the entire market demand for the respective range of goods or services at a lower total cost than any other combination of firms. Since markets can be spatially limited a network utility may be a natural monopoly only locally and not at a geographically larger level. Most surveys of natural monopoly have individuated some specific characteristics of natural monopolies (Farrer, 1902). Among the most commonly acknowledged, one can recall: economies of scale, capital-intensity, non-storability of supply with fluctuating demand, location specificity generating location rents, producing necessities or essential services for the community, and involving direct connections to customers. When speaking of natural monopolies one usually refers only to the first issue, forgetting various other concerns that could justify public interest. Network duplication implies an increase in the total supply cost for a given market and, in the presence of fluctuating demand for a non-storable product or service, either capacity is sized to peak demand or demand is rationed.

When in presence of substantial locational advantages (maintenance facilities, marshalling yards, etc.) the firm will achieve at least a local monopoly and various other firms may try to establish their own local monopolies. In this case competition may fail to secure the benefits of co-ordination, interconnection and system standardisation. This is particularly true for the railway sector, when taken from a European point of view - even if the validity of the reasoning might be also confirmed at national and regional levels. Network externalities are generated whenever the benefit of one user depends on the number of other users connected to the same network. Even if the classic example is telecoms, railways also constitute an appropriate example - at least until capacity is reached. The presence of relevant network externalities may lead to market failure due to the absence of proper incentives to establish appropriate interconnections and efficient network expansion. Furthermore, the combined recurrence of necessity and direct connection leaves greater exploitative power in the hands of the producer, posing a difficult regulatory question that has, in the past, been solved through public ownership. Efficient network expansion is very unlikely to come about if the investors have only limited interest in investing due to their restricted ability to obtain compensation for it. Once the investments are sunk, investors can be blackmailed by the regulator, which is why appropriate legal specifications, specially those concerning property, might be considered a public service provided by the state. The success of a good private financing scheme for public utilities has to be based on credible and satisfactory regulation, from both the consumer's and the investor's point of view.

3. The regulatory/commitment framework: a game theory approach

Having briefly described the fundamental characteristics of a network utility, an analysis of the commitment, credibility, and reputation of the different actors is put forward with the intent of setting the theoretical stage for the game theory discussion of the Italian regulatory framework in the railway sector.

To keep things simple and concentrate on one specific regulatory issue, one can assume that there are only two actors playing the regulatory game. The first is the community, represented by the regulator, and the second, the utility owner[5]. The interests of the two actors partially coincide and partially contrast with one another. Let's assume that the community has the power to grant exclusive access rights, whereas the utility disposes of the expertise to undertake, finance and manage the investment needed to construct the utility. Potential conflict between the two operators may arise from the distribution of the rents generated. This situation can be represented via a game of conflict and co-operation[6].

To describe a game one needs to clarify the following items: the number of players, the set of possible actions, information available to each agent when taking a decision, and the set of strategies[7]. Modelling the regulatory framework in which the regulator and utility will take their actions implies defining each element of the game while matching them up with relevant features of the economy in question. The most difficult and important task in defining a game is the limitation of the set of actions open to players. In our case, the level of difficulty confronting the analyst is asymmetric. In fact, while it is reasonably simple to define the actions open to the utility (operating plants up to capacity, then investing to increase it but not recovering the total value –usually very little– of the existing capacity), on the other hand the regulator has much more room for manoeuvre. The assumptions made for the regulator concern both the stability of the regulatory regime as well as the antitrust laws applying to the utility defining the legally available actions[8]. The maturity and comprehensiveness of the regulatory regime is very important in determining the final results of the game. In fact, whereas the Anglo-Saxon regulatory tradition is long standing and the appropriateness of the distribution of duties and powers among the various agents has been tested, clarified and further defined through various disputes and rulings, constituting a sort of institutional public good, the European tradition is, on the contrary, historically much weaker even if the European Union's regulatory and antitrust body of law is growing quickly. The main objective of this paper is to analyse what effects the present regulatory framework is likely to have on the efficiency of the decision making process.

Other important aspects to define are both the sequence in which the agents take their decisions as well as the information available to them when making a decision. One usually imagines a situation in which the public decision makers define the regulatory rules at the outset and subsequently empower a regulator that will act as its agent. Given the regulatory framework and the forecasts concerning both what the regulator will consider an admissible level of return, as well as the level of demand, the utility will decide how much capital to install. This decision is difficult to make since the utility will face a variable demand during the economic life of the investment and the actual level will be known only after the investment has been made.

As for the payoffs, the definitional problems encountered for the action set are reversed. In fact, whereas the revenues less the operating and financial costs incurred constitute the profits earned by the utility and therefore its payoffs, on the other hand, defining the payoffs for the regulator is more difficult. In fact, the actual definition of the payoffs will be influenced by the hypothesis made concerning the interests the regulator is actually representing. Supposing that the regulator responds only to consumers and shareholders, if the government takes a part of the profits (taxes or dividends) or represents the interests of those capitalists that have invested in the utility, then the regulator may be interested in guaranteeing a good level of profits; if the regulator responds, as in some models of representative democracy, to the average voter, then the situation will be reversed since the main focus will be on the expenditure, on the utility's service and on the consumers' surplus.

The game envisaged can be considered a simple non co-operative game where each agent is only interested in its own payoff[9]. In our situation the regulator possesses different legal revenue functions that it may choose to impose and, therefore, is not credible when declaring the restriction of future behaviour. In other words it cannot precommit. Given these premises the utility will have to predict what the regulator will actually do and forecast what its interest will be after the investment has been made and the capital has been sunk. If one supposes that the agents are playing a one-shot game, the outcome, given the potentially unrestricted behaviour of the regulator, looks rather bleak. In fact, if the regulator can freely choose to pay the promised return or cheat when reaching any decision node and, given that its payoff will be greater if it cheats, the utility will cautiously decide not to invest since it could make a loss.

4. Theoretical suggestions and institutional changes

In this section, after describing the fundamental concepts and strategic interactions in a network utility context, the coherence between the theoretical suggestions and the institutional changes influencing the economic incentives facing the various agents is analysed.

As noted earlier, the continental regulatory tradition is much weaker than the British one. Italy constitutes no exception to this general consideration, even if it has devoted the 1990's to an intense catching up process. As recently recognised by the OECD, "Regulatory reform was only one of many changes in Italy in the 1990s, but it was an *essential* one"[10]. In fact Italy, during this decade, witnessed a substantial dismantling of

centralised policies as well as the introduction of more transparent and pro-competitive policies. The turning point can be considered the passing of the 1990 Competition Act with which the Antitrust Authority (AA) was created, thus providing a strong base for market-oriented regulatory reforms. Given the short history of the Italian competition policy, the AA took Europe-wide reforms as basic references and, strengthened by the independent status it was given and by a prestigious leadership, it soon became an institutional reference in most policy debates, playing an important role in the promotion of competition principles. The role played by the AA has been important and relevant, but its functions and powers could and should be further increased (specially in a transition phase from monopoly to competition) by on one hand giving it, a wider range of sanctions and incentive instruments and, on the other, by providing greater judicial support for competition policy initiatives[11].

With specific reference to the transport sector, and rail in particular, there is widespread agreement on the necessity of increasing, widening, and rendering more stringent the regulatory reforms already undertaken. In fact, notwithstanding the unique range of actions undertaken to favour the liberalisation process, covering all modes of transportation, the relationship between Ferrovie dello Stato (FS) (the incumbent) and the regulator will only by the end of 2003 be regulated by competitive tendering for service contracts, and only with respect to local transport. Meanwhile the restructured incumbent, even if still inefficient when compared to other European railway companies[12], has been reducing the patent over-manning and has also been more free to price services according to the effective value of the service produced.

The further steps that should be taken relate, on the one hand, to the need of reducing entry barrier to make competition really feasible and, on the other, to the need of reforming FS governance and regulation so that it has credible incentives to: a) bargain toughly, b) take commercially oriented decisions, and c) invest efficiently in infrastructure. The most important reform is to take away the control function over the railway sector that resides within the government sphere and attribute it to a regulatory body. Along with the deregulation of the railway sector the privatisation of FS would, through the shareholders, introduce a direct interest for generating profits that would stimulate greater efficiency. Another relevant incentive induced by privatisation concerns rationalisation and capacity increase. In fact, vertical integration produces insufficient incentives for capacity increase if it is not properly rewarded and especially if it could be used by a potential rival. All the regulatory powers, direct and indirect, presently in the hands of FS should be passed to an independent regulatory body which should also provide information to the regions which, *de facto*, will be in charge of the franchising for all the local public transport[13]. Clear and well balanced rules for infrastructure access, especially to stations and freight terminals, and greater use of competitive tendering would favour new entrants. The presence of different operators on the network would generate the additional advantage of providing the regulator with a series of benchmarks for the whole community of contractors. The unbundling process between the monopoly and competitive elements in the sector began in 1999 when the first accounting separation was implemented between the four divisions created at that time (passenger, freight, regional transport and rolling stock)[14]. Under the co-ordination of a holding company, the subsequent year FS was split into two separate companies-infrastructure and transport services. Even if this meant a significant step toward effective separation, it was not generally perceived as sufficient for preventing discrimination as some antitrust cases subsequently described in this paper testify.

5. Institutional and regulatory evolution in the rail sector in Italy

FS is a state-owned company and responsible both for rail infrastructure and rail services in Italy (where only a limited part of the network is run by private companies). The bleak prospects of reducing the huge national deficit burdened by the subsidies paid to FS and the need to respect the parameters of the stability pact, among other economic policy measures, have induced the Italian government to start looking into the railway's *black box*. The increase of service quality, reduction of government spending in this sector, and the inversion of the modal split trend towards an ever increasing use of the road- both passenger and freight - are all objectives pursued by the introduction of competition in the sector. The first action to take involves reducing entry and exit barriers so to render competition in the market effective. With respect to these issues, art. 131 of Law 388/2000 intervened on barrier reduction by introducing, among other things, third party access. A ministerial decree of May 23rd 2000 granted a license to Trenitalia for operating transport services, thus liberalising the market by eliminating FS's previous concession. The general impression is that there is a generalised increase in pressure for greater efficiency. This impression is corroborated by changes such as the following: government budget tightening[15], greater pricing freedom (even in presence of a price cap), and performance-related rewarding for senior managers. In order to speed up the liberalisation and vertical separation process, other initiatives should be taken to reduce entry barriers for rail and multi-modal transport market: remove regulatory power from FS's hands and move it to either the government or, even better, to an independent authority; introduce competition in the market whenever possible[16]; acquire and analyse all the relevant information at a national level in order to administer regulation properly; and introduce competitive bidding also for maintenance and construction services. All these further steps would be more easily taken if there were a clear intention to create an independent regulatory body with instruments and objectives similar to those characterising the Office of the Railway Regulator in the UK.

At present FS is owned and regulated by the state (Ministry

of the Treasury and Ministry of Transport), while at the same time being subject to European rules. The relationship is also ruled by a "Contratto di Programma" (Master Plan) as well as by a public service contract. The first defines investment guidelines whereas the second regulates the unprofitable services that FS is asked to produce along with the compensation mechanisms used. CIPE (Interministerial Committee for Economic Planning) and the Ministry of Transport regulate prices for freight and long distance passenger services as well as track access charges. CIPE defines the guidelines and their practical application is left to the Ministry of Transport[17]. The AA has only limited jurisdiction in this sector with reference to competition law enforcement and, notwithstanding some legal controversies over interpretation, it has exerted its advocacy powers to stimulate the adoption of pro-competitive measures.

5.1 Infrastructure charges

After the switch from concession to access right awarding, one of the most important policy reforms is the regulation of access to rail infrastructure. This institutional change can be classified among those instruments that directly influence prices. CIPE Resolution 180 of the 5th of November 1999 defines the method of calculating access charges and provides the first railway infrastructure information report stating track assignment criteria for railway license holders and the new Master Plan with the infrastructure manager - now Rete Ferroviaria Italiana (RFI) still within FS Holding. Resolution 180 foresees an access charging system based on the following principles: a) "usage costs"[18] are taken as a base for calculating access fees, b) the "usage costs" considered for calculating access charges are not effective, but estimated taking into consideration that, since they depend on the level of the overall network efficiency, the effective ones are higher than those that would occur were the network efficiently managed[19], and c) the calculation method aims at maximising network use and favouring new entrants[20]. The proposed solution stands mid-way between marginal cost pricing, on the one hand, and average cost pricing on the other. The first charging method would stimulate maximum railway infrastructure use by facilitating the entrance of new operators but just covering a mere 10% of the total costs[21], whereas the second would cover approximately 50% of all the costs due to infrastructure management but would, at the same time, reduce infrastructure use to a socially inefficient level. The solution adopted mediates between the two desirable but contrasting objectives - cost coverage and increased number of operators. Subsequent adoption of these general principles has come through the Ministerial decrees of March 22nd and 23rd 2000 defining access charge procedures along with the above mentioned guidelines. The new Master Plan, on the other hand, clarifies the engagements the State assumes in financing the investment and extraordinary maintenance programmes that RFI will undertake as well as the financial contributions covering the "technological component" part of the "usage costs" that are temporarily not paid by train operators. Furthermore, the *Prospetto Informativo della Rete* (Network Information Report - NIR), published by RFI, defines the criteria for track assignment for the period from the 10th of July 2001 to the 14th of December 2002. It not only conforms to the principles set by the European directives, but also states that pluri-annual contracts cannot be used to assign a number of track-kilometres that would engage more than 70% of total network capacity in general. With specific reference to each single origin destination pair, the maximum limit is set to 85% of the total amount assigned. In case the assigned track capacity is used for less than 80% and for passenger and for less than 50% for freight, the initial assignment is not confirmed for the remaining periods. Further constraints have been imposed on RFI in accordance with the general European regulatory stance. In fact, not only must it provide basic network access and usage services but it must also guarantee each train operator, sufficient space proportional to the quantity of tracks booked, for auto production or third party production of manoeuvre services in passenger stations, and marshalling yard facilities for freight and maintenance services if requested[22]. Regulatory aspects concerning the appropriateness of keeping this function within a company that *de facto* belongs to FS will be considered in relation to regulatory capture problems in paragraph 6.

5.2 Medium-long run passenger services

Together with the regulatory innovations implemented for RFI there has also been a relevant intervention in the long-distance passenger rail transport market to create the necessary preconditions for offering a commercially remunerative service, given that this is a market sector in which true competition is most likely going to take place. Trenitalia, the incumbent, is presently operating in a situation where tariffs and operational costs are, respectively, lower and higher than those of comparable train operators in other European countries. To stimulate competition in this market, it is important to reduce the gap between costs and charges since, otherwise, any potential new entrant would be disheartened by the presence of a subsidised incumbent producing non remunerative services[23]. Following this general orientation, CIPE passed the Resolution 173 of the 5th of November 1999 defining:

a) a price cap mechanism for medium-long distance services for a four years period (2000 – 2003) allowing a mean weighted price increase of 3,5% in real terms;

b) the price increases linked to the amelioration of the service quality provided will not only allow for the reduction of the gap between Italian railway prices and those of the major European partners but should also guarantee the coverage of, at least, the "efficient production" costs for each service unit produced;

c) the freedom for Trenitalia, within the imposed price cap limits, to charge commercially based prices.

5.3 Regional transport services

Italy is undergoing a profound process of competence

decentralisation and the regions[24] are acquiring greater administrative powers. The transport sector has undergone similar changes and, in different aspects, has been a forerunner. Regional governments will receive funds from the national level and will then be responsible for local passenger transport in all modes, bus and rail constituting the most important components. Law 242 of 1997 and its subsequent integration, Law 400 of 1999 (to be further modified by a forthcoming Law), emphasise the role of competition in the market, and, whenever public service obligations and public subsidies are needed, it clearly states the compulsory adoption of competitive tendering for the assignment of the service. Once the tendering operations are over and the winner is selected the service contract will serve to specify in detail all the reciprocal obligations. The service contract will allow some revision mechanisms so as to provide a flexible regulatory instrument helpful for the fine tuning of what will always remain an incomplete contract.

The debate on the interpretation of the various articles of the Law and general philosphy has been quite heated. Even if there are different interpretations and substantial divergences in the adoption time path,[25] the general perception is that the change will have long standing influences on the way the whole sector is organised and administered. Probably most regions, for route and schedule coordination purposes, will tender a single contract for all rail services, or even tender bus and rail services together. The probable adoption of this approach might also be due to the scarce confidence that regional bureaucracies have with regulatory instruments. This tendency should be scrutinized critically and regions should be induced to look carefully at the technical feasibility of introducing competition on the same (bus and rail) routes whenever possible. Both theoretical considerations and practical experience indicate that modal and intermodal competition in the market are the best recipies for lowering prices and increasing service quality[26]. Another reason for the regions' intention to bundle together the various transport services is being able to use cross-subsidisation to finance unprofitable services at the expenses of the profitable ones. This too should be discouraged since it would invalidate the results that competitive tendering should produce, i.e. - assigning the service to the most efficient producer. Tenders for unprofitable services should be kept separate from profitable ones in order to choose the most efficient producer in each case, thus minimising the cost of subsidies. The liberalisation and privatisation trend seems to be confirmed by the recent 2002 Budget Law (n° 448, 28th December 2001), which has confirmed the implementation of market incentives for local public service companies in various industries.

6. Might regulatory capture be a problem?

One issue that should be carefully dealt with when modifying the institutional structure governing such a complex and articulated sector is the impact that introduced innovations might have on the pursuit of the final public goals. Given the present institutional configuration, it is worthwhile asking whether regulatory capture might be a problem and if so what might be its origin, and what can be done to avoid its undesirable effects.

In the benchmark model of regulation, the regulator is supposed to know everything necessary to operate, to be able to pre-commit, as well as to operate in the public interest. Deviations from the hypothesis of this best-case scenario pose different problems. In this paragraph the hypothesis that the regulator may not always be acting in the public interest will be questioned. Different economists have debated the realism of such hypothesis[27] and have considered the conditions under which it is likely that the regulator will act in the interest of the incumbent rather than in that of consumers and potential entrants. The main points of the analysis concern the actual winners and losers after the regulatory reform has taken place, that is - those who will benefit and those who will pay the cost of the rent-seeking attitude that the institutional arrangements will induce. In fact, the regulators themselves might be faced with situations in which they are confronted with strong incentives to behave in their own interest, to the detriment of social welfare and in favour of other groups in society, namely the incumbents and employees. Supposing the prices of a firm are set by a regulator. They must decide whether to privilege low prices making consumers better off or, on the contrary, high prices leading to high profits thus making firms better off. Since regulatory chores require a high level of technical skills, the regulator usually receives a vague mandate and has relatively high discretion over policy. Since the managers of the regulated firms frequently meet with regulators and also represent a better organised and financially stronger lobby than consumer ones, it is likely that they might be "captured", unless there is a linkage mechanism between regulators' salaries and regulatory results in terms of consumer welfare produced.

Regulatory capture is more likely whenever there are a high number of actors with conflicting interests, on one hand, and, an inappropriate regulatory system on the other. In fact, this might well be considered an appropriate description of the regulatory regime in the Italian railway sector. Regulatory capture might take place at different levels. First of all there can be a form of regulatory capture deriving from the greater relevance attributed by politicians to objectives that contrast with the objective of creating a common level playing field where the forces of free competition may meet and interact. Furthermore, what is more commonly considered regulatory capture refers to the capture of the technical office or person in charge of verifying the correct application of the regulatory mandate that, for negligence or for personal economic convenience, willingly avoids the application of the regulation.

In this situation there are actions that can be taken to favour the correct functioning of the market that, on the contrary, are not taken so as to favour those that should be regulated. This type of behaviour is more likely when the institutional

environment does not provide incentives to behave correctly, that is - to conform to what regulatory laws prescribe. Contrasting signals coming form the political sphere do not help the strengthening of the regulatory stance. The likelihood of regulatory capture on both levels increases in the presence of asymmetric information especially, as usually happens, when regulated actors dispose of better information than the regulator itself. Information asymmetry problems pose various questions to the regulator, but there are also countermeasures that might be adopted to reduce and circumscribe the negative effects provoked by this situation. In fact, the regulator that has to catch up with the regulated firm in a context of information asymmetry might act to: a) acquire specialists of the regulated sector, b) acquire information by cross-examining the various regulated firms, c) stimulate yard-stick competition whenever possible to indirectly acquire previously undisclosed information, or d) foster a best practice virtuous circle. Unfortunately in Italy the regulator (Ministry of Transport and CIPE) is in such a situation that it is not capable of adopting any of the above mentioned actions. Given this bleak reality one has to recognise that an implicit and even unwilling regulatory capture is very likely or inevitable since the technical phase of a regulatory process is usually completely dominated by the incumbent and only through a subsequent bargaining process on the economic aspects is the final decision taken. Unless the regulator gets access to an independent, credible and ascertainable flow of technical information, or else the whole regulatory process loses credibility.

7. What is the Antitrust Authority doing in the meanwhile?

The position taken by the AA has to be analysed in order to understand what are some of the most important regulatory interventions in this sector. The analysis of the AA position will be based on a recent paper that one of its experts in the transport sector presented at an international seminar on competition and European railway development[28].

Low productivity and substantial deficits can largely be attributed to pre-competitive factors linked to the lack of effective budget constraints and inefficient control of expenses. An absence of stringent budget constraints has reduced any incentive to minimise costs, resulting in overmanning and low service quality. This situation, coupled with an asymmetric information position objectively difficult to dismantle, has provided good arguments to FS managers asking for ever increasing subsidies.

Italy, along with other European partners, has introduced substantial modifications of the regulatory asset in the railway sector but, nonetheless, there is still clear opposition to further developing and implementing the liberalisation process. In fact, those who presently enjoy monopoly rents - i.e.: a) FS via subsidies, b) FS managers and employees via higher salaries, c) FS suppliers via supra-competitive prices - are, from their point of view, understandably against further liberalisation. Nevertheless, one has to consider carefully the role that market liberalisation might play in increasing efficiency and fostering better service quality. The position expressed by the AA, both on FS's behaviour as a dominant rolling-stock purchaser as well as a dominant supplier of railway transport services, is of great interest for the analysis proposed in this paper. Since the early '90s, the AA has intervened several times in the railway sector[29]. The proceedings of these interventions concerned the relationship between FS and its suppliers, the potential monopolisation of road and maritime transport, vertical restraint and discrimination affecting inter-modal transport.

The apparently "self-damaging abuses", (as Pezzoli describes the Capri Consortium and Fercomint case[30], whereby FS's purchasing policies resulted in a de facto protection of a particular national supplier), have been substantially redressed both via AA's decisions also thanks to the introduction of tendering procedures. Nowadays FS's purchasing procedures are much more efficient thanks to the adoption of more competitive purchasing mechanisms.

The Sogin/FS decision[31] is useful in clarifying the attempt made by FS to integrate rail with other modes of transport in order to put into place anti-competitive strategies. FS decided to buy the Sogin bus company in order to acquire a dominant position. In this case the costs that integration provokes more than outweigh the actual benefits in terms of allocative efficiency, even considering the potential benefits deriving from schedule integration -given that integration- where service overlapping is avoided automatically reduces inter-modal competition and increases the risk of dominant position abuse.

Vertical restraints and discrimination in multi-modal transport has also been a matter of concern for AA. In fact, FS, thanks to its integrated structure, has adopted anti-competitive purchasing practices jeopardising free competition on markets contiguous to rail transport. FS, managing both infrastructure and rail transport services, is always exposed to the enticement of discriminating against new entrants with whom it competes in the down-stream markets[32]. These cases were particularly important in evidencing the role that multi-modal and combined transport might have in favouring the liberalisation process by allowing the access of new entrants in high added-value segments of the rail transport sector. The AA intervened when it detected an unjustified application of different conditions for equivalent services thus provoking unfair drawbacks to FS's competitors.

The AA interventions have demonstrated both the need for a strong and well defined regulatory body and that the incumbent, if properly stimulated and given the correct incentives, will start behaving in a free market compatible way. The AA follows, for institutional reasons, a case by case and *ex post* punishing intervention approach and does not dispose of all the necessary regulatory capabilities needed for effective governance. Better results would be achieved had it the chance to act in a pre-emptive way or to use a sort of moral persuasion with respect to the incumbent. These considerations indicate the need for further structural

intervention accompanying the liberalisation process in the Italian rail sector. In fact, either good care is taken of interoperability, labour contracts and track assignment problems or else sooner or later FS will be induced to exploit its dominant position, thus forestalling the whole liberalisation process and frustrating all present efforts. Infrastructures, traction, and rolling stock *de facto* represent a precondition for true competition as, for example, does the need to accept flexible labour contracts in this sector (given that their present nature is due to the peculiar industrial relations that characterise a monopolistic environment). If new entrants have to sustain the same labour costs as the incumbent, a good part of the foreseen benefits of liberalisation will automatically vanish. Finally, the need for an independent player, third to all the participants in the market, is clearly identified especially in connection with the problems arising from track assignment competencies. As Polidori[33] suggests in his work published in this volume, a first step in this direction would be the creation of a dedicated agency, that acquires, organises and circulates information, and standardises procedures, creating a group of highly skilled experts capable of dialoguing at the same level with private company managers. Even if the need for a specific regulatory authority in the transport sector cannot be denied, in Italy the political obstacles have concerned the excessive proliferation of independent authorities. With reference to the aforementioned difference between the political and technical capture risks, however, one has to consider that the creation of an independent authority has two desirable characteristics. On the one hand, it reduces to a minimum the likelihood of regulatory capture at a technical level by: a) acquiring highly specialised experts, b) receiving well defined powers such as, for instance, punishing ones, c) being institutionally independent from the Government in power so as to avoid influence by political pressures, and d) also reducing the likelihood of political regulatory capture via a clear-cut definition of the programming (public), operating (private) and regulating (authority) competencies. These conditions are not present in the current Italian regulatory settings since the bureaucracies to which most regulatory competencies are remitted are, by definition, not independent from the executive power and often are over-exposed to the detrimental effects that political instability provokes[34]. The present situation seems to be a good example of how to promote regulatory capture at all levels and the pro-competition efforts that have so far been put into place will not be able to produce all the desirable effects if the political will deficit is not overcome and profound institutional modifications are implemented.

8. Summary and conclusions

This paper has provided an analysis of the present institutional settings of the regulatory situation in the Italian railway transport sector. Departing from the analysis of the economic and strategic characteristics of network utilities, theoretical suggestions and institutional changes have been individuated. Following a general description of network utilities the analysis has subsequently been focused on the most recent evolution in the regulatory scenario in the sector. The characteristics of the most recent innovations in terms of infrastructure charges, track assignment, medium-long term passenger services, and regional transport have been discussed with the aim of both illustrating the peculiarity of each problem and, at the same time, of describing the institutional settings in which the whole problem is taking place. Regulatory capture is treated as the most worrying issue that might arise from the unsatisfactory institutional context, where pro-competitive actions are taking place in an environment in which, as the antitrust cases described demonstrate, pre-competitive problems are still present and where issues such as effective interoperability, flexible labour contracts, and independent track assignment management are still chimeras. Unless these problems are solved, the expected beneficial shake-up effects that vertical separation is supposed to achieve will not materialise, and after the ashes settle we will be left simply with a more complex and less credible regulatory system which will be even more open to anti-competitive incursions.

NOTES

[1] See also Ponti in this issue.

[2] To cite the most recent and important, one can recall Ponti in this book, and Sebastiani, M., (2002), "Processi di liberalizzazione, privatizzazione e regolazione nei trasporti: assetti istituzionali e "cattura del regolatore"", paper presented at the conference, *La mobilità per lo sviluppo del Paese e delle economie locali*, ISFORT, Foligno, 10th May.

[3] An interesting survey of Antitrust cases in the transportation sector can be found in Pezzoli, A., and A., Siciliano, (2001), "The Liberalization Of The Italian Railways: The Role Of The Italian Competition Authority", paper presented at the conference, *Competition And European Railways Development: Paths And Perspectives Compared*, Università degli Studi di Roma "Tor Vergata", 14-16 February.

[4] On this subject, see Polidori in this issue.

[5] Well aware that the regulatory framework is much more complicated and includes more than two agents, just to cite the most relevant one could recall: suppliers, unions, consumer and environmental groups, I have decided to sacrify some realism to concentrate on the fundamental rules governing the regulatory game.

[6] Modern game theory provides interesting logical instruments to analyse and predict how rational agents will behave once both the choices open to them are defined and their impact on the payoffs each will receive is determined. However, its practical application is sometimes severely limited because the game cannot be precisely defined and its ability to predict the final outcome is reduced. Another fundamental issue that may reduce the applicability of game theory to regulation concerns the inclusion of all relevant features of the problem. The ultimate benchmark for judging the fruitfulness of the application of such an investigation technique is to verify the insights proposed by this method against history and empirical evidence.

[7] A strategy is defined by the set of rules indicating which action to select given the information available, the likely payoffs for all agents, and the equilibrium concept that determines the fianl outcome(s) of the game.

[8] The time horizon within which the analysis is conducted may influence the stability of the relationship, and the set of possible actions, in two different ways. The longer the time horizon, the more room for changing the relevant legal framework but, on the other hand, the longer the time horizon the more confident each agent can become concerning which actions will be considered legal by the counterpart.

[9] When dealing with this type of issue we refer to the concept of Nash equilibrium, that is a situation in which a set of strategies for each agent is defined in such a way that no agent has an explicit or implicit interest in changing his chosen strategy, given the strategies chosen by his competitors/counterparts. Each agent chooses the strategy providing her the highest payoff, given the other agent's choice of strategies, in such a way that no one will have an incentive to deviate from the equilibrium.

[10] OECD, (2001), *Regulatory Reform in Italy*, Reviews of Regulatory Reform, p. 9.

[11] Specific attention is paid to the AA's role in the transport sector in a paragraph 7.

[12] Just to cite two synthetic indicators one could recall that in 1996 fares covered only a quarter of total operating costs and government transfers were close to 1% of GDP making FS, per-capita, the most highly subsidised company in Europe.

[13] This aspect cannot be underestimated since the regional bureaucracy has never had any practical experience in managing a regulated market and it is very unlikely that it will be able to acquire all the necessary skills needed to regulate effectively. The greatest preoccupation in this respect is regulatory capture. Further considerations will be put forward in paragraph 6.

[14] See the Appendix by Emanuela D'Alessio for a more detailed description of the institutional evolution of the liberalisation process of the Italian railway sector.

[15] In the Appendix, this issue will be dealt with in further detail by analysing the evolutions introduced by the latest "Contratto di Programma" (Master Plan).

[16] Considering that almost 80% of the total amount of movement in the railway network takes place on roughly 20% of its extension, one would think that there can be considerable room for this option.

[17] The Appendix gives account of the intriguing complexity of the evolution of the relationship among the different institutional Actors.

[18] By usage costs the Legislator means all those costs involved in using the network, thus excluding all those undergone to create and maintain the infrastructure. Their most important components are the direct and indirect circulation costs such as, for instance, timetable planning and implementation, and part of overhead costs. Even if this might prove a convenient definition one cannot avoid noticing that usage costs, at least in the medium to long-run, are a function of implementation and maintenance costs thus giving rise to a circular definition. The Legislator has defined "existence costs" as those kind of costs that are almost independent from effective circulation. The most important components are attributable to: a) amortisation of the existing infrastructure, b) network expansions, and c) ordinary and extraordinary maintenance costs. All the "existence costs" are financed by the State through the "Contratto di Programma".

[19] *De facto*, the extra costs due to unsatisfactory technological development of the network are paid for by the State. An important example is the need of a second driver due to the inappropriate technological level.

[20] The economic policy idea backing this approach is that rail transportation has positive external effects when compared to its closest substitute (road transport) and thus it should not be strictly compelled to cover all the costs it produces.

[21] See NARS, (1999), *Raccomandazione del 22/7/1999 in materia di tariffa di pedaggio di accesso alla rete ferroviaria*, Rome, Ministry of the Treasury.

[22] All the issues linked to infrastructure access and to its charging are, at least in the medium and long run, linked to investments. As mentioned in the last "Piano Generale dei Trasporti e della Logistica", (Ministry of Transport, 2001, General Transportation and Logistics Plan, Rome) simply by adopting some specific investments on the network it would be possible to increase substantially network capacity so as to create much more room for new operators. This problem has been tackled in the new "Contratto di Programma" by defining incentives and penalties for FS in order to provide it with the appropriate economic incentives.

[23] Notwithstanding the general validity of the considerations put forward in the text, one should not underestimate the potential applicability of a system of competitive bidding for a service contract at a negative price that is commonly applied, for instance, in the bus sector.

[24] There are 20 Regions in Italy and two assimilated Provinces (*Province a Statuto Speciale* – Trento and Bolzano).

[25] There are some regions that have ratified the national laws and are swiftly proceeding to drawing up, passing, and implementing the indispensable regional laws, while there are others that still do not have any regional transportation law. Some regions have already voluntarily tendered some of the transport services to be reassigned, even if they are more the exception than the rule.

[26] The different tendering experiences of the city of Rome have demonstrated that for sufficiently large cities there can be enough room (minimum efficient scale) for applying the same principles not only to regions, but also to lower level administrative bodies (provinces and municipalities).

[27] Among others one should recall the classical work of Stigler, G.J., (1971), "The Theory of Economic Regulation", *Bell Journal of Economics*, vol. 2, pp. 3-21; Posner, R.A., (1971), "Taxation by Regulation", *Bell Journal of Economics*, vol. 2, pp. 22-50; Peltzman, S., (1976), "Towards a More General Theory of Regulation", *Journal of*

Law and Economics, vol. 19, pp. 211-40.

[28] See Pezzoli, A., and A., Siciliano, (2001), op. cit. Andrea Pezzoli is head of one of the Investigative Directorates of the Italian Antitrust Authority.

[29] Intervention has taken the form of proceedings against FS on subjects such as: the implementation of EC directive 91/440, reorganisation of the Finmare Group, and local public transport reform.

[30] See Pezzoli, A., and A., Siciliano, (2001), op. cit. See, also, provision n° 1663, of 22nd December 1993, Consorzio Capri, Bull. N. 40-41/1993.

[31] See Sogin/FS, Bull. n° 40-41/1993.

[32] See Fremura/Ferrovie dello Stato, Bull. n° 18-19/1993, Italcontainer/T.C.F., Bull. n° 48/1995 and Fremura-Assologistica/Ferrovie dello Stato, Bull., n° 8/2000.

[33] See Polidori, P., in this issue.

[34] A spoil system is presently being introduced for the high ranking public bureaucrats who might not be confirmed in their position when a new government sets in.

BIBLIOGRAPHIC REFERENCES

PONTI in this issue.

POLIDORI in this issue.

SEBASTIANI, M., (2002), "Processi di liberalizzazione, privatizzazione e regolazione nei trasporti: assetti istituzionali e "cattura del regolatore", paper presented at the conference, La mobilità per lo sviluppo del Paese e delle economie locali, ISFORT, Foligno, 10th May.

PEZZOLI, A., AND A., SICILIANO, (2001), "The Liberalization Of The Italian Railways: The Role Of The Italian Competition Authority", paper presented at the conference, Competition And European Railways Development: Paths And Perspectives Compared, Università degli Studi di Roma "Tor Vergata", 14-16 February.

OECD, (2001), Regulatory Reform in Italy, Reviews of Regulatory Reform, p. 9.

NARS, Raccomandazione del 22/7/1999 in materia di tariffa di pedaggio di accesso alla rete ferroviaria, Rome, Ministry of the Treasury.

FARRER, T.H., (1902), The State in its Relation to Trade, *Macmillan, London*.

NEWBERY, D.M., (2000), Privatisation, Restructuring, and Regulation of Network Utilities. The Walras-Pareto Lectures, *MIY Press, Cambridge, MA*.

Ministry of Transport, 2001, General Transportation and Logistics Plan, Rome.

STIGLER, G.J., (1971), "The Theory of Economic Regulation", *Bell Journal of Economics*, vol. 2, pp. 3-21.

POSNER, R.A., (1971), "Taxation by Regulation", *Bell Journal of Economics*, vol. 2, pp. 22-50.

PELTZMAN, S., (1976), "Towards a More General Theory of Regulation", *Journal of Law and Economics,* vol. 19, pp. 211-40.

Atitrust Authority, provision n° 1663, of 22nd December 1993, Consorzio Capri, Bull. N. 40-41/1993.

Fremura/Ferrovie dello Stato, Bull. n° 18-19/1993,

Italcontainer/T.C.F., Bull. n° 48/1995.

Fremura-Assologistica/Ferrovie dello Stato, Bull., n° 8/2000.

APPENDIX

The Full Legislative Story of the Rail Transport Reform Process

Emanuela D'Alessio
COPIT

1. The process of liberalisation in the rail sector in Italy

1.1 Guidelines for the reorganisation of the FS (State Railway) - Directive from the President of the Council of Ministers, January 30, 1997 (Prodi Directive)

The salient points for the economic and financial reorganisation and improvement of the company FS are the following: a four-year business plan, an investment plan, containment of unit cost of production, revision of the tariff system for passenger transport, and separation between infrastructure management and operation services.

The four-year business plan should outline the necessary provisions for bringing the company up to par with the average European standards of quality and characteristics for services offered, unit costs of production, and cost coverage through market revenues. It should provide for an investment plan as well as criteria and objectives for the development of passenger and goods transport as well as indicate ways in which to reorganise the company financially and economically. In the area of production cost containment, the per-unit production cost of labour will have to be revised, introducing significant elements of flexibility. The definition of the new Public Service Contract 1997-2000 provides for a new tariff system for passenger transport to cover effective costs of production. Such tariffs will constitute the base for applying a price-cap method. The price quota to be carried by users, and the residual quota to be shouldered by the state, and the time needed to bring the tariffs into line, must still be established.

1.2 FS Reorganisation - Directive from the President of the Council of Ministers, March 18 1999 (D'Alema Directive)

The D'Alema directive, much inspired by concepts from the preceding Prodi Directive, adds some further fine-tuning and new concepts. The central point is the business plan (relative to the years 1999-2003) that contains general and concise objectives. These include: an increase in the volume of passenger and goods traffic, a balanced budget, safety and quality of service, an evaluation of human resources, a reordering of organisation and parternships, an investment plan, and economic improvement. The investment plan must take some new priorities into account, such as new automation technology, safety, acceleration of the High Capacity project, integration with the European network, the rail shipment project, development of the network in the south, urban area projects, and respect for anti-pollution laws. The directive pays particular attention to safety, providing for a new annually updated safety plan. Another chapter of the business plan must deal with the development of transport services, defining commercial strategies for the development of traffic and accounting for the process of liberalisation in the European rail transport market. The Directive also gives a privileged place to service quality, with particular reference to passenger and goods transport in terms of punctuality, comfort of rolling stock, and reliability. In terms of reordering of organisation and partnerships, the Directive states precise implementation deadlines that have been substantially respected by the present organisation of FS.

1.3 The Evolution of the Ordering of FS

The FS group was turned into a Stock Corporation (Ltd.) in 1992. The shareholder of the Italian railways is the state, and in such, the Minister of the Treasury. Relations with the state are regulated by an Act of Concession that gives the railway a 70-year license to manage public rail and marine transport and to construct new lines and systems. With the Master Plan, the state as shareholder contributes to the maintenance of the infrastructure and provides financing to the company for the development of the existing rail network, acquisition of advanced technology, development of the High Capacity project, and for the renewal of rolling stock. With the Service Contract, on the other hand, the state buys those services that meet social needs that are cost-unsustainable for the company.

The company further evolved in 1998 when the Infrastructure Division was created. In May, 1999, a further three divisions were created to ensure medium and long distance passenger transportation, shipment of goods, and local area transport (carried out under the Prodi and D'Alema Directives).

The current structure is as follows. FS is the industrial holding that oversees strategy. Trenitalia, formed on June 1, 2000, is in charge of passenger transport and shipping and is subdivided into four divisions (Passenger, Regional Transport, Cargo, and Rolling Stock Technology Unit). RFI, formed in July, 2001, manages the rail network and holds the following responsibilities: ensure all rail activities over the entire rail network, guarantee the development and maintenance of an efficient infrastructure system, ensure the technological development of the Railway's systems and components, oversee safety and issue safety certificates to rail companies, oversee network capacity and usage by rail companies through the establishment of schedules and the management of contracts with the same rail companies.

The other companies that complete the State Railway Group are organised according to their specialisation: TAV is responsible for the High Capacity project; Italferr is the engineering company that plans and carries out large scale infrastructure and technological projects; Metropolis manages and evaluates the holdings of the Railway Group and plans renewal projects in the rail areas of the large cities; Grandi

Stazioni manages, renews, and evaluates the rail stations of the principle cities; Sogin oversees integrated mobility, rail, international, national, and local auto services; Fercredit is responsible for financial services.

2. Acceptance of Community rail Directives. Acceptance of Directive 91/440/CEE

2.1 Regulation with implementation norms for the acceptance of Directive 91/440/CEE relative to the Development of Community Railways - DPR July 8, 1998, n. 277

In accordance with Directive 91/440 and the principle of separation between management of infrastructure and operation, this regulation specifically refers to the management of rail infrastructure and the activity of rail transport by the Italian railroad companies, as well as access rights to rail infrastructure for international rail companies and those companies involved in combined international transport. The principles introduced by the Community norms are: autonomous management of rail companies, possible reorganisation of rail company financing, separation of accounting or formation of separate companies to manage the rail network and infrastructure, and free market access for transportation of goods or passengers by rail. The infrastructure manager is any public or private organisation in charge of building and maintaining the infrastructure, as well as managing control and security systems needed for convoy circulation. The infrastructure manager must be independent from companies operating in the transportation sector. A concession and a Master Plan regulate the relationship between the infrastructure manager and the state. Access to services is guaranteed by the manager, respecting the principles of non-discrimination and equal treatment of international rail companies and rail transport companies. Those international associations of rail companies of which at least one member has its principal headquarters in Italy have the right of access to the infrastructure. The manager will apply and collect an access fee from these companies for using the infrastructure. The access fee is determined by the appropriate Minister, given the opinion expressed by CIPE (see Resolution CIPE n. 180/1999). The present regulation obviously does not take into account the new directive 2001/12/CE, still waiting to be accepted, which integrates and modifies 91/440/CE clarifying the question of separation of accounting by defining the separation of essential functions, extending access rights, and defining the figure of the Infrastructure Manager responsible for its area of business.

2.2 Act of Concession for Relationships Between the Rail Infrastructure Manager and the State - DM October 31, 2000, n.138T

The ministerial provision has refined the concession act for the regulation of relationships between the infrastructure manager and the state, as outlined by Art. 5, Comma 2 of DPR 277/1998.

2.3 Master Plan 2001-2005 - Resolution CIPE April 4, 2001

This resolution has refined the master plan between the Minister of Transport and Navigation and FS, still in accordance with Art. 5, Comma 2 of DPR 277/1998. The master plan regulates the relationship between the state and the infrastructure manager regarding the financing of: ordinary and extraordinary infrastructure maintenance, investments for safety improvement, investments for research, experimentation, and updating in the areas of health and the environment, updating of specific techniques for the inter-operability of the European rail network, and investments for the development of the High Capacity program.

2.4 Accounting separation accomplishment between infrastructure management and transport activities – DM n. 703696 May 22, 2000

With the implementation of art. 4, comma 4 of DPR 277/1998, the accounting separation process was accomplished with the definition and approval of the separation method to be used in dividing infrastructure management from operations. This process had started back in 1998 when FS transferred infrastructure management functions to its Infrastructure Division.

3. Acceptance of Community Directives concerning rail transport. Acceptance of Directive 95/18 e 95/19

3.1 Regulation for the Implementation of Directive 95/18/CE on Licensing of Rail Companies, and Directive 95/19/CE on the Assignment of Rail Infrastructure Capacities and Collection of Usage Rights - DPR March 16, 1999, n.146.

This regulation defines the following concepts: license - the authorisation given by the appropriate authorities of the member states to companies with headquarters in Community territory for the provision of international passenger and freight transport; slot - the period of infrastructure usage necessary for one train to travel between two locations; capacity - the sum of slots that constitute usage potential; assignment - the allotment of infrastructure capacity.

It has been determined that the companies must have a license granted by the state of residence (by the Ministry of Transport and Navigation) for any provision of public rail service. Granting the license authorises the provision of services and formally recognises the applicant as a qualified rail company. The procurement of a license, however, does not imply the right to use the infrastructure. This right must be obtained by agreement with the infrastructure manager. Infrastructure usage is to be granted only to companies in possession of a license and safety certificate, and which have stipulated with the infrastructure manager the necessary administrative, technical, and financial agreements relevant to the assignment of capacity. The infrastructure manager is responsible for the assignment of capacity, and must, being

knowledgeable of the capacity of all available lines, proceed with assignment so as to guarantee equity, non-discrimination, and efficient infrastructure usage. The criteria and procedures for assignment are to be made public, and rejection of applications must be for sound reason. Upon request for capacity the applicant must give the manager a deposit for the amount directly fixed by the manager. The present regulation obviously does not take into account any future abrogation of Directive 95/19 concerning the assignment of capacity or its complete substitution by the new Directive 2001/14/CE (waiting for acceptance) that outlines new duties on the part of the infrastructure manager.

3.2 Issuing of Licenses to Rail Companies and Determination of Relative Fees - DM March 23, 2000, n.45T

This ministerial decree has brought about the determination, outlined in Art. 4, Comma 4 of DPR 146/1999, of the reimbursable fees to cover administrative costs sustained for the investigation, consideration, and granting of the license. The first license was granted to FS, now Trenitalia, with the DM 73T of May 23, 2000.
Another 8 licenses were successively issued under the guidelines of DPR 146/1999. Furthermore, in compliance with Art. 131 of the finance law (legislation n.388/2000) all nine license-holders have been conceded extensions to national services.

3.3 Assignment of Rail Capacity - Network Information Report (NIR)

In compliance with Art. 9, comma 2, of DPR 146/1999, the infrastructure manager made public the criteria and procedures for rail capacity assignment on October 27, 2000.

4. Tariff system

4.1 Rail Network Access Charging Scheme- Resolution CIPE n.180, November 5, 1999.

This resolution established a tariff system for the access toll to the rail network based on a few principles: the cost of infrastructure usage - that is the direct and indirect cost of circulation - remain the responsibility of the state. This includes the extra costs of technological lag and the burden of a provisional toll "discount" for transport companies. The cost of infrastructure usage is financed by the state through the program contract, including the costs of depreciation of existing infrastructure, new investments, and ordinary and extraordinary maintenance.

4.2 Criteria for Determining the Rail Infrastructure Usage Fee - Ministerial Decrees March 22 and 23, 2000, 43T and 44T.

The indications of Resolution CIPE 180/1999 were applied in the successive Ministerial Decrees 43T and 44T, which determined some toll rates in accordance with methodologies indicated by CIPE.

4.3 Medium and Long Distance Rail Tariffs- Resolution CIPE n.173 November 5, 1999.

With Resolution 173/1999, another regulation was added to the network management regulations for the purpose of making the medium and long distance transportation of passengers remunerative. The resolution's most salient points are: the establishment of a 4-year price cap for medium and long distance services, a strong link between tariffs and progress in efficiency and quality, and freedom to set and manage tariffs for Trenitalia.

5. Local and regional transport

5.1 Granting of Functions and Tasks Concerning Local Public Transport to the Regions and Local Bodies, Under Art. 4, Comma 4 of Law n.59 of March 15 1997, n.422 of November 19, 1997, and n.400 of August 4, 1999.

Another relevant aspect for rail transport liberalisation in Italy is the granting of regional transport functions and tasks to the Regions in compliance with the Bassanini Law n.59/1997. Air, maritime and road transport at the international and inter-regional level, remain in the hands of the state. National and international rail transport remains under state control only if involving high standards of quality or medium to long distance travel.
In short, these are the salient aspects of the legislation: decentralisation of programming (planning) and administration of local public transport, creation of local public bodies to carry the functions of programming, administration and control, and reorganisation of service management. The instrument regulating relations between the different bodies involved is the service contract - designed to define and establish individual areas of competence. Lasting no longer than nine-years, the service contract ensures that from January 1, 2000 at least a 0.35 ratio between revenues and operating costs is achieved, net of infrastructure costs. The assignment of the service is the choice of the service manager, and the regions are compelled to go through the open-competition procedure to obtain them. December 31, 2003 was the date fixed for the termination of the transition period during which service assignments could be performed without competitive tendering. With particular reference to the rail sector, the following should also occur: the transfer of rail infrastructure in concession and the former governmental commissioned management to the regions, the postponement of terms for the stipulation of new service contracts between FS and the regions, and the extension to local rail authorities of European norms and relative integration decrees concerning separation of infrastructure and services as well as division of capacity.

5.2 Article 35, Law N.448, December 28, 2001 (Budget Law 2002)

This article is inspired by the general principles of liberalisation and the substantial privatisation of local public

service firms (including local public transport). The ownership of networks and systems is maintained by local bodies that can transfer it to companies of their own in which they maintain a majority share-hold. Where sector norms allow for it, network and system management can be separated through service distribution. The first can be directly entrusted to public companies or assigned by tender, while the second can only be assigned by public tender.

5.3 D.Lgs Infrastructure and Transport - July, 2002

On July 17, 2002 the Parliament approved definitively the draft legislation connected with the Finance Law of 2002 containing norms concerning infrastructure and transport.

Railway Liberalization from a "Public Choice" Perspective

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1. Introduction

The Public Choice (PC) approach can be summarised, in an extreme synthesis, as the rebuttal of the assumption of the public decision-maker as "benevolent" and "all-knowing". This rebuttal has wide consequences: market failures must be balanced against the failures of the state; and in so doing, an entirely new set of policy tools has to be developed. Luckily, these tools can also be derived by different sources of elaboration: the principal-agent relationship, incomplete contracts theory, etc.. This field has been explored mainly in order to deal with "private" problems (insurance contracts etc.); its convergence with the PC approach to the political environment, is apparently a very fertile occasion for further developments.

The main issues of the PC approach are related to the identification of the possible "egoistic" objectives that can explain the actual behaviour of the decision makers, when the traditional "Social Choice" (SC) approach appears incapable of explaining that behaviour. In turn, within this analysis, the decision makers have to be separated in two main categories:

1. elected officials at different administrative levels, whose main "egoistic" objectives can be re-election (i.e. locally, short-term, special-interest oriented ones); and
2. public agencies (for example, the national railways), whose main "egoistic" objectives can be of a "rent seeking" nature, (i.e. reduced efforts, guaranteed subsides, etc.) and "capture", (i.e. the capability of controlling the political regulators of the agencies through vote exchanges, "information rents", etc.).

The PC approach to policy analysis contrasts the more traditional SC approach, in which public policies are assumed *a priori* as aimed to welfare maximization (assuming therefore a "benevolent prince" as the actor of every political process).

The PC approach is generally applied within an ideological context that strongly supports extreme pro-market solutions. This is consistent with the assumption of a "core" failure of state intervention, since the same motivations of this intervention show deep distortions, independently from the actual result of the political action itself. Nevertheless, the logical tools developed within this approach seem effective and useful also within a different, more redistribution-oriented context. As far as the proposed tools are valid, they may become of primary importance for reforming a socially-minded political system, not only for destroying it. Distortions and weaknesses of the welfare state are probably more worrying as greater importance is attributed to the role of the state.

Within the transport sector, this role remains crucial, for well-known technical reasons. The sector in fact looks specially prone to market failures: natural monopolies are dominant in the infrastructures, environmental and safety externalities are of growing magnitude, as are congestion-related externalities[1]. Capital indivisibility phenomena, and "network effects", are also large for infrastructures, and "Mohring effects" for collective services, and railways in particular[2].

Furthermore, collective transport services are in many cases considered an effective tool for income redistribution, as infrastructures are considered important tools for the economic growth of less-developed regions. This part of the picture is specially true for Europe.

It seems, therefore, relevant to use these types of realistic and up-to-date analytical tools for evaluating the structure of the European rail policy .

2. The picture up to now

2.1. The European policy

The Council Directive of July 29, 1991 on the development of the Community's Railways (EU 440/91) was aimed at opening the European railways market. It made mandatory for Member states to separate the industry vertically, i.e. to keep the rail infrastructures mostly public[3], and to promote competition in the market for the services. The directive immediately showed several limitations: only the long distance services were to be opened to competition, while the regional ones were not. Furthermore:

- in an initial phase, only inter-modal freight services were involved;
- "special" infrastructures (i.e. high-speed lines) were exempted;
- access fares and rules were vaguely specified, although they are not permitted to be "discriminatory", "grandfather clauses" were not explicitly excluded;
- state subsidies to the incumbent service providers are formally excluded, but in fact a wide set of hidden subsidies resulted possible.

Subsequent directives from the Commission have specified in further detail track allocation and licensing procedures for operations.

More generic "recommendations" have been issued by the European Parliament, but without major practical impact.

Apart from Sweden, and, of course, the U.K., not much has happened within the different European countries.

Paradoxically, for local services, some national legislation (Germany and Italy) seems to be more market-oriented than the European policy[4].

Political pressure, specially from France, to permit exceptions and delays to liberalisation, remained strong (stressing, for example, the need for "collaboration" between national railway companies, as a more effective approach than competition).

The basic explicit goal of the European policy for the sector was to improve the performances of an environment-friendly mode and, at the same time, to reduce the financial strain that the heavy subsidies were generating on the public purses (given also the Maastricht constraints on the public debt and deficit of the member states).

Implementation problems of the European policy appeared severe from the very first years after EU Directive 440/91. The national companies (the incumbents) immediately began a *de facto* strong opposition to the liberalisation process, and set up, as a matter of fact, a "cartel" in order to defend their positions.

Three examples can confirm this argument.

The Union of the European Railways appointed seven academic experts to produce a document on EU 440/91. The document was basically favourable toward the Directive, even if underlying drawbacks, weak spots, undefined issues, etc. This document, however, not only was never made public, but also its results were never discussed with the authors themselves[5].

A second example is the fate of the "freeways" project[6] (COM(97) 242). The European Commission, acknowledging that the liberalisation process, after several years, was getting nowhere, tried a more consensus-based approach. Several international rail corridors were designed (the main ones going through Germany), where competition was to be allowed, even if only for freight. Further conditions concerned a minimum commercial speed (60 Km/h) and a "single shop" service, in order to provide rail operators with only one counterpart, able to deal with track allocation, schedules and tariffs for all the chosen routes. No one applied. The reason was simple: Germany choose to charge the average cost for track use (obviously much higher than the marginal cost). German trains were paying the average cost themselves too, so formally there was no discrimination. The only detail was that German trains were paying that amount to themselves, vertical separation not yet being in place, and the subsidies to the services were not formally forbidden by the Directive.

The third example is in fact a "missing action". Why did no incumbent try to enter in a foreign market under competitive terms, not even on the "freeways" that were set up in consensual term with the incumbents? It is totally unrealistic to assume that the costs of the rail services for the incumbents do not show differences encouraging a cost-based competition (quite the contrary is true). The only possible explanation lies within the strength of the above-mentioned cartel.

More than ten years have passed and no long-distance passenger train and very few freight trains are running under competitive conditions in continental Europe. As usual, "real" competition is promised by politicians as coming "very soon". To consider this a policy failure seems quite obvious. In the meantime, public costs remain very high (notwithstanding some periodical declaration by individual railways of achieving a "break-even" budget; this result is technically true, but it is obtained against arbitrary subsidies, set often in advance specially to allow for this public-pleasing result). Furthermore, a provocative extrapolation of the "Financial Times" shows that the railway system, in continental Europe, will disappear completely after 2017 for lack of demand. This forecast looks unrealistic, but the weakness of the system remains evident.

The main consideration concerning the causes of European policy failure in this sector has to focus on the crucial role played by the governments with respect to their own railways companies (the incumbents). This contradiction probably undermined the liberalisation process from the beginning. A second "technical" explanation can be found in the already-mentioned weakness of the rail mode, that loses traffic notwithstanding the large state subsidies (quite a different picture from the air or road sector). This means that the external pressure from new-entrants is limited or non-existent. It has to be observed, however, that the high level of subsidisation easily permits incentives for the entry of new, more efficient operators, if the subsidies are really allocated in a non-discriminatory way. The problem is the lack of political will to give clear "signals" of that intention.

A "capture" phenomenon seems quite evident for this sector. "Rent seeking" by the large rail "agents" (the incumbents) has been achieved (i.e. overstaffing, salaries and wages well above the average of similar private sectors, low per-capita physical productivity, no risk of loosing jobs without large compensations). The supply industry (rolling stock etc.) is also generally protected from real competition (often due to fancy technical barriers). The main explanation can be basically set within the double power of the trade unions: the control of a large number of votes, and the capability of blocking the entire system since this is a monopoly with extended technical and functional "indivisibilities". These two facts reinforce each other, in a vicious circle. An immediate value judgement can be made here: defending labour income may be an acceptable political goal, perhaps even sector-by-sector; defending overstaffing is less acceptable, since the rail system is technically a capital-intensive sector (trains can be run almost automatically, due to the "guided" route and remote-controlled traffic). Overstaffing the railways means "blocking" its technical progress, that is mainly linked to automatisation.

A secondary explanation appears far weaker: politicians defend the rail system against competition, fearing that competition may imply a reduced social content of the service (safety, environment, marginal settlements to be served, etc.). It is fairly evident, however, that all these goals can be made explicit in transparent contractual terms, and the contracts

"auctioned" in the market. Perhaps emotional factors are at play too. A good example of a misled perception can be drawn from the safety problems of the (privatised) British rails[7]. Forty casualties have given rise to a large emotional pressure against the entire liberalisation process, while the 107 casualties of the (totally public) German railways have never been linked to their "sloppy State management"[8] (exactly the same emotional attitude was visible for a certain period in American air accidents: they were linked with the deregulation process, even if the statistics showed no actual worsening of safety records after liberalisation).

2.2 Cross subsidies as a special "capture" case

In a monopolistic context, cross subsidisation constitutes one of the biggest problems of public *governance*[9]. In the rail sector, long distance services (national intercity services, overnight services, etc.) present operating deficits on some links and extraordinary profits on others: the passengers on the first type of link subsidize the passengers (or the empty trains!) on the others. This solution isn't necessarily unacceptable, but a democratic and transparent debate is needed.

On one side, the rail companies use "social" arguments to defend this policy; on the other side the regional (or national) administrations obtain "free" services across their territories. The result is a kind of "free riding" policy of the local administration in subsidising non-commercial passenger services.

A correct approach should transfer the extra profits from the rail companies to the state that in turn can decide to subsidise non-commercial services. Other allocations of these funds are possible: the state can decide to subside schools, hospitals, or other transport services. In particular, on non commercially viable links it can decide to subsidise the existing rail services, or alternative services, for example bus or air services; the "border line" solution is to provide no service at all. In this case, the state can defend the consumers of the high-traffic services eliminating the extra profits on the profitable links through a standard regulatory act (i.e. a price/subsidy cap or a competitive bidding policy), forcing down the fares in this way. But a democratic decision-making system is necessary, and every decision must be rendered explicit, with the different actors involved showing their real objectives. In particular, the state must show its specific social strategy, and every trade-off must be supported by an explicit and public debate.

This political transparency seems necessary both within a SC approach and within a PC approach. In a SC approach, this should be so since there are important "market failures" in the sector, and the ensuing "corrections" would require a specific political debate. In a PC approach, on one hand, because through cross subsidisations (and the related extra profits, in case of private operators) the incumbents can "capture" the regulatory agencies, improving their monopolistic positions; on the other hand, if the regulators are elected (or too strictly depending from elected officers), because their motivations can be distorted by the need to obtain support for the next election. Further specifying this point, an elected decision-maker couldn't possibly motivate service reductions in his region, damaging his electorate, in order to get equity results aimed at other social groups, although the latter decision may well increase total welfare[10].

To avoid cross subsidisation and "capture" phenomena, it is necessary to separate commercial from the non-commercial service operations. The two kind of services must be operated by different companies or, if operated by the same company, at least separate budgeting procedures are needed in order to avoid the permanence of a dominant position through political "exchange of favours".

Now, some example cases will be analysed; at the end, some recommendations and solution will be put forward.

2.2.1 Sweden

In 1988 Sweden began transport reform. In the rail sector the separation between the infrastructure and the rail services has been the most important innovative element[11]. Banverket (BV) is the new company of rail infrastructure. The passenger services have been divided into two groups: regional services and national ones. Regional services have been regulated in concurrence with the market and "gross cost" contracts: in the first round the incumbent Staten Järnvägern (SJ) won twelve of sixteen lots auctioned, and all the lots in the second round.

The national services have been further separated into commercial and non-commercial services. The incumbent operates the commercial services as an unregulated monopolist and also decides on the division of the national services into the two above-mentioned groups. Apparently, a "moderation of competition" principle defends the incumbent, as a "national champion".

The national non-commercial services have been regulated like the regional services, but with "net cost" contracts. This railway managerial set-up is supposed to be capable of avoiding cross subsidisation. Formally, SJ could not subside non-commercial services through profits deriving from commercially profitable lines, particularly if new entrants operated regulated services. In reality, this was never the case since SJ won all the services on non-commercial links.

The biggest problem lies in the SJ group structure: the same firm provides commercial monopolistic services and participates in the awarding of the regulated services. So, SJ can subside non-profitable services trough monopolistic profits (made in previous periods) on commercial links.

Dumping is formally forbidden by the Swedish antitrust authority, but nevertheless SJ can offer services strictly at short run marginal costs; here as a borderline case, SJ does not cross-subsidise other activities. SJ can have profits, however, and can hide, for instance, depreciation allowances on commercial links while its competitors, operating in isolation, must at least cover their average costs. In the end, the competitors' costs exceeded SJ's costs in bidding for the contracts of service, even if they are potentially much more efficient than SJ. In Sweden, BK Täg (the new entrant who won four lots for regional services) appealed to

Konkurrensverket, the antitrust authority, against SJ. BK Täg accused SJ of bid-dumping in undercutting other offers, thanks to the expected extra profits on other services.

2.2.2 Italy

In Italy, cross subsidisation can be seen explicitly only in national passenger services and, maybe, between passenger and cargo services[12]. As we will see, some commercial lines subsidise non commercial ones.

After the beginning of the deregulation process, Trenitalia Holdings has been articulated into three different companies: regional transport (RT), long distance passenger services (LD) and freight services (Cargo).

Regional authorities decide on local services and subsidise them. The incumbent TL provides all the services as a monopolist, with some feeble regulatory pressure coming from locally negotiated fares; this situation will not change before January 2006, with the first competitive bidding (the previous deadline of 2004 has been recently further postponed). As stated, regional governments subsidise all local services, through large fixed subsides per train-kilometre, equal for every train (independent from its own characteristic and patronage).

So, there is no pressure on LD to subsidise RT. The real problem lays inside the LD services: LD is the only company to provide long-distance passenger services[13], and new entrants up to now couldn't enter the market, although the actual law does not seem to be completely clear. Some studies[14] demonstrated very large extra profits for LD on some lines (e.g. Milan–Venice and Milan–Naples intercity links). But LD declares a balanced budget. If this is true, there must be other lines whose revenues are far lower than their costs: an evident case of cross subsidisation emerges.

The decision whether long-distance, non-profitable services have to be provided is taken by Trenitalia according to its business strategy, and not by political decision-makers (or by a specific planning agency) after due public debate, with the related political and equity problems put on the table. LD strategy seems clear: as is generally the case of public incumbents with extra profits, it tries to derive from them maximum benefits in terms of guaranteed protection from competitive pressures. In a liberalised context, this behaviour will be equivalent to an entrance barrier. In fact, every possible new entrant on the non-profitable services would have to offer these services at least at short run marginal costs, while LD could sell below that limit.

In fact, at present, new entrants cannot "invade" the profitable part of the rail market also due to the saturation of the most profitable lines[15], over and above, as we have seen, the absence of any mechanism of capacity allocation different from "grandfather's rights".

So, LD "captures" the political decision makers via a "preventive action" against competition, providing "free" services instead of forcing an explicit debate on the social worth of the low-patronage services. In this way, LD tries to create a political entry barrier. By providing non-profitable services, LD acquires political protection against liberalisation in general, and against the menace of new entrants in particular. The political decision makers have little incentives to accelerate the deregulation process, in order to keep the above-mentioned "benefits" while LD can more easily defend its monopolistic position. A severe equity problem emerges, however, concerning the passengers of the profitable services who *de facto* subsidise other services, due to a managerial decision taken by Trenitalia and not following any public debate.

2.2.3 Some solutions for the cross-subsidy problem for passenger services

The Swedish case and the Italian case seem to be very different. Nevertheless, in a few years, the Italian rail regional transport will be regulated with an approach based on competition for the market. The actual Italian incumbent could have a dominant position due to political reasons, and it could be motivated by the competitive pressure to cross-subsidise the regulated services with the profits of the unregulated ones[16]. In Italy too the "Swedish problem" may well show up.

Some different generalised recommendations are possible.

1. "Open entry" in the national commercial services. So, if that market works properly, no competitor can have extra profits, distorting regular competition for regulated services, at the same time providing efficiency incentives in commercial services. The incumbent may lose its dominant position. The State must subsidise social (or non profitable) long-distance services after a democratic and transparent debate. The worst "capture" phenomena can be avoided.
2. If large scale economies emerge also for LD services, this sector should also be regulates for the market as well. In fact, this solution is similar in its effects to open entry. Also the social issue concerning long-distance unprofitable services can be solved via competitive bidding. A preferential position may well result for the incumbent (again, the "national champion"), but this risk is always present.
3. In case of only partial opening of the passenger market (for example, only for non-profitable services[17]), the incumbent should be split into two completely separated companies: the first one operating long distance profitable services with a price-cap regulation, and the second producing local and long-distance unprofitable ones, exposed to competitive bidding. The LD incumbent cannot cross-subsidises other services; nevertheless its dimension could be so large as to generate "capture" risks for the regulator, in particular if the regulatory agency is not able to value correctly the incumbent's conditions, given the large information rents existing at present. The only advantage left to the incumbent in the competitive bidding sector will be the possible information rents.

Note that the third solution seems to be the minimal one (both in Swedish and in Italian cases) when regulated and monopolistic services coexist, or during the temporal gap between different stages of the liberalisation process. Furthermore, it has to be noted that in general the incumbent, in order to reduce entry risks in its own market, is motivated to transfer the largest possible share of costs from services under competition to monopolistic ones, taking advantage from the information rents generally related to the "historical" subsidy mechanism. This may well constitute a special case of cross-subsidisation.

All these suggested approaches promote an acceptable level of transparency in the decision making process. No decision concerning the social services to be provided can be taken by the operators; the regulator (and its elected "principal") are the only subjects enabled to decide. "Capture" phenomena can thus be minimised. Some problems may still exist as to the role of vocal interests in obtaining an unreasonable level of subsidised services; but this goes far beyond the scope of this analysis.

2.3 The English case

A PC approach could be also used in analysing the severe problems of the British railways, although large cross subsidisation phenomena apparently have been avoided. "The trouble is that the economic architecture of privatisation has a serious defect. The train operators can add services only if Railtrack finds network slots for them. Although Railtrack has a regulatory duty to meet the train operators' needs, it has no financial incentives to do so. This is because 97% of its track access income is fixed regardless of the number of trains[18]". As consequence, on one side, Railtrack decided its investments with attention to their effects on rail traffic and capacity. This architecture was decided only to guarantee the initial investors large profits[19].

A safety problem can also be encountered. When accidents happen, public opinion overreacts against rail companies; people flee the railways and take to their own cars, even if road safety is far lower than rail safety. Moreover, the public's willingness to pay for safety is widely accepted as a key principle in appraising safety projects. After rail deregulation, because of the co-presence of different subjects in the business (the government, the regulator agency, the train operators, Railtrack), attention to rail safety increased. The elected bodies surely are paying attention to these instances, and are scared of the potential reaction of the press too.

Therefore the solution focuses on the increase of investments in safety. All safety measures imply the determination of a value of life. So, knowing the costs of safety systems and the corresponding number of avoided deaths, the implicit value of a life can be determined. As a result, the cost per avoided railway fatality results twice as great as that for roads. This difference is not perceived by public opinion, due to an asymmetric information problem. So, "in order to be seen to be doing something, the government prods the railways into extra safety spending"[20]. And because Railtrack is a regulated natural monopoly, it has no reasons to resist government pressure for more and more safety since, at the end, the government will pay. "So, when it [the government] prods, Railtrack jumps"[21].

This situation is not reasonable in social welfare terms. Why spend a fixed amount of money on rail safety instead of on road safety when the results can be better in the latter case? The answer is that in the collective imagination a rail crash (like an air crash) is more destructive than the sum of small road crashes, although the total number of deaths is far greater. A component of assumed confidence in a service provider, as opposed to self-driven vehicles, is also present. So, these large crashes generate strong reactions from politicians, worried about their short term electoral objectives. Nevertheless, it is possible to consider the safety problem as a borderline "capture" problem. In fact, if rail safety is perceived as outstanding by the public opinion at large, and the public is kept duly informed on the comparative costs and results, solving the problem can be considered a legitimate objective for politicians, and not only a way to increase their consent. Thisis the case even if its strict economic rationality is limited, or even flawed.

On the other hand, after October 5th, 2001, when Railtrack announced its bankruptcy, it is clear that "Railtrack's biggest problem was no longer fixing the rail network, it was fighting to survive. [...] By now, it was obvious that the company had only one place to go for most of the money it needed: the government. So the company basically asked taxpayers to bail out its shareholders. Given that Railtrack had been privatised, shareholders were supposed to bear the risk. For shareholders who had instead assumed that the government would always come to Railtrack's rescue for political reasons, there was more bad news. The government said in April that it would continue to support the railway industry as a whole, but not necessarily individual companies"[22].

There is a problem of asymmetric information, that could degenerate into a "capture" phenomenon, between Railtrack and the government about the strategies for the future. In fact, Railtrack seems to consider the government obliged to save the company, for social objectives, and because Railtrack is a monopoly operator of an essential service. It develops this policy in order to save its shareholders: in this sense, Railtrack in fact "captures" the government. The solution is not yet clear; it seems to be a new private company but without any power left to the shareholders. In other words, because the government will have to underwrite any future investment, it "means that rail network has been renationalised in all but name"[23]. In this way some political objectives (short term political objectives?) can be reached. Apparently, the mistake lies in having privatised something that cannot go bankrupt: in this case it looks unavoidable that public intervention tends to become blurry and contradictory.

A British "capture" problem, common to all Europen railways, concerns the regional distribution of subsidies. The public subsidies (per passenger) to lines with limited traffic seem to be five times bigger than the subsides to the main

commuter lines. This situation can be considered a social paradox (showing an evident "capture" phenomenon), when there are easy alternatives for low-traffic lines seen as socially "deserving" objectives, i.e. the provision of low fare (and low cost) bus services.
Finally, the "capture" aspects of the privatization process itself is now so well known that it deserves only a short reminder here. Railtrack knew the franchisees well; the real, medium run costs of Railtrack were severely underestimated, probably not innocently, so the initial expected profits were huge, and so were the gains of the initial shareholders reaped in the stock market (taking advantage from their large information rents). These initial shareholders, "close" to the conservative government, sold their shares as soon as the market peaked, leaving the new buyers (and the following labour government) in dire straits.

3. The political compromise of the new Common Transport Policy (CTP)

For many years the European Parliament has been seeking a larger role against the "technocratic" powers of the Commission.
The Commission is considered a non-elected body, and has been successfully accused of some (minor) misbehaving in order to reduce its powers. Apparently, this is the same fate that many independent Authorities are suffering in several states. This "priority to the political sphere" ideology may well be read, in PC terms, as the reaction to the reduction of discretionary powers by the single states. Discretionary power is a vital ingredient for building electoral consensus independently from any real political content. In fact, the Commission is and has been much more pro-market that the sum of the single states. This shift of power is quite evident from the content of the new CTP document. Competition is still allowed for in this text even if in a far less prominent way compared to previous documents. Infrastructures, i.e. investments and public spending, appear more urgent. As far as the railway sector is concerned, a political compromise looks quite evident[24]. There is a definite program aimed at liberalising freight traffic, with due time thresholds. For passenger services, nothing similar exists, i.e. no enforceable European policy is in sight. A definite policy does exist indeed: the build-up of European high speed services are recommended in order to curb the environmental pressure and congestion of air services. France has always opposed railway liberalisation (even suggesting, at parliamentary level, the term "co-operation" as an alternative to "competition"). France holds a dominant industrial role in high speed technology, with well amortised production plants for rolling stock and signalling, etc..
A compromise has been struck: gradual freight liberalisation against the revamping of the semi-dead European network of high-speed services. Besides, high-speed services can be exempted from any European liberalisation rule.
Is this *per se* a bad deal? After all, high-speed rail services on some distances can really compete with air services, and they are surely less polluting. The problem is that on the distances involved, the traffic is generally not large enough to pay for the infrastructure, if it has to be built anew and if the service has to compete with liberalised air fares (i.e. low cost services). In the end it depends on the balance between infrastructure costs and environmental costs. Generally, whatever figure is used for environmental costs, the balance seems to be in favour of air services. A rough order of magnitude: a kilometre of high-speed line costs around 15 million Euros while environmental cost for a passenger*km on a plane is less than 0,05 Euros[25]. The demand needed to balance these figures is in the order of 30 million passengers/year, a dimension of an intercity demand very difficult to reach, except among major state capitals.
Other aspects of railways policy are not clarified in the document, and the general trend toward other modes of transport leaves little space for optimism. The main issue concerns the allocation of scarce capacity. Scarce capacity arises where the demand is concentrated, and, given the large economies of scale of rail services, this implies that it concerns the most profitable routes. The problem is similar to slot allocation in air transport. In turn, the recent document on slot allocation from the Commission basically confirms the "grandfather clause" principle that foresees slots left in eternal and free use to the incumbent carriers, blocking any potential competition on the more profitable European routes. Competition is left on minor "point-to-point" routes (with some exception in U.K.) and only there the low-cost carriers can prevail.
If this anti competition principle is accepted for air transport, the incumbent rail companies will find an easy ground for asking a consistent European approach also for the rail sector (adding to this some environmental and social spurious argument).
Another issue concerns the overall European market structure, and this issue looks in fact outside the scope of DG-TREN. The incumbent state rail companies are probably, as we have seen above, a *de facto* cartel: they collaborate in defending their monopolist position, with mergers (Germany and Dutch freight services), joint projects (French TGV services in Italy, Cisalpino services between Italy and Switzerland, etc.), and above all avoiding any inter-state competition within the next ten years.
As said, it is impossible that all the national incumbents have the same costs, i.e. that they have no interest in entering a foreign market. The only possible explanation of this behaviour is the existence of a cartel, but the Commission has little power and/or will to intervene in public cartels. (In some states, even by law the anti-trust authorities are denied the possibility of intervening in politically-sponsored monopolies).

4. Conclusions and recommendations

The traditional principal-agent problems (moral hazard, and adverse selection) in the public sector are compounded by the presence of two separate "steps". The primary principal-agent relationship is the electorate-politician link: politicians develop "egoistic", short-term objectives (re-election), and favour special interest groups against less vocal ones, and

against long-term objectives.
Public agencies and transport operators are themselves "agents" in respect to their political "principals", and again these agents maximise egoistic, rent seeking, objectives. The resulting picture is complex, and requires further analysis, specially for the railway sector.
A different diagnosis has sometime related the above-underlined problems to a possible "prisoner's dilemma", in order to explain the weakness of the European railway policy. Each country is afraid of liberalising first, since this will put its national companies at a disadvantage, not knowing if other countries will follow suit, and at which "speed" they will. It is the well-know theory of "national champions", that have to be defended at least till they are "strong enough" to compete internationally on a fair basis. This hypothesis is not convincing: if the "prisoner's dilemma" damages everyone, as the theory clearly demonstrates, why not accelerate the negotiation process, as in "pure private" sectors? The "close relationship" between the political world and the transport sector in general (and specially with the railway companies) is a much more powerful explanation. Natural monopolies, externalities, social goals are intertwined and far more relevant than in other sectors, and for this reason the state has been much more directly involved.
Another, less pessimistic, approach may suggest that the European picture is changing, and in fact it is slowly introducing more consistent and pro-competition actions.
Speed, however, is not a neutral factor within a liberalisation process. Within a slowly moving context, incumbents can organise themselves well, taking advantage of information asymmetry and of sunk costs, forming cartels, cross-subsiding their activities, etc. Everything becomes more difficult if policy allows for lengthy organised resistance.
Recommendations in this field can only be humble, but nevertheless consistent with the picture outlined above.
In the first place, it seems useful to minimise the discretionary components within the decision-making process. Improvements in cost-benefit techniques[26] and explicit distributive evaluations may help, without forgetting that the process has to remain a political and democratic one (where value judgements are the core of the game).
In second place, the increasing role of independent authorities may help in separating efficiency goals (for example, with price-cap policies on natural monopolies, avoiding cross subsidies, checking artificially dominant positions stemming from the political defence of the incumbents, etc.) from distributive and environmental ones, where the political process has to play a larger role.
In third place, a shift of subsidies from service companies to final users allows for increased transparency, and better social effectiveness both for environmental and for redistributive goals, at the same time increasing the possibility of explicit policies in favour of a competitive environment for railways.
The strengthening of efficiency-oriented, pro-market regulatory bodies is also consistent with a stronger role for the European Commission, as compared to national ("egoistic") interests. The present political trend seems shaky at best on this issue, but optimism is mandatory (general "the interest" will prevail). Optimism, eventually, can derive from a "domino-effect": if competition begins to take hold, and delivers, as it has done up to now in every economic sector, the same will happen also in railways, even within a trial-and-error process.

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NOTES

[1] Congestion externalities are nevertheless a special case, being conceived as "club" externalities, in the sense developed by the Public Choice approach.

[2] Ponti, M., (1997), "Le esternalità di consumo nei trasporti collettivi", *Economia e Politica Industriale*, n° 96, Franco Angeli.

[3] Even if privatization was allowed, as in the U.K. case.

[4] Germany has permitted competition of aggressive new entrants in the regional services, and Italy has recently issued a quite pro-competition reform law on local transport (N422).

[5] The document was written in collaboration also by the author of the present paper, and is available upon request.

[6] European Commission, (1997), *Trans European Rail Freight Freeways* COM(97) 242, May .

[7] Nuti, F., (1997), "Il caso britannico", in Nomisma, *Liberalizzazione e privatizzazione nelle ferrovie europee*, Vallecchi, Firenze.

[8] Even taking into account the larger dimensions of the German rail traffic, safety statistics look comparable in the two cases.

[9] In market contexts cross subsidization is forbidden by antitrust authorities, to avoid anti competitive behaviours (i.e. dumping policies)

[10] Non-commercial services operate at a loss because of low tariffs and/or low traffic; in this second case, the services are seen as a "local" asset, whose availability is perceived as more useful then its real use. Nothing is said about the real social (distributive and environmental) content of these services.

[11] Swedish reform began three years before the EEC directive 440/91

[12] Even if there are no specific figures to confirm it, some compensation mechanism is well possible within the consolidated budget of the FS holding.

[13] Cisalpino AG provides international services in partnership with Trenitalia, and Trenitalia owns shares of this company.

[14] Pagani, F., (2000), *La liberalizzazione delle ferrovie*, mimeo, Milano.

[15] According to the studies of the Italian general transport plan , in particular between Milano and Bologna, and in some "hubs": Milan, Bologna, Florence, Rome, Naples, Venice

[16] Regione Lombardia will be the first Italian local administration to introduce concurrency for the market; but it decided to start regulating only a small portion of its railway network.

[17] It is peculiar that non-profitable passenger services are opened to competition before the profitable ones, and this again can be seen in "capture" terms; but it is the real case both for Italy and Germany.

[18] The Economist, (1999), "The Rail Billionaires", July 3rd.

[19] A subsequent elaboration on this point.

[20] The Economist, (2000), "The Price of Safety", November 25th.

[21] The Economist, (2000), op. cit.

[22] The Economist, (2001), "Bloods on the tracks", October 13th.

[23] The Economist, (2001), op. cit.

[24] And confirmed to the author, by an authority inside the Commission

[25] Assuming an interest plus amortisation cost of capital expenditure in the order of 10%. For environmental costs, see Rothengatter.

[26] See on this issue, for example, recent papers from the British Ministry of Transport, and within the "Transtalk" project funded by the Commission.

BIBLIOGRAPHIC REFERENCES

AMELOTTI-EICHLER, A., (1997), "Le prime esperienze di ristrutturazione nel settore ferroviario: Canada, Stati Uniti, Giappone e Svezia", in Nomisma, *Liberalizzazione e privatizzazione nelle ferrovie europee*, Vallecchi, Firenze.

BAUMOL, W., E., BAILEY, AND R., WILLING, (1997), "Weak Invisible Hand Theorems on the Sustainability of Multiproduct Natural Monopoly", *American Economic Review* , Vol. 70, n° 3, pp. 350 –365.

BAUMOL, W., J., PANZAR, AND R., WILLING, (1982), *Contestable Markets and the Theory of Industry Structure,* Hartcourt Brace Jovanovich, San Diego.

BUCHANAN, J., M., (1969), "Cost and Choice: An Enquiry in Economic Theory", Markham, Chicago.

BUCHANAN, J., M., M., JAMES, AND D., R., LEE, (1989), *Cartels, coalitions, and constitutional policy*, PC Studies, Vol. 13.

BUTTON, K., (1990), "The Missing Networks: European Aviation", Report, NECTAR, Department of Economics, University of Loughborough.

CAA, (1991), *Economic Regulation of BAA South East Airports 1992-1997,* Civil Aviation Autority, London.

CAPPIELLO, M.A., (1996), "L'approccio Public choice nell'analisi della decisione pubblica, con particolare riguardo ai trasporti". *Internal Paper*, IUAV, Venezia.

CESIT, (1998), *Liberalizzazione e organizzazione del trasporto ferroviario in Europa. Rapporto di sintesi*, Gangemi editore, Roma.

DAVISON, L., E., FITZPATRICK, AND D., JOHNSON, (1995), *The European Competitive Environment: Text and Cases,* Butterworth-HeinemannLtd, Oxford.

Deloitte & Touche Consulting, (1997), *European Railways Performance Indicators: a Benchmarking Test,* Analysis and Comments, Final Report to DGVII, Vol.1, July.

ECMT - European Conference of Ministries of Transport, (1989), "The role of the State in a deregulated Transport Market", Round Table, *Vol. 83*, Paris.

ECMT - European Conference of Ministries of Transport, (1995), "The Role of the State in a Deregulated Transport Market", Round Table n° 83.

ECMT - European Conference of Ministries of Transport, *(1998), Transport Infrastructure in ECMT Countries,* "Profiles and Prospects", Paris.

European Commission, (1992), "Lo sviluppo futuro della Politica Comune dei Trasporti: una strategia globale per la realizzazione di un quadro comunitario atto a garantire una mobilità sostenibile", (COM(92)494) December.

European Commission, (1994), "Communication on Financing the Trans-European Networks",(COM(94)860).

European Commission, (1995), "Reti Trans-europee", Relazione dei rappresentanti personali dei capi di Stato e di Governo, Lussemburgo.

European Commission, (1995), "The Citizen Network: Fulfilling the Potential of Public Passenger Transport in Europe", *Green Paper*.

European Commission, (1996), "A strategy for revitalising the Community's Railways", COM(96) 421, July.

European Commission, (1996), "Public Procurement in the European Union: Exploring the Way Forward", Green Paper, November.

European Commission, (1996), "Towards Fair and Efficient Pricing in Transport. Policy options for internalising the external costs of transport in the European Union", COM(95)691).

European Commission, (1997), *Trans European Rail Freight Freeways* COM(97) 242, May .

European Commission, (1998), "Report on the Implementation of the TEN T. Guidelines: State of the Art of the Networks".

European Commission, "The Single Market Review 1996- Impact on

services: Air transport".

European Commission, *The Common Transport Policy Action Programme 1995-2000,* (COM(95) 302).

FARREL, S., (1999), *Financing European Transport Infrastructure: Policies and Practice in Western Europe*, Macmillan Press, Londra.

GIRANDAUX, C., (1996), *I Trasporti in Europa,* Edizioni M&T, Torino.

GOOD, D.H., L.H., ROLLER, AND R.C., SICKLES, (1993), "US Airline Deregulation: Implication for the European Transport", *The Economic Journal,* Vol. 103, pp. 1028-1041, July.

ISOTOPE, (1997), *Improved Structure and Organisation for Urban Transport Operations of Passengers in Europe*, Final Report.

MOORE, T. G., (1993), "Regulatory Reform of Transport", in proceding of, *Regulatory Reform in Transport*, A World Bank Symposium, Washington D.C.

MOYER, N.E., L.S., THOMPSON, (1992), "Options for Reshaping the Railway"*, Transport Division Infrastructure and Urban Development Department,* The World Bank, Washington D.C.

NEA*, (1998),* "Examination of Community Law Relating to the Public Service Obligations and Contracts in the Field of Inland Passenger Transport", Report to DGVII, May.

NEWBERY, D., (1994), "The Case for a Public Road Authority", *Journal of Transport Economics and Policy*, Vol. 28, n°3.

NUTI, F., (1997), "Il caso britannico", in Nomisma*, Liberalizzazione e privatizzazione nelle ferrovie europee*, Vallecchi, Firenze.

OECD, (1993), *Infrastructure Policies for the 1990s,* OECD, Paris.

PAGANI, F., (2000), *La liberalizzazione delle ferrovie*, mimeo, Milano.

PELKMANS, J., AND S. LABORY, (2000), "European Regulation and Cost-Benefit Analysis: a Methodological Guide for Non Specialists", Report CEPS, Centre for European Policy Studies, Brussels.

PETRETTO, A., (1991), "Contratti di fornitura pubblica e concorrenza. Una sintesi della letteratura storica"*, Economia Pubblica*,

PONTI, M., (1995), "Organization of Transport Markets", Proceedings of XIII CEMT Symposimun - *New Problems New Solutions*, Luxembourg, 9-11, March".

PONTI, M., (1997), "Le esternalità di consumo nei trasporti collettivi"*, Economia e Politica Industriale*, n° 96, Franco Angeli.

PONTI, M., AND F., ASSANTI, (1995), "Le Ferrovie dello Stato: un possibile modello dei rapporti principale-agente", *Archivio di Studi Urbani e Regionali* n°52.

QUINET, E., (1993), "Transport Between Monopoly and Competition: Supply Side and Markets", *European Transport Economics,* in Polak, J., and A., Heertje, CEMT 1953-1993, Blackwell, Oxford.

QUINET, E., AND B., CAILLAUD, (1992), *Analyse du caracter incitatif des contracts de transport urbain, Report …cole Nationale des Ponts et ChaussÈes*, December.

SCHLEIFER, A., AND R., VISHNY, (1999), *The Grabbing Hands: Government Pathologies and their Cures*, Harvard University Press.

The Economist, (1999), "The rail Billionaires", July 3rd.

The Economist, (2000), "The Price of Safety", November 25th.

The Economist, (2001), "Bloods on the Tracks", October 13th.

The Economist, (2001), "Failtrack"*,* October 13th.

TRT, (1997), *The Single Market Review: Transport Networks*, Kogan Page Earthscan, Vol. 11, Lussemburgo.

TRT, et al, (1998), *European Approaches to Road Infrastucture Cost Recovery and Financing*, Report to Directorate General VII – Transport, Consortium START, May.

UITP, Union International de Transport Publique, (1998), *Major European players in public transport,* January.

The Economic Regulation of Railways Infrastructure: Role and Future of the Proposed European Railway Agency

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1. Introduction

The process towards a European Internal rail market is just beginning. With Directives 2001/ 12, 13, 14/EC a common framework for access to railway infrastructure, licensing and safety certification, allocation of railway infrastructure capacity, and for charging for use has been established. This new framework should be implemented by March 2003 when international freight services are opened to competition.

A European railway network that is efficient and opened to competition is an important step for the future development of the European Common Market. In fact, revitalising the railways is one of the key components in the strategy proposed by the Commission to shift the balance between modes[1]. However, even if the European transport strategy seems to give great importance to the rail transport mode, the rail's market share is continuing to decline, while quality standards for good services remain far from sufficient. The greatest cause for concern is the state of rail freight services. For example, their share of traffic stands at 8% today compared with 21% in 1970[2]. The action program suggested by the Commission proposes three types of measures to revitalise the railways:

1. first - a tariff system for all modes of transport must be organised to reflect the full value of the cleanest modes;
2. second - the development of the trans-European transport network must continue giving priority to rail and concentrating on removing bottlenecks and promoting interoperability;
3. third - a legally and technically integrated European railway area must be constructed.

The aim of this paper is to discuss some of the critical points proposed in this action program. The setting up of a European Railway Agency[3] will be particularly analysed with the aim of understanding if the agency could be a first step towards the creation of a European Regulatory Authority for the railway sector. In this paper we will follow the idea that either in a context where the railway sectors is reformed *via* separation of its vertical structure or *via* competitive access the need for a public regulatory authority or for an agency that can support the action of the European Commission to promote free competition is strong. In fact if the objective of the Community is to promote competition a common set of technical standards and rule has to be established and a regulatory body or a technical agency is the only way to reeduce the lack of organised information that up to now has, among other reasons, curbed the process of integration promoted by the Commission in the railway sector. Our idea is that technical barriers can be one of the main obstacles to competition and to the development of a common market for railroads. A prerequisite for having a set of common rules is to centralise information on technical characteristics of the network and rolling procedures. This preliminary step is necessary for developing a future method of tracking and tracing system that could be extremely useful for developing a European fee system for network usage.

For the scope of this paper no distinction will be made between passenger and freight railway transport because attention will be focused mainly on technical and institutional steps that should be taken to develop an efficient and competitive rail sector, and on the role that a European Agency could play in this reform process.

The paper is organised as follows: in part 2 some key economic questions concerning the reorganization and financing of the former vertically integrated railroad sector will be treated. In particular the main reason for the current crisis of the European railway system will be discussed - presenting the economic and structural solution adopted by the European Community. In part 3 some models for the reorganisation of the railroad sector will be presented with the objective of showing that each solution highlights the role and importance of a regulatory body structured at a European level. As follows from recent economic analysis, the level of information concerning public institutions plays a critical role in the reform process of the railroad sector. Which information is relevant to railway reform will be discussed in part 4, specially regarding the organization and application of a future tariff system for network usage. Part 5 describes the tasks that will be assigned to the European Railway Agency; here we will show how the information collected and organised by the Agency is a necessary prerequisite for the constitution of a future regulatory institution in the field of railroad transport. Part 6 presents some conclusions.

2. How to finance the railroad sector: some key questions

The rail industry is one of the most extensively regulated sectors in the economy. In fact, prices, entry, financial structure, accounting methods, vertical relations, and operating rules are more or less subjected to some form of governmental control. The public utility paradigm of governmental regulation has been widely applied on the assumption that the economic characteristics of this sector

preclude competitive organization. In the last ten years, this common way of thinking has been taking a more critical position on the traditional public utility regulation of the rail industry. First, there are already industrial segments of the sector where effective competition exists or can be developed. Second, government intervention produces misallocation of freight traffic among competitive transport modes, excess capacity, excess operating costs and, often, poor investment decisions as result of misguided national policy objectives (as suggested by the *public choice* theory)[4]. This regulation policy has resulted in the financially poor conditions of the railroads, the deterioration of rail infrastructure, the suppression and delay of cost reducing innovation, and low quality service[5].

Railways, like other major industries with a network infrastructure such as natural gas or electric power, are characterised by a mixture of competition and monopoly elements in supply. Furthermore the organization of these sectors is quite often complicated by public service objectives. In these cases centralised and state-controlled industries failed in the objective of self-financing the sector, and therefore of improving the quality of the services and technological innovation. This is mainly due to two factors: first, the use of such industries for improper objectives such as fighting unemployment and supporting underdeveloped regions; second, a misguided policy of pricing focused on cost consideration instead of on demand and cost together. This second mistake could be due to an inappropriate application of the perfect competition model where optimal prices are equal to marginal costs given particular conditions on the demand side. In sectors characterised by high fixed cost and natural monopoly conditions, however, marginal prices no longer finance infrastructure investment and do not allow an adequate rate of return. By contrast there are pricing principles which promote economic efficiency while removing impediments to adequate returns for carriers; these principles lead to demand differentiated prices following the well known Ramsey formula[6]. The idea that underpins these principles is that in order to develop the right investment policy and an efficient allocation of financial resources, price policies in these industries should not be used to achieve redistribution objectives. Only following these criteria can prices convey the correct signals. Redistribution policies should be pursued using different and less distortionary economic instruments.

Revenues are defined to be adequate when they are just sufficient to enable the firm to attract the financial resources needed for maintenance, replacement, modernisation and whatever demand conditions require. If revenues are lower than this the predictable conclusion is the deterioration and eventual disappearance of the service in question. For these reasons the railroad sector manifests a clear need for restructuring. Of course, there is always the option of subsidising with general taxation some particularly important investment in infrastructure that is considered strategic for the development of the European economic area, but this kind of policy can no longer be applied as a general rule.

One primary question is the level of contestability of the railroad sector, long considered to be characterised by indivisibility, pervasive economies of scale and scope, high cost of entry and few competitors. A market structure of this kind usually justifies prices for the use of the network infrastructure that, to be sustainable, should be above marginal costs. If contestability does not exist the classic solutions to this market structure are private unregulated monopoly, private state-regulated monopoly, and government operation[7]. If some form of contestability can be found, however, the range of possible solutions becomes wider and some kind of competition may open up at least in specific segments of the sector. The sunk cost and longevity of railroad capital may suggest that this industry is one in which contestability analysis cannot be applied. However railroad services are far more contestable than these initial considerations would suggest because they receive strong competitive pressure from other modes of transportation. In fact, this kind of pressure is one of the reasons that have contributed over time to railroad decline in terms of transportation market share. Nearly every sphere of rail freight service now faces intense competition. In those activities where there is no evidence that rail sector holds a position of market dominance the railroad should be offered freedom in prices; in all the other cases government regulation should be applied.

The present problems and difficulties of railroads compared to other modes of transport seem mainly related to a lack of efficiency, technological innovation, and interoperability within the sector that makes it not competitive compared to other modes. There is, of course, a problem of pricing. In fact, many of the external costs (i. e. environmental costs) associated, for example, to road or air transport are not properly internalised. The environmentally friendly technology associated with the railroad and its capacity to establish permanent corridors for passengers and commodities is a resource for the future. The choices made by the European Community for railroad improvement show its willingness in the direction of railroad restructuring for competitiveness, interoperability and safety with the aim of promoting this way of transport for the development of the European common market. This way of thinking has recognised that rail is a contestable market with competition coming from other modes and that the only way to support this transport system is the development of efficiency and innovation within the sector.

3. The restructuring of the railroad sector

The restructuring of railroad sector has three main options for designing the vertical railway structure. The first is to continue to follow the traditional monolithic approach under which the railway is an integrated entity owning and operating its own facilities and vehicles. As mentioned before, this choice lacks financial incentives and desegregated information on profitability, it is usually production oriented

and is not sensible to movements of market demand for services; the governance structure is hierarchical. Railroads organised and controlled according to the monolithic model, however, must be restructured in order to contribute to the economy and to avoid economic inefficiencies. A slightly modified version of this approach separates different lines of business organization within the same integrated entity. Entities may be reorganised and accorded financial responsibility for line of business to encourage comprehensive market sensitive and cost sensitive decisions such as greater responsiveness to demand changes for various services. The scope of this kind of restructuring could be to give the commercial sector a profitability objective and to give non-commercial lines incentives to reduce their losses. An internally restructured railroad enterprise may show lower technical operating efficiency by some traditional measure (i.e. coach-km per locomotive-km) but may achieve greater responsiveness of each services to customers' needs and their willingness to pay.

The second option is that of separating the ownership of facilities from other rail functions such as train operations and marketing. These solutions follow a classical approach to divesting vertically integrated industries[8]. These options are quite interesting because they seem to mitigate the problems associated with sunk and not recoverable costs. Natural monopoly conditions hold only for the rail network, and regulation is needed only for the part of the sector that still remains an essential facility. In fact only in this case the sunk nature of infrastructure costs creates significant barriers to entry. On the other hand the cost condition relating to the operation of services exercised on the network may be more consistent with active and potential competition. Two different kinds of vertical separation are possible: with the first solution the railway entity could own and operate the fixed facility and perform all operations on behalf of marketing operators which would be the retailers. The railway itself would haul the trains but would do no marketing to shippers. With the second solution the entire essential facility would be the property of and responsibility of a single owner. There could be one or more authorised users which would pay tolls for using the facility[9].

The third option is competitive access. In this case, companies would have exclusive control over some portion of the rail network, but would also have (and give) the right to competitive access over the portions of network to other companies. This approach differs from the previous one because in the "toll" regime separate entities provide the fixed facility and conduct operations, whereas under "competitive access" more than one entity operates in a given market over a specific portion of the rail network. In the competitive context the "common interest" of different operators in having access to different networks and markets is crucial for avoiding either opportunistic behaviour or the use of a dominant position to reduce competition. The open market is a consequence of "reciprocity", but it is possible only if operators have comparable market power and there are no strategic corridors or sub-network that have the characteristic of an "essential facility"[10].

Given the proposed analysis it seems clear that the monolithic approach and any possible transformation of it is not a good solution especially looking at the strong financial and restructuring needs that the rail sector has in order to compete with other transport modes. Comparing separation with competitive access the last is an optimal solution only under certain conditions, and none of the proposed alternatives completely avoids a certain level of public intervention and control with regard to maximising allocative efficiency[11]. In the case of separation the classical analysis on the divestiture of a vertically integrated sector with the consequent regulation of the economic phases that still remain a natural monopoly calls for the constitution of a regulatory authority, at least for pricing access to the essential facility[12]. In the case of competitive access, there will always be the need for an antitrust authority due to the firm natural inclination to collusion. Given this economic framework the constitution of a European Railway Agency can be read as a necessary step towards the constitution of a new and efficient market for railways able to compete with other transport modes.

4. The role of information in rail reform

As follows from more recent economic analysis, the role of information in any economic process is crucial[13]. Either in pure private economic context or in a regulated context where a game is played by a private agent and a public agency, the level of information concerning the players is a key element for defining strategies and, in many cases, winners. Regulators cannot rely on regulatory contracts that are contingent on information held only by the firm or, more generally, on information not easily verifiable by the court. For this reason much of the recent economic literature has been devoted to finding models with which to discuss alternative and more subtle ways of creating information to lessen the informational asymmetries for the promotion of competition or the involvement of watchdog supervisor.

What level of information is required to design the market for a new and more efficient rail sector? We will first analyse a regulated environment, then briefly analyse a competitive framework.

In the separation option it is obvious to concentrate attention on segments of the network that are characterised by natural monopoly or in any case by being an essential facility. In these cases a factor of crucial importance is the regulation of Third Party Access that is the pricing of the access to the network. Following the theory the three main options for pricing access are marginal cost pricing with subsidies to finance the fixed cost not covered by the tariff, Ramsey pricing with their equity problems, and two-part tariffs. Third Party Access is the duty that the network landlord or the network manager has in order to provide open access to the network to any competitor that is willing to pay a given access fee. In order to attract operators with the desire to constitute railways as commercial and self sufficient bodies,

access fees should be non discriminatory among operators, financially sustainable and efficient in order to produce the right signals concerning the operators' willingness to pay and about infrastructure scarcity. Of course, to design a such a kind of tariff is very difficult and many informational requirements are needed[14].

Pricing access to pure marginal cost is not an easy task and has relevant informational requirements concerning: problems of measurement, complexity of tariff design, financial implication, equity, efficiency, fair competition within sectors and transport modes, and acceptability.

Two of the main critical points are the pricing for congestion and scarcity. The first is related to the extra cost caused by a new network user and the second is related to a lack of network supply related to the level of demand. There are different options for pricing congestion and scarcity but all of them have cumbersome informational requirements. To solve the problem of pricing congestion, the cost of an additional delay may be estimated by using a complex network model - and obviously here it is critical to understand the technical characteristics of the rail network. To organise a sufficient level of knowledge of network characteristics and operator behaviour is quite difficult in a national context where there are few network users and a well established set of laws and rules. In the European context the task is even more difficult, and in fact, the basic requirements concerning network knowledge and the definition of a common set of rules on, for example, interoperability and safety do not exist and are far from being established.

Even more complicated, at a national and European level, is the possibility of solving the problem of scarcity by using economic instruments. A classic solution to the issue of inability to obtain the desired slot is the application of auction theory to assign scarce slots. A second possible solution, but theoretically less efficient because it does not take into account the different reservation price of operators, is the call for administered prices. Practical difficulties for an efficient solution of the scarcity problem are related to the complicated ways in which slots can be organised to support the production of different kind of services and, in the case of auctions, the possible lack of competition among agents.

Another possible scenario for pricing access to the network is represent by the *efficient component pricing rule*[15]. With the application of this rule the access price has to include the direct cost of access service supply and of all others opportunity costs of the network landlord. With the *efficient component pricing rule* the network operator will have to receive a mark-up on the final service exactly equal to the marginal cost that it has to support on the downstream market. Therefore he himself will have to consider an access price to "his own infrastructure" that is the same as the price imposed on other competitors in the final market. The main property of this rule is that it guarantees entry into the sector only to efficient firms with a cost structure lower than the cost structure of the incumbent. Furthermore because this rule is neutral towards the incumbent firm's profits, it does not provide any incentive for the network landlord to maintain anti-competitive behaviour with the scope of denying access to new entrants in the downstream market of final services. The *efficient component pricing rule* can be efficiently applied only if the separation option has been adopted in such a way that the network operator is also active in the downstream market for services and there would be an interest for strategic behaviour in order to avoid access and, therefore, competition from others service operators[16].

Regarding informational requirements, the *efficient component pricing rule* present the same problems noticed in the previous analysis. The cost and profit structure of the incumbent has to be known in order to define the mark up that has to be applied to the access direct cost. The network characteristics are relevant for the definition of rolling stock, congestion, and scarcity costs, and also in order for recognising when access is denied because of strategic behaviour on the part of the incumbent or because of real technical constraints that do not permit the entry of a new operator.

In a competitive access context there is no regulator to define access fees, but the need for information is not less than in the separation option. In this case the main informational requirements are related to the application of an efficient antitrust policy. The possibility that technical constraints related to the network can be used to deny entry require a common set of rules on interoperability and common working standards as far as common protocols on safety and environmental protection. In this context the idea of "reciprocity" among operators can be improved only if there are common initial conditions that can facilitate cooperation among different operators. In a sector characterised by high fixed investments for the development, upgrading and maintenance of the network, it seems necessary to reach a critical common level of interoperability in order to let free competition take hold and work efficiently. Furthermore, even after this critical level has been reached, the unavoidable antitrust actions require a certain level of technical information that has to be centralised if it has to be used appropriately and efficiently.

Following these considerations it appears evident that, in the different European railway restructuring options proposed, the level of information required it is, at least initially, not very different. This is exactly the reasoning that justifies the introduction of a European Agency, as a first necessary step towards railroad restructuring and towards a common market for railways. This is going to be discussed in the next section.

5. The role and perspectives of the European Railway Agency

In the White Paper "European Transport Policy for 2010: Time to Decide", the Commission announced a new package of measures that included the creation of a Community structure for railway safety and interoperability[17]. The proposal for a regulation by the European Parliament and by the Council establishing a European Railway Agency was

presented in may of this year in the Official Journal of the EU. Following the Community way of thinking, the progressive creation of a common railway area requires an action in the field of technical regulation applicable to both the technical aspects and the safety standards, the two being inextricably linked. In fact the technical and operational differences between the railway systems of the Member States have compartmentalised the national rail markets and prevented dynamic development in this sector throughout Europe.

For a long time safety objectives have been a purely national matter, mainly because the national markets were closed. In the new common perspective a need has emerged to develop common approaches to safety: first to ensure high safety standards as the market is opened up to an increasing number of operators and second to allow efficient use of infrastructure access without which incompatible national safety regulations would create new barriers to entry. One step could be the facilitation of issuing safety certificates to railway undertakings with a view of their mutual recognition in the long term. Furthermore in the field of safety it would be important to ensure the greatest possible transparency and an effective flow of information, with an analysis of performance based on common indicators and linking all operators in the sector. In case of safety requests from national authorities directed to receive information concerning other Member States, it would be important to have an independent technical opinion.

In one way safety is an essential requirement for the technical specifications for interoperability and must be taken into account directly when drafting them, while conversely different safety regulation among member states could be an obstacle to interoperability of rolling stock. For example rolling stock maintenance is an important part of the safety system and no genuine common market can be developed without a system of certification of maintenance workshops. The solution to this correlation is defining technical specification and European standards.

In the context of safety and interoperability, human capital also plays an important role and the vocational qualification required for train drivers could be relevant for the development of railroad system in Europe. These are also a precondition for the free movement of workers. For these reasons one of the Agency tasks is, among the others, to support exchanges of drivers and trainers between railway companies from different Member States.

None of these actions could be taken without the support of an independent and technical body to supply the Community with high quality expertise while ensuring neutrality *vis-à-vis* market operators and national authorities[18]. The economic improvements that will follow from a common set of technical and safety standards are a substantial improvement in the competitiveness of the European industry, the cost cutting of rolling stock, and the creation of a common internal market for railway equipments. Therefore, given this scenario, it is now easier to interpret the different objectives and services that should be provided by the European Railway Agency[19]. First, it must supply technical support for establishing a system for the registration of rolling stock. This act of registration is a prerequisite for the recognition of the technical capability of the existing and future stocks to operate under certain conditions. Second, the Agency must collect documents and any kind of relevant information useful for the process of interoperability and must make all these documents and information accessible to the public and interested operators. The Agency must also provide an efficient means for exchanging this information. Third, it has to promote innovation (in the field of railway safety and interoperability) and the use of new technologies. Fourth, it has to contribute to the implementation of the Community legislation for the creation of a common and free European railway area. The agency must be independent, having legal autonomy and a budget financed by the Community. It will be guided by an Executive Director supported by an administrative board[20] and by a staff of independent personnel under the full responsibility of the Executive Director.

The Agency is not an Economic Regulatory Authority, however, because although it may adopt recommendations addressed to the Commission and express opinions to the Commission or to the authorities in the member states, it does not have any direct regulatory power. It does not have the power to submit to member states compulsory regulation and it does not fix prices (as do the majority of existing regulatory authorities in the field of public utilities). This very important specification does not make any difference to the information required needed in order to operate. In fact, neither the European Railway Agency nor classical regulating authority could work without a critical mass of centralised information to be created for and by the Agency. We do not know if the Agency represents a first step in the direction of railroad regulation in the European context, but it must at least organise a framework of data bases, human skills, expertise, and registration documents necessary for the work of a typical regulatory body.

As mentioned before, one important task of the Agency will be the promotion of innovations aimed at improving railway interoperability and safety, particularly requiring, however, the use of new information technologies and tracking and tracing systems. The development of these kinds of expertise and models will be extremely useful for the application of a future system of access prices at a European level. If, for example, for the future European railway network the solution of pricing access following the marginal cost pricing rule is adopted, the question of the applicability of this system of prices will deal with the possibility of estimating use related wear and tear costs, congestion costs, scarcity costs, external accidents costs and environmental costs. The estimation of the first category of costs requires a well founded knowledge of rolling stocks and operational techniques while the others costs, accidents apart, can be estimated using models of tracking and tracing[21]. If, otherwise, pricing *via* average costs (or with two part tariffs)

is applied there will still be the need for identifying bottlenecks and infrastructure scarcity, therefore it will be important to have a system to model the railroad network usage during peak and off-peak periods.
It seems plausible to conclude from the above discussion that the process of railways restructuring promoted by the Commission and now on the floor calls for a future European regulatory body. This institution, in order to operate, requires a certain critical level of human skills and information that are in part contained in the information that the proposed European Railway Agency has the duty to collect and organise. Of course, the technical requirements are, for the moment, far from being the political requirements necessary for the establishment of a typical national regulatory authority.

6. Conclusions

This paper has discussed questions concerning the economic regulation of the railroad sector and the proposal for regulation by the European Parliament and Council to establish a European Railway Agency. The main idea of the paper is that the European Railway Agency represents a first step towards the constitution of a future European Authority for the railroad sector, even if, at present, the Agency proposed is far from having the institutional requirements that can allow it to work as a typical authority. Generally an authority is needed when the process of restructuring a formerly vertically integrated sector is implemented through separation. This approach consists of splitting the different phases of service production introducing competition when possible, and regulating the phases that have the economic characteristics of a natural monopoly. In order to operate properly, an authority needs a critical mass of information, a certain organization and a staff endowed with specific skills. Only in this case can the game among private operators and public institutions be fruitful for the development of competition and the development of efficiency within the sector, given the presence of asymmetric information that characterises these processes of restructuring. Even if, for the reorganisation of the railroad sector, the alternative solution of competitive access is chosen, however, the question of maintaining a certain amount of critical information that can allow market designing and the construction of a new and competitive framework still remain critical. In fact any antitrust actions made to support the market require clear rules for courts and technical information and evidence that can support any action towards the protection of competition.
The European Agency's task, at least at the beginning of its activity, is to organise and provide information, standardise procedure, create a body with highly qualified and competent human skills, and to promote innovation. With these acquired capabilities the agency could be transformed without many problems into a European Authority for the railroad sector, once the necessary political conditions exist.
Of course there would not be the need for a European Authority for the railroad sector if a common and open market for railroad services did not exist. For this reason, the agency must create the necessary conditions for the naissance of this market through interoperability, common technical standards, and safety rules. Once the European railway network has been organised with common technical operating rules, and once the common market is monitored, for example, with tracing and tacking systems, it would be possible to proceed with any kind of technical and economic regulation such as organising rail transport flows in bottleneck situations, pricing access, introducing transport tariffs, and promoting strategic infrastructure investments (for the development of the European market).

Notes

[1] Commission White paper *European Transport Policy for 2010: Time to Decide*; COM, (2001), 370.

[2] See Commission of the European Communities, (2002), Communication from the Commission to the Council and the European Parliament, Toward an integrated European Railway area, COM (2002) 18 final, 23.1.2002, Brussels.

[3] As proposed in the Official Journal of the European Community dated 28.5.2002, C 126 E, pp.323-331.

[4] A *public choice* perspectives of railway liberalisation is discussed by Ponti, M., and S., Erba, "The Liberalisation of the Railway in a "Public Choice" perspective", published in this issue.

[5] Paragraphs 2 and 3 will be organised following the idea presented in Kessides, I., and R., Willig, (1998), "Restructuring Regulation of the Rail Industry for the Public Interest", in OECD Report, R*ailways: Structure, Regulation and Competition Policy*, Paris, OECD.

[6] In case of multiproduct monopoly the level of prices is inversely correlated to demand elasticity.

[7] Some authors consider these solutions the "choice among three evils", Friedman, M., (1962), *Capitalism and Freedom*, University of Chicago Press, Chicago.

[8] See Laffont, J.J., and J., Tirole, (1993), *Theory of Incentives in Procurement and Regulation*, MIT Press, Cambridge, Ma, pp. 1-50, and the classical papers of Demsetz, H., (1968a), "The Cost of Transacting", *Quarterly Journal of Economics*, Vol. 82, pp.33-53; Demsetz, H., (1968b), "Why Regulate Utilities?", *Journal of Law and Economics*, Vol. 11, pp.55-66. For the case of public utilities see also Archibugi, D., G., Ciccarone, M., Marè, B., Pizzetti, and F.,Violati, (1999), *Il triangolo dei servizi pubblici*, Marsilio, Venezia.

[9] In Italy, for example, in some utilities the access to a fixed facility can be assigned with a regime of *concession* or with *authorization*, for a discussion see Marcucci, E., (2003), "Gare e contratti di servizio nei servizi pubblici locali: alcune indicazioni dal caso dei trasporti pubblici locali", in Perefetti, L., and P.,Polidori, (Eds), (2003), *Analisi economica e metodo giuridico: i servizi pubblici*, Cedam, Padova, in print.

[10] In this case it is possible to recall the classical considerations proposed by Williamson, O., (1975), *Market and Hierarchies: Analysis and Antitrust Implications*, Free Press, New York; Williamson, O., (1985), *The Economic Institution of Capitalism*, Free Press, New York.

[11] For a general discussion of the problem see La Spina, A., and G., Majone, (2000), *Lo Stato regolatore*, Il Mulino, Bologna.

[12] Armstrong, M., C., Doyle and J., Vickers, (1996), "The Access Pricing Problem: a Synthesis", *Journal of Industrial Economics*, Vol. 44, pp.131-50; Cervigni, G., and M., D'Antoni, (2001), *Monopolio naturale, concorrenza, regolamentazione*, Carocci, Roma.

[13] A classical reference is Laffont, J.J., and J., Tirole, (1993), *op. cit*.

[14] On this point see also the paper of Nash, C., and B., Matthews, (2002), "Implementing Marginal Cost Pricing of Rail Infrastructure – Barriers and Solutions", published in this issue.

[15] Known also as the *Baumol-Willig rule*. Willig, R. D., (1979), "The Theory of Network Access Prices", Trebin H. M., *Issues in Public Utility Regulation*, East Lansing (Mich.); Baumol, W.J., and J.,Sidak, (1994), "The Pricing of Inputs Sold to Competitors", *Yale Journal of Regulation*, Vol. 11, pp. 171-202.

[16] For a discussion on the regulation of access and on the application of the *Efficient component pricing rule* see Beccarello, M., (2002), "La regolazione dell'accesso alle reti ferroviarie", mimeo.

[17] The legal basis for this Community action may be found in Art. 71(1) of the Treaty.

[18] Of course there is the possibility that the regulator is captured, and it is not easy to define clearly the conditions (using the economic theory) that can assure neutrality. For an interesting discussion about the nature of authorities see, Patrizii, V., (2002), "Le autorità indipendenti", mimeo, in particular par. 4 on the question concerning their independence.

[19] All the action taken by the European Agency must, obviously, be transparent and non discriminatory as is required of any independent body.

[20] The board will be composed by six member of the Council, six member of the Commission and three independent experts, with no vote, appointed by the Commission.

[21] On the question of scarcity costs it is important to recall the above discussion on the allocation of slots.

BIBLIOGRAPHIC REFERENCES

ARCHIBUGI, D., G., CICCARONE, M., MARE, B., PIZZETTI, AND F.,VIOLATI, (1999), *Il triangolo dei servizi pubblici*, Venezia, Marsilio.

ARMSTRONG, M., C., DOYLE AND J., VICKERS, (1996), "The Access Pricing Problem: a Synthesis", *Journal of Industrial Economics*, Vol. 44, pp.131-50.

BAUMOL, W.J., AND J.,SIDAK, (1994), "The Pricing of Inputs Sold to Competitors", *Yale Journal of Regulation*, Vol. 11, pp. 171-202.

BECCARELLO, M., (2002), "La regolazione dell'accesso alle reti ferroviarie", mimeo.

CERVIGNI, G., AND M., D'ANTONI, (2001), *Monopolio naturale, concorrenza, regolamentazione*, Carocci, Roma.

Commission White paper, *European Transport Policy for 2010: Time to Decide*; COM (2001), pp. 370.

Commission of the European Communities, (2002), Communication from the Commission to the Council and the European Parliament, Toward an integrated European railway area, COM (2002) 18 final, 23.1.2002, Brussels.

DEMSETZ, H., (1968a), "The Cost of Transacting", Quarterly Journal of Economics, Vol. 82, pp.33-53.

DEMSETZ, H., (1968b), "Why Regulate Utilities?", *Journal Law of and Economics*, Vol. 11, pp.55-66.

FRIEDMAN, M., (1962), *Capitalism and Freedom*, University of Chicago Press, Chicago.

KESSIDES, I., AND R., WILLIG, (1998), "Restructuring Regulation of the Rail Industry for the Public Interest", in OECD Report, R*ailways: Structure, Regulation and Competition Policy*, Paris, Oecd.

LA SPINA, A., AND G., MAJONE, (2000), *Lo Stato regolatore*, Il Mulino, Bologna.

LAFFONT, J.J., AND J., TIROLE, (1993), *Theory of Incentives in Procurement and Regulation*, MIT Press, Cambridge, Ma.

MARCUCCI, E., (2002), "Gare e contratti di servizio nei servizi pubblici locali: alcune indicazioni dal caso dei trasporti pubblici locali", in Perefetti, L., and P.,Polidori, (Eds.), *Analisi economica e metodo giuridico: i servizi pubblici*, Cedam, Padova, in print.

NASH, C., AND B., MATTHEWS, (2002), "Implementing Marginal Cost Pricing of Rail Infrastructure – Barriers and Solutions", published in this volume.

Official Journal of the European Community, (2002), "Proposal for a Regulation of the European Parliament and of the Council Establishing a European Railway Agency", May, 28, C 126 E.

PATRIZII, V., (2002), "Le autorità indipendenti", mimeo.

PONTI, M., AND S., ERBA, "The Liberalisation of the Railway in a "Public Choice" Perspective", published in this volume.

WILLIAMSON, O., (1975), *Market and Hierarchies: Analysis and Antitrust Implications*, Free Press , New York.

WILLIAMSON, O., (1985), *The Economic Institution of Capitalism*, Free Press, New York.

WILLIG, R. D., (1979), "The Theory of Network Access Prices", Trebin H. M., *Issues in Public Utility Regulation*, East Lansing (Mich.).

The Possible Scenarios in the European Railway Industry After the Present Phase of Change

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1. Introduction

The railways in Europe have been going through a period of turbulence for nearly ten years. In truth, at the moment, the turbulence is predicted or hypothetical rather than real.

Nevertheless, the "real turbulence" should correspond to a precise objective of EU transport policy, that derives directly from the Treaty of Rome. It is neither a fashion nor caprice. It is part of the political objectives being carried out by the EU.

The scope of this paper is to see how the deregulation process is moving, if it will be realized completely and what will be the probable scenario at the end of this process of transformation.

2. Historical notes

Until the second post-war period, European railways had a leading role in the public transport of people and goods, both because the alternatives were not technologically in a position to replace the railways, and because the demand of mobility generally increased at a low rate compared to the increase of GNP. This situation was found particularly in the goods sector, because production was spatially concentrated, there was a predominance of verticality in the industry, and the goods were in big volumes, weights, and dimensions.

In the passenger sector, mobility was restricted with regard to distance, limited with regard to commuting for work and for school; welfare was not generalised and mobility for pleasure, shopping, and tourism was also limited.

Immediately after the second post-war period the alternative of roads dramatically replaced the rail one. In a short time the road system (both for people and for goods) prevailed totally, thanks to flexibility, door to door, specialisation, ever decreasing costs, and continuous technological development.

The railway has been left behind to the point of obsoletion, even compared to maritime and short-sea shipping that have adopted, for instance, hub and spoke system for container traffic.

The railway became very expensive and lost most of its competitiveness due to the scarce flexibility of the services offered. Labour and infrastructure were the main cost drivers.

Industrial development, based on industrial districts, has increasingly reinforced road transport, in the end virtually taking the place of the railway in the transport market.

For a long time it had been lacking commercial aggressiveness, technological and organizational upgrading, even if the technical specialisation of the engineers was often very high.

In addition, the general planning of the transport system underestimated the dependence of land transport on sea transport in a scenario of globalisation. The decline of the railway industry is linked to its gradual transformation from leading mode in the transport system to a tool of the governmental economic policy (employment, fares policies, prices of final products, etc.), producing great re-distributive effects as a result.

The railway industry essentially continues, essentially, to carry out so-called "public services", ensuring passenger service at marginal costs, or, in the case of the goods transport, carrying out a service that has no road alternative or that was not much in demand in terms of quality and reliability (i.e. the so-called poor goods in great volumes).

At the European scale the public financing of the railways assumes the form of subsidies to "requirements for public service" and to "aids for infrastructure costs".

As a matter of fact, the railways were an element of the welfare state, such that the ensuing crisis of one meant the crisis of the other.

All that until when, in 1991, the EU issued "Directive 440", concerning the development of the EU railways representing the first shock to the by now anacronistic giant.

3. From indifference to attention

Today, 10 years after the above mentioned directive, we have a number of directives, statements, and "white papers", whose aims is to invigorate the railways. It is possible to imagine a number of causes that determine these initiatives - causes of a political nature, such as the removal of barriers in the construction of a common European market, the free movement of people and goods and the progressive elimination of national networks in order to create a European one. The railways can neither escape this logic nor be an obstacle to it. There can remain no "state railways" but rather "European state railways". Obviously, this does not mean there will be a single great European railway industry. We have to remember that this process is being carried out in a scenario of deep evolution at a world-wide level. The United States of Europe will arise from the necessity to be stronger and more competitive. Consequently the different elements of the system must maintain dimensions adequate for this goal. Adequate dimensions for the economies, industry, financial groups, and the railways, must also be reached.

The opening of state railways to a European scale will also determine the elimination of inefficiency and localised rents

that characterise protected economies.
This situation is well explained by the "White Paper" on European transport, published in September 2001 - "European Transport Policy Until 2010: Time to Decide". This document was issued ten years after the first White Paper, entitled: "The Common Future Development of Transport". The key concept in the document is the opening of the transport market: "In ten years, with the only exception of the railway sector, – underlines the paper – this objective has been virtually reached".
The directives, the white papers, the communications of the EU, pay particular attention to freight transport, pursuing the fundamental objective of modal rebalance. In the freight sector, the increase of revenue is leading to an increase in the demand for goods. The increase of transport demand is consequent to that. It is also, however, consequent to the rules of the new world-reorganisation determined by delocalisation of production, increase of tertiary activities, and decrease or elimination of stocks.
These factors, particularly the second, determine the increase of transport demand - but of a demand with particular features in terms of quality and reliability. *Just in time* factor is one of the characteristics of this demand. Transportation has to be assured even if the factories are very far from each other, as is more and more frequent today, and separation has to be bridged by a land-sea-land transportation sequence. In addition, the land and maritime infrastructures are not always developed according to European standards. In those cases the logistic chain has to ensure "just in time". This means not only the final origin or destination in the factory has to be determined, but also the intermediate appointments of the change of transport mode, or those of load rupture.
This process is now under way, and one can see a generally limited presence of the railway, compared to the share of road, maritime and short sea transport. In other words, land transport will have to be proportioned and dimensioned to maritime and air navigation. This is the field of economic logistics, a new discipline particularly devoted to the investigation of new models of intimate integration between production and transport.
In general, the overall rise in transport demand, increasingly biased toward roads, will determine a saturation of at least the most important origin destination axes. It will be difficult to upgrade the supply of infrastructure to meet increasing demand. In addition, it is probably not possible to create new motorways on particular corridors in Europe, and only an optimisation of the existing capacity through new technology injection will be possible. Saturation, however, will be only postponed for some years. In Europe, a doubling of transport demand in the next ten years is very likely and it is inevitable that the railways will be called to satisfy a share of this increase. Its role in the logistic chain will be augmented if a greater compatibly with other modes is created within its vocational role.
There is a future for the railway industry if the efficiency level is raised. The railway system has to develop more synergies with the other modes according to the needs of the European and world-wide supply chain. The American railway system for example, is linked to the maritime one. When a container leaves from Japan and crosses the Pacific Ocean, it is loaded on a train in Los Angeles and then reaches Boston, going across the Atlantic Ocean, it arrives in Rotterdam and from here it arrives in Germany by train.
Another important element of infrastructure is that of maritime terminals. The Northern Range ports are the biggest in Europe and container business is increasing. The most relevant growth possibility is linked to the Mediterranean ports, such as those of the "Southern Range": Algeciras, Gioia Tauro, Malta and Taranto. The increasing East/West, and vice versa, movement of goods will favour these European ports. In this way the "Southern Range" might replace the Northern one.
Finally, we can indicate another important issue: the environment. The environmental equilibrium in goods transport and its impact on land is a strategic matter of economic logistics. This factor might not be the most important, but sensitivity towards environmental problems is widespread in the population and increasing. Strategic decisions in the alpine countries hinder the transit and the growth of road traffic in these territories. The EU support of environmental positions has focused great attention on this issue and has suggested possible solutions.
The most important environmental impacts of transport are: acoustic, atmospheric and land useage. At present the atmospheric impact is the most widely perceived problem. In this case trains are clearly the winners (at least, if the production of electric energy by oil is not considered). The other two types of impact are: noise and the territorial impact. Considering the first point, present rail transport seems to pollute more than road, at least for freight traffic. Studies are being carried out in order to resolve this problem.
Finally, as for land use, increasing transport demand will subsequently cause the proliferation of roads and, as reported in the White Paper, "Every day ten hectares of territory are covered with road infrastructure". The railway system has to be more exploited because it occupies only a third of the territory of road-networks.

4. The normative measures taken by EU

Among the most important normative measures implemented to stimulate rail transport in Europe over the last ten years are the following:

- Directive 18 of 1995, on the licencing regulations for enterprises; Directive 440 of 1991 concerning the development of the European railways.
- Directive n. 19 of 1995, on the sharing out of infrastructure capacities and the recovery of infrastructure usage rights.
- Directive 48 of 1996, on the standardisation of high speed railway systems.
- Directive 12 of 2001, that modifies Directive 91/440.

- Directive 13 of 2001, that modifies Directive 95/18 on railway licences.
- Directive 14 of 2001 on principles enforceable in the determination of rail infrastructure usage rights.
- Directive 2001/n. 16 of 2001 on the standardisation of conventional railway systems.

Let us look at these measures in more detail.
Directive 440 represents a milestone in the European railway history. In fact, it suggests separating infrastructure from service.
Directive n.19 of 1995 contains an important rule introducing the so called "Certificate of Security" concerning the technical capacity of a railway operator to circulate on a certain rail-network.
The Certificate of Security allows an operator to offer a transport service on a given network and constitutes a sort of barrier to the railway market for new operators since the railway system has a number of strict technical norms.
The Directives n. 1996/48 and 2001/16 concern inter-operability that is, the technical standardization of rail system at the European level. The numerous and rigorous above mentioned norms are in fact different in different countries.
In addition, these rigidities and differences are connected to the industry of railway equipment supply.
To overcome these limitations the EU has formed a technical association, the EARI (European Association of Railway Interoperability). Both representatives of the railway and supply industry are represented in this body. Undoubtedly an acceleration of the standardisation process will come from the present phase of reorganisation and concentration of supply at a world-wide level.
In parallel, the EU is removing another part of ancient states' supremacy - the traditional presence in the same entity of both the railway operation and the function of rules and control. The EU is gradually imposing the concept of the independent body, able to certify the conformity of all components of rolling stock and the infrastructure to the technical specification established in the interoperability norms, which must be mandatory throughout Europe.
Moreover, the EU is preparing other directives on railway safety, on the modification of directives 96/48 and 2001/16, on a regulation plan which creates a European Railway Agency for safety, and on a project to modify the directive 91/440 to open the access to infrastructure also to the national services and to complete the total opening of the railway market.

5. Possible economic settings

In order to create the new European railway it is necessary to reduce the present national systems and to reorganise them on a European basis. One can imagine that this process will pass through the typical phases of: liberalisation, fragmentation, and consolidation.
Therefore it is also interesting to examine how these phases will play out and which of them will be more important and lasting, and which, on the contrary, will feel the effects of the railroad industry rather than those of manufacturing or service. Here it is useful to recall what has already happened in air and railway deregulation in the US, in order to understand the potential changes in Europe.
The first changes can be dated back to the late seventies when the American Senate passed the Airline Deregulation Act (A.D.A.). This act eliminated the regulatory system that had been protecting the commercial air sector from competition for 40 years.
The A.D.A. represented the tangible mark of the government's move to substitute the norms regulating entry, exit, and fares with free market and competition rules. Competition, argued the supporters of deregulation, would produce a cut in fares, with clear advantages for customers. In addition, airlines would be forced to regain lost efficiency, thanks to the modification of the capacity offered and to the rationalisation of their networks. In the end, deregulation would create new opportunities, offering new and varied services that would better satisfy customer needs.
This strongly conservative scenario changed with deregulation. In fact, all companies satisfying technical prerequisites had free access to the market and freedom to choose the most profitable routes. Economic interests started operating and legitimate competition between operators for profitable routes made markets more competitive.
In the years following the A.D.A. many air companies that until then had been serving only regional markets, started operating at a national scale. In 1984, after a number of sensational failures, the number of air companies (or a significant part of them) that served the entire territorial USA, increased dramatically. Nevertheless, between 1984 and 1986, a combination of financial failures, mergers and acquisitions clearly redesigned the structure of the sector, via a substantial reduction of competitors. Many small operators were acquired by the main operators, thus becoming great carriers while others definitively left the market.
Amongst the strongest causes of this concentration of the market, were the bloody fare wars that broke out among the carriers immediately after the start of deregulation. This was reinforced by the appearance of low-cost carriers. These, in exchange for very low fares, offered "no frills" services, in accordance with a rigid strategy of operative costs reduction.
It is important to consider, however, that, although supporters of the deregulation process considered the market perfectly competitive, its oligopolistic and, in certain cases, monopolistic nature soon became evident.
Subsequently, at the beginning of the eighties, there was a passage from an oligopolistic market regulated by the state to an almost unregulated oligopolistic market.
In the freight sector, the same history concerns the world-wide maritime container traffic.
Considering the deregulation of European rail transport, it will be interesting to see whether there will be a return to oligopolistic and/or monopolistic models after the first phase of liberalisation has taken place.

These models in fact could be influenced by the structure of the railway industry, characterised by fixed costs, strong economies of scale, and a natural tendency towards concentration.
It is interesting to know what has happened in the American rail freight sector - the only one relevant in USA, with a share of 40% of the market, almost insignificant passenger service, and with the same problems as in the European case.
In 1980, the Stagger Act was passed. This Act reduced the role of the old ICC (Interstate Commerce Commission), created in 1886 to regulate rail transport. Companies gained the possibility of establishing market based fares and abandoning unprofitable businesses. Furthermore, the Stagger Act improved general market conditions but caused the concentration that one can see today.
In the last few years, this concentration has caused problems in terms of service quality. The different mergers and acquisitions brought about a market dominated by four big companies: Burlington Northern Santa Fe (BNSF), CSX, Norfolk Southern (NS) and Union Pacific (UP). These companies have eliminated many lines and stations that were active previously thus capturing many clients that are now "prisoners" of the will-power of the four "majors".

6. The possible settings for Europe

According to a first *optimistic scenario* there would be a first phase of competition between companies. To make this process easier, the EU has chosen to separate the network from operation. In this way the fixed costs of infrastructure will be eliminated from operation and new firms will enter the market by paying an access charge to the owner of the network.
The EU norms that try to promote this separation are– as we have seen – numerous and all going in the same direction.
In principle, this hypothesised system should create a competition-based market through a process of evolution. This implementation path should avoid the direct passage from the liberalisation to the concentration, without the intermediate phase of fragmentation, as in the USA. In the USA there is no separation between infrastructure and operations.
For Europe we can imagine more networks, and more rail operators - both identifiable by means of whatever criterion, but surely not by means of the old national criterion.
Progressive elimination of public restrictions, increasing technological standardisation, rationalization of industry supply, creation of a European network mostly dedicated to freight traffic, will all act to reduce barriers to market entry.
The present vertically integrated railways should be first separated into two main network and operation sectors to cut down on fixed costs. The operation will then be articulated into homogeneous businesses: long distance passenger, regional transport, and freight.
In the first phase one would have fragmentation, that is an increase in the number of train operators over and above the present national companies. These operators will be specialized and organized on the basis of the different criteria - for example, by typology of freight sub-sector (e.g., wood, chemical, intermodal, waste, etc) by direction/country relationship (e.g., North-South, East-West,: Italy-Sweden, Italy-Germany, etc.) and by geographical areas (e.g. National, European and East-European traffic, etc.).
It is possible to imagine that new entrants will come from the group of operators linked to the rail cargo market (e.g owners of private wagons and rail tanks, combined and intermodal transport operators, manufacturers that are already clients of railway, freight village and logistic platform operators, etc.). These could also be operators already inside the railway industry, but from other sectors such as the passenger or regional segment.
There will also be cargo operators of other modes, such as road and maritime transport. At the end of the day there could be a scenario characterised by a strong horizontal market segmentation. Subsequently the different firms will progressively reduce production costs by outsourcing maintenance, information services, and other subsidiary functions.
Once the market has opened up, railway service differentiation will increase especially those aimed at manufacturing companies thus allowing a further reduction in operating costs. Specialised firms, owning wagons and locomotives, will be born in order to rent their assets to railway operators. Platforms to manage information services will be created (like Railink in the USA). One might also speculate that human resources, which today require long and expensive training, such as for drivers, will be trained in shorter periods by specialised firms.
In the end, railway operators will have obtained a deep cut in fixed costs.
In a second phase one could witness a re-conquest of the market share and the game will be played again through technological innovation. In fact, the increase of volumes will be made possible through an augmentation of track capacity. The automation, control, and command systems for traffic management on the network would be technologically upgraded. Trains will have to be longer, heavier, and will also dispose of technologies to rapidly set and break them up.
In parallel, it will be necessary to specialise network traffic in particular segments: passenger, freight, regional, and high speed. This specialisation will require the construction of dedicated lines near big urban areas. Close to the junctions, in fact, they will emphasise the promiscuousness of the different types of traffic to avoid costly bottlenecks. Similar considerations apply to terminals.
In a third phase the sector might concentrate. There could be mergers stimulated by those operators that are interested in the acquisition of other potential competitors operating in different transport sectors.
For example, firms in the maintenance sector might merge with those renting locomotives, to obtain an integrated cycle.
On the market side, they could have the same requirements; for example, the perishable business might merge with

intermodal business to optimise the transport of controlled temperature units.

At the end of this process the scenario will show, on one hand, a reduced number of horizontally and vertically integrated big companies and, on the other hand, a number of auxiliary subjects that will profitably contribute to the optimisation of the world-wide logistic chain in the European network. The process will at least be the same as that verified in the world-wide full container shipping lines which, through a number of processes of vertical integration, have become terminal owners (e.g. Evergreen of Taiwan in Taranto) or even owners of truck fleets and logistic platforms (e.g. T.Notteboom and W. Winkelmans).

The second scenario could be considered realistic. The free market game seems to be the key tool to relaunching the railway industry. In reality the problem is complex, in fact it is not simply a technical problem of company reorganization. The question is how to regulate the institutional order and define incentives capable of stimulating efficiency and innovation in the railway industry. The principal cause of decline was found in the lack of competitiveness and in the deep defence of the national operators by the different countries. The prescription is always the same: more competitiveness - that is, more efficiency and more development.

One way in which the EU interventions aims at developing the European railway is by rendering management autonomous from the respective public owners. If this separation is made operational the railway industry could then be managed according to commercial criterion, while the social objectives could be warranted by means of auctioned service contracts with the States financing both infrastructures and commercially not viable operations.

If one analyses the present situation in the European railways one sees that the hoped for competitiveness in the final market of the transport service has not yet been materialised, and the clear "timidity" of the directives represent a difficult obstacle to overcome.

Network access to operators other than national incumbents was permitted only for international associations of firms. In addition, one can verify the strong opposition of incumbents and of the states to the real liberalisation of the market. It is thought, in fact, that the immediate opening of the market could bring a competitive disadvantage for the national incumbents. As a result of this fear, the present incumbent operators have tried to create co-operation agreements in order to discourage newcomers. One must not neglect, moreover, the strong entry and exit barriers that genuinely hinder competition. Among the most relevant barriers are the almost total lack of technical interoperability, high start up costs, lack of a secondary market for rolling stock, high labour costs, and the lack of an independent authority guaranteeing equal market access opportunities. The result is a non-existent competition in the passenger sector and very low one in the freight and regional ones.

To start the sequence of competitiveness-development, one has to create structural incentives, through a structural reorganisation, and a new managerial and ownership model. The main objective is to create conditions allowing for market contestability and sustainability, while preventing predatory actions from incumbents.

Two competition models have been proposed[1]: competition "in the market" and competition "for the market". The first model concerns the simultaneous competition among a number of railway industries. It is applicable, in particular, to the highly profitable passenger sector and to specific freight segments. Conditional to the application of this model is the separation of networks and operations, that is a prerequisite to reduce entry barriers and to eliminate the unsustainable cost component. The model based on competition "for the market", on the other hand, activates the competitive phase only periodically, for example when choosing an operator that will be able to operate a particular network or railway segment according to the consolidated scheme of the legal monopoly. This model is usually applied to the segments of regional transports needing public subsidies.

The second important action is the constitution of an independent authority capable of playing the role of referee among the contrasting interests of the consumers, shareholders, and the state. The authority should dispose of highly skilled and well paid personnel to avoid regulatory capture. This independent organism should introduce a process of regulation within the sector that will aim to guarantee access of new firms to the network, also by pro-competitive policies favouring newcomers.

The third measure regards the possible privatisation of the public firms born from the division process. The break up of the incumbent into a number of firms, each for a different segment of the market, should facilitate market flotation.

Combining the typical element of efficiency actions with specific elements of the sector, (like the public service management model, the formation of prices model, the choice model of investment financing, the splitting of the cost between public finance and user), should determine a change in the institutional arrangement of the sector. This should no longer be a policy of defence, but rather represent a real re-conquest of the market.

An important issue in this respect is the susceptibility of certain rail activities to open competition. One cannot imagine, for example, network or line duplications for each new entrant, so we can consider infrastructure as a natural monopoly. Many railway accidents in England, and the following failure of the infrastructure owner, Railtrack suggest a deep study of railway privatisation in Europe. It may be, in fact, more economical to keep the network in public hands since it requires great investments and costly maintenance needed for safety purposes. On the contrary, operations should be opened up to competition. Interesting considerations can be made by comparing the railway market and the liberalised telecommunications market where new operators usually offer value added services. New operators create their own infrastructures and are more competitive than

Rails incumbents. Unlike telecommunications, the network seems difficult to duplicate.
If the network were privatised, it is possible that enterprises might not recover their investments and, in this case, it would be necessary to envisage a new system to channel public resources to them.
If the aim were to have private firms operate not-commercially viable services one would need public subsidies to guarantee that network economies are not lost. This would also ensure equal opportunity conditions for all, stimulating competition. Once the supremacy of the competitive framework is accepted, the scope of regulation is to ensure the maximum number of competitors on the market. The only undesirable consequences of deregulation are the possibly inefficient fragmentation of the supply or, more probably, false plurality, with the presence of incumbents and niche operators. In addition an incomplete regulation of the sector could promote the formation of trusts, as the American rail experience and the world-wide air sector demonstrate.
The initiatives undertaken to favour interoperability and intermodality, the incentives to favour leasing and the training of specialised manpower, and the extension to this sector of the limitations of the public subsidies, are important steps, but they are not enough.
Despite these positive aspects, there is a long way to go before reaching full and free circulation of the rolling stock owned by different companies - not only in terms of insufficient interoperability and different signalling systems, but also in terms of the real difficulties for private companies in creating real logistic networks for maintaining and repairing rolling stock.
Europe is undergoing a period of transition from national no-market regulation to pan-European regulation for the market. Railway competition is based on wide competition and business differentiation. In the presence of broad business differentiation, the competitive advantage of the companies depends on their capacity to anticipate change, on quick response to customer needs, and on co-ordination capacity and resource/skill combination. For this purpose, railway companies are adopting the so called "*strategy of market creation*". This strategy consists both in horizontal integration, aiming at local market penetration, as well as vertical integration, implemented through contractual agreement with operators or by long term partnership with customers, that might also end up in joint ventures. The process of European market creation allows important changes in the railway sector through the opening of the national markets. In a short time the industry will pass from a state of monopoly to oligopoly, and so railway companies will increase the number of alliances and acquisition, while reducing the number of European and international operators.
The only fear is that the old natural monopolies will become new private monopolies on a European scale.

7. Conclusions

Once the phases of shock and successive rearrangement of the railway are over, will we return to a model of vertically integrated network/operations? Can one imagine that the dilemma of separation between infrastructure and operations will be reduced if specialised lines and terminals materialise as, for instance, in the USA, Australian or New Zealand models? The railway companies in these countries also own the network and this proves that a vertically integrated railway company, at least for the network and operation, can bring in revenue, in this way being adequate to the *hub and spoke* model on which the world-wide market of all transport modes tends to consolidate.

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The entire paper is due to strict co-operation, however paragraphs 1, 3, 6, 7 are by Ennio Forte and paragraphs 2, 4, 5 are by Francesco Del Vecchio.

NOTES

[1] See the Conference: Competition and European Railways Development: (2001), Paths and Perspectives Compared, Rome, Tor Vergata University.

BIBLIOGRAPHIC REFERENCES

European Commission, (2001), "European Transport Policy Until 2010: Time to Decide", *White Paper*.

CASSINO G., (2002), "La Divisione Cargo nel nuovo contesto della liberalizzazione", in *Atti della Giornata di studio sulla liberalizzazione del trasporto merci*, Collegio Ingegneri Ferroviari di Milano e Università Bocconi, Milano.

FORTE, E., (1999), "Competizione nella portualità tra Nord e Sud Europa nei traffici unitizzati", in *Trasporti Europei*, n° 12, pp 71-77.

NOTTEBOOM, T., AND W., WINKELMANS, (1998), "Spatial (De)Concentration of Container Flows: tha Development of Load Center Ports and Inland Hubs in Europe", *8 Conferenza Mondiale dei Trasporti*, Anversa, luglio.

SPIRITO, P., (1999), "Nuove regole per chi gioca al tavolo dei trasporti", in *Osservatorio della concorrenza*, Notiziario per il Gruppo FS, a cura di Funzione Strategica e Studi, Direzione Strategica e Innovazione, n° 4.

Competition and European Railways Development, (2001),"Paths and Perspectives Compared", Università di Tor Vergata, Roma.

Transfer Pricing: Theoretical Aspects and the Case of Ferrovie dello Stato S.p.A.

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1. Introduction

Sometimes the need arises to transfer goods or services from one division of a large company to another division of the same company, or between two subsidiaries. As a consequence, it is necessary to fix a price at which transactions have to be carried out. This is the transfer pricing problem, which can be defined as the unit price assigned to goods and services when they are transferred between the parent company and subsidiaries or between divisions within the same firm.

A debate is under way in the academic world about the definition of transfer pricing. As a matter of fact, some authors use this concept for both inter-corporate and intra-corporate transactions, while others generally separate the two according to the ownership percentage of the subsidiary.

The presence of a transfer price is generally justified by a process of decentralisation. This type of organisation can bring, for example, financial benefits due to the transfer of responsibilities to divisional/subsidiary managers, who are responsible for the profits of their divisions/subsidiaries. This can be seen, for example, as an incentive to divisional managers, as they would thus have more control over the factors that affect performance measures. The abilities of divisional managers and the profitability of each division is always assessed and performance evaluated.

On the other hand, decentralisation often causes problems between divisional managers and the organisation as a whole. As a result of decentralisation, the head of one unit looks first at the objectives of the division and then at the objectives of the company as a whole. Consequently, some conflicts may arise between the interest of a divisional manager and the interest of the organisation as a whole. As a matter of fact, when some strategic decisions are taken, it is sometimes possible that the head of one unit has an increase in the profits of that unit, but that company profits as a whole have decrease. It is clear that this type of operation cannot be carried out because contrasts with the interest of the company. The Management Control System then has to advise that unit, which has to modify decisions regarding that operation.

As a result, Central Management faces the problem of coordinating the output decisions of different profit centres in the interest of the firm as a whole. If all divisions are left to themselves, it may be that some of them adopt monopolistic behaviour that can negatively affect the profitability of the company. It is necessary, therefore, for Central Management to coordinate divisions by setting the transfer pricing system also in order to take advantage of such transactions and to eliminate contrasts among units.

As we mentioned above, in a large organisation there is generally the need to delegate some responsibilities to divisional managers in order to achieve better control of the organisation. This means that the structure of a company is based on a hierarchy of divisions and, in turn, of departments. As a result, there are transfers within the same organisation or between corporations of the same group. There is then the need to fix prices.

As mentioned before, however, the transfer pricing problem is much more than an accounting problem. Transfer pricing policies have great effects on performance evaluation and motivation of division/subsidiary managers[1].

The aim of this analysis is to illustrate how transfer prices can be fixed in this context. Also, the concrete case of Ferrovie dello Stato S.p.A.[2] will be analysed. This case study seems to be interesting in the light of recent developments in the rail sector, especially those which tend to highlight the actual performance measures of all railway branches.

2. The role of transfer pricing: crucial variables and company goals

Before proceeding further and analysing the core topic, it is useful to define and clarify some concepts.

First of all, we have to distinguish between intra-corporate transfer prices and inter-corporate transfer prices. The former is used for operations among the divisions of the same corporation and the latter is used for transactions among different corporation of the same company.

Inter-corporate transactions may be due to the need to transfer, for example, raw materials from a unit in one country to another one of a different country, or due tl the possibility that stages of the productive process are more efficient in one country than in another, and so on.

In addition, it is useful to give prominence to the fact that transfer pricing involving the divisions or the units of a multinational company causes more problems than transfer pricing within the domestic economy. As a matter of fact, for the Multi National Company (MNCs) we have to take more variables into account, such as tax legislation, custom duties and currency restrictions. Consequently, as shown in Table 1, there are some differences among companies located in different countries and therefore some crucial variables should be considered when determining transfer prices. Many factors can affect decisions regarding the setting of transfer prices. These factors weigh differently in multinationals spread all over the world. In addition, it seems possible to group some countries which prefer cost-based transfer pricing methods and those which prefer market-based transfer pricing methods. In the first group we can find American, French,

British and Japanese companies while in the second one Canadian, Italian and Scandinavian companies. For other groups, a precise location is not possible[3].

As shown in Table 1, generally the most important variable considered is income tax. Actually, with the exception of Germany, all countries considered this taxation highly important. Finally, Arpan found that most firms considered in his study used transfer price as an instrument of controlling subsidiary operation rather than a technique for evaluating and motivating subsidiary performance[4]. The study considered here was limited to sixty multinationals, enough to have an idea of the importance that the firms of each country give to the most important variables considered to determine transfer price.

Furthermore, for a multinational enterprise, international competitiveness is a very important variable in determining transfer prices and for this reason it is useful to understand in which way the profitability of all operations can be reached and how they affect each other. Let's consider an example of the relationships between a parent company located in the UK and two subsidiaries, one in Japan, the other in Mexico.

As shown in Figure 1, the Japanese subsidiary can be used to finance increased advertising by its British parent. As well low transfer prices on components shipped from a Mexican subsidiary can lower the latter's manufacturing cost and permit more aggressive external pricing strategies in Japan or raise the profitability of the Japanese subsidiary.

Another point that needs to be stressed is the relationship between organisational form and transfer prices. In the presence of a highly diversified organisation with scanty vertical integration, a policy determining transfer prices might not exist, because in this case all units would be free to establish some business relationships as if they were firms operating in an open market. On the other hand, in an organisation characterised by a vertical organisation, transfer prices calculated at full cost might not be the most appropriate. The difference between the first type of organisation and the second comes at the moment when the transaction implementation is decided upon. In fact, in an organisation with low vertical integration transfer price is market price, and on the basis of this price, a make or buy decision will be taken. On the other hand, in a group with vertical organisation, transfer price will be fixed after the purchase is made inside the company.

To conclude this brief description of the environment in which transfer pricing operates, it is important to add that some corporate goals can be achieved by using transfer prices. First of all, it is possible to save taxes which maximises global after-tax profits. In this case, tax rates in the different countries and the different procedures for obtaining income to be taxed are carefully examined.

Transfer pricing systems can also be used in order to minimise losses from fluctuations in foreign currencies. Here the parent firm looks carefully at the exchange risk and tries to reduce it by advising a specific currency to be used for the payment.

Moreover, transfer price can reduce the impact of some tariffs, especially the "ad valorem" ones. In this case, the sales corporation favours the reduction of invoice prices in order to reduce tariffs.

Variables	Parent nationality						
	USA	Canada	France	Germany	Italy	Scandinavia	United Kingdom
Income tax	1	1	1	3	1	3	3
Customs duties	2	2	2	3	3	3	3
Inflation	1	2	2	2	2	3	2
Changes in currency exchange rates	3	3	2	2	3	3	2
Exchange controls	2	3	5	5	5	5	5
Improving financial appearance of subsidiary	3	3	3	4	4	4	1
Expropriation	3	3	5	5	5	5	5
Export subsidies and tax credits	4	2	2	4	2	4	2
Level of competition	4	2	2	3	2	3	3

Notes:

Weighting Scale:
1 = high importance
2 = medium importance
3 = low importance
4 = not mentioned
5 = mentioned only with respect to non-US operations

Source: Arpan.

Table 1: National differences in relative importance given to variables in transfer price determination

3. Transfer pricing systems

Transfer pricing can be set in different ways and can be varied on the basis of the circumstances existing in particular situations or on the basis of the objectives of the management. Therefore, no transfer pricing method is appropriate in all instances. In addition, there is often a disparity between the theoretical approach and the practical application of transfer pricing mechanisms, but basically there are two types of transfer pricing systems in use:

1) cost-based transfer pricing methods,
2) market-based transfer pricing methods[5].

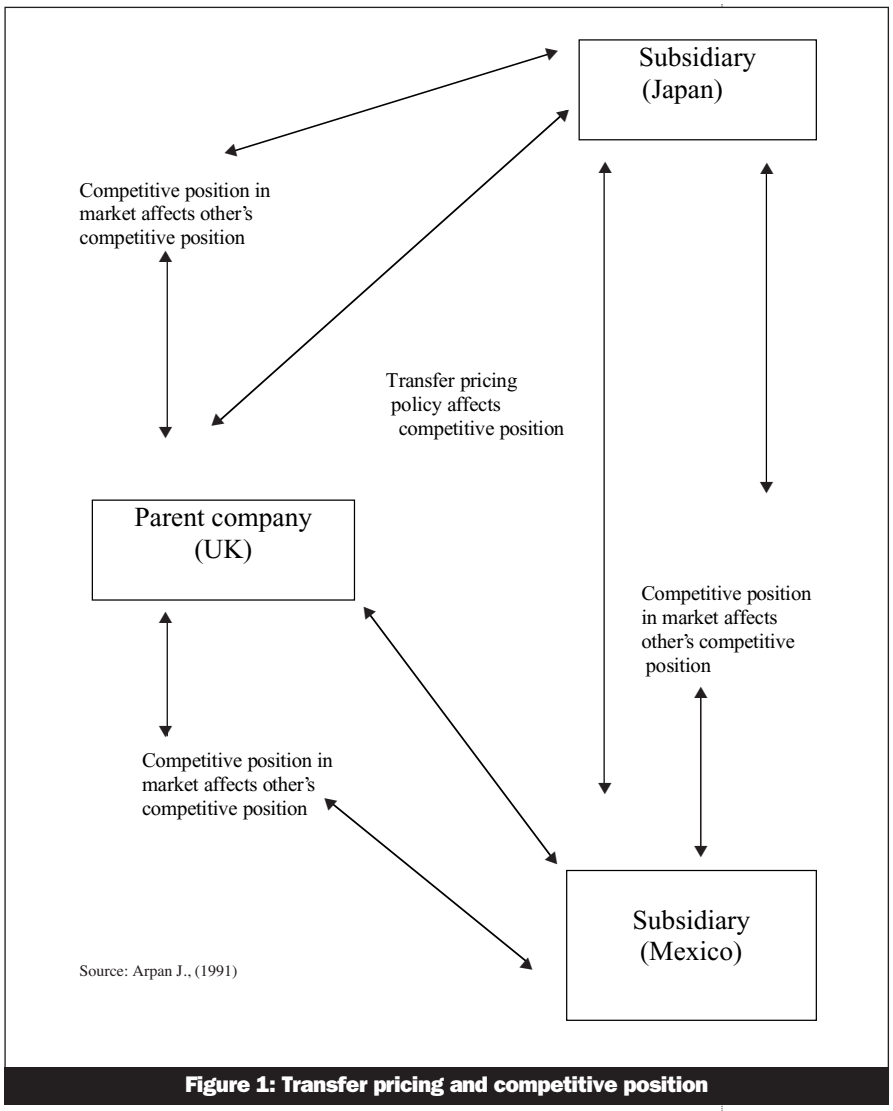

Figure 1: Transfer pricing and competitive position

3.1. Cost-based transfer pricing methods

Transfer prices calculated in this way are essentially based on internal costs. As shown below, different bases can be taken into account in order to fix the final transfer price.

3.1.1. Standard costs

Standard costs are calculated on the basis of a cost accounting system which uses predetermined standard costs which regard some elements of cost.

The process by which standard costs are determined can be described as follows:

1) detection of cost centres;

2) definition of the "standard operative conditions" of each centre;

3) determination of unitary standard;

4) determination of the volume of production;

5) calculation of process - and product - related standard costs.

The first stage is very important, because without it, it is impossible to calculate standard costs, due to the fact that this determination is based on each cost centre.

It is then necessary to define the quality of the outputs that can be obtained for each cost centre, and the factors to be used and the formality to comply with in order to carry out all processes.

Then follows the determination of the unitary standards and of the volume of production. Standard costs will depend on these quantities. Physical standards are determined separately for each productive factor, for each good that can be obtained and for each method of production adopted. Lastly, the standards that will be part of the calculation of some costs of production are only those which have been determined for some volumes of production and for some formalities of carrying out the production process. Therefore, the real choice will be made from a selection of all the possibilities.

Transfer pricing based on this method is appreciated by those managers who consider that the standard cost system is based on an analytically-developed cost unit. For them, unit costs are calculated at an attainable volume of output and therefore represent a reasonable degree of efficiency. In addition, the use of standard costs gives the possibility of eliminating the delay in processing transfers and also permits prior knowledge of the price to be paid or received for transactions.

3.1.2. Actual costs

This very simple method is restricted to situations in which the responsibility for profit performance is centralised. Nevertheless, production inefficiencies in the sales division will be passed on to the purchasing division.

3.1.3. Full cost plus a basis

The aforementioned methods are more often used in centralised companies. Actually, full cost transfer prices are incompatible with some objectives of decentralised organisations. In order to overcome the problem, when division managers have some authority, it is preferable to adopt a cost-based transfer price method which permits to add a mark up on the full cost. Thus, it is possible to overcome the problem of the objective of internal profit measurement, but not the problem of objective allocation of the decentralised company.

3.1.4. Marginal cost basis

When transactions take place on the basis of a marginal cost, each division manager is able to accept other orders of goods only if the price received exceeds the total marginal cost. Some difficulties can arise with this method. First of all, it is very difficult to have a constant marginal cost, consequently, very often it is not possible to know in advance the price at which operations will take place. In addition, it is also true

that the volume of production will depend on demand and supply and changes in marginal costs are consequently linked to this volume. As a result, all divisions should consider this situation in taking output decisions, especially when each division modifies this volume in order to cover the marginal costs with marginal revenues. Finally, this method does not take into consideration the performance measurement aspects of internal profit reporting.

3.1.5. Cost plus investments

The imposition of internal purchasing might be a possible solution for determining transfer prices. The sales division is divided into an investment centre, on the basis of external sales, and a cost centre for internal transfers. As a result, the purchasing unit is responsible for the profits and for the ROI of all the internal resources that are used to manufacture its products.

This method can be seen as a financial technique able to overcome, for example, some problems that can arise with other methods such as dual pricing, for which there is the problem of structural adjustments. Some problems may arise with the cost-plus-investments method too. Most of them are linked to the right allocation of costs and investments. In addition, if conditions change, allocations (which are a bit arbitrary) do not reflect the equilibrium between internal and external sales.

3.2. Market-based transfer pricing methods

Transfer prices calculated in this way have to be based on external market price, as we can see for the following methods.

3.2.1. The perfectly competitive market

In this situation, the purchasing division should pay market price such that then central management could only ensure the application of that price as a transfer price. This solution seems to be the best due to the absence of arbitrariness. As a matter of fact, it is possible to carefully calculate the measure of the economic performance of each division participating in the transaction, also because the profits of each division are the real economic contributions to the total company profits. In practice, if competitive market prices are used for internal transfers, they can appear too high, due to the fact that in such operations, for example, the costs of advertising and transport have been saved. Therefore, it would be better to use other mechanisms, as for example a discount to be calculated on market price or dual pricing.

3.2.2. Market price minus a discount

In this case, even though a transfer price may seem adequate for internal aims, it is also true that the central management affects transfer price by fixing the amount of the discount. As a result, the possibility of fixing transfer prices to market price levels is threatened.

3.2.3. Dual pricing

This method is a mix of the market price advantage (that is the incentive to the profit for the sales unit) and of the obligation to buy internally (that is the possibility of fixing a volume of transferred goods in order to reduce the manufacture costs of the unit). In this case, the purchasing division will receive the transferred goods at a cost price, whereas market price will be accredited to the sales unit. Then the double calculation of the profits will be eliminated from the highest levels of the organisation. As a result, even if there is the intervention of the central manager, this is compensated by a higher flexibility. Actually, the purchasing unit receives the product at a lower than market price, allowing the possibility to show profit in the report.

There are also problems with dual pricing. First of all, it is necessary to deal carefully with the double calculation of profits, because the net income of the company as a whole will be slightly lower than the sum of all the profits of the units if the financial and control systems are not adequate.

In addition, as the buying unit receives the product at cost price, it has no interest in negotiating a convenient market price. As a matter of fact, none of the units takes the trouble to look at the performance of the others (typical of competitive organisations).

Moreover, cost price might be higher than market price, as can happen in the first stage of product life cycles with a significant learning curve.

At last, it is clear that the firms probably cannot use dual pricing for long periods and for all products, even though it can be used for some strategically important items.

To conclude, in practice theoretical methods are only a basis on which transfers take place. Actually, transfer price is generally negotiated between the interested units in order to try to simultaneously satisfy the objectives of each unit and the objectives of the company as a whole.

4. The case of Ferrovie dello Stato SpA

The current and particular situation of Ferrovie dello Stato SpA is the result of the European directives applied to the railway sector (Dir. 91/440, Dir. 95/18 and Dir. 95/19) which mainly introduce competition into the rail sector by separating infrastructure from operation. The transfer price system currently in force is the same adopted soon after the process of accounting separation, the only difference being that the context has changed: operations are mainly among companies of the same group and no longer among divisions of the same company. This reflects the modified structure of Ferrovie dello Stato group, which is the result of both managerial restructuring and an attempt at organisational adjustment to external changes. Initially, the Ferrovie dello Stato group was organised on the basis of horizontal processes, which means that the company was organised to reach the efficient use of resources without taking into account the effectiveness of the services supplied to the market. This negative aspect, together with the liberalisation process of the railway sector in Europe and modified public interventions in companies characterised by state monopoly, brought about the idea of changing the company structure by

creating divisions in 1998. This implied a greater attention to demand needs, the urgency of increasing the operative efficiency of organisational/productive processes and quality standards, the need to increase economic efficiency, and finally, the absolute necessity of a more flexible organisational structure. The next step was the creation of a group with a holding and different specialised companies[6].

The transfer pricing system of Ferrovie dello Stato SpA has been structured to take into account the following aims:

- stimulate each strategic unit to reach the efficiency and the effectiveness objectives
- properly calculate revenues and margins, in order to have useful information so as to allocate resources and investments in more profitable areas.

The starting points of the transfer pricing system are the exact definition of:

- operations subjected to the transfer price scheme,
- criteria for pricing all operations
- drivers for quantifying internal movements
- formal rules related to movements.

With particular regard to the transfer price determination, Ferrovie dello Stato applies:

- the standard price for services like ordinary maintenance of rolling-stocks. This way, each unit includes these operations in its budget and the managers responsible for the results of each unit are interested in getting their own results,
- the market price for services available on external markets for which there are normal prices, such as ticketing, health services and so on,
- an administered price applied mainly to circulation services[7].

As to this final price, there are some hypotheses of evolution strictly related to the opening of the market to private operators. One of these criteria is to evaluate differently guarantees train-km (evaluated with a base tariff) and non-guaranteed train-km (evaluated with a negotiation process). In the end, this system should allow an increase in negotiated volumes on the market and a decrease in guaranteed volumes in order to stimulate supply and satisfy the concrete needs of the market. Can transfer pricing improve the internal efficiency and answer to the competitive aspects of the railway market? The answer is yes, neverthless efficient control mechanisms (such as transfer prices) are not typically independent of organisational forms. Therefore, full effectiveness of these tools strictly depends on the internal organisation of companies. As a consequence, the completion of the necessary reorganisation process of Ferrovie dello Stato stimulates great expectations in this sense, due to the fact that transfer pricing systems are absolutely important for the economic sectors characterised by the opening of markets to competition. Furthermore, it seems that efficient control mechanisms play an important role in sustaining the separation of ownership and control common to public corporation[8]. This, therefore, might be the right moment for managers to take this chance into consideration.

In addition, managers of the railway sector should start thinking that if the transfer pricing system is to be efficient, prices must be established which foster a healthy competitive spirit, provide an adequate profit yardstick for the measure of management, and provide figures to top management to be used for policy decisions.

A further consideration is that of internal monopoly when a supplier is in a monopolistic situation, commonly the case of railway companies. Actually, the monopolistic position of the supplier could hold the division/company it supplies to ransom. Head management could perhaps take a detached view of the situation if the amount which the transfering division/company adds to its own profit merely offsets the decrease in the profit of the transferee division/company. It is possible, however, for the buyer to lose more than the selling division/company gains, therefore adversely affecting the profits of the organisation as a whole.

Currently, Ferrovie dello Sato SpA is still characterised by a very complex transfer pricing system with too many parameters. This is mainly due to the impossibility of allocating some costs due to their intrinsic nature, therefore causing the need to elaborate peculiar criteria which reflect each service/product exchange. Probably the best solution is to detect few and simple transfer prices – even less precise – in order to give the same level of information to all parts. Ferrovie dello Stato group is working hard to facilitate both private and market views and to adopt a strategic approach which will lead to more easily attained profitability objectives. The corporation is improving the sense of responsibility in all its components by revising management control techniques, which should improve internal efficiency. On the other hand, Ferrovie dello Stato Spa is trying to externally apply the principles of contendibility and competitiveness which consent the free entrance of new operators in the railway service market.

Nevertheless, competition implies that the transformation from monopolies to open markets gives positive probability of entry. The main problem is that competition may force entrants to cover activities and costs which cannot be raised by single firms. Furthermore, in strategic terms Ferrovie dello Stato Spa may in the future demonstrate predatory behaviour by adopting predatory pricing after the entrance of new operators. As a matter of fact, this behaviour may be favoured by the instrument of transfer pricing, and by the fact that Ferrovie dello Stato Spa might not have financial constraints in the short term in light of higher profits in the future. This operation could seriously cause problems to new firms, which cannot operate with losses[9].

In addition, the transfer pricing mechanism may facilitate predatory practices as Ferrovie dello Stato operations take place among companies of the same group and information is fully available. On the contrary, new entrants may have imperfect knowledge, especially with regard to the cost function of the current monopolist, and Ferrovie dello Stato may respond aggressively in the effort to deter future entrants[10].

As a consequence, barriers to competitive entry or anti-competitive practices should be seriously considered, because they might become problematic in the near future, even in the presence of pro-competitive legislation[11].
This may occur in the next few years in the regional Italian rail market where competitive tendering (competition for the market) will be adopted. This means that one firm, after a call for tenders, is given the sole right for a predetermined period to a specific service previously operated by monopoly[12]. Nevertheless, even though local services may appear very attractive, due to the current level of state subsidies and cross subsidies, new entrants may face future practices not characterised by large subsidies. On the other hand, if non-discriminatory practices – linked to the allocation of subsidies and to the behaviour of the current monopolist - are applied, efficient operators might enter the market.
This change may only promote price efficiency in supply segments with weak external competition where the railway firm sells a service directly to few end users with significant needs in terms of volumes[13].
I believe, therefore, that there is an urgent need for a healthy regulation policy which protects new entrants, in order to create a genuine market in the rail transport sector and to prevent anti-competitive practices. Failure to design these rules could be one of the key reasons why the potential gains from restructuring the railway sector are not maximised.
At the same time, Ferrovie dello Stato should pay attention to the possible behaviour of external competitors that can use, as market prices, *distress prices* which are exceptionally low. This may occur when the new operator acts in an attempt to attract business in the short term. In this case, Ferrovie dello Stato should not switch its source of supply from an internal company/division to an external supplier, unless it is sure that distress prices are not being quoted.
The current continuing changes introduced by the Ferrovie dello Stato group in the asset allocation process and in the transformation of divisions into companies will probably reduce, in the near future, the number of exchanges previously recorded among divisions. Nevertheless, the corporation could pay the price for the luxury of having a decentralised situation. As a matter of fact, the validity of a decentralisation policy may be questioned where there is a considerable volume of interdivisional trading, as in the case of the Ferrovie dello Stato group. However, according to Young, "the volume of losses arising from sub-optimisation would have to be very high before the benefits of decentralisation are given up. Nevertheless, transfer prices are constraints on decentralisation because they are designed to link divisions, while by definition all sub-systems in a totally decentralised system should act as though they are independent. The abolition of transfer prices means that the profits of individual operating units can no longer be meaningfully measured and also prevents accurate estimates of the earnings on the proposed capital projects. The underlying requirement for profit centre controls is competitive prices negotiated in arms' length bargaining by divisional managers who are free to go outside the organisation if unhappy with prices paid by or to other divisional managers"[14].

5. Concluding remarks

Many theoretical methods exist for calculating transfer prices, but each of them has some particular characteristics such that it is impossible to use them without taking into account the type of organisation in which they are applied. In order to achieve some corporate goals, it is also useful to take into consideration some important variables when the problem of setting transfer prices is faced, such as the accounting methods for determining income to be taxed, which generally differ in each country.
Studies on transfer pricing systems indicate that there is often considerable disparity between the practical application of transfer pricing mechanisms and derivations from theoretical analyses of the topic. More generally, the company, which has the problem of fixing transfer prices, often prefers to set an "ad hoc" price, therefore reflecting the structure of the units involved in such operations. In some cases, though, there are particular circumstances which to some degree account for this disparity. For example, there may be justification for permitting an economically unviable transfer price in the short term in order to maintain the existence of a company/division, if central management decides that this company/division has a function to perform in the long term policy of the group. While allowing that these explanations account for some cases of transfer pricing mechanisms, in fact, there are still many cases where transfer prices have often never been posed or considered as an instrument for improving the group efficiency. Many managers are unaware that sub-optimisation is occurring within their organisations and that a change in the transfer pricing mechanism could seriously improve their overall profitability. I believe that the case of the Ferrovie dello Stato group is an example of this unawareness, because in the past the transfer pricing system had been seen as a mechanism used when internally transferring goods and services, without considering the effects of the pricing system on managerial motivations and, consequently, on the overall profitability of the organisation. Probably, some future outcomes will stem from the current restructuring process.

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NOTES

[1] Vidal, C.J., and M., Goetschalckx, (2001), "A Global Supply Chain Model with Transfer Pricing and Transportation Cost Allocation", *European Journal of Operational Research*, n° 129.

[2] It is the holding of the Ferrovie dello Stato Group, which is the biggest public Italian company. The strucuture of the group is the following: Ferrovie dello Stato SpA is the industrial holding, while Trenitalia is the company which manages passengers and freight transport, Rete Ferroviaria Italiana is the company that manages the railway network, TAV is the project company responsible for high speed networks, Italferr is the engineering company responsible for planning and realisation of technological infrastructures of the group, Metropolis is the company initially dedicated to asset management, property management, building and facility management and currently involved also in all non core business of the group, such as auditing and human resource management, Grandi Stazioni is responsible for 13 main Italian railway stations, Sogin is a company wich mainly runs the integrated mobility and local, national and international bus services, Fercredit supplies financial services.

[3] On this point and for the results mentioned in this part see Arpan.

[4] Arpan, J., (1991), I*nternational Transfer pricing*, in Nobes, C., and R., Parker, (Eds.), Comparative International Accounting, prentice All International, Hemel Hempstead..

[5] Wilson, R.M.S., and W.F., Chua, (1993), *Managerial Accounting. Methods and Meaning*, Chapman and Hall, and Young, A., (1979), *Pricing decisions*, Business Book.

[6] See note 2.

[7] This means that the firm's top management specifies a set of rules that govern transfer pricing. Vaysman, I., (1998), "A Model of Negotiated Transfer Pricing", *Journal of Accounting and Economics*, n° 25.

[8] Schroeder, D.A., (1993), "Organizational Structure and Intrafirm Transfer Prices for Interdependent Products", *Journal of Business, Finance & Accounting*, April.

[9] For specific models on this topic see Carraro, C., and C., Graziano, (1993), *Mercati oligopolistici e strategie dell'impresa*, Il Mulino, Bologna.

[10] These are known as reputation effects.

[11] To date, economists have not largely considered the issue of predatory pricing for the case of perishable service such as railway services. This is, therefore, an area for future research.

[12] For further details see Legislative Decree 400/1999.

[13] On these aspects see Jensen, A., (1998), "Competition in railway monopolies", *Transportation Researche*, n° 4.

[14] Young, A., (1979), *Pricing decisions*, Business Book.

BIBLIOGRAPHIC REFERENCES

AL-ERYANI, M.F, P., ALAM, AND S.H., AKHTER, (1990), "Transfer Pricing Determinants of U.S. Multinationals", *Journal of International Business Studies*, third quarter, pages 409-425.

ARPAN, J., (1991), "International Transfer Pricing", in Nobes, C., and R., Parker, (Eds.), *Comparative International Accounting*, Prentice All International, Henel Hempstead.

ARPAN, J., (1972), *International Intracorporate Pricing*, Praeger publishers, New York.

BARRETT, M.E., (1977), "Case of Tangled Transfer Price", *Harvard Business Review*, May-June, pages 80-178.

CARBAJO, J., (Ed.), (1993), *Regulatory Reform in Transport: Some Recent Experiences*, A World Bank Symposium, World Bank, Washington, D.C.

CARRARO, C., AND C., GRAZIANO, (1993), *Mercati oligopolistici e strategie dell'impresa*, Il Mulino, Bologna.

CHARLTON, C., R., GIBB, AND J., SHAW, (1997), "Regulation and Continuing Monopoly on Britain's Railways", *Journal of Transport Geography*, n° 2, pages 147-153.

Commission of the European Communities, (2001), *European Transport Policy for 2010: Time to Decide*. White Paper, COM(2001) 370.

CODA, V., (1975), *I costi standard nella programmazione e nel controllo della gestione*, Giuffrè, Milano.

CORR, A.V., (1974), "The Role of Cost in Pricing", in Formez *Problemi di gestione*, n° 1, pages 33-44.

DORWARD, N., (1987), *The Pricing Decisions*, Haper & Row, New York.

ECCLES, R.G., *Qui c'è da sciogliere una questione di prezzi*, to be published.

GABOR, A., (1977), *Pricing & Practices*, Heinemann Education Books, London.

GIAVAZZI, F., A., PENATI, AND G., TABELLINI, (Eds.), (1998), *Liberalizzazione dei mercati e privatizzazioni*, Il Mulino, Bologna.

JENSEN, A., (1998), "Competition in Railway Monopolies", *Transportation Research*, n° 4, pages 267-287.

KANT, C., (1988), "Endogenous Transfer Pricing and the Effects of Uncertain Regulation", *Journal of International Economics*, Vol. 24, pages 147-157.

KARMARKAR, U., AND R., PITBLADDO, (1993), "Internal Pricing and Cost Allocation in a Model of Multiproduct Competition", *Management Science*, n° 39, September, pages 1039-1053.

KIESSLING, T., AND Y., BLONDEEL, (1998), "The EU Regulatory Framework in Telecommunications. A Critical Analysis", *Telecommunications Policy*, pages 571-592.

Kpmg.-F.S., (1999), "Costi e ricavi interdivisionali", *Guida operativa per la formulazione del budget e per la rendicontazione*, Roma.

LESSARD, D.R., (1985), *International Financial Management*, John Wiley and sons, Chichester.

MARCUCCI, E., (2001), "Separazione strutturale e concorrenza nel settore ferroviario", *Trasporti Europei*, n° 17, pages 4-15.

Ministero delle Infrastrutture e dei Trasporti, (2001), *Il Nuovo Piano Generale dei Trasporti e della logistica*, Roma.

PHLIPS, L., (1996), "On the Detection of Collusion and Predation", *European Economic Re*view, n° 40, pages 495-510.

PICCIOTTO, S., (1992), "International Taxation and Intrafirm Pricing in Transnational Corporate Groups, Accounting", *Organizations and Society*, n° 8, pages 759-792.

ROBBIN, S.M., AND R., STOBAUGH, (1973), "The Bent Measuring Stick for Foreign Subsidiaries", *Harvard Business Review*, Sep.-Oct., pages 80-88.

SCHROEDER, D.A., (1993), "Organizational Structure and Intrafirm Transfer Prices for Interdependent Products", *Journal of Business, Finance & Accounting*, April, vol. 20 (3), pages 441-455.

VAYSMAN, I., (1998), "A Model of Negotiated Transfer Pricing", *Journal of Accounting and Economics,* n° 25, pages 349-384.

VIDAL, C.J., M., GOETSCHALCKX, (2001), "A Global Supply Chain Model with Transfer Pricing and Transportation Cost Allocation", *European Journal of Operational Research*, n° 129, pages 134-158.

WILSON, R.M.S., AND W.F., CHUA, (1993), *Managerial Accounting. Methods and Meaning*, Chapman and Hall, London.

YOUNG, A., (1979), *Pricing Decisions*, Business Book, London.

Are Trains More Dangerous than Planes? And, if so, What?

The Meaning and Use of Willingness to Pay in Privatised Transport Markets

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1. Introduction

"When accidents happen, the public opinion over-reacts against rail companies; people flee the railways and take to their own cars, even if road safety is far lower than rail safety. Moreover, the public's willingness to pay for safety is widely accepted as a key principle in appraising safety projects. After rail deregulation, because of the co-presence of different subjects in the business (the government, the regulator agency, the train operators, Railtrack), attention to rail safety increased. The elected bodies surely are paying attention to these instances, and it are too scared of the reaction of the press."[1].

Today, everybody eagerly subscribes to the idea of having ubiquitous markets ruling virtually everything. The pillar of markets, in a utilitarian society, is demand - in other words, willingness to pay. Markets, however, have their own requirements. For example, markets will only work properly if individuals are rational. Does this mean only somewhat rational, or 'extremely' rational? Textbooks warn us that individuals must be endowed with *unlimited* rationality. Do we think we are always able to shape our willingness to pay according to unlimitedly rational attitudes?

As in the notable example of assessing the comparative merits of competing travel modes, individual perception of risk hardly coincides with the textbook definition of 'unlimited' rationality. Therefore, travellers will prefer railways on grounds of safety, and will underestimate both the actual risk and the cost of safety provision of this vis-à-vis other modes. One consequence is the low level of willingness-to-pay that railway users may exhibit. Another is uncertainty on the part of the regulator as to which standpoint to take. Are individuals' inclinations to be subscribed to, according to an extremely utilitarian view, or are they to be rejected? Here we investigate the psychological reasons for the apparent lack of rationality of travellers, and discuss the diverging positions about public regulation of the issue.

Travel and risk come together under a number of different headings. Many people draw - or believe they could easily draw - distinctions as to the different level of riskiness of competing travel modes. Few, however, believe that an economic value can be attached to risk.

Trains are seldom discussed in terms of safety, except perhaps after some big change – such as privatisation or regulation. As a matter of fact, they are considered rather safe, and therefore perception is that they should not warrant big expenditures to enhance safety. Safety should come to travellers free, or very cheap. Of course, when people feel that the degree of safety has been severely (and perhaps 'unduly') reduced by some external factor (most of all, by political actions), they concede that a certain sum of money ought to be spent in order to at least restore the previous safety level. Rail privatisation in England seems to have done just this.

That trains are so safe, of course, is actually a preconception which should not prevent us from asking how safe are they vis-à-vis other modes. Therefore, we should be prepared to pay something even for the preservation of the current safety level. Especially after a (presumed) worsening in the safety conditions, however, we might want to ascertain how much we are prepared to pay for retrieving the preceding conditions. These answers can have implications, for instance, on the level of fares. On the other hand, the latter problem necessarily points to another question, i.e., whether it is worthwhile to redirect resources from other modes toward railways (or vice versa). Unless we feel inclined to subscribe to a non-economic view, like the idea that all travel modes should be made equally safe or equally risky in terms of - say - the number of casualties per period of time (an objectionable view, to say the least), we must be ready to use some economic analysis in order to assess the relative efficiency of alternative modes in terms of safety: put in another way, in order to determine the infamous economic cost of saving lives in different (and competing) modes.

As it is, risk assessment is very controversial and raises a host of problems in any sector of economic and social life. Certainly transport and travel provide an amazingly high and rich set of critical examples.

Sometimes in answering these questions, we do much more than simply make a subjective judgement. We try to put our judgements within the framework of an economic choice. This is what we are required to do, for instance, when asked to take part in a market decision concerning an uncertain outcome. The growing faith in (and consequent spreading of) market-like institutions, typical of the late XX-early XXI century in so many countries, seemingly leads us to inquire whether willingness to pay can be a proper substitute for administered prices, which were ubiquitous in previous institutional arrangements.

"Willingness to pay, as a synonymous of demand, is the pillar of any true competitive market".[2]

Truly competitive markets, however, assume unlimited consumer rationality as a prerequisite for economic choices, if these are to be conducive to maximum welfare. *Limited* rationality, much more easily found in real life, can be a real challenge to the building of a competitive setting.

The limited aim of this paper is to put together some observations nowadays customary in the descriptive approach to consumer choice. We deal with two main points:

- the meaning and the limitations of the willingness-to-pay concept as applied to risky choices, with special reference to transport and travel;
- the consequences produced by the ambiguity of this concept at the level of risk regulation (again, transport and travel provide useful references).

2. Perfect competition, risk and transport

At the eve of the privatisation *cum* liberalisation of the British Railways, in a personal exchange, one (not hostile) observer, while commenting on the idea of 'competition for the market', remarked that, contrary to a widely held belief, incumbent firms would have little incentive to continue lowering their costs, if the relative subsidy were to be repealed too soon after the reaching of a higher degree of efficiency. One is lead to speculate that the real world competitive setting can have a sort of ineluctability, which is not shared by its 'fake' counterpart, liable as it is to political bargaining. This can perhaps be taken as an example of how a partial reproduction of the competitive mechanism might not be a perfect substitute for the original mechanism (and, if we take the 2nd Best Theorem seriously, we are left with few hopes about the gains which we can expect for partial accomplishments).

That perfectly competitive markets are more likely to be found in the realm of abstraction than in the actual world, is widely acknowledged.

In a sense, we suspect that most people believe in markets just as the characters in Charles Dickens's *Pickwick Papers* believed in the Holy Ghost, as Joan Robinson used to quip. At any rate, the extent to which actual markets can be allowed to stray from ideal, and still be considered socially desirable, is unclear. In particular, the degree to which consumers can differ from the ideal of perfect rationality without harming society, and being harmed themselves, is at the core of a number of current debates.

Another consequence is uncertainty about the standpoint that the regulator should take. Must individuals' inclinations, in accordance with utilitarian views, be followed to their extreme and sometimes paradoxical implications, or are they to be rejected in the name of a more rational, if somewhat paternalistic, vision of society?

Here we revise some of the psychological reasons for the apparent lack of rationality of travellers, and discuss the diverging positions about public regulation of these issues.

3. Unlimited Rationality and Willingness to Pay

Unlimited rationality is a necessary pre-requisite for the working of ideal markets, because:

- it shapes individuals' willingness to pay for the commodities which are offered in the marketplace.
- it allows consumers to behave consistently to their real interest;
- in the end, it ensures the fulfilment of their true goals.

The first point is by no means a trivial one. Translating individual preferences into monetary magnitudes amounts to solving a number of problems which recent research has proved to be highly challenging. From a long series of experimental evidence, it can be seen that individuals' actual behaviour tends to differ from that prescribed by the textbook notion of unlimited consumer rationality. In short, we can perhaps say that the problem is twofold. On one side, people have trouble simply ordering their preferences according to logic patterns, and when it comes to actually choosing, many of us are liable to exhibit inconsistent behaviours. On the other side, individuals process data according to accounting rules which seldom, if ever, resemble those suggested by elementary statistics (basic probability theory, etc.). As a consequence, even simple comparisons are rendered dubious, and the attainment of efficient decisions becomes less likely.

A large body of literature is by now available on this issue. While the conclusion that individual behaviour does not conform to the paradigm of unlimited rationality has long since been familiar to many scholars, it must be acknowledged that the recent literature has highlighted a number of regularities in typical consumer behaviour[3]. Such regularities can be summarised as such:

- a search for decisional procedures capable of saving mental resources (leading to use of the so called *heuristics* in solving new or exacting problems); an interesting aspect of this tendency is recourse to partial mental accounting, in which decisions are not submitted to any thorough analysis, but rather are relegated in separate 'cells' and dealt with in a piecemeal way, thus contradicting any basic idea of comparative efficiency;
- an inclination to stick to apparently fixed clues, as a way out from unfamiliar or intriguing decisional problems: e.g., a tendency to protect the *status quo*, and therefore to belittle radical changes in wealth vis-à-vis incremental changes with respect to the *status quo* itself; or to rely on stereotypes and *idées reçues*, a general proneness to saliency in processing information, and so on.

All this should hardly sound new to anybody. The clash between the normative view (unlimited rationality) and the descriptive view, however, has a story of its own, and it seems worth observing that the latter has taken a long time to re-surface after a period of total oblivion.

4. Problems in Risk Assessment

Risk is perhaps one of the most controversial notions in the debate between the two visions of rationality, and more than any other, is a multi-faceted construct. Anthropologists such as Mary Douglas and economists such as Aaron Wildavsky have explored the cultural foundations underlying the perception of risk. The former, for instance, has observed a tendency to look for moral, rather than scientific, bases for risk and to equate risk with sin. They categorise cultures according to whether they are built on personal risk perception, or rather on risk assessment by a scientific hierarchy.[4]

Travel, being a risky activity itself, provides many examples of what has been found in recent literature.

For instance: it is well known that trains are perceived as less dangerous than other comparable travel modes. Therefore, railway accidents strike people as unexpected (and, perhaps, 'unjust'). As a consequence, travellers might exhibit lesser propensity to pay for railway trips than for other - assumedly riskier - kind of trips. On the other hand, they might be less inclined to pay for increasing safety on the railways than on other transport modes.

The relevance of willingness to pay is likely to become greater, as certain public services are moved into the realm of market relationships. In many European countries formerly characterised by mixed economies, the role of consumer demand was necessarily dwarfed by (a) limited reliance on utilitarian principles in setting prices, and (b) prevalence of general taxation as a means to collect revenues. These premises are being increasingly overturned, or have been overturned already in several places. Can willingness to pay, however, be a reliable guidance to the determination of economic prices?

Statistically, while being the safest travel mode on earth, the railway is not safer than all other competing travel modes. The fact that it is thought to be so may simply be due to bad information. However, even when informed about the relative riskiness of comparable modes, most people tend to insist that they would feel more secure on a train than, say, on a plane. In other words, it has been convincingly shown that, even *after* being provided with evidences about the relative magnitude of the chances to incur a disaster with a fatal outcome on a train as opposed to a plane, most people - regardless of their education, professional status, etc. - express the same disfavour for the plane that they exhibited before.

This case is widely employed as an example of cognitive dissonance, i.e., the refusal to accept an evidence which runs contrary to one's beliefs.[5]

To reconcile such (apparent) contradictions, we have to assume people's unfamiliarity with even elementary handling of statistics and probability, and to accept the idea that they will more likely recur to logical 'shortcuts', which make us save time and effort, even at the cost of big mistakes. This has been shown in a number of cases both related and unrelated to the treatment of risk. For example, when faced with the problem of assessing the identity of an unknown individual, about whom only little information is provided, the majority of people will typically cling to stereotypes (the resemblance of the individual's description to a known archetype), rather than statistical likelihood (the statistical odds of him belonging to a given group, or social status, etc.), even when the properly assessed likelihood is included among the data of the problem.

According to the results of recent research, we suspect that the above tendency is strengthened in dealing with problems which imply a certain amount of strain because of their novelty or complexity. In a sense, it seems that people are more inclined to elaborate on the qualitative, than on the quantitative, side of the choice which is submitted to them.

Thus, railways accidents are often seen as more 'controllable' than (for example) plane accidents, and therefore less threatening. While this is 'obviously' untrue (the comparison is made in terms of accidents of *given* gravity, e.g., fatal ones: then, 'controllability', besides being an illusion, is not relevant to the final outcome[6]), the source of the mistake is clear: quality is perceived as relevant (or, if we prefer, *process* utility is considered at least as relevant as *product* utility): the idea of 'crash' may look more frightening to many than that of 'clash', although, once we reckon in terms of *fatal* accidents, the difference can only be perceived at the esthetical level. And yet, we can easily agree that quality *is* important and that, once the actual terms of the choice have been redressed, it can well be considered meaningful. This contradiction lies at the roots of a well known dilemma in risk regulation (see below).

It is perfectly consistent with the observation above to notice that plane accidents also exhibit a number of characteristics which can help to understand the attitudes of laypeople.

Plane accidents are perceived as *unfamiliar* events, whose probability is more difficult to assess. This can by itself be a problem, but perhaps plane accidents are also seen as 'less natural' than accidents which happen on the ground. This may well be the expression of a primitive notion of nature, - so deeply rooted in fact, that it can be regarded more as an instinct than a true attitude - but instincts do play a role in our behaviour. (According to some scholars, a similar bias seems to be at work in shaping people's hostility toward nuclear power stations).

There are certainly other - though not unrelated - elements which can influence the comparison between travel modes in terms of their relative riskiness.

For instance, it can be argued that different sorts of risks are not assessed in symmetrical manners. Many people tend to consider travel accidents as real expressions of an unfriendly fate, which distributes a given number of fatalities out of a limited stock in a given span of time. This can perhaps explain another statistical oddity, i.e., the propensity exhibited by many individuals to believe that the chances of being caught in a plane accident are bound to rise with the increase in the number of plane trips that are made by the same person and that *therefore*, in deciding whether to take a train or a plane on comparable routes, it will always be safer to choose the former.

The way people process information is also relevant to this issue. To this effect, *retrievability* can be particularly important. Typically, the chances of being involved in a given event can be made to depend on the number of similar events that one is able to remember.[7] Now, memory is influenced by many factors, including - prominently - *saliency*. Needless to say, accidents involving trains are less salient than others (though perhaps more salient than, say, those involving cars). In particular, they are far less salient than plane accidents.

Saliency, of course, depends more on ease of association than on any other objectively measurable dimension of the event.

Plane crashes are generally covered by TV and magazines, and their details are exposed, with much greater pictorial emphasis than any other comparable event. Thus, they are easily remembered and 'numbered'. The same could hardly be said of train accidents, unless they can be hooked to a mental clue, (e.g., bracketed under a heading like 'privatisation').
There are, however, other aspects to be reckoned. A highly-valued danger hanging over a small number of persons is regarded as worse than a minor danger affecting a higher number of individuals, even if they come very close to each other in numerical value (e.g., when assessed in terms of expected value).
All this is compounded by the fact that events of a *catastrophic* kind are evaluated at a (negative) premium over equally damaging events, but lacking this character.
One of the most significant facets of risk - and one which has an obvious cultural dimension - is perhaps provided by what we could name the *degree of fear*. A sudden death is seen by many (typically, in the Western world) as 'more acceptable' to a lingering one. This fact, too, can have consequences on the comparative evaluations of risks in travel.

Individual controllability - which has already been mentioned as an attribute which people use to evaluate, although sometimes in very subjective manners - diminishes the perception of risk. This may have - and it often has – a moral overtone (e.g., exposing children to a danger which is beyond their control can look worse, also in the sense of 'more morally guilty'). Again, this is just a step away from considering certain, more 'natural', travel modes as less threatening than others.

Irreversibility is something that can make risk perception more acute. For example, the risk of lesser, but permanent, injuries can be deemed more severe than that of greater, but reversible, ones.

Salience of blame. If reducing risk can also 'redress injustice', the corresponding action may be seen as more worthwhile. Risk-reducing actions in favour, e.g., of poorer people (lower class trippers?) are often at a premium vis-à-vis actions taken in the interest of the rich.

Identifiability of those at risk. The rescue of people trapped in a tunnel, or in a wrecked carriage, may warrant more money and time than a risk imminent to a number of random individuals. Here, however, it should be noted that the use of a correct practice in decision making requires an *ex-ante* evaluation of alternatives, and therefore for the evaluation of 'disembodied' risks. *Statistical lives* should be substituted for identifiable victims, in order to avoid the psychological and ethical overtones which are inevitably raised by the problem of assessing the value of human life.
Expanding what we said above, we might notice that people tend to overrate certain risks implied by unlikely events (e.g., hurricanes, or guerrilla episodes), while underrating more realistic risks connected with familiar events or activities (e.g., contracting common disease, or suffering a heart failure, or incurring accident during the usual occupations of a working day).
By the same token, if an activity is not regarded as objectionable, or 'unjust', its degree of riskiness in generally considered low (which does not prevent people from asking exceptionally high compensations in case of accident).
As another example, most individuals seem more sensitive to deviations from levels of risk which are considered customary, than to the absolute level of risk.[11] Likewise, they tend to react more strongly when faced with the prospect of an increase over the current level of risk, or the appearing of a new risk, than when faced with the prospect of a reduction in the current - assumedly familiar - level.[12]
A much needed refinement of the practices followed in comparing risks would consist in trying to estimate the advantages to be expected from the risk-reducing action, as well as the costs at which reduction can be obtained. Ideally, benefits and costs ought to be combined in a benefit-cost ratio, in order to give a clear idea of the efficiency of the competing actions which are being envisaged.
Comparing risk is a demanding job. Still, in a market setting, where we can be required to evaluate risk *per se* in an outright form, or in the form of fixing standards, it cannot be escaped. What we should do, is to try to rationalise in explicit terms the less formal thought process which individuals and governments rely upon when they make choices in any given area.

5. Practical suggestions

Some additional remarks are in order, drawing from the most recent experimental works.
1- People seem to care about the risk to themselves (or other real people), not to a hypothetical average or worst-case person. If analysts can help people narrow down the risk range to a meaningful estimate specific to their unique circumstances, then their chances to of reaching a higher level of 'risk communication' are increased, and therefore more meaningful conclusions can be obtained.[8]
2- Actions, not disembodied risks, should be the object of comparisons. If our job is setting priorities (as opposed to, say, simply ranking risks for speculative reasons), then we should care about where resources go. While certain risks can loom larger than others because of psychological, ethical or other reasons, they should not command much attention (let alone resources) if they cannot pass the cost/feasibility test.
3- Risk should always be the real object of the assessment. As a matter of fact, a comparison which is often made, but on faulty premises, is that which considers a single quantifiable attribute of the things being compared, but which has nothing to do with risk. An example is provided by sentences like "a person who smokes x cigarettes inhales as much tar as a person who eats y steaks." [9]
Yet, we suspect that the habit of translating true expressions

of risks into - say- physical magnitudes which, at best, can be an *ersatz* for the real thing performs a very useful, and probably necessary, function, in that it allows laymen to get an idea of the order of magnitude of a certain risk: how big is a risk of 10^{-6}? How many people would quickly answer that it is more than being struck by a meteorite, but less than being hit by lightning?[10] *Anchoring* is an ubiquitous problem in the economic evaluation of subjective preferences.

One-dimensional comparisons – albeit founded on meaningful dimensions – are often unsatisfactory guidance to all this. Although it is also true that combining more than one attribute in a final decision is cognitively demanding, and can give rise to incongruous orderings.

Even after selecting the 'right' attribute(s), the danger still lingers that our data may not be processed, and the various prospects characterised, in a satisfactory manner.

It has been found that laypeople do not necessarily find it difficult to compare heterogeneous risks, nor do they find it *more* difficult do compare widely differing kinds of risks (although they sometimes are troubled by performing comparisons between more familiar risks).

Therefore, it can be safely said that risk comparisons, however engaging, *can* be framed in terms we are generally able to make sense of. The meaning of such comparisons can be greatly enhanced – from the level of plain uselessness to that of valid help to public decision making – if they are backed by a satisfactory awareness of the many problems involved by the exploration of individual preferences, and if certain provisos are met[13].

6. Dilemmas in risk regulation and conclusion

It is well known that people can *perceive* risk in a different (sometimes very different) manner from risk as statistically measured from empirical evidence. In certain places, there is a tendency to belittle perceived risk and to deny it any right to stand in the place of *objective* (sometimes called *actual*) measures of risk. This position has prevailed among the scholars long enough,[14] but has never gone completely unchallenged. Today, as a matter of fact, we are witnessing a revival of the opposite position. Reliance on perceived risk is basically founded on the observation that, in an utilitarian society, subjective assessment of risk cannot be outright dismissed as 'wrong': the public will assume responsibility for judgement which, however faulty, can bring utility to them.

At a different level, the conception of risk itself can be considered so composite and problematic, that a 'cold' computing of statistical probability may look inadequate to the task of transmitting the attitudes of individual toward a dangerous prospect. Recently, some researchers have gone so far as to maintain that the subjective perception of risk can be held superior to the objective one as a guide to public decisions.[15]

It can be held that the vision according to which objective reality ought not to be accorded a relevant place in collective decision making, is not necessarily 'progressive'. On the contrary, this vision has been attacked as inherently traditionalist and conservative.

Is the dichotomy between objective and perceived risk well founded? In a sense, all measures of risk must necessarily use a human medium, so that all they can be labelled as subjective (and are, in that sense, *perceived*). Still, it cannot be denied that there are such things as scientific methods by which risks are evaluated on the basis of data, and that such methods can at times contradict the results of strictly subjective evaluations. While they do not seem to disagree on the methods of collecting the evidence required for the actual decision, supporters of the 'perceptionist' school and of the 'objectivist' one subscribe to different *definitions* of risk. The difference is that perceptionists accept a definition which encompasses aspects which are missing from that of the objectivists. In principle, all aspects relevant to the subjective assessment of risk can be embodied by the former.

The appeal to self-interest implicit in the Utilitarian roots of the subjective approach is strong. The right to assess one's own preferences is certainly an overwhelming argument vis-à-vis the claim of the technocrats to regulate other people's private lives.[16] Moreover, technocrats can and do go wrong, or are simply unable to produce consistent responses, as testified *ad abundantiam* by Jones-Lee.[17] Therefore, people should not be foreclosed from participation in risk assessment by a deterministic vision of the authority of science (and scientists).

On the other hand, there are additional arguments, which can be employed in different directions and with ambiguous results. For instance, reliance upon perceived risk can produce regulatory 'mistakes' (like, e.g., the over- or under-regulation of certain phenomena). The overall result can be counterproductive – and possibly adverse to the interests of the majority. On a different level, perceived risk differs from objective risk in that it lends itself more easily to manipulation. The danger implied by a given transport mode can be magnified beyond the results of objective tests and evidences. (Still, the uneasiness produced by what is perceived by many as an 'avoidable' danger is an evil in itself, which – if possible and/or convenient in a truly democratic process-warrants consideration). According to many, then, the perceptionist position can be employed in a 'conservative' direction. At worst, perception could even be invoked to support entrenched (but inherently wrong) ideas, or even prejudices (e.g., that AIDS can be transmitted through casual contact, or that interurban highways are more dangerous than intra-urban ones). On the other hand, several political scientists have found a liberalizing effect of science and scientific truth. Science can indeed be used to limit the power of elites to induce actions guided by unwarranted or self-serving purposes, by holding the elites accountable to a sort of external reference. And yet, in a real democracy. unquestioning deference to the conclusions of scientists is also potentially counterproductive. The opinions of 'official' scientists, if not the result of science itself, can sometimes serve vested interests and be manipulated by authoritarian

governors much like public perception. The ultimate goal in a society which, while sympathetic to the Utilitarian view, is willing to avoid the most unpalatable implications of the latter, should then be that of striking a balance between subjectivism and democratic control.

NOTES

[1] Ponti, M., (2002) Railway Liberalization in a "Public Choice" Perspective. In this issue.

[2] Ponti, M. (2002), op. cit.

[3] Among the most important contributions produced by the revived interest in the idea of unlimited rationality, see Kahneman, D., Slovic, P. and Tversky, A. (Eds.) (1982) *Judgment under Uncertainty: Heuristics and Biases*. Harvard, Cambridge University Press; Hogarth, R.M. Reder, M.W. (Eds.) (1986) *Rational Choice. The Contrast Between Economics and Psychology*. Chicago, The University of Chicago Press; Thaler, R.H. (1991) Quasi Rational Economics. New York, Russell Sage Foundations. The classical reference for the early criticisms of the unlimited rationality hypothesis is the work by Herbert Simon (see, e.g., Models of Man. New York, Wiley, 1957).

[4] Douglas M. (1990) Risk as a Forensic Resource. *Daedalus*, Vol. 118, p. 13.

[5] Cognitive dissonance was known to marketing scholars and practitioners since the '50's, when Festinger first introduced this notion to the economists' audience. The more recent literature, however, has somewhat enlarged our understanding of the phenomenon. See, *a.o.*, Festinger, L. (1957) *A Theory of Cognitive Dissonance*. Stanford, Stanford University Press; Akerlof, G. and Dickens, W. (1982) The Economic Consequences of Cognitive Dissonance. *The American Economic Review*, Vol. 72, p. 307.

[6] It is clear that, in dealing with problems like this, many people perform a subtle substitution of the idea of the accident *per se* for the original idea of fatal, or invalidating, accident, which was the core of the problem.

[7] Kunreuther, H. (1976) Limited Knowledge and Insurance Protection. In *Public Policy*, Vol. 24, p. 227, has shown that the most important factor in influencing farmers' propensity to insure themselves against the damages from river floods is the fact of *having heard* about damages borne by other farmers.

[8] The evaluation of the level of risk implied by any given event consists of two elements: the estimate of the likelihood of the event itself, and the assessment of the level of risk. Many people, though, seem to find it difficult to distinguish between them. Thus, the likelihood of a certain prospect (being bitten by a bee during a walk in the countryside) may be high, and the risk of dying because of it may be as low as zero, still many of us might hold that the risk of dying because of a bee's sting is not insignificant. See, for a survey of the literature, Baron, J. (1998) *Thinking and Deciding*. Cambridge University Press, ch. 12.

[9] Here, the problem is twofold. On one hand, this kind of comparison is misleading, as the quantity of tar does not lie in any obvious relationship with the level of risk attached to it. On the other hand, and because of the first mistake, it cannot provide guidance to correct behaviour.

[10] To many people, as a matter of fact, even greatly *statistically* different measures may look only marginally so. One reason is obviously a cognitive one (the difference between 10^{-3} and 10^{-4} may not look very unlike that between 10^{-4} and 10^{-5}), and it seems that many scientists, too, are liable to make these sort of mistakes! Another reason may be that such differences do not reflect the risk that most actual people are faced with.

[11] Kip-Viscusi W. (1992) *Fatal Tradeoffs. Public and Private Responsibilities for Risk*. Oxford University Press, New York., New York. There is an obvious affinity between this behaviour and other phenomena, like the so called *lulling effect*, or the more familiar moral hazard.

[12] Hammond J.P. (1982) Utilitarianism, Uncertainty and Information. In Sen A.K. Williams, B. (Eds.), *Utilitarianism and Beyond*. Cambridge University Press, Cambridge.

[13] For instance, the presentation of alternatives should be done in probabilistic, rather than 'point,' terms; comparison should be limited to

meaningful and well understood alternatives (e.g., the answer to the question "is it safer to fly or to take the train ?" may obviously depend on the route and the time of the year, and even on length and characteristics of the trips to and from the terminal).

[14] Starr C. (1980) Introductory Remarks. In Schwing R., Albers W. (Eds.) *Societal Risk Assessment: How Safe is Safe Enough?* Plenum Press, New York.

[15] Reyner S., Cantor R. (1987) How Fair is Safe Enough? The Cultural Approach to Societal Technology Choice. *Risk Analysis*, Vol.7, p. 3; Gillette, C.P., Krier J.P. (2002) Risk, Courts, and Agencies. In *Law and the Environment. A Multidisciplinary Reader*. Percival R.V., Alevizatos D. (Eds.), Temple University Press, Philadelphia; Thompson P.B. (1990) Risk Objectivism and Risk Subjectivism: When Are Risks Real ? *Risk*, Vol. 3, p. 22.

[16] In this vein, for instance, it has been contended that the real issue is not risk, "but power; the power to impose risks on the many for the benefit of the few", Perrow C. (1984) *Normal Accidents: Living With High Risk Technologies*. Basic Books, New York .

[17] Jones-Lee M.W. (1989) *The Economics of Safety and Physical Risk*. Basil Blackwell, Oxford.

BIBLIOGRAPHIC REFERENCES

AKERLOF, G. and DICKENS, W. (1982) The Economic Consequences of Cognitive Dissonance. *The American Economics Review*, Vol. 72, p.307.

BARON, J. (1998) *Thinking and Deciding*. Cambridge University Press, ch. 12.

DOUGLAS, M. (1990) Risk as a Forensic Resource. *Daedalus*, Vol. 118, p. 13.

FESTINGER, L. (1957) *A Theory of Cognitite Dissonance*. Stanford, Stanford University Press.

GILLETTE, C.P. and KRIER, J.P. (2002) Risk, Courts, and Agencies. In *Law and the Environment. A Multidisciplinary Reader*. Percival, R.V. and Alevizatos, D. (Eds.), Temple University Press, Philadelphia.

HAMMOND, J.P. (1982) Utilitarianism, Uncertainty and Information. In *Utilitarianism and Beyond*. Sen, A.K. and Williams, B. (Eds.), Cambridge University Press, Cambridge.

HOGARTH, R.M. and REDER, M.W. (Eds.) (1986) *Rational Choice. The Contrast Between Economics and Psychology*. Chicago, The University of Chicago Press.

JONES-LEE, M.W. (1989) *The Economics of Safety and Physical Risk*. Basil Blackwell, Oxford.

KAHNEMAN, D., SLOVIC, P. and TVERSKY, A. (Eds.) (1982) *Judgment under Uncertainty: Heuristics and Biases*. Harvard, Cambridge University Press.

KIP-VISCUSI, W. (1992) *Fatal Tradeoffs. Public and Private Responsibilities for Risk*. Oxford University Press , New York.

KUNREUTHER, H. (1976) Limited Knowledge and Insurance Protection. In *Public Policy*, Vol. 24, p. 227.

PERROW, C. (1984) *Normal Accidents: Living With High Risk Technologies*. Basic Books, New York .

PONTI, M. (2002) Railway Liberalization in a "Public Choice" Perspective. In this volume.

REYNER, S. and CANTOR, R. (1987) How Fair is Safe Enough? The Cultural Approach to Societal Technology Choice. *Risk Analysis*, Vol.7, p. 3.

STARR, C. (1980) Introductory Remarks. In *Societal Risk Assessment: How Safe is Safe Enough?* Schwing, R. and Albers, W. (Eds.), Plenum Press, New York.

THALER, R.H. (1991) *Quasi Rational Economics*. New York, Russell Sage Foundations.

THOMPSON, P.B. (1990) Risk Objectivism and Risk Subjectivism: When Are Risks Real ? *Risk*, Vol. 3, p. 22.

Experience of National Railways Privatisation, and of Vertical Separation in Metro Systems

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1. Introduction

The privatisation of the rail system in Britain can be seen as the third, and most controversial, stage of a process which began with the Transport Act of 1980 and deregulation of express coach services in that year. This was followed by the deregulation of local bus services under the Transport Act of 1985. The rail privatisation has been the most complex and extensive, due in part to the different nature of the industry, involving infrastructure as well as service operations, and freight as well as passenger. The government's own policy was often unclear in the early stages, as Shaw[1] has shown. The structure of the industry remains a subject for intense debate, especially the role of Railtrack[2] (monopoly provider of infrastructure).

This paper follows an earlier piece of work reported to the 1998 World Conference on Transport Research[3] which examined the net financial impacts of rail privatisation, based on the known sale value of the privatised businesses, and the commitments made in the first round of passenger franchises (all of which, with one minor exception, were for seven years or more). It is now opportune to examine the outcome after the first five full years of franchised operation, in which much more is known of trends in ridership and financial performance.

As in the case of the express coach and local bus industries it is important to distinguish as far as possible the external factors which would affect performance of the industry apart from privatisation and deregulation *per se*. For example, in the case of local buses an underlying negative trend might be expected due to rising car ownership, the question being the extent to which ridership losses (in aggregate) were greater or lower than might be expected from this and other related causes. Conversely, in the case of the rail industry since privatisation the main external factors have been positive, notably growth in GDP and employment in central London.

It is also important to distinguish privatisation and deregulation effects separately. In the case of rail, the industry is wholly privatised but if anything is *more* regulated than before, notably in terms of service levels and fare controls.

2. Structure of the industry

This is very complex, and well described elsewhere. A brief review is provided at this point to set the scene. Prior to privatisation, British Rail (BR) was an integrated organisation, providing both passenger and freight services. Passenger operations were grouped in three business sectors (Intercity, Network South East, and Regional Railways), who were also responsible for their infrastructure. The new structure comprises:

The 25 passenger Train Operating Companies (TOCs), each covering a specific set of routes under a franchise agreed with the Strategic Rail Authority (SRA). They are largely monopolies within their own catchment areas, but some competition has emerged through prior existence of alternative routes (e.g. London to Birmingham) and a very limited amount of 'open access' operation permitted by the Rail Regulator (new services which compete with incumbents).

Railtrack PLC , owner of tracks, signalling, stations and other infrastructure, which charges TOCs and freight operators for access. It is responsible for maintenance and renewal of the existing infrastructure, but is now less likely to be involved in major enhancement. Railtrack was privatised by sale of shares to the public in May 1996.

Rolling Stock Leasing Companies (ROSCOs). Three main companies, privatised by direct sale in November 1995, which were subsequently resold to other businesses for about 50% more than the state secured initially. The existing passenger fleet was split between these companies, initially with little price competition between them. TOCs obtain almost all their stock from these companies but can also purchase outright or lease from manufacturers for supply of new stock.

Freight Operating Companies (FOCs). Most of the freight business was sold to English Welsh and Scottish (EWS). The other main operator is Freightliners, the rail container operator, sold to a management buy-out. In this paper the financial outcome in the freight sector is treated as neutral, the gains from sale of the companies by the state being largely offset by additional access grants.

Apart from Gatwick Express, all TOCs required financial support at the start of the privatisation period. Most of this comes from central government via the Strategic Rail Authority (SRA) but in the seven major conurbations outside London, the local Passenger Transport Executives (PTEs) determine service levels and fares on rail services, and are responsible for the support payments to operators, which are included in totals shown later.

Although the main national system now offers one of the most notable examples of vertical separation, certainly in Europe, integrated operations do remain in Britain. These include the Tyne & Wear Metro, and Glasgow underground (under direct public ownership), and also at present, London Underground. There is also an example of franchising involving a substantial vertically-integrated operation, the Docklands Light Railway (DLR) in London. Metro systems are considered separately in a later section of this paper.

3. Trends in passenger traffic: National Railways in Britain

Table 1 shows trends in passenger traffic since 1989/90 up to the latest full year for which figures are available, 2001/02.

Passenger-km are used as the preferred measure, since passenger trips may be subject to an element of double-counting following separation of TOCs within the previous British Rail structure prior to privatisation. In practice, the difference is fairly small: for example, 'passenger trips' rose from 812m in 1989-90 to 956m in 2001/02, by 144m or 17.7%, compared with 17.4% for passenger-km[4].

It can be seen that total ridership fell from a peak in 1989/90 associated with a high level of economic activity in that year, to a low point in 1994/95. This was associated with a recession (which also affected other modes) and in 1994 itself by strike action (mainly affecting long-distance and regional operators). The overall volume then rose steadily at about 5% a year to a new peak of 38,300m in 1999/2000, an aggregate growth of 33.4% from 1994/95, but then levelled out, as a result of the Hatfield crash (see below). This affected long-distance in particular, while London and South East continued to grow.

This pattern varied by sector, the long-distance operators showing the smallest growth, both over the whole period (zero) and in the growth phase after 1994/95 (20.6%). The largest percentage growth over the whole period was in the regional operators (which cover some major interurban routes, and operations within all the conurbations outside London, as well as low-density rural services), of 54.0%. Data published by SRA enables a fairly close matching with the three sectors previously found under the BR structure. Allowance for the transfer of Gatwick Express (a non-stop service between central London and Gatwick airport) from Intercity to regional increases the long-distance growth and reduces that for regional rail, but only to a modest extent.

Over half the absolute growth in rail use over the whole period took place on the London & South East operators, and none on long-distance. SRA data also indicates that the proportion of demand attributed to season ticket use fell from 32.7% to 28.1% over the whole period, although it did grow very substantially from the low point in 1994-95, representing 28.8% of the absolute network total growth between 1994-95 and 2001/02[5]. It is concentrated largely in the London and South East area, and correlated with employment levels in central London. Work by Lange[6] indicated that, on a year-by-year basis for the period 1975-1995, a significant relationship was found between GDP change and growth in total rail use, and also separately for InterCity and London & South East sectors - but not for regional, which was more strongly

	Million passenger-km of which:			
Year	Whole network	Long-distance operators	London & S.E.	Regional operators
1989/90	33,600	12,900	15,200	5,600
1990/91	33,200	12,700	14,900	5,600
1991/92	32,500	12,600	14,300	5,500
1992/93	31,700	12,200	13,600	5,900
1993/94	30,400	11,400	13,200	5,800
1994/95	28,700	10,700	12,900	5,000
1995/96	30,000	11,100	13,300	5,600
1996/97	32,100	n/a	n/a	n/a
1997/98	34,700	12,300	15,500	6,800
1998/99	36,300	12,600	16,500	7,200
1999/2000	38,500	13,200	17,700	7,600
2000/01	38,200	12,100	18,400	7,600
2001/02	39,100	12,900	18,500	7,700
Percentage change:				
1989/90 – 2001/02	+16.4%	+0.0% (+1.6%*)	+21.7%	+37.5% (+33.9%*)
1994/95 – 2001/02	+36.2%	+20.6% (+22.4%*)	+43.4%	+54.0% (+50.0%*)
Average trip length (km)				
in 2001/02	40.9	174.3	28.2	33.9

* Percentage change after effect of reassigning Gatwick Express volume of 200m from Regional to Intercity in 2001/02.

Data under the 'long-distance operators' from 1997/98 comprises the franchises for Anglia (inter city services), GNER, Great Western, Midland Main Line, Virgin West Coast and Virgin Cross Country. For the period up to 1995/96 inclusive, it comprises the former 'InterCity Sector' of British Rail, broadly the same services but also including Gatwick Express (which carries about 200m passenger-km per year). London & S.E. (South East) comprises the franchises closely corresponding to the former Network South East (Chiltern, South Central, Connex South Eastern, First Great Eastern, c2c (formerly LTS), Silverlink, South West Trains, Thames Trains, Thameslink, West Anglia Great Northern). 'Regional' comprises all other operators (including Gatwick Express from 1997/98), including inter alia all PTE services.

Source : National Rail Trends 2001/02, quarter 4. Strategic Rail Authority June 2002, tables 1.1a, 1.1b and Appendix. Sector data up to 1995/96 inclusive is from Transport Statistics Great Britain 1996 edition, table 5.11(a), HMSO London September 1996

Table 1: Passenger travel on national railways 1989/90 – 2001/02

affected by local economic variations and service quality changes.

It is clear that much of the recovery since 1994/95 is due to growth in GDP, stimulating travel in rail and other modes above the trends of the early 1990s. Work by the British central government department responsible for transport (in 2000 known as DETR, and now known as the 'Department for Transport', or DfT) in connection with the ten-year transport plan published in 2000[7] indicates that a model calibrated on the period from 1978 for 'non commuting' traffic (i.e. non-season ticket travel) provides a very good fit both before and after rail privatisation based on the following approximate elasticities:

GDP change: +2
Total car traffic: -1
Average real rail fares: -1

The 'car traffic' term is influenced both by changes in car ownership and factors affecting use of each car. The latter includes the effect of rising fuel costs due to the 'fuel tax escalator' (a government policy of increasing fuel duty in real terms each year) up to 2000. This model has also been used by DETR to forecast changes under the ten-year plan, implying that a further growth of about 40% would be quite plausible. The model did not find specific service quality factors to be significant at the aggregate level, although train kilometres run had increased over the period.

Figure A1, reproduced by kind permission of DETR, shows the estimated non-season passenger volume from this model, and the actual outcome, giving a very close fit, including the growth phase since privatisation.

DETR were not able to calibrate a model with a good fit for commuting (i.e. season ticket) traffic. However, in this case it would be even less likely that rail service quality has been a factor, given the lack of major investment in the period since privatisation (although medium-term growth might have been evident from the cross-London Thameslink service after its opening in 1988, and Chiltern route following its modernisation shortly before privatisation).

Actual and predicted volumes of 'non-season-ticket' rail

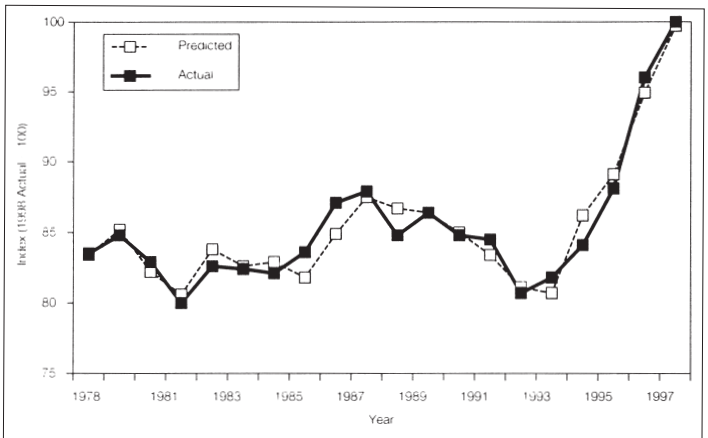

Figure 1: Non-commuting rail demand: predicted and actual

Period	Predicted Percentage Changes in Demand by Cause				Total Growth (% change)		Prediction Error
	Economic Growth (GDP)	Car Traffic	GDP + Car Traffic	Real Fares	Predicted	Actual	
1979–1985	9.4	–19.3	–9.9	6.6	–3.3	–3.4	0.1
1985–1990	50.9	–33.5	17.4	–13.0	4.4	5.2	0.8
1990–1994	–1.7	–3.1	–4.8	–1.9	–6.7	–5.4	1.3
1994–1998	29.6	–9.3	20.3	1.8	22.1	22.2	0.1
2000–2010	66.0	–29.5	36.5	5.3	41.8		

Table 2: Comparison of predicted and actual change in non-commuting rail passenger demand by cause (1979-1998), and Plan forecast (2000-2010)

demand Index, base 1998 = 100. Source: Department of Environment, Transport and the Regions (2000). *Transport 2010: the Background Analysis,* HMSO, London. Actual outcome is denoted by the black line and solid boxes, predicted outcome by the grey line and open boxes.

Rail privatisation *per se* thus does not emerge as a primary factor, and one can argue that much of the growth since 1994/95 would have taken place is any case. However, an element of the regulatory framework in the Railways Act 1993 has been important, namely the regulation of fares. Most season ticket and 'Saver' standard class travel was limited to average annual increases not exceeding the Retail Price Index (RPI) and from 1999, an 'RPI-1' formula has applied. This directly covers about half the total traffic volume, the other half being in any case a fairly price-elastic market dominated by discretionary travel and subject to modal competition. While real prices rose in the late 1980s and early 1990s, average real revenue per passenger-km has varied very little since 1995, at about 8.5-8.75p in 1999/2000 prices[8].

There is however an exception in the long-distance sector. Here, average revenue per passenger-km rose by about 8% in real terms between 1997/98 and 1999/2000 alone. A likely factor is the increases in 'Super Saver' fares, a category not regulated, which is a commonly used 'walk on' fare for personal leisure travel. While the range of low-price book ahead 'APEX' and similar tickets has widened, a user requiring the same 'walk-on' facility as before effectively pays a higher price.

The SRA has very recently produced a weighted price index, on a base of January 1999. This indicates that between January 1999 and January 2002 average rail prices changed very little, rising by about 1.7% in real terms. However, some unregulated fares rose substantially – for example, first class (all operators) by 16.5%, and long distance standard class unregulated by 9.5%[9].

A consequence of the overall stability in real revenue per passenger-km is that change in total revenue is closely correlated with changes in volume. Hence, real revenue growth of 36.0% has occurred since 1994/95[10], enabling TOCs to absorb reductions in franchise payments substantially from this cause, in aggregate terms.

4. Support payments to passenger train operators

Table 3 shows support paid to passenger train operators from

1990/91, adjusted to 1999/2000 prices. For the years up to 1995/96 this was given almost wholly to British Rail (apart from the last few weeks for 1995/96 in respect of South West Trains and Great Western franchises), 1996/97 a mix of BR and TOCs, and from 1997/98 inclusive entirely in franchise payments to TOCs. It can be seen that support increased in the early 1990s, largely due to the recession and its effects on revenue. It then jumped very sharply, doubling between 1993/94 and 1994/95, due to the internal restructuring of the railway industry prior to privatisation, in which Railtrack and ROSCOs were set up as separate companies (see discussion below). Commitments made by franchise operators then produced the drop to 1999/2000. Under their original commitments a steady drop would have continued to 2002/03. At 1999/2000 prices, for example, they would have fallen to about £900m.

£ million at 1999/2000 prices (approximate)

Year	Out-turn or original sum of franchisees' bids	Adjusted figure
1990/91	1000	
1991/92	1300	
1992/93	1600	
1993/94	1320	
1994/95	2540	
1995/96	2360	
1996/97	2340 (gross)	
1997/98	1940	
1998/99	1600	
1999/2000	1380	
2000/01	1210	
2001/02	1100	1250
2002/03	900	1080

Notes:
Derived from table 4.1 in Strategic Rail Authority bulletin 'National Rail Trends 2000-01, quarter 3', March 2001, converted to 1999/2000 prices by authors. Allowance is also made from 1997/98 for revenue received by PTEs directly at £125m per annum. 'Gross' figure refers to payments before 'administered profit' for BR services in that year (see White 1999). For basis of 'adjusted figure' see text .

Table 3 : Support to national passenger rail services in Britain 2001/02

However, it was clear that some very optimistic bids had been made, especially in the later stages of the franchising process. Whereas the first two bids, by Stagecoach and Great Western Trains, may now be seen as relatively cautious, the later bids implied very large increases in revenue, given that operators directly control only around 30% to 40% of their costs.

If the originally-anticipated sum of franchise payments to operators from 1997/98 (not shown here) is compared with the outcome, a further difference of about £125m per annum may be noted in terms of the public expenditure. This is attributable to the fact that five PTEs opted to secure services on 'gross cost' contracts in which the operator is paid for services provided, while revenue is retained by the PTE. In terms of total public spending, however, this may be 'netted off' against the PTE payments to the franchisees. For example, if a group of PTEs were supporting services in the public sector era which had a gross cost of £300m per annum and revenue of £100m, the net support would have been £200m. If these were then franchised on a gross cost basis to TOCs, the payment to the TOCs would have been £300m (ignoring any cost changes), but in terms of net public expenditure this would still have been offset by the £100m revenue retained by the PTEs.

In addition to the base revenue levels at 1995/96, some of the PTE networks have recovered from earlier low levels of traffic, and West Yorkshire in particular has benefited from strong growth in Leeds. In practice, the net payments made by PTEs fell by about 35% in real terms between 1995/96 and 2001/02[11], presumably a mix of cost reductions, revenue growth and any losses absorbed by franchisees where reductions in payments were faster than these factors would permit.

Table 3 also shows adjusted figures for 2000/01 to 2002/03 inclusive. In contrast to the originally-expected outcome, certain franchises have been renegotiated following financial difficulties represented by their owners, and reflecting the earlier over-optimism in bids for some regional operations. The last of the Regional franchises to operate without restructuring of originally-agreed payments were Central and Scotrail (both National Express franchises), but as from March 2002 these too have received additional support. Anglia Railways, operating a mix of intercity and local services, have also renegotiated their support[12]. Within table 3, an extra £150m p.a. has been added (at 1999/2000 prices) for 2001-02 and £180m for 2002-03 to allow for these changes.

The SRA has also brought forward the process of renegotiating existing franchises prior to their original termination dates, even where operations are profitable, as part of its longer-term approach. Agreements in principle have been reached for Chiltern and South West Trains (retained by their existing franchisees) and South Central (transferred from Connex (Vivendi) to GoVia in August 2001). However, profiles of expected cash flows are not yet available.

If projections were taken from those longer-running franchises (such as Virgin West Coast) continuing after 2002/03 as currently agreed then a further reduction would occur. However, this would involve extrapolating from a limited number of possibly unrepresentative cases. Furthermore, doubts must also exist as to whether the longer-

term franchises will actually perform according to their present schedule. While some improvement will certainly be expected in the case of the Virgin franchises, as new trains and higher speeds come into effect, further delays are occurring in the infrastructure upgrade, and other franchises may well need more support than presently budgeted.

5. Operator profitability

In order to remain in business, the franchised TOCs must attain an operating profit, after taking into account passenger revenue, franchise payments and any other income, set against Railtrack access and ROSCO leasing charges as well as direct operating costs. A very small percentage operating margin may suffice, given that TOCs' capital investment is very small - a 1% margin gives a high return on capital - but in practice a somewhat bigger figure would be needed to act as a 'safety margin' to allow for future changes in revenue and costs, especially revenue uncertainty.

The reduction in public expenditure on franchise payments to operators (including PTE revenues) between 1995/96 and 2000/01 at 1999/2000 price levels was about £980m (from table 3). Passenger revenue over the same period grew by £713m[13], i.e. around 73% of the reduction would be offset by passenger revenue growth. The remaining 27%, i.e. about £260m, would largely be covered in aggregate by the reduction in Railtrack access charges over this period of 2% per annum in real terms set by the Regulator in 1995 (at 1999/2000 prices these fell by about £200m between 1995/96 and 1999/2000, after the initial 8% reduction). Hence, only a small part (about £60m, or 7% of the drop in net support) would be attributable to net cost reductions (or lower profit margins) by the operators. This would imply a reduction in operators' total costs - excluding track access charges - of around 3%. Note these calculations assume that operators were basing their bids on costs after the initial 8% reduction had been made, and were allowing for the cut of 2% per annum thereafter.

This is in very marked contrast to the local bus industry, in which profitability has greatly improved since 1986, but very largely due to reduced real costs, and increased real fares partly offsetting passenger volume reductions[14]. As already noted in this paper, real revenue per passenger-km has changed little since privatisation, hence rail users in general have not suffered the financial losses experienced by their (lower-income, lower-status) opposite numbers using the bus.

Estimates by TAS, described by Cheek[15], suggest an aggregate operating profit for the 25 franchises in 1999/2000 (or the nearest equivalent financial year - accounting years vary between companies) of about £165m (approximately 3.2% of turnover), falling to about £110m (2.2% of turnover) in 2000/01. In 1999/2000 profits of about £90m in the long-distance sector, and £115m in London & South East were offset by a loss of £40m in regional. In 2000/01 11 of the 25 TOCs made losses, including all Regional companies except Scotrail. It should be borne in mind, however, that in the last year of British Rail, 1996/97, its passenger train operations reported an 'administered profit' of £200m (or about £215m at 1999/2000 prices), reducing the net financial support required from the state by an equivalent sum. The overall margin in 1999/2000 corresponded to about 3% of turnover. Further discussion of variations in operator profitability is provided by Powell[16].

The main achievement of the TOCs in cost terms lies not primarily in reducing total costs but in being able to manage an increase in train-km since privatisation while containing costs, i.e. producing a reduction in real cost per train-km of similar magnitude to its volume growth. A series over the whole period is not available, but SRA data shows that from 1997-98 to 1999-2000 timetabled train-km rose by 11.2%, and the 2001-02 level was 15.8% above that for 1997-98[17]. TAS data imply a drop of about 3% in money terms in total cost per train-km between 1996/97 and 1999/2000[18], or about 11% in real terms, i.e. of similar magnitude to the growth in train-km over that period . Given that most growth in service has been off-peak (of the growth between 1997-98 and 2001-02, only 5% was in London and South East peak services), using existing stock and that Railtrack charges vary little with train volume, one would of course expect the additional train-km to have a much lower unit cost than the previous average. Work on total factor productivity of TOCs by Cowie[19] points to a similar result.

There are also cases of TOCs which have made 'across the board' service increases in both peak and off-peak periods, associated with new rolling stock. Notable examples are Anglia, doubling the Norwich-London main line frequency to half-hourly, and Midland Main Line (MML), likewise doubling its core frequency (albeit with much smaller diesel multiple units, which now handle intermediate flows). Substantial ridership growth has occurred – in the MML case, about 15% in one year after an 80% growth in train-km[20] and in such cases there would appear to be an association between operator initiatives and passenger volume, although this is not very evident at the aggregate level indicated in DETR modelling[21].

6. The net financial outcome

From the viewpoint of the state, the rail industry structure set up from 1994/95 produced a large internal cash flow which was 'recycled'. Railtrack and the ROSCOs made high charges to TOCs (resulting in the large increase in payments to passenger rail services shown in table 3). However, while they remained in the public sector, the net increase in public spending was much less. When other subsidiary businesses such as infrastructure and telecommunications companies are included, the state-owned rail system produced an internal 'profit' of about £890m per annum from 1994/5. However, as companies were sold off the flow was lost to the public sector. Hence, the state gained through 'one off' sales of assets, but lost a long-term future cash flow of about £890m per annum. While a seemingly high sum was obtained for all the businesses, a total of about £4500m in the 1995-98 period (mostly represented by Railtrack and the ROSCOs) - less cost of the privatisation process - this reflected a relatively low

price:earnings ratio of about 6:1 for the biggest businesses, and much lower for the infrastructure companies. Hence, if one assumes that all other factors remain unchanged, the £890m per annum cash flow would be lost. Over 15 years this would amount to about £13,350m, or if discounted at 6% per annum in real terms (the discount rate for public sector investment appraisal) about £8640m. Thus, the state could be seen to be losing money as a result. Further details of this line of argument are set out in White[22].

This loss was offset by the reduction in payments to franchisees, as a result of their diminishing bids (table 3). Taking the then expected outcome to 2002/03 and extrapolating this figure to the end of the 15-year period (i.e. 2010/11) it could be shown that the state would benefit overall, assuming that gains in the franchising process were wholly attributable to the franchisees' own actions.

However, it can be argued that much of the revenue gain would have occurred in any case due to ridership growing for the reasons stated above. In addition, some further cost reductions might have been expected under continued BR ownership, rather than no efficiency gains at all. On this basis, the net financial outcome for the state was very similar whether privatisation had occurred or continued BR ownership continued.

7. The role of the infrastructure provider

In order for this financial outcome to be achieved, the greatest cost reduction pressure was on Railtrack, whose income derives very largely from rail passenger operations (over 80%) and which was in turn set to fall at 2% per annum in real terms following the Regulator's decision in 1996. Its annual profits would have been wiped out by 2001 had it not succeeded in obtaining corresponding cost reductions. The TOCs needed to stimulate ridership in order to attain their franchise payment reduction targets. Increased train-km may have played a part in this, necessitating the lower unit costs estimated above, but under the initial charging regime, only a very small part of Railtrack's income varied with the volume of train-km.

As indicated above, the reduction in Railtrack access charges was the second most important element in enabling TOCs to manage their reduced franchise payments, after revenue growth. It can be argued that a real cost reduction of 2% per annum is not unreasonable – in an economy with real growth of around 2% per annum and a stable total population, such an improvement in output per worker is implicit. However, it may be far more difficult for an organisation to achieve this by cutting back, than by increasing total output and income, effectively deploying existing resources more efficiently (as the TOCs have done).

A major method by which Railtrack reduced costs was through contracting-out much of the maintenance and renewal work. While common practice in many industries, the rapid shift to this method of working appears to have caused substantial problems in terms of ensuring quality of work, and safety. These were highlighted a derailment at Hatfield (on the GNER main line about 30 km north of London) on 17 October 2000. While the number of fatalities (four) was less than in other recent accidents, the cause was quickly identified as the fragmentation of a rail on a section of curved track. This potential problem of 'gauge corner cracking' was then considered to affect many other sections on the network, resulting the immediate imposition of severe speed limits and a number of temporary closures. Long-distance services of all operators were very badly disrupted. Only from the 2001 Summer timetable was a normal service restored.

Until the Hatfield crash, strong growth in rail use had continued, in line with trends since 1996, as indicated in table 1. In the quarter year before the crash long-distance volume was up by 9% on the same period one year earlier[23]. Trends since the crash indicate long-distance volumes are still affected – falling from 13,200m passenger-km in 1999-2000 to 12,100m in 2000/01 (the year in which the crash occurred) and partially recovering to 12,900m in 2001/02. Conversely, London & South East continued to grow in 2000/01 and 2001/02, despite significant disruption to services after the crash. This reflects less scope for its users to change their behaviour than on routes where more modal alternatives exist.

In addition to the payments to TOC franchise holders by the SRA, other major cash flows exist within the rail system. From the inception of privatisation, a system of incentives and penalty payments has existed, in order to promote improved performance . Where TOCs fail to meet specified performance standards, notably in service reliability, they are liable to pay penalties to the SRA. Relative to the total sums paid by the SRA to franchisees these were small until the year 2000/01, in which they reached £102m. While falling, they remained high in 2001/02 at £81m[24]. The largest element in such payments has been poor reliability, in turn substantially (though by no means wholly) attributable to problems caused by Railtrack to TOCs. Negotiations thus take place between TOCs and Railtrack over the compensation due (which also allows for loss of passenger revenue) – in effect, reduced track access payments for the periods in question. Hence, very large payments (or reduced income) were experienced by Railtrack after October 2000, greatly worsening its financial position. In the year to 31 March 2001, its operating margin fell from 16.6% in 1999/2000, to 7.8%. After the costs of Hatfield, primarily in compensation to TOCs (£561m), a loss of £307m was recorded[25].

In the longer term, the realism of continued reduction in Railtrack's real income had been questioned, and the need for additional finance to maintain and enhance the system more evident. Under the powers held by the Regulator, a second periodic review of access charging was carried out, and came into effect from April 2001. Total support payments increased by 34.5% between 2000/1 and 2001/2 then by about 5% in real terms to 2005/6, more than reversing the previous reductions[26]. These do not incur a direct cost to the TOCs, as the franchise agreements render any changes at periodic review a 'pass-through' to the SRA. However, the net effect

on the state is clearly to increase costs very substantially. The very large increases in payments in 2001, were in the form of direct grants rather than via TOCs (charges to TOCs as such actually fell in 2001/2, but then rise at 4-5% p.a.). The revised charging system also substantially increased the element of access charge variable with the volume of traffic, to about one third of the total, thus reflecting increased costs imposed, and providing incentives to expand capacity.

Clearly, some of these increases arise from a more realistic view of future cost levels, potential efficiency gains, and need to reinvest in the system that would also have applied under public ownership. However, some elements could be seen as related directly to privatisation – for example, the assumption that Railtrack would incur real interest rates of about 8% in raising capital, whereas substantially lower rates would apply to direct public borrowing: this is analogous to the argument applying to the funding of London Underground renewal by 'Public Private Partnership' (PPP) or direct state borrowing.

In an earlier version of this paper (June 2001), one author acknowledged the severe financial problems faced by Railtrack, but nonetheless considered that '….Given its existence as the single monopoly provider, it is difficult to see how it could be permitted to go out of business'. Indeed, the government brought forward payments of about £1,500m due under the revised access charging regime, to enable Railtrack to overcome short-run difficulties.

However, further problems continued, and in October 2001 the Secretary of State for Transport placed Railtrack in 'Railway Administration', effectively placing the main infrastructure business back under government control. Arrangements are being made to set up a new 'not for profit' business which will take over Railtrack's role. The arguments on both sides have been very complex and its is not the role of this short paper to examine them.

8. Vertical Separation of Metro systems

The trend towards vertical separation of rail systems can be traced in part to a general trend towards deregulation and vertical separation of network industries, in that the same principles used to justify deregulation of gas, electricity, telecommunications, etc are being applied to rail. In the case of European rail networks – particularly the high-speed routes – EU regulation is also a factor, and has prompted or hastened restructuring. Such regulation is more a consequence of the drive for a single market through the free movement of goods and labour, than it is a consequence of privatisation ideology; hence directive 91/440 specifically exempted local railways and Metro systems from its provisions.

Perhaps as a result of there being no framework driven by external policy, the dominant structural model for European Metros remains the vertically integrated monopoly entity. Where a city has had more than one Metro company, separation has tended to be horizontal rather than vertical (i.e. an oligopoly comprising vertically integrated firms imperfectly competing). Having said this, there are nonetheless a few examples of parts of services being vertically separated, e.g. the fledgling Metropolitan Railway in London initially operated using stock from the Great Western and Great Northern railways; while its competitor the Metropolitan District extended some services to Southend by utilising tracks of the Whitechapel and Bow Railway and tracks and locomotives of the London Tilbury and Southend Railways. Yet such examples are very much the exception, as like the railways, Metros have generally developed as vertically integrated organisations with the operator managing its own infrastructure.

Since the early 1990s, a number of European Metros have restructured. This has led to a move away from the traditional model and restructuring has increasingly included elements of vertical separation. Interestingly this has not resulted in a single model of vertical separation; rather a number of different models now exist ranging from limited tendering to open competition for operations or infrastructure. Fuller details are given in Ball[27].

8.1 Stockholm

The Swedish rail system was one of the first to be vertically separated (and the experience is said to have been one of the inspirations for EC91/440), so perhaps it is unsurprising that Sweden was also a pioneer in vertically separating a metro system: Stockholm's Tunnelbana. Vertical separation has in fact been the outcome of restructuring twice (in 1991, and again in 1999), in both cases to enable competitive franchising of operations.

The T-bana is a medium sized Metro with annual patronage of approximately 300 million journeys over a network of 110 route kms, serving 100 stations. The first line, the Green line, was opened in 1950 and followed by Red line (1964) and the Blue line (1975). The T-bana, together with 410 bus routes, 2 light rail lines and 3 'commuter' rail lines, serves a city of 1.8 million people.

Until 1991, the T-bana was owned, operated and managed by AB Storstockholms Localtrafik (SL) a traditional vertically integrated, multi-modal public monopoly. In 1991, SL underwent a radical transformation, centred around the vesting of operations responsibilities in new quasi-autonomous subsidiary companies. SL Tunnelbana AB, a wholly owned subsidiary of SL, took responsibility for operation of the three T-bana lines, while other subsidiaries operated the light rail, bus and commuter rail services. Vertical separation lay at the heart of the new structure, with the subsidiaries managing operations, while infrastructure ownership and control remained with SL. The division of responsibilities this created is shown in table 4.

Separation and creation of the subsidiaries was the first step towards offering 5-year operations franchises for each line, not unlike the route tendering used for London bus services. Franchising was to apply to all SL's services, including the three lines making up the T-bana, so creating a *de jure* horizontal separation. (This was made possible, or at least easier, by the characteristics of the network: there is no inter-running, each line has a separate control centre, and physical

AB Storstockholms Localtrafik (SL)	Operating Companies (Blue, Red and Green Lines)
Specify fares	Revenue collection
Strategic service planning	Detailed service planning and timetabling
Manage franchising process	Daily operations
Ownership of Track/signalling	Signalling/service control
Ownership of Trains	Driver services
Ownership of Stations	Station staff
Ownership of Depots	Depot management
Infrastructure renewal/replacement	Light maintenance including cleaning
Acceptance of new technology	Operations safety case

Source: SL/Connex Interviewees and Peterson[27]

Table 4: Division of responsibilities after vertical separation

interchange between the Red, Green and Blue lines is very limited with only four stations providing interchange between the lines – three of these are adjacent.) The franchises were to last only 5 years. Since this is a short period of time relative to the long lives of railway assets, vertical separation was a prerequisite for contestable franchising, as the payback period on investment would be insufficient in a 5-year vertically integrated franchise, leading either to no investment or no competition. The structure is very similar to that of British national rail, but an important difference is that competition is purely for the monopoly right to operate services using SL's assets; there is no direct on-track competition (reflecting the realities of high frequency/simple diagram metro operations), nor is there use of privately owned assets.

The first T-bana franchise (for operation of the Blue Line) was offered in 1994, followed by the Red Line in 1995 and the Green Line in 1996. Interestingly, the SL's subsidiaries were permitted to bid, and indeed the incumbent, SL Tunnelbana AB, won all three franchises with that for the Green Line uncontested.

By the late 1990s, it was concluded that the arrangement was not as successful as had been hoped (for reasons discussed below). A second restructuring occurred in 1999 when SL offered a 10-year operating franchise for the operation of the T-bana. The division of responsibilities remained as described above – vertical separation was retained. However, the nominal horizontal separation was abandoned, with the franchise covering the unified operation of all three lines. This time SL's subsidiaries were not permitted to bid, so the winner would have to be a private sector company. Ultimately this proved to be French transport company CGEA (Connex).

The Stockholm experience raises questions firstly of the reasons for the original restructuring and then not only of why the structure was abandoned, but also why the replacement retained vertical separation.

In the late 1980s SL faced a severe financial problem with the proportion of operating costs covered by income at only 36%, requiring a large operating subsidy. Moreover rising costs could not be explained by increased service since operated car-km stood only 12% higher in 1991 than in 1981. Competition was seen as the way to drive down costs, with relatively short contracts as the second best to pure open competition. As explained above, this could only be achieved with vertical separation so that asset responsibilities and their attendant sunk costs would not form part of the franchise. The intention was that reduced operating subsidies would allow SL to achieve higher levels of investment and bring about service quality improvements. These twin aims, reducing cost and improving quality, are evident in the language at the time of restructuring.

In terms of financial efficiency, the new structure demonstrated some success: operating costs fell in real terms for four consecutive years. The franchises were awarded to the lowest cost (subsidy) in a sealed-bid auction. Thus to be competitive against outside bidders, SL Tunnelbana reduced staff employed by 21% between restructuring in 1991 and award of the first franchise in 1994. It also increased service volumes, such that staff productivity (in terms of car km per staff member employed) had risen 39% by 1993. Accordingly, cost coverage had dramatically improved to 62% by 1999.

In terms of quality, the increase in service volumes was an obvious improvement. However, reliability declined significantly, with the average number of delays over 10 minutes increasing 36% between 1992-4 and 1997-9. Analysis of various causal factors shows that problems with the new signalling were predominantly responsible for the increased delays and decline in SL's reputation and patronage, i.e. the problem was not one directly related to the vertically separate structure, but one related to new asset teething problems familiar to so many metros both integrated and separated.

The 1991 restructuring only partly succeeded in creating contestable franchises. Again however, this is not due to vertical separation *per se*, rather it relates to the form of auction used. The contract covered "overall responsibility for quality" but the least-cost auction method was fundamentally at odds with that aim: it successfully delivered price competition was but blind to the differing abilities of bidders to improve service quality. A 'beauty contest' auction might have proved more successful. Where there was competition, the bids were extremely close in price, implying a different outcome may have emerged if quality proposals were also considered. Moreover, the incumbent had a clear information advantage and as a public entity SL Tunnelbana could take a relaxed attitude to risk, perhaps giving it an advantage over private sector competitors. Contestability may not have been truly credible with the incumbent allowed to participate, and this may explain why the incumbent, having won the previous two franchises, was unchallenged in the Green line competition.

The explanation of the second restructuring follows from

these conclusions about performance post-1991: vertically separated operations franchising was not in itself the problem, rather the associated mechanisms were not in harmony with the desired outcomes. Thus the nominal horizontal separation was abandoned to promote a 'network approach' to quality enhancement. The auction method was changed to a beauty contest approach much better aligned to the quality aim, and the incumbent was barred from bidding to restore credibility and contestability. (Indeed the winner would take over a 60% stake in SL Tunnelbana AB, so it would truly become SL's partner.) The contract was for six plus four years, i.e. a base contract of 1999-2005 with the possibility of extension to 2009 if performance is sufficiently encouraging. The threat that the contract could be terminated is real, thereby providing an incentive for quality improvement and cost control. Finally, the contract incorporates a performance regime whereby the operator is given an annual grant, with bonuses and financial penalties contingent on performance in the areas of reliability, staff visibility, cleanliness, information and safety. The operator's profit therefore is strongly related to its performance. Capital investment remains the responsibility of SL, however, Connex has a significant role in determining priorities for investment (a recent example being ticket barriers).

Early indications are that the new regime is regarded as a success both by operator and infrastructure owner. It is too early to confirm this conclusively, though performance data shows significant improvements in reliability and cleanliness performance. If these trends are suggestive of general performance it confirms the conclusions that vertical separation of a metro can work, so long as the contractual framework is appropriate to the situation.

8.2 London

While Stockholm provides possibly the best example of vertical separation in the European Metro context, it is not the only example. Moreover, the franchised operations structure is not the only model a vertically separated metro can adopt. Nowhere is this better demonstrated than in London where the London Underground has been vertically separated, but with infrastructure maintenance and renewal as the competitive element, while operations remain controlled by a public sector monopoly. Competition is being introduced into the element traditionally considered the natural monopoly, turning the traditional view of contestability on its head.

The London Underground, is the world's oldest Metro and one of the largest, with 12 lines stretching over 408 route kms, serving 275 stations. Annual patronage is approximately 955 million journeys (which is about the same as the entire national rail network). London itself has a population of 7.2 million and public transport includes extensive day and night bus routes, a smaller metro (Docklands Light Railway) and a limited tram system. There are also commuter rail services, though these are outside the control of the city transport authority.

Since 1933, the London Underground had been part of a traditional multi-modal, vertically integrated public body (known as London Transport in its most recent form). In 1999 a new transport authority, Transport for London, was established to take over LT's responsibilities for bus, DLR, and tram services, and also taxis and the major roads, as well as integrated transport functions such as fares and ticketing. The creation of TfL mainly related to changes in London's government, with the creation of an elected Mayor and Assembly. At the same time however, radical change was occurring for London Underground, which was restructured into an operating company (retaining the London Underground Ltd name and ultimately transferring to TfL), vertically separated from three subsidiary infrastructure companies (known as Infracos). The Infracos are themselves horizontally separated into line groupings: BCV (Bakerloo, Central, Victoria, Waterloo & City lines), JNP (Jubilee, Northern and Piccadilly lines) and SSL (Sub-Surface lines – Metropolitan, Hammersmith & City, District, Circle and East London lines). The Infracos took on maintenance and renewal responsibility for most assets, with each Infraco taking responsibility for a group of lines. The only assets excluded from Infraco control are non-operational property, and those asset areas covered by existing Private Finance Initiative (PFI) deals. The resulting division of responsibilities is shown in the next table.

Thus although both London and Stockholm became vertically separated structures, the actual arrangement of functions between the competitive and monopoly parties is radically different. Creation of the Infracos was a prelude to a competitive process where private sector consortia were invited to bid for ownership of the Infracos. This is called the Public-Private Partnership, or PPP.

In a sense this represents a partial privatisation of the industry, though the marked contrast to the national rail case is that the Infracos *lease* the assets from London Underground (cf national rail where ownership of the assets was transferred into the private sector with Railtrack). Infracos are required to maintain, enhance and make assets available for LUL use, in return for which, LUL pays an Infrastructure Service Charge (ISC); the level being contingent on performance. At the end of the contract, all assets revert to LUL with pre-defined minimum useful lives.

The privately owned Infracos are responsible for raising the finance necessary to pay for asset renewal and enhancement. However, given the sums of and non-recoverable nature of the investment required, short contracts would be impractical. A 30-year contract was chosen, and this better reflects asset lives and the timescales required to plan, realise and receive the reward on infrastructure improvement[28].

Like Stockholm, the causes of restructuring are financial. Unlike Stockholm however, the problem has not been one of operations deficits, indeed traffic revenues have exceeded operating costs since 1993/4. Between 1989 and 2000, real revenue increased by 60% as a consequence of a strong economy driving demand, and a policy of real fares increases against a price elasticity of –0.3[29]. Over the same time real

New London Underground Limited (LUL)	3 Infrastructure companies (Infracos: JNP, BCV, SSL)
Freehold on assets (including stations, depots, track and civil structures, signalling, and trains)	Leasehold on assets (including stations, depots, track and civil structures, signalling, and trains)
Strategic and detailed service planning	Infrastructure renewal/replacement
Manage bidding process	Deliver specified upgrades
Traffic hours control of the railway	Engineering hours control of the railway
Daily operation	Asset availability for operational use
Timetabling	Asset maintenance
Signalling/service control	Asset improvement
Driver services	Depot management
Station staff	Cleaning (sub-contracted)
Operations capability	Technical capability
Infrastructure technical assurance	Detailed technical design
Safety improvement specification	Implement safety improvement
Underground Safety Case for HSE	Safety Cases for LUL
Responsibilities under existing PFI contracts, not devolved to Infracos	
Specify fares and revenue collection	Ticketing/Revenue assets (Prestige PFI)
Power control	Power supply (Power PFI)
Communications user	Communications equipment (Connect PFI)
British Transport Police	BTP accommodation (BTP PFI)

Source: LUL interviewees and Glover (2000)

Table 5: Division of responsibilities since 1999

costs only grew 26%, hence the internal contribution to investment has increased significantly[30]. However, this gross operating margin has never been sufficient to cover the high level of renewals and depreciation – a consequence of the age of the network – and this has meant a continuing need for subsidy. London's problem however has been that levels of grant (and therefore investment) have been a) insufficient and b) highly variable due to annual funding settlements, resulting in an accumulated £1.2bn investment backlog.

The government's chosen means of addressing these problems was PPP, under which long-term stable funding and asset management would be provided by the private sector, with public sector operations, and guaranteed government commitment. Infracos (in the private sector) raise their own funds and make infrastructure investment. This requires vertical separation if operations are to remain public (per government desire), and long franchises to ensure returns on investment. It was the financing plan, therefore, which required and determined the unusual form of vertical separation.

Separation occurred in 1999, and since then the Infracos and LUL have been 'shadow running' the contract in preparation for transfer to the private sector (expected later in 2002 following recent signature of the Share Purchase Agreements). The recent and incomplete nature of the change make it difficult to draw many conclusions about the structure's effectiveness at this stage (particularly as the financial incentives are less effective when Infracos are subsidiaries). However, the competition for the Infracos provides some evidence of contestability. Details of the bids have not been made public, but an available measure is the number of bids. For the three competitions, a total of 12 bids were received from 6 consortia[31]. Four bids per contract compares favourably with national rail franchises (5-6 average), and is consistent with other large contracts. As in the second Stockholm competition, in-house bids were not permitted, putting bidders on an equal footing. The mechanism and number of bids suggests contestability, at least in the competition for Infraco Ownership.

The net financial impact of the PPP deal will be affected by the higher rates of return on capital required by the private sector consortia in comparison with direct public financing. Making reasonable assumptions, this suggests that the consortia will have to undertake the work itself at a cost about 20% less than the existing public sector organisations in order to offset this effect[32].

8.3 Other examples

Fully vertically separated structures are still very much in the minority. However, other systems are experimenting with restructuring, including elements of separation. These are worth brief discussion.

London's other metro system is the Docklands Light Railway (DLR), an automated system opened in 1987 and now carrying 30 million passenger journeys annually. The structure is unusual, in that railway development responsibilities and freehold ownership of the assets belong to DLR Ltd, a subsidiary of transport authority TfL. However, operations and maintenance were awarded as a vertically integrated franchise in 1997 to Serco plc on a performance-based franchise contract lasting 7 years (reflecting the very low sunk costs it involves because assets are relatively new and the franchisee is not expected to replace them). DLR Ltd also has a concession arrangement with CGLR, a consortium contracted to design build and maintain the recent Lewisham extension. Interestingly, operations over the extension are provided by DRML, who run the rest of the system, with the assets controlled by CGLR. As a result, the extension is vertically separated between two private sector companies, while the rest of the network is vertically integrated but franchised. This somewhat complicated arrangement appears not to have adversely impacted upon DLR performance, which has been consistently good since the opening of the extension in 1999.

The Berlin U-Bahn is a metro in transition from a typically vertically integrated, multi-modal public monopoly to a structure more resembling that in Stockholm. Unlike Stockholm however, where transition was achieved in three years, the process in Berlin is much lengthier, having begun in 1994 and due to reach and end state by 2008. In 1999 the U-Bahn operator, BVG, agreed a recovery and action strategy with the Berlin state authority, which sought to improve the

company's financial position and prepare it for competition. The origins of restructuring can be found in the political use of public transport during the Cold War division of the city. Both sides used public transport to maintain full employment, consequently, by 1992, 12,000 journeys per staff member employed were made in Berlin compared to nearly 40,000 in London. With the cold war political imperative gone, BVG was required to improve efficiency and become cost effective. As in Stockholm, competition for operations has been seen as the means of achieving this, thus if present plans are continued, vertical separation and operations franchising will take place circa 2008. In the meantime BVG has sought to cut costs and one of the means of doing so has been to create and privatise subsidiary companies to provide driver services under contract. This is not full vertical separation since other elements of operation are retained by BVG, but it is nonetheless another variation on a similar theme.

Some metros however have remained firmly vertically integrated. The small Glasgow Underground is a good example. The system is owned, financed and operated by the regional public transport authority, and suggestions that this should change have been steadfastly resisted.

Another firmly vertically integrated system is the Paris Metro, owned and operated by RATP. However, lack of separation does not mean there has been no structural evolution. From 2000, a formal contract has been established between the public transport authority (STIF) and RATP. The contract marks a degree of devolution to RATP, within the parameters of a performance contract including (limited) financial incentives.[33]

While not separation, the contract approach marks a departure from the traditional model. Moreover, it is the type of arrangement advocated by the EU in the recent draft regulation for public service contracts in passenger transport. The regulation is predicated on creating a level-playing field and fostering higher quality public transport, rather than prescribing structures per se. However, the regulation appears to require a formalised agreement between transport operator and authority, incorporating a 5-year service contract, and critics argue this may require the franchised operations form of vertical separation (given that vertically integrated franchises of only 5 years may not be contestable). Authorities both in London and Paris have argued that the complexity of the operations means that franchising operations for the whole network is impractical, while franchising lines/groups of lines is unworkable given the high levels of interchange and network integration benefits that would be lost.

8.4 Conclusions in respect of Metros

European Metro experience shows that since the early 1990s, the traditional model of a vertically integrated public corporation, perhaps best typified by the old London Transport, is being superseded by new structures. In a number of cases, the vertical separation of operations and infrastructure has formed a fundamental part of the new structure. Stockholm and London provide two examples of this, but they are two very contrasting examples. The reasons for this contrast appear to be twofold. Until very recently there has been no external policy influence on the form to adopt – the EU public service directive may change this unless its final form differs significantly from the draft. More importantly, the form of vertical separation directly reflects the particular problem that triggered restructuring in the first place. In Stockholm, for instance, the original problem contracting was designed to resolve was the persistent operating deficit: hence competitive least cost tendering for operations. Similarly in Berlin, it is a problem of high operating costs that is prompting a move towards competitive operations. For LUL, by contrast, the problem is an investment deficit, and infrastructure franchising was seen as the way to deliver the sustained investment necessary and retain public sector operations, without significant upfront cost for the public sector. This implies vertical separation has been used very much as a means to an end rather than an end in itself.

The differences between franchised operations and franchised infrastructure are significant, but arguably the similarities are equally worthy of comment, as they perhaps indicate a set of characteristics common to all vertically separated metros. First, regardless of which part is made contestable, strategic service planning functions are retained by the monopoly entity. Second, there is a desire to enable (at least the possibility of) private sector involvement, hence a need for a contract interface. Third, the length of contract reflects responsibilities towards assets in accordance with the axioms of contestability. (i.e. where sunk costs are expected, such as a contract requirement for the private sector partner to invest in asset renewal, a long contract is necessary in order for the private partner to have confidence that a return will be realised on investment. Similarly if the desire is for contracts of short duration, private sector interest will vary inversely with the level of sunk cost investment expected.) Fourth, beauty-contest auctions tend to form part of the competitive process, and fifth, the incentives of each party under vertical separation are aligned using a performance framework incorporating financial bonuses and penalties.

The traditional industry structure for metro systems is undoubtedly changing as, like the railways before, metros begin to adopt forms of vertical separation. In the cases discussed above it has been clear that vertical separation has not been sought as an end in itself, but as part of a response to a particular problem and as an enabler for competition/private sector involvement. Vertical separation for metros is still very much in its infancy, whether or not it is a success will be judged by the performance of vertically separated metros, and the extent to which other metros also adopt vertically separate structures. Moreover it will be interesting to see whether the variety of structures is maintained, or whether a standard model will emerge, perhaps as a result of EU regulation.

9. Overall conclusions

1. It is desirable to ensure that a comprehensive inventory of assets is compiled when ownership and/or responsibility for

infrastructure is transferred to the private sector. In the case of Railtrack, the sale was completed in a short period which did not enable this process to take place. Hence, valuation of the company was related to current profitability and perceived risk, rather than conditions of the assets as such, and uncertainty was created about the level of renewal investment needed in the medium to long term. In the case of London Underground, a clear asset inventory is necessary in order to determine the scale and cost of work needed. Hopefully, the extended period in which the PPP negotiations has been conducted has enabled this to be developed in greater detail.

2. The interface between train operators and the infrastructure needs to be clearly specified, to ensure that responsibility in the event of safety issues and delays affecting final users is determined. In the case of Railtrack and TOCs this takes the form of agreements between private sector businesses, with incentive and penalty payments. In the case of metros, this applies to private operating companies with public sector infrastructure (in Stockholm), or private infrastructure companies with public sector operators (in London).

3. Relationships between infrastructure providers (whether public or private) and sub-contractors to them need to be clearly specified, and appropriate controls in place. This is illustrated by the problems faced by Railtrack in the light of the Hatfield crash.

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Since this paper was written, Railtrack was replaced by the non-profit-making organisation Network Rail in October 2002. The first PPP contract, between London Underground and the Tube Lines consortium (responsible for the JNP Infraco) was signed on 31 December 2002

NOTES

[1] Shaw, J., (2001), *Competition, Regulation and Privatisation of British Rail*, Ashgate, UK.

[2] In October 2001 Railtrack was placed in railway administration, following serious financial difficulties, and iscurrently known (at June 2002) as 'Railtrack PLC (in railway administration)'. The term 'Railtrack' is used throughout this paper, referring both to the company prior to October 2001, and its current status.

[3] White, P., (1999), "Outcomes of Rail Privatisation", *Selected Proceedings of the 8th World Conference on Transport Research*, Pergamon , Vol 4, pp. 569-581.

[4] Derived from Strategic Rail Authority, (2002), *National Rail Trends 2001-02, quarter 4,* SRA, tables 1.1 and 1.2a.

[5] Ibidem, table 1.1

[6] Lange, B., (1998), *Rail Passenger Volume Growth in Great Britain*, Dissertation for MSc Transport Planning & Management, University of Westminster, (unpublished).

[7] Department of Environment, (2000), *Transport and the Regions. Transport 2010: the Background Analysis,* HMSO, London.

[8] Derived from ibid, tables 1.1, and 1.3

[9] Derived from ibid, table 3.1

[10] Derived from ibid, table 1.3

[11] Derived from ibid, table 5.1

[12] Data on changes to support payments derived from SRA releases, and reports in 'Transit'.

[13] Derived from SRA op. cit., table 1.3

[14] White, P., (2001), "Local Bus Industry and the Role of Longer-distance Services", in T., Grayling, (Ed.), *Any More Fares? Delivering better bus services,* Institute of Public Policy Research (IPPR), London.

[15] Cheek, C., (2002), "Railways Recover at Taxpayers Expense, but Will the Funds Keep Flowing?", *Transit*, pp. 10-11.

[16] Powell, T., (2001), *The Transport System: Markets, Modes and Policies*, PTRC, London.

[17] Derived from Ibid., table 1.4 Although earlier data is not available from SRA, that by Muir (Modern Railways December 2001, supplement page 4) indicates a level in 1995/96 only marginally below that of 1997/98.

[18] TAS, (2001), *Rail Finance Monitor 2001*, UK.

[19] Cowie, J., (2001), "Subsidy and Productivity in the Privatised British Passenger Railway", *paper presented at Seventh International Conference on Competition and Ownership in Land Passenger Transport*, Molde, Norway.

[20] MML data derived from Office of Passenger Rail Franchising Annual Report 1998/99, page 66; and SRA Annual Report 1999/2000, p. 28.

[21] see above

[22] White, P., (1998), "Impacts of Rail Privatisation in Britain", *Transport Reviews*, Vol. 18, n° 2, pp. 109-130; White, P., (1999), "Outcomes of Rail Privatisation", in *Selected Proceedings of the 8th World Conference on Transport Research*, Pergamon , Vol. 4, pp. 569-581.

[23] Derived from SRA op. cit., table 1.1b

[24] Strategic Rail Authority (2002), 'On track: Rail Performance Trends Oct 2001 to March 2002, p. 19.

[25] 'Underlying profits fall by more than half at Railtrack before £644m post-Hatfield hit' *Transit* 20 July 2001, p 12.

[26] Office of the Rail Regulator, Periodic Review of Railtrack's Access Charges: Final Conclusions., (ORR), October 2000, see summary in 'A strategic agenda: volume 2, the annexes. SRA, March 2001, pp 7-13.

[27] Ball, J., (2001), *Vertical Separation and the Restructuring of EU Metros,* Dissertation for MSc Transport Planning and Management, University of Westminster, (unpublished).

[28] Peterson, B., (1998), "Results from Procurement of Local and Regional Public Transport Services in the Stockholm Region", *Public transport Internetional*, pp. 16-19.

[29] Note that LUL has already used a similar type of contract for ticketing, power and communications assets. Private Finance Initiative (PFI) deals in these areas have brought in private sector contractors to maintain and improve the assets. True vertical separation has only come about with PPP, though PFI contracts remain active (see table).

[30] London Transport, (1998), *Forecasting London Transport's demand and revenue*, London, Regional Transport, London.

[31] Transport for London, (2000), *Transport Statistics for London 2000*, London, TfL.

[32] This includes Railtrack, who were given first option on the sub-surface lines Infraco.

[33] Industrial Society, (2000), *The London Underground Public Private Partnership: an Independent Review*, The Industrial Society, London.

[34] Jean-Pierre Balladur 'The Contract between STIF and the RAPT: a new dynamic for the RATP' Public Transport International, issue 3/2002, pp 26-31.

Bibliographic References

Ball, J., (2001), *Vertical Separation and the Restructuring of EU Metros,* Dissertation for MSc Transport Planning and Management, University of Westminster, (unpublished).

Cheek, C., (2002), "Railways Recover at Taxpayers Expense, but Will the Funds Keep Flowing?", *Transit*, pp. 10-11.

Cowie, J., (2001), "Subsidy and Productivity in the Privatised British Passenger Railway", *paper presented at Seventh International Conference on Competition and Ownership in Land Passenger Transport*, Molde, Norway.

Department of Environment, (2000), *Transport and the Regions. Transport 2010: the Background Analysis,* TSO, London.

Industrial Society, (2000), *The London Underground Public Private Partnership: an Independent Review*, The Industrial Society, London.

Lange, B., (1998), *Rail Passenger Volume Growth in Great Britain*, Dissertation for MSc Transport Planning & Management, University of Westminster, (unpublished).

London Transport, (1998), *Forecasting London Transport's Demand and Revenue*, London Regional Transport, London.

Powell, T., (2001), *The Transport System: Markets, Modes and Policies*, PTRC, London.

Peterson, B., (1998), "Results from Procurement of Local and Regional Public Transport Services in the Stockholm region", *Public Transport International*, pp.16-19.

Shaw, J., (2001), *Competition, Regulation and Privatisation of British Rail*, Ashgate, UK.

TAS, (2001), Rail Finance Monitor 2001, UK.

Transport for London, (2000), *Transport Statistics for London 2000*, London, TfL.

White, P., (1998), "Impacts of Rail Privatisation in Britain", *Transport Reviews*, Vol 18, n° 2, pp 109-130.

White, P., (1999), "Outcomes of Rail Privatisation", *Selected Proceedings of the 8th World Conference on Transport Research*, Pergamon , Vol 4, pp. 569-581.

White, P., (2001), "Local Bus Industry and the Role of Longer-distance Services", in T., Grayling, (Ed.), *Any More Fares? Delivering Better Bus Services,* Institute of Public Policy Research (IPPR), London.

The Japanese Experience with Non-Verticalised Urban Private Railways: An Analysis of Strategy and Performance of the "Minor" Companies*

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1. Introduction

In Japanese urban transportation, privately owned and operated railway firms are common and play an important role, particularly in urbanized areas.

Although it is considered common knowledge that a majority of the firms are financially independent and own the rail infrastructure they operate on, how they can manage is still open to debate. The present paper focuses on how these private railway companies manage their businesses without lump-sum subsidies and whether there are lessons that may be transferable to other situations.

Previously, Killeen and Shoji[1], Shoji and Killeen[2] and Shoji (2001), analysed the 15 so-called "major" private railway operators in Japan. The paper concluded that it is and has been the innovative use of diversification strategies that has allowed the firms in Japan to build a stable ridership necessary to not only survive but to thrive.

Some researchers consider the success of the private railways in Japan to be idiosyncratic. This is usually attributable to extremely high traffic volumes due to favourable market conditions (densely populated cities with concentrated urban cores). This might be true in the case of the "major" operators, which provide service mainly in Japan's three large metropolitan areas. However, it should be pointed out that there are numerous private rail firms, which operate successfully even in less populated areas in Japan. The innovative use of diversification and integration strategies has helped enable these private firms provide adequate urban transport at virtually no cost to the government.

The main purpose of this paper is to clarify diversification strategy as utilized by the "minor" providers of urban transport. A brief overview of rail transport in Japan follows the introduction. The paper then details the performance of and diversification strategy utilized by 63 "minor" private rail companies operating in Japan. As in earlier studies, Rumelt's[3] methodology for classifying strategic behaviour is adapted and utilised to analyse the "in-house" (company-level) diversification strategy of the "minors". The paper then focuses the analysis on six firms over a period of twenty years.

The main finding of the research is that, although the "minors" face declining ridership and increased competition from the automobile, the more efficient firms are profitable. The paper concludes that the Japanese model exemplifies a possible scenario in which railway systems could be privately operated more effectively and efficiently.

2. A Brief Sketch of Rail Transport in Japan

Although, trends indicate an increase in auto use and ownership and stagnant or gradually declining rail ridership, rail transport maintains a reasonably high modal share of total trips in Japan. In 1996, on a country-wide basis, the rail modal share of motorized transport in terms of passengers was 27%. If only the large metropolitan areas are considered this figure increases to 48%[4].

There are 174 rail operators providing passenger and freight service in Japan. Of these, 88 private railway companies operate passenger rail service. 15 of these firms, usually referred to as "major" private rail companies, provide service mainly in Japan's three large metropolitan areas with the exception of Nishitesu. The remainder of the firms are called "minor" private rail companies. 67 of these firms provide rail passenger service outside metropolitan areas. In addition, 50 quasi-public firms provide passenger services. A break down according to ownership and type of service offered is detailed in Table 1[5].

TYPE OF SERVICE	OWNERSHIP	NUMBER OF FIRMS
PASSENGER	PRIVATE	88
	PUBLIC	14
	QUASI-PUBLIC	50
	JR	6
FREIGHT	JR	1
	PRIVATE	15
		174

Note: 1) cable car, ropeway and non-rail operators are not included.
2) quasi-public operations (Daisan Sekuta) include monorail and Shin-Kotsu (AGT) operators
Source - Ministry of Transport. *A look at Rail Transport in figures (Suji de miru Tetsudo)*, Transport Economics Research Center, 1997

Table 1: Number of rail operators in Japan by type

In general, the private rail providers receive almost no subsidies while providing the government with considerable corporate tax revenues. While all 15 of the "majors" are completely self-sufficient (no subsidization), the firms operating in less densely populated centres generally receive minimal subsidies. In principle, Japanese national government policy dictates a policy of self-sufficiency even for the "minors". Although there is some controversy regarding this point, most private firms operate strictly on a commercial basis. Thus, in principle, they are responsible for their own operating and infrastructure costs.

Moreover, in Japanese public transport provision the operators decide the level and type of services offered. Since self-sufficiency dictates strategic planning, all private rail operators have to consider market and demand trends seriously. Dependant on passengers for income, private railways have had to treat passengers as customers and provide extremely reliable, safe and convenient service. In addition, facing increased competition from automobiles, buses, as well as other railway firms, private firms had to constantly improve efficiency.

The rail boom, which occurred in numerous industrialised countries in the late 19th and early 20th century, was also a phenomenon in Japan. Most Japanese private railway firms began operations in the late 19th or the early 20th century and thus have long histories. Unlike the bankruptcies that plagued rail operators in other countries, however, many Japanese firms are still in operation today, although several rail firms have closed unprofitable lines (in most cases, replacing them with their own bus operations) and reduced freight services in response to competition from automobiles. The total route kilometres of "minor" private railways decreased from 2,842 km in 1965 to 2,147 km in 1985[6].

It is generally taken for granted that a large potential ridership must exist before construction of infrastructure for urban transport will even be contemplated. This is because the public sector, not the private sector funds these projects and there must be a visible need before a project is even considered to be politically viable. In Japan, however, the "Railway Nationalization Law", which went into effect in 1906, restricted the activities of private railway firms. By law, private firms were restricted to the creation of lines that in general did not compete with government lines. Private firms were thus compelled to serve areas with relatively limited populations. While private firms anticipated that rail operations could be self-supporting, limited population bases forced firms to 'generate' a steady ridership for rail operations. This led to the initiation of a business diversification strategy.

It is important to note that Japanese private railways have long been permitted to operate non-rail businesses. Rail business activities and non-rail business activities, however, are strictly separated by "Rail Accounting Regulations" (*Tetsudo Kaikei Kisoku*), which are set and enforced by the Ministry of Transportation. A railway firm is forbidden to allocate rail and non-rail costing at its own discretion. Regulations dictate how to allocate costs for common facilities and administration. Therefore, an intentional cross-subsidy strategy, whereby a rail company charges low fares at the expense of non-rail businesses and vice versa is unlawful and thus avoided.

Today, the private railway firms generally divide their operations into four divisions: a rail division, a transport division, a real estate division and an "other business" division. The rail division, in general, provides commuter services but some firms provide inter-city, resort access, airport access and freight service as well. The transport division provides such services as bus and taxi feeder links to rail lines, inter-city express bus service and tour bus operations. The real estate division mainly develops commercial and residential properties and/or leases these properties. The other business division's operations vary between each firm and include various retail ventures, restaurants and leisure facilities such as amusements parks, stadiums, and museums.

In addition to in-house diversification, private rail companies also form multi-company networks called "groups". In many cases, the flagship company of the "group" is the rail firm. The members of each "group" are linked by cross-ownership and other types of other financial ties, interlocking directorates, long-term business relationships and other social and historical links. Although many "group" companies remain fairly independent entities with somewhat "weak" links, the sum of "group" concerns allows firms to offer a full range of lifestyle service needs for the communities they serve.

3. An Overview of "Minor" Private Railway Firms

Of the 88 private railway firms, 15 are referred to as "major" private rail companies. Classification is conducted by the Ministry of Land and Transportation and at present includes firms with annual revenues of over approximately US $700 million. The remaining 73 firms provide rail services in the less densely populated cities of Japan, and are referred to as "minors".

The differences between "minor" firms in terms of scale and type of services offered are substantial. While several of the firms have more extensive networks than the smallest "majors", others have limited infrastructure. In terms of service provided, most firms offer either commuter service, inter-city links, access to tourist areas or some combination of the three. The total number of passengers carried also varies significantly. Shinkeisei, for example, transports an average of over 300,000 passengers daily, while Arita at the other end of the scale carries just 78. Therefore, firm differences are considerable. However, all firms do have one notable similarity, they are all active diversifiers.

While the "majors" receive limited or no subsidization, there are subsidies available to smaller private firms, especially those operating in rural areas. In 1985, total subsidies directed at "minor" private railways excluding JNR related firms was only 918 million yen. This represents only 1% of total revenue attributable to the "minor" rail firms. In 1995, subsidies directed at the small and medium including JNR reform related quasi-public firms, ex-JNR lines and other JNR reform related lines, totalled 3 billion yen (about US$25 million). This represents only 1.6% of total revenue of the small and medium railway firms in Japan. To put this figure into perspective, subsidies for British Columbia, Canada's transit system totalled US$230 million (about 27.6 billion yen) in 1994. Moreover, in 1997, the Ministry of Transport ceased one of the subsidization schemes for "minors" - 'subsidies covering a portion of operating deficits'. It should be noted that fare-reimbursement to the private railway

operators for discount fares (such as old aged pensioners) is uncommon in Japan.

While 73 firms are classified as "minors", 63 were considered for the purpose of this study. 5 firms, which own rail infrastructure only and do not offer passenger rail service directly (these firms typically lease rail infrastructure to other firms) and 3 recently incorporated firms were excluded from the study. Two other firms, Osaka-fu Toshi-Kaihatsu, which is generally referred to as "Senboku" and Kita-Osaka-Kyuko were also excluded. Both companies operate lines in the Osaka metropolitan area and their traffic density is well over 100,000 passenger-kilometres per day per route-kilometres. These two firms were excluded from the study because of the high-density markets in which they operate as well as because both these companies are quasi-private.

Table 2 classifies the "minor" private rail companies according to passenger density and profitability. As an index of profitability, the ratio of the revenue from rail operation to the cost of rail operation (including depreciation) is utilized. The table also indicates the profitability of the firms at an operational level. The results indicate that numerous companies are profitable which do not operate in high-density markets. Of the 63 firms under study, 29 firms are profitable in the rail division. In addition, 9 firms covered more than 95% of their rail division costs. Only 11 of the 21 firms with traffic densities of less than 2000 passenger-kilometres per route-kilometres per day were not able to cover 80% of 'operating expenses', including depreciation. Overall, when diversified operations are taken into account, 34 of the 63 firms were found to be profitable.

This is quite remarkable given the fact that passenger fare revenues do not cover operating expenses incurred on operating, maintaining, and administrating the rail operations in Europe and North America. In fact, the fare-box ratio (the ratio of fare revenues to operating expenses which normally exclude depreciation cost) does not exceed 80% in most cases[7]. Although firms which carried over 10,000 passenger-kilometres per route-kilometre per day, were almost all determined to be profitable, passenger density itself did not seem to have a crucial influence on the overall profitability if the passenger-kilometres density was more than 2,000.

DENSITY[1]	NUMBER OF COMPANIES	RAIL DIVISION PROFITABILITY				FIRMS WITH OVERALL OPERATING PROFITS	FIRMS WITH CURRENT PROFITS (after taxes)
		100% -	95 - 100%	80 – 95%	less than 80%		
more than 40,000	1	1	*0*	*0*	*0*	1	1
20,000 – 40,000	5	4	*1*	*0*	*0*	5	2
10,000 – 20,000	10	10	*0*	*0*	*0*	9	9
8,000 - 10.000	0	-	-	-	-	-	-
6,000 - 8,000	8	5	*0*	*3*	*0*	3	2
4,000 - 6,000	5	3	*1*	*1*	*0*	2	2
2,000 - 4000	13	5	*3*	*5*	*0*	6	4
0-2,000	21	1	*4*	*5*	*11*	8	5
TOTAL	63	29	*9*	*14*	*11*	34	25

Note: 1) density is defined as the average number of passenger-kilometers per route-kilometer per day.

2) two firms (Sanyo and Kobe Dentetsu) use 1994 data due to effects of the Great Kobe Earthquake.

3) there are seven companies that also provide rail freight services. But only three of them, their freight revenues exceeds passenger revenues; Chichibu (density was 6,300, rail profitability was 84%), Mizushima (4,300, 96%) and Sangi (3,000, 102%). Gakunan (1,400, 81%) has almost same weight of both services.

Table 2: Passenger density[4] and number of profitable firms (1995)

FIRM	Number of Firms	Diversification index[4]	Operating level profitability[1]	Revenue percentages			
				Rail Division	Transportation Division	Real Estate Division	Other Business Division
Majors	15	42.87	115	51%	11%	21%	17%
Minors	63	40.43[3]	101	38%	32%	13%	17%

Note: 1) operating level profitability is defined as operating profits divided by operating costs (including depreciation).

2) the numbers are simple averages of each category of companies

3) the weighted average of DI for Minors was 59.55.

4) DI = $(1-\sqrt{(\sum P_i^2)})*100$ where P_i is the percentage of revenues attributable to a discrete business.

Table 3: Revenue percentages of the majors and firms operating in smaller markets (1995)

Table 3 details the differences in the average revenues accrued by each division. An average total of 62% of revenues was earned in the case of the "minors" by diversified operations. While revenues earned by the real estate and other business divisions are, on average, similar to the "majors", the transportation division generaly plays a more important role for the "minors". Bus service is operated in many cases in lieu of rail service. In general, this type of bus service does not function in a complimentary role but rather in a trunk role because the smaller densities are more conducive to being supported by bus service.

4. Diversification Strategy of the "Minors"

Rumelt's[8] pioneering methodology for classifying firms based upon their diversification activities was utilized in the present research. This study simplified Rumelt's eight categories into five - including firms which are fundamentally specialised (single business), firms whose diversified businesses are on the whole vertically integrated with the main business (vertically integrated), firms which are diversified to an extent but whose operations largely hinge on the main business (dominant business), firms which have horizontally diversified into areas which are related in terms of the market technology to the main (related business), and firms which are widely diversified into area not exclusively related to their main business (unrelated business). It was also necessary to adapt the model to make it applicable to the transport industry because Rumelt's model was created for comparing firms conducting business in the manufacturing sector[9].

Due to the complexity of businesses within the individual divisions in each firm, it was necessary to determine the share of vertically integrated businesses, related businesses, and unrelated businesses within each division to sufficiently quantify the specialisation ratio, related ratio, and the vertical integration ratio[10]. While individual differences between firms were noticeable, averages were taken to standardise the classification technique. The Tetsudo Tokei Nenpo (Annual Report of Rail Statistics) published by the Ministry of Transportation was primarily used because it provided standardised data for all the firms in the study.

The rail division was considered to be the main business (largest single business). In the transport division bus and taxi feeder lines which link residential developments and other facilities to the rail lines can be classified as being vertically integrated businesses because of the complementary nature of their operations. Long distance bus service and tourist buses (which have duplicate functions), however, are more likely to

be related in nature. Some firms have unrelated businesses in their respective transport divisions including toll roads, trucks, etc. In some cases, the transportation division or part of its operations might more appropriately be classified as the main business. For purposes of consistency, however, the assumption that rail is the main business was maintained, as per the analysis of the "majors".

The real estate division also has a wide variety of businesses. Vertical businesses include those formed primarily to increase ridership. Utilization of acquired "core competencies" obtained from developments located close to rail infrastructure to develop land in other markets is better classified as related business[11]. The location of the business in question was used as a primary indication of relatedness. The "other business" division is made up of a variety of businesses some of which are related, some are unrelated and some are vertically integrated.

Using the adapted model, the firms were classified according to strategic type for the fiscal year 1995. The results indicated that 8 firms were single business, 3 were vertically integrated, 6 were dominant, 6 were related and 40 were found to be classified as unrelated. Thus, a large number of firms were found to be following an unrelated business strategy. On the other hand, more majors tended to utilise a related business strategy.

When we consider the profitability of each division, the low profitability of the rail division and the losses accrued by transportation division became apparent. Total profitability was calculated by dividing total rail division revenues by total operating expenses, including depreciation. The total profitability of the transport division was 103% while the average profitability (the average of the 63 companies) of the rail division was only 96%. Total profitability of the transport division was 93% while the average profitability of transport division was only 62%. On the other hand, in the real estate division total profitability was 131%, while average profitability was 123%.

Although drawn from only one year of data, the results indicated that the success of the "majors" has been duplicated by numerous firms operating in less densely populated cities. Even some firms with extremely small passenger densities are able to remain profitable.

There are three major factors most likely to determine the success or failure of these firms. The first factor is whether the firms are able to increase the demand for their rail services. The attraction especially of non-pass holders is of vital importance to the survival of the firms, as a majority of this type of commuting is done by automobile. Thus, private firms operating in smaller markets strive to increase rail use by attracting shoppers and tourists to its services. This traffic also contributes to levelling off discrepancies between passenger volumes during peak and off-peak periods (and directions).

Another important factor is increasing the efficiency of rail operations. This is achieved through the initiation of unmanned stations, out-sourcing of rolling stock repairs as well as by the rationalization of staff and management. In addition to the above cost cutting measures firms have also worked to improve the safety and efficiency of rail operations, as perceived by the customer, through increases in the frequency of service.

The third factor is the important role of diversification. Limitations on the profitability of the rail division have forced firms to look for new sources of revenue. The most successful firms are those able to increase demand for rail services and/or the frequency of use of non-pass holders, largely accomplished through the initiation of diversified operations. Thus the internalisation of externalities brought about by creation of rail infrastructure leads to profitability, which makes it easier for the company to improve services.

5. Diversification Strategy of Selected Firms

The next step in the analysis was to focus on 6 firms over a 20-year period to get a better idea of the nature of their operations. The sample was chosen on the premise that passenger densities should be similar to or less than those in a "typical city" in other countries. The 6 firms under study (with their 1995 passenger densities in brackets) included Sanyo (32,500), Kobe Dentesu (Shintetsu, 29,400), Nose (39,100), Hiroden (18,500)), Kotoden (6,600) and lyo Tetsu (6,200)[12]. Table 4 provides an overview of the firms and exemplifies the varied nature of their operations in terms of scale of the rail network, in addition to the high percentage of diversified operations earnings.

COMPANY NAME	YEAR[1] ESTABLISHED	NETWORK SIZE (PASSENGER KM)	NUMBER OF RAIL EMPLOYEES	ANNUAL PASSENGERS x THOUSAND	AVERAGE PASSENGER-KMS PER KM PER DAY	REVENUE FROM RAIL OPERATIONS	REVENUE FROM DIVERSIFIED OPERATIONS	OPERATING LEVEL PROFITABILITY
SHINTETSU	1926	69.6	768	62,500	29,400	69%	31%	119%
SANYO	1933	70.4	1,013	79,800	32,500	71%	29%	110%
NOSE	1908	15.4	188	32,800	39,100	52%	48%	111%
HIRODEN	1942	34.9	237	65,600	18,500	28%	72%	104%
KOTODEN	1943	60.0	340	16,500	6,600	83%	17%	103%
IYO TETSU	1942	43.5	356	21,900	6,200	29%	71%	114%
AVERAGE	1932	49.0	484	49,800	22,100	55%	45%	110%

Note: 1) all companies except Nose have their predecessors. For example, Sanyo's predecessor (Hyogo Denki) was established in 1906 and began rail service in 1910. Hiroden's first section opened in 1912 and by 1925 most lines began services. Kotoden started up rail operations in 1912 and most sections opened by 1927.

2) number of rail employees includes directors.

Source: Ministry of Transport, (1995), *Annual Rail Statistics, (Tetsudo Tokei Nenpo)*.

Table4: Comparison of selected local urban transit providers in Japan (FY1995)

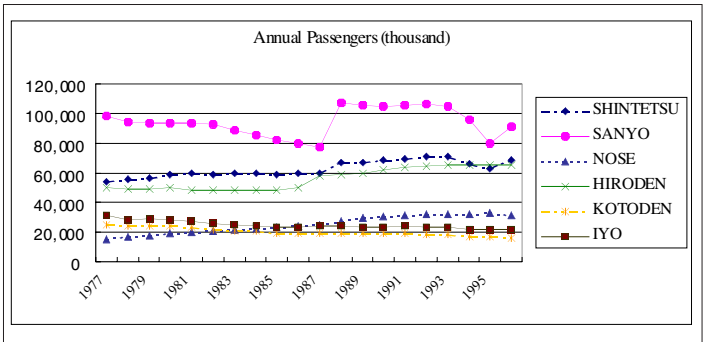


Figure 1: Annual ridership of selected minors in Japan (1977-1996 average)

Figure 1 shows the trends in annual ridership for the six companies from fiscal year 1977 to 1996. While Kotoden and lyo face decreasing ridership, which mirrors the situation in many less populated centres, Shintetsu, Nose and Hiroden

have managed to increase ridership steadily over the course of the data set. Sanyo's ridership has experienced considerable fluctuation, though this is part due to exogenous factors such as the Great Kobe Earthquake and a change of the definition of 'passengers' under "The Railway Enterprise Law"[13].

Table 5 shows the breakdown of revenue percentages accrued by the respective divisions of each company. The diversification strategy type and diversification index of each firm is also detailed. Shintetsu and Sanyo's operations indicate a focus on rail operations. Shintetsu earned an average 62% of total revenues from rail operations over the period of study, while Sanyo earned 75%.

Like other private railways in Japan, the six companies under study have a long history of diversification. At Sanyo, the inauguration of bus service was in 1936. This was followed by tourist bus services in 1940 and express service in 1990. Sanyo's predecessor (Hyogo Denki) initiated diversified operations, including facilities to attract rail patronage at the time of its incorporation in 1910. Other diversified operations followed in 1918, including power generation and supply, housing development, and amusement parks. In 1925, the revenue percentage earned by the rail division was 63%, while power generation and supply earned 36% of revenues and real estate only 1%[14].

Hiroden earns a majority of its revenues from its transportation division (61%). This is largely due to the urban structure of Hiroshima, which is more conducive to bus operations. While the rail division is mainly focused on commuter services, it is unique in the success of its tram operations. Acquisitions and mergers play a large role in Hiroden's diversification strategy. A merger in 1938 led to the inauguration of general bus service followed by the acquisition of a tourist bus company in 1956. In 1960, the first retail store was opened followed by the inauguration of real estate development the following year. The transportation division was expanded with the start of express bus service in 1984 followed by limousine bus service in 1993.

Both Kotoden and Iyo operate in similar sized and structured markets in cities with populations of less than a half million people. While Kotoden has remained rail focussed (62%); Iyo is an extensively diversified organization. It operates heavy rail lines in addition to trams, actively develops real estate, and operates a large transportation division. In addition to numerous travel agencies, Iyo operates airfreight service and a store at Matsuyama's airport. Iyo became actively involved in diversified operations when faced with declining ridership from 1965. Much, like Hiroden, Iyo attracts a large number of non-pass holders (72% to Kotoden's 42% in 1996) partly because of the presence of famous sightseeing spots in the area where Iyo operates.

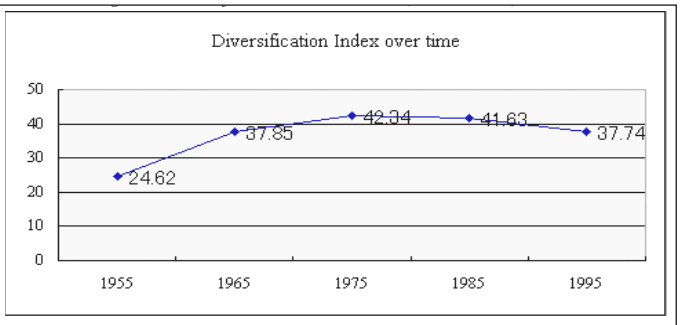
The analysis determined that Shintetsu and Nose followed related type diversification strategies due to the high importance of real estate development. In fact, Shintetsu and Nose are located in areas that have developed rapidly, especially during the 70s and 80s. Diversified operations thus focus on the development of housing properties. Sanyo and Kotoden were found to be vertically integrated, due to the significant role of the transportation division. Iyo and Hiroden were classified as unrelated although a vertically integrated strategy classification is probably more appropriate for Hiroden because it may be possible to classify the bus service as the main business. Revenue percentages earned by the four respective divisions clearly represent differences between firms.

FIRM	Strategy	DI	Revenue percentages			
			Rail Division	Transportation Division	Real Estate Division	Other Business Division
SHINTETSU	R	35.63	62%	3%	21%	14%
SANYO	VI	24.06	75%	15%	9%	1%
NOSE	R	40.67	49%	-	50%	1%
HIRODEN	U	51.00	24%	61%	15%	0%
KOTODEN	VI	34.70	62%	27%	0%	11%
IYO	U	57.92	27%	42%	22%	9%
AVE.	_	**40.66**	**50%**	**25%**	**20%**	**6%**

Note: 1) operating level profitability is defined as operating profits divided by operating costs.
2) VI = vertically integrated business, R = related business, U = unrelated business

Table 5: Breakdown of revenue percentages by division (1977-1996 average)

While diversified operations increased over the course of the data period there was a recent trend towards refocusing operations, indicated by a fall in the diversification index over the past 10 years.



Note: diversification index values are averages of six companies for the year in question

Figure 2: Diversification index over time (1955 to 1995)

Table 6 shows average profitability of the selected firms at both operating and current levels for each respective division.

Firm name	Strategy	DI	Operating level profitability					Percentage of total profits				Current level profits		
			Overall	Rail Division	Transportation Division	Real Estate Division	Other Business Division	Rail Division	Transportation Division	Real Estate Division	Other Business Division	Gross profits (thousand yen)	Current level profits operating level revenue	Years with Current level losses
SHINTETSU	R	35.63	118	119	87	141	97	66	-3	40	-3	260,767	2%	3
SANYO	VI	24.06	112	110	107	149	74	65	9	29	-3	608,751	3%	1
NOSE	R	40.67	121	119	-	124	98	45	-	55	0	191,560	3%	1
HIRODEN	U	51.00	104	111	97	131	-	63	-54	91	-	443,815	2%	2
KOTODEN	VI	34.70	101	98	89	-	190	-225	-549	-	874	8,799	0%	9
IYO	U	57.92	109	103	95	173	111	9	-26	106	11	1,137,194	8%	0
AVE.	_	**40.66**	**111**	**110**	**95**	**144**	**114**	**4**	**-104**	**54**	**147**	**441,814**	**3%**	**3**
AVE. (Note 4)	_	41.86	113	112	97	144	95	50	-15	64	1	528,417	4%	1

Note: 1) operating level profitability is defined as operating profits divided by operating costs.
2) percentage of total profits is defined as division operating profits divided by total operating profits.
3) current level profits take into account non-operating revenues and costs (including interest on debt).
4) Kotoden's result is not included in this average.

Table 6: Profitability of the local firms at both operating and current levels (1976 to 1995)

While all of the six firms were profitable, there were numerous differences. The rail divisions of both Iyo and Kotoden, as expected, were less profitable than their counterparts operating in more densely populated areas. In addition, much like the "majors", the real estate division was responsible for a large proportion of profits while the transportation and other business divisions suffered losses or were slightly profitable. In the case of Kotoden, profits from real estate endeavours were included with other business profits influencing that figure.

At current levels, which include interest on debt payment, all firms were found to be profitable over the course of the study except for Kotoden, which broke-even. The most conspicuous result is the success of Iyo, which is in large part due to its efficient use of diversification strategy. Kotoden, which operates in a comparable market, suffered losses in almost half of the years of the study. Due to a lack of support from weak local governments, property owned by the firm was usually sold to cover losses, a procedure that cannot continue for any lengthy period of time.

Many studies have indicated that firms which diversify into fields relating to their main business tend to be more profitable than firms which expand into unrelated activities (Rumelt (1982), Itami (1982)). The results from this research are consistent with this conclusion, although the number of sample firms is limited. This corresponds with the result obtained in the case of "majors" (Killeen and Shoji[15], Shoji and Killeen[16] (2001)), although further research is necessary to determine the cause of this result.

Due to decreasing ridership and the continuing recession, the firms under study are coping in different ways. Shintetsu and Nose are fortunate in the sense that they are located in higher growth areas. Shintetsu's present focus is on improving the speed of rail services in addition to the development of its real estate properties. Hiroshima has managed to greatly increase the number of non-pass holders, which accounts for almost 80% of total ridership. This figure is considerably greater than in the case of other firms. Sanyo, which suffered heavy damage in the Great Kobe Earthquake, has since rebuilt its infrastructure and is striving to improve rail service, although Sanyo faces severe competition from JR-West. Sanyo has also strived to improve the efficiency of its transportation division and the recent rationalization of tourist bus operations was one such step. Iyo is constantly modernizing and striving to streamline operations. One such effort was divesture of its of taxi service in 1976. In addition, Iyo is planning a major urban redevelopment at its main station.

6. Conclusions

Diversification strategy plays an important role for the many private firms operating in the less densely populated centres in Japan, even though these firms vary greatly in terms of scale, type of services offered and profitability. Faced with decreasing ridership, increased competition from the automobile, and nominal subsidies from the governments, the minors have not only had to strive to improve the efficiency of rail operations but also generate other sources of revenues.

The idea is not new. Metropolitan Railway in England and Canadian Pacific in Canada followed similar development patterns. While Canadian Pacific originally received huge subsidies and land grants to complete its network, the Japanese counterparts were not so fortunate and had to contrive imaginative methods of attracting ridership and internalising the benefits accrued by their infrastructure development.

The results of the study found that 34 out of the 63 minors were profitable at an operating level in 1995. Passenger densities did not to seem to have a crucial influence on the results in the case of firms operating in markets with more than 2000 passenger-kilometres per route-kilometre per day. The six representative firms, which were considered over a twenty-year period, exemplified the uniqueness of each firm's strategy. The results in terms of related-type firms tending to be more profitable, that diversification increases with time and that the rail and real estate divisions were responsible for a majority of profits, however, were consistent with the result of the analysis of the "majors" conducted in previous studies.

Private rail firms have benefited in Japan because they have been allowed to thrive on competitive principles. Private initiative allows the development of long-term strategies (in which diversification plays a crucial role), that are not possible under political cycles. The diversification indicated here is not random, but rather maintains the strict goal of increasing rail ridership. This focused, methodical, long-term strategic concept has given the transport providers a reliable base of ridership.

Moreover, because Japanese private railways are non-verticalised and have to pay for their own operating and infrastructure cost, it is beneficial to have a long-term commitment to the community they serve. Thus, private rail firms have taken initiatives in prompting systematic regional development in and around the areas their networks serve, and have developed in close harmony with trackside communities to the mutual benefit of both. It should be noted that diversification contributes in such a way that companies can more easily develop a market-oriented outlook based on its experience from operating in a non-rail competitive business environment.

The Japanese example provides us with a role model that may lead to increased private initiative into the provision of public transport services, including rail transportation[17]. The success of the private rail companies in Japan, "major" and "minor" alike, indicates that the Japanese example may be duplicable in other settings. How the Japanese example can be applied to other countries is an important point for further research.

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NOTES

[1] Killeen, B.J., and K., Shoji, (1997), "Diversification Strategy and Urban Transportation: The Case of Japan", paper presented at *the Fifth Conference on Competition and Ownership in Land Passenger Transportation,* Leeds, U.K., May.

[2] Shoji, K., and B.J., Killeen, (2001), An Appraisal of Diversification Strategy as Utilized by Major Private Railway Firms in Japan, (Ote-Shitesu no Takakuka-Senryaku ni kansuru Ichi-Kousatsu), *Koutsugaku Kenkyu 2000*, March, pp, 185-194, (in Japanese).

[3] Rumelt, R., (1974), *Strategy, Structure and Economic Performance,* Harvard Business School.

[4] In 1990, these numbers increased to 28% and 51% respectively. In 1980, the modal split of rail transit in Japan was 35% and 53% in metropolitan areas. In 1970, the percentages were 40% and 55%.

[5] Strictly speaking, these "minors" include several private-public mixed (quasi-public) companies.

There are several definitions of "minors". According to "Annual Railway Statistics", the Ministry of Transport utilizes six categories for passenger rail operators (which exclude tram, mono-rail and automated-guided-transit operators); JR (6), "Majors" (15), Eidan (1), Jun-Ote ("Junior Majors")(6), "Local Minors" (98) and Municipals (12). Jun-Ote provides services in and/or on the outskirts of metropolises but not to the extent of the "majors". Three of those firms are quasi- private (50% or less of the shares are owned by the public sector). "Local Minors" include ex-JNR '3rd Sector Railway' (quasi public) (38) but exclude operators (6) that built and own rail infrastructure but not run the any trains by their own.

[6] Because of the "Japan National Railway Reform" laws, it is hard to compare the statistics after this year.

[7] This definition normally excludes depreciation, interest payments and renewal provisions, and concession payments. Depreciation, however, is included in the Japanese case. For the statistics of several cities, please refer to House of Commons, (1983), "Fifth Report from the Transport Committee", Session 1981-82*, Transport in London,* Vol.1, (ordered by HoC to be printed July 1982), HMSO, 127, 1, table III, p.xlvi, and Pucher, J., and C., Lefevre, (1996), T*he Urban Transport Crisis in Europe and North America*, Macmillan Press, table 2.8 and 2.9, pp.33-34.

[8] Rumelt, R., (1974), *Strategy, Structure and Economic Performance,* Harvard Business School.

[9] Because businesses in the service sector were analyzed, "vertically integrated operations" are defined as those including operations located in the vicinity of rail lines whose main function is to help increase rail ridership. Related operations for the large part capitalize on know-how and experience acquired over the years and location is of less importance. Unrelated operations are usually located at a distance from rail infrastructure and have little link or relation with the main business.

[10] The specialisation ratio (SR) is the proportion of a firm's revenues that can be attributed to its largest single business in a year. The related ratio (RR) is the proportion of a firm's revenues that can be attributed to its largest group of related businesses. Businesses are considered to be related when a common skill, resource, market, or purpose is applicable to each business. The vertical integration ratio (VR) is the proportion of a firm's revenue that arises from all by-products, intermediate products and end products of a vertically integrated sequence of processing activities.

[11] Historically, residential sites were developed in the vicinity of rail not only to increase demand for rail service but also to capture externalities. However, some real-estate development now takes place in areas located a considerable distance from rail. These endeavours more likely utilize the know-how and experience acquired from years in development and are more likely related type business. One of the objectives of leasing property at stations and developing real estate development nearby is to increase ridership and thus these types of businesses are vertical integrated in nature.

[12] Their average passenger volume per day per route-kilometres were Sanyo (3717), Shintesu (2729), Nose (5839), Hiroden (5149)), Kotoden (756) and lyo Dentetsu (1380).

[13] Since 1988, the statistics for annual passengers carried by Sanyo and Shintetsu include passengers carried on Kobe-Kosoku lines. This came to effect in 1987 with the initiation of "The Railway Enterprise Law". In 1988, 29 million Sanyo passengers utilized the Kobe-Kosoku line (27% of total passengers). In the case of Shintetsu the total was 5 million (8% of total passengers of Shintetsu). In addition, as a result of the Great Kobe Earthquake, which struck at 5:46 a.m. on January 17, 1995, Sanyo and Shintesu's infrastructure suffered severe damage. Five months later, Sanyo restored its rail operation on June 18th and Shintetsu on the22th.

[14] Power generation and supply (lights and electricity) historically was one of the major diversified businesses of many private railway firms in Japan. In fact, there were several companies, which were owned by electricity companies, such as Sanyo. In 1942, however, electricity was nationalized. Thus, private railways had to give up this business. This is why Hiroden, Kotoden and Iyo were established during same period.

[15] Killeen, B.J., and K., Shoji, (1997), "Diversification Strategy and Urban Transportation: The Case of Japan", paper presented at *the Fifth Conference on Competition and Ownership in Land Passenger Transportation,* Leeds, U.K., May.

[16] Shoji, K., and B.J., Killeen, (2001), An Appraisal of Diversification Strategy as Utilized by Major Private Railway Firms in Japan, (Ote-Shitesu no Takakuka-Senryaku ni kansuru Ichi-Kousatsu), *Koutsugaku Kenkyu 2000*, March, pp, 185-194, (in Japanese).

[17] These firms have been fortunate because their stockholders have not been shortsighted. However, private ownership and a non-verticalised structure does not guarantee long-term success. There are numerous issues, which need to be considered. In fact, in 2001 Kotoden ran into difficulties because their diversified retail business was beset by the bankruptcy of one of Japan's large department store chains (Sogou).

BIBLIOGRAPHIC REFERENCES

House of Commons, (1983), "Fifth Report from the Transport Committee", Session 1981-82*, Transport in London,* Vol.1, (ordered by HoC to be printed July 1982), HMSO, 127, 1.

KILLEEN, B.J., AND K., SHOJI, (1997), "Diversification Strategy and Urban Transportation: The Case of Japan", paper presented at *the Fifth Conference on Competition and Ownership in Land Passenger Transportation,* Leeds, U.K., May.

MIZUTANI, F., AND K., SHOJI, (1997), "A Comparative Analysis of Financial Performance: U.S. and Japanese Urban Railways", *International Journal of Transport Economics,* Vol. 24, n° 2, pp. 207-239, June.

Ministry of Transport, (1997), *A Look at Rail Transport in Figures,* (Suji de miru Tetsudo), Transport Economics Research Center.

Ministry of Transport, (1995), *Annual Rail Statistics, (Tetsudo Tokei Nenpo).*

PUCHER, J., AND C., LEFEVRE, (1996), T*he Urban Transport Crisis in Europe and North America*, Macmillan Press.

RUMELT, R., (1974), *Strategy, Structure and Economic Performance,* Harvard Business School.

SHOJI, K., (1993), "The Japanese Experience with Urban Private Rail Companies: Idiosyncratic or Exemplary?", In *The Selected Proceedings of the 2nd International Conference on Privatization and Deregulation in Passenger Transportation*, (Tampere, Finland, June 1991), Auranen, February, pp 295-309.

SHOJI, K., (2001) "Lessons from Japanese Experiences of Roles of Public and Private Sectors in Urban Transport", *Japan Railway and Transport Review*, Vol. 29, pp.12-18.

SHOJI, K., (2001) *Urban Public Transport Policy* (*Toshi Koukyou Kotsu Seisaku*), Chikura co., (in Japanese), Tokyo.

SHOJI, K., AND B.J., KILLEEN, (2001), An Appraisal of Diversification Strategy as Utilized by Major Private Railway Firms in Japan, (Ote-Shitesu no Takakuka-Senryaku ni kansuru Ichi-Kousatsu), *Koutsugaku Kenkyu 2000*, March, pp, 185-194, (in Japanese).

The Production Economics of a Vertically Separated Railway – The case of the British Train Operating Companies

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1. Introduction

This paper focuses on the production economics issues surrounding the vertical separation of infrastructure from rail services with regard to passenger operations. A case study of the British passenger railway privatisation is used. The issues therefore are not solely restricted to a vertical separation but also a horizontal division between different aspects of rail operation.

As is well-documented elsewhere, within a European context Britain is neither unique nor revolutionary in dividing its rail system vertically, with such divisions first occurring in Sweden in the late 1980s and subsequently followed by Norway, Denmark, France (partial) and the Netherlands. The British approach to rail reform however is unique in three other aspects. Firstly, the extent of horizontal separation of the former state owned railway, with the former monolithic state enterprise being divided into 104 individual autonomous units. This division was not solely by type of operation, but further divisions were made within these types of activities e.g. three rolling stock companies, 25 passenger franchises, (originally) five freight companies, 14 infrastructure service units etc. Secondly, with only five years between the government white paper[1] and full implementation of the revised structure, the time-frame over which these structural changes were implemented was very short. Thirdly, the extent of the involvement of the private enterprise in these reforms, with 96 of the autonomous units highlighted above transferred to the private sector[2]. To contrast this approach to reform with Sweden, services (both passenger and freight) were integrated into the state operator Statens Järnvägar, whilst the infrastructure with the exception of the Inlandsbanen was transferred to Banverket. The former 'combined' national operator was thus vertically separated into two new companies, infrastructure and services. Importantly, the service operator was transferred as a whole into the new (publicly owned) operator[3]. Some horizontal division did occur through competitive tender of regional routes, where several private sector companies were successful in the bidding process. In other European examples however, reform of the state operator has taken the form of divisions by type of operation. For example, in Germany the former state company has been split into five stand alone subsidiaries, which roughly equate to intercity, regional, freight, infrastructure and stations. All are currently owned however by Deutsche Bahn and the railway remains vertically integrated.

The division of the state owned British Rail is fully covered elsewhere[4]. Consequently, this paper is an empirical investigation of railway structures arising out of Britain's radical reforms of the passenger railway. Specifically, issues such as economies of scale with respect to passenger train service provision, the substitutability of inputs through factor markets, and the productivity and efficiency of train service provision are examined. The following sections give a review of the literature relating to economies of scale, elasticity of the factors of production and efficiency with regard to railway economics. An overview of the British train operating companies (TOCs) is given before a translog cost function is estimated using data from the first five years of operation of these TOCs. From this function estimates are derived for economies of scale, factor elasticities of demand and efficiencies. Conclusions are then drawn and policy prescriptions from the British experience given.

2. Economies of Scale, Efficiency and Productivity

Preston[5] identifies two schools of thought with regard to railway economics that have considerable consequences on the vertical (and indeed horizontal) separation of the railway. The first is the long-held view that both infrastructure and services are indivisible components that constitute a natural monopoly, and hence returns to scale are significant and inexhaustible given the market size. An alternative is that returns to scale and natural monopoly effects are solely associated with the infrastructure and not in the operation of services[6]. Preston[7] terms the former the traditional view and the latter the revisionist view. Following revisionist logic, any restructuring of the industry should not be based around the necessity to maintain the infrastructure and services under the control of the same organisation. Furthermore, any horizontal separation of the services component of the railway into individual units is unimportant as the implications are that such companies will exhibit little, if any, economies of scale. This was the view that eventually emerged from the short British public debate over reform of the railways. Many issues of course remain, such as the suitability of on-line competition, length of franchise under such a system, regulation of the industry etc. but these are outside the scope of this paper and are covered elsewhere[8].

Empirical studies on the topic of economies of scale within rail operations in a contemporary European context are few, and no studies have been undertaken on train service companies. Preston[9] examined fifteen western European railways using data over a twenty-year period, 1971 to 1990. Using three outputs, train-kilometres, route length and percentage of freight train-kilometres, and three input prices, labour, energy and materials, he found evidence of the classic u shaped cost curve, with increasing economies of scale for smaller railways and diseconomies of scale for larger operators. Furthermore, most railways were found to exhibit increasing returns to density, a concept that relates to the use of the network; increasing returns would suggest that, based on a European average, most railway infrastructure was found to be under-utilised. At the minimum efficiency scale (optimal production level), in terms of train-kilometre output, SNCB (the Belgian state operator) was found to be nearest the optimal level of train-kilometre production and

network size. Shires and Preston[10], in an expanded study to include data up to 1994 and two other European railways, found the Swiss state operator, CFF, to be nearest the optimal train-kilometre and network size levels. Interestingly, the inclusion of four later years may have slightly increased (by around 10%) the estimated MES point.

Cantos Sanchez[11] in a study of twelve European state railways over an eighteen year period between 1973 and 1990 found similar results with regard to train-kilometre production, however all railways were reported to display considerable economies of density. The results also showed evidence of substitutability between track infrastructure and passenger operations but complementarity between track infrastructure and freight operations. In other words, higher track costs result in lower passenger operation costs, but lower freight costs result in higher track infrastructure costs. This would strongly indicate no economies of scope between freight and passenger operations, a similar finding to Preston[12]. Any horizontal separation, therefore, does not need to organise passenger and freight services within the same company.

Whilst based upon a very much smaller scale of operator, Filippini and Maggi[13] and Cowie[14] both found existence of increasing returns to scale for the Swiss private railway industry, thus further confirming that scale effects within integrated railway operations are significant. There would appear therefore to be strong empirical support for economies of scale within integrated operations. If, however, scale effects are estimated for purely train service companies and found to be constant, it may be implied from the literature that economies of scale are solely related to the infrastructure. This would in part empirically underpin the revisionist view, which suggests that all (in this case passenger) railways should be vertically separated. Economic theory would further propose a horizontal separation to maximize economic welfare benefits through the contestability of markets. This would relate to both productive (lower costs) and distributional (lower prices) effects.

With regard to elasticities of substitution, again little empirical evidence exists. McGeehan[15] in a study of the Irish state operator Córas Iompair Éireann over the period 1973 to 1983 found a small degree of substitutability between labour, equipment and fuel. Similarly, elasticities of substitution derived using the modeled cost share values (equations [3a] and [3b] below) from Filippini and Maggi's[16] translog cost function for the Swiss Railway industry suggested a small degree of substitutability between all three of the inputs specified within the function, labour, energy, and capital. Elasticities derived in a similar fashion from Cantos Sanchez's[17] model produced estimates consistent with substitutability between labour and energy and labour and material, but complementarity between energy and materials.

What is important in this context is that if a high degree of complementarity between inputs is found, this may suggest that theoretically these should be under the control of a single organization. For example, if rolling stock and infrastructure were found to be complementary, this would be an argument for an integrated, rather than a vertically separated, railway[18]. If however these two inputs were found to be substitutes, then this may be an argument for a vertically separated railway, as such a division would theoretically create competition between factor markets[19]. The organizational structures of state railways however have not allowed such an analysis to be performed, as, using McGeehan[20] as an example, it would make no logical sense to split a railway horizontally into labour, equipment and fuel companies. Nevertheless, previous literature is useful in informing the current study.

With regard to studies on efficiency/productivity, a plethora of literature exists on the assessment of performance of European state railways. These have employed a number of different estimation methods, ranging from total factor productivity measures based upon index numbers and data envelopment analysis efficiencies[21], to technical efficiencies based upon econometric estimation of a stochastic production frontier[22]. Oum et. al.[23] provide a comprehensive review of these studies. In brief, the state railways of Sweden and the Netherlands have tended to perform strongly, whilst the performance of the nationalised British Rail has tended to be variable, strong in some studies[24] but poor in others[25]. In relation to the performance of the British industry since reform, Cowie[26] estimated productivity gains of around 3-4% for the 25 train operating companies over the first three years of 'privatised' running, whilst Preston[27] estimated a similar value based upon productivity of the network.

3. The British Passenger Rail Industry

The British passenger railway was formally privatised between 1996 and 1997, with the first franchise awarded to National Express, who took over the running of the Gatwick Express from 6th April 1996. The last franchise to be let was the problematic (then as now) West Coast mainline, which was taken over by Virgin Rail on 31st March 1997. Consequently, the whole franchising process was completed in just under a year. From 1996 onward however, all TOCs were at least in shadow running, therefore this can be taken as the first accurate year for which reliable data exists on the separation of the former state owned company. Industry statistics for the period 1996 to 2000 are given in Table 1.

		1996	1997	1998	1999	2000	Diff
Train Kilometres (000s)	Total	368.38	382.60	398.83	417.09	429.24	60.86
	Maximum	32.99	34.60	35.04	35.04	37.60	4.61
	Minimum	0.32	0.28	0.27	0.29	0.30	-0.02
	Mean	14.74	15.30	15.95	16.68	17.17	2.43
	St Dev	9.87	10.30	10.57	10.43	10.93	1.06
Journeys (000)	Total	776.40	831.19	874.40	936.50	960.40	184.00
	Maximum	113.40	118.20	122.90	131.90	142.40	29.00
	Minimum	0.70	0.71	0.70	0.70	0.80	0.10
	Mean	31.06	33.25	34.98	37.46	38.42	7.36
	St Dev	30.58	32.21	33.67	36.04	37.75	7.17
Passenger Kilometres (m)	Total	31.96	34.34	35.76	38.26	38.69	6.73
	Maximum	3.35	3.57	3.67	3.93	4.14	0.79
	Minimum	0.01	0.00	0.01	0.01	0.01	0.00
	Mean	1.28	1.37	1.43	1.53	1.55	0.27
	St Dev	0.98	1.05	1.06	1.14	1.15	0.17
Networks (km)	Total[1]	24289	24289	24841	24860	25257	967.80
	Maximum	3016	3016	3016	3016	3016	0.00
	Minimum	14	14	14	14	14	0.00
	Mean	972	972	994	994	1010	38.71
	St Dev	906	906	930	933	933	27.17

Note: 1. Not to be confused with the total size of the British passenger rail route kilometre. As an example, total route kilometre was 16,666km in 1998, therefore there was some 8175 route kilometres contained within two or more franchise areas.

Table 1: British Passenger Railway, 1996-2000

Train-kilometres relate broadly to the supply of rail services[28], and, in part, the level of output contracted by the SRA under the franchise agreements, whilst journeys and passenger kilometres refer to public demand. As can be seen from Table 1, the period under review has been a time of expansion, with train-kilometres in total increasing by some 16% over the period, passenger numbers by 21% and passenger kilometres by over 23%. The table also reveals considerable variation in terms of size of operators within the British industry. For example, the largest TOC in 2000 (South West Trains) operated over fourteen times the number of train-kilometres, carried over thirty times the number of passengers and twenty times the number of passenger kilometres than the second smallest operator (the Gatwick Express)[29].

To put the British privatised industry roughly into the context of the literature, the largest network operator, Scotrail, with just over 3000 km, would be around 80% of the size of the estimated optimum. In terms of train-kilometres, South West Trains, with an output level of 37.6m, would be about a third of the output of the estimated optimum. It would appear therefore that based upon estimates calculated from integrated railways, all British TOCs are too small in size to take full advantage of scale effects. British TOCs however are purely train service companies that own very few assets (track access is purchased and rolling stock is leased), and thus may exhibit quite different production economic characteristics with regard to company size.

4. Methodology

The method used is the commonly applied translog cost function, and is fully detailed in Greene[30], hence only a brief synopsis is given. The general form of the translog cost function for a single output and j = k inputs to be estimated is of the form:

$$\ln C_i = A + \alpha \ln Q_i + \sum_{j=1}^{J} \beta_j \ln P_{ij} + 1/2\delta(\ln Q_i)^2 + 1/2 \sum_{j=1}^{J} \gamma_{jj}(\ln P_{ij})^2 + \sum_{j=1}^{J} \sum_{k=1}^{J} \gamma_{jk} \ln P_{ij} \ln P_{ik} + \sum_{j=1}^{J} \rho_j \ln P_{ij} \ln Q_i + e_i; \; j \neq k \qquad [1a]$$

Where: C_i = total cost for firm i
Q_i = output of firm i
P_{ij} = cost of input j for firm i

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:

$$\beta_1 + \beta_2 + \ldots + \beta_j = 1, \; \sum_{j=1}^{J} \gamma_{jk} = \sum_{k=1}^{J} \gamma_{kj} = 0, \quad \sum_{j=1}^{J} \rho_j = 0 \qquad [1b]$$

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:

$$S_j = \frac{\partial \ln C_i}{\partial \ln P_j} = \beta_j + \sum_{j=1}^{J} \gamma_{jj} \ln P_j + \sum_{j=1}^{J} \sum_{k=1}^{J} \gamma_{jk} \ln P_{ik} + \sum_{j=1}^{J} \rho_j \ln Qi \qquad [1c]$$

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. Imposition of the restrictions listed under [1b] ensures that the cost shares sum to unity.

Inclusion of the share equations allows an increase in the degrees of freedom and also the demand for factor shares based on input prices to be predicted. In order to estimate the model, one of the share equations must be dropped to overcome the problem of singularity and Zellner's[31] method of Seemingly Unrelated Regression applied.

5. Data and Results

Three inputs are specified in the estimation of TOC costs – labour, rolling stock, and infrastructure. Review of company annual reports revealed that on average these three inputs accounted for around 85% of total costs. Figures relating to annualised wages, rolling stock leasing charges and infrastructure access charges were obtained from the annual accounts and these were divided by figures relating to staff levels, tractive rolling stock units (i.e. multiple units and/or locomotives) and route kilometres to obtain prices of the three inputs. All input prices were, as a matter of course, standardised to 2000 values using the average annual retail price index for each respective year. This was an academic exercise however as the final form of the estimated cost function standardised all financial values (see below), irrespective of the (time) units of currency in which they were originally measured

With regard to the output, train-kilometres are used. TOCs are assumed to sales maximise, hence consistent with this assumption TOCs will attempt to produce cost efficient train, rather than cost efficient passenger, kilometres. Furthermore, a large percentage of TOC income comes in the form of franchise payments from the Strategic Rail Authority, which are paid on the basis of providing train services in the franchise area, irrespective of use. Indeed two TOCs, Scotrail and Merseyrail, operate full cost contracts with the regional Passenger Transport Executive in their franchise areas.

The study only includes 23 of the 25 TOCs in Britain. In the first instance, the Island Line based on the Isle of Wight is a vertically integrated railway hence infrastructure costs could not be derived. In the second instance, a complete set of figures could not be obtained for the Great Eastern Railway, as this company's accounts do not distinguish between rolling stock leasing charges and track access charges. All data relating to the other TOCs has been taken from the company annual reports, the Strategic Rail Authority[32] and the annual Rail Industry Monitor produced by the TAS partnership[33].

All financial values have been standardised by one of the input prices (infrastructure) to reduce the estimation effects of multicollinearity. Due to the high degree of correlation between many of the right hand side terms of equation [1a], the effect of each of these terms would be 'smeared' across other terms due to the high degree of correlation. As the individual terms will be used to estimate scale effects and elasticities of substitution, this is an important consideration. Equation [2] gives the actual equation to be estimated and

also includes a time component to test for technical progress over the period reviewed.

$$\ln(C_i/P_N)=A+\alpha\ \ln Q_i+\beta_R\ \ln(P_R/P_N)+\beta_L(P_L/P_N)+1/2\delta(\ln Q_i)^2 +\gamma_{LL}1/2\ \ln(P_L/P_N)^2+\gamma_{RL}\ \ln(P_R/P_N)\ln(P_L/P_N) \quad [2] +\rho_{RQ}\ \ln Q_i\ln(P_R/P_N)+\rho_{LQ}\ \ln Q_i\ln(P_R/P_N)+\tau T+\tau_Q TQ_i$$

The parameter values along with the associated regression statistics from estimation of equation [2] are given in Table 2.

Parameter	Term	Estimate	St Error	T Stat
A	Constant	4.1986	0.1431	29.3345
β_k	Rolling Stock	0.2132	0.0190	11.2042
β_l	Labour	0.2520	0.0249	10.1210
β_n*	Network	0.5348	n/a	n/a
α	Train Kilometres	1.6083	0.0945	17.0264
γ_{kk}	Rolling Stock Squared	0.0373	0.0030	12.4418
γ_{kl}	Rolling Stock/Labour	-0.0028	0.0036	-0.7670
γ_{kn}*	Rolling Stock/Network	-0.0345	n/a	n/a
γ_{ll}	Labour Squared	-0.0264	0.0083	-3.1750
γ_{ln}*	Labour/Network	0.0292	n/a	n/a
γ_{nn}*	Network Squared	0.0053	n/a	n/a
ρ_{ry}	Rolling Stock/Train Kilometres	-0.0011	0.0064	-0.1789
ρ_{ly}	Labour/Train Kilometres	-0.0126	0.0067	-1.8938
ρ_{ny}*	Network/Train Kilometres	0.0138	n/a	n/a
δ	Train Kilometres Squared	-0.2332	0.0361	-6.4577
τ	Time	-0.1120	0.0267	-4.1930
τ_y	Time/Output	0.0205	0.0099	2.0707

* - These terms are derived from imposing the restrictions given in equation [1b]. For example, as $\beta_k + \beta_l + \beta_n = 1$, then $\beta_n = 1 - \beta_k - \beta_l$.

$\bar{R}^2 = 0.9619$, $F = 262.44$, $df = 103$, $p = 0.0000$

Table 2: Parameter Estimates from the Translog

Examining the various regression statistics, this would appear to be a reasonable model from which to examine economies of scale, elasticities of substitution and efficiencies. The overall fit, at 0.9619, suggests that most of the variation (just over 96%) in total costs is explained by the production of train-kilometres and variation in the three input prices. Hence, the cost function fits the data very well. Furthermore, nine of the twelve estimated parameters are statistically significant at least at the 5% level including both of the time variables. Finally, the appropriateness of the functional form (Translog) was tested against an alternative specification of the cost function (Cobb-Douglas) by use of a likelihood ratio test. This was found to be highly significant, suggesting that railway technology is better represented by the Translog rather than the Cobb-Douglas functional form.

6. Elasticities of Substitution and Demand

Further examination of the results begins with calculation of the Elasticities of Substitution and Demand. Following Greene[34], these are given by:

$$\sigma_{ii} = \frac{\gamma_{ii}+\bar{S}_i(\bar{S}_i-1)}{\bar{S}_i^2} \quad [3a]$$

$$\sigma_{ij} = \frac{\gamma_{ij}+\bar{S}_i\bar{S}_j}{\bar{S}_i\bar{S}_j} \quad [3b]$$

Where: $\bar{S}_i$ and $\bar{S}_j$ are the mean cost shares of inputs i and j respectively.

Equation [3a] represents elasticities of demand whilst equation [3b] represents elasticities of substitution. As there are three inputs specified in this model we have three forms of equation [3a] and three forms of equation [3b], one for each two-way combination of the inputs. These latter measures describe the extent to which the average firm will substitute one input for another. For ease of interpretation however, these are expressed as own and cross price elasticities of factor demand by multiplying by the relevant cost share, thus:

$$E_{ij} = S_j\ \sigma_{ii} \quad [4]$$

As highlighted by Button and O'Donnell[35], while $\sigma_{ij} = \sigma_{ji}$, there is no reason to assume that $E_{ij} = E_{ji}$. These figures are presented for the years 1996, 1998 and 2000 in Table 3.

	Year	Rolling Stock	Labour	Network
Rolling Stock	1996	-0.609	0.212	0.159
	1998	-0.611	0.206	0.153
	2000	-0.606	0.226	0.166
Labour	1996	0.228	-0.870	0.295
	1998	0.238	-0.854	0.306
	2000	0.261	-0.823	0.333
Network	1996	0.382	0.657	-0.454
	1998	0.373	0.648	-0.458
	2000	0.344	0.598	-0.498

Table 3: Own and Cross Price Elasticities of Factor Demand

All of the own price elasticities of demand have the appropriate sign, i.e. all are negative, hence a rise in the price of that factor will lead to a decline in its usage. For example, in 1998 it is estimated that a 10% rise in the 'price' of rolling stock would lead to a 6.11% decline in its usage. Infrastructure has the lowest elasticity of factor demand suggesting this is the most inelastic of the three inputs specified i.e. least sensitive to factor price changes. Over the three years shown, the values for rolling stock remain relatively constant, but for labour there is a notable decrease in the elasticity of demand. In the period under review, TOCs on the whole have reduced staff levels to improve productivity and save costs in an attempt to keep pace with cuts in subsidy[36]. Taken at face level therefore, this result would be consistent with economic theory; as fewer workers are employed, those that remain become more difficult to substitute or 'transfer'. It is worth noting that more recent times have seen increased industrial unrest within the industry, with work to rules and one-day strikes occurring in several of the franchises. This should not be looked at in isolation however and wholly attributed to such changes in the labour market, as it is also in part due to the horizontal separation of train operating companies. This has resulted in localised pay agreements and pay differentials within the industry increasing.

The other notable movement in factor price elasticity has

been with regard to the infrastructure. This became more price elastic in the last year under review, suggesting that changes in the price of infrastructure will lead to more increases/decreases in usage than would have been the case in the past. Given the subject of vertical separation of the railway, it is worth noting that in a static analysis (i.e. no changes in the other factor markets) this would appear to suggest that the price regulation of Railtrack's access charges have been reasonably successful over most of the initial privatisation period, as a decrease (i.e. more inelastic) would be an indicator of greater market control.

Examining the cross price elasticities of factor demand, the positive signs indicate that all inputs have a degree of two-way substitutability. The relative low values however associated with rolling stock and labour, and rolling stock and infrastructure combinations would perhaps suggest a fixed factor proportions technology amongst these inputs i.e. no substitutability. There would however appear to be a small degree of substitutability between labour and infrastructure. When worked through a simulated 5% real rise in the price of infrastructure, estimates calculated from the 1998 figures would suggest that to maintain its level of output the average firm would increase tractive rolling stock by 2% and labour by just over 3%. Similarly, a 5% real increase in the price of labour would be predicted to lead to a 4.3% decrease in staff numbers and a 1.5% increase in track access. Furthermore, such an increase in the labour price would also result in a small increase in rolling stock (1.2%). Taken together therefore, this is simply substituting labour for capital.

It should be highlighted that all of these results relate to a five-year period, and whether such a relatively short time period or the accuracy of the measurement allows for such precise analysis is debatable. Nevertheless, the results would appear to concur with actual events and do make some logical sense.

7. Economies of Scale

Following Christensen and Greene[37], economies of scale can be estimated from equation [1c] by applying the formula:

$$EOS = 1 - \frac{\partial \ln C_i}{\partial \ln Q_i} \qquad [5a]$$

or in full:

$$EoS = 1 - [\alpha + \delta \ln Q_i + \rho_{RQ} \ln(P_R/P_N) + \rho_{LQ} \ln(P_L/P_N) + \tau_q] \qquad [5b]$$

Economies of scale are thus defined as the rate of change of total cost with respect to the change in output, and will be positive i.e. increasing, where this is greater than zero and negative i.e. decreasing, where this is less than zero. The results of estimating equation [5a] for each TOC in each year are given in figure 1. This plots these estimates against output in order to determine if economies of scale vary with firm size.

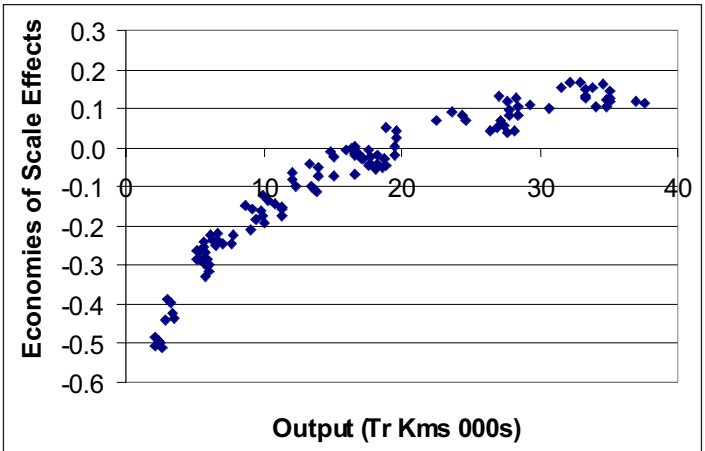

Figure 1: Economies of Scale

Figure 1 shows marked variability with regard to output and the level of economies of scale. It would thus appear that scale effects are present in passenger service provision, thus the size of TOCs is important. Examining the results more closely, these would initially imply an inverted u-shaped long run average cost curve, with smaller companies exhibiting decreasing economies of scale and larger companies increasing economies. Given the method employed however, these results are also entirely consistent with the traditional long run u shaped average cost curve. As firms become larger, the rate of change of costs is found to be smaller than the rate of change of output, indicating that average costs (per train-kilometre) are falling for all railways in the data set as output grows. Thus all TOCs are operating in that area of the long run average cost curve where average costs are falling and hence output levels are below a hypothetical minimum efficiency scale.

In an attempt to relate the above findings to previous literature, a very rough calculation was taken by assuming a quadratic function for the scale effects with respect to train-kilometres shown in Figure 1, and then extending the series. Such a functional form would be consistent with a u-shaped average cost curve and would ultimately capture the hypothetical minimum efficiency scale (MES) level of production. This estimated an MES point in the order of 56m train-kilometres per annum. This level of output would be around half the size of an integrated railway based upon previous studies[38]. Furthermore, it would also suggest that the optimal number of franchises in Britain should be around five to six in order to maximise scale economies.

The significance of the time variables in Table 2 is indicative of technical progress over the period, and this may also be expected to have an impact upon scale effects over time. With declines in labour and the reported substitutability of labour by rolling stock and infrastructure in Table 3, this may suggest a subtle switch towards a more capital intensive production process. This would imply that scale effects have increased over the period. White[39] used a similar argument for the British bus industry. Referring to equation [5b] and the results in Table 2, these would suggest that the MES point has risen over the period reviewed, by a value of 0.0205 per year

(the τ_Q co-efficient in equation [5b]). In order to give this value some context, if factor prices remained constant the mean passenger railway in 1996 would need to increase output by around 8% per year in order to prevent slipping further away from the optimal level of production. As most TOCs have not expanded output at such levels, over the period the majority of TOCs have 'moved' further away from the MES point. This however will be re-considered later in the conclusions.

8. Cost Efficiency

Equation [2] was used to estimate deterministic corrected ordinary least squares (COLS) efficiencies. This was found by applying equation 6.

$$Efficiency = \exp(e_i - e^+) \qquad [6]$$

Where:
e_i = residual (actual minus estimated cost) from equation [2] for TOC i.
e^+ = largest negative residual from equation [2]

In simple terms, equation 6 identifies that firm which has the lowest actual to estimated costs i.e. the largest negative residual. This is based upon an 'average' calculated from all firms within the data set. This, by definition, is the most efficient firm and all others are then related to this firm based upon a cost frontier i.e. how far away they are for a given level of output from the most efficient firm.

When considering 'efficiency', under the output measure used (train-kilometres) there can be many sources of inefficiency for a railway company, such as the terrain, type of service (stopping services are detrimental to the cost of producing train-kilometres as a higher number of inputs are required), and the prevailing climate. To a certain extent, such exogenous factors would be taken into account by estimating a stochastic efficiency frontier, however such estimations are problematic in the case of systems of equations[40]. In the following analysis therefore, the absolute efficiencies are less relevant than the relative changes over the time period, as the latter roughly assumes that such external factors have remained constant over the period.

Results relating to cost efficiency are plotted in Figure 2. These are presented as two industry averages (the mean and the median) for each of the five years reviewed.

According to Cowie and Riddington[41], deterministic COLS efficiencies tend to underestimate the true efficiency level[42]. For example, a data envelopment analysis[43] carried out on the same data set gave a mean efficiency of over 80% in 1998. Whilst accepting therefore that true absolute efficiency levels may be considerably understated, the COLS efficiencies presented in Figure 2 nevertheless do give an indication of the overall trend. This shows a decline over the period, in the order of 4-5%, with most of this decrease occurring over the last three years. Previous analysis of factor substitution and economies of scale has suggested that over the period

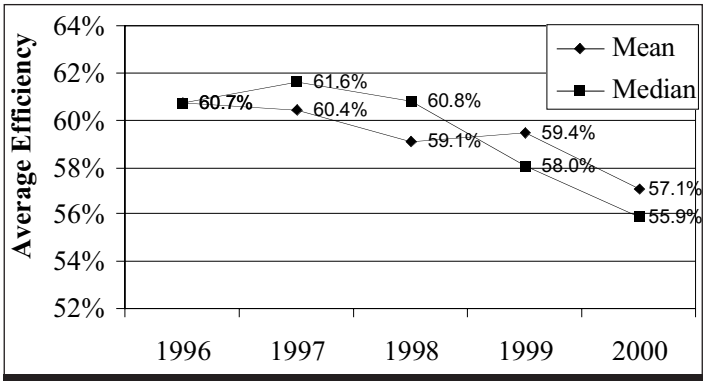

Figure 2: Average Cost Efficiency, British Passenger Rail Industry, 1996 to 2000

reviewed there has been a switch to a more capital intensive industry and the significance of the time variables suggests an increase in the production frontier. The results on efficiency however would strongly indicate that these effects were at their highest at the beginning of the period. Latterly, it would appear that most TOCs failed to keep pace with technical progress hence, despite considerable productivity improvements, average efficiency fell. Technical progress in this example relates to reductions in staff levels and better utilisation of rolling stock and infrastructure. Economists would term these short run measures, as different amounts of a variable factor (labour) are being added to, or in this case subtracted from, fixed amounts of the other inputs (tractive rolling stock and infrastructure). Consequently, these can probably be considered as 'one-off' post-privatisation measures rather than an indication of a change in production processes that will continue into the medium to longer term.

Short-run measures taken at the beginning of the period are now virtually exhausted and staffing levels at most TOCs have now stabilized, some even increasing. Given the high influence of these short-run effects, little else can be said regarding efficiency levels, as a longer time period would be required in order to provide a fuller and more meaningful analysis.

9. Concluding Remarks

The most significant finding from the preceding analysis is that the size of train operating companies matter. In any vertical separation of the railway therefore, consideration needs to be given to the size (and hence number) of the train service provider(s). Although significant, scale effects were found to be smaller than in comparison to previous studies based upon vertically integrated railways. It can thus be deduced that scale effects are associated with both service provision and the infrastructure, and hence with regard to company size, railway economics would appear to be more consistent with the traditional rather than the revisionist school of thought. Furthermore, it was suggested that all British TOCs were operating on the downward part of the average cost curve i.e. all were too small in terms of train kilometre production. Therefore, one of the key areas for productivity gains for TOCs would be in the area of scale

economies. In Britain however, expansion in train-kilometres, and hence firm size, is restricted by the franchise system, the size of the market and limited excess infrastructure capacity on many parts of the network. Consequently, firm expansion could only arise out of the next round(s) of re-franchising or through the market for corporate control i.e. acquisition.

The actual number of train operating companies within Britain however should not be solely based upon production economics. There may be a number of advantages in having a larger number of franchise holders, such as the ability to provide a stronger local and regional focus, greater benchmarking opportunities (for regulator and operator alike) and the existence of a higher number of potential competitors.

A small degree of substitutability was found between the inputs, however, this result should be treated with some care. If, for example, TOCs reduced labour levels and improved utilisation of existing inputs, then there would appear to be substitutability between labour and the other two inputs. Technically speaking of course this is true, but these effects may be over-estimated as the period was particularly notable for reductions in labour and increases in frequency (i.e. train-kilometres). When added to the results on efficiency, these suggest that the substitution effects identified involving labour are to a large extent due to 'one-off' measures taken during the early period of private sector operation. A longer time period would therefore be required to investigate substitution effects between inputs, and hence competition between and within factor markets. This would also impact upon scale effects over time. In particular it would suggest that the 8% annual growth of output required to 'keep pace' with technical progress is an over-estimation as it only refers to short run measures. It can be concluded however that the actual privatisation of train service provision companies has induced a single step expansion of the production frontier and a small switch to a more capital intensive industry.

Finally, based upon estimates of the price elasticity of infrastructure, it would appear that in the British example the regulator has been reasonably successful in controlling the market power of the monopoly operator, Railtrack. Any such conclusion however must be highly guarded, as other factors, most notably the meltdown of Railtrack's finances and its ultimate placement into administration, suggest that this issue requires a far more focused and detailed investigation.

NOTES

[1] DoT, (1992), *New Opportunities for the Railways. The Privatisation of British Rail*, Cm 2012, HMSO, London.

[2] Of the remaining 8 units, no buyer could be found and hence these ceased trading. This mainly included units that were part of the central services function of British Rail.

[3] Since the 1988 legislation however, passenger and freight services have been horizontally separated.

[4] See for example NASH, C., (1993), "Rail Privatisation in Britain", *Journal of Transport Economics and Policy*, Vol. 27, pp. 317-322, and Curwen, P., (1997), " The end of the line for British Rail", *Public Money and Management*, Vol. 17, pp. 55-67.

[5] PRESTON, J., (1994), "Does Size Matter? A Case Study of Western European railways", *paper presented at the 29th Annual Universities Transport Study Group conference*, University of Leeds, January.

[6] BRADSHAW, B., AND M., AVELINE, (1996), "Rail Privatisation - Progress, Players and the Future", *Centre for Socio-Legal Studies*, Oxford, The Oxera Press.

[7] PRESTON, J., (1994), op. cit.

[8] JONES, I., (2000), "The Evolution of Policy Towards On-rail Competition in Great Britain", *Journal of Transport Economics and Policy*, Vol. 34, pp. 371-384.

[9] PRESTON, J., (1994), op.cit.

[10] SHIRES, J., AND J., PRESTON, (1999), "Getting Back On-Track or Going Off the Rails? An Assessment of Ownership and Organisational Reform of Railways in Western Europe", *paper presented at the 6th International Conference on Competition and Ownership in Land Passenger Transport*, Cape Town, South Africa, September.

[11] CANTOS-SANCHEZ, P., (2001), "Vertical Relationships for the European Railway Industry", *Transport Policy*, Vol. 8, pp. 77–83.

[12] PRESTON, J., (1994),op. cit.

[13] FILIPPINI, M., AND R., MAGGI, (1992), "The Cost Structure of the Swiss Private Railways", *International Journal of Transport Economics*, Vol. 19, pp. 307-327.

[14] COWIE, J., (1999), "The Technical Efficiency of Public and Private Ownership in the Rail Industry - The case of Swiss private railways", *Journal of Transport Economics and Policy*, Vol. 33, pp. 241-251.

[15] MCGEEHAN, H., (1993), "Railway Costs and Productivity Growth, the case of the Republic of Ireland 1973 – 1983", *Journal of Transport Economics and Policy*, Vol. 27, pp. 19-32.

[16] FILIPPINI, M., AND R., MAGGI, (1992), op. cit.

[17] CANTOS-SANCHEZ, P., (2001), op. cit.

[18] This however would not preclude the possibility of a horizontal division of vertically integrated railways.

[19] This is a very complex issue and not as simple as presented in the text. When specifying inputs for a cost function, by their very nature these are complements e.g. the function estimated in this paper includes three factors, infrastructure, rolling stock and labour, as all three are required to produce train services. These are therefore complements. Substitutability only refers to substituting one input for another in order to maintain a given level of output or where output is changing. Therefore, whilst the argument for complementarity may be clear, for substitutability it applies only within certain limits.

[20] MCGEEHAN, H., (1993), op. cit.

[21] OUM, T.H., AND C., YU, (1994), "Economic Efficiency of Railways and Implications for Public Policy", *Journal of Transport Economics and Policy*, Vol.28, pp. 131-138.

[22] GATHON, H-J., AND P., PESTIEAU, (1995), "Decomposing Efficiency into its Managerial and its Regulatory Components: the case of European railways", *European Journal of Operational Research*, Vol. 80, pp. 500-507.

[23] OUM, T.H., W.G., WATERS II, AND C., YU, (1999), "A survey of productivity and efficiency measurement in rail transport", *Journal of Transport Economics and Policy*, Vol. 33, pp. 9-42.

[24] See for example GATHON, H-J., AND P., PESTIEAU, (1992), "Decomposing Efficiency into its Managerial and its Regulatory Components: the case of European railways", *CIRIEC Working Paper No 92/07*, University of Liège.

[25] See for example COELLI, T., AND P., PERELMAN, (1996), "Efficiency Measurement, Multiple Output Technologies and Distance Functions: with Applications to European Railways", *CREPP Working Paper No 96/05*, University of Liège.

[26] COWIE, J., (2002), "Subsidy and Productivity in the Privatised British Passenger Railway", *Economic Issues*, Vol. 7, pp. 25-38.

[27] PRESTON, J., (2002), "Railtrack – problems, solutions and absolutions", *paper presented at the 34th Annual University Transport*

Study Group conference, Napier University, Edinburgh, January.

[28] OUM, T.H., AND C., YU, (1994), op. cit.

[29] The smallest passenger railway in Great Britain is the tiny Island line, which operates a 14km route on the Isle of Wight off the south coast of England.

[30] GREENE, W.H., (1996), *Econometric Analysis*, MacMillan Publishing, New York.

[31] ZELLNER, A., (1962), "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias", *Journal of the American Statistical Association*, Vol. 57, pp. 977-992.

[32] SRA, (2001), *Strategic Rail Authority Annual Report, 2000/2001*, SRA, London.

[33] TAS, (2002), *Rail Industry Monitor 2002*, TAS Publications.

[34] GREENE, W.H., (1996), op. cit.

[35] BUTTON, K. J., AND K.J., O'DONNELL, (1985), "An Examinatoin of the Cost Structures Associated with Providing Urban Bus Services in Britain", *Scottish Journal of Political Economy*, Vol. 32, pp. 67-81.

[36] COWIE, J., (2002), op. cit.

[37] CHRISTENSEN, L., AND W.H., GREENE, (1976), "Economies of Scale in US Electric Power Generation", *Journal of Political Economy*, Vol. 84, pp. 655-676.

[38] PRESTON, J., (1994), op. cit., estimated an MES point of around 95m train-kilometres per annum, and in a later study, Shires, J., and J., Preston, (1999), op.cit., reported an MES value of around 104m train-kilometres. Results for both of these studies refer to production of train-kilometres at, or close to, the optimum network size.

[39] WHITE, P.R., (1997), "What conclusions can be drawn about bus deregulation?", *Transport Reviews*, Vol. 17, pp. 1-16.

[40] GREENE, W.H., (1993), "The Econometric Approach to Efficiency Measurement", *Working Paper No 93-20,* Department of Economics, Stern School of Business, New York University.

[41] COWIE, J. AND G., RIDDINGTON, (1994), "Performance Assessment Using DEA - A Cautionary Note", *Journal of the Operational Research Society,* Vol. 45, pp. 603-604.

[42] Such apparently low levels of efficiency are not uncommon. For example, Perelman, S., and P., Pestieau, (1988), "Technical Performance in Public Enterprises – a comparative study of railways and postal services", *European Economic Review*, Vol. 32, pp. 432-441, estimated an average efficiency level of just over 54% for 18 European state railways plus Japan.

[43] It should be mentioned that Cowie, J. and G., Riddington, (1994), op. cit., also stated that data envelopment analysis tended to over-estimate true efficiency levels.

BIBLIOGRAPHIC REFERENCES

BRADSHAW, B., AND M., AVELINE, (1996), "Rail Privatisation - Progress, Players and the Future", *Centre for Socio-Legal Studies*, Oxford, The Oxera Press.

BUTTON, K.J., AND K. J., O'DONNELL, (1985), "An Examinatoin of the Cost Structures Associated with Providing Urban Bus Services in Britain", *Scottish Journal of Political Economy*, Vol. 32, pp. 67-81.

CANTOS-SANCHEZ, P., (2001), "Vertical Relationships for the European railway industry", *Transport Policy*, Vol. 8, pp. 77–83.

CHRISTENSEN, L., AND W.H., GREENE, (1976), "Economies of Scale in US Electric Power Generation", *Journal of Political Economy*, Vol. 84, pp. 655-676.

COELLI, T., AND P., PERELMAN, (1996), "Efficiency Measurement, Multiple Output Technologies and Distance Functions: with Applications to European Railways", *CREPP Working Paper No 96/05*, University of Liège.

COELLI, T., D.S., PRASADA-RAO AND G.E., BATTESE, (1997), *An Introduction to efficiency and productivity analysis,* Kluwer Academic Publishers, Dordrecht, the Netherlands.

COWIE, J. AND G., RIDDINGTON, (1994), "Performance Assessment Using DEA - A Cautionary Note", *Journal of the Operational Research Society,* Vol. 45, pp. 603-604.

COWIE, J., (1999), "The Technical Efficiency of Public and Private Ownership in the Rail Industry - The case of Swiss private railways", *Journal of Transport Economics and Policy*, Vol. 33, pp. 241-251.

COWIE, J., (2002), "Subsidy and Productivity in the Privatised British Passenger Railway", *Economic Issues*, Vol. 7, pp. 25-38.

CURWEN, P., (1997), " The end of the line for British Rail", *Public Money and Management*, Vol. 17, pp. 55-67.

DoT, (1992), *New Opportunities for the Railways. The privatisation of British Rail,* Cm 2012, HMSO, London.

FILIPPINI, M., AND R., MAGGI, (1992), "The Cost Structure of the Swiss Private Railways", *International Journal of Transport Economics*, Vol. 19, pp. 307-327.

GATHON, H-J., AND P., PESTIEAU, (1992), "Decomposing Efficiency into its Managerial and its Regulatory Components: the case of European railways", *CIRIEC Working Paper No 92/07*, University of Liège.

GATHON, H-J., AND P., PESTIEAU, (1995), "Decomposing Efficiency into its Managerial and its Regulatory Components: the case of European railways", *European Journal of Operational Research*, Vol. 80, pp. 500-507.

GREENE, W.H., (1993), "The Econometric Approach to Efficiency Measurement", *Working Paper No 93-20,* Department of Economics, Stern School of Business, New York University.

GREENE, W.H., (1996), *Econometric Analysis*, MacMillan Publishing, New York.

JONES, I., (2000), "The Evolution of Policy Towards On-rail Competition in Great Britain", *Journal of Transport Economics and Policy*, Vol. 34, pp. 371-384.

MCGEEHAN, H., (1993), "Railway Costs and Productivity Growth: the case of the Republic of Ireland 1973 – 1983", *Journal of Transport Economics and Policy*, Vol. 27, pp. 19-32.

OUM, T.H., AND C., YU, (1994), "Economic Efficiency of Railways and Implications for Public Policy", *Journal of Transport Economics and Policy*, Vol. 28, pp. 131-138.

OUM, T.H., W.G., WATERS II, AND C., YU, (1999), "A survey of productivity and efficiency measurement in rail transport", *Journal of Transport Economics and Policy*, Vol. 33, pp. 9-42.

NASH, C., (1993), "Rail Privatisation in Britain", *Journal of Transport Economics and Policy*, Vol. 27, pp. 317-322.

PERELMAN, S., AND P., PESTIEAU, (1988), "Technical Performance in Public Enterprises – a comparative study of railways and postal services", *European Economic Review*, Vol. 32, pp. 432-441.

PRESTON, J., (1994), "Does size matter? A case study of western European railways", *paper presented at the 29th Annual Universities Transport Study Group conference*, University of Leeds, January.

PRESTON, J., (2002), "Railtrack – problems, solutions and absolutions", *paper presented at the 34th Annual University Transport Study Group conference*, Napier University, Edinburgh, January.

SHIRES, J., AND J., PRESTON, (1999), "Getting Back On-Track or Going Off the Rails? An Assessment of Ownership and Organisational Reform of Railways in Western Europe", *paper presented at the 6th International Conference on Competition and Ownership in Land Passenger Transport*, Cape Town, South Africa, September.

SRA, (2001), *Strategic Rail Authority Annual Report, 2000/2001*, SRA, London.

TAS, (2002), *Rail Industry Monitor 2002*, TAS Publications.

VICKERS, J., AND G.K., YARROW, (1988), *Privatization: An Economic Analysis,* MIT Press, Cambridge, Massachusetts.

WHITE, P.R., (1997), "What conclusions can be drawn about bus deregulation?", *Transport Reviews*, Vol. 17, pp. 1-16.

ZELLNER, A., (1962), "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias", *Journal of the American Statistical Association*, Vol. 57, pp. 977-992.

Metropolitan and Urban Traffic in the De-Verticalisation Process of Italian Railways

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1. Introduction

On a regional and metropolitan scale railway transport de-verticalisation is linked with federalism and the territorial decentralisation of the political choices. This is also a great trend in Community regulations and in many countries both inside and outside the European Union.

On this territorial scale railway transport enjoys less favour than in the other market sectors. Thanks to the mid-long range long-haul links, in fact, rail has gained competitiveness in the last 20 years. Regarding passenger transport, this has occurred mainly through the enlargement of high-speed connections (and networks) able to compete with air transport. Freight transport has gained thanks to the increasing environmental and infrastructural costs of transport on road and measures imposing higher restrictions and costs.

On a regional scale, similarly, the only fundamental competitive field in rail transport seems to be underground transport, due to road network overcrowding and the consequent growth in general costs of road transport.

In this context, the regionalisation of a rail transport inclined to de-verticalisation outlines a new institutional picture. It combines regulations aimed at efficiency (separation of infrastructure management from service production in which competition is promoted) with the territorialisation of skills based on subsidiarity, which aims at increasing transport effectiveness through a closer relationship between needs planning and collectivity requirements. In this way greater competitiveness allows the recovery of market-sections belonging to short-range metropolitan passenger transport - where private transport external costs and public road transport fiscal costs weigh heavily on the sustainability of the urban socio-economic system.

This aspect gives regional railway transport a much more important role than has been the case, because the last few decades have seen not only a progressive consciousness of the environmental costs of individual car transport, but unfortunately also the sunk costs of collective road transport effectiveness (in terms of general costs) and its high fiscal cost (the structural deficits of the public transport system)[1]. In this way collective transport, with low or no local environmental impact and possibly automatic control, has became the only mode of transport able to "force" the trade-off among effectiveness, environmental sustainability and "tax sustainability" implied in urban mobility politicies. Rail transport – train or tube – avoids the cumulative effects of overcrowding, maintains a high average speed compared to other modes, and has the advantage that electric tracks reduce localised pollutant emissions (in urban centers due aprox. 2/3 to transport). Moreover, the high ratio between passengers and drivers reduces staff costs, which represent over 70% out of the management costs in the public road transport. This increases the competitiveness of rail transport – tramways, people-mover systems, and undergrounds in the urban context; and undergrounds and regional railways in the suburban and subregional context. This is nevertheless limited by the following:

- proportionate demand compared to initial investments amount;
- ability to ensure repayments suitable to the huge investments, able to attract private capital through project finance but adequate even for public financing, considering the scarce availability of tax resources;
- suitable planning skill, subsequent to the substantial irreversibility of the realisation of railway infrastructures (urban or regional) on the territory, in particular in the valuable and "sensitive" urban and periurban territory.

2. Competition in regional public transport services

2.1 Liberalisation, privatisation and competition in railway transport

Currently, liberalisation and privatisation also involve railway transport in replacing of government intervention with boosted competition, producing new institutional and managerial structures. They allow allocative and dynamic efficiency growth, but are not able to solve all the problems, particularly because a liberalised railway transport market doesn't aim automatically at competitive or contestable structures. Government intervention in the sector is of crucial importance because it has to ensure a close proximity to competitive market functions.

Inefficiency in the public production system has stimulated economic policy trends toward the liberalisation and privatisation of large economic fields – thanks to the strengthening of European integration based on the achievement of competitive principles in the markets. This means, respectively, the promotion of a free or at least easier access to market offers in order to achieve a more competitive market structure, and undertaking at least the partial transfer from public to private property (as long as the private component effectively holds the decision-making power).

In the phase prior to private market and enterprise economic policy, reasoning is motivated by other more contingent factors. For example, public finance constraints (more evident in the Euro area countries due to the restraints imposed by the stability pact) tend to alienate public undertakings, both

profitable ones (further profits coming from their alienation), subsidised, and structurally poor ones like transports, because even if subsidisation continues, privatisation is able to minimise or at least reduce the revenue costs.
In this way the proprietary asset passes from mainly public to mainly private or mixed control, and thanks to the liberalisation of market access, the industrial organisation passes from a monopoly situation to a situation of competitive oligopoly or competition (*in* or *for* the market, as explained later in the paper).
These trends aim at:
- increasing efficiency by re-establishing information mechanisms (prices) and proper incentives for the competitive assets;
- attracting private capital to public undertakings (in the transport industry *capital intensive* innovations make public financing of investments problematic);
- reducing public deficit at different government levels.

In the same way, the main tasks of sector liberalisation are:
- promoting market contestability and overcoming the present and possible future monopolies by private operators;
- guaranteeing service production (characterised by positive externalities) independently by direct profitability of its production and sale;
- limiting negative externalities of metropolitan and short-range transport realised through other means of transport.

Market contestability requires conditions aimed at setting market access and exit costs to zero. So access to the production technologies must not be connected to the production scale, and there must not be sunk costs (such as infrastructure costs, marketing costs, R&D, etc.).
In this way a contestable market allows, in theory, the same efficiency of perfect competition, since the incumbent will be forced to behave like a competitor in order to prevent "hit-and-run" competition from potential new entrants.
Nevertheless, perfect contestability and perfect competition can hardly be found in the real world. A further task for political decision-makers pursuing regulations will be that of minimising the inefficiency of a non-fully contestable market, through adequate control measures.
The instruments of competition for the market[2] are found in the sector of regulations aimed at promoting contestability, which has to choose by auction the private operator to manage a certain asset or service production for a fixed period of time.
Thus, even if a competitive market (or competition *in* the market) can't be promoted due to the technical characteristics of production, usually characterised by strong scale or net economies, it is possible to restore the competitive mechanism through competition *for* entrusting the monopoly for a particular period of time.
The target of guaranteeing production of goods/services as public properties, or generating positive externalities, even without direct profitability stimulating private producers, gives rise to the need to subsidise this production. The regulation target is then twofold. On one hand it guarantees the productive efficiency of the subsidised production in order to minimise the revenue costs, while on the other hand it guarantees the quality of the goods/services produced and the satisfaction of the needs expressed by the demand for those goods or service.
Evidently, market competition can be used indifferently both in entrusting a potentially profit-bearing asset and in tendering a subsidised service, in which the public subject states that (for social reasons) the service has been sold below cost.
Regional railway transport assets combine a de-verticalisation systems, keeping the infrastructure manager apart from railway service producers through a regionalisation process that introduces market competition. This functions because, as an institutional client, the region expresses popular demand for railway transport in assigning production to a railway system.
The following paragraph analyses the ways in which the two processes are introduced into the Community and Italian set of rules, and proposes an investigation of the problems arising from the complex setting up of such a deeply innovative institutional and organisational asset.

2.2 The European trend and the Italian case

The European set of rules stems from the main principles on competition set out in the Treaty of Rome[3]. These stipulate that no agreement, decisions, or negotiations should be taken which in any way damage the healthy functioning of a competitive market, and that there must be no abuse of dominant positions over the market in order to separate its behaviour and prices from those of the competitive market. These trends apply both to private and public undertakings.
Nevertheless, both regarding competition and the prohibition of dominant positions, and the prohibition of public aids, the large numbers of exceptions and their enumeration (which sometimes is too vague) creates exceptions in the rail industry that end up over-stepping the rules.
Particularly, there have been policies of aids and public subsidies in rail transport designed to oppose two market failures particularly important for modal distribution balance and for the consequent impact on the economy:
– the trend towards a natural monopoly due to technological reasons peculiar to the railway market (importance of infrastructure sunk costs);
– the lack of balance in negative environmental externalities, much lower in rail than in road transport, which causes a inefficient modal split.

If we take into consideration even the "historical" positive externalities of railway accessibility, (especially during the great industrialisation of the second half of the nineteenth century and of the first decades of the twentieth century), and investment suitability in the field of keynesian expenditure policies supporting the aggregate demand, we can understand the several exceptions to the principles of competition and free market characteristic of the Community structure and the

consequent prevalence of public aids and subsidies.
It is possible that this trend has been necessary to railway transport in order to maintain a certain effectiveness regarding increasing market requirements, despite certain competition (even if decreasing) from other modes of transport. At the same time the trend has:

- favoured the rise of the so called "government failures", in the end requiring intervention in order to re-establish competition and make service production more efficient;
- created huge financial discrepancies which heavily affected public finances (which pay more attention to financial balances), and consequently the monetary unification and the "stability pact" of the E.U. member states.

Since natural monopoly is essentially determined in infrastructures, whereas the railway transport service market is (at least) more (if not fully) contestable, and since progress in railway technology (particularly in signalling and controlling) has gradually disengaged infrastructure management from service management liberalisation has concentrated on the service sector (with only a few exceptions, as in the case of the British railways).
In fact, in the 1990's, tendencies within the European Community were:

- the economic and functional split between railway service production and infrastructure management;
- the consequent liberalisation of the service market, in which several railway systems can operate with their own trains on the same line or infrastructure network;
- the persistence of property in this infrastructure network, at least under strict public control.

The Council Directive 91/440/CEE introduces the above mentioned separation between infrastructure management and service production and underlines (art.4) the need for independence between management of rail undertakings and public authority.
The production of the service offered to meet the mobility requirements of the collectivity, as evaluated by the political decision-maker, is imposed through a public service obligation ruled by a proper service contract.
The principle of freedom of access to railway infrastructures is dealt with by the Council Directive 95/19/CE (which does not apply to operators of urban, extra-urban, or regional services) which directs governments to identify an authority able to distribute infrastructure skills equally by allocating time paths so that the access cost to the infrastructure, together with the grants-in-aid, guarantees the balance of accounts to the infrastructure manager.
Italy has adapted itself to the Community rules on these points through the D.P.R. 8/7/1998 n.277 and 16/3/1999 n.146, which establish financial and organisational separation between infrastructure and service, the granting of railway permissions to new subjects, the distribution of the railway skills (allocation of time paths), and the different ways of determining and collecting usage fees for the time paths.[4]
Consequently, *Ferrovie dello Stato SpA* has re-organised itself into four departments: infrastructure, local and regional transport, passenger transport, and freight transport. The first department has become the new society *Rete Ferroviaria Italiana* (RFI), under the control of FS, whereas the other three departments have converged into Trenitalia, and have to compete with other railway operators[5] as reflected in Community trends.
This context of reorganization and deep institutional and managerial transformation of the railways was the background for the complex of rules known as the "Bassanini Reforms". These are inspired by subsidiarity (as recognized and promoted by the European Community) and are aimed at decentralizing important government competencies to the regions, by transferring to them the relevant resources and (still only partially) tax loads.
The reform delegates the programming, legislation and financial responsibility of regional and local authorities, aiming at increased correspondence between the needs of administered collectivities, increased local devolvement of responsibility in the use of resources, and easier concertation between territorial authorities. At the same time it accepts the other big strategic orientation - the "de-verticalisation" and liberalisation of transport - in light of the implementation of competitive procedures for the selection of service suppliers.
This complex set of rules is based on the "Bassanini laws" (law 15/3/1997, n.59 - modified by law 15/5/1997, n.127, the so-called "Bassanini bis", and by law 16/6/1998, n.191, the so-called "Bassanini ter"), on the subsequent implementation of legislative-decrees (D.lgs. 31/3/1998 n.112, D.lgs. 22/9/1998 n.345, D.lgs. 20/9/1999 n.400), and on the regional laws which implement the guidelines established by the reform. The new order, then, implements subsidiarity, delegating to local authorities those public functions which do not require unitary national management. Legislative-decree 19/11/1997, n.422 (the so-called "Burlando decree") implements the Bassanini reform in the field of local public transport and delegates to the regions those competencies of public rail transport (and programming) which do not require unified state management.
The Burlando decree (later modified by the above-mentioned D.lgs. 20/9/1999 n.400) sets some principles of regional competence. First of all, the regions, which are responsible for the programming of regional and local public transport requirements, must arrange Regional Plans for Transport and Mobility, and through Triennial Service Plans, define the traffic areas (which have already been arranged by law10/4/1981 n.151) as well as the minimum service standards necessary to meet the mobility needs of the socio-economic regional system. According to the programming, they must identify the transport service manager by means of competitive procedures (conforming to the Community's position as stated by Regulation 93/38/CE, implemented by D.lgs. 17/3/1995 n.158) and sign manager service contracts with them which, *inter alia*, regulate the quality and quantity of the service, implement programs, rates, managers' remuneration by the public administration, and relations to

employees etc. Competitive procedures, managers' choice, and service contracts must promote the improvement of the price-earnings ratio, which since 2000 should be at least 0.35. The strong "social" connotation of transport falls within the concept of "minimum service standard". This is defined as the supply of service adequate to satisfy the citizens' request for mobility and represents the public service obligation whose cost is shouldered by the regional budget[6].

While for road transport the Burlando decree covers the possibility of a further delegation from regional to local authorities (provinces and municipalities, according to whether the services are in the territory of a single municipality or not), rail transport, like marine transport, falls directly under the competence of the regions replacing the state as "institutional client" in relations with the infrastructure manager and railway companies by delegating transport on rails and signing the service contracts relating to it[7].

3. De-verticalisation at regional level: opportunities and risks

Institutional and organizational order has changed dramatically. Two "Copernican revolutions" are taking place in the organization of rail transport. Apart from the pioneering era of the XIX century, it had been historically based on self-production by a single or largely dominant public operator usually in a monopoly situation. There were few exceptions (one such was Italy, with its railways in concession). Against this pre-existing condition, which denies any possibility of competition and deprives the management of any incentive to increase the efficiency and/or the quality of the service, there are two different policies: de-verticalisation, with the separation between infrastructure manager and service producers and the introduction of competition for the market, and regionalisation which is inspired by subsidiarity.

In fact the historical context is one of the main causes of the slow and constant decline of railway transport, as seen in increased user costs and, consequently, in decreasing market segments. Though not the only cause, the different relevance of external costs creates a systematic disequilibrium between total costs and costs for the user which, in a decentralized decision-making[8] system, systematically penalizes railway transport since it is characterized by minor external costs.

It is, however, difficult to introduce competitive mechanisms in the railway field. For this reason de-verticalisation and regionalisation might not lead to significant increases in effectiveness and efficiency, at least in the short run. This does not mean that this reorganization is not just, nor that local public transport on rails cannot be improved. The greatest potential is found in metropolitan mobility systems where costs are much greater than those paid by users, and which are now unsustainable both from the environmental standpoint because of the high level of environmental externalities, and from the financial point of view because of the high level of subvention of infrastructures and collective public transport.

Thus within the context of regionalisation, it is on the urban and metropolitan level that we find one of the best "strategic" opportunities for railway transport. In a highly jammed and polluted system where public transport has heavy tax costs, it represents, a (locally) less-polluting means of transport whose infrastructure cannot be used by individual traffic and whose passenger-km costs are largely lower than those for road transport (conditional to adequate minimum efficient scale).

From this point of view, it is fundamental to delegate the programming of regional mobility to the regions. As mentioned in the previous paragraph, this is articulated in the following different points:

– arrangement of planning documents;
– quantitative and typological definition of minimum service standards;
– possibility of distributing state transfers among the various means of transport;
– possibility of stimulating the efficiency of transport producers by means of market competition, that is to say competitive procedures to service allocation and the service contract between the regional or delegated local authority and the service manager.

Actually, these potential strengths seem to encounter more than one problem.

In terms of planning, many regions have neither arranged nor are arranging Regional Plans for Transport and other planning documents, for they are considered useless or uselessly binding.

As far as the definition of minimum service standards is concerned, regulations present a concept, which although theoretically and logically clear, can easily be distorted when applied in practice.

First the distribution of state contributions between the regions is not based on objective criteria expressing the potential mobility requests of different areas and/or their supply of infrastructure in proportion to the population, productive structure, or surface. On the contrary, it seems to be based on a projection of historical trends which are scarcely apt to evaluate changes brought about by time and which can be influenced more by electoral motives than by objective evaluations.

Secondly, the budgetary constraints represented by state transfers constitute, the criterium for the definition of minimum service standards. In this way they are not those considered necessary for the mobility needs of the population, but rather those which can be financed with a certain amount of state transfers. Since there is no regional transport planning, the definition is limited to the mere quantitative aspect (a certain amount of kilometers or of seat-kilometers), and does not produce effective programming of regional mobility systems nor does it define qualitatively and typologically the "minimum" service standards. Moreover, since there are different elements that endanger the efficiency of the system of auction and competition for the market as presented by the reform, the real risk is represented by the "jamming" of liberalisation at the regional (for railway

transport) and/or subordinate territorial level (for road and tramway transport) [9].

For more or less the same reasons, the possibility of freely distributing state contributions among the various means of transport is paralyzed in the event by the need to maintain production standards in every means of transport which are fit to justify productive and occupational standards and transfers equal or proportional to those historically achieved.

Lastly, as far as the introduction of competitive mechanisms is concerned, we must remember that a tender system *à la* Demsetz[10] is efficient if:

- competitors can obtain inputs in competitive conditions;
- collusion is impossible or not convenient;
- incumbent positions create no advantages (informative, technological, etc.);
- after the assignment there is a body capable of enforcing the contract or sanctioning the assignee, or revoking the assignment.

These conditions are not likely to occur in the situation we are examining.

In detail, the first of them implies:

- the absolute equality of access to the network for Trenitalia and other operators. This in turn requires the existence of a non-colluded regulator (certainly not a company in the same group) during the assignment of train paths as well as the preventive knowledge of the possible charge for this access;
- equal access to rolling-stock, with regard to which the question of property is still controversial; an "English" solution would be desirable, where rolling-stock is delegated to third-party companies (not necessarily private and, if public, also regional) which grant its usage to the private winner of the tender against prearranged rates[11].

As far as the second condition (impossibility or inconvenience of collusion) is concerned, the tendency of many regions to create mixed companies between regions (and possibly local authorities), Trenitalia, and other existing railway companies during the regional implementation of the Burlando decree appears at least suspicious. In this way they limit the competition standard and give the incumbent a strong advantage over potential new competitors.

Even without coming to this borderline situation, where owner and competitor coincide[12], the risk of labour and social conflicts can easily make the buyer not indifferent to suppliers and let fade the real desire to acquire the service on a really competitive market.

Even the third and the fourth conditions do not seem to be completely fulfilled. This is mainly due to many Regions' incapacity for real programming, and to the (partially consequent) tendency to define the need for transport as a projection of pre-existing conditions and/or that allowable with limited resources.

Furthermore, it is important to notice that there are usually managerial, technological, and financial barriers which prevent entrance to this field. Many potential competitors do not dispose of the necessary assets. As mentioned before, this is due to the problem of access to infrastructure and rolling-stock, and to the fact that specialised personnel take a long time to train and that the main personel trainer continues to be the incumbent itself. In addition to this, many potential competitors could not dispose of sufficient dimensions or financial capabilities with regard to limits purposely introduced in the call for bids in terms of production volumes, bonds, guarantees etc.

Moreover, informative asymmetries in favour of the incumbent are very likely, since the incumbent is the "historical" depositary of railway competence with regard both to the granting authority and to potential competitors. This implies these difficulties:

- for the competitors: in submitting a tender knowing the real technical, financial and risk conditions;
- for the granting authority: in checking the respect of the service contract.

For all these reasons, it is possible that only Trenitalia takes part in the auctions for regional service. Its (public) owner will then, however, make good its possible losses. Since market competition has been introduced to challenge natural monopoly, the less efficient the market becomes, the more likely the case of a single competitor is.

In the present situation – with a publicly owned incumbent – the auction will reach the expected result only if the tendered service allows management cost reductions. That is to say, if they guarantee – as stated by art. 19, c.1 of the Burlando decree on service contracts – the "complete correspondence between service burden and available resources net of tariff revenues".

This last argument introduces another possible difficulty with the reform, linked to the kind of contract signed between the granting authority and the winning company.

In particular, among the most common kinds of contract - *management contracts*, *gross cost contracts* and *net cost contracts* – it has been stressed[13] that the *net cost* form most stimulates service trustees to operate not only on costs, but also on revenues, since supply corresponds to the difference between estimated revenues and agreed management costs, such that revenues lower or higher than estimated are enjoyed or carried by the company[14].

Even when tariffs and service quantity are set by the granting authority, the net cost contract still represents a revenue incentive, at least for the increase of service quality (which influences revenues) and for the incentive to fight evasion by passengers. For inverse reasons a gross cost contract should have negative effects on the service quality standard as well as on evasion rate, while a pure management contract would not stimulate the trustee to make an effort to control costs.

This subject is important, because the formulation of the above-mentioned art.19 c.1. of D.lgs.422/1997 is quite ambiguous. In fact the words "net of tariff revenues" do not imply the implementation of net cost contracts.

Considering the service contract features, there is also the possibility that the mechanism stimulates efficiency improvement, mentioned but not specified in c.4 of the same art. 19.

Other problems are represented by the difficulty of maintaining and promoting functional and tariff integration of services on road and rail. This is due to the implementation of competitive procedures in regional railway transport and local public transport.

Complementarity of urban road, underground, and railway networks (as well as complementarity with private transport, which can be realized only with adequate interchange facilities) represents one of the benchmarks of the new politics for urban mobility because the consequent intermodality allows a better dimensioning of vehicles with regard to the volume and the rate of demand territorial scattering[15]. This complementarity is accentuated by an integrated tariff system, which requires an agreement between the different service managers. Public transport tenders have already shown the impossibility for potential new entrants to foresee the economic features of their possible agreements with other manager and, in particular, with the railway manager. This difficulty will be stressed by the introduction of a similar regime also on the railway side, which will make the result of such an integration completely undefinable. At the same time, the possible integration rate between one's own and other managers' service network deeply influences both costs and revenues, but is unknown to competitors. The unpredictability of economic benefits could let people prefer the (minor but definite) benefits of a mere elimination or non consideration of complementarity agreements.

This problem cannot be easily solved and, unfortunately, can lead to an advantage for incumbents and maintain the *status quo*, unless the region (for railway transport) and public authorities (for local public transport) play a more important role in the planning of networks and in the functional and tariff integration of the different kinds of service. In fact, if single competitors are not stimulated to guarantee complementarity, this must be requested by granting authorities themselves and a regulator must define its economic conditions.

A final theme which should be dealt with - but which is too specific to be dealt with here - is the possible risk that regulations introducing calls for bids on transport service could thwart the use of project financing for the most important infrastructure works (and, in particular for railway ones). This problem can be particularly relevant for undergrounds and so, theoretically, is beyond the object of this reflection.

4. Local Public Transport (LPT) on rails and its figures

Regional railway transport is now assigned to the Regional Transport Division of Trenitalia. This division is set out in 21 Offices (19 regional and 2 provincial) where about 22 thousand employees produce a transport supply of about 170 million train-km per year. That is about 6800 train-days and more than 65 billion seat-km, globally offered by Regional Transport including regional, through way, and inter-regional trains.[16] Regional service demand is estimated by the company to be about 19.5 billion passenger-km, while the average number of transported passengers on a weekday is about 1,400,000.

In the balance sheet for the year 2000 (the most recent available online), revenues from public service contracts with local authorities were only 7,6 million euro (16.2% more than in the previous year), while production - freight and passengers - amounted to 8,397 million euro (6.2% more than in the previous year). In this way the contribution of public service contracts with local authorities to the production represents only 0.09% or 0.16% if we consider only the revenues generated by the sale and supply of services (that is the total 1 in the table below).

INCOME STATEMENT (000 of euro)	2000	1999	Difference
A. Value of the production			
1. Revenues of sales and supplies			
a) Products of passenger traffic			
Ordinary clientele	2.041.814	1.925.776	116.038
Territorial public authorities	7.592	6.532	1.060
b) Products of freight and mail traffic	735.045	699.307	35.737
c) Public service contract with the State	1.612.962	1.511.876	101.086
d) Other revenues from sales and supplies	368.890	327.896	40.994
Total 1	4.766.302	4.471.387	294.915
2. Variations of stocks of under production, semi-finished and finished goods	9	0	9
3. Variation of work made to order	-33.854	25.092	-58.945
4. Increase of facilities for internal work	864.052	782.712	81.339
5. Other revenues			
a) Revenue grants			
According to EEC regulations	1.449.628	1.430.586	19.042
Others	137.999	125.019	12.980
b) Employment restructuring fund ex lege 448/98	998.530	974.179	24.350
c) other revenues	214.996	97.044	117.952
Total 5	2.801.153	2.626.828	174.325
Total A - Production value	**8.397.661**	**7.906.018**	**491.643**

Source: Gruppo Ferrovie dello Stato

Table 1: Value of FS Group production in the year 2000

This sum is going to increase both in the final balance for 2001 and in the following years. This is mainly due to the fact that in 2000 many service contracts between Trenitalia and the regions had not been signed yet.

It has to be stressed, however, that according to budgetary data - which are also confirmed by the service chart 2002 - the sum of the grants from the public service contract with the state and those from the public service contracts signed with local authorities almost equals the revenues generated by passengers on internal travel.

These are the main values involved in the privatisation of local public transport on rails introduced by legislative-decree n. 422/97.

5. Regional progress towards privatisation

As far as LPT is concerned, the transfer of competence from the state to the regions was concluded with the regional laws implementing the reform[17] and with the first service contracts which public and private subjects consider as a test prior to the tenders to be made within 2003.

In consideration of what could happen in the next two years, it is interesting to focus on a survey by Federtrasporto (2001) which compares the content of these first documents with a grid of interesting elements.

	Improvement revenues/costs	Additional Supply	Quality increase	Integrated tariff system	Obligatory Service Chart	Sanctions for quality	Prizes for passenger increase	Prizes for quality increase	Flexibility Exercise program	Terms of contract revision	Terms of succession	Region's investments	Sanctions for Region
Abruzzo	■		■		■	■			■				
Basilicata	■		■	■	■	■			■			■	
Calabria	■		■	■	■	■			■			■	
Campania			■	■	■	■			■				
Emilia R.			■		■	■			■	■			
Lazio			■		■	■		■	■	■			
Liguria			■			■			■				
Lombardia			■	■	■	■		■	■				
Marche			■	■	■	■			■				
Molise	■		■	■	■	■			■	■			
Piemonte			■		■	■			■	■			
Puglia			■		■	■			■	■		■	
Toscana	■		■		■	■		■	■		■		
Umbria			■		■	■			■				
V. Aosta	■		■	■	■	■			■	■			
Veneto			■		■	■			■				
Total	6	0	16	8	15	16	0	3	16	5	1	3	0

Source: Federtrasporto, (2001), *Monitoraggio del TPL*, n° 2, luglio.

Table 2: Features included in the service contracts Regions-Trenitalia

A first analysis shows that the regions are more interested in an improvement of the quality standards of the railway transport than in its economic management. This is demonstrated, by the fact that, with the exception of Liguria, every region has created its Service Chart. The focus on quality standards rather than on economic details could be justified by the fact that economic terms will be imposed by the competition during the tender (competition *for* the market and not *in* the market), by the pursuit of profit as well as by the creation of *net cost* contracts where commercial risk is taken by those producing the service[18].

However, service quality includes many different aspects - travelling times, service frequency, service reliability, air-conditioning and cleanliness of the carriages, staff courtesy both on board and on land, punctuality and accuracy of information, etc. - which are difficult to judge according to one single measure if evaluated before signing a contract. In this way often the only element taken into consideration is the possession of a quality certificate, which is quite restrictive if compared with the different elements listed in table 2.

Moreover, if calls for bids continue to show preference for a multiplicity of criteria for identifying the economically more advantageous offer, the problem of their effectiveness arises. That is to say the possibility for the authorities of deciding which offer is the most advantageous for the collectivity is very difficult[19].

It is evident that, in case of informative asymmetry between the subjects taking part into the "game" (not forgetting that to this day the state was the competent authority for public transport), we can expect that during the first tenders the incumbents' offers will be far from optimal, such that this inefficiency is included in the public service contract, or in other words, that the collectivity has to pay for it. This distance between the ideal quantity of service realizable with public subsidy and the quantity actually indicated as minimum service standard will be proportional to the informative asymmetry rate present on the market.

Regions	**Regional law (R.L.) details**
Piemonte	R. L. n. 1 of 4 january 2000 Norme in materia di trasporto pubblico locale, in attuazione del decreto legislativo 19 novembre 1997, n. 422.
Lombardia	R. L. n. 22 of 29 october 1998 Riforma del trasporto pubblico locale in Lombardia
Piemonte	R. L. n. 25 of 30 october 1998 Disciplina ed organizzazione del trasporto pubblico locale
Liguria	R. L. n. 31 of 9 september 1998 Norme in materia di trasporto pubblico locale
Emilia Romagna	R. L. n. 30 of 2 october 1998 Disciplina generale del trasporto pubblico regionale e locale
Toscana	R. L. n. 42 of 31 july 1998 Norme per il trasporto pubblico locale
Umbria	R. L. n. 37 of 12 october 1998 Norme in materia di trasporto pubblico locale in attuazione del decreto legislativo 19 novembre 1997, n. 422.
Marche	R. L. n. 45 of 24 december 1998 Norme per il riordino del trasporto pubblico regionale e locale nelle Marche
Lazio	R. L. n. 30 of 16 july 1998, Disposizioni in materia di trasporto pubblico locale
Abruzzo	R. L. n. 152 of 23 december 1998 Norme per il trasporto pubblico locale
Molise	R. L. n. 19 of 24 march 2000 Norme integrative della disciplina in materia di trasporto pubblico locale
Campania	R. L. n. 3 of 28 march 2002 Riforma del Trasporto Pubblico Locale e Sistemi di Mobilità della Regione Campania
Puglia	R. L. n. 13 of 25 march 1999 Testo unico sulla disciplina del trasporto pubblico di linea
Basilicata	R. L. n. 22 of 27 july 1998 Riforma del trasporto pubblico regionale e locale in attuazione del decreto legislativo del 19-11-1997, n. 422
Calabria	R. L. n. 23 of 7 august 1999 Norme per il trasporto pubblico locale

Table 3: Regional laws after legislative-decree n. 422/97 of reform implementation[19]

In other words, public service, in particular the definition of minimum service standards, is likely to be measured on the strength of historical results which include an internal inefficiency, risking to reproduce it even in the future and betraying, in this way, the true spirit of the reform[20].

The scarce relevance given to the possibility of increasing the offer of service with respect to the quantity indicated in the service contract as well as the lack of incentives (with the exception of the obvious increase of revenues for the company) for the increased number of passengers speak in favour of this argument.

For this reason, it would probably be useful to consult a great number of surveys and benchmarking studies in order to pinpoint the efficiency standards of the individual operative structures that operate in similar contexts. For local authorities this would imply a great effort from the point of view of their internal skills. After years of having had only programming and mainly administrative tasks, these structures should now be reinforced with economic and transport competencies. That is why no region has to this day created *yardstick competition* or *price cap* systems which link public service subsidy to the achievement of certain efficiency standards by the company that wins the tender.

It is important to notice that regional authorities are very interested in the integrated tariff system of public transport. It is evident that they have a double target: improve the quality of the service while allowing the passenger to use more easily different means of transport managed by different subjects - such as tram, bus, train, underground. This implies introducing a single ticket, and the desire to increase the efficiency of each means of transport taking them to the ideal traffic level (for which average costs are minimal)[21]. From this point of view, in many regions the creation of a metropolitan railway network allowed a relevant expansion of the services, which are at the citizens' disposal for their intra-urban mobility without worsening road traffic conditions.

The lack of tariff systems recording passengers' real routes

(for example with a magnetic card) and of reliable surveys on the used capacity can lead to conflicts in revenue management from the integrated tariff system between rail and road operators (with the possibility of generating forms of cross-subsidy). This is more likely to happen with *net cost* contracts where, as we said before, commercial risk is taken by those producing the service, especially in case of long term contracts and of investment plans which can influence traffic distribution quite differently.

6. Privatisation of railway system and of LPT

As we mentioned, local public transport is undergoing a double transformation:

- on one hand, the reform of local public transport tends to privatize the production of the service itself, leaving the programming and planning phase to local authorities (regions or provinces) which have the task of determining the traffic basins and the so-called minimal services;
- on the other hand, the railway reform of EEC Directive 440/91 which has taken place also in Italy, provides that transport service is left to private enterprises, while the management of infrastructures (an element which characteristically is a natural monopoly) is delegated to a subject under public control (in Italy RFI).

This leads to a sharp distinction between the privatisation process of local public transport (LPT) on both road and rail, even though both processes are taking place simultaneously.

In the first case market competition ideally involves a great number of operators negotiating with the public subject to give them the exclusive concession for producing transport services, while in the second case a third subject is involved - the infrastructure manager.

Railway enterprises, then, compete for the right to produce LPT service exclusively according to the timetable, supplementary services, costs, and public subsidies which, in case of positive results in the tender, will later be negotiated with the infrastructure manager. It is very difficult for railway companies to ask for time paths at the moment of the call for bids. In fact, according to the procedures for assigning railway capacity, if the company does not use the capacity which has been assigned to it, the infrastructure manager must revoke the assignment and, more importantly, confiscate the guarantee lent in his favour[22]. With regard to this situation, present Italian regulations do not consider the possibility of the regions booking train paths, but this empasse should be overcome by implementing the Directive 2001/14/CE or creating regional laws on this issue.

In case the request of train paths gets closer and closer to or should even exceed the offer, a problem in train path management arises which has to be solved by the Italian infrastructure manager (RFI) who has already outlined a complex system of priorities among the requests. If we take into consideration that the transport services must not be concentrated over a certain limit in the hands of a single operator, regional traffic has priority (in the process of assignment of train paths to the ones who have requested it), together with the high speed services on dedicated infrastructures and the freight services on dedicated lines (first priority level according to President of Republic's decree 146/1999). In the case of incompatibility among same priority services, however, regional transport is favoured only in the time band 6.00-9.00 A.M.

Moreover, great urban areas may greatly benefit from the shifting of urban traffic from road to rail, but are also those areas where railways are congested or highly utilised. Here it is possible that the infrastructure manager may prefer to assign paths to freight trains or other passenger trains that are more profitable than urban ones, with the risk of a "path rationing" behaviour.

The presence of a third subject whose task is to make train paths available for the arrangement of LPT service on rails has consequences related to the sanctions provided by most service contracts in case of service delay or decline in quality. In fact there is the concrete possibility that the railway companies are considered responsible for reasons due to the infrastructure manager. This isn't so important for the final responsibilities of the railway companies, because they still have the chance to make up for the possible damages or for the incidental charges caused by the infrastructure manager. This is important for the suitability of the penalties belonging to the service contracts drawn up by the regions concerning the provisions of the General Access Conditions (Art. 1) to the railway infrastructure.

7. Investments

In order to face the new competence of the Local Public Transport, regional authorities have set up a series of investments with the purpose of improving the public service both in quantity and in quality. The railway industry has benefited from these public investments as well as from the investments provided by the present service producer (Trenitalia).

Trenitalia has provided for the allocation of 2.090 million euro for the four-year period 2002-2005 (427 million euro for 2002) which are to be split as follows: 862 destined for the purchase of new rolling stock and for restyling or revamping the already operative rolling stock, 146 million euro for improving safety on board, 83 million euro for improving information services for passengers and for the electronic collection system, and 41 for the expansion and the strengthening of workshops.

In recent years, Italian railway companies have been making a great effort to improve transport conditions and the service quality of regional transport. In the main urban areas the integrated tickets road+rail (bus+train) have been succeeded by the new trains TAF (High Usage Train) and the TBF (Low Usage Train) which have been intentionally created for local traffic. There are 67 trains of this kind up to now, and another 32 will be added within 2003. Other efforts aim to improve traveller comfort thanks to air-conditioning in the carriages, better internal and external cleanliness, and sound communication of information.

As mentioned before, local authorities also take part in these efforts, or at least some of them, by allocating capital for the purchase of new rolling stock or signal systems, and for travel information at the railway station – as seen in Liguria, Lombardia, Lazio, Toscana, Veneto, Abruzzo, Campania, Emilia Romagna, Marche and Piemonte. The chance for the local authority to invest in local transport service is provided by the reform implementation (see, for instance, Art. 43 of the law of Regione Campania; Artt. 6 and 20 of the law of Regione Toscana, Art. 10 of the law of Regione Lombardia, Art. 18 of the law of Veneto) on condition that the incumbent of the investments can not transfer them or use them for purposes other than local public transport (LPT).
These investments are increased by those which follow the drawing up of service contracts with local authorities for levels of service that surpass the minimum.
The nature of investments in the railway industry has repercussions for the length of service contracts. Investments in equipment such as rolling stock must take into consideration that the economic life of the goods greatly exceeds the contract length, so that it becomes necessary to lay down rules for the incoming of new concessionaires in the investment management[23]. The service contract length provided by the regional laws goes from a 3 years minimum in case of direct assignment (according to the law of Regione Lombardia), and 5 years in case of assignment according to tender procedures (law of Regione Liguria), up to 9 years maximum as set out by Art. 18 of the legislative decree 422/97.

8. Italian reform and the European regulations

As affirmed by Boitani and Cambini[24], the most tricky menace to the deregulation process just begun in Italy could come – if the version of February 2002 should be approved by the European Parliament and by the Council – from the new Community Regulations 2000/0212(COD) regarding public services duties and public service contracts in the field of passenger transport by rail, road, and on inland waters.
Another theme purposely faced in the Regulations is controlled competition instead of deregulation or privatisation of local public transport (LPT) services as an instrument for making public transport more efficient and attractive. What is most important is that the regulations give large discretion to local authorities in opening the market to competition.
The last version of the Regulations has raised (art. 7) the maximum threshold standard "de minimis" value, on the basis of which local authorities can entrust services without tendering - bringing the threshold from an annual average value of 400 thousand euro to one million euro in the assignment of extra services and from 800 thousand euro to 3 million euro in the assignment of a whole network. In these cases the public authority has to indicate in advance that it isn't going to call for tenders, in order to give anybody the chance to present different proposals for the provision of the same public service. In this way the authority forces the public body to value them and to express reasons for possible acceptance or rejection. If this stands, however, small urban centres could be completely excluded from all competitions, particularly centres that have economically undersized companies and which are less equipped (because of their size) for making comparative evaluations on a non homogeneous basis (differently from what would happen if they called for public tenders).
Moreover, the new Art. 8 of the E.U. Regulations gives local authorities the direct possibility of supplying local public transport service, taking a step backward towards the sharp separation, indicated also in many regional laws, between the phase of the transport service planning and the phase of the real production of public service. As well, conflicting interests between regulated bodies and regulators will emerge and develop in such a way that in many cases they would end up coinciding.
The solution provided by Art. 9 seems to be quite odd, as it would impose the subcontracting of part of the services if the public tender winner concentrated prominent market shares in itself. It is clear that the community legislator considers a certain level of competition valid only by a minimal number of operators, rather than by the possible "hit and run" behaviour of potentially new elements, increasing market contention rather than the number of operators.
In order to amortise investments, art. 6 finally provides a 15 years maximum limit for public service contract length for transport on rails, higher than normally indicated by the regional laws. Such a large time period could produce the risk of opportunistic behaviour on the part of the transport system management which could reflect on the ability of the reform to affect transport services costs and the service level offered to citizens.

9. Prospects and open problems

Even if the terms foreseen for the beginning of tender procedures are quite close to date, there are two regions in Italy, according to a survey conducted in the first half of 2002, which are closer to the announcement of tenders. They are Liguria and Lombardy, which have chosen different ways of carrying out service privatisation. Liguria, in fact, is going to call for only one tender for the whole regional railway service, whereas Lombardy has "broken" the railway network into different basins which will be entrusted through tenders during the period 2004-2008.
The choice of Lombardy is based on the fact that the time necessary to a company to complete rolling-stock is extremely long, different than in the LPT for road[25]. Moreover we have to consider that, following the LPT reform in Italy, the railway industry can acquire rolling stock property even if it has been financed by the state or by the regions (or other local authorities), highlighting the difficulty that other non-incumbent bodies face in participating in the tenders, unless the tenders are announced in advance (years before).
This problem is reduced in case of non-electric railway lines because the delivery time of diesel trains and tractors are shorter (so the times for the birth of new rolling stock

companies are reduced) and because the lack of an electrified railway line with the same voltage remains one of the main barriers for the entrance of foreign companies.[26]

These facts point out that one of the obstacles to the realisation of LPT target reform is the lack of an independent body (an agency for instance[27]) to whom it is possible to entrust the property of the rolling stock, with the subsequently exclusive task of giving railway systems management to public service concessionaires through leasing contracts. All this lets us think that the first tender session should end up with the confirmation of the present service transport managers, but this doesn't mean that there will not be improvement in the service quality and a reduction on its cost.

Consequently, tenders should set off a new interest in enterprises which already have the railway licence and safety certificate, that's to say the ones which manage the railway lines in administrative concession and which could be soon interested in acquisitions, joint-ventures, and co-partnerships.[28]

This leaves open questions of future chances of having multimodal public transport services. This solution would allow the creation of real tariff coordination for the different transport modalities involved, avoiding possible competition among different transport systems[29]. This seems feasible in some regions – such as Lombardy, where it will be probably applied to the Brescia-Edolo line – but isn't considered as a valid solution in other Italian Regions.

10. Concluding remarks

Railway transport is experiencing a difficult transition from public production and centralisation in planning and management of service and infrastructure to open-market service management and regionalisation of a great part of transport planning (that is to say everything not considered of national or international interest, implementing subsidiarity).

In Italy (with significative analogies with France and Germany and partially with the United Kingdom) the first feature of this new order is based on the implementation of the EU regulations to separate infrastructure management and service production (de-verticalisation) and on the contemporary liberalisation of the latter by means of competition for the market. The second feature is obtained by delegating to the regions (Bassanini reform) the planning of regional and local public transport (regional plan for transport, triennial program for local public transport service), the definition of transport service in order to satisfy citizens' request for mobility (minimum service standard), the regulating function by means of the choice of service manager (as mentioned, by means of competitive procedures), and the control of the manager's activity (by means of the service contract).

This system, based on the principles of liberalisation (and potential liberalisation) and regionalisation seems to be apt, at least theoretically, to increase both production, by reintroducing competitive and market mechanisms, and service efficiency with regard to the needs of the local community, by empowering regional government.

Consequently, railway transport is going to play an important role in urban and metropolitan mobility. In particular, it is fundamental for government strategies in big metropolitan areas, because it allows the simultaneous increase of effectiveness, efficiency, and sustainability of transport, while other kinds of strategies present some trade-offs for the achievement of the different goals.

However, if we consider the liberalisation processes in transport of the last 25 years as a whole, the introduction of competitive principles has met more difficulties in the area of local transport.

Avoiding any consideration of de-verticalisation in general (the question has already be examined in other chapters of this special issue), the possible dangers for the implementation of the global project for regional railway transport represent the items on the policy makers' agenda. They can be defined in this way:

1. Role confusion and consequent conflicts or collusion. The outlined scenario presents a complex system with many actors. For this reason it is fundamental that the roles of the region (regional mobility planner and institutional service claimant), of the infrastructure manager, and of the service manager are well defined. The complexity of the situation and the attempt to protect pre-existing interests can, on the contrary, lead to a partial clash of functions, as we have seen for the constitution of regional railway companies. This leads to many possible conflicts of interests and/or collusion, as we have already mentioned: between region and tender winner, between infrastructure manager and railway transport companies (for train tracks[30]), or between region and incumbent, if the latter is the favourite service trustee for political, social or labour reasons.

2. Advantages for the incumbent. These derive from the potentially different access to inputs (the mentioned problems concerning the assignment of tracks, the property of rolling stocks, the training of personnel), from the dimension of other operators (if the pre-existing operators are too few or too little), from political and labour pressure (as partially mentioned in point 1, caused by the preference to maintain the *status quo*).

3. Planning difficulties. In addition to a frequent technical insufficiency in planning capabilities by regional authorities, a more important aspect is the real definition of minimum service standards. In fact, they risk coinciding with those which obtained with the existing "historically" determined state transfers that are. This would thwart the concept of the reform in terms of the response of regional requests to the real needs of the users.

4. Difficulties connected with competitive procedures. The problems mentioned, particularly in § 3, can allow tenders to become tenders for management, maintaining unchanged the situation rents, the entity and the cost of personnel, and the existing service, thwarting the possibility of increasing service efficiency and effectiveness.

5. Difficulties connected with service contract. There are many problems deriving from the implementation of the service contracts between regions and railway companies. In particular they are due to:
- the definition of the kind of contract (art.19 c.1 of decree n.422/1997) and, in particular, the opportunity to sign net cost contracts, in order to stimulate service trustees not only to reduce costs, but also to increase revenues;
- the definition of the kind of incentive for the improvement of efficiency by the service manager (art.19 c.4 of decree n.422/1997);
- the evaluation by the region of the real fulfillment of contract commitments and the real possibility of punishing possible breaches;
- the evaluation of service quality standards;
- the difficulty of feed-back as far as the fulfillment of the goals and the final request needs by the service producer are concerned.

6. Difficulties deriving from the generalised use of competitive procedures to increase functional and tariff integration with the transport on wheels and, in general, with the urban and metropolitan transport, which is produced by other companies.
7. Difficulties in activating construction and management concessions (project finance), since the service production must be delegated with a competitive procedure.
8. The insufficient financial and taxation autonomy of the regions. This is a "transversal" problem which involves many sectors of the economy and which influences many of the above-mentioned points.
Apart from the above-outlined difficulties, this reform could lead to deep changes in regional rail transport and, plausibly, also in supply (cost reduction, reorganization and rationalization of the network, increased labour unrest), in the market (bilateral monopoly situations where the distinction of roles and a real liberalisation, followed by a possible privatisation, seem to be fundamental), and in the cost for users (increased tariffs, greater attention to the final client by companies which, up to now, were mainly production oriented).
On the other hand, we can say, without exaggerating, that keeping regional socio-economic systems depends on the sustainability of the short-range transport system and that railway transport plays a fundamental role, at least in some kinds of "urban systems". In fact, the suitability of local public transport is strongly linked to the typology of metropolitan growth. Railway transport could be the right choice in a monocentric radial urban system (cities belonging to the "industrial triangle", but also some big cities of Southern Italy), but even more in polycentric diffuse systems (such as, for example, those of Veneto and Tuscany), while those urban fabrics reproducing *ad infinitum* the same "module" around elevated service standards are, inevitably, based on individual road transport (but they are not very diffuse in Italy and in Europe).
With regionalization, the region becomes the centre of transport networks according to a logic which foresees the inter-connection of international networks (such as Trans-European Networks), national high speed/capacity networks and local transport on rails and road. From this point of view, the regional governance of request definition is fundamental in order to optimise the interface with national (railway) transport and with local transport (road, collective and individual).
Railway transport planning and management can become one of the linchpins of competition among territorial economic systems and could regain, at least partially, that role of localizing factor that it had during the industrial revolution between the last half of the 19th and the first decades of the 20th century, when it was essentially a freight transport mode.

Acknowledgements
The entire paper is a product of the strict co-operation of the authors, nevertheless §§ 1, 2, 3 and 10 are by E. Musso and §§ 4, 5, 6, 7, 8 and 9 are by C. Ferrari.

NOTES

[1] In Italy the number of people transported has inverted the increasing trend at the end of the '70s, going from 6 millions 150 thousands passengers in 1978 to less than 3 and a half million in the last years, while there has been a growth of people transported by underground and a much more evident decrease in bus transport. Musso, E., and C., Burlando, (1999), *Economia della mobilità urbana*, Utet, Torino, cap. 4.

[2] Demsetz, H., (1968), "Why Regulate Utilities?", *Journal of Law and Economics*, Vol. 11, pp. 55-65.

[3] See articles 81, 82 e 86.

[4] The fees, calculated on costs base (circulation, energy, general expenses and indirect expenses), must grant the balance account to the infrastructure manager, Zucchetti, R., and M., Ravasio, (2001), *Trasporti e concorrenza: dal monopolio pubblico al libero mercato*, EGEA, Milano. The time paths entrusting considers first of all the mobility need of the citizens, relations ruled by service contracts (regional and local), high skilled services and freight services and, in the end, national passengers' services.

[5] The first new operators obtained permission in 2001.

[6] As we will mention in the next paragraph, the real definition of minimum service standards is one of the most difficult aspects of the implementation of the reform.

[7] As regional implementation rules are quite different, regional railway management includes different disciplines such as the creation of regional companies and the call for bids and, in some cases, regional laws do not arrange mechanisms for entrusting services. Zucchetti, R., and M., Ravasio, (2001), op. cit.

[8] It is not by chance that railway transport had greater and longer success in centralized economies. It is symptomatic that the German Democratic Republic's reunion to Germany and its conversion to a market system implied a collapse of railway market segments in that country.

[9] In parallel, the transposition of the same mechanism between Region and local authorities, as far as municipal and provincial transport on wheels is concerned, lets "minimum service standards" correspond to regional subventions, which, usually, correspond to a service standard that is much lower than the present one and create serious financial difficulties to local authorities. Theoretically, they could integrate regional subventions in order to enhance their service standard with regard to the minimum one, but this is almost impossible because of their financial situation. In this way public transport risk overstuffing overmanned with regard to the service quantity which is possible to tender. This stresses labour opposition and risks making calls for bids meaningless.

[10] Demsetz, H., (1968), op. cit.

[11] Even existing rolling-stocks should be given to these societies in order to avoid any advantage for the incumbent.

[12] Paradoxically, this conditions the difficulty existing for municipal road transport companies which compete with others in tenders which have been called by their own owners!

[13] Boitani, A., and C., Cambini, (2002), "Il Trasporto Pubblico Locale in Italia", *Mercato Concorrenza Regole*, Vol. 4, n° 1.

[14] In a gross-cost contract, supply corresponds to the estimated and agreed management costs, independent of the revenues taken by the granting authority.

[15] For a more detailed treatment, Musso, E., C., Burlando, (1999), op. cit., chapter 8.

[16] Service Chart 2002.

[17] Table 3.

[18] Taking into consideration subjects charged with industrial risk (linked to management costs), and commercial risk (linked to the revenue trend), literature usually distinguishes: *management contracts*, where the client is charged with the two kinds of risk, *gross-cost contracts* where the operator is charged with industrial risk and the client with commercial risk and *net-cost contracts* where the operator is charged of both the risks.

[19] Since so many elements weigh on the evaluation, it is necessary to establish a test specimen among these criteria.

[20] As far as LPT by road is concerned, in one case the incumbent was forbidden to take part in the tender, in order to diminish the informative asymmetry between competitors and the "auctioneer", but this solution cannot be applied to LPT on rail, as we will see later.

[21] Think, for example, that an urban railway network can transport up to 70 thousand passengers per hour on one single rail at a speed of about 30-35 Km/h, while in case of a bus transport the transport capacity is reduced to 10-15 thousand passengers per hour.

[22] Whose value is equal to the highest between the 10% of the economic value of the contract and its economical value referred to the month of greatest supply by the infrastructure manager (art. 10 "The Criteria and Operating Procedures for railways capacity allocation" and art. 1 "General Access Conditions" to the railways infrastructure).

[23] It is evident that the lack of chances for new concessionaires to succeed in the patrimonial management of rolling-stock and equipment leads the railway industry towards insuperable barriers in market entry and exit.

[24] Boitani, A., and C., Cambini, (2001), "La riforma del trasporto pubblico locale: problemi e prospettive", *Workshop Antitrust*, Milano, 22 giugno.

[25] The Regione Lombardia has estimated the average time between the order and the delivery of a train of about three years.

[26] It is known that the EU countries have electrified lines with different voltages, so interchangeability is guaranteed only thanks to tractors able to adapt themselves to different voltages (much more expensive than the ones used in the single national lines).

[27] Regarding independent authorities in the transport field, see also Boitani, A., (2000), "Un'Autorità indipendente per i trasporti?", *L'Industria*, Vol. 24, pp. 821-832.

[28] Regarding co-partnerships see Torbianelli's article in this volume. For an economic analysis of the regional railways lines see Canali, C., (1988), *Le Ferrovie Regionali in Italia*, Step,Parma.

[29] Regarding competition among alternative transport modalities see also Marchese, U., (2000), *Lineamenti e problemi di Economia dei Trasporti*, ECIG, Genova.

[30] It is necessary to mention that another difficulty could be arise from a recent EU attitude tending to divide the use of the network into "nodes" and "arches", in order to let the use of the former pay more than the latter. For local transport, which is based on nodes, this would mean that it should pay most of the use of the infrastructure network.

Bibliographic References

Boitani, A., (2000), "Un'Autorità indipendente per i trasporti?", *L'Industria*, Vol. 24, pp. 821-832.

Boitani, A., and C., Cambini, (2001), "La riforma del trasporto pubblico locale: problemi e prospettive", *Workshop Antitrust*, Milano, 22 giugno.

Boitani, A., and C., Cambini, (2002), "Il Trasporto Pubblico Locale in Italia", *Mercato Concorrenza Regole*, Vol. 4, n° 1.

Burlando, C., (2001), "La riforma del trasporto pubblico locale a livello regionale: stato di attuazione e problemi aperti", *Quaderni Regionali*, anno XX, n° 2.

Canali, C., (1988), *Le Ferrovie Regionali in Italia*, Step, Parma.

Demsetz, H., (1968), "Why Regulate Utilities?", *Journal of Law and Economics*, Vol. 11, pp. 55-65.

Directive 2001/14/EC of the European Parliament and of the Council of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification, Brussels.

European Community Commission, (2002), Proposta modificata di regolamento relativo all'azione degli Stati membri in tema di obblighi di servizio pubblico e di aggiudicazione di contratti di servizio pubblico nel settore del trasporto di passeggeri per ferrovia, su strada e per via navigabile interna, Brussels.

Federtrasporto, (2001), *Monitoraggio del TPL*, n° 2, luglio.

Marchese, U., (2000), *Lineamenti e problemi di Economia dei Trasporti*, ECIG, Genova.

Martinez, M., (2002), "La differenziazione e la contendibilità dei mercati regionali e locali dei servizi di trasporto pubblico in Italia", *Ingegneria Ferroviaria*, anno LVII, n° 8.

Musso, E., and C., Burlando, (1999), *Economia della mobilità urbana*, Utet, Torino.

Rete Ferroviaria Italiana, (2001), "General Access Conditions", RFI, Rome.

Rete Ferroviaria Italiana, (2001), "The Criteria and Operating Procedures for the Railway Capacity Allocation", RFI, Rome.

Tirole, J., (1999), "The Institutional Infrastructure of Competition Policy", *Roundtable on New Comparative Economic Systems*, World Bank-CAE, Paris, Vol. 21, June.

Zucchetti, R., and M., Ravasio, (2001), *Trasporti e concorrenza: dal monopolio pubblico al libero mercato*, EGEA, Milano.

The Impact of Vertical Separation on Regional Railways: The Case of Veneto and Friuli Venezia Giulia

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1. Introduction

Other articles featured in this edition illustrate the main characteristics and the most remarkable themes of railway reform in Italy, as regards urban and local transport. They clearly point out that the issue of de-verticalising the railway system in Italy is strongly linked to a general reform of competencies. As highlighted, for example, by Musso and Ferrari: "*…the regionalisation of a railway transport inclined to de-verticalisation outlines a new institutional picture, combining regulations aimed at efficiency (separation of infrastructure management from service production in which competition is promoted) with the territorialisation of skills, based on subsidiarity, which aims at increasing transport effectiveness through a close relationship between requirements planning and collectivity requirements*" [1].

This article features an in-depth analysis of the most significant issues in the regionalisation process of railway competencies. This analysis is carried out through the observation of the actual situation in a specific geographic area: the north-eastern part of Italy (comprising the regions of Veneto, Friuli-Venezia Giulia, and Trentino Alto Adige, represented in fig.1).

Figure 1: Friuli Venezia Giulia and Veneto

Indeed, this area: a) has been at the forefront of a significant economic development over the last 10-15 years; b) features, in the main region (Veneto), an articulate and multi-centric urban structure within which the urban railway system has a very important potential role, considering the current road congestion levels and the dispersion of town centres; c) includes different models of regional administration (Veneto has an "ordinary statute", whereas Trentino Alto Adige and Friuli Venezia Giulia, bordering on foreign countries, have "special statutes"[2]); d) has seen the development, over the last years, of a politically strong movement for the decentralisation and devolution of policies, in all sectors.

The proposed analysis does not aim at describing and discussing in detail the overall aspects of the actual implementation of the railway reform in the Italian regions. On the contrary, the analysis focuses on the description of the real situation, which, albeit partial and limited (since based on examples), aims at illustrating the nature of the problems the Italian reform is facing.

2. Implementation of the Railway Reform in Veneto

2.1 The regional legislative framework and the state-region agreement

Of all regions in north-eastern Italy, Veneto is the most important in terms of size, population and economic parameters. This is the main reason why the text comprises a large description of the Veneto example. Due to the size of the region and, therefore, the scope of the issues, it is a particularly interesting example.

In the Veneto Region, the implementation of the railway reform has been carried out according to a procedure similar to that adopted by many other Italian regions with ordinary statutes.

As soon as in 1998 the regional legislation on transport in Veneto[3] adopted the guidelines of the national Legislative Decree n. 422 dated19/11/97, that were amply illustrated in the articles by Marcucci and Musso-Ferrari. According to regional legislation, the fundamental objective of the Veneto region is to overcome the monopolistic model of transport service management. The same law defines the strategies to be implemented generally by all transport modes (bus and railway transport) to reach that objective. The strategy comprises the following points: a) the introduction of competition rules into the periodic committal of services, through calls for tenders aimed at choosing service providers or private partner companies managing those services; b) the introduction of public service contracts based on the principles of effectiveness and profitability, able to ensure full

compliance of their contract obligations as regards available services and resources, net of revenues from tariffs; c) the integration of tariffs among the various transport modes, promoting the separation of organisations responsible for services planning and financing activities from those actually managing the services.
Furthermore, particularly regarding the railway sector, the regional Law statues that the provisions of the directive n. 91/440/CEE be applied also to regional and local transport structures. Other parts clearly call for the principle of separation between the planning/regulatory functions (principal) from the functions of industrial management (agent) and the one concerning the stipulation of service contracts, featuring precise contents, backing, and description of promotion mechanisms.
Over and above these principles, there is the decision that authorises the regional Council "to set up a company for the management of the railways that are managed by the state on commission, and are entrusted to the Ferrovie dello Stato S.p.A. for restructuring." The above-mentioned company may acquire shareholdings in companies whose statutory purpose is the management of regional and local railway services.
Overall, it can be said that the principles established in the Veneto regional legislation aim at setting up a system for the production of public transport services, including railways, based on competition. It is worth mentioning that the same framework explicitly envisages the possibility of the regional Administration's active involvement, through a company of its own, in the production of railway services in the region[4], neglecting the possible negative implications of such a participation for the competitive environment (see paragraph 2.3.2).
In Veneto, as in other Italian regions, the instrument regulating the devolution of competencies from the state to the regions was the so called "Accordi di Programma" (framework agreement) between the Ministry of Transport and the regional administration, directly conferring upon the latter the funds for the acquisition of railway services from railway companies operating in the region.
Before the adoption of the agreement, these companies operated directly on behalf of the Ministry, and received subsidies for the services provided from the Ministry, not the region.
Regarding the Veneto region, the framework agreements for the two railway companies operating in the region (Trenitalia S.p.A. and Ferrovie Venete) were stipulated between the Transport Ministry and the regional government[5] in 2000.
For Veneto, the devolution of railway competencies was implemented for certain categories of urban railway transport services, notably: a) for passenger transport services performed by "regional" trains (for journeys within the region's borders), b) for certain "inter-regional" trains, communicating with bordering ordinary-status regions (Lombardia, and Emilia Romagna).

2.2 The experimental service contracts between Regions and railway companies

In general, according to the principles of competencies' devolution, the state-region framework agreements explicitly require that the relationship between the two parties be further regulated through an additional agreement, also known as service contract.
Specifically, the service contract between the region and the railway company directly derives from the framework agreement as regards: a) the threshold for regional financial support (subsidy); b) certain contract obligations, among which the most significant is monitoring, i.e. compulsory accounting and reporting activities (in favour of the region) regarding production costs and other technical, economic, and financial parameters.
The contracts envisaged by the state-region framework agreements are defined as "experimental" because of the compulsory "monitoring" (over and above other product-related parameters) of analytical production costs with the objective of shedding light, year after year, on costs actually imputable to the urban railway service production by each regional network. In the long run, therefore, the result should be a sensible distribution of state funds among the regions, based on a correct estimate of cost of production figures.
According to the provisions of the framework agreement with the state, and in collaboration with railway companies operating in the region's territory under the old regime, the Veneto Region started drawing up the first experimental service contracts (2000-2001) as soon as in 2000.
In spite of the differences between the two counterparts (Trenitalia is the state-owned Italian railway company, whereas Ferrovie Venete is a small integrated operator performing its services on a secondary line of approximately 70 km between Adria and Mestre), the two contracts are based on identical principles and, therefore, can be discussed jointly. However, it should be pointed out that their duration is different The contracts with Trenitalia (strategically very important because they cover most of the services in the region) have been envisaged as annual contracts to ensure a better management of the experiment. The contracts with the "local" railway have a 3-year validity.

2.2.1 Clauses for the monitoring of economic parameters

The contract between the region and Trenitalia explicitly recognizes that the parties, first of all, should set up adequate tools and resources for measuring, checking, and evaluating the physical, economic, and financial variables involved in service production. Knowledge and information are considered very important.
More specifically, the information gathered should permit the following: evaluating costs and revenues of each line; measuring of cargoes on each line and train; monitoring the quality of services provided; measuring customer satisfaction (quality perceived).
The contract further specifies and requires the railway

company to collect information relevant for the control of management. This includes: fare-paying transported passengers; annual service distances actually covered (as against planned amounts, due to strikes, accidents, natural disasters); operative cost of service per kilometre, forecasted and final; operating speed of services (ratio between train-kilometres* and number of hours of service offered) based on official timetables; and ratio between revenues from services and operative costs, net of infrastructure costs.
According to the contract, the railway operator should submit this information to the region, as precisely defined in the contract.
As stated, the contract defines the economic/management monitoring parameters to support the regulatory entity (the region) in its monitoring of the entire regional transport service system, in both input/output aspects and the evaluation of the levels of efficiency.
Another purpose of these clauses is to motivate the multi-product state-owned railway company (Trenitalia) to further refine its system of analytic accountancy, which, if left unchanged, will not have allowed a rational charging of costs to the services produced on behalf of the region, and their distinction from costs pertaining to other services (long distance, etc.).
The control mechanism also requires the railway company to provide basic information referring to the resources specifically dedicated to the production of services for the region. In the contract special attention is given to personnel information (number of employees allocated to each function).
Further compulsory information on the service provided relates to the difference between planned and actual service provision: number of rides lost, number of break-downs, accidents, and shifts from planned driving hours (which ought to be registered both in absolute values and in percentage points each six months).

2.2.2 The difficulty in rolling-out the application of the monitoring clause

One year after the contract between the Region and Trenitalia became active, the transfer of information appears still far from its full realisation. Hence, the Veneto Region still does not have the basic information on the services management costs.
The failure to transfer information poses no problems over a short period, but taking further steps in the implementation of the reform may become much more difficult.
It is true that the region does not necessarily need to receive information concerning costs for purposes that are directly connected to the management of the Trenitalia contract. Indeed, during the first years of contract application, the subsidy transferred to the railway operator for the performance of services basically does not depend on the costs of management, in the sense that no mechanism has been devised to connect the cost trend and the financial public support (see paragraph 2.2.4).
However, there seems to be no case for a mild breach of the spirit of the contract. In fact, it should not be forgotten that the main objective of the monitoring clauses is to improve the knowledge, at the local authority level, of costs (and the operative margins!) in the production of services across the regional network, also in view of a possible tender. Such information is essential for the definition of the tender criteria.
Considering the prospect of a future tender for the commissioning of services may explain Trenitalia's reluctance to provide data, according to the company's strategy of preserving maximum information asymmetry.
Trenitalia has no interest in providing the region with information that may reduce its scope for action (and profit!) at the moment the tender takes place. Trenitalia would benefit from the difficulties the region might have in identifying the economic parameters for the tender, given that each year of delay means, for Trenitalia, the smooth carrying out of its business. Finally, even in the period that precedes the tender, the failure to provide cost information is advantageous for the railway operator - who runs no risks of being criticised because of excessive margins when the annual subsidy is being defined.
The railway company is partially justified by the fact that the knowledge of costs imputable to a single production segment is not readily available. Only after splitting into different companies, i.e. over the last few years, has Trenitalia started to sort out their analytic accountancy sector. It is true, however, that a possible weakness in the accounting system was well known long before the signing of the contract.

2.2.3 Service quality and its monitoring

In general, as Musso and Ferrari point out well, the regions are much more sensitive to quality than to the issue of cost-efficiency, because the quality of services moulds the citizens' opinions (including those of political nature) on the work of the local bodies.
The provisions on the monitoring of the quality of services play a very important role, including in the service contracts between the Veneto Region and the railway companies.
The requirements on the quality of service contained in the experimental contracts between the Veneto Region and Trenitalia define, above all, a generic commitment towards the improvement of the levels of quality perceived by the clientele.
On the whole, an effort towards giving "an optimal response to the needs" is required, focusing specially on the needs of the disabled (eliminating architectural barriers, standardising compositions as regards the position of cars for the transport of the disabled, etc.).
According to the contract, service quality monitoring also falls (in principle) within the railway operator's responsibility. The operator should provide data on adhesion to the minimum standards every six months, including the list of trains arriving late by more than five minutes[6].
However, the region can carry out a survey by sampling, in

order to assess compliance with minimum quality standards (frequency, punctuality, cleanliness, condition of the rolling stock, quality perceived by the clientele), but the sampling criteria should be defined in agreement with the railway company. Regional authorities' employees can carry out these surveys in full. The monitoring activities by regional surveyors comprise the following: the identification of punctuality upon arrival at destination, comfort (the average number of available seats, the time passengers spend standing, temperature/air-conditioning, equipment, lighting and door efficiency), cars and restroom cleaning, respect of minimum contractual standards, and identification of causes for possible delays. The check is carried out on samples without prior notice as to the composition being examined and taken as an example.

Inspections on Trenitalia trains began in November 2002. As regards the evaluation of the quality of service, it can be said that service quality monitoring poses less difficulties than that of the costs of production.

Cleanliness is considered a crucial element in the service contracts, and the relevant detailed regulations are surprising. The contract meticulously lists the stations requiring daily cleaning (the main ones), or fortnightly, weekly, etc. As regards cars, the cycles for the different cleaning services are also outlined (full service, every 60 days, normal, every 5-10 days, superficial, daily), whereas checks are carried out every six months on a sample of at least 10% of the trains. The evaluation criteria for cleanliness are based on parameters referring to three different areas of the car (external, compartments, WCs), on the basis of which a weighted average is produced. During the checks and, therefore, upon judgement, the scores are given with reference to a parameter of acceptable quality, considering also other parameters including the car's age.

As regards crowding and comfort, a more generic classification is envisaged, according to which "the trains compositions should be planned in such a way to suit the demand, foreseeing – if possible – a seat for every passenger; nevertheless, if this is not possible, actions should be taken to reduce to the minimum the time the passengers are forced to spend standing, not exceeding 20 minutes." The evaluations are carried out on a monthly basis.

Trains cancelled due to technical failures in the cars or infrastructure should not exceed 0,5% of the planned services. If there are problems, downtime should not exceed an hour.

Finally, as to the transmission of information to the public, there should be railway maps and audio notices on-board the trains with suitably equipped cars. The stations should be equipped with a timetable for trains and buses, a map of all local passenger transport services and adjacent parking areas, tables with tariffs (both for trains and busses), and the indication of the departure platform.

In general, respect of monitoring obligations should be checked and discussed periodically by an ad hoc technical committee comprising representatives of the institutions involved (railway company, ministry, and region), to evaluate or reformulate the parameters in prospect of contract renewal. To date, however, the technical committees apparently have not met the expectations regarding the task entrusted to them.

2.2.4. Other features of the experimental service contract

General aspects

Over and above the monitoring of the economic and qualitative service parameters, the contents of the service contract deserve attention in other aspects.

Under an experimental contract the railway operator is required to draw up a service operations programme complete with all information (distance, time-table, operation days, train-km, etc.) for each train operated. Furthermore, the railway company carries the costs of management supporting administrative activities, and of the programming and co-ordination of ancillary activities (maintenance and control of the rolling stock, etc.)

In that respect, there is an interesting clause in the contract with Trenitalia, according to which the railway company commits itself to ensure as far as possible that maintenance of the rolling stock take place at facilities located in the region, to achieve a locally-generated economic return, and ensure that the rolling stock remains within regional borders.

The contract aims at promoting flexibility within the agreed operating programme. In general, the path towards the re-programming of kilometric distances remains open, to allow quick adjustments to changes in demand or to promote intermodality. The railway company has the responsibility of drawing up a declaration on the service actually provided.

The continuity of the service on low demand distances is ensured by the opportunity given to the railway company to set up replacement journeys by bus, previously agreed with the region. Furthermore, the railway company can include integrated railway/bus services in its operation plans, provided these are previously approved by the region and agreed upon with the bus companies.

The contract model comprises a clause granting the region the right to act directly - being directly responsible for the services - in the event the operator abandons or suspends the service (for reasons not attaining the failure to pay the subsidy). In cases of Force Majeure, there is no reduction of the subsidy due, provided the company ensures a suitable replacement transport service by bus, both in terms of timetables and type of service.

Contract penalties

The nature of the penalties is classified according to the type of event: 1) failure to comply with the parameters of punctuality as regards the timetable; 2) other types of non-compliance (failure to comply with the cleaning cycles or provide the information required to the public or to the supervisor).

1) The shifts from the parameters of punctuality are sanctioned according to different criteria, depending on the type of service involved. For this purpose, three groups of

services have been identified:
a) services performed by inter-regional trains connecting large urban centres (i.e. Verona-Bologna; four services)
b) services performed by regional and direct priority trains (i.e. Venezia-Padova-Verona-Brescia; eight services).
c) other services performed by regional and direct trains.
There are two tolerance thresholds: max 12% of trains with a delay exceeding 5 minutes and a max of 6% of trains with a delay exceeding 15 minutes. For each percentage point exceeding the two tolerance thresholds, in a 6-months period, different penalties are applied (varying, in 2001 from approx. 7,500 Euro to approx. 20,000 Euro), depending on the type of service and the tolerance threshold breached.
The services most significantly protected by the penalty mechanism belong to category b), being of the greatest interest for the region (daily commuting between the urban centres of the Veneto). There is, however, a sort of an acquittal bonus reducing the burden and the possibility of penalties: if 90% of total annual services registers delays not exceeding 10 minutes, the penalty is not applied.
Shifts from cleaning cycles and compulsory railway information service are defined by single breaches of contract as identified through inspection or through notices given and then checked, irrespective of the service category. In 2001, the penalties ranged from 250 to 500 Euro for a single breach.
The reinvestment of revenues deriving from the application of penalties and sanctions is determined by the region, but should be designed to enhance the railway service or the local public transport system in general.

Nature of contract and incentives
Like many other experimental railway contracts enacted in Italy, the one between railway companies and the Veneto Region is in principle a net cost contract (Boitani-Cambini, 2002).
The contract defines the services to be provided, the subsidy, and the tariffs. These envisage that the incentives in favour of the railway operator are mainly linked to the opportunity to reduce costs and increase the number of passengers carried, although the most recent version of the contract contains some price-cap elements.
There is no connection between the subsidy and the level of costs in regional network operations. Still today, the subsidy amount is equal to the one applied in the period preceding the reform of the contracts. For the issue of cost reporting, we refer to paragraphs 2.2.1 e 2.2.2 on clauses regulating the monitoring of production costs. After all, there seems to be no real opportunity for the introduction of mechanisms that would enable the region to benefit from cost reductions applied by the railway operator.
Tariffs are set by the region which, generally, applies the principle that tariff increases should not lead to competition distortions with regard to road transport. The transition from the first experimental contract (2001-2002) to the more recent one (2002-2003) has introduced some changes. According to the first edition of the experimental contract, the railway company could put forward tariff adjustment requests only once a year, aligned with the planned annual inflation rate, except in the case of non-recurring investments made by the company. Furthermore, that contract envisaged that tariff variations (always defined by the region) were granted exclusively for "the enhancement of the quality of services" both on ground and on-board, and for improving the quality of the rolling stock. The new edition of the contract saw the introduction of a price-cap mechanism that recognises two further parameters (personnel cost and fuel cost, respectively) as reference points for tariff variations. The mechanism is rather complex. For example, as regards the costs of personnel, different threshold percentage variations have been considered for each salary category. The regional body hopes that this mechanism does not raise debates over its interpretation.

2.3 Prospects for the service management on the Veneto network

2.3.1 The Regional Urban Railway System project (SFMR)
In a long term view, the role of the Veneto Region as a planner of local and regional railway transport services is bound to expand in the central part of Veneto, as indicated by the planning project for the "Regional Urban Railway System" SFMR-Sistema Ferroviario Metropolitano Regionale (Net Engeneering, 2001).
The SFMR scheme was elaborated at the end of the 80s, but it was in 2001 - exactly during the transfer of railway competencies from the state to the regions - that a more detailed proposal for a project was drafted. The purpose of the SFMR is clear: defining an integrated transport system capable of supporting and responding to the development of a multi-centre urban area as is Veneto, while ensuring adequate levels of accessibility, in order to make up for the growing (and in certain areas dramatic) saturation of the road network.
The SFMR project is specially designed as a project for transport services and not as an infrastructure project. It does include a component of infrastructure planning, but the latter is the result of a precise estimate of requirements in terms of services needed. The fundamental elements of the planned system relate, in fact, to the operative programme.
The most salient features are: the coordinated scheduling of trains and buses and the system of constant frequency departures. The project includes the definition of an integrated tariff system (only one travel document for the entire bus and rail Public Transport network[7]), the identification of rolling stock requirements (in terms of quantity and quality), the main features of the customer information systems, and the management model.
Planners believe that the implementation of the SFMR ought to be achieved within a fully redefined and effective legislative framework . All evaluations are based on this hypothesis. For example, regarding cost estimates, the planners who drew up the economic and organisational

profile of the SFMR have *"decided to make no reference to the current average costs of the FS (...); the trend towards a bigger opening to the market... ought to lead to a different and a more efficient model of service production, and to the reduction in the cost of production. (...) According to the adopted methodological approach, the supposition was that the SFMR service be provided by an ad hoc company..."*[8].

2.3.2 SFMR run by a company managed by the Region?

As well in political terms, and albeit implicitly, the SFMR project represents a clear indication of the way the Veneto Region intends to introduce an integrated services (road/railway) management system, operated by a railway company set up according to efficiency principles.

The question is, in perspective, whether a strong political intention to entrust the management of the entire Veneto network to a single company can be actually achieved in a truly competitive environment. Many regional regulations seem to open alternative paths, but do not ensure the same respect of the principles of competition.

First of all, the same art. 28 of the already mentioned Veneto Region Law allows the region to acquire "capital shares in companies whose statutory purpose is the management of regional and local railway services", through companies born out of the transformation of "local" commissioned railways (see paragraph 2.1). Undoubtedly, these regional subsidiaries could propose themselves as service managers in the region, and it is difficult to imagine their defeat in a tender competition, should they forge an alliance with the incumbent railway operator currently managing the entire rolling stock.

What recently happened to the small company Ferrovie Venete is an important indication. In April 2002, Ferrovie Venete merged into a larger regional company (Sistemi territoriali S.p.A.), operating in the field of planning. After the acquisition, Sistemi Territoriali came to comprise also the railway sector. It is interesting to note that the company has started negotiations with Trenitalia Cargo Division to operate in the regional railway cargo sector. In future, it seems possible that this sort of collaboration with incumbent railway operators may extend the local public transport sector.

2.3.3 Two sensitive issues: tenders and rolling stock

The issue of the regional companies is useful for introducing the last topic of this case study concerning tenders for the assignment of services. As already pointed out by Musso and Ferrari, there is still much uncertainty as to the possibility of achieving true market competition based on tenders. The legislation is quite vague The first law (dated 1997) sets 2003 as the year for the organisation of tenders, but many doubts emerged in the meantime. First of all, Law 166 (dated 2nd August 2002) enabled this date to be postponed in order to organise a tender for services for formerly commissioned regional railways (of the type Ferrovie Venete).

Furthermore, there is complete uncertainty as to the crucial problem of the incumbent's (Trenitalia) assets, which basically include the rolling stock. As referred by Marcucci[9], there are two national regulations at stake. The first is the aforementioned Law 166 which, in dealing with public service calls for tenders, states that the basic assets should never become a discriminatory element for the evaluation of competitors' offers.

According to this regulation, the tenders should ensure that the assets owned by an incumbent are made available to the operator chosen through the tender . According to this type of norm, Trenitalia, even if it loses a tender, would be compelled to make available (while preserving ownership of) its cars.

In this regard, however, the hypothetical scenario, envisaging the formal making available of the rolling stock by Trenitalia in favour of a potential winner, seems to have been already defined by Trenitalia as an unfeasible scenario, at least in Veneto.

The second norm is the one envisaging the application of Law 448/2001 (Art. 35), requiring the separation of assets and services to entrust the services to "industrially/economically significant sectors". However, no relevant decree has been adopted yet to decide whether the public transport sector falls into the category of "industrially significant sectors", creating a climate of complete uncertainty.

Facing this and other problems (the lack of information on the cost of production, etc.), the Veneto Region is also running late with the preparation of the tenders.

After all, the issue is about the chances for the tenders to be organised in such a way to enable a truly competitive environment. As observed, the regions are strongly pushing towards the setting up of regional railway companies that include - both in their management and capital structures - the same Trenitalia. Some authors (Boitani- Cambini, 2001) point out that these sort of projects do not promote competition but on the contrary enable the strengthening of existing incumbents.

3. The situation in the special-status regions

3.1 The issues connected to the inter-regional trains

So far we have illustrated the situation of the Veneto Region. Veneto is very important, both for its size and urban density, hence the importance of the issues exposed and their playing as examples for the remaining Italian regions.

This last part of the article will discuss some specific problems of two other north-eastern autonomous Regions (Trentino Alto Adige, comprising the two autonomous Provinces of Trento and Bolzano, and the Region of Friuli-Venezia Giulia). The special nature of the problems these two regions face is due both to their political and administrative organisation (see note 2), and their geographic position *vis-à-vis* their "strong neighbour" (Veneto). Set on the periphery, both regions represent areas with relatively weak traffic but strongly gravitate towards Veneto, to which they are linked by very important railway connections (the Brennero line and the lines Venezia-Udine-Tarvisio and Venezia-Trieste). The two regions are given less space here due to the limited scope of the issues involved.

In the first place, it ought to be said that the special status

regions in the north-eastern part of Italy are running late compared to the others with ordinary statutesin terms of the acquisition of competencies for railways, because of a more complex legislative procedure (see note 2).
Thanks to a legislative decree, the two autonomous provinces of Trento and Bolzano acquired their railway service competencies as early as in July 2001. However, the law was not immediately followed by a State-Region framework agreement, at least not until 2002, and the same is true for the service contract. In these Provinces, the relations with the railway operators is still managed by the state, although there are some agreements between the regional body and Trenitalia on tariff integration and the setting up of certain new trains between the region and the railway company.
Friuli-Venezia Giulia, in a way, lags even further behind, due to the lengthy procedure required for the formal adoption of the regional law by the Parliament. The law adoption procedure calls for a qualified majority and is, as such, time-consuming.
For the special statute regions, an important problem for the implementation of the reform lies in the conferral of competencies for inter-regional trains that travel across the territory of two or more regions. For example, the law conferring railway competencies to the Autonomous Provinces of Trento and Bolzano requires that bordering regions reach an agreement over the assignment of these services, prior to the stipulation of service contracts.
Generally, reaching agreements is complex because of the overlapping of many market segments. A detailed observation shows the situation between Veneto and Friuli-Venezia Giulia on whose territories inter-regional trains perform both the role of urban transport and feeder service for long-distance trains (where Venezia-Mestre is the hub). In this context, it should not be forgotten that for the lines leading to the country's "outskirts" (Friuli-Venezia Giulia and Trentino-Alto Adige), there are very few long-distance trains planned, because of the weak demand and low revenues (considering that these services cannot be subsidised). Therefore, long-distance passengers in Friuli-Venezia Giulia using inter-regional trains as the initial or final portion of their journey with a connection train in Mestre, could face serious problems in terms of timetables and connections if the trains were managed (e.g. within an SMFR framework) by the Veneto Region, taking into consideration only the needs of metropolitan passengers, to the detriment of those travelling long-distance.
Currently, the two regions are involved in a controversy over future conferrals of inter-regional services, given that the Veneto Region seems to have no intention of giving up the competency over these trains.

3.2 The ministerial guidelines for the period of transition

To conclude with the issues regarding the special statute regions and their running late with competency transfer procedures, it should be mentioned that the Transport Ministry recently drafted guidelines for provisory contracts between the regions and Trenitalia, to temporarily regulate the production of services while awaiting the definitive devolution of competencies to the regions. Although the contract has temporary validity, notably until the definitive transfer of competencies to the regions, the guideline drafts can be criticised from several view points. The planning criteria and the identification of the criteria for the definition of the contribution seem very rigid. The indications on the service to be produced, as against contribution, are given only in terms of train-km (a fixed subsidy is set and valid in any case, at the national level), while neglecting the basic and distinctive features of the services (peak and off-peak, etc.) as regards the cost of production. Furthermore, there is no specific regulation for loss of revenues due to special tariff reductions (social tariffs). And service quality rules are weak.
In spite of contract's temporary nature, it would probably have been useful to includesolutions complying with the principles that the regions will try to apply when they are entrusted the competence over these services. More specifically, an analysis could have been made to look into the most interesting solutions adopted by those regions that already approved their service contracts, and to include them in the draft contract. If the temporary contract does not acknowledge the true requirements of the regions now, it runs the risk of loosing the opportunity to anticipate and facilitate the transition from old to new models. Should the draft contract remain unaltered, the regions that still await the conferral of services will have to overcome the biggest hurdle - including in their relations with Trenitalia - instead of following a smoother path traced by a central authority more strongly focussed on the future. Transport policy and a legislative culture are hardly matters that can be made up and applied overnight through the formal adoption of a law.

4. Conclusion

To conclude, notwithstanding the latest legislative changes, the Railway Reform in one of the economically most important Italian areas is still at the pre-development stage. The main cause for concern is that, in spite of good intentions and expectations, the practical application of experimental service contracts does not seem able to solve, indeed neither to diminish, the problem of asymmetric information that is still strongly benefiting incumbent operators. This persevering of asymmetric information is critical, as it is slowing down or blocking local authorities' efforts to obtain the information necessary to prepare the tenders. The latest examples of service contracts applications raise the question whether there is need to envisage stricter rules, at national level, regulating the release of information by local transport incumbents or, alternatively, to carry on studies aimed at assessing the efficient-cost level for railway operation on regional networks. These studies should be co-ordinated at national level and supported centrally by the public sector. However, the results of the case study analysis lead to believe that the regional authorities themselves are interested in

maintaining very good relationships with the incumbents over the preparation of the tenders. Indeed, the incumbents may provide the necessary support for the setting up of regional companies, subject to local authority's control, which seem to be a long term implicit objective of the local authorities. In Veneto, the SFMR project and the recent acquisition of Ferrovie Venete have launched a signal that should not be underestimated. There is still much to do, even in the developed and effective north-eastern Italy, to achieve an environment of true competition in the railway sector.

NOTES

[1] See, on this issue, Musso and Ferrari., op.cit

[2] The special status regions ("autonomous" regions) have a higher degree of legislative autonomy compared to regions with ordinary status. However, their greater autonomy is counterbalanced by a stronger control of regional laws by Parliament, checking their compatibility with the Constitution. This implies longer and more complex control procedures, compared to those applied to laws adopted by Regions with ordinary status.

[3] Regione Veneto, Regional Law no 25 dated 30 October 1998 (BUR no 99/1998).

[4] As regards Veneto, the railway company Adria-Mestre is a remarkable case. This local-level company has been commissioned by the state and since 2002, after a number of misadventures, has joined a regional-level company with rather broad objectives ("Sistemi territoriali" S.p.A.).

[5] Framework Agreement between the Transport Ministry and the Veneto Region for the Enactment of the Devolution Act envisaged by Art. 9 of the Legislative decree no 422/97; Framework Agreement between the Transport Ministry and the Veneto Region for the Enactment of the devolution Act envisaged by Art. 8, Par. 3 of the Leg. D. no 422/97

[6] The minimum quality standard is defined by: cleanliness of stations and onboard trains, punctuality, crowding and comfort, reliability and information system. Furthermore, the continuous monitoring of the service standards and a periodical survey, taken at least once a year to collect comments by the clientele on the quality perceived, are compulsory.

[7] For tariff integration problems in Veneto see: Veneto Regional council, 2002, The tariff system of the local public transport -documents and analysis, Venice.

[8] Net Engennering, (2001), p. 105.

[9] See, on this issue, Edoardo Marcucci. op.cit.

BIBLIOGRAPHIC REFERENCES

BOITANI A., AND C. CAMBINI, (2001), La riforma del trasporto pubblico locale, problemi e prospettive, Workshop Antitrust, Milan, 22nd June.

BOITANI, A., AND C. CAMBINI, (2002), "Il trasporto pubblico in Italia", *Marcato Concorrenza Regole*, Vol. 4, n°1, pp.

Net Engineering, 2001, *Il sistema ferroviario metropolitano regionale dell'area centrale veneta. Sintesi degli Studi e del progetto*, Venice, October.

Competition in Railways: the Case of United Kingdom

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1. Introduction

The production of railway services is characterised by economies of scale and by technical indivisibility. Such rigidity, as well as its non-lucrative character related to capital remuneration due to the use of public investments, has historically guaranteed the development of the railway system within a natural monopolistic environment dominated by the presence of state-owned companies.

As a matter of fact, apart from the USA, where railway management was given to private companies within a strictly regulated regime, nationalisation was the solution adopted in all European countries, the Soviet block and the Third World countries. Relatively recently, however, the rigidly vertical structure of the railways has often been the object of discussion. This is because technological progress has contributed towards the reduction of that rigidity that has characterised the organisation of the production of services. In other words, despite the presence of unrecoverable investments (sunk costs) and average costs that decreased so greatly as to make competition inapplicable, the technical limitations that force the concentration of the market on the supply side have been weakened.

This situation, as well as increasing subsidy levels, drove the Governments of many countries to undertake reforms in this field in order to design organisation schemes that could overcome the pre-existing unity of the railway enterprises.

Japan's strategy for introducing a certain level of competition in the market was the creation of individual private firms, six of which are dedicated to local passenger traffic, one to the transport of goods, one to high speed connections, and others to the management of regional railway networks.

In South America and Africa the restructuring of the railway system, carried out by the World Bank, had as its main objectives the geographical fragmentation of the networks and the achievement of a higher level of competitiveness thanks to the transfer of services management to private companies operating in a market controlled by an independent regulator.

2. The European Railway Policy and the Reform of British Railways

In the years following World War II, most European countries showed a tendency to nationalise the railway system.

The Labour Government in Britain was deeply influenced by the alleged successes of the Soviet Five-Year Plans while trying to redefine the management structure of the public services[1]. A nationally unified model was chosen for the railway sector because, according to the policy makers, only centralisation could guarantee relevant economies of scale and organisational simplification, whereas public property would have avoided the negative aspects that generaly characterised monopolies. This policy lead to the birth of a great bureaucratic structure hardly directed towards the market, the economic sustainability of which was essentially based on public funding.

A transformation of the main guidelines of the British railway policy took place as a consequence of the situation in the US market. In the US, after the 1970 crisis, the Congress approved the *Rail Passenger Service Act* and created the *National Railroad Passenger Corporation* (*Amtrack*) in order to provide long distance passenger transport services as a monopoly. The later bankruptcy of the railway companies of the Midwest and North-East (such as *Penn Central*) led to the creation of the *Consolidated Rail Corporation (Conrail)*, privatised in 1987, to which the transport of goods was assigned. It was this experience that persuaded the British Government to take a totally innovative approach to railway policy.

Free trade, which was at the basis of the Treaty of Rome that created the EEC, was also applied to the railway sector in the 1990's. Directive 440/91 established that the countries of the EU were to separate infrastructure from operations, at least in accounting, in order to delineate an evolutionary path for the European railway market characterised by the presence of distinct operators in competition with one another. In 1995, with the approval of directives 95/18 and 95/19 regarding the release of licences to railway firms and the sharing of the infrastructural capacity, a further step was made towards the opening of the market to competition.

European railway policy is based on the hypothesis that the main types of technical and economic rigidity involve the infrastructural aspects of the railway system. On the contrary, in transport services the reduction of concentration on the supply side might contribute to increasing the industrial efficiency, being this not subject to excessive fixed and sunk costs.

After the promulgation of the 1991 directive, the Commission passed other regulations with the aim of defining in detail the procedures for applying separate accounts (for the network and services), the regulation of market access and the application of fares for the use of the infrastructures. In the field of the transport of goods, Quinet[2] argues that the most recent EU policy has aimed at overcoming the national individualities that make up the main barrier to operator access to the market.

The individual countries reacted in different ways to this EU innovative policy.

In particular, the vertical separation of the railway enterprises took place rather swiftly in the North European countries. For instance, Sweden chose separation between network management (assigned to the state) and production of the

transport service (assigned to a private firm). The long distance transport of goods and passengers is now liberalised, whereas the individual regional councils manage local transport. The overcoming of the original monopolistic scheme introduced a remarkable increase in productivity due to this simplification.

In Germany, the redefinition of the railway system began in 1994, when the private firm D.B.A.G. was formed from the merging of the railway companies of East and West Germany. The objective of the German reform was the subdivision of the completely privatised transport activities into different regional market areas, whereas infrastructure was left to the state.

The cardinal principle established by the UK Government for increasing the productivity of its railway system is its division into different market areas (*Intercity, Regional Railways*, etc.), with the intention of individuating the most appropriate solutions for each of them. The 1993 *Railway Act* established the creation of:

a) a public firm, *Railtrack*[3], forced to operate according to private company criteria for the management of the network and the infrastructure,

b) twenty-five firms (*Train Operating Companies - TOCs)* for the management passenger transport,

c) three firms (*Rolling Stock Leasing Companies*) for the renting or leasing of rolling stock[4],

d) two firms (*Infrastructure Service Co.* and *New Infrastructure Projects*) specialising in the maintenance of the tracks and machinery and in designing and building new lines respectively.

Railtrack's income essentially consists of the fees paid by the TOCs to use the railway infrastructures. This circumstance helps one understand the importance of the issue of the definition of the economic value of routes that create both competition between the transport firms and income for the managers of the infrastructures.

In this respect one has to notice that, as in other industries characterised by an important distribution phase, in the transport industry the infrastructures are a fundamental factor in the processes of regulation of the level of market competitiveness because they cannot be reproduced immediately. In other words, the influence of the infrastructures might limit the industry's potentials and prevent the market from achieving a greater level of development and economic efficiency. As a consequence, a valid regulation of access to infrastructures seems essential in order to protect competition among operators and the interests of the passengers as users of a public service.

The privatisation of *British Railways* followed a procedure based on the subdivision of the railway firm into individual components in competition with one another in order to eliminate the power of the monopoly and increase internal efficiency.

This *separation* principle was also applied to the management of the transport services. Each TOC operates on different areas and lines. The track assignment to the TOCs is carried out using the franchising system, the conditions of which are established by the *Franchising Director,* elected by the Government. The TOCs' need for their own equipment has turned out to be relatively modest. They leased rolling stock from companies that had received all the rolling stock previously belonging to British Railways. As far as the use of the network and machinery is concerned, contracts will also be stipulated between the individual TOCs and *Railtrack,* which can rent or lease stations. The *Strategic Rail Authority,* whose role in establishing the policy relative to the infrastructures is particularly delicate, is in charge of the regulation of the railway market, whereas the control of *Railtrack* and the access to the infrastructures is assigned to an independent agency (*Office of Rail Regulator*).

The privatisation of *British Railways*, which earned the treasury 4.5 billion pounds, is certainly the most significant experience of vertical separation of the railway service. Britain is the only European country where all firms operating in the railway sector are private.

3. Privatisation and efficiency of the British railway system

The renovation model followed in Britain is characterised by the recovering of market mechanisms in all the sectors that form the complex railway industry. This was done by privatising the infrastructures and opening competition for the transport service, for the provision of rolling stock, maintenance, the design and construction of new tracks.

The British experience is the most innovative example of the process of vertical separation of the railway system. At the moment, however, it is difficult to express an unambiguous judgement on the overall results achieved by the system from an efficiency point of view.

As a matter of fact, in the railway sector, the variables that should be taken into account in order to be able to satisfactorily judge the new management model are several.

The market share certainly has a remarkable importance: an increase in railway transport demand is an objective of entrepreneurial character, the effects of which go beyond the firm, since it is a source of positive externalities which arise from the weakening of the modal imbalance.

In this respect the results have been unambiguous, because in the year 2000 the railway system achieved its best performance in the passenger sector since the promulgation of the Beeching Plan in the sixties. An analogous judgement can be expressed about the sector of the transport of goods, the demand of which has constantly been growing since 1994.

A further positive aspect of the British method was the public funding of the railway industry which, as a consequence of the massive involvement of private shareholders in all branches, registered a sharp decrease[5].

It must be emphasised, nevertheless, that the model of privatisation of the infrastructures does not involve direct Government funding for the renovation or the enlargement of the network. Such burdens are the duty of operators of privatised sections, which are eligible for public funding. *Railtrack,* therefore, receives indirect government funding via

the fares paid by the firms in charge of the transport services.
Despite the rather high level of the fares, however, the system is unable to guarantee a flow of funds appropriate for the needs for its fixed capital to renew itself and grow, since a large amount of these funds are used to pay the shareholders of the firm managing the infrastructure. This is the cause of a large imbalance between profits and investments, as those opposing privatisation often emphasise.
The shortage of investments is currently the main hurdle to the development of the field and the maintenance of the service level reached so far[6].
These problems are made even worse by the lengthening of the time necessary to renew the rolling stock, due to the fact that the procedure introducing new trains onto the network is hindered by the limitations imposed by *Railtrack*[7]. Furthermore, in order to make the structural deficiencies less obvious the manager of the infrastructure tends to apply, ever so often, harsh speed limits[8] that result in longer travel times and a reduction in the productivity of the investments of the transport firms. The coexistence of distinct operators for travelling activities and the management of the infrastructures leads, therefore, to a reduction of the efficiency of the system as a whole, due to friction in the relationship between operators whose interests might diverge.
In a nutshell, the current British railway system is characterised by an insufficient capacity from both a quantitative and a qualitative point of view. The lack of appropriate cash flow has hindered the possibility of carrying out a programme to make the consequences of this renovation compatible with the real potentialities of the supply, in terms of traffic development. It must be mentioned, however, that these shortcomings are the consequence of the scarce investments planned by the policy followed, for decades, within the railway industry.
A confirmation of the poor conditions of the British Railway industry comes from the results of an analysis carried out towards the end of 2001 by the *Strategic Rail Authority* which, in its *Strategic Plan,* emphasised the need to invest 70 billion pounds to modernise infrastructure and the rolling stock. Only this way, according to the representatives of this regulatory body, will they be able to cope with the increase of supply, the magnitude of which is estimated to be 50 % in the passenger sector and 80% in the goods one.

4. Conclusion

In conclusion it can be said that the relevance of the necessary investments, together with the scarce and belated profitability of the products, is the main cause of the failure of the privatisation of the British railways. From this experience it turns out that it is currently difficult to completely do without any sort of public intervention in the railway sector, because an infrastructure funding scheme relying exclusively on the private sector cannot be put into practice.
A confirmation of how difficult it is for the management mechanism of the British railway network to cope, comes from the gradual growth of *Railtrack*'s debts[9] and the reduction of the size of the income from the characteristic management within the company's income structure. The poor liquidity, therefore, necessary to fund the investments and guarantee a good efficiency level of the infrastructures in use, has caused a considerable qualitative degeneration of the supply and an inevitable reduction of the safety level of the railway services. In other words, despite that fares applied to access the network are considerably high, most of *Railtrack*'s income goes into paying its shareholders, resulting in further increases in the fares to the final customers[10] and a reduction of the funds available for the renovation and maintenance of the network.
A further negative aspect of the British railway renovation is the pressures on Government from the managers of the firm managing the infrastructure. This makes the policy makers particularly sensitive to the needs of the demand and safety aspects. Furthermore, the presence of one operator only in the management of the infrastructures increases the rigidity of the system, making the Government more vulnerable to demands from *Railtrack*.
Major importance is given to the issues concerning the influence that interest groups might have on the processes that define public intervention. It is not a coincidence that the most recent political economy studies give considerable importance to the act of influencing political power (*lobbying)* by the social classes and groups[11].
These considerations emphasise that nowadays, not only it is impossible to remunerate the invested capital, but public funding still turns out to be essential to both the use of the network and the investments into new infrastructures. Only in this way can the system guarantee a qualitative standard appropriate to the needs coming from the demand side and a level of fares which is able to stimulate competition and to promote the development of the market where transport firms operate.
These inefficiencies drove the British policy makers to create *Network Rail,* a non-profit company which, according to information disclosed at the end of June 2002, will have to purchase *Railtrack* at the price of 500 million pounds, 300 million of which will be paid by SRA. With the same operation the English Channel Tunnel railway line will be passed over to *London and Continental Railways*.
As far as the travel sector is concerned, the importance of the efficiency gains coming from the revaluation of the principles of competition must be emphasised. It is, therefore, necessary that the recuperation of market mechanisms be beneficial to the community in a way that more than makes up for efficiency losses resulting from fragmentation of the supply. We must not forget that the production of railway services is characterised by economies of scale and network economies. Pluralism on the supply side might cause increases in average costs, due to the reduction of the production scale, and generate problems for customers arising from the poor connection between lines and the increased difficulty in getting information relative to the services offered and fares.

NOTES

[1] The planned economy model attracted British policy makers more than the National Recovery Act and the Roosvelt's New Deal's regulation, which grew in importance in the US at the beginning of the century.

[2] Quinet, E., (2001), "Competition and Development of European Railways: Paths and Perspectives Compared", paper presented at Conference held at the University of Rome "Tor Vergata", January.

[3] Railtrack, privatised in 1996 and currently quoted on the Stock Exchange, owns an infrastructure consisting of 10,000 miles of tracks, 40,000 among bridges, viaducts and tunnels, 2,500 stations, 9,000 level crossings and 90 workshops for the maintenance of the rolling material.

[4] Rolling stock renting and leasing have the aim of reducing the barriers to the new operators' entrance to and exit from the market, limiting the capital necessary to start a transport service.

[5] In particular circumstances Government has granted Railtrack substantial extraordinary funding in order to modernise the network.

[6] The average delay in year 2000 was 45 minutes.

[7] Despite this since 1993 rolling stock has considerably grown by acquiring 2,350 new passenger carriages, 2,500 goods wagons and 310 locomotives.

[8] The most limiting restrictions are imposed on high-speed trains since it is these vehicles that make rail subsidence more likely to happen, due to the greater rail wearing.

[9] According to government predictions, by 2003 the debts will increase by about 8 billion pounds.

[10] The price of a return ticket for a 180 km journey (e.g. from London to Birmingham) is 60 pounds.

[11] The conceptual innovation of this part of literature between the economic theory and political science emphasise the government's failures due to the hurdles present in the valuation mechanism of social preferences.

BIBLIOGRAPHIC REFERENCES

CAMPOS, J., AND P., CANTOS, (2000), "Railways", *Privatisation and Regulation of Transport Infrastructure*, The World Bank, Washington D.C.

CARLUCCI, F., (1994), "Trasporto ferroviario: esperienze internazionali e prospettive di privatizzazione", *Sistemi di Trasporto*, n° 3, pp. 35-39.

MITUZANI, F., (1999), "An Assessment of the Japan Railway Companies Since Privatisation: Performance, Local Rail Service and Debts", *Transport Reviews,* Vol. 19, n° 2, pp. 117-139.

NASH, C.A., AND J.P., TONER, (1999), "Competition in the Railway Industry", *Journal of Competition Law and Policy*, Vol. 1, n° 1, pp. 197-227.

NASH, C.A., (2000), "Privatisation and Deregulation in Railways – An Assessment of the British approach", in Bradshaw, B., and H., Lawton-Smith, (Eds.), *Privatisation and Deregulation of Transport*, MacMillan Press Ltd, Basingstoke.

QUINET, E., (2001), "Competition and development of European Railways: Paths and Perspectives Compared", paper presented at the Conference held at the University of Rome "Tor Vergata", January.

PETRICCIONE, S., (1997), "Effetti esterni della ristrutturazione ferroviaria", I quaderni di *Trasporti Europei*, atti della IV Riunione Scientifica Annuale della Società Italiana degli Economisti dei Trasporti, Trieste, pp.228-294.

Public and Private Railway Companies in 19th and Early 20th Century Italy

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1. Introduction

One of the first concerns facing the government of the unified country was the creation of links between the Italian regions. In building an infrastructure system, the French model was followed, where the role of experts (and engineers in particular) was highly esteemed[1]. The *Grands Travaux* were, at least for a decade, a necessary reference for the aspirations of the Italian upper class[2].

Initial conditions, however, were far from ideal. The roadway system inherited by the Kingdom was in an appalling state and practically devoid of border crossings; the railway system was quantitatively limited and consisted of a series of regional sub-systems lacking any links with one another. Lastly, the port system required thorough restructuring and relaunching. In general, the first priority appeared to be that of improving the rather minimal integration between the regional economies. What was offered to the first liberal rulers was based on very different previous experiences and presented characteristics that were just as different. A great effort, also at the level of administrative conformity, was necessary. On the whole, there can be little doubt that in Italy in 1861, the infrastructure system was lacking in every respect[3]. In light of this, the attempts made by more than one scholar to quantify the role of infrastructures taken as a whole within the sphere of the process of industrialisation and economic development of the country appears more readily understandable[4].

2. The construction of a new Italy

The physical construction of modern Italy began in 1861. This not only meant creating a national market, but also applying a new spatial and organisational dimension to the territorial problems that had intensified with unification[5]. The construction of the infrastructure system was the necessary premise for all this, to the point that transportation seemed to be the answer (even more than the concept of the "nation") to creating a real identity for the new country[6]. In other words, the physical and territorial concept of the nation could actually be defined as the shaping of space by the infrastructure system.

Thus, the roadway and rail systems, the layout of canals for navigation, irrigation and industry, land reclamation, improvement of unproductive territory and development of ports became integral aspects of the main aspirations of the new rulers. Infrastructure was found to be at a crossroads of formidable interests. With the creation of lobbies for political, military, business, and locally-based interests, the aims of the new state were inextricably entwined with the private goals of some powerful groups[7].

Infrastructure was immediately viewed as an important client for these groups, favoured by the financial impotence of the state that was constrained to delegate the building of the infrastructure network through the institution of concession. This institution did not have enough foresight to clarify respective roles, leaving the way open to conflict and offering ample possibilities for speculation and profit.

It is difficult to say to what extent real industrial ambition was an aspect of the project. The prevailing economic activity was still agriculture, and transportation was largely viewed as the ideal means for taking agricultural products to market, and only secondarily as an important means of aiding the unification of the country. The historical period coincided, however, with the early industrial development of north-western Italy, and so the new infrastructure system developed in response, on the one hand, to the need to join together all the fragmentary pieces that formed the country and, on the other, to the general tendency to strengthen those areas that were economically and industrially stronger even before unification.

3. The railways first and foremost

The logic that was followed at the moment of the creation of the national railway system was marked on one hand by the rejoining of the various sub-regional systems just barely delineated in the pre-unification era, and on the other by the hurried construction of lines held to be fundamental to the physical unification of the country. The adoption of time restrictions inevitably provoked much error and dysfunction, due overall to the scarce attention given to the complex and diverse realities of the territory. The incoherent scattering of numerous small networks of rail lines that changed the design of the map of the young Kingdom, was almost chaotic and accentuated the longitudinal character of the Italian railway system. This policy, justified by the conviction that the railways were essential for guaranteeing the very survival of the state did not, however, addressed the obvious problem of clear imbalance in the rail coverage of different parts of the country. Indeed, regions like Piedmont[8] and Tuscany[9], in which the construction of the first lines was carried out in the sphere of at least a minimum development plan (though more so in the early phase), contrasted with areas characterised by the total lack of any rail lines.

The system that was being created in the 1860s thus suffered continuous interruptions and was substantially without transverse connections, those with more difficult construction caused by the need to cross the Apennines. Within five years,

from 1861 to 1866, the size of the railway system doubled, going from little more than 2,000 km to more than 4,500; it will not be superfluous to note that in 1861 Great Britain counted 17,000 km of railway and France 9,300.

Year	km	Year	km
1839	7	1890	13.617
1840	20	1895	15.959
1845	152	1900	16.417
1850	620	1905	17.067
1855	1.268	1910	18.079
1860	2.435	1915	19.640
1865	4.623	1920	20.374
1870	6.460	1925	21.094
1875	8.037	1939	22.372
1880	9.309	1951	21.711
1885	10.901	1965	20.381
1890	13.617	1975	20.176
1895	15.958	1990	19.576

Source: Maggi, S., (2001), *Politica ed economia dei trasporti. Secoli XIX-XX. Una storia della modernizzazione italiana*, Il Mulino, Bologna, p. 30.

Table 1: Italian railway network 1839-1990

In 1863 the tracks extended down the Adriatic coast as far as Foggia, the following year the line from Bologna to Florence was opened, and in 1866 Rome was linked to Ancona and in 1867 with Pisa. Later, in 1879 the Naples-Foggia line went into operation, and in 1872 the Rome-Florence line was completed. Two years later the Genoa-Pisa line was also completed. In the same era some of the longer tunnels were opened or at least begun: we can remember the two projects by the Giovi, brought to a close between 1846 and 1855, and those of Fréjus, realised between 1857 and 1871. In a second phase the Brennero mountain line (1867), the Pontebbana Udine-Tarvisio (1879), the Gottardo line (1882) and still later, the Sempione line (1906) came into being. The opening of the passes effectively permitted the connection of Italy to central Europe, flinging open the doors to more and more easily reachable markets[10].

4. The world of the railway companies at the dawn of the Unification

With the formation of the new Kingdom, the world of the railway companies was profoundly reorganised. The Kingdom of Italy had inherited an extremely confusing situation from pre-Unification governments, with regard to the companies that managed the railways built up to that time. Some were entirely based on private initiative, others were more or less openly supported by the individual pre-unification states, nevertheless all appeared weak and incapable of meeting the challenges imposed by the new state. Aside from the government, as many as 22 large and small companies were in charge of the existing rail system on the peninsula[11].

In 1865 the excessive number of often unprofitable companies was drastically reduced by a selection process that privileged the one with the best financial structure[12]. The future of the railways in the country was about to be delivered into their hands. The Italian government then had to devote itself to developing an efficient system of management, that commenced in 1865 with the first general restructuring, the so-called "legge dei grandi gruppi" (law of the large groups), enacted two months after the promulgation of the law for administrative unification of the Kingdom of Italy. This law provided, in appendix F, for the organisation of public projects, which was very important for the railways as it provided the regulations for construction, concession and policing the system.

Franchisee	km in operation	km under construction or planned
Piedmont State Agency	566	418
Companies:		
Torino-Saluzzo	103	–
Alessandria-Tortona	116	–
Genova-Voltri	15	–
Savona-Acqui	–	158
Alessandria-Cavallermaggiore	43	55
Alessandria-Acqui	34	–
Torino-Pinerolo	38	–
Chivasso-Ivrea	33	–
Santhia-Biella	30	–
Torreberetti-Pavia	41	–
Mortara-Vigevano	13	–
Vigevano-Milano	–	36
Novara-Alzo	36	6
Arona-Domodossola	–	59
Lombardia e Italia centrale	743	69
Livornesi	293	151
Maremmana	224	10
Centrale Toscana	171	60
Romane	383	238
Meridionali	482	508
Vittorio Emanuele	32	1.120
Sarde	–	386
Total	*3.396*	*3.274*

Source: Sachs, I., (1885), *L'Italie. Ses finances et son développement économique depuis l'unification du royaume 1859-1884*, Guillaumin, Paris, p. 964.

Table 2. Railway companies in operation in the Kingdom of Italy at the end of 1864 (excluding those of the Veneto and Papal State)

Restructuring brought about the abandonment of the state management that had been operating until then in a good part of the Piedmont system. Railway construction and operation were entrusted to three major private capital societies: *Strade Ferrate Alta Italia, Strade Ferrate Romane* and *Strade Ferrate Meridionali*, that were to manage a system of 1,500-2,000 km each, and to whom was generally assured a subsidy for each line or kilometre of line in operation (decreasing with the increase of the takings); at times this was substituted by the guarantee of a minimum interest rate per annum on stocks, as well as by other forms of subsidies, according to various and variable mechanisms even between specific lines run by the same company. In addition to the main companies, some small companies existed that had remained independent, such as the *Società Vittorio Emanuele* and the

Compagnia reale sarda, to whom in 1863 was given the concession to construct rail lines in those regions that were still without: Calabria, Sicily and Sardinia[13].
The system was soon rocked to its foundations by the introduction of the "*corso forzoso*" (suspension of the currency in gold), adopted in 1866 as a result of the third war of independence. This suspension, in fact, caused an almost 10% devaluation of the lira against other currencies, consequently raising the cost of imported products and ruining companies with concessions, which largely depended on foreign industry for the supply of both coal and rolling stock. Moreover the government's financing system, based on the so-called "*guarentige a scala mobile*" (escalating guarantees) system, that is the above mentioned public subsidies, that diminished as traffic increased, did not encourage the administrators of these companies to seek increases. Therefore various financial vicissitudes occurred, with the State advancing future subsidies, guaranteeing bonds, undertaking the construction of new main lines and continuing the construction of lines already contracted directly under the supervision of the state civil engineers - as in the case of the Ligurian coastal rail and railways in Calabria and Sicily. Moreover, diverse legislative provisions would be made, that brought about first the modification to the conventions of 1865, followed by the recovery of the *Alta Italia* (with the ex-Austrian lines inherited after 1866) and *Romane* systems. In short, long and heated discussions were held, culminating in 1876 with the fall of the historic Right party and the parliamentary revolution due to the defection of the group of Tuscan deputies linked to the *Strade ferrate Meridionali*[14].
The peninsula was divided longitudinally with the intent to develop north-south traffic, and the system was entrusted to the *Società per le strade ferrate del Mediterraneo* in the western part and to the *Società per le strade ferrate Meridionali* in the eastern part; the *Società per le strade ferrate della Sicilia* received the lines on that island, while previous arrangements remained in effect for the *Ferrovie della Sardegna*. What was new was the division between property, that remained under state ownership, since railway property was by then so vast that no private group could redeem it, and the management, assigned to the three companies for a maximum 60 year term, renewable every 20 years. The shareholdings were owned by large Italian and German financial groups, as well as the newly established national mechanical industry with companies like Ansaldo and Breda.
While infrastructures and stations thus remained under public ownership, the State sold its rolling stock to the three large companies, thus foreshadowing a situation that in some respects resembles the current situation regarding the ownership of equipment and infrastructures, but with the fundamental difference that the trains and networks were managed on a unitary level with a territorial base.
The government guaranteed the company shares a minimum annual dividend of 3% and three special funds were set up: one for natural disasters, one for the renewal of fixed and mobile assets and one for increasing equity, this last was financed by the issue of government bonds. Capital was expected to increase by 3.5% per year, but the system never achieved its goal, since traffic did not grow at the expected rate over the subsequent period of economic depression.

5. Railway companies, a new protagonist

Railway companies wherever they were before Unification took the form of corporations. Compared with limited partnerships, the most common form of business association in Europe before the advent of the railways, the "anonymous partnership" extended the benefit of limited responsibility to all its members instead of one part alone. The railway corporations were composed of the Board of Directors, responsible for the management, and the Meeting of Shareholders, that according to the by-laws met once a year to approve the budget. The secretary ruled the company and often in a dictatorial manner without considering the wishes of the members.
Railway companies were a significant new element on the Italian scene from the point of view of business organisation, of which they offered a model that was extensively copied in later years. To mention one example, let it suffice to say that the railway managers were the first company executives in the modern sense[15].

6. The debate on nationalisation

With points of greater or lesser intensity, the debate on nationalisation spanned the entire period from the first reorganisation of the railway companies in 1865 until 1905[16]. Thus, there were forty years of controversy and conflict that would lead, as was noted, to the fall of the Right party in 1876[17], and pass through the conventions of 1885 that artificially extended the life of railway companies[18].
During the last years of the 19th century the commissions nominated to reform the railway management began to pick up steam. As well, the role played by the 1898 referendum that approved the nationalisation of the railways in Switzerland cannot be forgotten, as this decision significantly influenced Italians' views on the subject.
As the government was forced to take over more and more economic obligations, the supporters of rail nationalisation were ever on the increase. When a left-wing government came to power this orientation changed. In 1878 a commission was appointed to investigate operations. Based on this commission's conclusions a new reorganisation was implemented after intense disputes in April 1885 on the *legge sulle convenzioni (*law on concessions). The introduction to the over 300 page report began with the following statement: "Few projects have been subject to such long and patient study as this one on the railway concessions, possibly because no other project has been so important until now". The railway question was, indeed, absolutely central to the national political economy.
If the government's choice of private enterprise led to leaving

railway management to the companies, they were also burdened with many obligations regarding the protection of public interest and equal treatment. In the sphere of relations between the State and the railways, the function of some early "railway authorities" proved to be particularly interesting. These consisted, at first, of the *Direzione generale delle strade ferrate*, then of the *Commissariato generale per le ferrovie concesse all'industria privata*, and finally of the *Ispettorato generale governativo sull'esercizio e sulla costruzione delle strade ferrate*, that were supposed to control the activities of the concessionaires. These institutions, closely linked to the Ministry of Public Works, proved, however, to be incapable of guaranteeing State interests - in practice leaving the companies free to operate as they wished and to furnish such poor quality service that it was said to be at the point of complete disintegration.

The nationalisation of the railways could be seen as a typical state intervention in the economy of the country. It was, however, a fundamentally disorganised operation (in view of the economic emergency and of what was considered as the need to come to its rescue), quite contrary to the notion of a well-organised, planned action aimed at a specific body of political and economical objectives. Since theory had been found wanting, nothing remained but to trust in empiricism as a method of railway policy, an attitude that did not change after subsequent post-nationalisation government initiatives in this strategic sector. In short, critical change was enacted hastily, without any idea of what sort of new organisation to give to the railway system.

The positions held in the country represented a highly interesting kaleidoscope of opinion. They include: those of the Meridionali, which resisted to the last, and by virtue of their strength opposed the main Italian railroad company's plans to incorporate the other company, Mediterranea; the companies that produced railway materials, attracted by opportunities in terms of orders that seemed more likely after the elimination of private management; and the military, naturally favourable for strategic and defensive reasons. In the final analysis, it is not unlikely that nationalisation came about for a number of very different reasons, originating from different sectors and not all working in the same direction but tending, nevertheless, to place on the shoulders of the state the stresses and problems caused by imbalances in the sector of economic growth.

From this point of view, nationalisation has been accurately defined as the crucial result of the new relations between economic and political circumstances and a relevant factor in the capitalistic transformation of the beginning of the century.

7. The nationalisation law

At the beginning of the 20th century, the Italian railway system was based on the aforementioned concessions stipulated in 1885. These had a maximum duration of 60 years, divided into three periods of 20 years each, at the end of which both contracting parties could request the closure of the contract with two-years' advance notice. On June 30, 1903 notice was given by the government. That same year prime minister Giovanni Giolitti, strongly convinced of the principle that railway transport should be controlled by the State and very much afraid of the worsening of the conflict between the private companies and personnel, ordered his experts to prepare an initial draft law for nationalisation, which was presented in Parliament at the presentation of the government program on 1st December of that year. The design of the law, as intended by Giolitti, also had to serve as a contractual weapon in negotiations with the private companies.

After the controversial debate characterised by the intervention of numerous members of Parliament as well as the press, and after the first national strike in Italian history, held by the railway workers against the proposed law that considered them public employees, legislation nationalising the railways was passed in April 1905 - much earlier than corresponding measures taken in the other main European countries.

On April 11th, 1905 the draft law which was to become law n°. 137 was presented to the Chamber; it was ratified as a transitory decree with reference to a future, final law on railway operation. Some detractors claimed that the text was prepared in excessive haste. Eight days later, April 19th, it was approved by the Chamber, and on April 22nd by the Senate; in both cases there was an overwhelming majority in favour of nationalisation.

The state paid an amount equivalent to 500 million lire to indemnify the railway companies, largely collected through special subscriptions by the *Cassa Depositi e Prestiti*. Much of this capital was directed toward one of the more promising industries at that time - electricity[19].

With nationalisation, the autonomous administration of the *Ferrovie dello Stato* (FS) was created. It was conceived as something new in the Italian economic system, the first example of a corporation linked to a ministry (that of Public Works), but endowed, through the Board of Directors presided over by a general manager, with the necessary freedom to manage a market-oriented service.

The business was organised around a largely privatised base, borrowed from the earlier managements of the companies, with less complex decision making and bookkeeping procedures than those of the public administration, and a more agile structure and with personnel paid in a different manner than by the State. It should be borne in mind that the "*stato giuridico*" (legal status) of railroad workers granted in 1906, prepared the way for that of civil servants granted two years later. The extensive autonomy that, according to attentive socialist observer Filippo Turati, could have generated a lack of responsibility, was gradually narrowed in the course of the years by the imposition of greater control on the firm.

8. The secondary railways

With regard to the secondary Italian railways, it serves to note that a precise legal definition to distinguish them from the major lines did not exist, even if since the last years of the 19th century this term had indicated the so-called railways in concession, i.e., the railways managed by local companies

and not inserted into the main system. It serves moreover to note that the national system, created in 1905, had always included some tracts with characteristics typical of secondary railways: for instance territorial placement at the service of the countryside and minor centres, limited traffic, the departure of mainly agricultural products from their stations, and in some cases tourist use[20].

At the time of nationalisation in 1905, the State Railway system counted about 17,000 km. As well, about 3,000 km of railway and another 3,000 km of tramway belonged to private enterprises or municipalities, that maintained a large number of small steam powered trains and both steam and electric trams.

In Italy the strong development of the secondary railways began in last twenty years of the 19th century with a genuine generalised movement to promote the branching out of the railway, producing a myriad of leaflets supporting the projects of the single outlying lines, today conserved in libraries and local archives. These brochures were substantially the same in the introduction, where a single scholar or the promoting committee for a line always made grand reference, sometimes with the use of elegant expressions, to the civility brought by the presence of the trains.

With the completion of the main lines, the outlying centres began to clamour for the trains that, in an agricultural society without for the moment the automobile, seemed the only link with civilised life capable of bringing economic development and political and social modernisation. Italy was a country with an ancient infrastructure and numerous lively towns, often having been founded on hills in order to escape the centuries-old endemic illness malaria. These towns were often, in their municipal activity, the protagonists of the completion and management of a secondary system on the peninsula.

In the last twenty years of the 19th century, the development of narrow gauge technology, that allowed narrower curves and steeper slopes thereby reducing the need for great engineering works, and the achievement of particular gripping systems like the rack-and-pinion, made it possible to link by rail the many small towns and villages located in the hills and on the slopes of mountains. The medium-sized municipalities thus would increase their investments in the sector thanks to the power to take out loans with a public bank, the *Cassa depositi e prestiti*.

In 1879 the so-called "*legge Baccarini*" was passed (named after the minister of public works in charge), representing an attempt to classify the so-called complementary railways needed to complete the railway system for the peninsula by dividing them into four categories. The fourth and last category consisted of "secondary railways", 1,530 km of lines that could be constructed as long as the interested provinces and municipalities possessing the necessary means found them useful and took on the responsibility to contribute to the expenses.

Most of the trunk lines of the secondary railways, constructed between the end of the 19th century and the beginning of the 20th, were conceeded to local municipal enterprises and not managed by the major companies. After the general administrative reorganisation of 1865 and 1885, some railways remained entrusted to specific private societies that on 31 December 1887 operated a total of 1,326 km of track: 414 km were assigned the *Compagnia reale sarda*, and 189 km to the *Palermo-Marsala-Trapani*. Along with the more extensive lines, there was also the *Società veneta* with 134 km of the lines Vicenza-Schio, Vicenza-Treviso e Padova-Bassano. 63 km were operated by the *Ferrovie Nord Milano*, that would be noticeably extended in the new century, and 134 km by the *Ferrovia dell'Appenino Centrale* Arezzo-Fossato di Vico. At the beginning of the 20th century other lines would be added to the list - mainly those links with mountain centres in the Alps and Apennines - and already in 1905, immediately following nationalisation, the overall extension had climbed to 3,419 km, of which 2,061 were normal gauge and 1,358 were narrow gauge.

Although not comparable with that of Switzerland, the mileage of mountain or hillside tourist lines was also quite extensive in Italy. This infrastructure was completed within the first thirty years of the 20th century, when trains reached Campo Tures, Predazzo, Ortisei, Cortina d'Ampezzo and Agordo in the Dolomites, Renon, La Mendola, Malè and Riva del Garda between Trento and Bolzano, Piazza Brembana and Clusone in the valleys of Bergamo; Vallombrosa, Gubbio and Norcia in the central Apennines; Castovillari, San Giovanni in Fiore, Mammola, Cinquefrondi and Sinopoli in the interior of Calabria; Palazzo Adriano and Piazza Armerina, to mention only two localities touched by the dense system of narrow gauge Sicilian railways; and Mandas, Sorgono and Arbatax in Sardinia.

Moreover, where the huge investment necessary for a railway was not justified, rails were even placed on ordinary suburban streets, constructing horse-powered, or more often steam tramways, with small locomotives and lightweight wagons.

The decline of the tramway began in Italy in the 1930s. The words of the minister of Communication, Costanzo Ciano, have remained famous. According to him it was necessary "to take the bull by the horns and just tear out the tracks" from the streets, as they were interfering with the motor vehicle circulation[21]. The elimination of tramways continued, moreover, along with that of the secondary railways, into the '50s and '60s, when transportation policies had decisively embraced the cause of motor vehicle transport, assigning a definitely marginal role to systems on rails, operated by state or public companies, in general, and characterised by deficits and inefficiency.

9. Conclusions

The history of the Italian railways in the 19th century has many analogies with the phase of transition that the system is going through in our own time. At the same time we can discern a number of major differences. Privatisation has certainly been the predominant trait in modern railway development for at least the past fifteen years. Although then

slow and muddled, this can in any case be considered the most significant new development. A parallel with what occurred in the last quarter of the 19th century comes spontaneously to mind. At that time the question was whether to nationalise or not, and almost all agreed with this as the most appropriate solution for enabling the Italian railway system to reach its final maturity. Today, with equal unanimity, we are moving towards the idea of a privatisation whose outlines are still rather unclear and that, up to now, has not been able to solve the deep-rooted problems that have long afflicted the service. Although it is going in the opposite direction, the experience of the long pursuit of nationalisation may perhaps have something to teach those who are called upon today to alleviate the oppression that motor vehicles have come to represent in our daily lives.

NOTES

[1] Merger, M., (1999), "L'ingegnere ferroviario nell'Ottocento", in Giuntini, A., Minesso, M., (Eds.), *Gli ingegneri in Italia tra '800 e '900*, Franco Angeli, Milano, pp. 81-99.

[2] Cantarella, E., (1987), "Lo sviluppo delle ferrovie dalle origini alla statizzazione", in *Storia della società italiana*, Vol. 17, Teti, Milano, pp. 101-147.

[3] Giuntini, A., (1999), "Nascita, sviluppo e tracollo della rete infrastrutturale", in Amatori, F., Bigazzi, D., Giannetti, R. and Segreto, L., (Eds.), *Storia d'Italia. Annali 15, L'industria*, Einaudi, Torino, pp. 551-616.

[4] Fenoaltea, S., (1973),"Le ferrovie e lo sviluppo industriale italiano 1861-1913", in Toniolo, G., (Ed.), *Lo sviluppo economico italiano 1861-1913*, Laterza, Bari, pp. 157-186; Fenoaltea, S., (1983), "Italy", in O'Brien, P., (Ed.), *Railways and the economic development of Western Europe 1830-1914*, St. Antony's-Macmillan Press, Oxford, pp. 49-120; Fenoaltea, S., (1984), "Le costruzioni ferroviarie in Italia, 1861-1913", in *Rivista di Storia Economica*, Vol. 1, n° 1, pp. 61-94.

[5] Zamagni, V., (1984), "Ferrovie e integrazione del mercato nazionale nell'Italia post-unitaria", in *Studi in onore di Gino Barbieri*, PEM, Pisa, Vol. 3, pp. 1635-1649.

[6] Mioni, A., (1976), "Le trasformazioni delle infrastrutture territoriali", in Mioni, A., (Ed.), *Le trasformazioni territoriali in Italia nella prima età industriale,* Marsilio,Venezia, pp. 45-150; Bortolotti, L., (1985), "Viabilità e sistemi infrastrutturali", in De Seta, C., (Ed.), *Storia d'Italia. Annali 8, Insediamenti e territorio*, Einaudi, Torino, pp. 287-366.

[7] Guadagno, V., (1995), *Ferrovie ed economia nell'Ottocento postunitario*, Edizioni CAFI, Roma.

[8] Guderzo, G., (1961), "Per una periodizzazione della politica ferroviaria sabauda (1826-1859)", in *Studi giuridici e sociali in memoria di Ezio Vanoni ,* Tipografia del libro, Pavia, pp. 338-369.

[9] Giuntini, A., (1991), *Leopoldo e il treno, Le ferrovie nel Granducato di Toscana (1824-1861)*, Edizioni Scientifiche Italiane, Napoli.

[10] Schram, A., (1997), *Railways and the Formation of the Italian State in the Nineteenth Century*, Cambridge University Press, Cambridge.

[11] Maggi, S., (2001), *Politica ed economia dei trasporti. Secoli XIX-XX. Una storia della modernizzazione italiana*, Il Mulino, Bologna, pp. 34-35.

[12] Brianta, D., (1976), "Piemontesi e toscani di fronte alla legge di riordinamento del 1865. Problemi economico-finanziari nella vendita delle Ferrovie dello Stato alla Società dell'Alta Italia", in *Il Risorgimento*, Vol. 28, n° 2, pp. 173-194.

[13] Maggi, S., (1995), "Aspetti istituzionali della storia delle ferrovie nell'Ottocento", in *Le Carte e la Storia, bollettino semestrale della Società per gli studi di storia delle istituzioni*, Vol. 1, n° 2, pp. 176-181.

[14] Passerin-d'Entreves, E., (1951), "Pietro Bastogi e la fondazione della Società italiana per le strade ferrate meridionali", in *Bollettino storico livornese*, Vol. 1, n° 1-2, pp. 6-17; Cantarella, E., (1976), "Capitale estero e capitale nazionale: alle origini della Bastogi", in *Studi storici*, Vol. 17, n° 3, pp. 97-137.

[15] Merger, M., (1992), "Origini e sviluppo del management ferroviario italiano (1850-1905)", in *Annali di storia dell'impresa*, Vol. 8, pp. 379-417; Merger, M., and Giuntini, A., (1998), "L'organisation des chemins de fer italiens: un ou des modèles (1839-1939)", in *Railway management and its organisational structure: its impact on and diffusion into the general economy,* Proceedings of the 12th International Economic History Congress, August, Fundaciòn Fomento de la Historia Econòmica, Madrid, pp. 11-30.

[16] Papa, A., (1973), *Classe politica e intervento pubblico nell'età giolittiana*, *La nazionalizzazione delle ferrovie*, Guida, Napoli.

[17] Berselli, A., (1958), "La questione ferroviaria e la rivoluzione parlamentare del 18 marzo 1876", in *Rivista storica italiana*, Vol. 70, n°

2, pp. 188-238, and n° 3, pp. 376-420.

[18] Pagliarino, G., (1974), "Le concessioni ferroviarie in Italia dal 1885 al 1905", in *Economia e storia*, Vol. 21, n° 4, pp. 475-510; Merger, M., (1997), "Les conventions de 1885 en Italie: un exemple à ne pas suivre?", in *Les chemins de fer en temps de concurrence. Choix du XIXe siècle et débats actuels*, numero monografico della *Revue d'histoire des chemins de fer*, Vol. 16-17, pp. 190-213.

[19] La Francesca, S., (1965), "La statizzazione delle ferrovie e lo sviluppo dell'industria elettrica in Italia", in *Clio*, Vol. 1, n° 2, pp. 275-306.

[20] Battilani, P., (1998), "Limiti e vantaggi della mano pubblica: il trasporto collettivo in Italia in una prospettiva di lungo periodo", in *Rivista di Storia Economica*, Vol. 14, n° 1, pp. 3-34.

[21] Fumi, G., (1998), "Vie di comunicazione e trasporti", in *Guida all'Italia contemporanea 1861-1997*, Vol. 1, *Risorse e strutture economiche*, Garzanti, Milano, pp. 89-118.

Bibliographyc References

Battilani, P., (1998), "Limiti e vantaggi della mano pubblica: il trasporto collettivo in Italia in una prospettiva di lungo periodo", in *Rivista di Storia Economica*, Vol. 14, n° 1, pp. 3-34.

Berselli, A., (1958), "La questione ferroviaria e la rivoluzione parlamentare del 18 marzo 1876", in *Rivista storica italiana*, Vol. 70, n° 2, pp. 188-238, and n° 3, pp. 376-420.

Bortolotti, L., (1985), "Viabilità e sistemi infrastrutturali", in De Seta, C., (Ed.), *Storia d'Italia. Annali 8, Insediamenti e territorio*, Einaudi, Torino, pp. 287-366.

Brianta, D., (1976), "Piemontesi e toscani di fronte alla legge di riordinamento del 1865. Problemi economico-finanziari nella vendita delle Ferrovie dello Stato alla Società dell'Alta Italia", in *Il Risorgimento*, Vol. 28, n° 2, pp. 173-194.

Cantarella, E., (1976), "Capitale estero e capitale nazionale: alle origini della Bastogi", in *Studi storici*, Vol. 17, Teti, Milano, n° 3, pp. 97-137.

Cantarella, E., (1987), "Lo sviluppo delle ferrovie dalle origini alla statizzazione", in *Storia della società italiana*, Vol. 17, pp. 101-147.

Fenoaltea, S., (1973),"Le ferrovie e lo sviluppo industriale italiano 1861-1913", in Toniolo, G., (Ed.), *Lo sviluppo economico italiano 1861-1913*, Laterza, Bari, pp. 157-186.

Fenoaltea, S., (1983), "Italy", in O'Brien, P., (Ed.), *Railways and the economic development of Western Europe 1830-1914,* St. Antony's-Macmillan Press, Oxford, pp. 49-120.

Fenoaltea, S., (1984), "Le costruzioni ferroviarie in Italia, 1861-1913", in *Rivista di Storia Economica*, Vol. 1, n° 1, pp. 61-94.

Fumi, G., (1998), "Vie di comunicazione e trasporti", in *Guida all'Italia contemporanea 1861-1997*, Vol. 1, *Risorse e strutture economiche*, Garzanti, Milano, pp. 89-118.

Giuntini, A., (1991), *Leopoldo e il treno, Le ferrovie nel Granducato di Toscana (1824-1861)*, Edizioni Scientifiche Italiane, Napoli.

Giuntini, A., (1999), "Nascita, sviluppo e tracollo della rete infrastrutturale", in Amatori, F., Bigazzi, D., Giannetti, R. and Segreto, L. (Eds.), *Storia d'Italia. Annali 15, L'industria*, Einaudi, Torino, pp. 551-616.

Guadagno, V., (1995), *Ferrovie ed economia nell'Ottocento postunitario*, Edizioni CAFI, Roma.

Guderzo, G., (1961), "Per una periodizzazione della politica ferroviaria sabauda (1826-1859)", in *Studi giuridici e sociali in memoria di Ezio Vanoni ,* Tipografia del libro, Pavia, pp. 338-369.

La Francesca, S., (1965), "La statizzazione delle ferrovie e lo sviluppo dell'industria elettrica in Italia", in *Clio*, Vol. 1, n° 2, pp. 275-306.

Maggi, S., (1995), "Aspetti istituzionali della storia delle ferrovie nell'Ottocento", in *Le Carte e la Storia, bollettino semestrale della Società per gli studi di storia delle istituzioni*, Vol. 1, n° 2, pp. 176-181.

Maggi, S., (2001), *Politica ed economia dei trasporti. Secoli XIX-XX. Una storia della modernizzazione italiana*, Il Mulino, Bologna.

Merger, M., (1992), "Origini e sviluppo del management ferroviario italiano (1850-1905)", in *Annali di storia dell'impresa*, Vol. 8, pp. 379-417.

Merger, M., (1997), "Les conventions de 1885 en Italie: un exemple à ne pas suivre?", in *Les chemins de fer en temps de concurrence. Choix du XIXe siècle et débats actuels*, numero monografico della *Revue d'histoire des chemins de fer*, Vol. 16-17, pp. 190-213.

Merger, M., (1999), "L'ingegnere ferroviario nell'Ottocento", in Giuntini, A., Minesso, M., (Eds.), *Gli ingegneri in Italia tra '800 e '900*, Franco Angeli, Milano, pp. 81-99.

Merger, M., and Giuntini, A., (1998), "L'organisation des chemins de fer italiens: un ou des modèles (1839-1939)", in *Railway management and its organisational structure: its impact on and diffusion into the general economy,* Proceedings of the 12th International Economic History Congress, August, Fundaciòn Fomento de la Historia Econòmica, Madrid, pp. 11-30.

Mioni, A., (1976), "Le trasformazioni delle infrastrutture territoriali", in Mioni, A., (Ed.), *Le trasformazioni territoriali in Italia nella prima età industriale,* Marsilio,Venezia, pp. 45-150.

Pagliarino, G., (1974), "Le concessioni ferroviarie in Italia dal 1885 al 1905", in *Economia e storia*, Vol. 21, n° 4, pp. 475-510.

Papa, A., (1973), *Classe politica e intervento pubblico nell'età giolittiana*, *La nazionalizzazione delle ferrovie*, Guida, Napoli.

Passerin-d'Entreves, E., (1951), "Pietro Bastogi e la fondazione della Società italiana per le strade ferrate meridionali", in *Bollettino storico livornese*, Vol. 1, n° 1-2, pp. 6-17.

Sachs, I., (1885), *L'Italie. Ses finances et son développement économique depuis l'unification du royaume 1859-1884*, Guillaumin, Paris, p. 964.

Schram, A., (1997), *Railways and the Formation of the Italian State in the Nineteenth Century*, Cambridge University Press, Cambridge.

Zamagni, V., (1984), "Ferrovie e integrazione del mercato nazionale nell'Italia post-unitaria", in *Studi in onore di Gino Barbieri*, PEM, Pisa, Vol. 3, pp. 1635-1649.

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Casper, F.N. and Brugge R. Ter (1993) A logistics approach to shortsea shipping. In *Strategic Planning in Logistics and Transportation*, ed. J. Cooper, pp. 247-261. British Library, London.

Turner, R.E. (1975) Freight mode selection in Canada. Institute of Guided Ground Transport, Report n. 75 - 14, Queen's University, Kingston, Ontario.

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