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EUROPEAN RAILWAY COMPARISONS FINAL REPORT

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GLOSSARY

BR	British Rail
BV	Banverket (Swedish Rail Track Authority)
CFF	Chemins de Fer Federaux suisses (Swiss Federal Railways)
CIE	Coras Iompair Eirann (Irish State Railways)
CP	Caminhos de Ferro Portuguesas
DB	Deutsche Bundesbahn (West German State Railways)
DSB	Danske Statsbaner (Danish State Railways)
ECMT	European Conference of Ministers of Transport
FS	Ente Ferrovie dello Stato (Italian State Railways)
NS	Nederlandse Spoorwegen (Dutch Railways)
NSB	Norges Statsbaner (Norwegian State Railways)
OBB	Osterreichische Bundesbahn (Austrian State Railways)
RENFE	Red Nacional de los Ferrocarriles Espanoles (Spanish State Railways)
SNCB	Societe Nationale des Chemins de fer Belges (Belgian State Railways)
SNCF	Societe Nationale des Chemins de fer Francais (French State Railways)
SJ	Statens Jarnvager (Swedish State Railways)
UIC	Union Internationale des Chemins de fer (International Union of Railways)

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1. INTRODUCTION

1.1 The Institute for Transport Studies (ITS), University of Leeds and the British Railways Board (BRB) carried out a major comparative study of Western European railways in the late 1970s (BRB and University of Leeds, 1979). Follow-up work was carried out by ITS financed by the Social Science Research Council and reported by Nash (1985). It was decided to revive this work at ITS for a number of reasons:

(i) It is over ten years since the last set of comparisons (for 1981) were made at ITS and therefore a review of the changes in costs and productivity may be timely.

(ii) There has been a number of technical developments that make the use of statistical cost analysis more promising. These developments include the use of more flexible functional forms such as the translog, and the development of comprehensive total factor productivity indices (see, for example, Dodgson, 1985 and, more recently, Hensher and Waters, 1993).

(iii) There is increasing interest in the organisational structure of railway industries as a result of the 1988 Transport Act in Sweden, the EC directive 91/440 and the publication of proposals for privatising British Rail in July 1992 (see, for example, ECMT, 1993).

(iv) Given the explosion in information technology, there were some hopes that data availability would have improved.

1.2 The aim of this project was not simply to repeat the 1979 study but rather to:

(i) Compare the current efficiency of European railway operators and examine recent trends at both aggregate and disaggregate levels.

(ii) Make an exploratory assessment of the potential for further disaggregation by market type in order to make detailed comparisons of market share etc.

(iii) Assess the extent of economies of density and scale on European rail operations.

1.3 The third aim was achieved through the development of a translog cost function using data published by the Union Internationale des Chemins de fer (UIC) and is reported elsewhere (Aldridge and Preston, 1992, Preston and Nash, 1993, Preston 1994). The key findings are presented in ITS Working Paper 375.

1.4 This study involved the following methodological approaches:

(i) A review of the expanding literature on railway cost and productivity analysis to identify state-of-the art techniques and empirical findings (Nash and Preston, 1992A, B, 1993).

(ii) Published data was collected from the UIC, rail companies' Annual Reports and Accounts and, where available, from central Government statistics, for the following operators and countries:

BR (Great Britain)*	NS (Netherlands)*
CFF (Switzerland)	NSB (Norway)*
CIE (Eire)	OBB (Austria)
DB (West Germany)*	RENFE (Spain)
DSB (Denmark)*	SJ/BV (Sweden)*
FS (Italy)*	SNCB (Belgium)*
SNCF (France)*	CP (Portugal)

* Studied also in 1979.

Of the 14 operators studied, 9 were also studied in the 1979 project. Only one company (VR - the Finnish operator), was included in the 1979 study but not in our current study. Annual Reports and Accounts for 1990 (BR 1990/91) have been obtained for all operators. National transport statistics for 1990 have been obtained for Great Britain, Switzerland, Italy, Norway and France. In the summer of 1993, an MSc student undertook a study of railways in Portugal (Tao, 1993), and as a result the state railway operator in that country (CP) has been added to our study.

(iii) Each operator was approached on a Chairman to Chairman basis. All operators agreed to co-operate with the study. Detailed questionnaires (a copy is included as Appendix one) were sent to all companies. All operators have returned the questionnaire, or provided additional data although in some cases not all the information requested has been provided. The questionnaires have been supplemented by face to face interviews with 13 of the 14 operators. These face to face interviews were particularly useful in obtaining information on the institutional, managerial and financial structures of the different rail operators and the degree of regulation that they face in the passenger and freight markets. This work is reported in detail elsewhere (Preston and Nash, 1992)

(iv) The data collected has been entered into Works spreadsheets and preliminary analysis of performance and trends in operating, commercial and financial performance has been undertaken. This work was seen as being the first of two phases. A second phase would involve disaggregating results by output and analysing market shares. The scope for such analysis has been examined in this first phase. Those operators that have the information required for this second phase will be identified and a prospectus for further research will be outlined.

(v) An initial interim report was produced in March 1993 and circulated with an accompanying letter requesting comment to all co-operating railways. Comments were received from 10 of the 13 co-operating railways, and have been incorporated into this interim report, and the appropriate data bases updated.

(vi) Following the revision of the Interim Report in June 1993, a time series data base was developed using UIC International Railway Statistics, covering the

years 1971-91. From this data base a series of partial productivity indices (see 1.8) were developed, along with other tabulations such as utilisation of freight stock. Graphing the resultant indices allows us to examine the long term performance trends of all 14 operators. This gives us a different perspective on European Railway Comparisons to that afforded by the Interim Report, which is a short-term, snapshot view. This work is reported in detail elsewhere (Shires, 1993).

1.5 Most of the literature that has been reviewed relates to North American railways, with Caves et al. providing papers on total factor productivity measurement (1982) and the application of the translog cost function (1985). The translog is a flexible functional form that has usually been used to relate costs to output and input prices in order to determine economies of scale and density. Recent applications of this technique in Europe include studies carried out in Britain, using historical data between 1900 and 1912 (Dodgson, 1993), in Eire using time-series data (McGeehan, 1993) and in Switzerland using pooled cross-sectional and time-series data for 48 'private' railways (Filippini and Maggi, 1992). Other recent quantitative work has included comparisons of Australia's railways, based on total factor productivity indices (Hensher et al, 1992), and the passenger railways of Europe with those of Japan, Korea, North America and Australia, using a linear programming technique known as data envelopment analysis (Oum and Yu, 1991).

1.6 There are a number of reasons why relatively little work has been done on comparing European railways. In particular:

(i) European railways have a diverse range of outputs. North American and Australian railways are dominated by long haul freight. European railways, to different degrees are involved in inter-city, urban and rural passenger transport, as well as different mixes of freight traffic. Derivation of a comparable composite traffic unit measure is extremely difficult. Despite obvious problems, in the rest of this paper traffic units are defined as combinations of passenger kilometres and freight tonne kilometres.

(ii) Although there have been recent improvements, instigated by the UIC, there is still a lack of comparability of accounts. Particular problems surround the measurement of depreciation and capital stock, interest charges and pension and social security liabilities.

(iii) Government policy greatly affects fares, services operated and the degree of competition. This suggests that demand related output measures (such as passenger kilometres) may be poor measures of management performance. More meaningful comparisons may be obtained from supply related output measures (such as train kilometres).

(iv) The variety of geographical circumstances, in terms of area, population density, industrial structure, strategic location, climate and terrain (including the need for ferry crossings) may make comparisons difficult.

(v) European railways have a diverse range of inputs, for example with respect to traction power, and there are difficulties in measuring factor prices, due to different currencies, differing standards of living and taxation systems.

1.7 We were aware of these, and other problems, at the start of our study and this awareness was reflected in the approach adopted, with its emphasis on gathering unpublished data on variables such as product mix, investment and capital stock. The outline of this report will be as follows. In section two, we present some background information on the role of European railways. In section three, we assess operating performance, whilst in sections four and five we assess commercial and financial performance respectively. In section six, we measure some aspects of quality of service, namely safety, reliability and punctuality. Lastly, in section seven we draw some tentative conclusions and make some recommendations for further work.

1.8 Following our earlier work, we concentrate on the development of a series of partial productivity indices as follows:

$$\frac{\text{Receipts}}{\text{Traffic Units}} \cdot \frac{\text{Traffic Units}}{\text{Train Kms}} \cdot \frac{\text{Train Km}}{\text{Staff Nos}} \cdot \frac{\text{Staff Nos}}{\text{Staff Costs}} \cdot \frac{\text{Staff Costs}}{\text{Total Cost}}$$

$$= \frac{\text{Receipts}}{\text{Total Costs}}$$

1.9 Of these indices we would classify Train Km/Staff Nos as being the key measure of operating performance, Receipts/Traffic Units and Traffic Units/Train Kms as measures of commercial performance and Receipts/Total Costs as a measure of financial performance. Staff Nos/Staff Costs and Staff Costs/Total Costs are best regarded as largely determined by factor prices.

2. THE ROLE OF WESTERN EUROPEAN RAILWAYS

2.1 Railways in western Europe are a minor mode, for both passenger and freight traffic. Table 2.1 shows that rail accounted for 7.2% of passenger kilometres made in 1990 by land based mechanised modes in our sample. This is a reduction compared to rail's 8.4% share in 1980, despite a growth in absolute volume from 226 billion passenger kms to 256 billion. The reason for rail's relative decline is the continuing rapid growth of car use, which has increased market share from 80.3% to 83.3%. Only two countries in our sample (Ireland and Switzerland) have seen rail's market share increase between 1980 and 1990. Similarly, only two countries (Switzerland and Spain) have seen bus increase its market share. These two countries are also the only countries to have seen car lose market share, despite absolute growth.

2.2 In 1990, the UK had the third lowest rail market share for passenger traffic at 5.4%. Only Norway (5.1%) and Eire (3.6%) had lower. Similarly, the UK had the third lowest bus market share (7.2%) with only France (6.0%) and Switzerland (4.8%) lower. The UK has the highest car market share (86.5%) in 1990, whereas in 1980 it had the fifth highest share, below Switzerland, France, the Netherlands and Sweden. At first this finding would appear to be difficult to explain given the UK's relatively low levels of car ownership. However the high levels of fares (illustrated in Table 3.5) reduce the attractiveness and competitiveness of rail in comparison to other transport modes. It should be noted that Table 2.1 does not take into account air travel which may be particularly important in certain countries (e.g. Norway, Sweden).

2.3 Table 2.2 shows that rail accounted for 17.1% of freight tonne-kilometres moved in 1990 by inland modes for the countries in our sample. This is a reduction compared to rail's 21.9% share in 1980. Unlike passenger traffic, there has also been an absolute decrease in rail freight movements, down from 229 billion tonne-km in 1980 to 219 billion tonne-km in 1990. Rail's relative share has declined in all countries in our sample, although there has been some volume growth in four countries (Sweden, Italy, Spain and Denmark). Road freight is increasing its market share, up from 59.1% to 68.5%, at the expense of not only rail but also inland waterways and pipelines.

2.4 In 1990, the UK had the third lowest rail market share for freight traffic, at 9.9%, with only Spain (7.0%) and the Netherlands (4.6%) having lower shares. There is much more variation in rail's share of the freight market than the passenger market. The highest market shares were achieved in Sweden (42.5%), Switzerland (41.6%), France (26.7%) and West Germany (20.6%), although the last three had suffered large losses in market shares since 1980. There are also definitional problems due to the fact that Table 2.2 does not include coastal shipping. For example, if coastal shipping is included as a mode, rail's share of the freight market in Sweden is reported to reduce to 29% (Hylen, 1993).

2.5 Table 2.3 brings together what evidence we have available on traffic mix. It can be seen that BR has a greater dependence on commuter traffic and a lower dependence on inter city traffic than many of the other railways for which we have evidence. The main exceptions to this are CP and OBB. This may explain the relatively short mean passenger journey lengths (only DSB and CP have shorter mean journey lengths) and low loads (only SNCB and NSB have lower) exhibited by BR (see Table 2.4).

2.6 By contrast, Table 2.3 shows that the freight mix is more favourable to BR, with there being a much greater dependence than any other country, with the exception of Belgium, on bulk commodities. Thus Table 2.4 shows that although BR has the disadvantage of short length of haul (only SNCB and NSB, due to the relatively short haul to Narvik, have shorter), it has the advantage of relatively large freight train loads (only SJ and NS have higher loads, albeit by a considerable margin).

2.7 We have converted financial data to pounds sterling using the purchasing power parity (PPP) exchange rates given in Table 2.5. These are shadow exchange rates that take into account differences in the cost of living between countries (see, for example, Kravis et al, 1978). The shadow exchange rate, expressed in pound sterling, is greater than the market exchange rate for all countries other than Spain and Portugal, and is over 40% higher in Scandinavia and Switzerland due to the much higher cost of living in those countries compared to Britain.

2.8 A further important difference between BR and continental European railways is highlighted by Table 2.6 and is the much higher mean actual hours worked per member of staff. BR staff work longer than the staff of any of the other twelve railway companies for which we have data. This differential has persisted despite the introduction of flexible rostering. The reasons must lie in the way that overtime is much more prevalent on BR due to the way that Sunday working has been traditionally rostered and due to the relatively low basic wage levels. Table 2.6 also shows annual salary costs per person and hourly wage rates. However, comparisons are notoriously difficult. Domestic labour markets may differ from country to country. Earnings in rail transport in each country may be broadly similar in relation to earnings in all industries across all our sample. Gross salary costs involve different levels of provision of state welfare benefits which need to be investigated further. Composition of the labour force may also be important. It may be that some railways have a higher proportion of high skill/high wage workers or more flexible working practices rewarded by higher wages. Nonetheless, Table 2.6 gives some broad indications that, although the annual earnings of BR employees are similar to many of their European colleagues, the hourly rates are some of the lowest (only CIE and CP have lower).

2.9 Table 2.7 gives some indications of the role of geography on rail operations. It can be seen that the United Kingdom has a medium-high population density compared to the rest of our sample, but BR has a low amount of rail route per million population and a medium-high traffic density. Particularly noticeable, is the large variation in population density ranging from the sparsely populated Nordic countries (Norway and Sweden) to the densely populated Low Countries (the Netherlands and Belgium). It should be noted that the 300 route kilometres network of Northern Ireland Railways is not included in our data set. From Table 2.7 onwards all Tables refer solely to the activity of the dominant state owned rail operator in each of the 14 countries studied, with the minor exception of Sweden where the figure are based on the dominant rail operator and the state owned infrastructure authority.

2.10 Table 2.8 gives a brief comparison of the different car taxes operating within several of the countries whose rail operators are participating in this study. The first column aggregates taxes stemming from the ownership of a car and its use per annum i.e. road tax and fuel tax. Such costs accrue annually unlike acquisition taxes (second column) that are a one-off cost, associated with the purchase of a car. In terms of

ownership and useage taxation, Britain is neither a low nor a high taxing country. Its annual charges of £530 p.a. is the mid-point of the range of charges shown in column 1, of Table 2.8, with France and the Netherlands having substantially higher annual charges whilst Sweden and Germany have significantly lower charges. From column 2 a wide range of acquisition taxes can be identified, ranging from VAT to Registration Taxes. Not only do the types of taxes vary from country to country but so do the rates these taxes are levied at, making comparisons of overall tax levels difficult. This is illustrated by Britain, which levies one of the lowest VAT rates of the countries being compared, but on top of this levies a 10% Car Tax. If the various taxes are aggregated for every country the overall tax rate ranges from 20% to 30%.

2.11 The total length of route (kms) BR operates is 16,584 kms, a figure exceeded only by the German and French operators, 26,949 kms and 34,070 kms respectively (see Table 2.9). However over 50% of the German and French routes are single track only, whilst BR has double track on 70% of its route. The increasing returns to operating capacity and utilisation afforded by a double track mean that BR's overall operating capacity will be extremely high. Only the Netherlands and Belgium have comparable percentage levels of double track. The other operators, with the exception of Switzerland, have less than 50% double track route with the Norwegians having the least (2.4%).

2.12 Examination of Table 2.10, shows that 29.6% of BR's route is electrified. This figure is well below those returned by the majority of the other operators and is considerably less than the mean of 47%. These figures are tempered somewhat by looking at the total length of route electrified, which show BR to be both above the mean and many of the other operators. Another point worth noting is that BR has tended to prioritise electrification of its double-track route rather than its single track route. Other large operators have followed a similar strategy. However there is a lack of standardisation of electrification systems between European operators and in some cases within each operator themselves, with at least seven systems in use (AC 11 KV, 15 KV, 25 KV, DC 750V, 1200V, 1500V, 3000V).

2.13 The ratio of "track/route" is illustrated by Table 2.11. Portugal, Norway and Ireland have the lowest ratios, with 1.26, 1.3 and 1.45, reflecting their high percentages of single track route (see table 2.9). BR has a high ratio of 2.28, which given its high percentage of double track is not surprising, but does not surpass Belgium which has a ratio of 2.76.

2.14 The most noticeable difference between the operators in Table 2.12 occurs in the "average distance between freight stations" column. The mean distance is 10.4 kms whilst the figure for BR is 132.67 kms. The majority of the other operators range from 6.8 kms to 11 kms. BR's figure reflects two elements, firstly the minor role played by rail in the UK freight transport market (it presently only has 9.9%) and secondly BR's policy of rationalising freight terminals and concentrating on sidings to sidings flows.

2.15 Table 2.13 gives some indication on how geography may effect rail operations, as, for example, FS has the highest number of bridges per route km, whilst NSB has both the greatest length of tunnel and the greatest number of level crossings per route km. As a rule, densely populated countries, including Great Britain, tend to have large numbers of bridges; mountainous countries, such as Norway and Italy, have large numbers of tunnels. It is noticeable that Britain has the lowest number of level crossings per route kilometre in Europe.

2.16 Table 2.14 shows that in 1990 only two railways out of the nine for which we have data (BR and SNCF) had a significant percentage of track capable of carrying trains at speeds in excess of 160 km/hour. However, a number of railways (most notably DSB and NS) had significant percentages of track capable of accommodating speeds in excess of 120 km/hr.

2.17 Examining Table 2.15 shows that Britain's real GNP per capita belongs firmly in the middle category of those countries that are represented. Not surprisingly Switzerland has the highest real per capita GNP and Portugal the lowest. The second column shows the level of car ownership per thousand population, revealing a possible correlation between high levels of car ownership and high levels of real GNP. The level of car ownership in Britain is comparable to those experienced by Norway, the Netherlands and Austria, who also have similar per capita real GNP's. The figures in column three refer to rail passenger km per thousand population, and show that BR's provision of passenger kms is one of the lowest in comparison to the other rail operators. This comes as no surprise given the earlier table 2.1 that showed the UK to have the second lowest rail market share for passenger traffic (5.4%).

Table 2.1: Passenger Transport (Thousand Million Passenger Km)

		Rail	%	Private Cars	%	Buses and Coaches	%	TOTAL
Austria	1980	7.38	11.6	43.54	68.7	12.45	19.6	63.37
	1990	8.46	11.1	54.10	71.0	13.62	17.9	76.19
Belgium	1980	6.96	8.5	65.38	80.3	9.08	11.1	81.41
	1990	6.54	N/A	80.75	N/A	N/A		N/A
Switzerland	1980	9.18	10.7	72.60	84.9	3.78	4.4	85.55
	1990	11.06	10.8	87.08	84.7	4.97	4.8	102.87
West Germany	1980	40.50	7.0	470.30	81.6	65.60	11.4	576.40
	1990	43.60	6.3	593.80	85.7	55.50	8.0	692.90
Denmark	1980	4.31	8.7	38.10	76.6	7.30	14.7	49.71
	1990	4.86	7.1	53.60	79.1	9.30	13.7	67.76
Spain	1980	14.83	8.5	130.90	75.3	28.10	16.2	173.82
	1990	16.73	7.6	164.22	74.8	38.68	17.6	219.64
France	1980	54.66	10.0	453.00	83.0	38.00	7.0	545.66
	1990	63.74	9.2	586.00	84.8	41.30	6.0	691.04
Italy	1980	39.59	9.4	324.03	76.9	57.84	13.7	421.46
	1990	46.43	7.1	522.59	80.1	84.38	12.9	652.49
Eire	1980	1.03	3.5	21.69	73.4	6.81	23.1	29.53
	1990	1.29	3.6	26.97	79.1	5.91	17.3	34.11
Norway	1980	2.75	7.1	31.30	80.4	4.88	12.5	38.93
	1990	2.43	5.1	39.34	83.7	4.88	10.4	46.98
Netherlands	1980	8.89	6.9	107.10	82.9	13.20	10.2	129.19
	1990	11.06	6.9	136.20	85.0	13.00	8.1	160.26
Portugal	1980	6.08	11.1	41.00	75.0	7.60	13.9	54.68
	1990	5.66	7.0	65.00	80.3	10.30	12.7	80.96
Sweden	1980	7.00	8.6	66.70	82.3	7.30	9.0	81.00
	1990	6.17	6.1	85.60	84.9	9.00	8.9	100.77
UK	1980	30.26	6.7	367.00	81.6	52.00	11.6	449.26
	1990	34.20	5.4	550.00	86.5	46.00	7.2	636.20
TOTAL (excluding Belgium)	1980	226.46	8.4	2167.26	80.3	304.86	11.3	2698.58
	1990	255.69	7.2	2964.50	83.3	336.84	9.5	3557.03

Source: ECMT

Table 2.2: Freight Transport (Thousand million tonne-km)

		Rail	%	Roads	%	Inland Waterways	%	Pipelines	%	TOTAL
Austria	1980	11.00	39.9	2.88	28.7	1.56	5.7	7.06	25.6	22.50
	1990	12.68	46.1	6.75	24.6	1.66	6.0	6.37	23.2	27.46
Belgium	1980	8.04	23.6	18.31	53.9	5.85	17.2	1.80	5.3	34.00
	1990	8.35	17.8	32.05	68.4	5.45	11.6	1.02	2.2	46.88
Switzerland	1980	7.39	50.3	6.03	41.0	0.16	1.1	1.11	7.6	14.69
	1990	8.30	41.6	10.32	51.7	0.15	0.7	1.17	5.9	19.94
West Germany	1980	63.80	25.2	124.40	49.2	51.44	20.4	13.10	5.2	252.74
	1990	61.40	20.6	169.80	57.0	54.80	18.4	11.74	3.9	297.74
Denmark	1980	1.62	17.1	7.85	82.9					9.47
	1990	1.79	16.0	9.35	83.9					11.14
Spain	1980	11.30	10.9	89.50	86.2			3.01	2.9	103.81
	1990	11.61	7.0	152.25	91.8			4.22	2.5	165.83
France	1980	66.37	31.6	98.10	46.7	10.87	5.2	34.67	16.5	210.02
	1990	51.53	26.7	114.80	59.4	7.17	3.7	19.61	10.2	193.11
Italy	1980	18.38	12.2	119.60	79.7	0.20	0.1	11.94	8.0	150.12
	1990	21.22	10.1	177.95	84.5	0.12	0.1	11.10	5.3	210.38
Eire	1980	0.62	11.0	5.01	88.8					5.64
	1990	0.59	10.3	5.13	89.9					5.72
Norway	1980	1.66	24.0	5.25	75.9					6.91
	1990	1.63	14.3	7.69	67.6			2.06	18.1	11.38
Portugal	1980	1.00	7.81	11.80	92.2					12.80
	1990	1.59	12.71	10.92	87.3					12.51
Netherlands	1980	3.40	5.7	17.67	29.7	33.48	56.2	5.04	8.5	59.59
	1990	3.07	4.6	22.89	34.4	35.66	53.6	4.87	7.3	66.50
Sweden	1980	16.65	43.8	21.36	56.2					38.01
	1990	19.61	42.5	26.52	57.4					46.13
UK	1980	17.64	14.8	91.10	76.4	0.4	0.3	10.08	8.4	119.22
	1990	15.80	9.9	132.90	83.1	0.2	0.1	11.04	6.9	159.94
TOTAL	1980	228.87	21.9	618.86	59.1	103.96	9.9	94.87	9.1	1046.56
	1990	219.17	17.1	879.32	68.5	106.87	8.3	79.20	6.2	1284.56

* Includes transport for hire and reward only. ** Excludes own account operations
Source: ECMT

Table 2.3: Distribution of Traffic by Market Sector (%)

	Passenger km			Freight tonnes kms	
	Commuter	Inter-City	Other	Bulk [1]	Other
BR	45	38	17	76	24
CFF	25	75	0	61	39
CIE	18	82	0	60	40
CP	62	38	0	50	50
DSB	27	73	0	N/A	N/A
FS	N/A	N/A	N/A	39	61
NS	N/A	N/A	N/A	46	54
NSB	N/A	N/A	N/A	34	66
OBB	43	35	22	34	66
RENFE	30	54	16	34	66
SJ	N/A	N/A	N/A	22	68
SNCB	N/A	N/A	N/A	70	30
SNCF	14	75	11	38	62

Source: Study Data N/A=Not available
[1] Consists of Solid Fuels, Petroleum, Ores, Metals and Building Materials

Table 2.4: Traffic Characteristics

	Passenger Mean Journey Length (km)	Mean Train Load (pax)	Freight Mean Shipment Length (km)	Mean Train Load (tonnes)
BR	41.0	89.0	128.3	343.2
CFF	42.0	116.7	161.4	299.4
CIE	49.0	124.2	179.7	134.8
CP	25.0	206.5	246.2	235.6
DB	41.8	107.8	221.8	305.9
DSB	33.4	100.1	215.4	245.1
FS	106.0	193.1	324.6	318.0
NS	43.3	104.6	166.9	365.5
NSB	61.1	83.2	120.1	224.3
OBB	50.8	113.7	202.3	314.6
RENFE	56.4	128.8	385.7	285.8
SJ	78.5	103.4	349.5	471.0
SNCB	46.0	56.7	124.5	217.5
SNCF	76.4	200.2	358.7	303.7

Source: Study Data.

Table 2.5: Purchasing Power Parity (PPP) Rates

	Market Exchange Rate	Shadow Exchange Rate
BR	1.000	1.000
CFF	2.467	3.596
CIE	1.075	1.130
CP	253.206	169.786
DB	2.870	3.415
DSB	10.993	15.452
FS	2128.100	2323.500
NS	3.234	3.547
NSB	11.119	16.108
OBB	20.195	22.989
RENFE	181.055	178.98
SJ	10.513	15.353
SNCB	59.357	64.532
SNCF	9.671	10.821

Source: OECD. (1992) "National Accounts. Main Aggregates. Volume One. 1960-1990" Department of Economics and Statistics.

Table 2.6: Mean Actual Hours of Work per Annum per Member of Staff and Annual Salary Costs (£)

	Hours Worked	Annual Salary Costs per person (£)	Salary Costs per Hour Worked (£)
BR	2472.34	15054.47	6.09
CFF	1643.74	21197.22	12.90
CIE	2383.65	14467.96	6.07
CP	1911.81	8483.19	4.44
DB	1505.69	26296.02	17.46
DSB	1569.30	13360.35	8.51
FS	1656.00	22899.49	13.83
NS	1567.15	18711.70	11.94
NSB	1603.18	13595.61	8.48
OBB	1621.55	14935.19	9.21
RENFE	N/A	19473.35	N/A
SJ/BV	1457.69	14844.14	10.18
SNCB	1585.96	24591.58	15.50
SNCF	1644.89	18729.41	11.39

Source: Study Data, converted to sterling at purchasing power parity exchange rates (see Table 2.5).

N/A=Not available

Table 2.7: Population, Route and Traffic Density

	Population per km^2	Rail route km per mil.population	Train km per route km
BR	233.151	290.62	26055
CFF	159.860	440.00	41099
CIE	51.382	549.15	7324
CP	110.3	333.68	13033
DB	246.597	439.38	22405
DSB	119.071	457.01	23522
FS	190.675	279.70	19560
NS	433.559	190.15	41927
NSB	12.967	962.86	9076
OBB	90.633	693.29	20827
RENFE	77.414	320.86	13695
SNCB	327.934	350.71	44206
SNCF	102.679	606.44	14313
SJ	18.898	1477.65	9225

Sources: Population, Area: Times Atlas of the World (1990)
Other Information: Study Data

Table 2.8: Taxation of Private Cars - 1988

Ownership and use of Taxation[1] (p.a)		Acquisition Taxes
Britain	530	15% Vat & 10% Car tax,(wholesale price)
Germany	380	14% Vat
Denmark	573	22% Vat & 1st Registr. Tax(83%-158%)
Netherlands	715	Purchase Tax 16.4% - 24.6%
Norway	-	5.3% Vat, Import Tax based on Value & Weight 42.5% - 105%
Sweden	394[2]	19% Purchase Tax, 2% - 10% Import Tax
Belgium	447	25% Vat & Small Registration Fee
France	825	28% Vat & Small Registr. Fee on HP basis

Source: International Road Federation World Road Statistics 1984-88 Geneva 1989

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[1]:The exact definition is as follows:annual taxes paid by a 1500cc private car travelling 15000kms and consuming 1500 litres of petrol p.a.. All figures in £ Sterling.

[2]:Includes special taxes only;not import tax and purchase tax.

Table 2.9: Percentage of Single And Double-Track Route

	Total Length of Route(km)	Total Length of S-Tk Route(km)	S-Tk Route %	Total Length of D-Tk Route(km)	D-Tk Route %
BR	16584	4952	29.9	11632	70.1
CFF	2978	1460	49.0	1518	51.0
CIE	1944	1424	73.3	520	26.7
DB	26949	14569	54.1	12380	45.9
DSB	2344	1417	60.5	927	39.5
FS	16066	10295	64.1	5771	35.9
NS	2798	1006	36.0	1792	64.0
NSB	4044	3945	97.6	99	2.4
CP	3126	2732	87.4	419	13.4
OBB	5624	3964	70.5	1660	29.5
RENFE	12560	9856	78.5	2704	21.5
SJ/BV	10801	9610	89.0	1191	11.0
SNCB	3479	895	25.7	2584	74.3
SNCF	34070	18283	53.7	15787	46.3
Mean	10240.5	6029.1	58.9	4213.1	41.1

Source: Study Data S-Tk=Single Track, D-Tk=Double Track

Table 2.10: Percentage of Route Electrified

	Total Length of Route(km)	Total Length of Elect. Route(km)	% of Elect. Route	Elect. S-Trk.(km)	% of Elect. S-Trk	Elect. D-Trk. (km)	% of Elect D-Trk
BR	16584	4912	29.6	235	1.42	4677	28.20
CFF	2978	2968	99.7	1450	48.69	1518	50.97
CIE	1944	37	1.9	N/A	N/A	37	1.90
DB	26949	11693	43.4	2187	8.12	9506	35.27
DSB	2344	230	9.8	1	0.04	229	9.77
FS	16066	9512	59.2	3833	23.86	5679	35.35
NS	2798	1957	69.9	241	8.61	1716	61.33
NSB	4044	2426	60.0	2327	57.54	99	2.45
CP	3126	458	14.7	55	1.76	403	12.89
OBB	5624	3246	57.7	1586	28.20	1660	29.52
RENFE	12560	6416	51.1	3805	30.29	2611	20.79
SJ/BV	10801	6995	64.8	5804	53.74	1191	11.03
SNCB	3479	2294	65.9	162	4.66	2132	61.28
SNCF	34070	12609	37.0	1787	5.25	10822	31.76
Mean	10240.5	4697	47.5	1676.6	19.44	3020	28.04

Source: Study Data Elect.=Electrified N/A=Not available

Table 2.11: Length of Route and Length of Track (1990)

	Total Length of Route(km)	Total Length of Track(km)	Ratio Trk/Rt	Total Length of Elect. Track (km)	% of Elect. Trk/ All Trk Length
BR	16584	37810	2.3	12567	33.2
CFF	2978	7517	2.5	7047	93.7
CIE	1944	2810	1.4	37	1.3
DB	26949	60549	2.2	21771	52.5
DSB	2344	5068	2.2	230	4.5
FS	16066	31187	1.9	21841	70.0
NS	2798	6680	2.4	N/A	N/A
NSB	4044	5276	1.3	3161	59.9
CP	3126	3940	1.3	1040	26.4
OBB	5624	10698	1.9	7036	65.8
RENFE	12560	18706	1.5	N/A	N/A
SJ/BV	10801	17056	1.6	11067	64.9
SNCB	3479	9615	2.8	5543	57.6
SNCF	34070	70046	2.1	32239	46.0
Mean	10240.5	20635	1.8	11132	48.0

Source: Study Data N/A=Not available

Table 2.12: Passenger and Freight Stations

	No of Stations Total	Avge Dist Between Stations (Kms)	No of Pass. Stations (total)	Average Dist Between Pass. Stns (Km)	No of Stations With Freight Serv.	Average Dist Between Freight Stns (Km)
BR	2615	6.3	2490	6.7	125	132.7
CFF	816	3.6	799	3.7	598	5.0
CIE	121	16.1	N/A	N/A	N/A	N/A
DB	4809	5.6	4430	6.1	2776	9.7
DSB	284	8.3	284	8.3	284	8.3
FS	2843	5.7	2763	5.8	2061	7.8
NS	460	6.1	389	7.2	71	39.4
NSB	589	6.9	589	6.9	589	6.9
CP	772	4.0	760	4.1	201	15.6
OBB	1563	3.6	1456	3.9	794	7.1
RENFE	2257	5.6	1624	7.7	1207	10.4
SJ/BV	1055	10.2	546	19.8	827	13.1
SNCB	678	5.1	563	6.2	416	8.4
SNCF	5766	5.9	4952	6.9	3980	8.6
Mean	1759	5.7	1665	6.5	N/A	10.4

Source: Study Data. For CP, information contained in Wagonload OD-DO Matrices MS 20550 (1990) was used. N/A=Not available

Table 2.13: Bridges, Tunnels and Level Crosssings

	Number of Bridges	No of Bridges per Rte-km	Number of Tunnels	No of Tunnels per Rte-km	Number of Level X-ings	L-X's/ Rte-km
BR	26101	1.57	283	0.0171	9338	0.56
CFF	4114	1.38	241	0.0809	2126	0.71
CIE	2752	1.42	16	0.0082	2564	1.32
DB	31426	1.17	686	0.0255	20267	0.75
DSB	2200	0.94	N/A	N/A	1786	0.76
FS	61279	3.81	1955	0.1217	9993	0.62
NS	4500	1.61	3	0.0011	3303	1.18
NSB	2700	0.67	725	0.1793	6805	1.68
CP	2000	0.64	117	0.0374	4361	1.40
OBB	5422	0.96	226	0.0402	7154	1.27
SJ/BV	2957	0.27	90	0.0083	16083	1.49
SNCB	3934	1.13	115	0.0331	2720	0.78
SNCF	28280	0.83	1409	0.0414	24338	0.71

Source: Study Data. N/A=Not available

Table 2.14: Percentage of Track, following Maximum Admissible Speeds.

		Less th. 120 Km/h		120-160 Km/h		160 Km/h&M.	
	Total Track	Total	%	Total	%	Total	%
BR	37810	23835	63.04	8753	23.15	5222	13.81
CIE	2810	2305	82.04	505	17.96	0	0
DSB	5068	2515	49.62	2553	50.38	0	0
NS	6680	3636	54.37	3048	45.63	0	0
NSB	5276	4940	93.63	336	6.37	0	0
CP	3940	2940	74.62	1000	25.38	0	0
OBB	10698	8101	75.73	2219	20.74	378	3.53
SJ/BV	17056	14290	83.79	2520	14.77	246	1.44
SNCB	9615	5961	62.00	3654	38.00	0	0
SNCF	70046	44561	63.62	14756	21.07	10729	15.31

Source: Study Data

Table 2.15: GNP, Car Ownership and Rail Use - 1990

	Real GNP per Capita (PPP)in £	Car Ownership per Capita	Rail Pass KM Per Capita
BR	5826	376	595
CFF	7835	443	1882
CIE	3957	228	350
DB	6840	437[3]	709
DSB	6220	312	945
FS	5932	433	788
NS	5860	370	743
NSB	5893	380	495
OBB	6085	384	1101
RENFE	4370	308	431
SJ	6257	421	712
SNCB	6166	393	665
SNCF	6466	417	1130
CP	2898	242	538

Source: British Railways Board, Policy Office

[3]figures includes the former GDR

3. OPERATING PERFORMANCE

3.1 In Table 3.1 we present our key measure of operating performance, train kilometres per member of staff. From the unadjusted figures (kilometres per staff) we can see that in 1990 the performance of BR appears to be reasonable, with only DSB, NS, SJ and SNCB bettering it. All the operators have experienced improvements in operating performance since 1977, in some cases quite significantly e.g. BR saw a 32% improvement. Since some of the operators were not included in the original study of 1979 (BRB and University of Leeds, 1979) figures are not available for the year 1977.

3.2 Because we believe that freight traffic is more labour intensive than passenger traffic (Nash, 1985) passenger train kms have been weighted to take this into account. In the first comparative study carried out by BRB and University of Leeds, passenger train km were given a weighting of 0.45. This obviously makes a large difference to the absolute values but in the majority of cases only leads to modest changes in relative performance. The major exception is NS whose performance is brought back into line with the other operators. However we now believe that the data we have for NS is probably the most reliable in this respect suggesting that freight services require 35% more staff than passenger services and that passenger train km should be weighted by 0.74. This weighting too has little affect on relative performance.

3.3 Table 3.2 presents Train kms per Staff (1990) at the disagregate level. In the case of BR and SNCF, freight and parcel staff appear more productive than passenger staff in contradiction to earlier findings (Nash, 1985) that freight traffic was more labour intensive than passenger traffic.

3.4 Table 3.3 shows another measure of operating performance, train kilometres per traction unit. Table 3.3 excludes shunt operations and locomotives with less than 750 kw power. The utilisation of diesel locomotives is highly variable. However, the low figures for CFF, NS and SJ may reflect the role of diesel locomotives as back-ups for predominantly electrified systems and may also reflect the inclusion of small shunters despite our request for these to be excluded. More difficult to explain are the high utilisation figures for both CP and DSB. At this stage we are treating them as outliers, due to either missing or misinterpreted data. The utilisation of electric locomotives is less variable and generally much higher than diesel locomotives, with BR locomotive utilisation tending towards the upper end of the observations.

3.5 The utilisation of diesel multiple units (DMUs) shows less variability than diesel locomotives. The utilisation of electric multiple units (EMUs) is more variable than DMUs and tends to be lower (CFF, NSB and RENFE are exceptions). BR utilisation of DMU's is good, but for EMU's in common with France, Germany and Denmark the utilisation is poor, presumably reflecting the peaked nature of these operators' services. As expected both BR and SNCF utilise their fixed formation High Speed Trains very heavily at 378,884 km and 355,660 km (respectively) per annum per train set. What is significant is the similar levels of utilisation given the different geographical and operational characteristics facing the two operators.

3.6 Table 3.4 presents further utilisation data, in the form of Vehicle Gross Tonne km. BR utilises both diesel and electric locomotives very heavily, in the case of diesel this is especially so when compared to the other operators. Only the Portugese operator

is especially so when compared to the other operators. Only the Portugese operator CP has a similar level of diesel locomotive utilisation, whilst the majority of the operators have utilisation levels of under 10 million gross tonne kms. Levels of electric locomotive utilisation are more constant across the operators, with the majority of operators having utilisation levels greater than 50 million gross tonne kms. The figures for utilisation of D.M.U.'s and E.M.U.'s refer to passenger vehicles only and show wide ranges of values. DB has the lowest level of utilisation for D.M.U.'s, 260,000 gross tonne kms and DSB the highest 19.9 million gross tonne kms. The DB figure is probably so low because D.M.U.'s are either being phased out or operating as a backup to E.M.U.'s. This is a policy also followed by CFF. The utilisation levels for E.M.U.'s ranges from 4.5 million gross tonne kms for NSB to 20.3 million gross tonne kms for RENFE.

3.7 Table 3.5 attempts to provide a more detailed breakdown of capacity utilisation of passenger services. The first column shows that BR is a relatively high fare railway, charging 6.2 pence per passenger km, with SJ the company with the next highest fare (5.2 pence - adjusted using the PPP rate). This goes some way to explaining the low loads for BR passenger services (Table 2.4). BR's relatively low total vehicle kilometres per train kilometre reflects a greater policy of using shorter trains and/or multiple units than other countries. Given definitional problems, any discussion of the passenger km/vehicle km figure must be circumspect but it does suggest that if this measure is used as the basis for loads, than BR's loadings may not be out of line with the average in our sample.

3.8 Table 3.6 provides a more detailed breakdown of the utilisation of freight services. In terms of freight rates per tonne km, BR at 4.2 pence per tonne km has the second highest rate of the eight railways for which we have data. DSB's higher rate (at 5.3 pence per tonne km) probably reflects a commodity structure that has a higher proportion of high value goods than BR's freight operations. There is a high variability in the wagon km per train km figures with those for OBB and SJ being particularly high. Tables 3.5 and 3.6 highlight the problems we face when attempting detailed disaggregate analysis with our current data set. In particular, we continue to possess little information from DB, FS and SNCF, the three railways which in terms of size, at least, are most similar to BR.

3.9 Large differences in Freight Mean Shipment Length are illustrated by Table 3.6. The French, Spanish, Swedish and Italian operators have the highest mean length (all greater than 300 kms), whilst the Norwegian and Belgium operators have the lowest mean length (all around 125 kms). Similarly there are large differences in wagon turnaround figures, ranging from 3.2 days for the Irish operator, CIE, to 14.9 days for the Italian operator, FS. For the majority of the operators the figures are centred around 5 days. The fastest freight shippers are the Swedish (69.9 kms/day), the Danish (65.28 kms/day) and the Irish operators (56.2 kms/day), whilst the Belgium and Italian operators are the slowest, at around 21 kms/day.

3.10 The age of rolling stock is examined in Table 3.8 for the Locomotive Fleet, Railcar Fleet and the Coach and Wagon Stock. BR has one of the youngest rolling stocks of all the operators, for example its electric loco fleet is 17 yrs old whilst the Norwegian fleet is 24.5 yrs old. Other operators with similarly aged fleet include the Dutch, the Italians and the Belgiums.

3.11 Table 3.9 shows the level of productivity amongst the operators' train crew, terminal staff, maintenance staff and administration staff. The figures for BR refer to passenger traffic only (with the exception of maintenance staff) and so comparison with the other operators is not possible. A wide range of values are given by Train Kms/Terminal Staff, ranging from 13,889 kms per staff member for the Dutch operator, NS, to 1,307 kms for the Danish operator, DSB. On the whole the majority of the operators are centred around 12,000 kms. The Train Crew and Administration Staff Indicators show less variation with values being centred around 2,000 kms. More variation is displayed by the Train Kms/Maintenance Staff Indicator. The figures range from 4,464 kms for the Italian operator, FS, to 55,556 kms for the Spanish operator RENFE. British Rail's figure of 29,412 kms out performs the majority of the other operators but is still a long way short of matching the performance of the Spanish operator RENFE. However doubt can be cast on the RENFE figure given its widespread use of contract labour. In the questionnaire response we received, no use of contract labour was indicated, when in practice we know that large amounts of contract labour are used by RENFE. If such labour was included then the performance would in all probability be well down on the present figure.

3.12 In this section we also present several of our time series measures, generated from the UIC data base (see 1.4). We have split the 14 operators into small, medium and large railways. Small railways were classified as producing less than 90 million train kms per annum, large railways producing over 170 million train kms per annum and medium railways producing between 90 and 170 million train kms per annum. Despite being classified as a large railway, BR appears alongside small and medium railways to facilitate comparison with all the operators involved in the study. The key measure of operating performance, train kms per member of staff, is illustrated by Figures 3.1, 3.2 and 3.3. Figure 3.1 shows a general trend of improvement in operating performance throughout the period for all the small operators. BR itself experienced little improvement until 1982, a year that marked a significant upsurge in its performance until 1989 when it started to decline. CIE has been left out of Figure 3.1 because of the difficulty in disaggregating rail staff from the total staff employed in all of CIE's operations.

3.13 Figure 3.2 shows a similar trend of improvement in operating performance throughout the period. For most of the period BR's performance is well below that of CFF and SJ, only matching them in the late eighties. Throughout the period NS consistently outperforms not only the medium sized operators but, as Figure 3.3 shows, the large operators as well.

3.14 In Figure 3.3 all the large firms, with the exception of FS, follow the same pattern of little improvement in operating performance until 1982-83, after which large improvements take place. In particular both BR and RENFE show very sharp, large improvements in operating performance during this period. Whether such improvement is attributable to exogenous or endogenous factors is a question beyond the scope of this report. However the reorganisation of BR during the eighties and the upturn in the economy during the same period would appear to explain the large improvement experienced by BR during the eighties, especially considering the fall in operating performance from 1989 onwards, which coincides with a downturn in the British economy. Spain has experienced a similar set of conditions, a growth in the economy and a large expansion in the amount of train kms provided (Commuter

Networks) for a small expansion in staff numbers. Unlike BR, the Spanish operators have continued to improve their operating performance through the early nineties, suggesting that it is mainly endogenous factors that have fuelled the improvement in operating performance.

3.15 The finding of strong productivity growth for BR in the 1980's confirms the work of other studies, most notably Molyneux and Thompson (1987) who found output per head increased by only 0.8% per annum between 1968 and 1978 but by 3.9% per annum between 1978 and 1985.

3.16 Also included in this section are two new indices, dealing solely with freight, Vehicle Size (Freight Tonne Capacity/Total Freight Stock) and Freight Wagon Utilisation (Freight Tonne Kms/Total Freight Stock). In Figure 3.4 all the operators have increased their vehicle size throughout the period. In BR's case, the reduction of its freight market and its resulting specialisation in bulk commodities may provide some of the explanation.

3.17 For medium sized operators, (Figure 3.5), the long term trend is similarly one of increasing vehicle size. In Figure 3.6 the picture is repeated, with all the operators moving towards larger vehicles throughout the period in question. By 1991 BR had reversed its early position and was operating some of the largest vehicles among the fourteen operators, with vehicle size increasing by 90.4%. This is again indicative of the fact that BR has rationalised its freight business to a greater extent than many other European railways.

3.18 Freight wagon utilisation has increased significantly for all the small operators during the period, with the exception of NSB, whose growth has been less pronounced, (Figure 3.7). The majority of medium operators (Figure 3.8) have seen little growth over the period, even taking into account the distortion caused by the scale. The two operators who have significantly improved their utilisation are BR and NS, the former increasing utilisation by 993% over the period in question and the latter making exceptional improvements (but this may be distorted by increasing international traffic). What both these operators have in common is the sharp increase in utilisation that occurred during the 1980's.

3.18 The trend for large sized firms shown by Figure 3.9 is one of low growth throughout the period in question. The exception to this rule is BR, whose relative position, in comparison with the other operators, is one of high utilisation.

Table 3.1: Unadjusted and Adjusted Train Kilometres per Staff

	Total Unadjusted		Adjusted By 0.45	Adjusted By 0.74
	1977	1990	1990	1990
BR	2417	3193	1673	2475
CFF	N/S	3033	1728	2408
CIE	N/S	2693	1667	2208
CP	N/S	1857	1134	1496
DB	1750	2559	1607	2103
DSB	2242	3920	1944	2986
FS	1411	1568	861	1202
NS	3909	4484	2261	3433
NSB	2267	2504	1555	2055
OBB	N/S	1750	1101	1428
RENFE	N/S	3459	2065	2766
SJ/BV	2830	3501	2328	2927
SNCB	1800	3402	1998	2738
SNCF	2096	2413	1518	1976

Source: Study Data. N/S=Not in the original 1979 study

Table 3.2 Passenger and Freight Train Kilometres per Staff (1990)

	Passenger	Freight
BR	10996	27467
NS	5139	3818
SNCB	20309	11536
SNCF	3803	4599

Source: Study Data

Table 3.3: Utilisation of Traction Units Kilometres per annum (Excludes Shunt)

	Diesel loco km/ Diesel loco	Electric loco km/ Electric loco	DMU Vehicle km/ DMU vehicle	EMU vehicle km/ EMU vehicle	Fixed formation HSTs
BR	69571	164483	63624	21863	378884
CFF	2904	79294	N-A	92415	N-A
CIE	97373	N-A	N-A	24600	N-A
CP	125000	140527	61736	61638	N-A
DB	30230	165010	43309	23152	N/A
DSB	131244	189000	65242	21572	N-A
FS	17814	109288	43631	42999	N/A
NS	6987	170089	51783	48049	N-A
NSB	32910	123705	45136	50057	N-A
OBB	22796	105703	61649	28079	N-A
RENFE	61378	115452	65608	101652	N/A
SJ	9819	121952	69630	31701	N/A
SNCB	74119	108160	68417	59570	N-A
SNCF	18075	120608	40509	21113	355660

N-A Not Applicable N/A=Not available
Source: Study Data

Table 3.4: Vehicle Gross Tonne Km By Motive Power (000,000's)

	Diesel Locom	Electic Locom.	D.M.U.'s	E.M.U.'s
Operator	Total	Total	Passen.	Passen.
BR	50.00	72.93	10.93	4.71
CFF	0.46	16.38	N-A	15.09
CIE	24.02	N-A	N-A	N/A
CP	55.11	51.87	6.91	14.34
DB	8.70	85.82	0.26	4.97
DSB	33.81	16.30	19.90	8.86
FS	5.33	53.06	3.71	7.70
NS	3.48	74.79	6.09	9.41
NSB	7.40	59.87	4.20	4.49
OBB	4.67	53.70	3.68	6.29
RENFE	22.69	56.92	13.79	20.32
SJ	5.00	69.56	4.10	5.14
SNCB	32.71	50.83	4.13	7.93
SNCF	8.81	76.53	3.18	8.51

Source: Study Data N/A=Not available N-A=Not Applicable

Table 3.5: Capacity Utilisation on Passenger Services

	Passenger rev (pence)/ Passenger km	Total vehicle km/ Train km	Passenger km/ Vehicle km
BR	6.21	2.92	30.45
CFF	3.74	7.78	15.00
CIE	4.05	6.36	19.51
CP	1.92	N/A	N/A
DB	3.95	3.26	30.67
DSB	3.97	2.54	26.07
NS	3.52	4.31	23.92
NSB	3.78	5.06	16.44
OBB	2.92	6.05	18.78
RENFE	2.79	6.26	20.56
SJ	5.17	5.41	19.12
SNCB	2.88	2.42	23.45

Source: Study Data N/A=Not available

Table 3.6: Capacity Utilisation on Freight Services (Includes parcels)

	Freight revenue/ Freight tonne km (pence)	Wagon km/ Train km	Tonne km/ Wagon km	Wagon km/ Wagon
BR	4.15	N/A	N/A	N/A
CFF	N/A	21.97	13.62	22012
CIE	4.20	10.98	12.27	25265
CP	2.58	N/A	N/A	N/A
DSB	5.29	N/A	N/A	N/A
NS	2.08	15.29	17.28	27248
NSB	2.75	18.01	12.45	33437
OBB	3.70	29.66	10.61	34003
RENFE	2.93	15.15	18.83	17780
SJ	1.23	33.64	14.00	52480
SNCB	2.52	11.18	19.45	13690

Source: Study Data N/A=Not available

Table 3.7: Freight Wagon Turnaround

	Freight Mean Shipment Length (km)	Wagon Turnaround Number of Days	Notes	Speed Km/day
BR	128.27	N/A		a)
CFF	161.39	4.8		33.6229
CIE	179.68	3.2		56.15
DB	221.78	7.6		29.1816
DSB	215.41	3.3	(1987)	65.2758
FS	324.59	14.9		21.7846
NS	166.86	4.1	(1985)	40.6976
NSB	120.12	4.1	(1985)	29.2976
CP	246.20	6.9	(1988)	35.6812
OBB	202.31	5.2		38.9058
RENFE	385.70	12.1		b)
SJ	349.48	5.0		69.896
SNCB	124.45	5.9		21.0932
SNCF	358.73	12.3		29.165

a) Wagon Turnaround Data not Available, since a significant number of Freight Trains are of the "Merry-go-Round" Type, with negligible stopping time and absence of shunting operations.

b) Mean Freight Shipment Length Unknown.

Source: Study Data N/A=Not available

Table 3.8: Age of Rolling Stock

	Loco Fleet Age (Years)		Railcar Fleet Age (Years)		Stock Age (Years)	
	Electric	Diesel	Electric	Diesel	Coach	Wagon
BR	17.07	23.94	18.98	16.30	15.47	17.53
CFF	25.00	23.59	19.78	N-A	21.76	22.08
DB	22.99	23.49	15.08	16.45	18.65	19.69
DSB	3.50	22.57	17.84	9.83	17.68	19.63
FS	22.25	17.30	21.63	18.68	16.67	20.83
NS	24.08	31.02	17.65	19.79	7.80	20.56
NSB	24.51	23.39	20.46	18.53	19.49	18.55
CP	21.81	22.84	19.47	22.89	22.17	23.08
OBB	21.51	24.41	15.39	21.09	16.77	18.96
RENFE	18.71	19.80	11.61	9.83	16.11	22.11
SJ/BV	23.33	23.46	13.61	7.95	27.14	18.77
SNCB	19.67	25.26	18.64	35.00	20.44	16.63
SNCF	22.78	23.14	12.84	19.46	16.24	19.07

Source: Study Data and BRB, Policy Office N-A=Not Applicable

Table 3.9: Labour Productivity (kms per staff)

Operator	Train Kms /Terminal Staff	Train Kms /Admin. Staff	Train Kms /Mainte.Staff	Train Kms /Train Staff
BR	18868*	83333*	29412	16393*
CFF	7194	32258	14706	15152
CIE	12500	22222	N/A	N/A
CP	N/A	N/A	N/A	N/A
DB	7937	20833	6849	26316
DSB	1307	15385	35714	27027
FS	5128	15625	4464	11905
NS	13889	24390	16949	32258
NSB	13699	23256	12048	25000
OBB	5435	24390	5102	21277
RENFE	12500	25641	55556	17241
SJ	11111	35714	24390	35714
SNCB	11364	34483	11628	20000
SNCF	7519	14493	7692	24390

Source: Study Data N/A=Not available
* Figures just for passenger traffic only

UIC: Train Kms/Staff Numbers

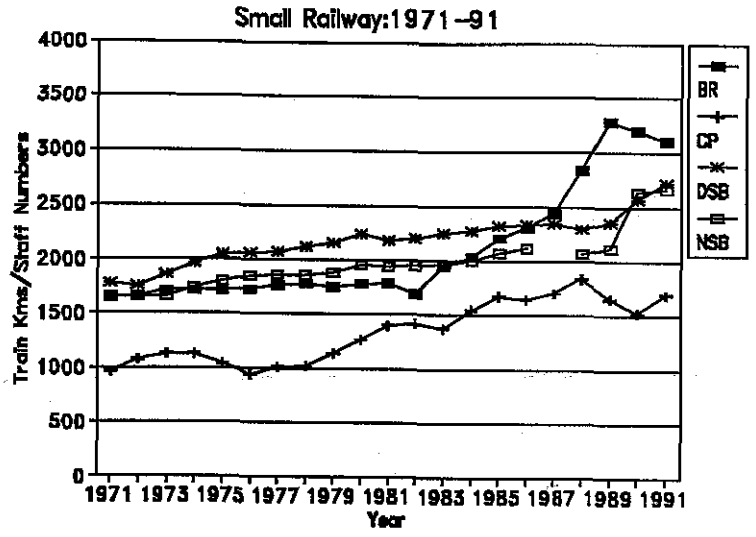


FIGURE 3.1

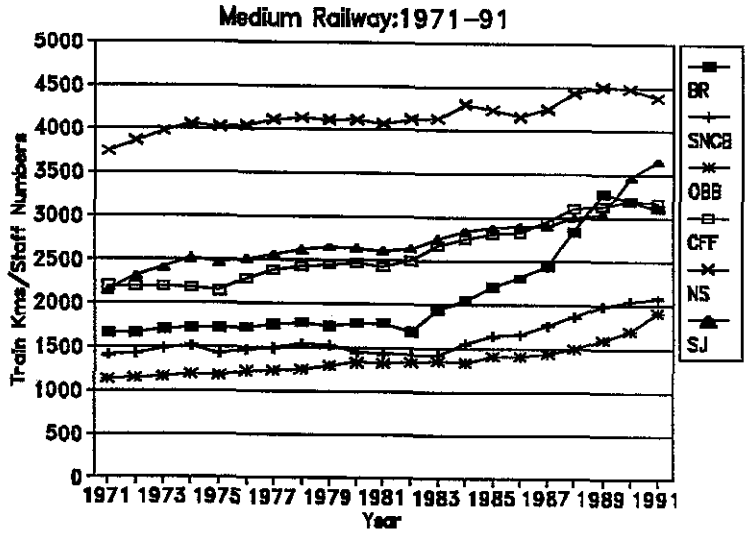


FIGURE 3.2

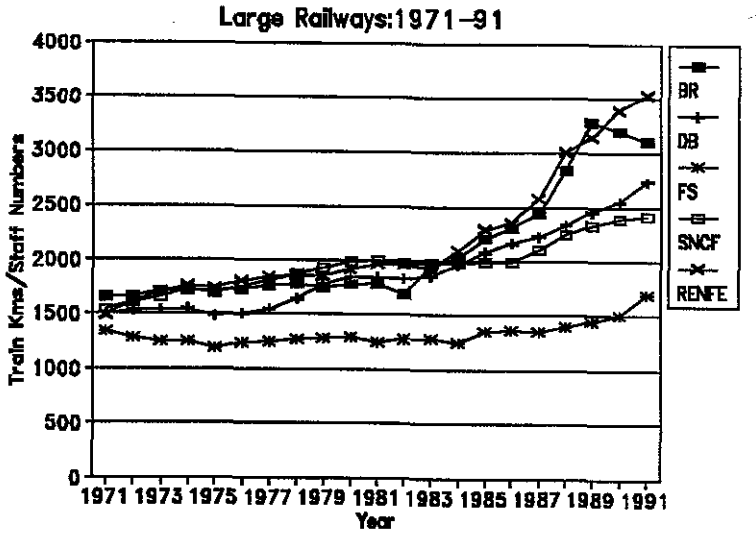


FIGURE 3.3

UIC: Vehicle Size

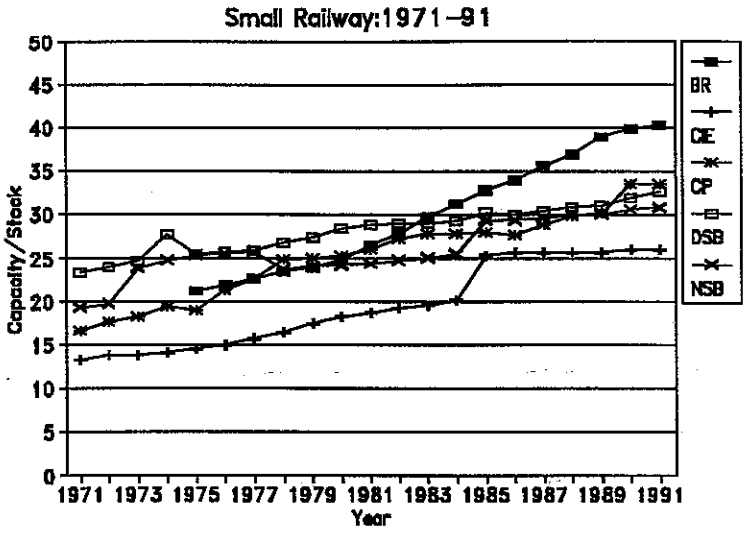


FIGURE 3.4

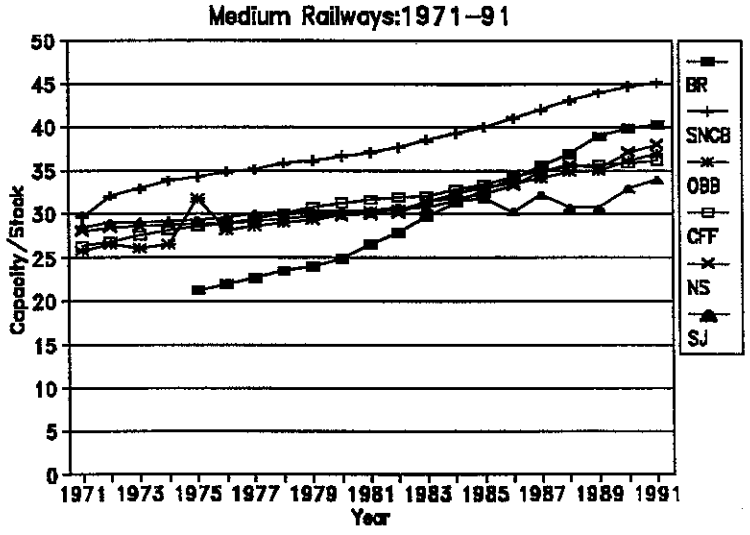


FIGURE 3.5

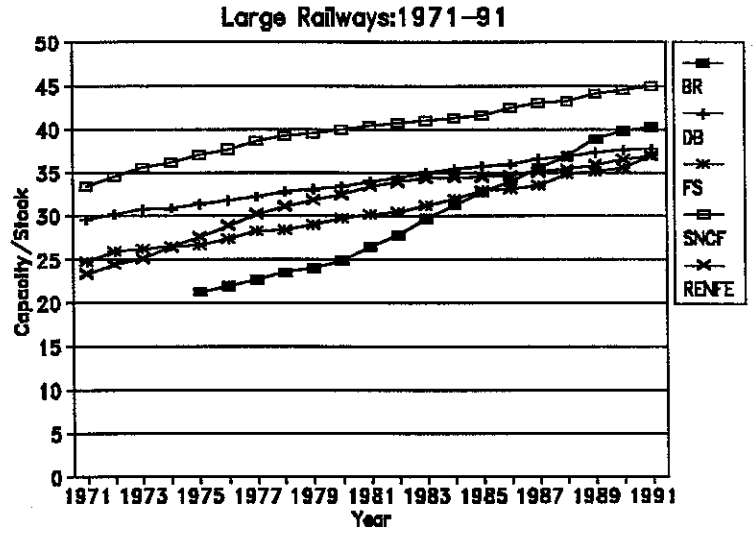


FIGURE 3.6

UIC: Utilisation

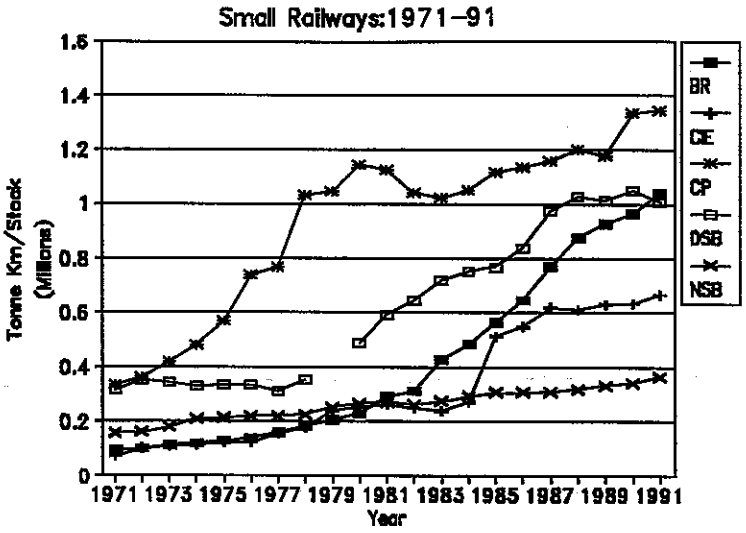


FIGURE 3.7

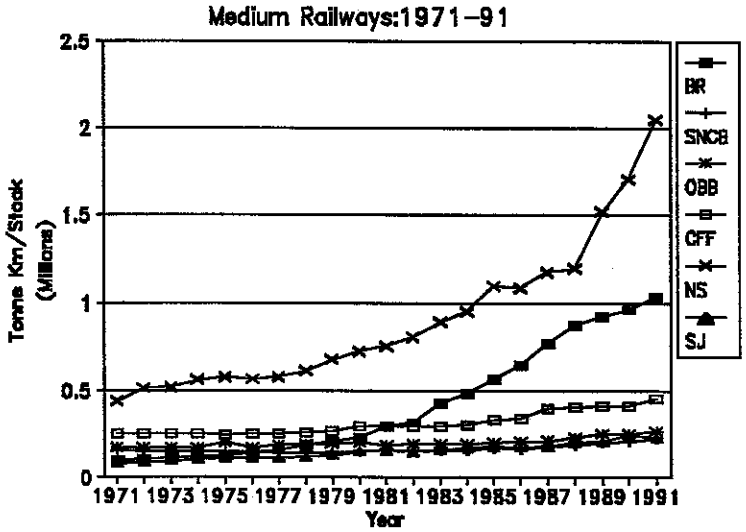


FIGURE 3.8

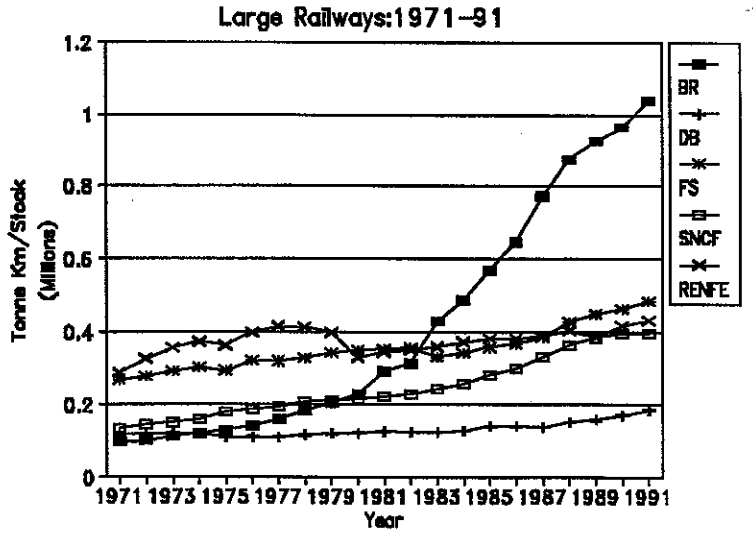


FIGURE 3.9

4. COMMERCIAL PERFORMANCE

4.1 Tables 4.1 and 4.2 present our two main indicators of commercial performance. In Table 4.1 we present traffic units per train kilometre. This Table illustrates that the use of total traffic units can be misleading because many railways exhibit different results in their passenger and freight businesses and have different balances between passenger and freight traffic. For example, BR has relatively low loads in its passenger business, but high loads in its freight business leading to low loads overall, because passenger traffic dominates BR's overall business. Similarly, SJ has relatively low loads in its passenger business and high loads in its freight business but in this case has high loads overall, because freight traffic dominates SJ's overall business. The final column of Table 4.1 shows that BR has a relatively high dependence on passenger traffic. This column also illustrates the heterogeneity of our sample, ranging from dominantly passenger railways (NS, DSB) to dominantly freight railways (SJ).

4.2 In Table 4.2 we present receipts per traffic unit. However, the total traffic unit figure is again misleading. In total SJ has the lowest charges in our sample, but if these charges are disaggregated it can be seen that SJ has the second highest fares per passenger kilometres but by far the lowest rate per freight tonne. This low rate is likely to be due to a combination of a dominance of low value commodities (especially iron ore) and long haul lengths.

4.3 We now present trends for our two main indicators of commercial performance, traffic units per train kms and total receipts per traffic units. Ideally these measures would be disaggregated to the passenger and freight level, as in Tables 4.1 and 4.2 but the UIC data-base has only facilitated an aggregate measure.

4.4 Figure 4.1 illustrates that, despite yearly fluctuations, no real increase in loads has taken place over the period considered for the smaller railways. The exception to this is the Portuguese operator, CP, whose overall loads increased significantly throughout the seventies, due to new bulk freight flows. BR's loads have been constantly low throughout and have placed it well below those for other small operators.

4.5 In Figure 4.2 a similar picture emerges for medium-sized railways, with no growth in loads between 1971 and 1991. Again BR performs unfavourably in comparison to other operators, who this time are medium operators.

4.6 For the large firms, illustrated by Figure 4.3, there is again little long term variation in loads. Unfortunately for BR its performance compares very unfavourably with the other large operators, as it does with medium and small operators. However BR operates shorter trains than the other operators, so its percentage occupancy rate may not be as bad as suggested here.

4.7 The measure of receipts per traffic unit is in pence. The total receipts measure is comprised of traffic receipts only, in an attempt to overcome any possible inclusion of operating subsidy. In so doing, we may have excluded some legitimate revenue e.g. from real estate, catering etc.... In Figure 4.4, the largest reduction in charges (another interpretation of receipts per traffic unit) over the period has been that experienced by the Portuguese operator CP. The reduction has been quite dramatic, plummeting from eighteen pence in 1971 to just over two pence by 1991. However this may be due to accounting conventions. The other operators have seen little long term variation in their charges throughout the period, with BR being consistently high

in comparison with the other small railway operators. The gap in DSB's curve is caused by missing data for traffic units.

4.8 In Figure 4.5 several operators have periods of short term variation, but over the long term the pattern is one of no or little growth in charges throughout the period. The exception here is with the Swiss operator, CFF, who experienced a strong rise in charges until the mid-eighties after which a steep fall occurred. BR again had the highest charges throughout the whole of the period.

4.9 In Figure 4.6 the long term trend for RENFE has been a downward one, with charges falling from six and a half pence in 1971 to three pence in 1991. DB has experienced a long term rise in charges, from two pence in 1971 to four and a half pence by 1991. FS has experienced a long term fall in charges from six and a half pence to two and half pence. BR had the highest charges of all the large firms, a position also reflected in Figures 4.4 and 4.5.

Table 4.1: Traffic Units/Train Km

	Total	Passenger	Freight and Parcels	% of Traffic Units Passenger Kms
BR	113.97	88.97	343.17	67.5
CFF	158.11	116.72	299.35	57.1
CIE	127.48	124.24	134.81	67.6
CP	175.21	206.5	235.6	78.1
DB	173.76	107.75	305.89	41.5
DSB	119.27	100.05	245.08	73.8
FS	212.34	193.14	317.97	68.2
NS	120.45	104.59	265.30	78.3
NSB	127.29	83.18	224.30	45.0
OBB	181.48	113.72	314.59	40.3
RENFE	170.64	128.80	285.37	52.7
SJ	249.23	103.42	471.01	24.5
SNCB	96.94	56.68	217.46	43.9
SNCF	234.66	200.25	303.68	55.7

Source: Study data

Table 4.2: Receipts/Traffic Units (pence)

	Total	Passenger	Freight	Parcels
BR	5.77	6.21	4.15	N/A
CFF	3.89	N/A	N/A	N/A
CIE	3.63	3.58	3.72	N/A
CP	2.10	1.92	2.58	N/A
DB	4.28	N/A	N/A	N/A
DSB	4.32	3.97	5.29	N/A
FS	2.37	N/A	N/A	N/A
NS	3.20	3.52	2.07	N/A
NSB	3.45	3.78	2.75	127.10
OBB	3.36	2.85	3.70	340.70
RENFE	2.60	N/A	N/A	N/A
SJ	2.24	5.17	1.23	196.40
SNCB	2.96	2.88	2.52	N/A
SNCF	3.38	N/A	N/A	N/A

Source: Study data N/A=Not available

UIC: Traffic Units/Train Kms

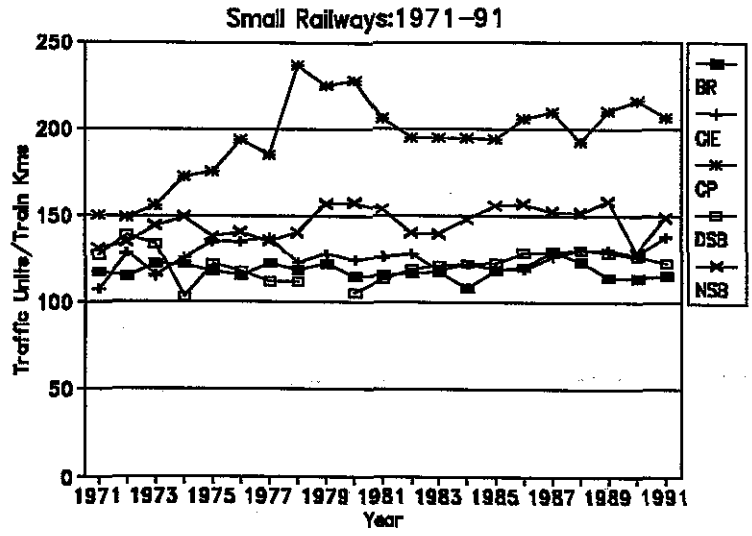


FIGURE 4.1

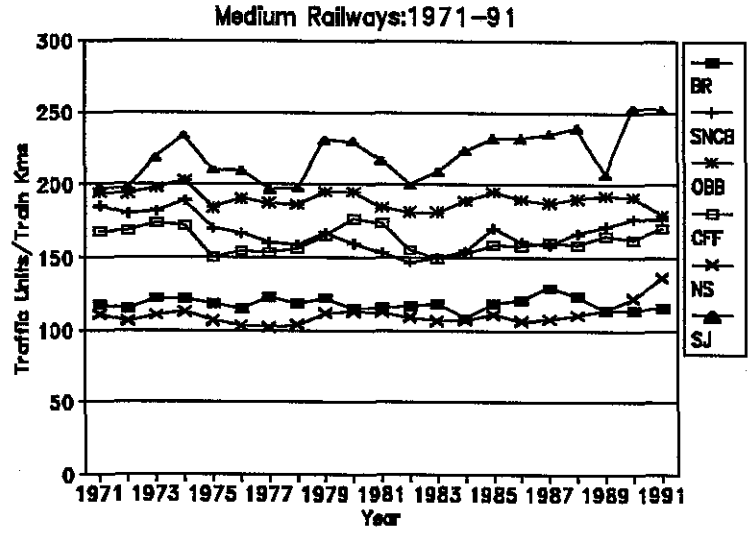


FIGURE 4.2

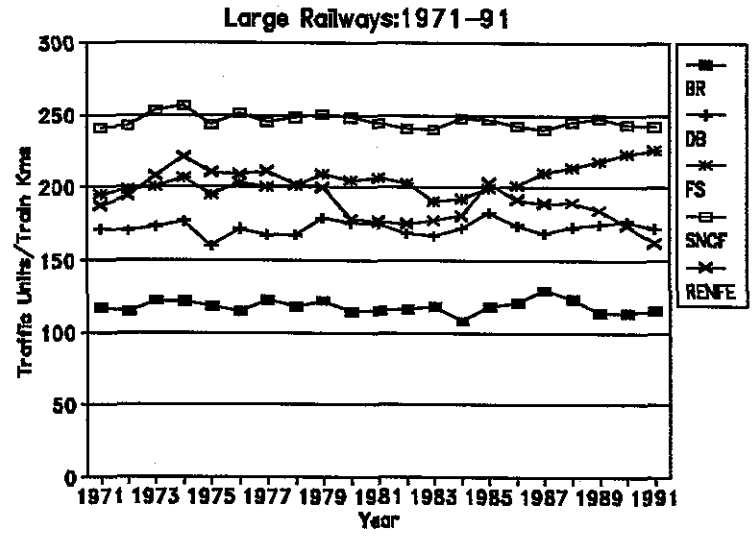


FIGURE 4.3

UIC: Total Receipts/Traffic Units

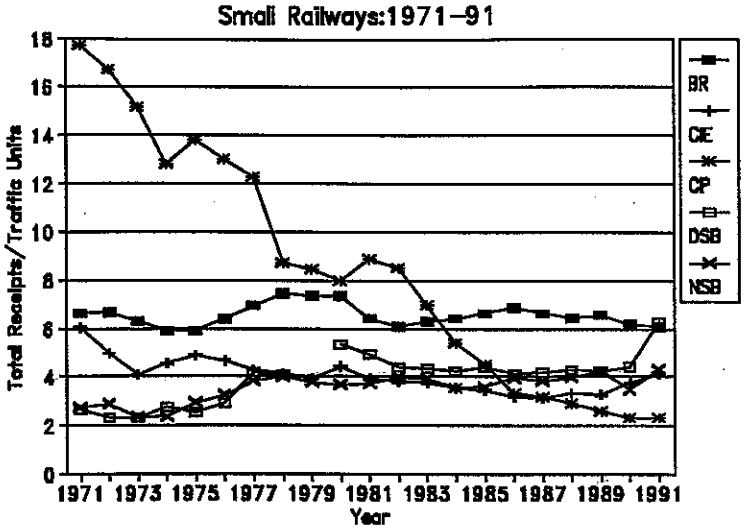


FIGURE 4.4

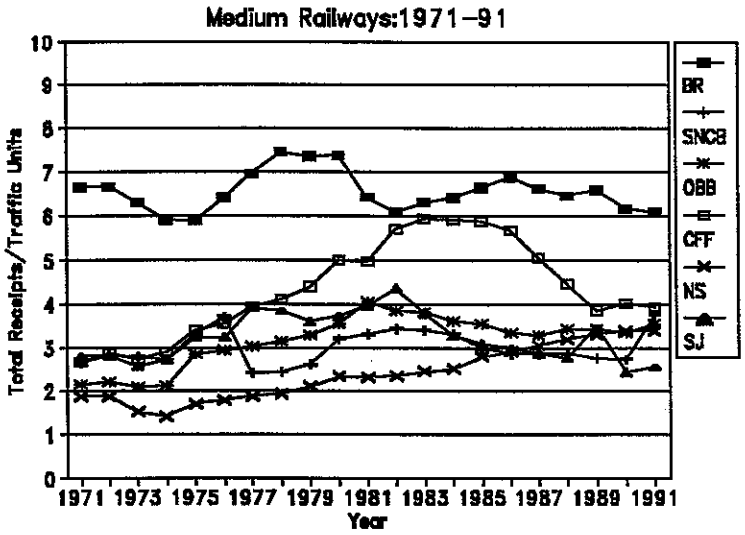


FIGURE 4.5

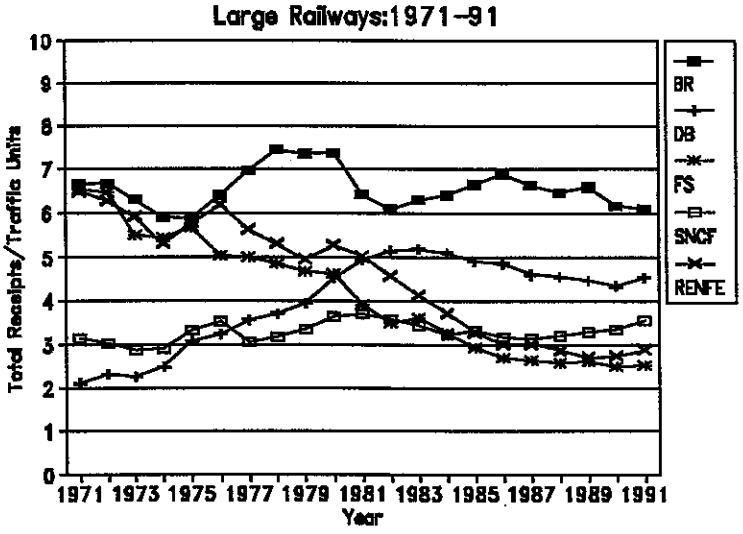


FIGURE 4.6

5. FINANCIAL PERFORMANCE

5.1 Table 5.1 shows the breakdown of total costs for the 14 railways in our sample. It should be noted that in most cases there are some residual, unallocated costs so that figures in the rows do not sum to 100. The problem seems to be due to the cost figure for supplies and services, other than fuel and power. Given such comparability problems, Table 5.1 must be interpreted carefully. Staff costs account for between 43% (DSB) and 68% (SNCB) of costs, with BR being in the middle of this range. Fuel costs vary from 1% (FS) to 14% (CP) of costs, with BR again being in the middle of the range (5%). Other supplies and services vary from 5% (NSB) to 34% of costs (OBB). The high figures for SJ, OBB and (potentially) BR are probably due to accountancy conventions including certain forms of capital expenditure. Capital costs (historic cost depreciation and interest charges) vary from 29% (DSB) to 6% (BR).

5.2 Table 5.2 attempts to break down staff costs into more detail. However, this is only possible for eight railways in our sample. Train operations staff account for between 23% (NSB) to 47% (NS) of staff costs (although again there are definitional problems). BR is again in the middle of the range (at 34%). Terminal staff account for between 15% (BR) to 42% (NSB) of staff costs (but figures are only available for six railways). Vehicle maintenance staff cost vary from 4% (NSB) to 22% (SJ) of staff costs, whilst infrastructure maintenance and operations staff account for between 8% (CIE) and 30% (NSB) of staff costs. Administration staff account for between 9% (CFF) and 18% (BR) of staff costs. These figures may be affected by the contracting out of services. However, only two railways in our sample reported using contract labour, which accounted for 0.4% of BR's workforce and 1.2% of SNCB's, even though a number of other railways are known to use contract labour, particularly with respect to track maintenance. We have attempted to gain additional information here but have been unsuccessful

5.3 In Table 5.3 we present the three financial measures. Staff numbers divided by staff costs is the reciprocal of the second column in Table 2.5, whilst staff costs divided by total costs has already been presented in Table 5.1. Hence, the key index is receipts divided by total costs, in other words, the cost recovery ratio. This index varies from 0.16 (FS) to 0.82 (BR). However, many railways have important non rail business receipts and other (unspecified) income sources. For only three railways (BR, CIE and NSB) do these income sources account for less than 5% of total costs. If these income sources are included as receipts, the index varies from 0.27 (FS) to 0.89 (CFF), whilst the mean ratio increases from 0.46 to 0.63.

5.4 Table 5.4 presents similar financial measures as Table 5.3, however in this case depreciation and interest have been taken out to give operating cost rather than total cost. Such a measure eradicates the differences in interest payments and treatment of historic based depreciation that exist between the fourteen operators. The overall effect is to increase all the ratios, most noticeably for CFF and DSB who have cost recovery ratios greater than one for their rail and non-rail business.

5.4 In Table 5.5, we assess the direct government support per capita for our sample. Great Britain has the second lowest subsidy per head at £13 per annum, with Portugal having a slightly lower subsidy level (£11 per head) and Eire a slightly higher level (£16 per head). There is then a gap to Switzerland and Spain at £25 (and indirect support to CFF and RENFE may be important here). The highest subsidy per head

is Italy at £95 per annum, followed by Belgium (£86) and Austria (£80). However, we are aware that the figures presented here are not always consistent with other sources and further work is required in reconciling these differences. A further point is that this figures have been presented as pounds sterling after adjustment using PPP rates. This is also the case for the figures presented in Table 5.6.

5.5 In Table 5.6, we present estimates of future investment in the fourteen railways based on earlier work undertaken for the Department of Trade and Industry. This shows that projected investment in BR up to the turn of the century may be equivalent to over £17 per person per annum, with only CIE (with currently a near zero investment policy, although a major investment scheme, with EC funding, is being planned) lower, although the figure for Sweden (at £19) is not too dissimilar. High figures are apparent for Switzerland (£67 per head per annum), the Netherlands (£48), Austria (£42) and Denmark (£40), all countries with major capital projects planned and/or underway (see Preston and Nash, 1992).

5.6 In the rest of this section we present trends in the three financial measures, staff numbers/staff costs, staff costs/operating costs and the key index of total receipts/operating cost (cost recovery ratio), based on UIC time series data. Operating cost has been used instead of total cost to overcome potential differences in operators interest payments and historic cost basis depreciation. The financial figures have been converted to 1991 prices and to pounds sterling (using PPP).

5.7 The Figures 5.1, 5.2 and 5.3 refer to the staff numbers/staff cost index. To prevent misinterpretation some clarification is required at this stage. The index relates the number of staff per year that can be employed for a million pounds e.g. BR could employ 95 staff for a million pounds in 1971.

5.8 The majority of operators illustrated in Figure 5.1 have experienced a long term trend of increasing staff costs in real terms. For example, by 1991 BR was employing 56 staff for a million pounds. The exception to this has been the Portuguese operator CP, who have seen a significant reduction in staff costs over the period. However, CP's initial figure of forty staff per million pounds in 1971 is quite surprising given that labour costs in Portugal are one of the lowest in Europe. It suggests that staff costs may have included other items such as supplies and services. As such we are treating CP's figures as spurious and ignoring them. BR has experienced long term increases in its labour cost, despite quite marked reductions in its overall staff numbers. The final position is one of near parity for BR and the other small rail operators. CIE is missing from this figure because we were unable to disaggregate the staff costs relating to railway operations from the staff costs relating to the whole of CIE's operations.

5.9 A similar picture emerges in Figure 5.2, where the long term trend facing medium operators is one of increasing staff costs. At the beginning of the period BR has the second highest staff costs, a position that is reversed by the end of the period. The first three years are missing for OBB because of a change in accounting convention that removed part of the pension from staff costs in accordance with the regulations (paragraph 17) of the Federal Railways.

5.10 From Figure 5.3 we can see that two firms, RENFE and FS, have experienced either no or little real term growth in staff costs. The other firms have experienced long

term increases in staff costs, with DB's increase being quite marked. Despite quite large disparities in staff costs in 1971, by 1991 all the large operators are experiencing very similar staff costs, a characteristic of medium and small operators too.

5.11 Figure 5.4 illustrates the staff cost/operating cost index for small railways. A slight trend can be identified towards a reduction in the ratio throughout the period, but the only major fall is that of the Danish operator DSB. BR experienced a large fall in the early seventies, but remained stable throughout the rest of the period. A possible outlier appears in 1981 (DSB), but until the accounts can be examined for that year we are treating it as a correct observation. CIE is also absent from this figure because of the problem of disaggregating staff costs.

5.12 In Figures 5.5 and 5.6, despite yearly fluctuations the majority of the operators experienced little significant changes in the staff cost/operating cost ratio over the period. The exceptions to this general rule are SJ, OBB and RENFE. In comparison to the other operators, BR's ratio was consistently average throughout the period.

5.13 The figures obtained for the key index of total receipts divided by operating cost and presented by Figures 5.7 to 5.9 differ to those reported in the Interim Report, March 1993 and replicated in table 5.3. This occurs because we have restricted the definition of total receipts to include receipts received from the passenger and freight rail business, only (as explained in 4.7).

5.14 An examination of Figure 5.7 shows quite substantial differences between the cost recovery rates of the small operators throughout the period in question. Yearly fluctuations are also quite pronounced throughout the period in question. Again there is a possible outlier in 1981 (DSB). A general comment can be made regarding the overall picture these figures reflect. Many railway operators have important non rail business receipts and other (unspecified) income sources, which if included in the equation would significantly enhance their cost recovery ratio. This should be taken into account when viewing these figures.

5.15 Figure 5.8 shows a similar picture as that of Figure 5.7, with the exception of SNCB and CFF who exhibit large declines in their cost recovery ratio over the period. The steep fall experienced by SNCB, from 1976 to 1977 is questionable and would suggest a change in accounting procedure which cut out an operating subsidy. In OBB's case the change in pension regulations explains the jump from 1973 to 1974. BR's performance is one of pronounced fluctuations in its recovery ratio throughout the period, peaking at the height of the eighties boom, 1988.

5.16 The majority of the large operators, (Figure 5.9), have experienced falling cost recovery ratios' throughout the period, with the more pronounced falls being experienced by RENFE and SNCF. The overall picture for BR in comparison to the other fourteen operators is one of strength. BR outperforms all the other operators when only passenger and freight receipts are taken into account.

Table 5.1: Breakdown of Total Costs (%)

	Staff	Supplies and Services		Depreciation Historic cost	Interest
		Fuel	Other		
BR	59.1	5.0	N/A	4.5	1.1
CFF	57.4	3.3	15.5	11.1	8.6
CIE	47.7	5.0	35.2	0.2	11.9
CP	51.9	14.3	11.3	4.3	14.5
DB	60.7	5.1	12.7	6.3	9.8
DSB	43.2	4.6	18.3	11.4	17.7
FS	44.1	0.7	19.9	4.5	14.9
NS	49.5	5.9	16.9	8.2	7.1
NSB	60.0	3.8	4.5	5.9	3.9
OBB	48.8	2.7	34.4	10.0	1.1
RENFE	53.6	8.8	16.1	12.6	N/A
SJ	45.1	4.7	32.6	14.7	2.8
SNCB	67.9	3.1	9.9	5.9	8.1
SNCF	48.9	2.7	20.3	7.4	14.8

Source: Study data

Percentages do not add to 100 due to other costs/unallocated costs

N/A = Not Available

Table 5.2: Breakdown of Staff Costs (%)

	Train Opera.	Term.	Marshal.	Veh. Maint	Infra. Maint. & Oper.	Admin.
BR	33.6	15.1	0.8	10.0	22.2	18.1
CFF	26.2	35.4	6.3	8.4	7.9	9.1
CIE	—	50.4	—	20.2	19.4	10.0
FS	27.6	21.8	12.6	12.0	13.4	12.60
NS	46.8	N/A	N/A	13.2	27.6	12.3
NSB	23.3	42.2	N/A	4.3	30.1	N/A
SJ/BV	25.9	20.0	7.4	21.9	12.6	12.2
SNCB	27.2	23.6	N/A	10.2	24.5	14.5

Source: Study data N/A = Not Available

Table 5.3: Financial Indices

	Staff Nos/ Staff Costs (£m)	Staff Costs/ Total Costs	Receipts/ Total Costs	
			Rail business only	Rail and Non-Rail business
BR	66.4	0.59	0.82	0.85
CFF	47.2	0.57	0.51	0.89
CIE	47.2	0.77	0.46	0.46
CP	96.5	0.60	0.34	0.73
DB	38.0	0.61	0.44	0.58
DSB	74.8	0.43	0.45	0.78
FS	46.9	0.44	0.16	0.27
NS	53.4	0.50	0.46	0.58
NSB	73.6	0.60	0.49	0.51
OBB	67.0	0.49	0.35	0.72
RENFE	51.4	0.54	0.42	0.60
SJ/BV	67.4	0.45	0.59	0.73
SNCB	40.7	0.68	0.27	0.49
SNCF	53.4	0.49	0.50	0.68
Mean:			0.46	0.63

Source: Study Data

Table 5.4: Financial Indices

	Staff Costs/ Operating Costs (£m)	Receipts/ Operating Costs	
		Rail Business only	Rail and Non-Rail business
BR	0.63	0.87	0.90
CFF	0.71	0.64	1.11
CIE	0.55	0.51	0.63
CP	0.74	0.42	0.90
DB	0.73	0.52	0.69
DSB	0.61	0.63	1.10
FS	0.55	0.20	0.33
NS	0.59	0.54	0.68
NSB	0.67	0.54	0.57
OBB	0.55	0.39	0.81
RENFE	N/A	N/A	N/A
SJ/BV	0.55	0.72	0.88
SNCB	0.79	0.31	0.57
SNCF	0.63	0.64	0.87

Source: Study Data N/A=Not available

Table 5.5: Direct Government Support per Annum (1990)

		Support (£m)	Receipts (£m)	Subsidy per capita (£)
BR	Great Britain	736.70	2843.19	12.9
CFF	Switzerland	164.62	753.33	24.9
CIE	Eire	55.74	67.73	15.8
CP	Portugal	116.49	149.81	11.3
DB	West Germany	2866.74	4486.65	46.8
DSB	Denmark	139.01	283.90	27.1
FS	Italy	5454.20	1580.38	95.0
NS	Netherlands	412.68	452.80	28.0
NSB	Norway	162.74	161.40	38.7
OBB	Austria	608.13	713.19	80.0
RENFE	Spain	989.12	763.33	25.3
SJ/BV	Sweden	280.61	555.78	33.0
SNCB	Belgium	852.78	440.80	86.0
SNCF	France	2015.37	3867.27	36.1

Source: Study Data

Table 5.6: Estimates of Future Investment 1993-2000 (1990 prices)

		Investment (£m)			Per capita investment per annum (£)
		Track & Signalling	Rolling Stock	Total	
BR	Great Britain	4240	3760	8000	17.5
CFF	Switzerland	2150	1420	3560	67.4
CIE	Eire	N/A	N/A	40	1.4
CP	Portugal	1484	326	1810	22.0
DB	West Germany	10400	3660	14060	28.7
DSB	Denmark	1030	630	1660	40.5
FS	Italy	15500	1720	17220	37.5
NS	Netherlands	4050	1580	5630	47.8
NSB	Norway	500	350	850	25.3
OBB	Austria	2040	530	2570	42.3
RENFE	Spain	N/A	N/A	11520	36.8
SJ/BV	Sweden	990	310	1300	19.1
SNCB	Belgium	1280	450	1730	21.8
SNCF	France	9600	2770	12370	27.7

Adapted from: Department of Trade and Industry (1990) "West European Railway Component Study - Volume II".

N/A=Not available

UIC: Staff Numbers/Staff Costs

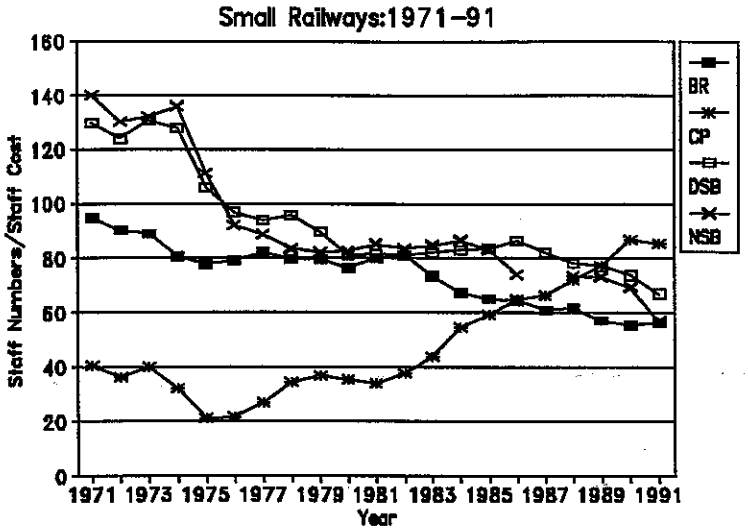


FIGURE 5.1

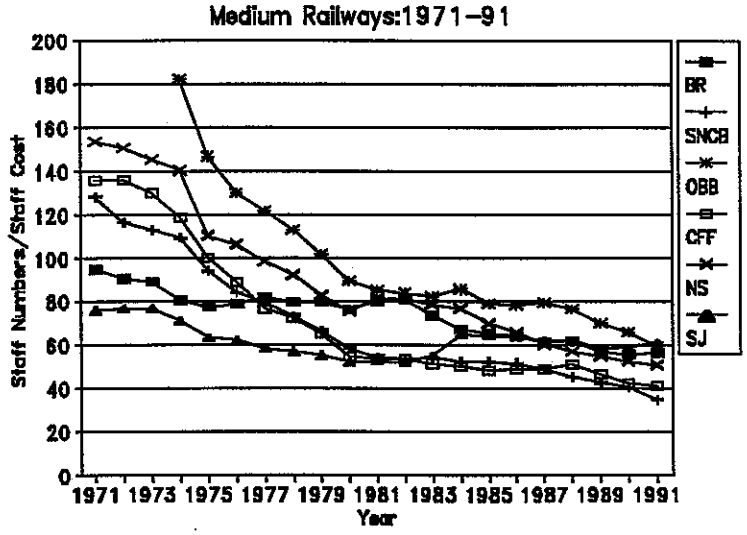


FIGURE 5.2

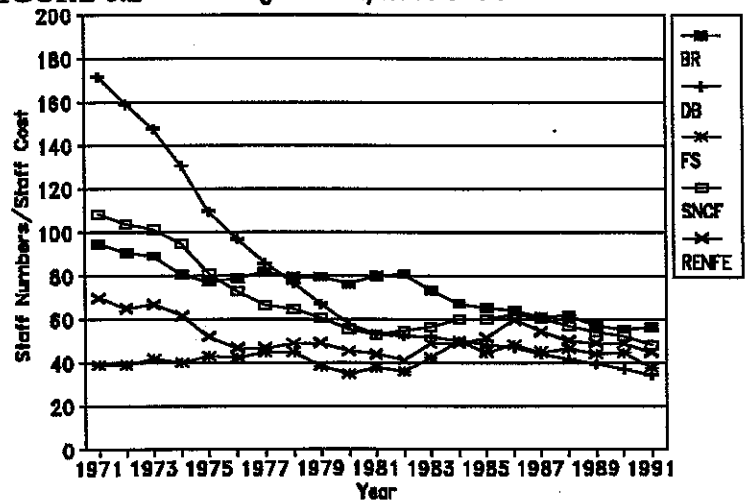


FIGURE 5.3

UIC: Staff Costs/Operating Costs

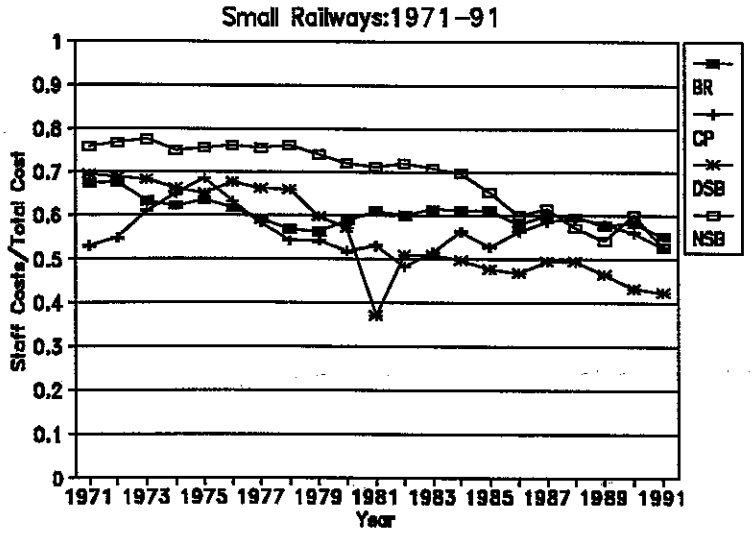


FIGURE 5.4

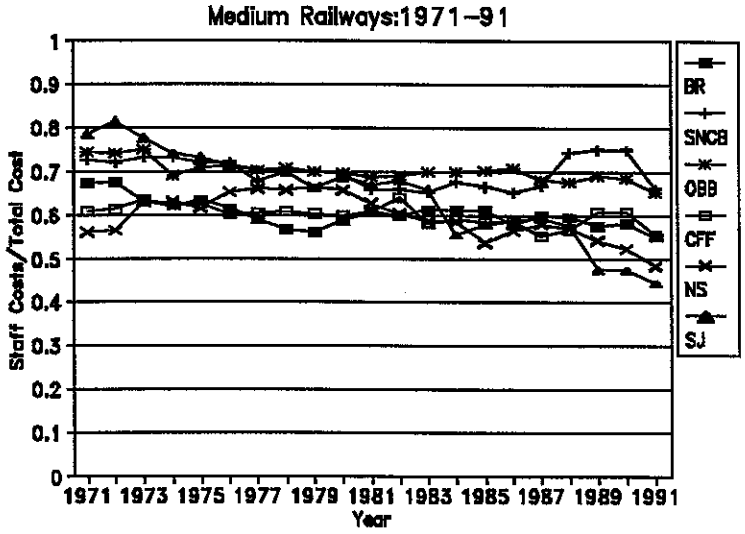


FIGURE 5.5

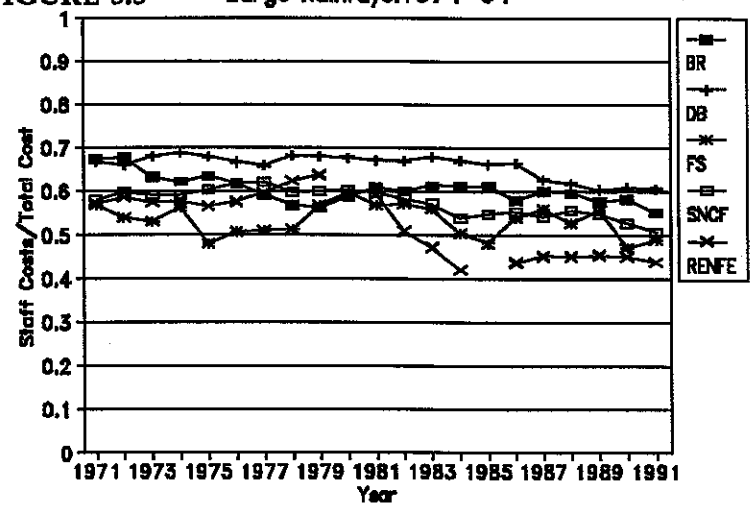


FIGURE 5.6

UIC: Total Receipts/Operating Costs

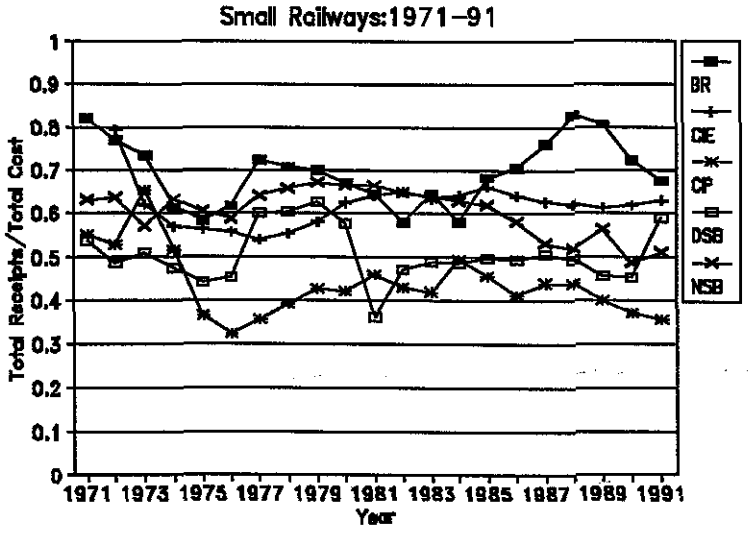


FIGURE 5.7

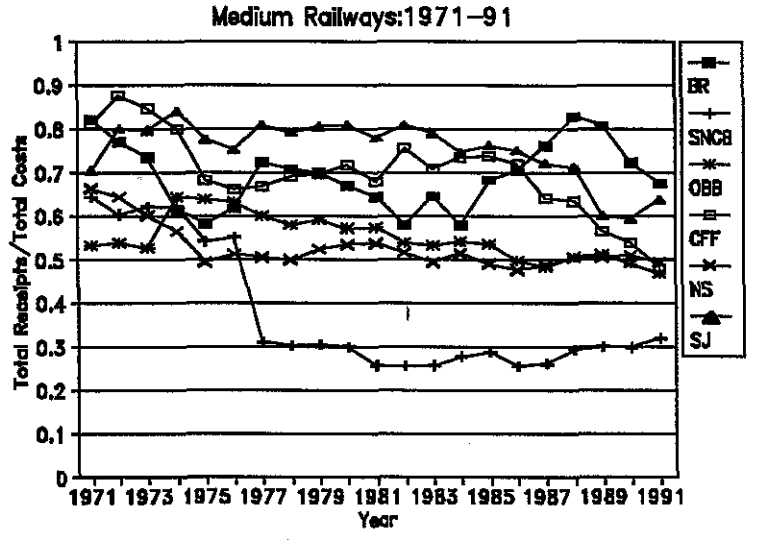


FIGURE 5.8

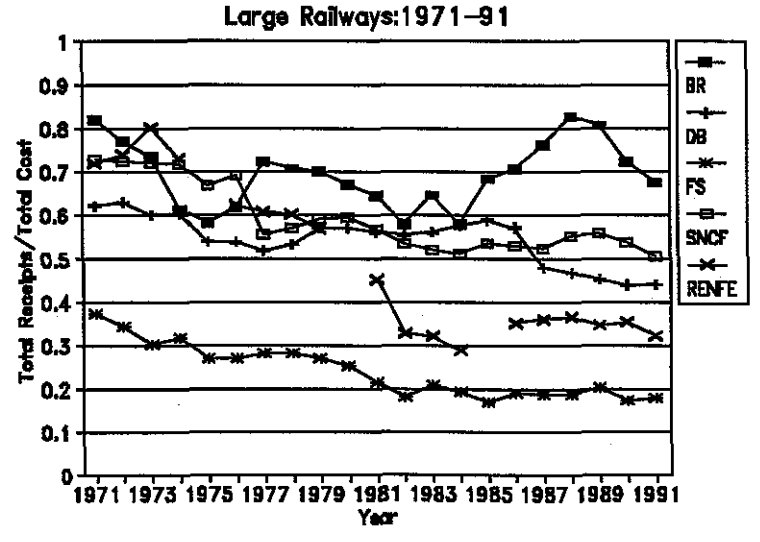


FIGURE 5.9

6. SERVICE QUALITY

6.1 In this section we present a series of tables containing quality of service measures. In Table 6.1 we examine accident rates, classifying accidents into 6 categories. From the number of total accidents column, we can see that with 1,230 and 1,178 accidents per year British Rail and the German operator, DB have significantly more accidents than other operators. Given the large size of both these operators this is expected, but seen in comparison with similar sized operators, such as FS and SNCF (556 and 616) such figures still appear to be high, possibly reflecting different reporting conventions. A more balanced picture is presented from the figures showing accidents per billion traffic units. These figures show that SNCF, CFF and FS enjoy the best safety records, with each of these operators experiencing less than 10 accidents per billion traffic units. BR, despite having a high accident rate of 24.9 accidents per billion traffic units, still falls short of OBB and DB's rates of 57.9 and 68.4 accidents per billion traffic units.

6.2 Table 6.2 shows data for the related measure of injuries and casualties per billion traffic units. Examination of the injuries per billion traffic units reconfirms the poorer safety records of CP and BR. They once again have two of the worst safety records, with 27.8 and 11.6 injuries per billion traffic units respectively. SNCF enjoys the lowest injury rate, whilst nine other operators have injury rates under 7.7. A different picture emerges when examining the casualty rates. As one would expect Portugal has the highest rate, with 18 casualties per billion traffic units, however BR has one of the lowest rates with 1.7. CFF, NS and NSB have figures around the 3.0 mark, whilst Ireland has a figure of 7.4.

6.3 Table 6.3 exhibits punctuality data for some of the operators being studied. Different geography, climate and operating practices all act to reduce the degree of comparability between the operators. Differences also occur in the definition of punctuation and in the level of disaggregation, which once again distorts comparability. On a general basis the Dutch operator, NS, appears to have the best record with 96.5% of its trains arriving within 5 mins of booked time and 97.1% of its long distance trains arriving within 5 mins. BR has 5 disaggregate measures, the worst performance is by Inter-city, who had 84.1% of their trains arriving within 10 mins of booked time in 1991, a figure down on previous years. 91% of Network South East trains arrived within 5 mins of booked time as did 90% of Regional short trains. SNCF had 78.3% of its long distance trains arriving within 3 mins of booked time and 92.5% of all its regional trains arriving within 5 mins of booked time. The poorest punctuality figures belong to Norway's NSB and Swedens' SJ. SJ has only 80.7% of its trains arriving within 5 mins of booked time, while NSB has only 78% of its long distance and 82% of its sburban trains arriving within 5 mins of booked time. This is partly a reflection of the extreme climatic conditions these two countries seasonally face, but also reflects the high proportions of single track working.

Table 6.1: Accidents per Thousand Million Unit-Kilometre (billion traffic units)

	Collis	Derailm.	Others	Acc.at Level X	Invol. Moving Stock	Tot. Accd.	TotalAcc./ Th-M U-Km
BR	289	177	306	36	422	1230	24.9
CFF	19	22	31	40	46	158	8.2
CIE	2	8	14	1	3	28	14.9
DB	421	170	48	228	311	1178	11.2
DSB	156	282	1	16	0	455	68.4
FS	151	189	38	32	146	556	8.2
NS	52	51	23	115	50	291	20.6
NSB	33	20	11	24	0	88	21.7
CP	83	44	223	48	22	420	57.9
OBB	42	72	19	55	212	400	18.9
SJ/BV	82	148	6	60	16	312	12.1
SNCB	70	119	11	19	65	284	19.1
SNCF	56	52	55	212	241	616	5.4

Source: Study Data Collis=Collisions Derailm=Derailment Acc=Accident Invol=Involving Th-M U-Km=Thousand Million Unit-Km

Table 6.2: Injuries and Casualties per Thousand Million Unit-Km (billion traffic units)

	Injuries				Casual.				Injuries / Th.M. U-Km	Casual/ Th-M. U-Km
	Pass.	Agent	Third-P	Total	Pass.	Agent	Third-P	Total		
BR	244	306	20	570	39	22	23	84	11.6	1.7
CFF	15	13	26	54	8	12	39	59	2.8	3.0
CIE	0	7	1	8	1	2	11	14	4.3	7.4
DB	113	101	114	328	45	21	133	199	3.1	1.9
DSB	9	10	32	51	1	2	3	6	7.7	0.9
FS	60	21	30	111	9	4	70	83	1.6	1.2
NS	15	15	52	82	2	1	40	43	5.8	3.0
NSB	14	3	4	21	4	3	6	13	5.2	3.2
CP	84	58	58	200	22	3	106	131	27.6	18.0
OBB	50	82	82	214	6	2	46	54	10.1	2.6
SJ/BV	42	6	1	49	3	2	13	18	1.9	0.7
SNCB	54	11	21	86	0	2	18	20	5.8	1.3
SNCF	63	10	67	140	30	14	144	188	1.3	1.6

Source: Study Data

Table 6.3: Percentage of Passenger Trains Arriving Within 5 mins of Booked Time(Unless otherwise indicated)

		1985	1989	1990	1991
SNCB		94.2	94.7	93.8	93.5
DSB	Long Dist.[85%]	-	-	-	81.0
	Suburban [92%]	-	-	-	94.6
VR	-	-	87.0	89.2	-
SNCF	[3 min]	80.0	80.0	78.0	-
	Long Dist.[3]	-	-	-	78.3
	Suburban	-	-	-	93.2
	Regional	-	-	-	92.5
BR	InterCity [10]	-	87.0	85.0	84.1
	Network SE	-	92.0	90.0	91.0
	Regional	-	90.5	90.5	-
	Regional long[10]	-	-	-	92.0
	Regional short	-	-	-	90.0
CIE	Long Dist.[10]	-	-	-	89.1
	Suburban [2]	-	-	-	98.1
FS	Long Dist.[5]	-	-	-	55.7
	Long Dist.[15]	-	-	-	80.0
	Suburban [5]	-	-	-	73.1
	Suburban [15]	-	-	89.0	93.7
NS	[4]	96.4	97.8	97.3	-
	[5]	-	-	-	96.5
	Long Dist.	-	-	-	97.1
	Suburban	-	-	-	92.8
NSB	Long Dist.	-	-	-	78.0
	Suburban	-	-	-	82.0
Renfe	[10]	76.6	78.4	87.5	-
SJ	-	66.2	78.3	79.1	80.7
	Suburban [2]	-	-	-	93.0
CFF		90.0	93.0	92.0	-

Source: International Railway Gazette (1992).

7. CONCLUSIONS

7.1 The extent to which we have been able to disaggregate data in such a way so as to be able to make meaningful comparisons has been limited. Any policy conclusions we can draw are necessarily limited and highly qualified.

7.2 Our overall impression is that BR's commercial performance is mixed, its operational performance is medium to good and its financial performance is good to excellent. The general impression that emerges is that BR is one of the most consistently good performers in our sample along with SJ, NS and CFF. However, most railways perform well with respect to at least one indicator.

7.3 Given our inability to disaggregate data, we have not been able to compare all our results with those of the earlier (1979) study in any detail. However aggregate comparisons can be made for three indicators, market share, receipts divided by operating costs and train km per staff for nine railways (BR, DB, DSB, FS, NS, NSB, SJ, SNCB and SNCF). The results are shown by Table 7.1 and Figures 7.1 and 7.2.

7.4 Table 7.1 summarises the findings of our most recent work compared with those of our earlier work in 1979. Between 1976 and 1990, BR lost market share in both the freight and passenger markets (down 41% and 17% respectively) at a greater rate than the average for the nine railways (down 20% and 12% respectively). However, between 1977 and 1990 BR increased train kms per member of staff by 32% compared to the 27% average increase for the nine railways studied. Moreover, BR increased its cost recovery ratio by almost 16% in the period 1977 to 1990, whereas the average for the nine railways studied showed a 22% decrease. Overall then it appears that the achievements of British Rail in the 1980's are impressive by Western European standards in terms of productivity and financial performance. BR has achieved the fastest rate of productivity improvement of any Western European railway other than that of Spain, and has ended the period one of the most productive railways, and certainly the most profitable national rail network, of Western Europe (see also Nash and Preston, forthcoming).

7.5 Overall, our work has been slightly disappointing in that, despite repeated efforts we have been unable to collect anything like the desired set of data. In part, this may be because data availability has, contrary to our expectations, worsened since our earlier study. However, we do believe much of the data we require could be made available and we shall be pursuing this matter both with the railway companies themselves and with the research community. In terms of future research, we would suggest that two directions are worth considering:

(i) Disaggregate comparisons of BR with two or three other railways. Of the railways contacted, only CFF and SNCF have stated that they can, potentially, provide all the disaggregate information we are interested in. This might suggest that if work was to proceed in this direction, SNCF should be targeted.

(ii) Make comparisons at a service group level. For example a BR InterCity route could be compared with inter-city routes elsewhere (possible cost comparisons could be made with CFF, NSB, SJ and SNCF) or Network SouthEast/PTE

services could be compared with commuter services elsewhere (possible cost comparisons could be made with CIE's DART service, SJ's services in Gothenburg, Malmo and Stockholm or SNCF's Ile de France services). Some data has been collected on urban railways and will be analysed over the next year, as part of an MSc dissertation.

Table 7.1: Market Share, Train Kms Per Staff and Receipts/Costs Comparisons

Operator	YR	Rail (Freight) Mrkt %	Rail (Passenger) Mrkt %	YR	Train Kms Per Staff	Receipts /Costs %
BR	1976 1990	16.8 9.9	6.5 5.4	1977 1990	2417 3193	71 82
DB	1976 1990	26.1 20.6	6.4 6.3	1977 1990	1750 2559	61 44
DSB	1976 1990	15.0 16.0	7.3 7.1	1977 1990	2242 2709	61 45
FS	1976 1990	18.2 10.1	12.1 7.1	1977 1990	1411 1568	32 16
NS	1976 1990	4.9 4.6	6.4 6.9	1977 1990	3909 4484	56 46
NSB	1976 1990	23.2 14.3	5.6 5.1	1977 1990	2267 2504	60 49
SJ	1976 1990	44.6 42.5	5.4 6.1	1977 1990	2830 3501	83 59
SNCB	1976 1990	22.1 17.8	11.4 N/A	1977 1990	1800 3402	50 27
SNCF	1976 1990	34.1 26.7	11.0 9.2	1977 1990	2096 2413	55 50
MEAN	1976 1990	22.7 18.1	7.6 6.7	1977 1990	2302 2926	59 46

Sources: British Railways Board and University of Leeds (1979)
Preston et al. (1993)

Figure 7.1: Receipts/Operating Costs
European Railway Comparisons 1977 and 1990.

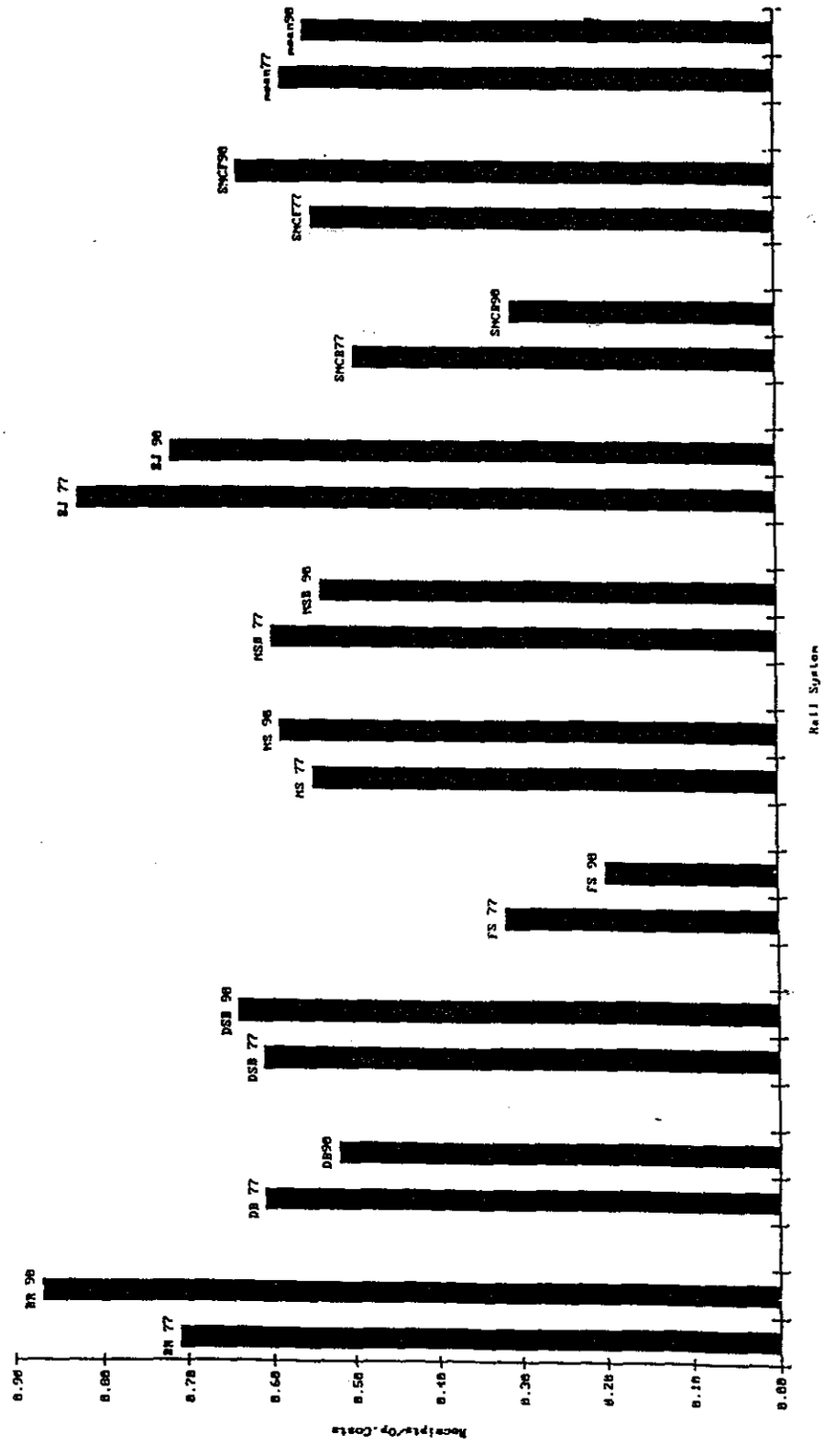
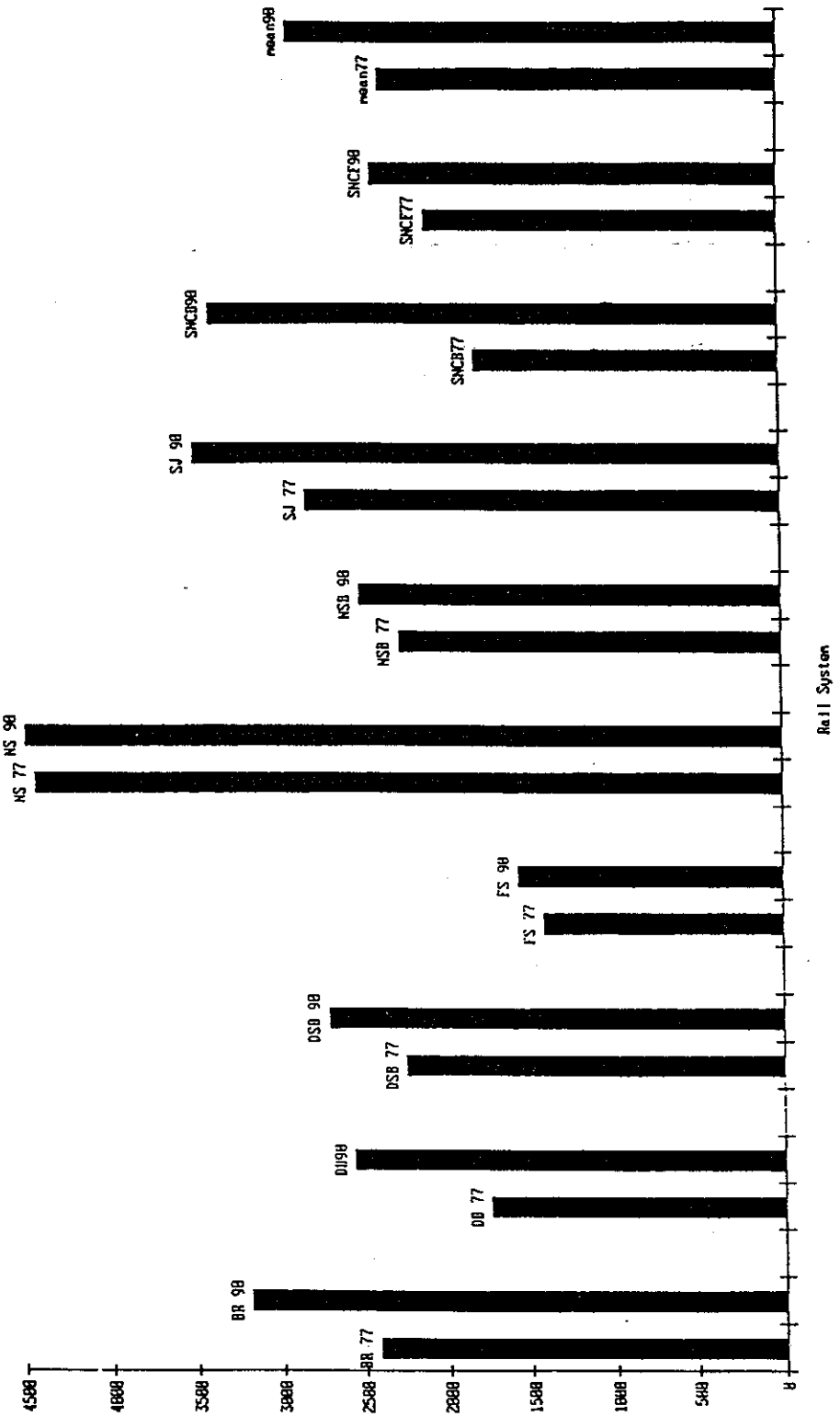


Figure 7.2: Train Km/Staff Nos
European Railway Comparisons 1977 and 1990



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EUROPEAN RAILWAY COMPARISONS
APPENDIX ONE
QUESTIONNAIRE

EUROPEAN RAILWAY COMPARISONS - QUESTIONNAIRE

Please give the following information, by market sector, for the railway business of your company (unless specified otherwise) for the calendar year 1990:

A. ASSETS

		Passenger	Freight	Parcels	Total
1.	Number of Locomotives:				
	- Diesel (>750kW)	[	][	][	][ ]
	- Electric (>750kW)	[	][	][	][ ]
	- Other (<750kW)	[	][	][	][ ]
2.	Fixed Formation High Speed Trains	[	][	][	][ ]
3.	Number of Multiple Unit Vehicles *(including both powered and non powered vehicles)*				
	- Diesel	[	][	][	][ ]
	- Electric	[	][	][	][ ]
4.	Number of Locomotive-hauled Coaches				
	- Passenger carrying	[	][	][	][ ]
	- Non-passenger carrying	[	][	][	][ ]
5.	Number of Freight vehicles				
	- Railway owned	[	][	][	][ ]
	- Privately owned	[	][	][	][ ]

B. ASSET UTILISATION *in thousand train kms*

6.	Locomotives				
	- Diesel-Kms	[	][	][	][ ]
	- *of which shunt*	[	][	][	][ ]
	- Electric-Kms	[	][	][	][ ]
	- *of which shunt*	[	][	][	][ ]
	- TOTAL	[	][	][	][ ]
7.	Fixed Formation High Speed Train-Kms	[	][	][	][ ]
8.	Multiple Units				
	- Diesel-Kms	[	][	][	][ ]
	- *of which shunt*	[	][	][	][ ]
	- Electric-Kms	[	][	][	][ ]
	- *of which shunt*	[	][	][	][ ]
	- TOTAL	[	][	][	][ ]

		Passenger	Freight	Parcels	Total	
9.	Locomotive-hauled Coaches					
	- Passenger carrying-Kms	[	][	][	][	]
	- Non-passenger carrying-Kms	[	][	][	][	]
10.	Freight vehicles					
	- Railway owned-Kms	[	][	][	][	]
	- Privately owned-Kms	[	][	][	][	]
	TOTAL TRAIN KMs					
	-Loaded	**[**	**][**	**][**	**][**	**]**
	-Empty	**[**	**][**	**][**	**][**	**]**

C. TRAFFIC

11.	Passenger					
	- Passenger Journeys *in thousands*	[	][	][	][	]
	- Passenger Kms *in millions*	[	][	][	][	]
12.	Freight *(excluding parcels and departmental)*					
	- Tonnes forwarded *in thousands*	[	][	][	][	]
	- *of which international*	[	][	][	][	]
	- Tonne Kms *in millions*	[	][	][	][	]
	- *of which international*	[	][	][	][	]
13.	Parcels					
	- Tonnes forwarded *in thousands*	[	][	][	][	]
	- Tonne Kms *in millions*	[	][	][	][	]
14.	Departmental					
	- Tonnes forwarded *in thousands*	[	][	][	][	]
	- Tonne Kms *in millions*	[	][	][	][	]

		Passenger	Freight	Parcels	Total
D.	**COSTS** *in Domestic Currency - Thousands*				
15.	Train Operation				
	- Train crew staff costs	[	][	][	][ ]
	- Train crew supplies and services	[	][	][	][ ]
	- Cleaning, servicing etc staff costs	[	][	][	][ ]
	- Cleaning, servicing etc supplies and services	[	][	][	][ ]
	- TOTAL	[	][	][	][ ]
16.	Fuel and Power				
	- Diesel oil used for traction	[	][	][	][ ]
	- Electricity used for traction	[	][	][	][ ]
	- Other ie lubricants	[	][	][	][ ]
	- TOTAL	[	][	][	][ ]
17.	Terminal Costs				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
18.	Marshalling and Shunting *(excluding engine power)*				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
19.	Diesel Locomotive Maintenance				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
20.	Electric Locomotive Maintenance				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
21.	Diesel Multiple Unit Vehicle Maintenance				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
22.	Electric Multiple Unit Vehicle Maintenance				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
23.	Locomotive-hauled Coaches Maintenance				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]

		Passenger	Freight	Parcels	Total
24.	Freight Vehicle Maintenance				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
25.	Track Maintenance				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
26.	Structures Maintenance				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
27.	Signal Operating				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
28.	Signal and Telecommunications Maintenance				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
29.	Fixed Electric Track Equipment				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
30.	Administration				
	- Staff costs	[	][	][	][ ]
	- Supplies and services	[	][	][	][ ]
31.	*Depreciation - Historic Cost Basis*				
	- Diesel locomotives	[	][	][	][ ]
	- Electric locomotives	[	][	][	][ ]
	- Diesel multiple units	[	][	][	][ ]
	- Electric multiple units	[	][	][	][ ]
	- Locomotive-hauled coaches	[	][	][	][ ]
	- Freight vehicles	[	][	][	][ ]
	- Land and Fixed Installations	[	][	][	][ ]
	- Other Equipment	[	][	][	][ ]
	- TOTAL	[	][	][	][ ]
	- *of which Transport Stock*	[	][	][	][ ]

		Passenger	Freight	Parcels	Total	
32.	Depreciation - Current Cost Basis					
	- Diesel locomotives	[	][	][	][	]
	- Electric locomotives	[	][	][	][	]
	- Diesel multiple units	[	][	][	][	]
	- Electric multiple units	[	][	][	][	]
	- Locomotive-hauled coaches	[	][	][	][	]
	- Freight vehicles	[	][	][	][	]
	- Land and Fixed Installations	[	][	][	][	]
	- Other Equipment	[	][	][	][	]
	- TOTAL	[	][	][	][	]
	- *of which Transport Stock*	[	][	][	][	]
33.	Interest	[	][	][	][	]
34.	Other costs *Please specify*	[	][	][	][	]
	TOTAL COSTS	[	][	][	][	]
	of which					
	Staff Costs	[	][	][	][	]
	Supplies and Services	[	][	][	][	]

E. CAPITAL EXPENDITURE *in Domestic Currency - Thousands*

35.	Diesel Locomotives	[	][	][	][	]
36.	Electric Locomotives	[	][	][	][	]
37.	Diesel Multiple Unit Vehicles	[	][	][	][	]
38.	Electric Multiple Unit Vehicles	[	][	][	][	]
39.	Locomotive-hauled Coaches	[	][	][	][	]
40.	Freight vehicles	[	][	][	][	]
41.	Passenger stations/ Goods or parcel stations	[	][	][	][	]
42.	Marshalling Yards	[	][	][	][	]
43.	Traction and Rolling Stock Depots	[	][	][	][	]
44.	Plant and Machinery	[	][	][	][	]

		Passenger	Freight	Parcels	Total
45.	Track	[	][	][	][ ]
46.	Signalling and Telecommunications	[	][	][	][ ]
47.	Electrification	[	][	][	][ ]
48.	Service Vehicles	[	][	][	][ ]
49.	Rail Catering	[	][	][	][ ]
50.	Administration Buildings	[	][	][	][ ]
51.	Workshops	[	][	][	][ ]
52.	Major New Projects *Please specify*	[	][	][	][ ]
53.	*Other*	[	][	][	][ ]
TOTAL EXPENDITURE		**[**	**][**	**][**	**][ ]**

F. ACCUMULATED CAPITAL ASSETS *in Domestic Currency - Thousands*

54.	Historic Cost Basis	[	][	][	][ ]
55.	Current Cost Basis	[	][	][	][ ]

G. INCOME *in Domestic Currency - Thousands*

56.	Receipts from passengers and freight shippers	[	][	][	][ ]
57.	Contributions/Support				
	- Current operations	[	][	][	][ ]
	- Investment items	[	][	][	][ ]
	- Other	[	][	][	][ ]
	- TOTAL	[	][	][	][ ]
58.	Receipts from customers of non-rail business	[	][	][	][ ]
59.	Other income *Please specify*	[	][	][	][ ]
TOTAL INCOME		**[**	**][**	**][**	**][ ]**

		Passenger	Freight	Parcels	Total
H. AVERAGE NUMBER OF STAFF EMPLOYED					
60.	Train Crew				
	-Drivers	[ ][	][	][	]
	-Drivers Assistants/ Firemen	[ ][	][	][	]
	-Guards	[ ][	][	][	]
	-Travelling Ticket/ Examiners	[ ][	][	][	]
	-TOTAL	[ ][	][	][	]
	-of which contract labour	[ ][	][	][	]
61.	Terminals	[ ][	][	][	]
	-of which contract labour	[ ][	][	][	]
62.	Marshalling and Shunting	[ ][	][	][	]
	-of which contract labour	[ ][	][	][	]
63.	Other Train Operations				
	-Train cleaning and servicing	[ ][	][	][	]
	-Other	[ ][	][	][	]
	-TOTAL	[ ][	][	][	]
	-of which contract labour	[ ][	][	][	]
64.	Traction and Rolling Stock Maintenance				
	-Diesel Locomotives	[ ][	][	][	]
	-Electric Locomotives	[ ][	][	][	]
	-Diesel Multiple Units	[ ][	][	][	]
	-Electric Multiple Units	[ ][	][	][	]
	-Locomotive-hauled Coaches	[ ][	][	][	]
	-Freight Vehicles	[ ][	][	][	]
	-TOTAL	[ ][	][	][	]
	-of which contract labour	[ ][	][	][	]
65.	Signalling and Maintenance				
	-Maintenance	[ ][	][	][	]
	-Operation	[ ][	][	][	]
	-of which contract labour	[ ][	][	][	]
66.	Track Maintenance	[ ][	][	][	]
	-of which contract labour	[ ][	][	][	]
67.	Fixed Electric Track Equipment Maintenance	[ ][	][	][	]
	-of which contract labour	[ ][	][	][	]

		Passenger	Freight	Parcels	Total	
68.	Administration	[	][	][	][	]
	-of which contract labour	[	][	][	][	]
69.	Civil Engineering	[	][	][	][	]
	-of which contract labour	[	][	][	][	]
70.	Other	[	][	][	][	]
	-of which contract labour	[	][	][	][	]
	Please specify					
TOTAL STAFF		**[**	**][**	**][**	**][**	**]**
-of which contract labour		**[**	**][**	**][**	**][**	**]**
-number of hours worked		**[**	**][**	**][**	**][**	**]**

I. TRACK AND INSTALLATIONS

71.	Length of Line (Km)	[	][	][	][	]
72.	Length of Track (Km)	[	][	][	][	]
	-of which electrified	[	][	][	][	]
	-of which in tunnel	[	][	][	][	]
73.	Number of stations and stops					
	-Passenger and Freight	[	][	][	][	]
	-Passenger Only	[	][	][	][	]
	-Freight Only	[	][	][	][	]
74.	Number of Depots	[	][	][	][	]
75.	Number of Workshops	[	][	][	][	]
76.	Number of					
	-Level Crossings	[	][	][	][	]
	-Bridges	[	][	][	][	]
	-Tunnels	[	][	][	][	]

J. GENERAL INFORMATION

77. Are more detailed **cost** figures available by passenger traffic type, for example:

-Inter City	Yes	[ ]	No	[ ]
-Commuting	Yes	[ ]	No	[ ]
-Rural and other services	Yes	[ ]	No	[ ]
-International services?	Yes	[ ]	No	[ ]

78. Are more detailed **output** figures available by passenger traffic type, for example by:

-Inter City	Yes	[ ]	No	[ ]
-Commuting	Yes	[ ]	No	[ ]
-Rural and other services	Yes	[ ]	No	[ ]
-International services?	Yes	[ ]	No	[ ]

79. Are more detailed **cost** figures available by freight commodity group, for example by:

-Agricultural products	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Foodstuffs	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Solid Fuels	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Petroleum	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Ores	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Metals	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Building materials	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Fertilisers	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Chemical products	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Other	Yes	[ ]	No	[ ]	Not applicable	[ ]
-International	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Inter-modal?	Yes	[ ]	No	[ ]	Not applicable	[ ]

80. Are more detailed **output** figures available by freight commodity group, for example by:

-Agricultural products	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Foodstuffs	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Solid Fuels	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Petroleum	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Ores	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Metals	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Building materials	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Fertilisers	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Chemical products	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Other	Yes	[ ]	No	[ ]	Not applicable	[ ]
-International	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Inter-modal?	Yes	[ ]	No	[ ]	Not applicable	[ ]

81. Is market share information available for the following passenger businesses:

-Inter City	Yes	[ ]	No	[ ]
-Commuting	Yes	[ ]	No	[ ]
-Rural and other services	Yes	[ ]	No	[ ]
-International services	Yes	[ ]	No	[ ]
-All passenger services?	Yes	[ ]	No	[ ]

82. Is market share information available for the following freight businesses:

-Agricultural products	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Foodstuffs	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Solid Fuels	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Petroleum	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Ores	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Metals	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Building materials	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Fertilisers	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Chemical products	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Other	Yes	[ ]	No	[ ]	Not applicable	[ ]
-International	Yes	[ ]	No	[ ]	Not applicable	[ ]
-Inter-modal	Yes	[ ]	No	[ ]	Not applicable	[ ]
-All freight services?	Yes	[ ]	No	[ ]		

83. Is any of the information in questions 77 to 82 available for geographic regions?

Yes [ ] No [ ]

84. Are reliability standards set for:

-Passenger services	Yes	[ ]	No	[ ]
-Freight services	Yes	[ ]	No	[ ]
-Parcels?	Yes	[ ]	No	[ ]

85. Are measures of reliability performance available for:

-Passenger services	Yes	[ ]	No	[ ]
-Freight services	Yes	[ ]	No	[ ]
-Parcels?	Yes	[ ]	No	[ ]

86. Are load factor standards set for passenger services?

Yes [ ] No [ ]

87. Are measures of load factor performance available for passenger services?

Yes [ ] No [ ]

THANK-YOU FOR YOUR HELP. We shall be arranging to visit you shortly in order to collect this questionnaire.

EUROPEAN RAILWAY COMPARISONS - DRAFT QUESTIONNAIRE - GUIDANCE NOTES FOR RESPONDENTS

GENERAL

Please give information for the rail business only of your company (including international traffic), unless requested to do otherwise, ie exclude bus services, shipping services, hotels etc. Give information for the calendar year 1990 but if this is not possible please give information for the financial year 1990/91.

Parcels services should include, if possible, postal and baggage traffic.

SECTION A - ASSETS

Please give details of the number rail vehicles owned or operated by your company at the end of the appropriate year (or the mean number of vehicles over the year if this is more readily available). Locomotives of less than 750kW power (eg shunters) should be counted seperately.

SECTION B - ASSET UTILISATION

Please give details of the use of rail vehicles. Treat vehicles used for shunting as a separate category. Non-passenger carrying-Kms for locomotive-hauled coaches refers to coaches and vans used for freight and parcels.

SECTION C - TRAFFIC

Please give details of the amount of traffic carried by your rail operations. Departmental traffic refers to traffic carried by railways on their own account (eg ballast, sleepers etc).

SECTION D - COSTS

Please give details of out-turn costs of rail operations

SECTION E - CAPITAL EXPENDITURE

Please give information on capital expenditures in 1990 (1990/91) at out-turn prices.

SECTION F - ACCUMULATED CAPITAL ASSETS

Please give information on capital stock at replacement cost at mid 1990 prices.

SECTION G - INCOME

Please give information on the income from your company at out-turn prices.

SECTION H - AVERAGE NUMBER OF STAFF EMPLOYED

Please give the average number of staff employed by your company over the year, or if this is not possible at the end of the appropriate year. Include casual labour and trainees. Treat part-time staff as units of full-time staff eg two part-time employees each required to work half the annual statutory number of days, according to the Railway's own rule of

pay, should be counted as equivalent to one full-time member of staff. Show contract labour separately.

SECTION I - TRACK AND INSTALLATIONS

Please give figures for the end of the appropriate year, or the mean number for the year if this is more readily available.

SECTION J - GENERAL INFORMATION

This section is intended to give an indication of further detailed information that is possessed by your railway company and that might be made available for subsequent research. In the interviews information will also be requested concerning:

(i) Objectives, including ownership and control, objectives and constraints and subsidiary activities.

(ii) Finance, including Government support, investment and taxation.

(iii) Competition and Regulation, including service and pricing policies, for the passenger, freight and parcels businesses.

(iv) Investment in, and taxation of, competing modes.

EUROPEAN RAILWAY COMPARISONS:

APPENDIX ONE 418

ECONOMETRIC ANALYSIS: TRANSLOG MODELS OF RAIL OPERATIONS

Dr J Preston

January 1994

1. INTRODUCTION

The aim of this appendix is to outline the work undertaken by the Institute for transport Studies in developing a Translog model of rail operating costs which enables the estimation of economies of scale, density and scope for western European railways. In section two, the translog model is briefly described and some recent applications to the railway industry discussed. In section three, the data used to estimate a translog model of rail operating costs is described and the basic structure of the model outlined. In section four, some exploratory results obtained by Vigoroux-Steck (1987) for 13 railways for the period 1971 to 1987. In section five, this model was revised and updated to 1990. This work is described in detail by Preston and Nash (1993). In section six this work is extended to cover 15 railways (Tao, 1993, Garcia, 1993) and sensitivity analysis is undertaken concerning capital costs and economies of scope. This work is described in detail by Preston (1994). Lastly, in section seven some conclusions and recommendations for further work are made.

2. THE TRANSLOG COST FUNCTION

Transcendental logarithmic (or translog) functions were initially developed to examine production frontiers (see, for example, Christensen, Jorgenson and Lau, 1973), as work had shown that the assumptions of linearity and homogeneity that are made by production functions such as the Cobb-Douglas and the Constant Elasticity of Substitution may hold for functions involving more than one output or more than two outputs. In such cases, a more flexible function that permits a greater variety of substitution and transformation patterns is required. The translog production function, being quadratic in the logarithm of the quantities of inputs and outputs, is such a function as it provides a local second order approximation to any production frontier.

By exploiting the duality between production and cost functions it is possible to develop cost functions that are quadratic in the logarithms of outputs and factor prices thus paralleling the translog production function. Reviews of translog cost functions are given by Dodgson (1985) and Hensher and Waters (1993). Their application to the rail industry is particularly appropriate given its multiple output, multiple input nature. Thus early applications of the translog cost model include the work of Caves et al. (1990), Friedlander and Spady (1981) and Caves et al. (1985) on North American Class I railroads. Subsequent studies have tried to improve the methodology, particularly with respect to the treatment of capital costs (Friedlander et al., 1993). The results of these studies, along with studies by Keeler (1974 - based on a Cobb-Douglas production function), Harris (1977 - based on a linear cost function) and Harmatuck (1979) are given by Table 1. They indicate increasing returns to density but, based on expansion around the point of means, broadly constant returns to scale.

Table 1: Economies of Density and Scale for US Rail Roads

		Returns to Density	Returns to Scale	
			Fixed haul and trip length	Increased haul and trip length
Friedlander and	1981	1.16	0.88-1.08	1.07-1.37
Spady	1980	-	1.01	1.13
Caves et al.	1979	1.92	1.01	1.02
Harmatuck	1977	1.72	0.93	1.02
Harnis	1974	1.79	1.01	-
Keeler	1985	1.76	0.98	1.00
Caves et al.	1993	2.24 (SR)	1.27 (SR)	1.21 (LR)
Friedlander et al.		4.03 (LR)		

The studies in Table 1 are based on Class I North American rail roads, which have sizeable networks, are predominantly long haul freight and have a high degree of specificity of rolling stock. The European railway industry is much more diverse. The few translog cost studies that have been undertaken in Europe have concentrated on historical data (Foreman-Peck, 1987; Dodgson, 1993) or have focused on Europe's smaller railways such as CIE or the Swiss private railways (McGeehan, 1993; Fillippini and Maggi, 1993). The results of these studies are summarised in Table 2. As with the North American studies, the overall finding is one of constant returns to scale but increasing returns to density, although Dodgson did find that some of the larger railways in Britain in 1912, including the Great Western, exhibiting diseconomies of density and Fillippini and Maggi tend to find increasing returns to scale for the small, so called private, railways in Switzerland.

Table 2: Economies of Scale and Density for European Railways

	Data	Returns to Scale	Returns to Density
Foreman-Peck (1987)	(a) Britain 1865	1.05	
	(b) 12 countries 1940-1910*	1.25 (Capital Costs Only)	
			0.81
Dodgson (1993)	(a) Britain 1912 - Translog	1.00	>1.00
	(b) Log Linear	1.00	1.33
McGeehan (1993)		0.99	
			1.45-1.55
Fillippini and Maggi (1993)	CIE 1973-1983	1.03-1.35	
	Swiss Private Railways 1985-1988		

*Includes United States, Australia, Canada and India

3. DATA AND METHODOLOGY

A data set has been assembled for 15 western European railways (listed in table 3) for the period 1971 to 1990 based on information published by the Union Internationale des Chemins de fer (UIC). The data set consists principally of total operating costs, three input prices (Labour, Energy, Materials and Services and three outputs (passenger train kms, freight train kms and length of route). The variables used are listed in Table 4.

Table 3: Railways Included in the Study

Acronym	Name	Country
BR	British Rail	Great Britain
CFF	Chemins de Fer Federaux Suisses	Switzerland
CIE	Coras Iompair Eireann	Eire
DB	Deutsche Bundesbahn	West
DSB	Danske Statsbaner	Germany
FS	Ente Ferrovie dello Stato	Denmark
NS	Nederlandse Spoorwegen	Italy
NSB	Norges Statsbaner	Netherlands
OBB	Osterreichische Bundesbahn	Norway
RENFE	Red Nacional de los Ferrocarriles Espanoles	Austria
SNCB	Societe Nationale des Chemins de fer Belges	Spain
SNCF	Societe Nationale des Chemins de fer	Belgium
SJ/BV	Francais	France
CP	Statens Jarnvager/Banverket	Sweden
VR	Caminhos de Ferro Portugueses	Portugal
	Valtionrautatiet	Finland

Table 4: Definition of Key Variables

RTC	Railway Total Operating Costs (excludes depreciation and interest charges (£ million)
WM	Price of labour (£ per employee) calculated as salary costs divided by staff numbers
WE	Price of energy (£ per thousand train km) calculated as energy costs divided by total train km
WV	Price of materials and services (£ per thousand train km) calculated as materials and service costs divided by total train km
TKT	Total Train km for all types of traction (thousands)
%TKP	Percentage of Total Train km operated by passenger services
LL	Length of route at the end of year (km)
YEAR	Time trend variable
DBR	Dummy Variable for British Rail
DCFF	Dummy Variable for Chemins de Fer Federaux Suisses etc.

A number of points should be stressed.

Firstly, we concentrate on operating costs because there are major problems of comparability concerning published data on depreciation, capital stock and interest. However, our definition of operating costs includes expenditure on materials and services. This will be affected by accounting policy. For example, up to financial year 1992/93, BR treated expenditure on track, signalling, electrification and associated structures and buildings as an operating rather than a capital cost. As a result, for BR, operating costs are 94.6% of all costs, whilst, at the other extreme, for DSB operating costs are only 66.1% of all costs (Preston et al., 1993). Secondly, we concentrate on a supply-related, intermediate output measure, train kms. This is because demand-related, final output measures, such as passenger-kms and freight tonne-kms are affected by differing Government policies concerning fare levels, services operated and the degree of competition and therefore may be poor measures of managerial and organisational performance. Our measure of network output, length of line, fails to take into account quality. Length of track would be a better measure but this data is incomplete for many railways in our sample. Thirdly, our data is made comparable between time periods by expressing costs in 1990 prices and converting to pounds sterling through the use of purchasing power parity rates published by the Organisation for Economic Co-operation and Development (OECD). Lastly, it should be noted that our models assume that all railway firms are cost minimisers. This may not be true for some of the railways in our sample. In particular, FS is an outlier in our sample.

The analytical method we choose to use is the transcendental logarithmic (translog) cost function, which in our case takes the form:

(1)

$$\ln RTC = \alpha_o + \sum_i \alpha_i \ln Y_i + \sum_j \beta_j \ln P_j + 1/2 \sum_i \sum_k \delta_{ik} \ln Y_i \ln Y_k + 1/2 \sum_j \sum_m \gamma_{jm} \ln P_j \ln P_m$$

$$+ \sum_i \sum_j P_{ij} \ln Y_i \ln P_j + \sum_n \theta_n D_n + \phi T + \varepsilon$$

where $Y_{i,k}$ = Output measures (TKT, %TKP, LL)
$P_{j,m}$ = Factor prices (WM, WE, WV)
D_n = Railway specific dummy variable
T = Time Trend
Σ = Error term.

For homogeneity of degree one in input prices, we require that the following restrictions be satisfied:

$$\sum_j \beta_j = 1 \; ; \; \sum_j \gamma_{jm} = \sum_m \gamma_{jm} = 0 \; ; \; \sum_i P_{ij} = \sum_j P_{ij} = 0 \qquad (2)$$

Input cost shares can then be derived using Shepherd's lemma. In general:

$$W_j = \frac{P_j X_j}{C} = \frac{P_j \partial C}{C \partial P_j} = \frac{\partial \ln C}{\partial \ln P_j} \qquad (3)$$

where W_j = cost share of input i
X_j = quantity of input i.

So for the translog:

$$W_j = \beta_j + \sum_m \gamma_{jm} \ln P_m + \sum_i P_{ij} \ln Y_i \qquad (4)$$

4. EXPLORATORY ANALYSIS

Exploratory analysis was undertaken by Vigoroux-Steck, who made use of a sub-set of our data, based on 13 European railways (CP and RENFE excluded) for the years 1971 to 1987. This data set has also been used by Jara-Diaz and Munizaga (1992). A unrestricted translog model was developed using ordinary least squares and the resultant model is given by Table 5.

Table 5: Translog Model - Exploratory Analysis

$$
\begin{aligned}
lnRTC = \;& -\underset{(-1.2)}{11.05} + \underset{(3.7)}{5.930\,lnWM} + \underset{(6.1)}{2.726\,lnWE} - \underset{(-3.1)}{1.192\,lnWV} + \underset{(0.5)}{0.575\,lnTKT} \\
& + \underset{(4.4)}{10.940\,ln\%TKP} - \underset{(-0.4)}{0.517\,lnDEN} - \underset{(-9.4)}{0.009\,YEAR} \\
& - \underset{(-3.2)}{0.247(lnWM)^2} + \underset{(7.0)}{0.070(lnWE)^2} \\
& + \underset{(6.5)}{0.054(lnWV)^2} + \underset{(2.2)}{0.111(lnTKT)^2} - \underset{(-0.8)}{0.241(ln\%TKP)^2} + \underset{(4.1)}{0.292(lnDEN)^2} \\
& - \underset{(-5.9)}{0.261\,lnWM \cdot LnWE} + \underset{(1.7)}{0.067\,lnWM \cdot lnWV} - \underset{(-4.7)}{0.168\,lnWM \cdot lnTKT} \\
& - \underset{(-5.2)}{1.195\,lnWM \cdot ln\%TKP} + \underset{(2.0)}{0.164\,lnWM \cdot lnDEN} - \underset{(-2.9)}{0.044\,lnWE \cdot lnWV} \\
& + \underset{(0.2)}{0.002\,lnWE \cdot lnTKT} + \underset{(1.7)}{0.191\,lnWE \cdot ln\%TKP} - \underset{(-0.3)}{0.012\,lnWE \cdot lnDEN} \\
& + \underset{(7.0)}{0.076\,lnWV \cdot lnTKT} + \underset{(2.3)}{0.186\,lnWV \cdot ln\%TKP} - \underset{(-0.1)}{0.002\,lnWV \cdot lnDEN} \\
& - \underset{(-1.3)}{0.095\,lnTKT \cdot ln\%TKP} - \underset{(-2.9)}{0.252\,lnTKT \cdot lnDEN} + \underset{(2.5)}{0.405\,\ln\%TKP \cdot lnDEN} \\
& + \underset{(2.7)}{0.35\,DBR} + \underset{(4.9)}{0.38\,DCFF} - \underset{(-1.1)}{0.12\,DCIE} + \underset{(2.0)}{0.40\,DDB} + \underset{(2.4)}{0.15\,DDSB} + \underset{(4.3)}{0.48\,DFS} \\
& + \underset{(0.8)}{0.06\,DNS} - \underset{(-1.7)}{0.06\,DNSB} + \underset{(16.5)}{0.69\,DOBB} - \underset{(-3.6)}{0.24\,DSJ} + \underset{(10.5)}{0.55\,DSNCB} + \underset{(0.0)}{0.00\,DSNCF}
\end{aligned}
$$

$R^2 = 0.9996 \qquad F = 14117.9$

Source: Vigoroux-Steck, 1989

The model involved the estimation of 41 parameter values, of which 11 were insignificant at the 10% level. From this model the elasticity of cost with respect to size of output (train km), holding density constant, could be calculated as:

$$\eta_s = \frac{\partial \text{ Ln RTC}}{\partial \text{ Ln TKT}}$$

with returns to scale (RTS) estimated as $1/\eta_s$ and constant returns where $\eta_s = 1$.

Similarly, the elasticity of cost with respect to traffic density, holding train km constant, was calculated as:

$$\eta_d = \frac{\partial \text{ Ln RTC}}{\partial \text{ Ln DEN}}$$

In this case, returns to density (RTD) were estimated as $1 - \eta_d$, with constant returns where $\eta_d = 0$.

Table 6: Returns to Density and Scale - Exploratory Results

Operator	Network size (km)	Network density (train km per line km)	RTD	RTS	Operator Comparisons
BR	16584	26837	1.45	0.86	1.40
CFF	2978	41099	0.88	1.35	1.48
CIE	1944	7323	1.30	1.51	0.90*
DB	26949	22405	1.72	0.78	1.46
DSB	2344	22252	0.99	1.45	1.19
FS	16066	19560	1.56	0.83	1.60
NS	2798	41928	0.80	1.46	1.07*
NSB	4044	9076	1.55	1.15	0.94
OBB	5624	20839	1.44	0.96	1.97
SJ	10801	9225	1.83	0.88	0.79
SNCB	3479	26675	1.07	1.23	1.75
SNCF	34070	14314	1.96	0.72	0.99*
VR	5867	6993	1.79	1.04	1.00

* The corresponding dummy variable was insignificant at the 10% level.

These initial results are given by Table Seven. In terms of returns to density, two railways exhibit decreasing returns (RTD < 1). These two railways (CFF and NS) have high traffic densities with in excess of 40,000 train km per line km per annum. Two other railways (DSB and SNCB) exhibit constant returns to density (RTD = 1), whilst all other railways exhibit increasing returns to density (RTD > 1). These include the large state operators (BR, DB, FS, and SNCF), the Nordic operators (NSB, SJ and VR) and the lightly used CIE and, to a lesser extent, OBB networks.

In terms of return to scale, the pattern that emerges is that the larger railways (BR, DB, FS, SJ and SNCF) have decreasing returns to scale (RTS < 1), whilst the smaller railways (CFF, CIE,

DSB, NS, NSB and SNCB) have increasing returns to scale (RTS > 1). Two medium sized railways (OBB and VR) exhibit approximate constant returns to scale (RTD ≈ 1). This suggests that optimal network size may be around 5,000 to 6,000km. This might suggest that the BR network could be split into three units, the DB network could be split into five units and the SNCF network could be split into six units.

The findings from the exploratory analysis concerning returns to scale and density seemed plausible. The interpretation of the operator dummy variable also has some plausibility indicating that OBB, SNCB and FS were cost inefficient. However, the finding that, all other things being equal, BR's costs were 40% greater than those of VR was not thought to be plausible.

5. INTERMEDIATE ANALYSIS

Further analysis was undertaken, reported by Aldridge and Preston (1992) and Preston and Nash (1993) and involved four main amendments.

Firstly the data was up-dated from 1987 to 1990 and re-indexed to incorporate the most recent information on international prices. Secondly, the cost model was constrained to ensure linear homogeneity of degree one in factor prices, so that if all factor prices increase by 10%, costs increase by 10%. This was done by introducing the constraints given by equation (2).

The constrained model was estimated using the Statistical Analysis Systems computer package (SAS, 1988), with the restrictions being imposed by the method of Lagrangian parameters associated with Pringle and Raynor (1971). Thirdly, problems of heteroscedasticity introduced by the use of pooled time-series and cross-sectional data was reduced by re-defining variables around the sample mean as suggested by Mundlack (1978). Fourthly, the RTD and RTS measures were redefined so as to be consistent with other studies, principally Caves et al. (1985). The measure of RTD used by Vigoroux-Steck was a long run one, in that in order to increase density, given constant total train km, track length must be reduced. A more common, short run, measure of density examines the changes in costs as a result of changes in total train kms, given constant track length. Thus in our further analysis the variable DEN was replaced by LL. The resultant model is given in Table 7. It should be noted that 14 out of 41 parameters are insignificant at the 10% level, including the LL first order term and five out of six cross terms. With this model we define:

$$\eta_1 = \frac{\partial \text{ Ln RTC}}{\partial \text{ Ln TKT}} \; ; \; \eta_2 = \frac{\partial \text{ Ln RTC}}{\partial \text{ Ln LL}}$$

$$\text{RTD} = 1/\eta_1 \quad ; \quad \text{RTS} = 1/(\eta_1 + \eta_2)$$

Table 7:: Translog Model - Further Analysis

$$
\begin{aligned}
lnRTC = \;& \underset{(3.2)}{2.53} + \underset{(35.8)}{1.043\,lnWM} + \underset{(1.9)}{0.008\,lnWE} - \underset{(-2.0)}{0.051\,lnWV} + \underset{(0.5)}{0.557\,lnTKT} \\
& + \underset{(1.8)}{0.083\,ln\%TKP} - \underset{(-1.0)}{1.329\,lnLL} - \underset{(-11.6)}{3.119\,YEAR} \\
& + \underset{(7.4)}{0.031(lnWM)^2} + \underset{(4.6)}{0.005(lnWE)^2} \\
& + \underset{(6.2)}{0.014(lnWV)^2} + \underset{(7.2)}{6.692(lnTKT)^2} - \underset{(-2.6)}{0.025(ln\%TKP)^2} + \underset{(6.6)}{7.638(lnLL)^2} \\
& - \underset{(-6.0)}{0.011\,lnWM \cdot lnWE} - \underset{(-6.6)}{0.020\,lnWM \cdot lnWV} - \underset{(-1.3)}{0.104\,lnWM \cdot lnTKT} \\
& - \underset{(2.4)}{0.020\,lnWM \cdot ln\%TKP} + \underset{(0.1)}{0.009\,lnWM \cdot lnLL} + \underset{(4.6)}{0.006\,lnWE \cdot lnWV} \\
& - \underset{(-1.6)}{0.061\,lnWE \cdot lnTKT} - \underset{(-1.4)}{0.006\,lnWE \cdot ln\%TKP} + \underset{(1.3)}{0.048\,lnWE \cdot lnLL} \\
& + \underset{(2.9)}{0.164\,lnWV \cdot lnTKT} - \underset{(-2.4)}{0.014\,lnWV \cdot ln\%TKP} - \underset{(1.2)}{0.057\,lnWV \cdot lnLL} \\
& - \underset{(-0.6)}{0.077\,lnTKT \cdot ln\%TKP} - \underset{(-5.7)}{13.071\,lnTKT \cdot lnLL} + \underset{(0.4)}{0.049\,ln\%TKP \cdot lnLL} \\
& + \underset{(2.5)}{0.07DBR} + \underset{(5.5)}{0.08DCFF} + \underset{(0.8)}{0.02DCIE} + \underset{(1.1)}{0.05DDB} + \underset{(5.9)}{0.07DDSB} + \underset{(3.4)}{0.08DFS} \\
& + \underset{(4.1)}{0.06DNS} + \underset{(2.1)}{0.01DNSB} + \underset{(15.0)}{0.13DOBB} - \underset{(-3.2)}{0.04DSJ} + \underset{(11.4)}{0.12DSNCB} - \underset{(-0.3)}{0.01DSNCF}
\end{aligned}
$$

$R^2 = 0.9989 \qquad F = 6424.7$

Source: Aldridge and Preston, 1992

Table 8: Returns to Density and Scale - Further Results

Operator	η_1	η_2	RTS	RTD	Operators Comparisons
BR	0.66	0.68	0.74	1.50	1.08
CFF	1.25	-0.49	1.30	0.80	1.08
CIE	0.28	0.74	0.97	3.57	1.02*
DB	0.46	1.04	0.66	2.17	1.05*
DSB	0.93	-0.10	1.20	1.08	1.08
FS	0.47	0.96	0.70	2.11	1.09
NS	1.29	-0.55	1.36	0.75	1.06
NSB	0.16	0.97	0.88	6.19	1.01
OBB	0.75	0.37	0.88	1.33	1.13
SJ	-0.06	1.47	0.71	n.a.	0.96
SNCB	0.96	-0.07	1.12	1.04	1.13
SNCF	0.08	1.59	0.60	12.11	0.98*
VR	-0.17	1.44	0.79	n.a.	1.00

* The corresponding dummy variable was insignificant at the 10% level.
n.a. Not appropriate

The results of this further analysis are given by Table Eight. In terms of returns to scale, our models suggest the largest railways (BR, DB, FS, SJ and SNCF) exhibit decreasing returns but are now joined by the medium sized railways (NSB, OBB and VR). The smaller railways have increasing returns to scale, with the anomalous exception of the smallest railway in our sample (CIE), which exhibits constant returns to scale.

In terms of return to density, the most densely used railways (CFF, NS) continue to exhibit decreasing returns, whilst DSB and SNCB continue to exhibit broadly constant returns. All other railways exhibit increasing returns to density. In the case of SJ and VR these economies of density are such that the elasticity of rail costs with respect to train kilometres is the wrong sign.

In terms of operators' comparisons, the results appear more plausible. All other things being equal, only SJ's operating costs are lower than VR's (by 4%). A number of railways have significantly higher operating costs than VR, including NSB (by 1%), NS (by 6%), BR, CFF and DSB (by 8%), FS (by 9%) and SNCB and OBB (by 13%). All other operators' costs are broadly the same as VR. This suggests that most of the big differences in operating cost performance are explained by geography (which determines the scale and density of operations) and factor prices. It should also be noted that the proportion of total costs that are defined as operating costs varies in our sample from 94% (BR) to 71% (DSB), with the figure for VR being around 82%. An analysis that takes into account capital costs could give different results.

6. FINAL ANALYSIS

6.1 OPERATING COST MODEL

Our analysis was extended further by adding CP and RENFE to our data base and, given n (three) factor prices, using n-1 (two) cost share equations of the form given by equation (4) to be estimated jointly with the translog cost model in order to improve the efficiency of the estimation.

Given n factor prices, n-1 cost share equations may be estimated jointly with the translog cost function. The estimation method used was the Seemingly Unrelated Regression (Zellner, 1962) procedure provided by the Statistical Analysis Systems Computer Package (SAS, 1988). The resultant models are given in Table 9. Statistical tests indicated that autocorrelation, heteroscedasticity and multicollinearity were not significant problems. The econometric problems that arise from the use of pooled data have been reduced by the use of firm-specific dummy variables and a time trend variable, and may be thought of as a form of the covariance model advocated by Pindyck and Rubinfeld (1991, p224). It should be noted that of the 57 parameter values estimated in the three modal system, only 27 are significant at the 5% level. It should also be noted that we can not readily compute standard errors for the elasticity measures, but we would anticipate that they would be large. Additional work will be undertaken in this area.

Table 9: Translog Model and Cost Share Models (t-statistics in brackets)

$$
\begin{aligned}
lnRTC = {} & \underset{(3.56)}{16.083} + \underset{(7.07)}{1.172}\ lnWM - \underset{(-0.24)}{0.030}\ lnWE - \underset{(-0.86)}{0.142}\ lnWV + \underset{(0.36)}{0.179}\ lnTKT \\
& + \underset{(1.60)}{2.071}\ \ln\%TKP - \underset{(-1.03)}{1.051}\ lnLL - \underset{(-11.34)}{0.010}\ YEAR \\
& + \underset{(1.23)}{0.004}\ (lnWM)^2 + \underset{(6.05)}{0.060}\ (lnWE)^2 + \underset{(5.62)}{0.063}\ (lnWV)^2 \\
& + \underset{(7.82)}{0.326}\ (lnTKT)^2 - \underset{(-2.22)}{0.825}\ (\ln\%TKP)^2 + \underset{(6.717)}{0.537}\ (lnLL)^2 \\
& - \underset{(-0.04)}{0.0003}\ lnWM.lnWE - \underset{(-0.51)}{0.0038}\ lnWM.lnWV - \underset{(-2.676)}{0.0860}\ lnWM.lnTKT \\
& - \underset{(-3.58)}{0.4217}\ lnWM.\ln\%TKP + \underset{(0.59)}{0.0235}\ lnWM.lnLL - \underset{(-8.179)}{0.0593}\ lnWE.lnWV \\
& + \underset{(1.96)}{0.0487}\ lnWE.lnTKT - \underset{(-0.84)}{0.0746}\ lnWE.\ln\%TKP - \underset{(-1.23)}{0.0372}\ lnWE.lnLL \\
& + \underset{(0.42)}{0.0137}\ lnWV.lnLL + \underset{(1.33)}{0.0372}\ lnWV.lnTRT + \underset{(5.29)}{0.4963}\ lnWV.\ln\%TKP \\
& + \underset{(1.18)}{0.213}\ lnTKT.\ln\%TKP - \underset{(-5.84)}{0.708}\ lnTKT.lnLL - \underset{(-0.90)}{0.205}\ \ln\%TKP.lnLL \\
& + \underset{(1.59)}{0.15}\ DBR + \underset{(2.63)}{0.38}\ DCFF - \underset{(-0.83)}{0.15}\ DCIE = \underset{(0.17)}{0.03}\ DDB + \underset{(2.12)}{0.32}\ DDSB \\
& + \underset{(4.93)}{0.33}\ DFS + \underset{(1.07)}{0.15}\ DNS - \underset{(-0.11)}{0.01}\ DNSB + \underset{(6.97)}{0.69}\ DOBB - \underset{(-9.79)}{0.35}\ DSJ \\
& + \underset{(4.78)}{0.60}\ DSNCB - \underset{(-1.416)}{0.31}\ DSNCF - \underset{(-0.07)}{0.07}\ DVR = \underset{(2.42)}{0.50}\ DCP
\end{aligned}
$$

$\overline{R^2} = 0.9987 \quad F = 6778.245$

$(WM.SN)/RTC =$

$$
\begin{aligned}
& \underset{(7.07)}{1.172} + \underset{(1.23)}{0.004}\ lnWM - \underset{(-0.04)}{0.0003}\ lnWE - \underset{(-0.51)}{0.004}\ lnWV - \underset{(-2.68)}{0.086}\ lnTKT \\
& - \underset{(-3.58)}{0.422}\ \ln\%TKP + \underset{(0.59)}{0.023}\ lnLL
\end{aligned}
$$

$\overline{R^2} = 0.3559 \quad F = 28.538$

SN = Staff Numbers

$$(WE.TKT)/RTC =$$

$$\underset{(-0.24)}{-0.030} \underset{(-0.040)}{-0.0003\ lnWM} + \underset{(6.048)}{0.060\ lnWE} \underset{(-8.179)}{-0.059\ lnWV} + \underset{(1.96)}{0.049\ lnTKT}$$

$$\underset{(-0.84)}{-0.075\ \ln\%TKP} \underset{(-1.23)}{-0.037\ lnLL}$$

$\overline{R^2} = 0.2782 \quad F = 20.206$

Three key results from the translog model are presented in Table 10. By taking the exponential of the firm specific dummy variables, cost efficiency may be assessed relative to the base operator, RENFE. All other things being equal, seven railway companies would have the same costs as RENFE, one railway would have lower costs (SJ) and six would have higher costs (OBB, SNCB, CP, FS, CFF and DSB).

Table 10: Cost Efficiency (1971 - 1990), Returns to Density (1990) and Returns to Scale (1990)

	Operators comparisons	Returns to Density	Returns to Scale	Train Km per annum (000)	Length of line (km)	Density (train km per line km)
BR	1.17*	1.11	0.72	445060	16584	26837
CFF	1.46	0.81	1.22	122394	2978	41099
CIE	0.86*	6.00	1.23	14237	1944	7324
DB	1.03*	1.33	0.64	603797	26949	22405
DSB	1.38	1.10	1.26	52160	2344	22252
FS	1.39	1.48	0.69	314255	16066	19560
NS	1.17*	0.77	1.25	117314	2798	41928
NSB	0.99*	4.44	1.02	36705	4044	9076
OBB	2.00	1.25	0.88	117201	5624	20839
SJ	0.70	6.04	0.76	99634	10801	9225
SNCB	1.82	1.00	1.10	92802	3479	26675
SNCF	0.73*	2.37	0.60	487670	34070	14313
VR	0.94*	53.83	0.89	41026	5867	6993
CP	1.65	1.98	1.05	33693	3064	10996
RENFE	1.00	2.08	0.73	168960	12560	13452

* Not significantly different from 1.0 at the 5% level.

Twelve of the fifteen railways exhibit increasing returns to density and this finding is particularly marked for the four railways with a traffic density of less than 10,000 train km per annum per km of line (VR, CIE, NSB and SJ). The Belgian railway (SNCB) exhibits constant returns to density, with a traffic density of almost 27,000 train km per km of line. The two most densely used rail networks in western Europe (NS and CFF, both with traffic densities of over 40,000 train km per km of line) exhibit decreasing returns to density, suggesting existing infrastructure is congested

and that investment plans to expand rail capacity in both the Netherlands and Switzerland may be justified.

It can be seen that only seven of the fifteen railways exhibit returns to scale greater than one and of these NSB, CP and SNCB may be characterised as having broadly constant returns to scale, whilst the remaining four (CIE, DSB, NS and CFF) may be characterised as having increasing returns. Of the remaining eight railways with returns to scale that are less than one, VR may be characterised as having constant returns and SNCF, DB, FS, RENFE, BR, SJ and OBB have decreasing returns to scale.

6.2 Capital Costs

In Table 11 we look at the sensitivity of our results concerning returns to density and scale to assumptions about capital costs. Data on capital costs was based on historic cost depreciation and interest determined from UIC data for 1990 (1991 for VR), supplemented by data collected by the Institute for Transport Studies (Preston et al, 1993). We test two broad assumptions:

> Firstly, that capital costs are fixed. For returns to density we assume that a change in TKT will not affect capital costs and for returns to scale we assume that a change in TKT and LL will not affect capital costs (or put another way we assume that the elasticity of capital costs with respect to TKT and LL is zero).
>
> Secondly, we assume that capital costs are variable. For returns to density we assume that a proportionate change in TKT will lead to a proportionate change in capital costs (that is the elasticity of capital costs with respect to TKT is one). For returns to scale we assume initially that a proportionate change in TKT and LL will lead to a proportionate change in capital costs; that is the elasticity of capital costs with respect to TKT and LL is one. An alternative assumption is that the elasticity of capital costs with respect to TKT is one and the elasticity of capital costs with respect to LL is one, implying a return to scale with respect to capital costs of 0.5.

Analysis of Table 8 indicates that our results are sensitive to assumptions concerning capital costs. For returns to density, if we assume capital costs are fixed, compared to Table 6, returns increase so that all railways exhibit increasing returns except NS (decreasing returns) and CFF (constant returns). If capital costs are assumed to be variable, then there is a tendency for returns to converge towards unity, but with most railways exhibiting increasing returns, with the exceptions of CFF and NS (decreasing returns) and DSB and SNCB (constant returns).

For returns to scale, if we assume capital costs are fixed then, compared to Table 6, returns to scale increase so that OBB now appears to be the railway with the optimal size network as it exhibits constant returns. Under our first assumption concerning variable costs (returns to scale with respect to capital costs equals one), returns converge towards unity, with CP and NSB exhibiting constant returns. Under our second assumption concerning variable capital costs (returns to scale with respect to capital costs equals 0.5), returns reduce so that NS and CIE exhibit constant returns and all other railways exhibit decreasing returns.

From section two, we hypothesise that capital costs are likely to have a large fixed element (50% plus) and the most plausible estimates of returns to density and scale may be between those given in Table 6 and by the capital costs fixed columns of Table 11.

6.3 Economies of Scope

There has been very little work undertaken on the existence of economies of scope in European railways. The only study that we are aware of is the one by Jara Diaz and Munizaga (1992) who, using a sub-set of the data base we have developed (13 railways for the period 1971 to 1987), developed a quadratic cost function and found increasing returns to scope for 11 railways and constant returns for two (DB and SNCF).

One of the reasons there has not been much work in this area is due to the fact that the translog can not handle zero outputs. A sophisticated solution to this problem is to replace the logarithmic function with a suitable Box-Cox transformation. A rather simpler approach is to estimate costs at near zero levels of output. This approach was adopted in Table 12 with economies of scope defined as:

$$EOS = (R\hat{T}C_P + R\hat{T}C_F)/(R\hat{T}C_{PF})$$

where $R\hat{T}C_P$ = Estimated Total Costs of Producing Passenger Train Km Only
$R\hat{T}C_F$ = Estimated Total Costs of Producing Freight Train Km Only
$R\hat{T}C_{PF}$ = Estimated Total Cost of Producing Passenger and Freight Train Km.

The results in Table 12 suggest that all railways exhibit decreasing returns to scope, with the exception of British Rail, which is paradoxically the railway in our sample where the freight and passenger businesses are most separated. Sensitivity analysis based on differing definitions of near zero outputs was undertaken but did not dramatically affect the results. However, a word of caution should be issued here. Additional work suggests that results are sensitive to model form (Garcia, 1993), which is also backed-up by the conclusions of Jara Diaz and Munizaga, who used similar data to ourselves but produced dramatically different results. We are undertaking further analysis in this area.

Table 10: Sensitivity of Returns to Density and Scale to Assumptions concerning Capital Costs

Operator	Returns to Density		Returns to Scale		
	Capital Costs Fixed	Capital Costs Variable	Capital Costs Fixed	Capital Costs Variable (1)	Capital Costs Variable (2)
BR	1.17	1.10	0.76	0.73	0.70
CFF	1.01	0.84	1.52	1.17	0.95
CIE	6.71	3.66	1.41	1.20	1.04
DB	1.59	1.26	0.76	0.68	0.61
DSB	1.55	1.06	1.79	1.18	0.88
FS	1.82	1.35	0.86	0.73	0.64

NS	0.91	0.80	1.47	1.20	1.02
NSB	5.05	3.38	1.13	1.02	0.93
OBB	1.39	1.22	0.98	0.89	0.81
RENFE	2.65	1.69	0.93	0.78	0.66
SJ	7.14	3.17	0.92	0.79	0.87
SNCB	1.16	1.00	1.28	1.08	0.94
SNCF	3.06	1.82	0.77	0.66	0.57
CP	2.42	1.66	1.30	1.04	0.87
VR	62.50	5.15	1.09	0.91	0.78

Table 11: Economies of Scope between Passenger and Freight Operations (Approximations)

BR	1.13	OBB	0.77
CFF	0.65	SJ	0.74
CIE	0.77	SNCB	0.66
DB	0.65	SNCF	0.77
DSB	0.80	VR	0.68
FS	0.83	CP	0.79
NS	0.82	RENFE	0.71
NSB	0.66		

7. CONCLUSIONS

Translog models have been developed for wester European railways and appear to give plausible and consistent results. However, we have some concern about the precision of our estimates and in future work we hope to compute the standard errors associated with our elasticity estimates and undertake more rigorous statistical comparisons of the different model forms we have developed.

our results suggest that the western European railway industry exhibits U-shaped average cost curves with respect to output (train km or network km). Average costs exhibit a downward sloping curve with respect to traffic density over a broad range of densities but even here may be upward sloping at extremely high traffic densities as in the Netherlands and Switzerland.

The economies of density findings are relatively easy to explain. As infrastructure is used more intensively, the fixed cost element of total costs reduces and hence average costs reduce. However, a point may be reached where the infrastructure is being used too intensely, resulting in congestion problems. Economies of scale in operations may arise from better utilisation of rolling stock and staff though better scheduling and the operation of faster through trains (which our models can pick-up and are better described as economies of scope) and though the operation of larger and longer vehicles (which our models do not explicitly handle). Economies of scale

may also result from the purchasing power held by large firms. These factors suggest that there is a minimum efficient size for a network rail operator. The diseconomies of scale exhibited by large railways are more difficult to explain but may be the organisational complexities of large firms leading to spiralling transaction costs (Williamson, 1975) and X-inefficiencies.

In terms of minimising capital and operating costs, our model suggests that the optimal network is likely to be around 5,500 km and the optimal density around 40,000 train km per line km per annum. This suggests that, in cost terms assuming the existing network is to be maintained the optimal structure for the railway industry in Britain would be to have around three (or possibly four) railway operating companies, each with a traffic density about 50% greater than that which currently exists for BR.

In terms of further work, we see scope in combining our work on partial productivity measures and in developing the translog cost function, in order to develop measures of total factor productivity in a manner similar to that of Caves et al (1982), Hensher et al (1992) and McGeehan (1993).

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EUROPEAN RAILWAY COMPARISONS
APPENDIX THREE
COMPANY PROFILES

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C A NASH

This work was undertaken on a project commissioned by British Railways Board
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CONTENTS

ABSTRACT

PRESTON, JM and NASH, CA (1992). European Railway Comparisons. *ITS Working Paper* **379**, Institute for Transport Studies, University of Leeds, Leeds.

This work was undertaken as part of a project sponsored by the British Railways Board entitled 'European Railway Comparisons'. The aims of this project are as follows:

(i) To compare the current efficiency of European railway operators and examine recent trends at both aggregate and disaggregate levels.

(ii) To assess the effects of economies of scale and economies of density on European rail operations.

(iii) To make an exploratory assessment of the potential for further disaggregation by market type (InterCity, Commuter, Freight) in order to make detailed comparisons of market shares.

The main methods employed to carry out this study are as follows:

(i) A review of the literature on railway cost and productivity analysis. Preliminary findings are given in Working Paper 354 and a paper presented to the World Conference on Transport Research (Nash, C.A. and Preston, J.M. (1992) "Assessing the Performance of European Railways").

(ii) Collation of published data for 14 European State Railway Operators.

(iii) Face to face interviews with managers at the 14 State Railway companies in order to check our understanding of published data sources, gain more information at a disaggregate level (administered by a self completion questionnaire) and obtain an understanding of the institutional background.

This report summarises some of the background information that was obtained from the interviews undertaken in the summer of 1992. A company profile is developed for each operator under four main headings: Objectives and Management, Finance, the Freight Market and the Passenger Market.

KEY-WORDS:

Contact: J Preston, ITS (tel: 0532 335340)

1. AUSTRIA - Oesterreichische Bundesbahn (OBB)

A. OBJECTIVES and MANAGEMENT

1. Ownership and Organisation

OBB is currently still operated as a department of state, being part of the government budget. A new railway law will come into effect on 1/1/93, which will implement EC requirements ready for Austrian membership and give OBB much greater commercial freedom. Under this law, OBB will be split into operating and infrastructure divisions as part of the same organisation. The government will pay for the infrastructure but will charge for its use (charges, based on marginal cost, will cover 3/8 of the cost with the state bearing the rest). The operating division will be free to act commercially; the government will be able to buy uncommercial services, but will have to negotiate a contract, with proper payment, to do so. At present OBB is required by law to provide various uncommercial services.

2. Objectives and Controls

Currently, OBB's objectives and constraints are largely defined in terms of legal obligations. Under the new law, the operating arm of OBB will have clear commercial obligations, with social obligations being the responsibility of the state to provide and fund.

3. Subsidiary Activity

OBB owns a large fleet of buses and some lorries and ships. It also operates some 70 narrow-gauge secondary railways, which complicates comparisons with Switzerland, where these are totally separate from SBB. Many studies over the years have recommended closure of most of these, but whilst some have closed, further closures are not currently under consideration.

B. FINANCE

1. Government Support

OBB currently receives support ex post under four legal provisions. These are (amounts received in 1990 in brackets):

a.	Tariff obligations for	passengers	(3110m schillings)
		freight	(1503m schillings)
b.	Provision of local passenger services		(2800m schillings)
c.	Maintenance of the infrastructure		(4560m schillings)
d.	Operation of secondary railways		(1951m schillings)

Total support from the state is therefore 13924m or 36% of turnover.

2. Investment

The Neue Bahn concept was launched in 1987, the aim being to relieve pressure on the road system by massive investment in rail infrastructure. As part of the deal, OBB was required to improve its efficiency and marketing.

The Neue Bahn concept requires investment of some 60000m. Austrian schillings over 10 years 1991-2000, and will upgrade the Vienna-Salzburg line for speeds for 160-200 kmph, build a Semmering base tunnel, improve the Brenner and Taker routes as improving many other passenger and freight terminals, provide new rolling stock and expanded track capacity for freight and passenger services. Further studies on high speed and on the Brenner base tunnel under the Alps for international freight and passenger traffic are continuing.

Currently OBB cannot borrow from the private capital market, but under the new law it will be able to, probably with government guarantee.

C. FREIGHT MARKET

1. Services

In 1990, OBB carried 62.6m tonnes of freight of which .769m was less than wagonload traffic. Of the wagonload traffic, only 18.392m tonnes was domestic; 18.475 was imports, 13.426 was exports and 11.528 transit. A total of 11m tonnes of inter modal traffic was carried, of which almost all was international. A breakdown of commodities carried is given in Table 1.1; from which the continued importance of food and agriculture is apparent, no doubt in part as a result of the continuation of wagonload traffic to many small stations under the requirements of carry and tariff obligations.

2. Pricing

OBB is free to set freight tariffs except where it is obliged to provide uncommercial tariffs and compensated by the state for it.

3. Competition

Road haulage competition is very severe. Although road hauliers are subject to a tonne km tax for traffic of over 175km, this is levied on the basis of consignment notes, and can be widely avoided by splitting the journey into stages. This also distorts data on road haulage operations.

D. PASSENGER MARKET

1. Services

OBB operates international and intercity domestic trains, stopping trains, suburban trains and secondary railways. Part of the Neue Bahn concept is to introduce regular interval inter city and inter regional services throughout the system.

2. Pricing

Tariffs are currently controlled by the state, which has held them down as part of anti-inflation policy. Generally an increase has been permitted only once every three years. Under the new law, OBB would have commercial freedom except where prices were the subject of a contract with the state.

OBB is a member of several Verkehrsverbund (or PTE) arrangements whereby local authorities set fares for all modes of public transport. In this case local authorities make a payment to the state in respect of these costs.

3. Competition

OBB used to hold all bus licences throughout Austria, although it franchised many services to the private sector it still owns many buses. Private operators are now licensed by the 9 districts. Although car is the main competitor, coach competiton is growing - particularly as a result of liberalisation in Eastern Europe - and raises bigger issues regarding fair competition regarding insfrastructure costs.

Table 1.1(a) Wagonload Traffic by Type of Goods (tonnes)

	Total	Domestic	International	Imports	Exports	Transit
Tonnes	61 821 312.1	18 392 077.6	43 429 234.5	18 475 201.9	13 426 140.3	11 527 892.3
	100.0	100.0	100.0	100.0	100.0	100.0
0. Agricultural products & live animals	8 034 114.3	3 185 173.7	4 848 940.6	2 382 703.7	1 440 302.1	1 025 934.8
	13.0	17.3	11.2	12.9	10.7	8.9
1. Foodstuffs & fodder	2 876 860.2	1 109 790.4	1 767 069.8	554 896.5	747 887.9	464 285.4
	4.6	6.1	4.1	3.0	5.6	4.0
2. Solid fuels	3 639 159.2	770 747.0	2 868 412.2	2 799 487.8	1 981.3	66 943.1
	5.9	4.2	6.6	15.2	0.0	0.6
3. Oil products	3 633 626.5	1 391 360.3	2 242 266.2	1 460 894.9	342 027.3	439 344.0
	5.9	7.6	5.2	7.9	2.5	3.8
4. Minerals & wastes for the metals industry	6 745 191.0	3 001 630.2	3 743 560.8	2 290 620.5	522 262.0	930 678.3
	10.9	16.3	8.6	12.4	3.9	8.1
5. Metal products	4 259 185.3	991 623.6	3 267 561.7	983 770.5	1 014 519.8	1 269 271.4
	6.9	5.4	7.5	5.3	7.6	11.0
6. Minerals & construction materials	4 569 991.9	2 855 859.0	1 714 132.9	596 909.3	790 458.2	326 765.4
	7.4	15.5	3.9	3.2	5.9	2.8
7. Fertiliser	1 911 185.1	329 739.5	1 581 445.6	606 237.4	696 322.2	278 886.0
	3.1	1.8	3.6	3.3	5.2	2.4
8. Chemicals	5 175 878.8	1 181 203.5	3 994 675.3	1 966 207.8	967 608.8	1 060 858.7
	8.4	6.4	9.2	10.6	7.2	9.2
9. Machines, vehicles, manufactured goods & specialised transactions	20 976 119.8	3 574 950.4	17 401 169.4	4 833 473.5	6 902 770.7	5 664 925.2
	33.9	19.4	40.1	26.2	51.4	49.2

Table 1.1(b)
Wagonload Traffic by Type of Goods (tonne km)

	Total	Domestic	International	Imports	Exports	Transit
Tonne km	12 506 932.5 100.0	3 473 467.0 100.0	9 033 465.5 100.0	3 183 933.6 100.0	2 986 622.6 100.0	2 862 909.3 100.0
0. Agricultural products & live animals	1 706 178.1 13.6	626 085.4 18.0	1 080 092.7 12.0	401 355.7 12.6	356 227.3 11.9	322 509.7 11.3
1. Foodstuffs & fodder	728 930.2 5.8	290 454.7 8.4	438 475.5 4.9	99 223.5 3.1	181 509.9 6.1	157 742.1 5.5
2. Solid fuels	625 656.1 5.0	101 368.5 2.9	524 287.6 5.8	507 291.4 15.9	189.6 0.0	16 806.6 0.6
3. Oil products	907 474.9 7.3	498 397.6 14.3	409 077.3 4.5	127 582.5 4.0	50 645.6 1.7	230 849.2 8.0
4. Minerals & wastes for the metals industry	1 084 920.4 8.7	377 096.9 10.9	707 823.5 7.8	410 188.5 12.9	149 339.5 5.0	148 295.5 5.2
5. Metal products	972 835.0 7.8	115 409.1 3.3	857 425.9 9.5	181 538.0 5.7	297 671.6 10.0	378 216.3 13.2
6. Minerals & construction materials	663 249.3 5.3	322 296.3 9.3	340 953.0 3.8	88 098.9 2.8	183 519.3 6.1	69 334.8 2.4
7. Fertiliser	348 690.8 2.8	64 343.5 1.9	284 347.3 3.1	102 776.5 3.2	106 936.6 3.6	74 634.2 2.6
8. Chemicals	1 102 206.2 8.8	228 527.7 6.6	873 678.5 9.7	318 664.6 10.0	206 632.2 6.9	348 381.7 12.2
9. Machines, vehicles, manufactured goods & specialised transactions	4 366 791.5 34.9	849 487.3 24.4	3 517 304.2 38.9	947 214.0 29.8	1 453 951.0 48.7	1 116 139.2 39.0

2. BELGIUM - Société Nationale des Chemins de Fer Belges (SNCB)

A. OBJECTIVES and MANAGEMENT

1. Ownership and Organisation

In October 1992, SNCB became a public economic company for an indefinite period of time. It is organised into 6 main departments (Transport, Rolling Stock, Infrastructure, Finance and B-Cargo), with operations divided into 5 districts (see Figure 2.1).

2. Objectives and Controls

An important change in law on March 21st 1991 strengthened the autonomy of four public companies (aviation control, postal company, communication and railways). A council of administration and a committee of directors were to be installed and a managerial contract was to be drafted.

Since October 1992 the five year renewable contract between the state and SNCB defines the public mission as being:

a) To provide domestic passenger train services;
b) The acquisition, installation, maintenance, management and operating of infrastructure and investments in rolling stock;
c) To deliver services which meet the needs of the Nation.

The managerial contract also regulates the financial contributions by the state, covering the consequential costs of the public mission.

The contract states the passenger network to be served and the stations to be regarded as intercity and local. For each type of station a minimum frequency of service is specified (for inter city, this is 16 per day in each direction on working days and 12 on other days and for local at least 4 per day in each direction). Overall SNCB is to operate a minimum of 160,000 passenger train kilometres (including at least 70,000 intercity and 60,000 local) on working days and 100,000 (including at least 55,000 inter city and 30,000 local) on other days. With the permission of the Minister, some of these connections may be made by bus, and SNCB may withdraw services from any station for which traffic falls below 150 passengers per working day and 75 per other day.

The contract also specifies detailed quality standards, for instance concerning the facilities to be provided on trains and at stations, reliability (95% of passenger trains to arrive within 5 minutes of schedule), overcrowding. SNCB must produce an annual corporate plan.

3. Subsidiary Activity

Recently SNCB decided to continue parcel transport, mainly by road, as a largely autonomous subsidiary. SNCB owns shares in several companies, their activities being complementary to railway objectives (see Tables 2.1 and 2.2).

B. FINANCE

1. Government Support

In 1990, SNCB received 34.81b BF in state compensation for public missions and normalisation of accounts, of which 20.94b BF was direct state support towards passenger operations, compared with 12.1b BF of revenue from passengers. However, this undoubtedly understates the level of support.

20,948,310	state compensation for passenger traffic, covering partially infrastructure costs.
13,746,194	state compensation for imposed financial charges disadvantaging the compensation position of SNCB.
115,996	contribution to normalisation of the cost of personnel
34,810,500	
20,221,004	contribution to pension
55,031,504	

The new contract has restructured state compensation and contributions. It guarantees SNCB, from 1992 to 1996, an annual contribution of 12.1b BF in respect of service level and tariff obligations in the domestic passenger sector and a yearly non indexed payment of 24b BF in order to contribute to the cost of maintainance, management and operation of the infrastructure. Together this comes to 36.1b BF compared to 34.8b BF in 1990. On top of this an annually calculated support to pension and other social charges will be acredited.

2. Investment

In 1990, SNCB had a total investment of 9.7b BF, of which 3b was for rolling stock (including 0.6b BF towards TGV rolling stock) and most of the rest towards infrastructure including electrification. Under the 10 year investment plan (1991-2000) agreed with the state and adopted in the new contract, investment is fixed at 11b BF for two years, then rising to 15b BF per annum from 1993 on. The breakdown of these investments varies greatly from year to year. Each year, SNCB has to provide details of proposed investments for state approval. Included in the 11 to 15b BF investment amount are the costs of adaption, renewal and modernising of infrastructure and the acquisition of rolling stock destined for domestic passenger traffic.

Investment may be funded by state grant, by borrowing from the private market with state approval and guarantee or by sale and lease back arrangements for rolling stock. In the latter two cases the state then compensates SNCB for all the costs involved so that in effect SNCB receives all its capital free of charge.

C. FREIGHT MARKET

1. Services

Tables 2.3 and 2.4 show the volumes transported by rail in tonnes and tonne kilometres, and the market share for 1983 to 1990 inclusive. It is seen that the rail share has dropped to 11.6% of tonnes and 21.7% of tonne kilometres. Table 2.5 disaggregates rail traffic by commodity. As for most railways, bulk commodities form most of the traffic, but

the total amounts available for transport of these commodities are declining.

2. Pricing

SNCB has complete commercial freedom in pricing freight traffic. Although it publishes a tariff, it carries most of its freight at a discount on specially negotiated tariffs.

3. Competition

Waterways remain very competitive for bulk traffic and roads for general merchandise. Neither fully covers its infrastructure cost.

D. PASSENGER MARKET

1. Services

Passenger services operate mainly on a regular interval basis, and are marketed as Inter City (Including Eurocity international trains), Inter regional and stopping services. However, in reality the three are intimately intertwined both in terms of operations and traffic; thus for instance much commuting takes place on inter regional and inter city trains.

2. Pricing

Pricing is based on mileage, with supplements for some international trains. An enormous list of categories of passenger, including police, war-wounded, large families etc are entitled to varying discounts, compensated by the state.

3. Competition

Although buses and coaches are mainly owned by the regions and could compete, they mostly perform a complementary role, generally connecting with rail services. Only on international services is there serious coach competition. The principal competition, at national level is seen as being the private car. In the interests of relieving congestion, it is intended to maintain and if possible extend the SNCB share of the passenger market, this will entail an increase in traffic of some 50% over 20 years. In the case of Brussels, SNCB caters for some 50% of commuters. Rail serves the central area well, due to the north south tunnel, but increasingly jobs are decentralising away from this corridor.

Figure 2.1: Organisation of SNCB

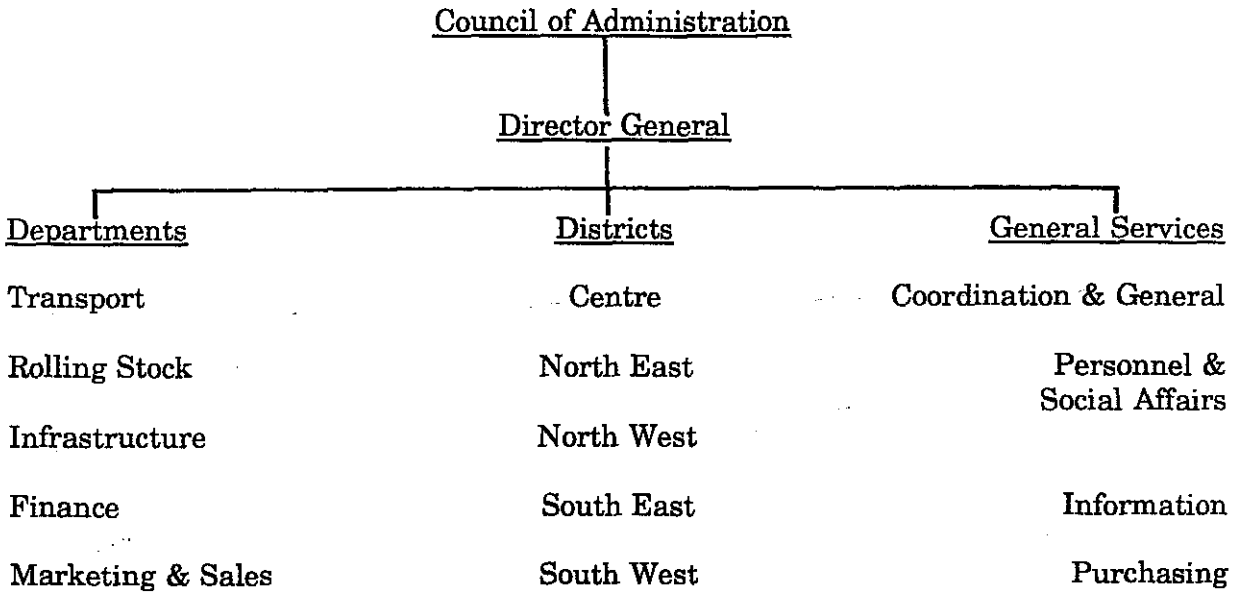


Table 2.1: SNCB subsidiaries with majority SNCB shareholding

Affiliation (31.12.91)	Control	Main Activity
Depaire nv	99.10%	Inter. Group expedition, road transport
Bruxelles Terminal Brussel	100.00%	Storage and distribution
H.V.H. International nv	99.90%	Development and marketing of transport software
Ferry-Boats nv	67.82%	Transshipment Terminals in Zeebruge
Interferry nv	100.00%	Expedition by rail of large containers
Euratral nv	100.00%	Service and prospection for DB & ÖBB in Belgium
Zeebrugge Container Repair nv	80.00%	Repair and maintenance of containers
Home van de Spoorwegbediende	99.99%	Social housing loans for SNCB personnel
Woningkrediet voor Spoormannen nv	99.97%	Mortgage loans for SNCB personnel

Table 2.2: SNCB subsidiaries with minority SNCB shareholding

Major shareholdership 20-50% (31.12.91)	Control	Main activity
TRW nv	21.27%	Trailer and truck transport by rail
Euro-Combi-Est nv	40.00%	Operating of multimodal terminals
Sea Ro Terminal	25.00%	Diverse harbour activities
Sea Technology - Zeebrugge nv	50.00%	All activities and services related to transport
Railtour c.v.	38.22%	Rail Travel Agency
Transurb Consult C.V.	24.29%	Transfer of Railway Engineering and Technology
Publifer nv	49.85%	Publicity on railway property

Table 2.3(a)
Tonnes Transported (m)

	1983	1984	1985	1986	1987	1988	1989
Road (1)							
- Domestic	269.999	267.727	265.383	257.556	259.480	287.611	287.078
- Imports	31.245	34.049	35.409	36.294	41.564	47.452	50.303
- Exports	31.245	34.049	35.409	36.294	41.564	47.452	50.303
- Transit	10.810	13.232	10.620	11.195	11.913	13.887	14.119
TOTAL	343.299	349.057	346.821	341.339	354.521	396.402	401.803
Inland Waterways							
- Domestic	20.050	22.026	21.471	20.884	22.034	22.110	20.310
- Imports	37.195	41.119	39.471	40.129	40.658	45.452	46.959
- Exports	30.249	31.487	28.944	30.910	28.809	28.446	28.123
- Transit	3.728	4.056	3.775	3.415	2.876	3.151	2.876
TOTAL	91.222	98.688	93.641	95.339	94.378	99.159	98.269
Rail							
- Domestic	19.162	20.150	20.127	29.700	31.360	30.713	30.812
- Imports	17.919	19.915	20.101	11.507	11.746	12.112	11.736
- Exports	12.263	13.994	14.467	17.122	16.064	18.092	18.472
- Transit	13.961	16.773	17.744	4.740	4.818	4.867	4.859
TOTAL	63.305	70.832	72.439	72.439	63.988	65.724	65.879

(1) by vehicles with a carrying capacity of at least 1 tonne.

Source: SNCB

Table 2.3(b)
Tonnes Transported (%)

	1983	1984	1985	1986	1987	1988	1989
Road (1)							
- Domestic	87,3	86,4	86,5	83,6	83,0	84,5	84,9
- Imports	36,1	35,8	37,2	41,3	44,2	45,2	46,2
- Exports	42,3	42,8	44,9	43,0	48,1	50,5	51,9
- Transit	37,9	38,8	33,0	57,9	61,2	63,4	64,6
TOTAL	68,9	67,3	67,6	68,3	69,1	70,6	71,0
Inland Waterways							
- Domestic	6,4	7,1	6,9	6,8	7,0	6,5	6,0
- Imports	43,0	43,2	41,6	45,6	43,3	43,3	43,1
- Exports	41,0	39,6	36,7	36,7	33,3	30,3	29,0
- Transit	13,0	11,9	12,0	17,6	14,7	14,4	13,2
TOTAL	18,3	19,0	18,3	19,1	18,4	17,7	17,4
Rail							
- Domestic	6,1	6,5	6,6	9,7	10,0	9,0	9,1
- Imports	20,7	20,9	21,2	13,1	12,5	11,5	10,7
- Exports	16,6	17,6	18,4	20,3	18,6	19,2	19,1
- Transit	48,9	49,2	55,0	24,4	24,6	22,2	22,2
TOTAL	12,7	13,7	14,1	12,6	12,5	11,7	11,6

Source: SNCB

Table 2.4(a)
Tonne km Transported (billion)

	1983	1984	1985	1986	1987	1988	1989
Road (1)							
- Domestic	9.910	10.684	10.380	10.834	10.958	12.375	12.513
- Imports	2.764	3.150	3.310	3.583	3.982	4.497	4.867
- Exports	2.764	3.150	3.310	3.583	3.982	4.497	4.867
- Transit	2.162	2.646	2.124	2.261	2.383	2.777	2.824
TOTAL	17.600	19.630	19.124	20.261	21.305	24.146	25.071
Inland Waterways							
- Domestic	1.589	1.720	1.678	1.641	1.671	1.748	1.610
- Imports	1.646	1.776	1.729	1.782	1.809	2.053	2.089
- Exports	1.246	1.223	1.177	1.322	1.262	1.204	1.236
- Transit	491	523	479	461	380	430	387
TOTAL	4.972	5.242	5.063	5.205	5.122	5.435	5.322
Rail							
- Domestic	986	1.054	1.024	2.270	2.389	2.429	2.601
- Imports	1.916	2.173	2.240	1.743	1.751	1.762	1.772
- Exports	1.539	1.720	1.819	2.680	2.421	2.791	2.965
- Transit	2.429	2.958	3.171	730	705	712	711
TOTAL	6.870	7.905	8.254	7.423	7.266	7.694	8.049

Source: INS - SNCB

Table 2.4(b)
Tonne km Transported (%)

	1983	1984	1985	1986	1987	1988	1989
Road (1)							
- Domestic	79,3	79,4	79,4	73,5	73,0	74,7	74,8
- Imports	46,3	45,4	45,4	50,4	52,8	54,1	55,8
- Exports	49,8	51,7	52,5	47,2	51,9	52,9	53,7
- Transit	42,5	43,2	33,3	65,3	68,7	70,8	72,0
TOTAL	59,7	59,9	59,0	61,6	63,2	64,8	64,0
Inland Waterways							
- Domestic	12,7	12,8	12,8	11,1	11,1	10,6	9,6
- Imports	26,0	25,0	23,8	25,1	24,0	24,7	23,9
- Exports	22,4	20,1	18,6	17,4	16,5	14,2	13,6
- Transit	9,6	8,5	7,5	13,4	11,0	11,0	9,9
TOTAL	16,8	16,8	15,6	15,8	15,2	14,6	14,3
Rail							
- Domestic	7,8	7,8	7,8	15,4	15,9	14,7	15,6
- Imports	30,2	30,6	30,8	24,5	23,2	21,2	20,3
- Exports	27,7	28,2	28,9	35,3	31,6	32,9	32,7
- Transit	47,7	48,3	59,2	21,3	20,3	18,2	18,1
TOTAL	23,3	24,1	25,4	22,6	21,6	20,6	21,7

Source: INS - SNCB

Table 2.5(a)
Tonnes Transported (m) by Commodity (1989)

Commodity	Rail	Inland Waterway	Road	TOTAL
0. Agricultural products and live animals	1.645	5.520	31.112	38.277
1. Foodstuffs and fodder	2.060	6.845	42.734	51.639
2. Solid fuels	11.506	5.401	6.372	23.279
3. Oil products	2.903	19.302	14.862	37.067
4. Minerals and wastes for the metals industry	13.882	5.668	3.683	23.233
5. Metal products	17.126	7.791	16.240	41.157
6. Minerals and construction materials	3.410	29.210	143.568	176.188
7. Fertiliser	1.610	4.920	8.345	14.875
8. Chemicals	3.150	9.112	18.840	31.102
9. Machines, vehicles, manufactured goods and specialised transactions	8.587	4.499	51.626	64.712
TOTAL	65.879	98.269	337.381	501.529

Source: SNCB

Table 2.5(b)
Tonne km by Commodity (1989)

Commodity	Rail	Inland Waterway	Road	TOTAL
0. Agricultural products and live animals	196	351	3.547	4.094
1. Foodstuffs and fodder	250	365	4.465	5.080
2. Solid fuels	1.162	400	369	1.931
3. Oil products	654	809	935	2.398
4. Minerals and wastes for the metals industry	1.782	429	217	2.428
5. Metal products	1.714	345	2.221	4.280
6. Minerals and construction materials	340	1.881	5.963	8.184
7. Fertiliser	209	265	572	1.046
8. Chemicals	480	404	3.285	4.169
9. Machines, vehicles, manufactured goods and specialised transactions	1.262	73	8.821	10.156
TOTAL	8.049	5.322	30.395	43.766

Source: SNCB

3. DENMARK - Danske Statsbaner (DSB)

A. OBJECTIVES AND MANAGEMENT

1. Ownership and Organisation

DSB is operated as a government agency, with the Director-General directly responsible to the Minister of Transport under arrangements established by the 1969 Act on the Administration of DSB which was last revised in 1989. DSB's accounts are part of the Ministry of Transport's accounts in the National Budget. A Railway Advisory Board, consisting of politicians, trade unions and industrialists gives advice to the Ministry of Transport and the Finance Committee.

DSB's activities are divided into divisions according to product. There are several subsidiaries. An organisational chart is given by Figure 3.1.

2. Objectives and Constraints

DSB's objectives are determined by four year agreements with Government (the current agreement covers the period 1990-93) in which Government predetermines budget support and investment levels and DSB outlines rationalisation programmes, personnel reductions and revenue increases. Line closures require an Act of Parliament. From March 1990, DSB can change and differentiate its tariffs without the permission of Parliament's Finance Committee as long as the average price increase does not exceed the average increase in DSB's costs. Preparations are in hand for EC directives; infrastructure and operations accounts are being separated, whilst the bus, ferry and travel agency divisions are being established as separate businesses. DSB also operates commuter services in Copenhagen.

3. Subsidiary Activities

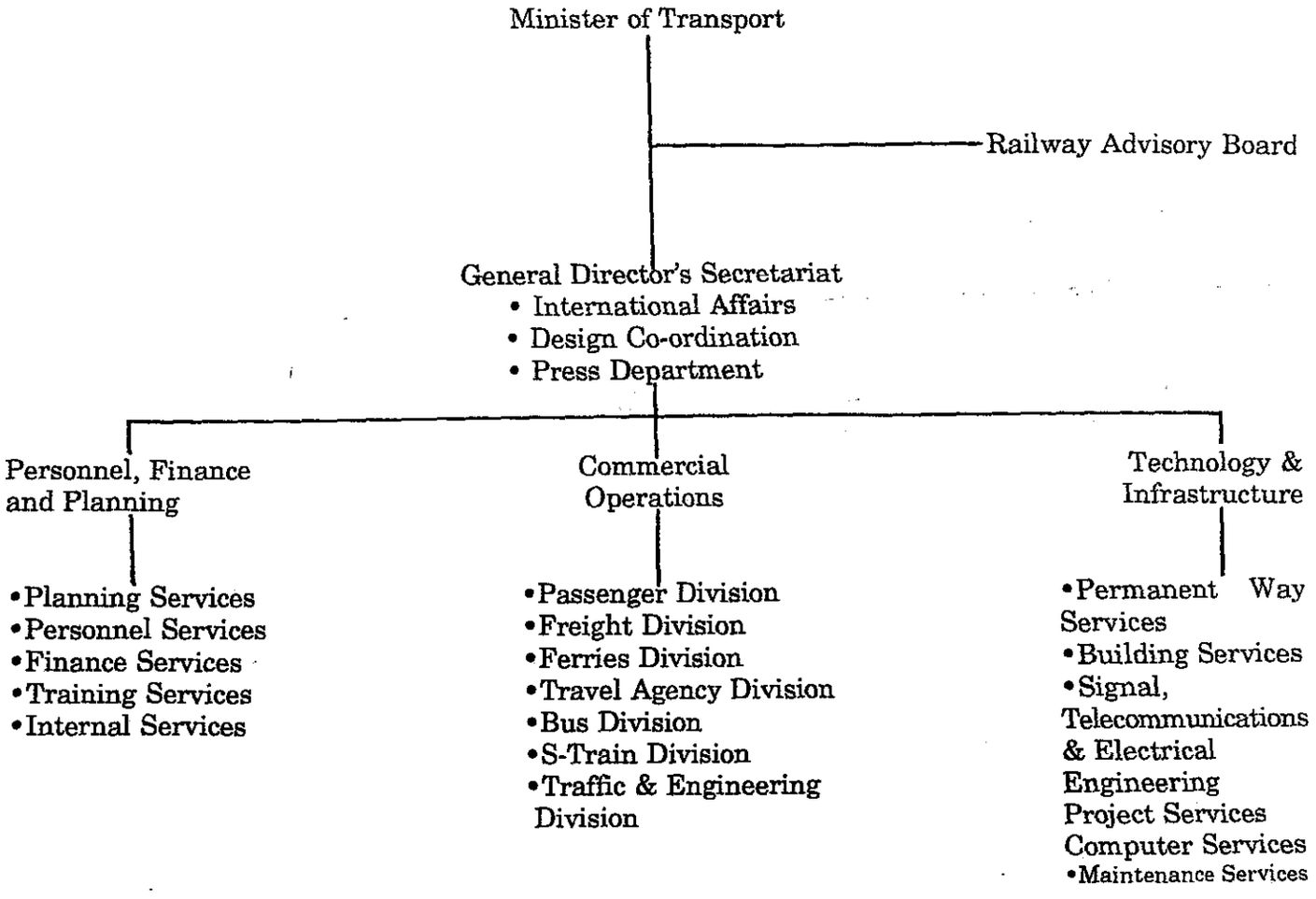
DSB has three substantial non-rail business:

1. Ferry Division. DSB operates 10 ferry crossings served by 28 ships. Three of the routes are combined train and car crossings, two are train-only crossings and five are for cars and passengers. In 1990, the Ferry Division had earnings of DKK 1167m and 2700 employees.

2. Bus Division. DSB operates as a contractor for county and intermunicipal corporations competing on an equal footing with private contractors. DSB accounts for about 25% of traffic outside Greater Copenhagen. DSB's current contracts are from 1989 and have a term of 5 years. The Bus Division has 580 buses and 1530 employees.

3. Travel Agency Division. This business has 22 outlets, 360 staff and a turnover of DKK 1,000m. DSB has entered into collaboration with a privately owned agency, Maersk Travel, with joint offices in Esbjerg and Billund.

Figure 3.1 DSB Organisational Chart



Catering activities on trains and ferries and at stations are taken care of by three privately owned public limited companies (DSB Tog Service A/S, DSB Faergerestaunter A/S and DSB Restuaranter og Kiosker A/S respectively), which hold concessions from DSB. Another concessionaire (Trans Media A/S) handles all advertising activities on DSB property. Altogether these companies employ 3300 and have a turn-over of DKK 2.5b. DSB's income from these activities amounted to DKK 380m.

B. FINANCE

1. Government Support

The rail budget is approved in advance at a global level; subsequent adjustments require parliamentary approval. Operating losses in 1990 were DKK 1041m (1989 1022m), excluding depreciation and interest payments, but this included an extraordinary item of 115m for the transfer of S-trains from HT to DSB. If this is taken into account and corrections made for inflation, the 1990 result was the best for 11 years.

A cash grant is made by the State to DSB to maintain a nationwide traffic system that provides customers in all parts of the country with a suitable level of service and frequencies at a reasonable price. For 1990 the cash grant included in the Annual Appropriations was DKK 2758m but following negotiations this was increased by 283m.

2. Investment

DSB's gross investments in 1990 amounted to DKK 2,862m (1607m 1989), broken down as follows:

(i) Replacement of fixed assets - 15%

(ii) New fixed assets - 23% (including electrification Copenhagen-Odense, establishment of ATC and a new line between Snøghøg and Taulov in Jutland)).

(iii) Rail rolling stock - 42% (including new IC3 train sets, 17 electric IR4 sets and 12 electro-locomotives).

(iv) Ferries and ships - 7% (including the building of a ferry and a ferry terminal for the Elsinore-Helsingborg crossing).

(v) Road vehicles - 3%

(vi) S-Trains - 7% (including renovation of train sets)

(vii) Other - 2%

Net investments in 1990 amounted to DKK 2691m, DSB having sold property and land for DKK 97m and received investment reimbursements of 74m.

Future investment schemes include:

(i) The Storbelt link. This combined road and rail link involves a bored rail tunnel and road bridge between Zealand and Sprogø and a road/rail bridge between Sprogø and Funen. The rail service is now planned to operate by mid 1996, with the road link being completed some two to three years later.

The railway technical installations were designed and built by DSB at a cost of DKK 1.4b. The scheme has been financed by a free standing company, 100% owned by the Ministry of Transport, raising capital on the open market. These loans are expected to be serviced by user charges, with those for rail expected to be DKK 900m p.a. According to forecasts up to 12 to 14 million people will be crossing the Great Belt (Størbelt) by train p.a., compared to the 1990 figure of 4.5m. Freight volumes are expected to increase.

(ii) The Oresund link. In 1991 Acts were passed in Sweden and Denmark authorising the establishment of a tunnel and high level bridge fixed link. The cost of the connection is estimated to be DKK 12b and the Danish on-shore installations at approx. DKK 2.5b. A rail link to Copenhagen airport (at Kastrup) might be included at a cost of DKK 2b. It is proposed the same financial arrangements as to the Størbelt will apply. User charges for rail freight alone will amount to DKK 150m p.a.

(iii) Femer Belt. Studies and investigations are being carried out in collaboration with the Deutsche Bundesbahn concerning a fixed link between Rødby and Puttgarden. However, it will be the turn of the century before such a link can be established.

(iv) High Speed Services. In 1993 services between Copenhagen and Aarhus will be increased from 150 km/hr to 180 km/hr, with an eventual increase of up to 200 km/hr possible. Investment of DKK 4.3b will be made on tracks, signalling, level crossings and IC3 rolling stock. Automatic Train Control (ATC) will account for DKK 700m.

(v) Electrification. By the end of 1992, the rail network from Elsinore to Odense will be electrified at a cost of DKK 1.7 trillion.

(vi) Rolling Stock. A rolling stock replacement programme is underway at a cost of DKK 3.2b. This programme includes 85 diesel Inter City IC3 train sets, 17 electrical regional IR4 train sets and 12 electrical multiple units. S-train rolling stock is being renovated but consideration is also being made of wide bodied trains.

(vii) Remote Control. In May 1990 a new control centre was inaugurated at Copenhagen, covering the area between Klampenborg and Roskilde. Four systems are integrated in one location: remote control of driving current, remote control of signalling equipment, automatic train number system and electronic public announcement system. The remote control system will be continued across Zealand via the Størbelt to Fredericia.

As part of the four year political agreement, DSB must sell land and buildings at a value of DKK 690m. DSB owns around 5,500 properties and a number of major projects are planned but none have yet been realized due to the general fall-off in the property market.

C. FREIGHT MARKET

1. Services

Rail services concentrate on container and unit load traffic at ten main depots, with mega-terminals being developed at Taulov, in Jutland, and Høje Taastrup, near Copenhagen. Parcels are handled by eleven terminals. International traffic accounts for 69% of tons lifted, 64% of ton-kms and 41% of freight revenue (1990 figures).

2. Pricing

Railway rates are published, but most traffic is subject to discounts. Tariffs are based on weight and distance, but wagonload traffic is also distinguished by commodity.

3. Competition

Rail carried 8 million tons in 1990 (1787m ton-kms). Although road transport is licensed, entry is relatively free.

D. PASSENGER MARKET

1. Services

Services are split between Inter-City (including international services), Regional and S-Trains. The Inter City and Regional network consists of 2174 route km and 205 stations. Copenhagen's S-train network consists of 170 route km and 79 stations. Inter City frequencies are generally hourly, S-trains operate every 10 minutes in the peak, 20 minutes off-peak. Regional frequencies vary. The Inter City and Regional network carried 54m passengers (3.6b passenger-km)in 1990; the S-train network carried 97m passengers (1.3b passenger-km). 13 private passenger railways exist, carrying 11m passengers and 200m pass-km in 1990. Market shares within the rail market are:

	Passengers	Passenger-kms
Regional/InterCity	33%	71%
S-train	60%	25%
Private	7%	4%

2. Pricing

There is a fixed price per km up to a certain distance, after which a taper applies. An exception is Copenhagen where a zonal fare system operates. Reductions apply to season tickets and old-age pensioners.

3. Competition

Inter City services face competition on three long distance express bus routes (two established in 1983) and from three air companies (SAS, Maerskair and Cimber). Expansion of the long distance express bus network has been blocked by regulation as has development of DSB bus services to act as contractors in the Greater Copenhagen area. The Størbelt fixed link is thought to enable rail to capture most non-interlining air traffic but will increase car competition.

4. EIRE - Córas Iompair Éireann (CIE)

A. OBJECTIVES AND MANAGEMENT

1. Ownership and Organisation

Córas Iompair Éireann is a stated owned transport company which was reformed by the Transport (Re-organisation of Córas Iompair Éireann) Act 1986, which was implemented on 2 February 1987. Three new subsidiary companies were established:

- Iarnród Éireann (IE) which operates the national railway including DART (Dublin Area Rapid Transit) and the road freight service.

- Bus Éireann which operates the national bus services

- Bus Átha Cliath which operates the Dublin city bus services.

CIE as the Holding Company is responsible for the overall direction and development of the Group for the continued operation of CIE Tours International, CIE Outdoor Advertising and ancillary businesses. This re-organisation replaced the previous structure, established in 1961, based on five areas (Waterford, Cork, Limerick, Galway and Dublin).

The board of IE includes the chairman of CIE, the managing director of IE, an executive director of CIE, a non-executive director and two elected directors. Below the managing director of IE there are seven management units.

- Finance and Company Secretarial
- Business Development (Freight)
- Business Development (Passenger)
- Operations
- Human Resources
- Mechanical Engineering and Manufacturing
- Civil Engineering

In addition, there are nine business units

- InterCity. High quality, fast and frequent passenger services are provided between the major centres of population and Dublin.

- Suburban. Diesel hauled commuter rail services are provided for the outer Dublin region and Cork.

- DART. Electric commuter rail services are provided in the Dublin area between Bray and Howth.

- Rail Freight - Bulk Traffic. These include Minerals, Beet, Cement, Ammonia, Fertiliser and Acrylonitrile.

- Rail Freight - Unit Load. Containerail provides a service for containerised freight,

whether single units or full train loads.

- Rail Freight - Other Services. Transtrack provides a nationwide distribution service for groupage traffic on dedicated freight trains and a distribution service for Letter Mail is provided by An Post. Fastrack provides a nationwide distribution system for express parcels using passenger trains. Navigator Freight Agency provides a complete international freight forwarding agency.

- Road Freight services are operated as an adjunct to rail services and provide a railhead service. In addition, a direct road service is provided which does not compete with the railway.

- Catering. Catering services are provided on-trains and at stations.

- Rosslare Harbour. IE is the port operator at Rosslare.

2. Objectives and Control

Section 8 of the 1986 Act specifies that

> "The principal objective of the railway company shall be to provide within the state and between the state and places outside the state, a railway service and a road freight service and for those purposes to exercise functions in that behalf conferred on the Board by the Transport Act of 1950 or any other enactment."

IE is intended to have total autonomy for all aspects of its operations (including industrial relations and personnel matters) with two exceptions:

(1) Overall financial control because of the lack of capital and the existence of substantial borrowings.

(2) Competition issues so that wasteful competition between the different modes of transport be eliminated. Section 8(9) of the Act provides that the Board shall decide competition issues with due regard to its overall interests and the interests of the companies concerned.

Government concern with the railways has been related to containing the railway deficit. A report by McKinsey and Co. Inc (1981) found that if no changes were made to existing arrangements, the railway deficit would double by the year 2005. Their analysis focused on four options:

(1) Increase volume
(2) Maintain with modifications
(3) Reduce network. (Close all lines except those from Dublin to Belfast, Cork and Limerick)
(4) Close down the system after either 10 or 25 years (ie in 1990 or 2005).

The Government decided in June 1983 to implement option 2. This involved a requirement that CIE should reduce its rail expenditure in real terms by 2.5% per annum for five years. This was extended by one year to 1989 and the reduction target increased to 3.7% per annum. In addition, there was to be no new investment in mainline rail

services other than essential safety-related expenditure.

The 1985 Transport Policy Green Paper viewed these measures as providing a temporary breathing space. In the long term, consideration of reducing or closing down the (mainline) rail network would have to be made. However, robust performance in recent years (revenue up 5% in 1990 compared to 1989; 25 million passengers carried in 1990 - an all time record) has led to the postponement of consideration of service closures. Indeed, given the availability of EC structural funds there may be some expansion of the network. Up to IR £80m is committed to improving the Dublin-Belfast mainline and IR £12m to introduce commuter services to SW Dublin. In addition, bids are being made for up to IR £350m to upgrade the mainline network and up to IR £300m for the Dublin Transport Initiative (not all of which will be rail related).

3. Subsidiary Activity

There are three main areas of subsidiary activity, all of which operate profitably

(1) Road Freight. IE operates 247 road vehicles with gross revenue in 1990 of IR £18.45m (profit IR £0.48m)
(2) Rosslare Harbour, with gross revenue in 1990 of IR £5.20m (and profits of IR £2.16m)
(3) Catering Services, with gross revenue in 1990 of IR £5.42m (and profits of IR £0.3m).

B. FINANCE

1. Government Support

In 1990 IE received IR £87.97m in state support. This may be broken down as follows:

(i)	Public Service Obligation (EC Regulation 1191/69)	£42.65m
	of which: Main line Services	£38.06m
	Bray-Howth (DART)	£4.59m
(ii)	50% of rail freight infrastructure costs (Article 3.1(b)) and residual deficit (Article 4) (EC Regulation 1107/70)	£20.32m
	TOTAL REVENUE RELATED	£62.97m
(iii)	Normalisation of Accounts - Pensions (Class III, EC Regulation 1192/69)	£7.14m
(iv)	Normalisation of Accounts - Level Crossings (Class IV, EC Regulation 1192/69)	£1.80m
(v)	Freight Infrastructure Grant (EC 1107/70)	£4.89m
	TOTAL EXPENDITURE RELATED	£13.83m
(vi)	State Grant for DART Interest	£11.17m
	TOTAL STATE GRANTS	£87.97m

Overall, in 1990 IE had total revenue of IR £105.6m compared to expenditure of IR £187.8m representing a cost-recovery ratio of 56%. For the rail business this can be subdivided as follows:

	Revenue	Expenditure (incl interest)	Expenditure (excl interest)	Cost Recovery Ratio	
Mainline	£66.6m	£138.6m	£130.2m	0.48	(0.51)
Bray - Howth	£9.9m	£26.1m	£14.9m	0.38	(0.66)
Rail Only	£76.5m	£164.7m	£145.1m	0.46	(0.52)

Figures in Irish Pounds

The above shows the importance of interest payments, particularly for the Bray - Howth Service which was electrified in 1984.

2. Investment

In 1990 capital investment by IE was IR £7.8m of which IR £1.1m was spent on Rosslare Harbour. The balance (IR £6.7m) was spent on carriage refurbishment, station development, engineering equipment, signalling and ticketing equipment. This "falls short of what the Group's management considers desirable to maintain and develop dependable services". It is also noted that the EC Regional Development Programme for Ireland has concentrated transport infrastructure investment almost entirely on roads; "The Board views this issue with some seriousness and seeks special consideration of the additional capital needs of the rail infrastructure without deflecting resources from other rail or bus operations". (CIE, 1990, Annual Report and Accounts, page 11).

C. FREIGHT

1. Services

Goods Train Traffic was responsible for IR £20.9m of revenue in 1990, carrying 3.3m tonnes. Fastrack (parcels) was responsible for IR £3m revenue. The tonnage in 1990 was broken down by the following categories (m)

	Tonnes	%
Ales, Beer and Stouts	0.21	6.4
Beet and Beet Pulp	0.15	4.6
Cement	0.67	20.4
Fertiliser	0.21	6.3
Mineral Ores	0.78	23.7
Petrol and Oil	0.05	1.5
General Freight	1.22	37.0
TOTAL	3.29	

In addition, IE's road freight operation carried 1.2m tonnes in 1990.

2. Pricing

IE has some 6,000 freight customers. Standard tariffs are produced but large contracts are negotiated. The average receipt per tonne km of rail freight was IR 3.55 pence in 1990.

3. Competition

The freight market is deregulated and highly competitive. In 1990 IE's rail services were estimated to have a market share of around 10%.

D. PASSENGERS

1. Services

There are three types of passenger services for which figures were published in 1990, as follows:

	Passengers (Thousands)	%	Receipts (IR £ Thousands)	%
Mainline	7,787	31.1	37,622	75.7
Bray-Howth	15,249	60.0	9,643	19.4
Other Dublin Suburban	1,974	7.9	2,421	4.9
TOTAL	25,010		49,686	

The average passenger trip length in 1990 was 49km.

2. Pricing

The average fare in 1990 was IR 4.05 pence per km.

3. Competition

IE's official competition comes mainly from Bus Éireann and Bus Átha Cliath. In theory, the bus industry is regulated but, in practice, there is de facto deregulation. In particular, a large number of unofficial private operators cater for the week-end commuter market between Dublin and the rest of the country. Official deregulation of the bus industry is being considered.

5. FRANCE - Societe Nationale de Chemin de Fer (SNCF)

A. OBJECTIVES and MANAGEMENT

1. Ownership and Organisation

SNCF was founded as a public service enterprise, initally as a 50 year franchise, in 1937 following the merger and nationalisation of the six companies operating the French rail network at the time. This role was reconfirmed when the official SNCF remit was renewed on 30 December 1982. This confirmed SNCF as an 'epic' organisation (establissment publique industrielle et commercialle), a public company that must, after subsidy, cover costs. Three sets of documents are particularly relevant to SNCF:

(i) Loi d'orientation des transports interieurs (LOTI)
(ii) Cahiers des Charges and
(iii) Contrat du Plan

Management is rested in the Council of Administration which consists of members of Government and of SNCF. The President of SNCF must be a member of Government and it is this, combined with the strong government representation on the Council of Administration which ensures the close link between Government and SNCF policy.

Management remains centralised but there has been some decentralisation of responsibility to the 23 Regions in that responsibility for regional passenger services has been devolved. Recent organisational changes have concentrated on re-structuring central activities and introducing business sectors. The current organisational structure is given by Figure 5.1.

2. Objectives and Controls

The financial relationship between SNCF is stipulated in five yearly Contrat du Plan, with the current plan covering the period 1990-1994 for national services. A separate Contrat du Plan between SNCF and the Ile de France region for the period 1989-1993 covers services in the Paris conurbation. These plans:

(i) Authorise SNCF to proceed with both service development and investment plans.
(ii) Undertake that Government will provide or ensure the necessary grant aid and investment support for the period and
(iii) Commit SNCF to achieve the objectives of the Business Plan, indicating service quality targets.

Investment for the current national plan is estimated at FF 100b (compared with 70b 1985-89). In turn the French government has agreed to make available the necessary funds, through direct provision or support for access to capital markets. This support is aimed to provide annually (at 1990 prices) about

- FF 2b for revenue support for fare levels
- FF 3.5b for revenue support for regional services
- FF 14b for SNCF pension funds
- FF 10b for infrastructure investment support

The plan stipulates that an overall minimum of 34% of all investment should be self financed, with the remainder supplied by local and central government. Specific projects may be as little as 20% self financed as long as the annual average is not below 34%. SNCF is authorised to borrow on the international financial markets.

SNCF prices are tightly controlled by Government, as the Council of Administration determines published tariffs and rates (Cahiers des Charges). The Ministry of Transport has powers to delay proposed closures, especially in the Paris region, but after a fixed time period (usually six months) must pay subsidy. Regions may specify services, provided they also finance them under arrangements set up by LOTI.

3. Subsidiary Activity

Through its SCETA group holding SNCF is involved in some 247 subsidiary companies divided into 8 groups:

- Combined Transport
- Specialist Transport
- Zusti Ambrosetti Group
- Road Transport
- Tourism and Passengers
- Finance
- Location
- Diverse

In addition, SNCF has three groups of direct subsidiaries; housing, ferries and a variety of other businesses, including for example a 12% share in Air Inter, a domestic airline company. Total turnover of subsidiaries in 1990 was FF 19b, approximately 20% of total turnover.

B. FINANCE

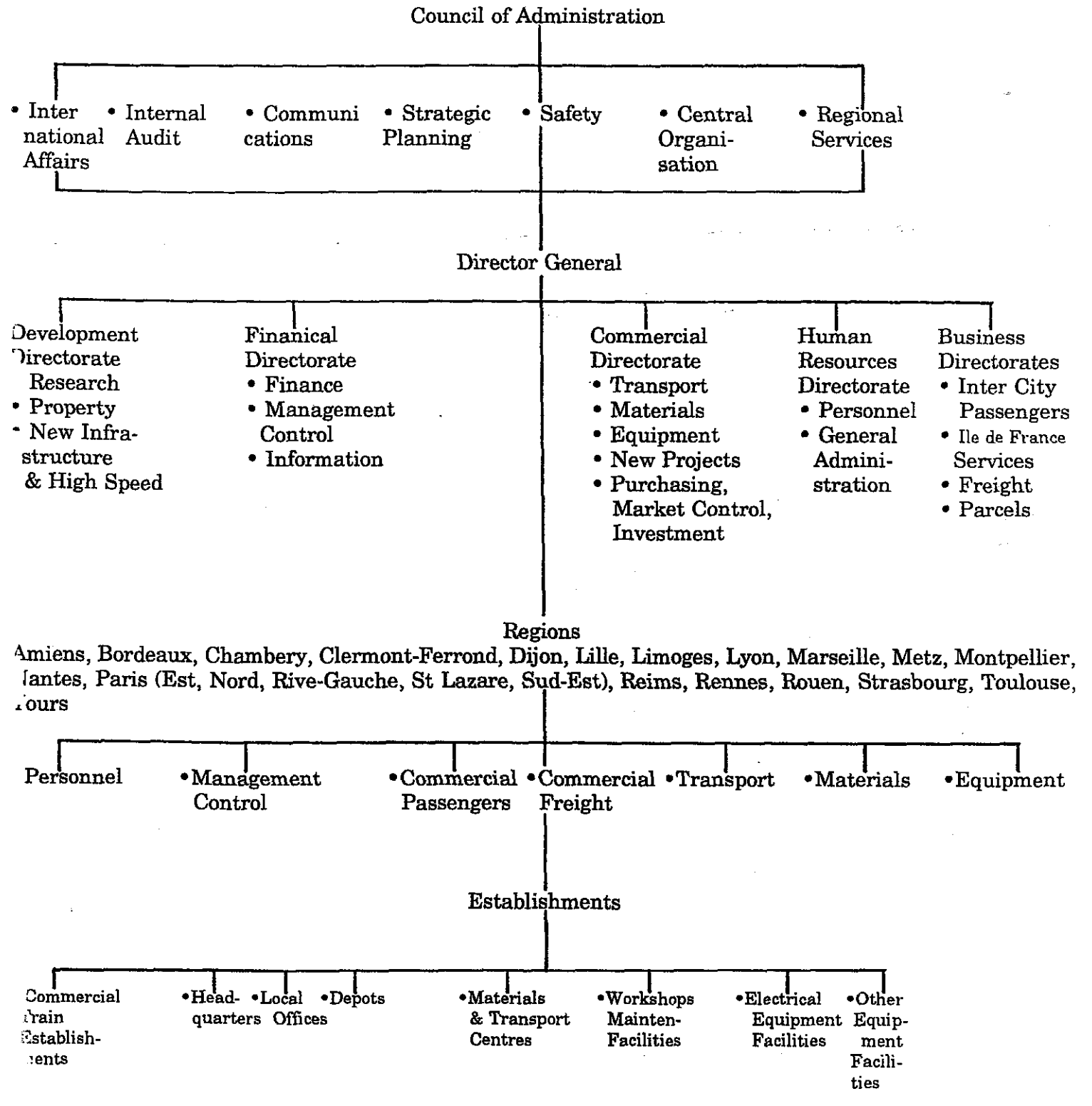
1. Government Support

The budget, including Government support ('versements contractuels de l'Etat et des Collectives Publiques') is determined annually, but can be revised if required. Government support excluding pension contributions, in 1990 stood at FF 15,379b, approximately 16% of total group turnover. Surpluses (earned in the years 1988 to 1990) are carried to a special reserve fund. Deficits (expected for 1991) are firstly charged to the special reserve, then carried forward to be serviced by loan finance.

2. Investment

Investment reached FF 17b in 1990 of which 51% was on the principal network, 39% was on new lines and 10% was on the Parisian network. Around 14% of investment

'igure 5.1: Organisational Chart for SNCF



was on rolling stock. The main element of the investment plan is for a major high speed network approved by the National Transport Council, the Regional Councils and the Regional Transport Councils under LOTI legislation. The Master Plan includes 4,700 km of new lines (including the 500 km already in service and the 560 km under construction) but the network of TGV services will total 11,000 km in all if account is also taken of existing lines, upgraded to different degrees for higher speeds. The proposals are as follows: (see Figure 5.2)

(i) Two lines are in operation TGV Sud-Est (Paris - Lyons) and TGV Atlantique (Paris - Tours/Le Mans)

(ii) Three lines are under construction: TGV Nord (Paris - Channel Tunnel), extending TGV Sud-Est to Valence and Eastern interconnection around Paris.

(iii) Sixteen TGV schemes have been proposed:

- Aquitaine	(Tours - Bordeaux - Langon/Dax)
- Auvergne	(Paris - Clermont-Ferrand)
- Brittany	(Le Mans - Rennes)
- Est	(Paris - Strasbourg)
- Southern Interconnection	
- Alpine	(Lyons - Montmelian - Turin)
- Limousin	(Paris - Limoges)
- Provence	(Valence - Marseilles)
- Riviera	(Aix-en-Provence - Frijus-St Raphael)
- Languedoc-Rousillon	(Avignon - Perpignon - Barcelona)
- Midi Pyrenees	(Bordeaux - Toulouse)
- Normandy	(Paris - Rouen/Caen)
- Loire	(Le Mans - Angers)
- Picardy	(Compiegne - Channel Tunnel)
- Rhine-Rhone	(Dijon - Mulhouse)

Overall, the various projects covered by the Master Plan represent an investment of FF 180b for infrastructure and 30b for TGV trainsets. Table 5.1 shows the main features of the different projects in terms of financial and socio-economic rate of return is calculated from a combination of the financial benefits for the SNCF, the value of time saved by passengers and the general benefits of reductions in congestion and in accidents on the roads.

C. FREIGHT MARKET

1. Services

Freight services are divided between combined transport (14% of tonne-km moved in 1990), 'train entiers' (47%) and other (wagonload or groupage) traffic. The breakdown of traffic by product type is given by Table 5.2. The two most important commodity groups are metals and ores (16% of ton-kms in 1990) and foodstuffs (also 16%).

Parcels are handled through a special subsidiary SERNAM (Service National des Messagereies de la SNCF).

igure 5.2: Map of TGV Proposals

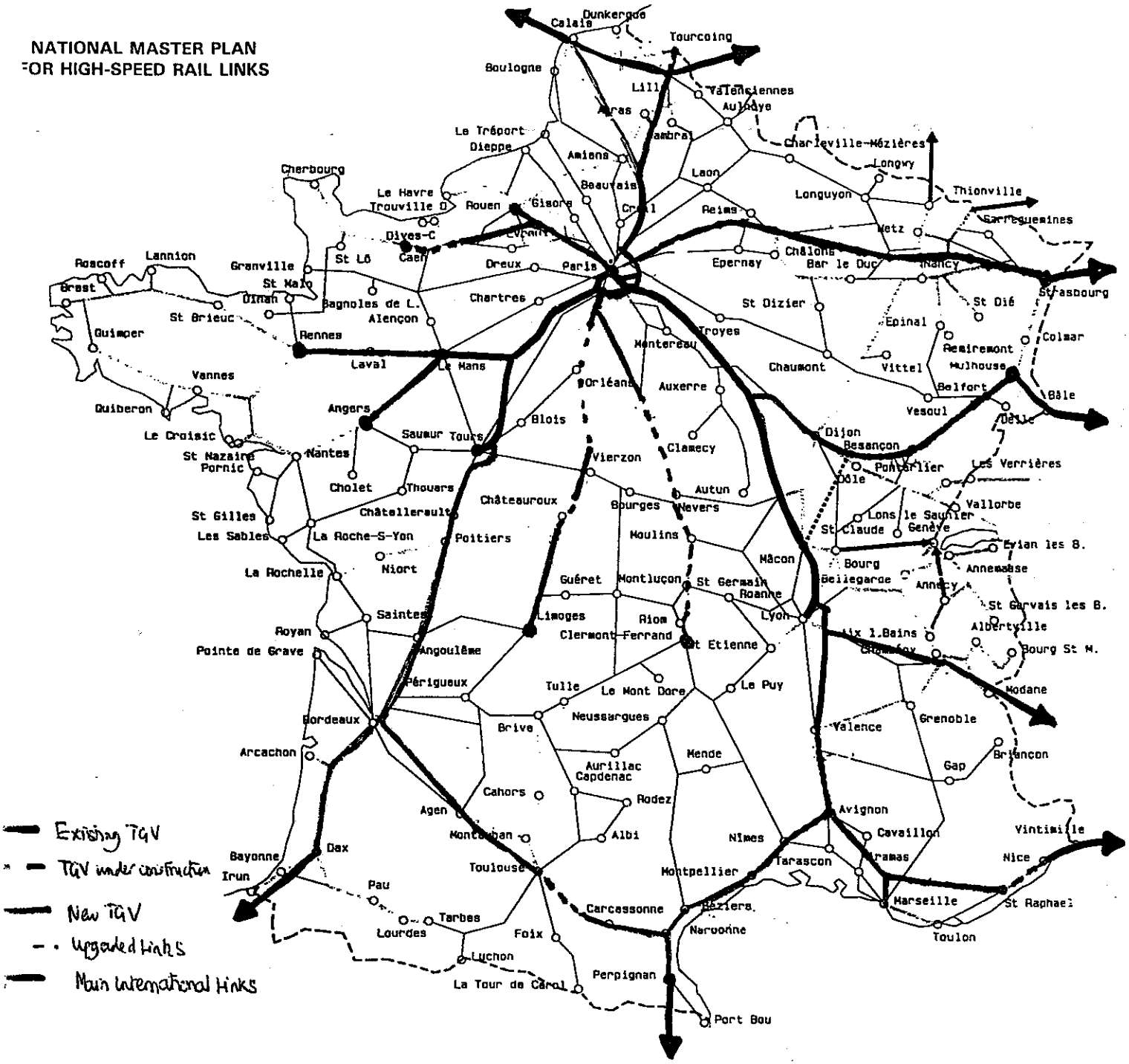


Table 5.1: Evaluation of TGV Lines

The 16 projects selected (of which first possible phases)	km of new line	Traffic in millions of passengers			return on investment (1)	
		before	after		financial	socio-economic
AQUATAINE	480	14,7	20,1	5,4	7,5	10
of which Tours-Bordeaux	361	(14,7)	(19,7)	(5,0)	9,5	12,3
AUVERGNE	130	2,9	3,9	1,0	3,1	6,7
BRITTANY	156	9,1	12,2	3,1	7,4	13,6
EAST	460	8,4	14,5	6,1	4,3	8,8
"GRAND SUD"	70	3,7	5,3	1,6	5	12
SOUTHERN INTERCONNECTION	49	12,6	13,4	0,8	8,2	9,6
ALPINE LINK	251	11,4	19,1	7,7	5	10
of which Avignon-Montemelian	107	(8,2)	(11,8)	(3,6)	8,5	14,7
LIMOUSIN	174	3,3	4,0	0,7	2,4	4,4
PROVENCE	219	16,6	20,9	4,3	9,8	13
RIVIERA (COTE D'AZUR)	132	5,1	7,8	2,7	8,4	11
LANGUEDOC-ROUSSILLION	290	5,8	9,5	3,7	6,1	9
of which Avignon-Montpellier	75	(5,8)	(7,1)	(1,3)	7,8	10,5
MIDI-PYRENEES	184	2,3	3,3	1	5,5	6,5
NORMANDY	169	5,5	7,1	1,6	0,1	3
LOIRE	78	7,5	8,4	0,9	5,4	7,7
PICARDY	165	13,5	14,4	0,9	4,8	5
RHINE-RHONE	425	9,5	15,3	5,8	5,9	10,7
of which Mulhouse-Dole	190	(9,6)	(13,8)	(4,2)	8,4	13,9

(1) These values have been obtained from initial calculations and will have to be corrected once the final layout has been decided.

Table 5.2: SNCF Freight Products (b tonne-km)

	1988	1989	1990
Combined Transport	7.17	7.43	7.29
Metallurgy Products	6.38	6.57	6.40
Cereals, Animal Fodder	5.60	5.64	5.53
Construction Materials	5.55	5.61	5.33
Chemical Products	4.01	4.02	3.86
Petroleum Products	3.34	3.44	3.53
Beverages	3.31	3.42	3.60
Fertilizers	2.94	2.96	3.62
Solid Fuels	2.34	2.49	2.11
Vehicles	2.14	2.22	2.10
Minerals/Ores	1.62	1.77	1.67
Timber	1.32	1.29	1.33
Grocery Products	1.06	1.06	1.99
Perishable Commodities	0.90	0.72	0.49
Paper	0.86	0.93	0.92
Other Products	2.13	2.00	1.87
TOTAL	50.67	51.57	50.64

2. Pricing

SNCF is constrained by an obligation to carry and publish rates but since 1971 has been free to offer discounts for competitive reasons or to enter into contractual arrangements for bulk or regular traffics. Over 95% of traffic is moved at such special rates.

3. Competition

SNCF had a 32% share of the freight market in 1990, compared to road, 60% (exclusive of short haul traffic), waterways 5% and pipelines 4%. Obligatory tariffs for road haulage were removed in 1990 whilst licensing restrictions have been relaxed. As a result, competition from road is intensifying and rail is losing market share.

D. PASSENGER MARKET

1. Services

Passenger services consists of four groups:

(i)	TGV services	-	14.92 b pass/km in 1990
(ii)	InterCity services	-	33.24 b pass/km
(iii)	Ile de France services	-	8.99 b pass/km
(iv)	Services Regionaux	-	6.80 b pass/km

This tends to understate the importance of Paris services. 842m passengers used SNCF services in 1990, of these 530m (63%) used Ile de France services.

2. Pricing

The basic passenger fare structure consists of a boarding charge plus mileage charge, with supplements on express and TGV services. These supplements vary by route, time of day, day of week and season. This allows price discrimination and the development of revenue yield techniques. Abonnements (season tickets) are an important option and there are reduced fares for school children, students, pensioners and families. Maximum tariffs are fixed by Government.

3. Competition

Bus and Coaches are regulated and perform a complementary rather than competitive role. Domestic airline competition has increased in terms of price but the main competition has been the car which has been aided by a large autoroute development plan and harmonisation of VAT which has lowered purchasing costs.

6. GERMANY - Deutsche Bundesbahn (DB)

A. OBJECTIVES and MANAGEMENT

1. Ownership and Organisation

DB is the rail operator in the former Federal Republic of Germany; it is subdivided into 10 regions. It is a state enterprise, embodied in the Federal Law, and is subject to public service regulations and budget laws which prevent it from operating as a commercial enterprise. For instance 130,000 of its 220,000 staff are classified as Civil Servants, with guaranteed jobs for life and relatively high pay and pensions.

Following the report of the Government Railway Commission, the German government decided that DB will merge with the railway of the former German Democratic republic on January 1st, 1994. The new company, German Railway PLC, will be freed of many of its former debts and obligations, and will be operated as a public limited company wholly owned by the Federal government and divided into three business sectors - passenger, freight and infrastructure. It is the intention ultimately to privatise these, although probably not for some 10 years. To avoid the current situation whereby the states succeed in demanding loss making services whilst having no financial responsibility for them, it is intended that subsidies for local and regional services should be devolved to the states; this is however a very controversial proposal.

2. Objectives and Controls

Under the existing Federal Law, the Minister of transport has the right of intervention in many matters, including tariffs, personnel, wages, line closures and investment. Although railway deficits have been a matter of great concern to the government for many years, a continued high level of investment has failed to secure a substantial and sustained improvement in financial performance.

3. Subsidiary Activity

Through its subsidiary holding company (Deutsche Bundesbahn Holding Company) the railway owns a number of travel agencies, consultancies, bus companies and road freight companies, including Schenker.

B. FINANCE

1. Government Support

In 1990, DB incurred a deficit of 5.0b Deutschmarks, after receipt of Federal grants of 3.75b., mainly on account of short distance passenger services. A further 5.3b was paid on grounds of equalisation of competition, and 4.3b. in contributions to capital costs. In 1991, the deficit grew to 5.3b. and grants for public service obligations to 4.1b. It was predicted that the combined losses of DB and DR would total 13.9b. in 1993, and that in the absence of reform these would rise to over 40b. by the turn of the century.

A detailed breakdown of receipts from government is given below:

Public Service Obligations	
Short distance rail passenger traffic	3561b
Long distance rail passenger traffic	45b
Lack of fares on DB/DR traffic	62b
Maintenance of routes	34b
Education traffic (bus)	4b
Losses on DB/DR traffic	44b
Total	3750b
Equalisation of Competition	
Level crossings	253b
Staff and social security costs	5040b
Total	5293b
Capital contributions	
Interest	869b
Contributions to investment	3471b
Total	4340b
Other	349b
GRAND TOTAL	13732b

2. Investment

Rail investment has been at a high level for many years, this being seen as the key to increasing traffic and improving financial performance, and a continued investment of some £2b. per annum through the 1990's is planned in rail infrastructure alone, including new high speed lines and upgrading of existing lines. A high level of investment has also taken place in the freight sector, including new marshalling yards for traditional wagonload traffic.

C. FREIGHT MARKET

1. Services

DB runs a mixture of bulk trainload, traditional wagonload and intermodal services (carrying containers, swap bodies and complete semitrailers). Traffic and receipts in 1990 were split as follows:

	Tonnes	Tonne km	Receipts
	m.	b.	m Dm
Wagonload	272	60.3	5600
Less than wagonload	3	1.0	1413
Container	13	6.1	\ 791
Piggyback	13	6.0	/

2. Pricing

DB is subject to laws requiring it to publish freight tariffs and not to discriminate between customers. It can offer discounts for particular flows of traffic but must make these available to all customers in comparable circumstances.

3. Competition

DB has enjoyed a degree of protection from road haulage both from a licensing system which restricted the number of vehicles used on long distance road haulage, and from tariff controls on road operators. In the light of the completion of the single European market and the introduction of cabotage these controls are breaking down and it is expected that road competition will become much more severe over the next few years. Germany already has a relatively high level of taxation on road haulage, and is dealing with the threat of competition from hauliers in low tax countries by proposing a special licence fee for the use of motorways, which would be compensated by reduced annual licence fee for domestic operators.

D. PASSENGER MARKET

1. Services

Passenger services are in the course of being reorganised into four main groups:
-Inter City, including ICE high speed services and Eurocity international services, which form a high quality regular interval service over the main lines.
-Inter Regional, which will form a similar if somewhat slower network of services over secondary and cross country routes.
-S Bahn, which are suburban services operated as part of consortia with local government (Verkehrsverbund) forming part of integrated public transport networks in the main conurbations.
- other local services.

63% of passengers and 22.5% of passenger kilometres were accounted for by S Bahns.

Passenger receipts in 1990 (in m. Dm) were split as follows:

Inter City and EC	1998
Other long distance	1830
Connurbation (with and without S Bahn)	1018
Other short distance	783
Total	5576

2. Pricing

Pricing is based on mileage, with supplements for inter city and international trains. Charges on S Bahns are determined by the Verkehrsverbund, which invariably operate zonal ticketing systems covering all modes of public transport.

3. Competition

Buses and coaches are regulated and perform a complementary role, generally connecting with rail services. Air services compete over longer routes, although in some cases Lufthanse has transferred to the use of rail for the domestic leg of its services. The principal competition is seen as being the private car; there is no speed limit on german motorways.

7. GREAT BRITAIN - British Railways Board (BRB)

A. OBJECTIVES AND MANAGEMENT

1. Ownership and Organisation

Railways in Britain came under public ownership in 1948 as a result of the 1947 Transport Act. British Railways were an operating division of the British Transport Commission, which also operated a full range of other transport services. The current British Railways Board (BRB) was established as a result of the 1962 Transport Act, with rail services being promoted under the British Rail banner. The Board consists of six full-time member (all rail managers) and seven part-time members (all managers or ex-managers of other businesses) appointed by the Government. BRB's initial organisational structure was hierarchial in structure, based on geographical divisions (Regions, Divisions and Areas) and separation of functional responsibilities (eg Finance, Marketing, Traction & Rolling Stock, Infrastructure, Personnel and Public Affairs). From 1982 onwards, superimposed on this organisational structure was a further division between business sectors. This assisted BRB in its efforts to adopt commercial business principles but the 'matrix management' structure that resulted (see Figure 7.1) led to unclear divisions of responsibility and lack of bottom line accountability.

It was therefore decided to re-organise BRB under the Organising for Quality (OfQ) programme, which was completed in June 1992. The Business Sectors became the key organisational unit and were defined as follows; four passenger businesses namely:

1. InterCity which is responsible for mainline services and is responsible for five routes (also referred to as profit centres) (the East Coast Main Line, the West Coast Main Line, the Great Western Main Line, the Midland Mainline/Cross Country and Gatwick/Norwich).

2. **Network SouthEast** which is responsible for local services in the London and South East England region and is split into nine divisions (Thames and Chiltern, North, West Anglia and Great Northern, London, Tilbury and Southend, Thameslink, South East, South Central and South West).

3. **Regional Railways** (formerly Provincial) which is responsible for secondary and local services in the rest of the country and is divided into five regions (Scotrail, North East, North West, Central and South Wales and West).

4. **European Passenger Services** which will be responsible for BRB's passenger services through the Channel Tunnel.

In addition there are two freight sectors:

5. **Train Load Freight** specialising in the movement of bulk commodities and consisting of four businesses (Coal, Metals, Construction and Petroleum).

6. **Railfreight Distribution** specialising in intermodal traffic, especially containers, but also operating some trainload services eg for automotive products, and consisting of two businesses (European and UK).

The former parcels sector is operated jointly by the three main passenger businesses whilst corporate functions are provided by Central Services Division. As a result BRB is now divided into 28 profit centres, each of which is vertically integrated with

responsibility for operations and infrastructure (in the latter case, either through ownership or leasing through inter-business trading arrangements).

However, further organisational reforms have been proposed by the White Paper "New Opportunities for the Railways - the Privatisation of British Rail" published in July 1992. This sets out six policy intentions to be achieved in the current parliament (ie by April 1997, at the very latest). These are:

1. To sell BR Freight and Parcels to the private sector.
2. To establish a Franchising Authority and to franchise a substantial number of passenger services.
3. To restructure BR to own and operate track and infrastructure separately.
4. To establish rights of access for new operators to the rail network.
5. To establish an independent Regulator.
6. To provide opportunities for the sale or leasing of stations.

BRB's main role in the future will be as an infrastructure authority ('Railtrack') and a residual passenger rail operator of those services (expected to be grouped by profit sector) for which private sector franchisees can not be found. However, it may be expected that BRB staff will transfer to private sector operating companies, the Franchising Authority (yet to be named) and the independent Regulator ('Ofrail'). It should be clear that the proposed reforms imply a massive organisational shake-up with infrastructure being separated from operations, thus reversing recent organisational trends, and three new corporate bodies being created (Ofrail, Railtrack and the Franchising Authority). Figure 7.2 shows how this will transform the rail businesses organisational structure from a simplified multi-divisional structure to a more complex form.

2. Objectives and Constraints

The statutory framework under which BRB currently works was established by the 1974 Railways Act which introduced the concept of a Public Service Obligation (which was also required given Britain's entry into the EEC), which the Minister of Transport could lay on the Board, and in return for which he would have to provide compensation. The initial obligation (issued in a Ministerial directive of January 1975) was for BRB to provide a network of passenger services 'comparable generally with that provided by the Board at present'. However, it is not clear exactly what 'comparable generally' means in this context and major cutbacks in service have been possible but complete withdrawals have been problematic. For passenger services to be withdrawn and lines or stations closed, a detailed closure procedure enacted by the 1962 Transport Act, has to be undertaken and has, in some cases, prevented closure (with Settle - Carlisle being the most famous case). By contrast, freight services should be operated commercially and there are no closure procedures for freight-only lines.

This obligation was amended by a new Ministerial directive issued in March 1988 which removed from the directive services which 'are or may be operated as InterCity services', services in the PTE areas (the main conurbations outside London) and of experimental services under the Speller amendment to the 1962 Transport Act (which exempts these experimental services from the closure procedures discussed above).

InterCity services, like Freight, are now expected to be operated on a commercial basis, with an ultimate goal of an 8% rate of return on assets, although in the meantime lower targets have been set. For the two subsidised sectors (Network South East and Regional Railways) target reductions in subsidy are set. Indeed, it had been hoped at one time that Network SouthEast would operate without subsidy by 1992/93 but this has subsequently

been abandoned.

BRB has, in theory, total pricing freedom with the exception of the PTE areas where it acts as an operations sub-contractor to the Local Authorities under arrangements set up by Section 20 of the 1968 Transport Act. BRB's fares are market based, with price discrimination the norm. However, there is some evidence that Government has limited some price increases, particularly on Network SouthEast services which is the one area of operations where BRB is perceived to have a transport monopoly.

BRB has much less of a free hand in terms of capital investment. It is not permitted to raise capital on the open market and its borrowings from government are limited by the External Funding Limit (EFL) which limits the amount an operator may spend in any one year from services other than its own, internally generated finances. Given that up to 40% of BRB's investments have been internally generated and given the information presented in Table 7.1 it can be seen that the EFL has not been a binding constraint in the recent past but may become so in the future (especially as the property market slump has curtailed a major internal revenue source).

Table 7.1: British Rail (BR) EFL and Investment (£m, cash)

Year	EFL	Out-turn investment
1986/87	777	428
1987/88	591	543
1988/89	375	590
1989/90	673	715
1990/91	1016	834
1991/92	1522	1095
1992/93	2041	
1993/94	1361	
1994/95	975	

Source: Department of Transport 1992 "Government Expenditure" Plans for Transport". Cm1907.

3. Subsidiary Activities

BRB's main non-rail operations subsidiary activities were privatised in the 1980s. These included:

(i) British Hovercraft Limited sold in 1981.

(ii) British Transport Hotels sold between 1982 and 1984 to a variety of private sector groups for £30m.

(iii) Sealink ferries sold to British Ferries Limited, a subsidiary of Sea Containers, in 1984 for £66m (despite a book value of £108m).

(iv) British Railway Engineering Limited (BREL) and the Horwich Foundry sold in 1988.

(v) Traveller's Fare Limited, the on station-catering company sold to the private sector in 1988.

(vi) Doncaster Wagon Works, sold to a management buy-out (RFS Industries).

(vii) British Transport Advertising.

Further, a narrow gauge passenger railway (the Vale of Rheidol) has been transferred to the private sector. Private sector involvement has also been encouraged for on-train catering, train cleaning, station maintenance and property redevelopment.

British Rail has three main wholly owned subsidiary companies; Transmark, a Consultancy company, British Rail Maintenance Limited, responsible for the National Supply Centre at Doncaster and four other heavy maintenance depots, and BR Telecommunications Limited, to provide business telecommunication services on a commercial arms-length basis and exploit new opportunities. BRB also has a minority share-holding in three railfreight companies designed to increase private sector involvement; Masterhaul, principally involved in the movement of deep sea containers, Charterrail (22% holding) and Combined Transport Limited (10% holding)

B FINANCE

1. Government Support

BRB recorded a Group loss in 1991/92 of £144.7m, compared to a loss in 1990/91 of £10.9m and a surplus of £269.8m in 1989/90. Table 7.2 gives the result for the rail businesses only for 1990/91 and 91/92.

Table 7.2: British Rail - Financial Results (£m)

	1990/91		1991/92	
	Revenue	Surplus	Revenue	Surplus
Inter City	851.2	49.7	896.7	2.0
Network South East	998.3	(154.9)	1044.3	(181.9)
Regional	203.7	(503.4)	312.9	(583.6)
Trainload Freight	509.5	98.7	505.3	67.5
Railfreight Distribution	172.8	(152.3)	174.9	(118.7)
Parcels	115.8	(25.8)	101.5	(34.7)
TOTAL	2951.3	(688.0)	3035.6	(849.4)
Grant	671.5	(16.5)	766.9	(82.5)

Source: BRB Annual Report and Accounts 1990/91, 1991/92.
Figures In Brackets Are Deficits

It can be seen that TrainLoad Freight and InterCity operated 'profitably' during this period with costs recovery ratios in 1991/92 of 115.4% and 100.2% respectively. Network SouthEast achieved a respectable cost recovery ratio of 85.2% but all other businesses are heavy loss makers with cost recovery ratios at 74.5% (parcels), 59.6% (Railfreight Distribution) and 34.9% (Regional Railways).

However, there have been substantial reductions in subsidy. Table 7.3 shows that during the four-year period 1986/7 to 1989/90 subsidy decreased by 37% in real terms, although

it is now beginning to increase again (up 9% between 1989/90 and 1990/91). In 1990/91, 20% of Government support was to Network SouthEast services, 14% was to PTE services and 61% was to Regional Railway services outside the main conurbations (with the balance due to capital grants for level crossings).

Table 7.3: British Rail Subsidy (£m, 1990/91 prices)

	1986/87	1987/88	1988/89	1989/90	1990/91
InterCity	137.4	134.1	-	-	-
Network SouthEast	258.5	263.3	155.0	87.8	142.7
Regional - PSO	534.7	512.6	472.2	431.6	428.1
- S20	94.5	97.2	89.7	100.2	100.7
Other *	-	-	-	24.1	28.4
TOTAL	1025.1	1007.2	716.9	643.7	699.9
of which PSO	930.6	910.0	627.2	543.5	599.2

* Capital Grants for Level Crossings (not included in Table 7.2).

2. Investment

Out-turn figures for investment are given by Table 7.1 and illustrated by Figure 7.3. This shows that the real level of investment is at its highest for 30 years but in part this just reflects the cyclical nature of rail investments. The last major investment programme was the Modernisation Plan of the late 1950s/early 1960s. These assets are now life-expired. Major future investments were outlined in the document "Future Rail" published in 1991 which envisaged investment of £10b over the next decade. The main schemes outlined were:

(i) £1.5b of new railway for the Channel Tunnel, due to open in 1993. In addition, a new fast route is being developed by Union Railways (a steering group of BRB and private sector interests) to develop a fast link to the Tunnel, accessing London via the East Thames Corridor, Stratford and Kings Cross.

(ii) Upgrading of West Coast Main line services (London - Birmingham - Manchester - Glasgow) by introducing InterCity 250 services. This scheme was to be completed in 1995 at a cost of £0.75b but has been postponed given the uncertainties surrounding the White Paper proposals.

(iii) "Total Route Modernisation" for Network South East services including the deployment of a new generation of Network turbo and electric trains. In addition four major schemes are proposed that will lead to the development of a regional express network in London similar to the RER in Paris. These are:
   (a) Paddington to Heathrow Airport, a joint project with BAA (British Airports Authority), which is in abeyance due to funding problems
   (b) East - West Crossrail, a joint project with London Underground Limited which will link Paddington and Liverpool Street by a new route via Farringdon
   (c) Thameslink 2000, improvement of the existing North - South link between

Kings Cross and Blackfriars via Farringdon

(d) Kent Express, introduction of fast commuter services using infrastructure developed for Channel Tunnel services.

(iv) Regional Railways main investment need, fleet renewal, will be virtually completed by 1993 but "Future Rail" promises service improvements including 150 miles of electrification, 60 miles of new route and 100 new stations over the next decade.

(v) The main investments in rail freight relate to the Channel Tunnel. In 1992 the Government announced its approval of Railfreight Distribution plans to buy fleets of 450 intermodal and 550 fully enclosed car carrying wagons for Channel Tunnel services. In addition a network of eight intermodal terminals at Mossend (Glasgow), Wilton (Teeside), Wakefield (West Yorkshire), Trafford Park (Manchester), Seaforth (Liverpool), Bescot or Hams Hall (Birmingham), Cardiff, Willesden and Stratford (both London) is being planned. This network will be served by three freight operating centres at Wembley (London), Doncaster and Crewe.

C. FREIGHT MARKET

1. Pricing

BRB's freight market is dominated by a small number of major customers. Individually negotiated contracts are therefore the norm.

2. Services

The bulk of BRB's freight is moved in trainload services. TrainLoad Freight carried 123.1m tonnes (7,553m tonne miles) in 1990/91 compared to Railfreight Distributions 15.1m tonnes (2,380m tonne miles). In 1990/91 total freight train miles operated was 29.8m and for parcels was 7.2m. Wagonload services continue to be unprofitable; in 1991 BRB withdrew its Speedlink services (although managed to retain 70% of traffic) and is continually restructuring its Freightliner services. Two quarry companies (Foster-Yeomans and ARC) own their own locomotives but these are operated on their behalf by BRB.

3. Competition

In 1990 rail was estimated as having an 8% share of the United Kingdom freight market (measured in tonne kms) compared to road 62%, water 25% and pipeline 5%. Rail's share varies by commodity category; it has a 54% share of the Solid Mineral Fuels market and a 33% shares of the Ores and Metal Waste market but a near zero share of the Manufactured goods market. The dominance of four bulk products can be seen from Table 7.4.

Table 7.4: BR Freight Traffic by Commodity (million tonnes lifted)

	1980	1990
Coal and Coke	94.1	74.9
Steel and Metals	13.0*	18.4
Construction	15.9	21.9
Petroleum	13.7	10.1
SUB TOTAL - 4 main Commodities	136.7	125.3
SUB TOTAL - Other	16.8	15.8
TOTAL	153.5	141.1

* Affected by industrial action

In 1990, these four bulk commodities (coal, steel, construction materials and petroleum) accounted for 89% of tonnes lifted.

Road haulage was deregulated in 1968 and this, along with the motorway building programme has led to intense competition, virtually wiping out rail's presence in the general merchandise market. Coastal shipping and pipeline are particularly effective competitors in the petroleum market.

D. PASSENGER MARKET

1. Pricing

BRB has near total pricing freedom, prices vary by route, by time of day, day of week and week of the year as well as by distance. Most services offer both First Class and Standard services. InterCity services operate a series of discounted Saver-fares, including an airline style book in advance APEX fare. Cheap day returns and season tickets are available on most routes. Price discrimination is enhanced by a series of Railcards entitling holders to reduced fares; these are available for Senior Citizens, Students and Young Persons, members of the Armed Services and Families.

2. Services

Services are mainly distinguished by business sector, although both Network SouthEast and Regional railways operate some Express services. In 1990, the breakdown of passenger kms was Network SouthEast 15.3b (45%), InterCity 13.1b (38%) and Regional Railways 5.7b (17%). In a recent development, a private bus company, Stagecoach, is providing and marketing two carriages on the overnight Aberdeen to London service. Some BRB urban services have been transferred to other operators, most recently the Manchester Metrolink (subsequently withdrawn).

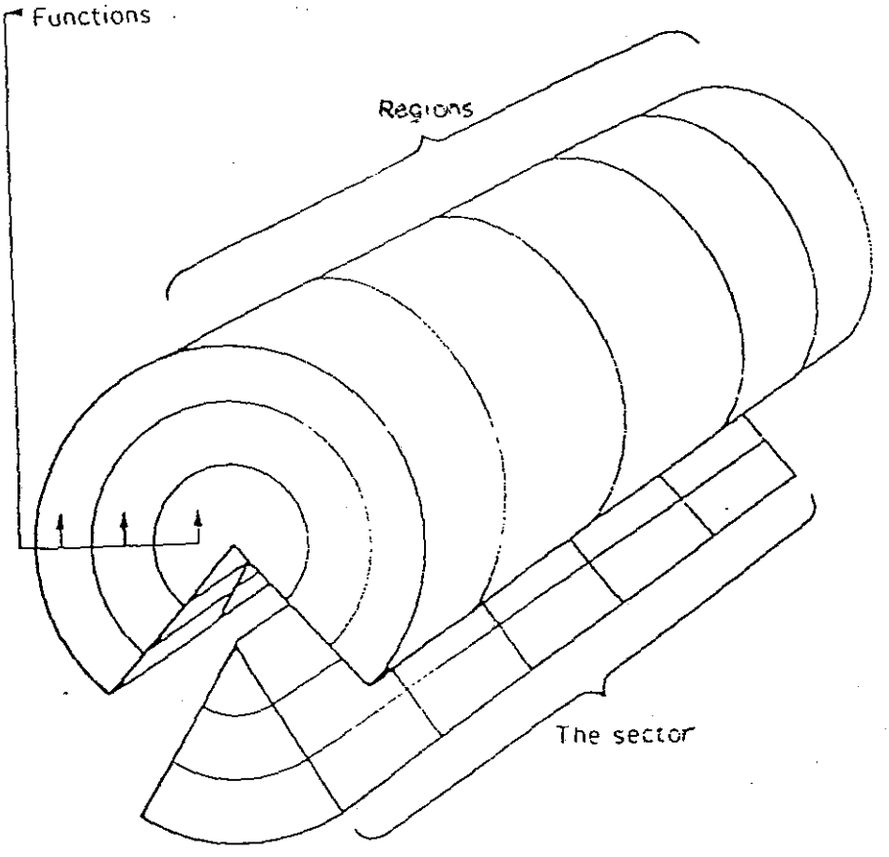
3. Competition

In 1990 rail had a 6% share of the UK passenger market (in terms of passenger km) compared to cars and taxis 85%, bus 6%, pedal-cycle, motor-cycle and air (1% each). Rail has a higher share in certain market segments, in particular the central London commuter market. In 1990 rail's share in this market was estimated to be 76% compared to car 14%, bus 8% and pedal/motor-cycle 2%. However, rail's share was split 55:45 between Network SouthEast services and London Underground Services. Rail also has

relatively high shares of medium distance travel between conurbation centres and the capital (eg Leeds to London).

BRB's main competition comes from the car, which has been encouraged by the road building programme and generous tax-allowances for company motoring. Express coaches were deregulated as a result of the 1980 Transport Act and this led to intense competition with rail. This competition has stabilised in terms of service but periodic price wars do still occur. Local buses were deregulated as a result of the 1985 Transport Act but, except in isolated cases, have had little effect on rail services. Domestic airline services were liberalized during the 1980s and have been particularly successful in the long haul business market (eg London - Scotland).

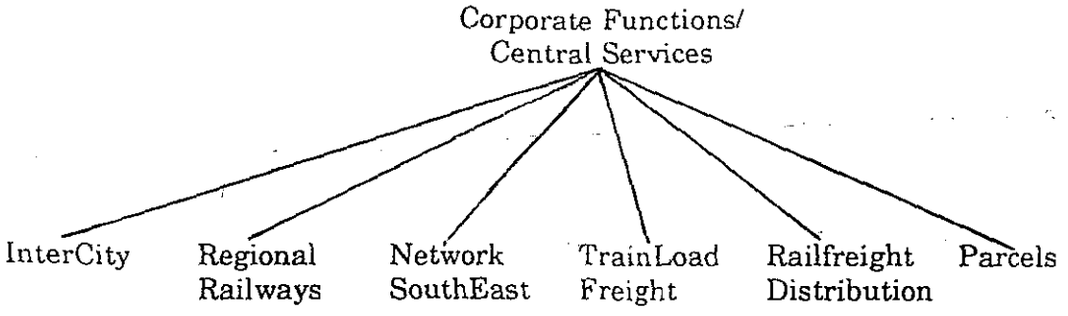
Figure 7.1 BRB Organisational Structure 1982 to 1992 (Matrix Management)



Source: Allen, D and Wiliams, G. (1985) in Button, K. and Pitfield, D. (Eds) "International Railway Economics". Gower, Aldershot, p90.

Figure 7.2: British Railway Industry Organisational Structure Before and After the 1992 White Paper (Simplified)

Before



After

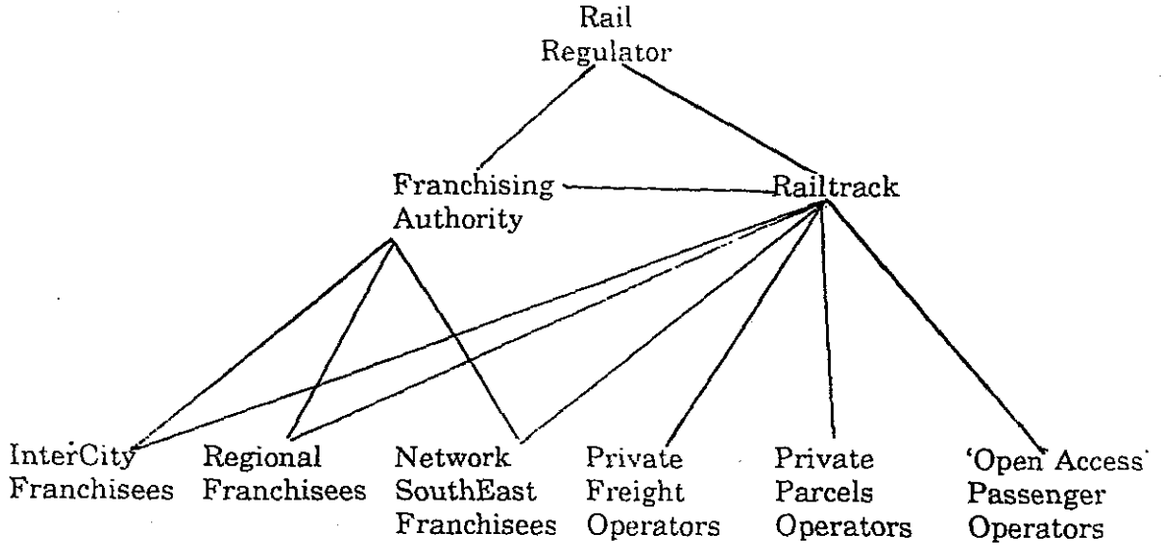
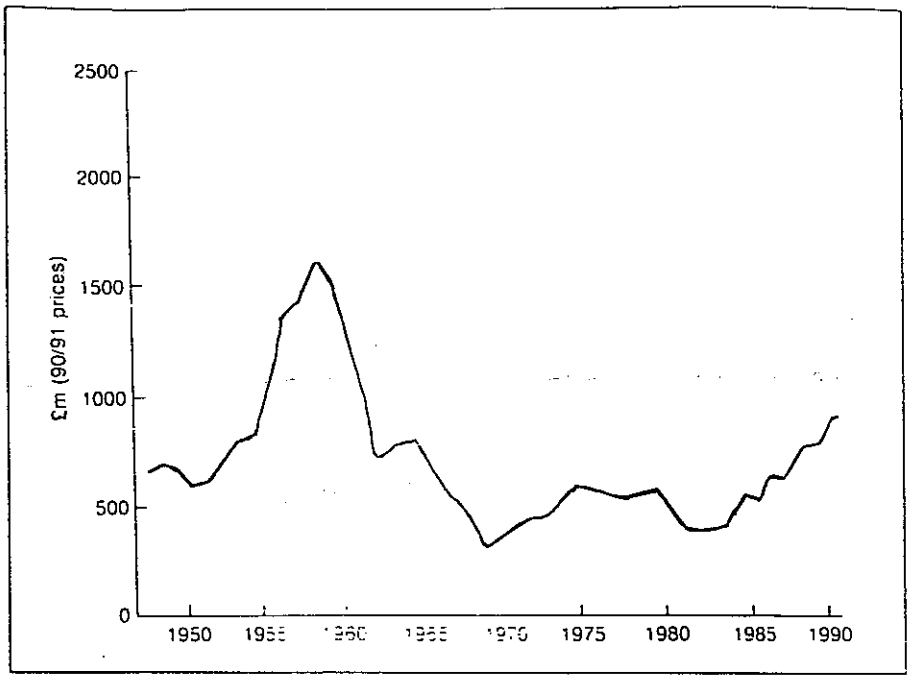


Figure 7.3: Past Investment in British Rail



Source: Brown, C. (1992). "The British Rail View". In Institution of Civil Engineers, Rail Privatisation, Deregulation and Open Access", p29.

8. ITALY - Ente Ferrovie Dello Stato (FS)

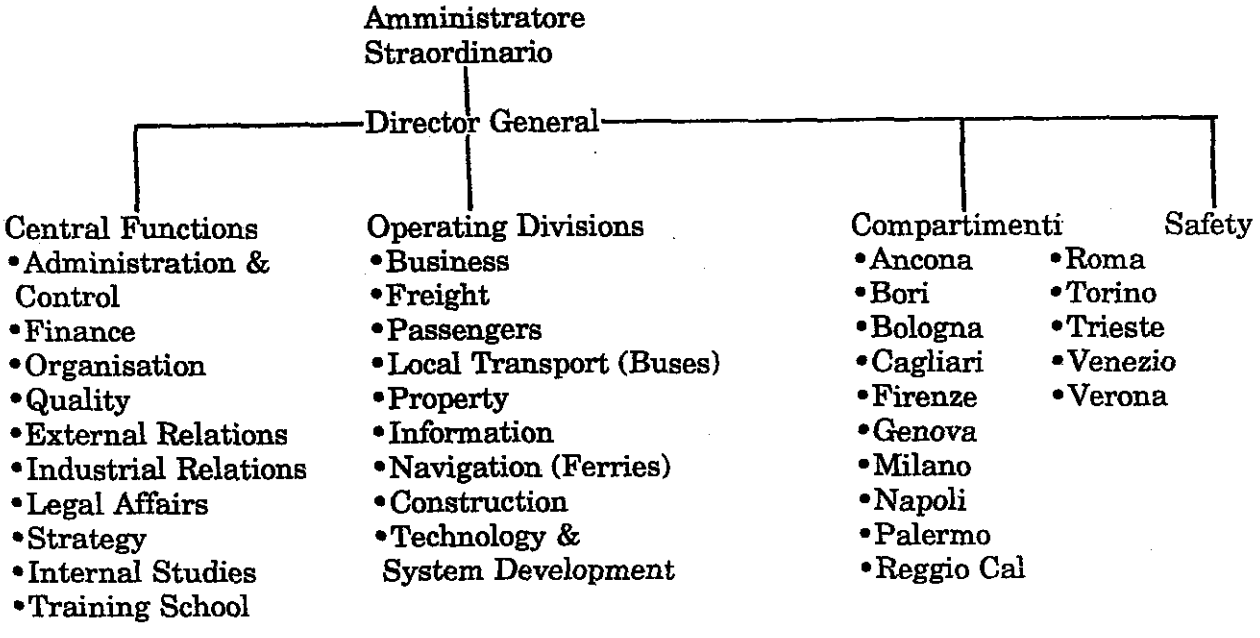
A. OBJECTIVES AND MANAGEMENT

1. Ownership and Organisation

FS is formally an independent company, through which the State runs the national network. In practice, it is controlled by the Minister of Transport who has wide ranging responsibilities. In arriving at his decisions the Minister consults the Board of Directors ("Amministratore Straordinairo"), of which he is Chairman, and is composed of the Civil Service, FS employees, members of the judiciary and FS customers. Members of the Board are appointed by decrees of the President of the Republic on the proposal of the Minister, except representatives of FS staff who are elected by the staff themselves. Board members remain in office for three years and can be re-appointed. The Board is sub-composed into an Advisory Board, a Legal Committee and a Management Committee, whilst members also sit on the Committee that revises the accounts.

FS is managed by a Director General who, while adhering to the directives of the Minister, is responsible for the direction and supervision of the whole network. A major internal re-organisation was enacted in 1990 in an attempt to commercialise the organisation and stimulate efficiency. Central functions are divided into ten departments to support nine operating divisions that are managed by 15 regional divisions ("Compartimenti"). The organisation chart is given by Figure 8.1. The key division is the Business division which co-ordinates the activities of all other divisions.

Figure 8.1: Organisational Chart for FS



2. Objectives and Control

FS is entrusted with the management of the railway network nationwide. Regional railways, covering around 4,000 route kms (FS covers around 16,000 route kms), are run by private companies under the supervision of ministerial authority. The largest regional

railways are Ferrovie del Sud-Est and Ferrovie Nord Milano Esercizio.

Fares are fixed by the State; restructuring and increases of a generalised nature are approved by Ministerial decree. The FS capital budget is part of the Central Government budgetary process. FS investment plans are approved by law. Level of service is politically determined; there have been few withdrawals of passenger services but there has been some rationalisation of freight services. Remuneration of FS personnel is also fixed by law.

3. Subsidiary Activities

FS has two main non-rail activities. It runs bus services which are closely integrated into the rail network and appear on rail timetables and it operates a fleet of train ferries to Sicily and Sardinia. These activities are financed and priced in the same way as the railways.

FS is permitted to take an interest in enterprises engaged in the growth and provision of rail services and the development of complementary services. Wholly owned subsidiaries include:

(i) INT (Istituto Nazionale Trasporti) which provides freight collection and delivery services
(ii) CIT (Compagnia Italiana Turismo)
(iii) BNC (Banca Nazionale delle Communicazioni)
(iv) ITAL PER, a railway development institute.

Partially owned subsidiaries include Sigma, a telematics company, Eurofima, a finance house, the Straits of Messina fixed link development company, nine "interporti" (road/rail interchanges), two freight companies (INTER CONTAINER and INTERFRIGO), as have many rail companies and the Banco Nazionale del Lavaro.

B. FINANCE

1. Government Support

The FS budget must be approved by Parliament as part of the Ministry of Transport's budget. In accordance with EC regulations receipts are received from the Treasury for public service obligations, infrastructure grants, concessionary fares and repayment of capital contributions. The residual deficit is covered by grants from the Treasury to which, in principle, any surplus would go. Table 8.1 shows that FS is heavily reliant on government support; in 1990 revenue only covered 31% of operating costs (defined so as not to include capital costs), despite re-classification of the accountancy system.

Table 8.1: Reclassified FS Accounts, 1990, 1991 (milliardi lire)

	1990	1991
Operating Revenue	4031.48	4320.46
Operating Costs	12544.62	13574.47
- Labour Costs	10254.46	10739.08
- Materials and Services	2519.16	2835.39
Operating Result	-8513.14	-9254.01
State Intervention		
- Public Service Obligation	4300.00	4300.00
- Infrastructure Grant	2360.00	1500.00
- Concessionary Fares	730.00	730.00
- Internal Capital Costs	334.00	375.22
Revised Operating Result	-789.14	-2348.79
Depreciation	0.0	0.0
Property Receipts	55.41	307.31
Pension Obligations	872.00	700.20
Interest	133.43	85.58
Tax Obligations	143.34	132.07
Business Result	-1882.50	-2959.51
Losses covered by Equilibrating Subsidy	658.40	438.80
Residual Deficit	1224.10	2520.71

2. Investment

As FS is an integral part of the Ministry of Transport, its investment funding comes through the annual Government budgetary procedures. As a result investment plans may be subject to unpredictable cuts. By 1990, the cumulative investment plan stood at 49,535 milliardi L, of which 54% had been paid for, 12% had contracts awarded and 10% had Government approval (the remaining 22% had not yet received approval). Between 1989 to 1990 actual investment increased by 3,323 milliardi L. The main scheme is to develop a T-shaped high speed network Nuova Rete ad Alta Velocita) between Milan-Florence-Rome-Naples and Turin-Milan-Venice. Development is to be by a separate company TAV (Treno Alta Velocita) in which FS will have a 40% stake, with the remainder held by banks and insurance companies. A further high speed line is being considered to link with the Swiss Transalpine proposals (Linee di Valico) whilst major track upgrades are in progress on four key sections (Genoa-Ventimiglia, Pescara-Foggia, Bologna-Padua and Rome-Pescara) and seventeen major schemes are on the books.

C. FREIGHT MARKET

1. Services

FS has been attempting to develop full train load and container traffic as well as multi-modal transport. 43% of tonne-km in 1990 were domestic based, 39% were for imports and 18% were for exports. 20% of tonne/km were accounted for by containers and 5% by combined traffic. Postal services are an important revenue source, accounting for 5% of FS' revenue in 1990, compared to freight's 34%.

2. Pricing

There is a general obligation to carry at the published tariffs (which were established by law in 1940) but there is legislation (dating back to 1970) which allows the Minister to grant discounts on the total level of traffic consigned by one customer. Freight tariffs are distinguished in three ways: by length of haul, size of consignment and type of goods.

Table 8.2: Indices of Freight Tariffs 1990 (FS = 100)

	CECA Products	Non-CECA Products
Switzerland - CFF		216.0
Austria - OBB		150.2
Holland - NS	195.5	188.0
Belgium - SNCB	167.5	186.0
Luxemburg - CFL	311.0	150.0
Germany - DB	148.6	164.0
France - SNCF	118.4	204.2

Source: FS Annual Report and Accounts 1990

Table 8.2 shows that as a result of Government intervention FS has some of the lowest freight tariffs in western Europe.

3. Competition

In 1990 rail was estimated to have a 12% share of the goods market compared to road 63%, sea 19% and pipeline 5% (for distances above 50km). Although hire and reward road haulage is controlled by a quota system, this is ineffective as own-account operations are not restricted. Road haulage rates are controlled only for scheduled (linea) operations which constitute a very small part of the sector. For the rest, free market rates prevail.

D. PASSENGER MARKET

1. Services

A distinction is made between main line services (linee commerciali), regional services (linee integrative) and local services (linee locali), whilst further distinctions are made on the basis of speed (rapido, espresso, diretto, locale).

The network on which services are provided is determined by law, though the level of service is set by FS. FS requests the closure of low traffic lines each year but these requests are usually rejected and compensation has to be awarded.

2. Pricing

The basic structure of fares was determined by a law of 1935, with there being three broad tariffs; ordinary, concessionary and commuter (pendolare). Fares have failed to keep up with inflation and a low fare level exists (see Table 8.3). Commuter fares are

even lower.

Table 8.3: Indices of Rail Fares (Ordinary tariff for 100km journey)

	1st Class	2nd Class
Austria-OBB	21.3	14.2
Holland-NS	23.8	15.9
Belgium-SNB	16.6	11.1
Luxemburg-CFL	18.5	12.4
Switzerland-CFF	34.8	21.4
Germany-DB	23.8	15.9
France-SNCF	19.8	13.2
Italy-FS	10.8	6.3

Source: FS Annual Report and Accounts 1990

3. Competition

FS and other railways accounted for 12% of the passenger market in 1990 compared to road 86% and air 2%. Road-based passenger transport is regulated and heavily subsidised but domestic airlines are allowed some pricing freedom in order to compensate for their lack of subsidy.

9. NETHERLANDS - Nederlandse Spoorwegen (NS)

A. OBJECTIVES and MANAGEMENT

1. Ownership and Organisation

NS is a public corporation wholly owned by the state. It was reorganised in 1988 into Headquarters, Business Units for freight and passenger sectors and Service Units for operating, rolling stock and infrastructure. Each business unit has a contract with each service unit for the provision of services. These contracts are in essence very simple. For instance, the rolling stock unit is required to supply vehicles at a charge (in 1990 prices) of 120,000 NLG per coach per annum. For infrastructure the price is 100,000 per km per annum and for operation 2.9 per train km, 0.94 per coach km (mainly to cover fuel) and 0.016 per passenger km (mainly to cover ticketing and inspection). The latter figures are based on 30% of kilometres being in the peak, a higher figure would be paid if this changed substantially. All these figures reduce by 2% per annum in real terms; if units better this, they are allowed to retain the surplus and plough it back into additional investment, enhanced salaries etc.

The Wijffels Commission, which reported on 5/6/92, recommended further changes to establish a more arms-length relationship between NS and the government. Under this, the government would take over responsibility for the infrastructure and NS would have complete commercial freedom regarding operations. Initially support would be paid for the operation of passenger services, but it was suggested that in the long run this might be phased out. NS would then be permitted to borrow from the private market without government control or guarantee.

2. Objectives and Controls

Under the latest contract between NS and the government, NS is promised a constant real level of support. Minimum service frequencies are stipulated, but in fact NS currently far exceeds these. Maximum passenger fares are also set. In freight traffic, NS has complete commercial freedom, although currently some subsidy is paid.

However, the real objective comes from the growing concern with the congestion and environmental problems from the growth of road traffic. In 1988, NS put forward a plan (RAIL 21) to contribute towards solution of these by doubling its passenger carryings by the year 2005 with no increase in subsidy (ie. a 100% increase in traffic for a 50% increase in real costs, or a 25% cut in cost per passenger kilometre). In October, 1988, this plan was accepted by the government, as part of a package of measures (including inter-urban road pricing) designed to achieve a cut in the growth of car traffic to 5% per annum. So far NS has achieved a 40% growth in passenger traffic. However, the failure by the government to implement effective measures to restrain the car is making it difficult for NS to achieve its targeted growth; it can only go on increasing traffic by holding fares down.

A similar plan for a vast increase in freight traffic (RAIL 21 CARGO), dependent on providing a new freight route between Rotterdam and Germany, and the major development of international inter-modal services, was submitted late in 1990. The new freight route has now been approved.

3. Subsidiary Activity

NS no longer owns subsidiary companies in road transport; its subsidiaries are now closely aligned with its main business - eg. a travel agency, telecommunications, containers.

B. FINANCE

1. Government Support

In 1990, NS received 1394m NLG in support for passenger services and 29m in support for freight, a total of 41% of turnover (for passenger services, support amounts to around 50% of income). As commented above, currently a constant real level of support is promised by the state.

2. Investment

Up until 1988, investment in NS was running at around 700m NLG per annum. The plan to double rail traffic by the year 2005 requires a vast increase in investment to the level of some 2500m per annum. This breaks down as follows:

Rolling stock		replacement	300
		expansion	400
Infrastructure	existing lines	renewals	400
		expansion	200
	new lines	passenger	800
		freight	400

Regarding infrastructure the main intercity network will be expanded from 2 to 4 tracks to enable a frequent pattern of inter city, interregional and stopping services to be accommodated. In terms of rolling stock, the fleet will be expanded from 2250 passenger carrying vehicles in 1988 to 3375 in 2000/2005. Since by then half of the fleet will comprise double deck vehicles this will increase the number of seats by 90%, and - with a small increase in vehicle utilisation, will suffice to carry twice the traffic volume with no increase in standing. The plan is then to achieve a doubling of passenger kilometres with an increase in track kilometres of 15%, an increase in rolling stock of 50%, an increase in train kilometres of 25% and consequently an increase in passengers per train of 60%.

The current position is that new infrastructure is financed by the government, but NS has to finance replacement of assets and all rolling stock. It has access to the private capital market, with government permission and government guarantee; as commented above, the Wijffells Commission recommends that both the government guarantee and the need for government permission be removed as part of a further reorganisation. Private financing of new high speed and freight lines on the basis of risk capital has been considered, but is very problematic, these lines are not very profitable, being at the extremities of the European network, and involve mainly international traffic, where cooperation with other railways is essential.

C. FREIGHT MARKET

1. Services

In 1990, NS carried 18.4m tonnes of freight, of which 13.4m was international.

By method of operation, freight traffic in tonnes breaks down as follows:

	DOMESTIC	INTERNATIONAL	TOTAL
Trainload	1.7	6.7	8.4
Wagonload	1.2	3.6	4.8
Combined transport	1.3	3.1	4.4
Other	0.8	0	0.8
Total	5.0	13.4	18.4

2. Pricing

NS has complete commercial freedom in pricing freight traffic. Although it publishes a tariff, it carries most of its freight at a discount on specially negotiated tariffs.

3. Competition

NS has a small share of the domestic market, as a result of short distances and the wide availability of water transport for bulk commodities. NS also argues that neither water nor truck transport pays its infrastructure costs.

D. PASSENGER MARKET

1. Services

Passenger services operate mainly on a regular interval basis, and are marketed as Inter City (Including Eurocity international trains), Inter regional and stopping services. However, in reality the three are intimately intertwined both in terms of operations and traffic; thus for instance much commuting takes place on inter regional and inter city trains.

2. Pricing

Pricing is based on mileage, with supplements for international trains. There is a growing pattern of off-peak discount fares and of season tickets, including a national card giving unlimited travel for students.

3. Competition

Buses and coaches are regulated and perform a complementary role, generally connecting with rail services. The principal competition is seen as being the private car.

10. NORWAY - Norges Statsbaner (NSB)

A. OBJECTIVES AND MANAGEMENT

1. Ownership and Organisation

The NSB Board is appointed by the Government and is responsible to the Ministry of Communications. It comprises the Director General and six part-time members representing the major interest groups. The delineation of boundaries of the fields of responsibility of NSB and the Ministry of Communications are to be revised under the Government Enterprise Act (Statsforetaksloven), with a trend towards greater managerial autonomy. NSB accounts are part of the National Accounts but there is a move towards preparing commercial accounts (to be fully operational in 1993).

Internally, NSB is organised at three levels. Headquarter functions are divided between seven directors. There are also seven operational divisions: passenger services, freight services, road transport, travel agencies, property, rolling stock and production and (since January 1991) permanent way. Passenger services are further subdivided into two sub-divisions (short/medium distance and long distance) whilst freight services are split into sixteen units, on a geographic basis. Overall, NSB is moving towards becoming a free standing public enterprise.

2. Objectives and Constraints

NSB's Railway Plans, approved by Parliament, form part of the National Transport Plan. The plan for the period 1994-1997 is awaiting approval. Particular concerns are reducing transport costs and improving the environment.

Passenger fares, maximum freight charges, passenger service levels and investment budgets all require Government approval. Fare increases have tended to be below inflation. Fares are based on distance; this can lead to anomalies. The construction of the Drammen tunnel reduced the distance to Oslo and hence fares had to be reduced even though service quality had been improved and there was scope for pricing up. Freight rates are based on volume rather than weight or value and can result in under-charging.

The objective of passenger services is a break-even outcome. By contrast, freight services are operated on a commercial basis with an aim of breaking even by 1994. There has been abandonments of passenger services in the 1980s, whilst more recently some freight services have been withdrawn (e.g. the Hardanger line).

3. Subsidiary Activities

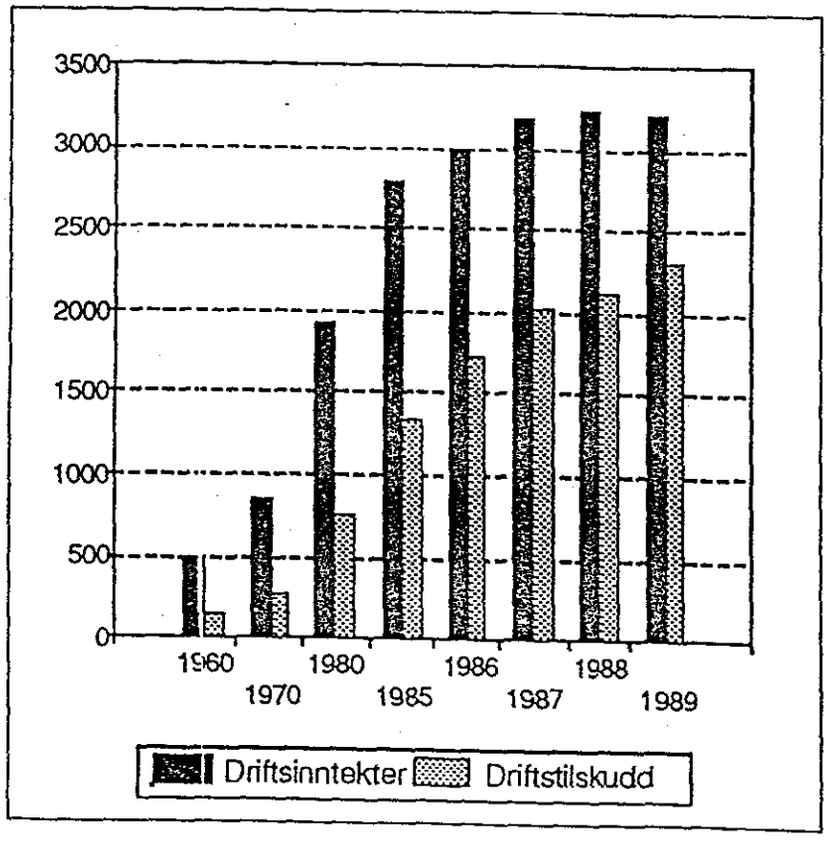
NSB Biltraffikk is the largest bus operator in the country. Buses are operated as separate regional companies and receive direct county subsidy on a kilometre basis. NSB operates three subsidiaries in the freight market, Linjegoods A/S (the parcels carrier - 40% state owned), Transportinvest A/S and KombiFrakt. The latter operation which provided a freightliner type service was wound-up in 1991 although some services were taken over by a consortium of Swedish freight operators. NSB also has a 41% share in Narvesen A/S, the catering and bookstall organisation and train catering franchise.

B. FINANCE

1. Government Support

Although Government contributions are determined in advance at the global level, a balanced budget principle is adhered to: in practice any surplus/shortfall is absorbed by adjustments to Government contributions. The special fares policy (including travelcards) that effects NSB's suburban services in Oslo (Lokaltrafikk) receives local government support. In 1990 receipts from the passenger and freight railway businesses were NOK 3,813m compared to expenditure of 4,584m. Figure 10.1 shows that Central Government support for NSB has increased approximately threefold during the 1980s (and it should be noted that these figures have not been adjusted for inflation).

Figure 10.1: Costs and Revenue of NSB's Rail Activities



Source: Norges Offisielle Statistikk (1992) "Transport and Communication Statistics 1990" p39.

2. Investment

Passenger investments are funded 100% by Government loans. Specific investments for freight services and subsidiaries are based on borrowings from Government at specified interest rates. However, at the end of 1991, application of commercial principles meant that NSB was re-defined as being wholly financed by loans with the debt to Government being estimated at NOK 3.5 billion. By the end of the 1990s interest costs on new loans alone will be around NOK 100 million. A re-financing package is being considered. Recent trends in capital investment in the railways are shown in Table 10.1.

Table 10.1: Capital Investment in State Railways. Million kroner

Year	1987	1988	1989	1990	1991
Expenditure	1108	1146	1205	803	1116 (Planned) 1237 (Outturn)*

Scource: Transport and Communications Statistics, 1990, p64 except * NSB Annual Report and Accounts, 1991.

Around 45% of expenditure in 1991 was on Permanent Way with the main investment items being:

(i) Doubling of track between Ski and Moss (1991-1995)
(ii) The Finse tunnel (1991-1993),

whilst the next major investment will be:

(iii) The Oslo Airport (Gardermoen) link (1992-1999)

Capital expenditure in the Traffic Sector is concentrated on fleet renewal, with a major upgrading of the Oslo-Lillehammer service being undertaken by 1993, whilst there are plans to replace the type 68 electric multiple units.

Since 1990 property development has made a small contribution to the railways finances, raising NOK 41 million in 1990 and 67 million in 1991. The NSB's former head offices at Storgaten were sold to property group Investa (but the sale will not figure in the accounts until 1992) and the Railway School premises at Blindernveien were sold to the University of Oslo.

Particular concern lies in the fact that NSB investment is lagging behind that of its Nordic neighbours, who are estimated to be investing NOK 100 billion in the next 10-15 years, whereas the upper investment level for NSB is estimated to be 25 billion. Main priorities are reducing the age of the locomotive fleet and upgrading track, particularly along the Bergen-Oslo-Goteborg axis.

C. FREIGHT MARKET

1. Services

The major trainload flow is the 5,000 tonne ore trains from Kiruna to Narvik, accounting for 63% of tonnes carried but only 6% of net tonne km in 1990. Inland wagonload traffic accounts for around 31% of tonnes carried and 89% of tonne-km. Foreign traffic makes up the balance. In 1990 the main wagonload traffics were (based on tonnes carried -

excluding special transactions):

Crude minerals other than ore:	30%
Miscellaneous manufactured items	24%
Wood and cork	23%

The main origins and destinations for wagonload traffic are (based on tonnes carried):

Origins:		Destinations:	
Nordland -	28%	Nordland -	29%
Telemark -	13%	Telemark -	12%
Hedmark -	12%	Buskerud -	9%
Abroad -	8%	Abroad -	8%
Oslo -	7%	Oslo -	5%

2. Price

Although maximum rates are published, over 90% of traffic is subject to specially negotiated discounts. Pricing policy is based on contribution maximisation, subject to covering variable costs.

3. Competition

In 1990 the mode split (based on tonne-km) was coastal shipping 48%, road 43% and rail 9%. This compares to the figures of 60%, 29% and 11% reported in the late 1970's. The growth of road-based goods transport relates to deregulation in the mid 1980's which led to fierce competition but mainly abstracted traffic from coastal shipping. Competition has now quietened down. It should be noted that scheduled local services by sea are often provided and subsidised by local authorities.

D. PASSENGER MARKET

1. Services

Rail services are classed as Day trains (Dagtog) and Night trains (Nattog) and between InterCity, Regional, Local (Naertrafikktog) and Suburban (Localtog). A number of small branch lines in Southern Norway were closed in the 1980s (eg. Kragero, Flekkefjord) and replaced by bus services, but others survived (eg Arendal, Notodden).

2. Pricing

Fares are based on a standard charge per km (see above), tapering by distance. Around 22% of passengers (16% of revenue) used monthly and half monthly season tickets in 1990, whilst reduced ordinary ticket fares are available for pensioners, students, families and members of the armed services.

3. Competition

Around 79% of passenger km in Norway were made by car, with 11% made by bus, 5% made by plane, 4% by train and 1% by boat in 1990. By contrast, in 1980 the corresponding percentages were 76%, 12%, 3%, 6% and 2% respectively. In the 1980s there has been some relaxation of the licensing system for express coach services, whilst all road-based forms of transport have benefitted from a large scale road building programme. Air is a serious contender for business traffic with there being one publicly

owned national company (SAS), one privately owned (Braathen) and a series of regional operators. Services remain licenced but as the market has grown the burden of cross subsidy on the main trunk routes has reduced.

Rail journeys are relatively short, with 47.5% being under 30km, representing the dominance of Oslo based commuting. This is also borne out by an analysis of origins and destinations (based on passengers in 1990):

	Origin	Destination
Oslo	22%	22%
Hordaland	14%	14%
Buskerud	12%	12%
Ostfold	10%	10%
Rogaland	8%	8%

Oslo and its adjacent counties (Buskerund, Vestold, Ostfold, Akerhus and Oppland) accounts for 58% of travel. The main city in Hordaland is Bergen and the main city in Rogaland is Stavanger.

11. PORTUGAL - Caminhos de Ferro Portuguesas (CP)

A. OBJECTIVES and MANAGEMENT

1. Ownership and Organisation

CP is still a public corporation, wholly owned by the State. However some of its former divisions have been turned into subsidiary concerns and the whole railway itself has been re-arranged in a "Holding" company, in readiness for the possible privatisation of the most profitable constituents.

CP owns all the rolling stock and infrastructure, but plans have been drawn up to set up a separate track and infrastructure authority along the lines of Banverket and Railtrack. Already the company's accounting system has been changed to separate infrastructure from other costs.

The Portuguese government has expressed intentions to involve private companies in the building and running of new railway services. A policy it hopes will boost rail investment after many years of stagnation. The first stage of such a scheme would involve the sub-concession of services, in the manner of the former "Sociedade Estoril". Likely candidates would include the Cascais Line, the Sintra Line, the Lisbon Half-Ring Line and the new suburban service in the Southern Shore. Later stages of the governments policy may possibly include privatisation of some Inter-City services, together with most of CP-Freight and the recently created TEX (Transport of Express Parcels).

2. Objectives and Controls

In theory CP's objectives are set by the Ministry of Transport, in terms of definition of its level of service and its respective prices for the passenger services. In practice the real objective of CP is difficult to define, given this period of transition. A Decree in 1992, from the Ministry of Transport, established that Caminhos de Ferro Portugueses, E.P., was no longer a "Public Interest Corporation". An idea of what is to become a significant part of the existing and future railway services may be illustrated by part of the third paragraph, of the 1990 Accounting Report Preamble, with respect to a closure package affecting 750 Km of lines: "...it is not possible to imagine the existence of a modern rail network, adequate and prepared to the new future challenges, and, simultaneously, maintain sections of route **without any market perspectives** and in a complete state of dereliction." This suggests that CP is tacitly a profit-making concern, supporting a remaining set of activities, such as the Suburban Operations, as uncomfortable burdens.

Opening and closure of lines and services, must, according to Decree 63/83 and the New Land Transport Law, always have consent from the Ministry of Transport. Important indicators that are used include the state of infrastructure and the availability of funds to renew it; many services have been lost, not for lack of patronage, but on a mere avoidable cost basis. If a service is withdrawn, the rail operator must become responsible for the provision of replacement bus services for passengers (in practice such a policy is rarely enforced). A line without a service is abandoned, but in most cases remains "Classified", with the possibility of regional rail services being run by the local councils.

3. Subsidiary Activity

CP has recently added seven subsidiaries to its pair of long established subsidiaries, Fergrafica and Ferbritas. Fergrafica has traditionally been CP's graphic arts concern, producing tickets, timetables and other printed material for the rail operator and third parties.

Ferbritas specialises in ballast and rock extraction, extracting good quality aggregate materials, used for both track renewal or construction, and to sell to third-parties, such as the National Road Board.

Recently the following concerns were added: Stifa, Portif, Publifer, Tex, Fernave, Invesfer and Emefe. Stifa runs assembly plants. Portif runs the international container services, whilst TEX runs a new express parcels service. Publifer promotes advertising space in stations and other public spaces. Fernave deals with technical services and is a conjugation of efforts between CP, the Lisbon Metro, the Transtejo (Tagus Ferries), the STCP (Oporto Public Transport) and Ferbritas.

Invesfer is responsible for "property development". Generally the land promoted is occupied by old depots, warehouses and in exceptional cases disused railways. Emefe, created in May 1993, is a repair and maintenance service, comprising the former CP workshops and personnel; though not as yet scheduled for privatisation, it has been suggested that this could take place at a later stage, with groups such as ABB (Asea Brown-Boveri) taking it over.

CP also has interests in two long-distance international coach service companies (Internorte and Intersul - 10.3% and 10.0% respectively) and automobile retailing business Ultrena, with 10% of its Capital.

B. FINANCE

1. Government Support.

Compensations vary from year to year and are granted on an ad-hoc basis through a resolution of the Council of Ministers. Since 1990, such awards have been subject to VAT (8%) taxation, which has contributed to a greater reduction of their amounts. In 1990, CP was granted Esc.Million 19,779 of Direct Compensations, plus Esc.Million 2,988 of "Equilibrium Fund". Both these contributions representing about 77.5% of all rail operating receipts.

2. Investment.

In the year of 1990, CP had a total investment of Esc.Million 27,100, comprising as follows,

(i) Directly By The State (All figures in Esc.Million)

Track	8573
Stations	555
Electrification	498
Signalling and Telecommunications	1950
Level Crossing Replacement	817
Other	-

(ii) Directly By Corporation (All figures in Esc.Million)

Fixed Installations	434
Rolling Stock	8130
of which Traction Stock of which Passenger Stock of which Freight Stock of which Rolling Stock Improvements	2012 3765 670 1684
Equipment for Permanent Use	493
Other	251

Source: Transport Statistics, Institute Nacional de Estatistica, Portugal

Despite the apparent differences in investment sources, in practice all capital expenditure carried out by CP is an indirect form of state investment, since a significant part of it consists of non-returnable state grants.

A closer look into the CP's 1990 Accounting Report may give a more accurate idea of the current sources of financing presently available for railway investment in Portugal:

Year: 1990	Total	Invest. Funding		Mill.Esc
		PIDDAC	Europ. Funds	Cap.Donations (FRDP)
Long Duration Infrastructure (ILD'S)	12972	7155	2418	2810
Purchase & Modernisation Of Rolling Stock	7640	-	-	1219
Other	1101	-	-	529
Total - General	21173	7155	2418	4558

Year: 1990	Total	Invest.Funding		Mill.Esc	
		DGTT	Eurofima	Bank Loans	BEI(CP-II)
Long Duration Infrastruct. (ILD'S)	12972	589	-	-	-
Purchase & Modernisation Of Rolling Stock	7640	-	1902	519	4000
Other	1101	-	483	89	-
Total - General	21173	589	2385	608	4000

Source: CP Accounting Report

Most infrastructure investment is covered by the PIDDAC (the Plan of Investment and Expenses of Development of the Central Administration), which is part of the yearly state budget. Other investment sources come from the European Fund and part of the Capital Donations (the remaining of the latter funding 20% of expenditure incurred with the purchase and modernisation of rolling stock and other investments); from the DGTT (the General Direction of Land Transport - a division of the Ministry of Transport), funding was obtained for an inter-change between the Cascais corridor directly to the Lisbon Half Ring Line. The majority of rolling stock investment was funded by Eurofima and loans, from both the national and foreign banks and the EIB (European Investment Bank).

The following projects were carried out from 1990 to 1993 - infrastructure: Northern Main-Line upgrading to 200 Km/h; ATC and radio-telephone; Beira Alta Main-Line upgrading, CTC, electrification; Vendas Novas Line: upgrading and electrification; Sado Line: CTC; construction of the new Southern Line from Pinhal Novo to Lisbon, together with several station reconstruction in the southern shore of the Tagus, part of the Sintra Line Quadruplication; bridge strengthening in several sections of the network, opening of the industrial branches of Neves-Corvo Mines, Pego power plant and Lourical pulp mills.

Rolling Stock: new freight wagons, new diesel-electric metre-gauge units for the Povoa Line (7), new main-line electrics for 200 Km/h operation (30), new electric quadruple units for the Sintra Line (42), and refurbishment of existing stainless-steel coaches, including new air-conditioning equipment.

Future investments include: double-tracking and electrification from Ermesinde (Oporto) to both Braga and Marco, a similar scheme between Cacem and Torres Vedras, in the Western Main-Line and Entroncamento-Abrantes, on the Eastern Main-Line, with an extension of the wires to the pego power plant; electrification of the Sado Line as far as Ermidas-Sados; electrification of part of the Western Main Line, to give the electric tractive units access to the Lourical industrial branch; purchase of the electric tilting trainsets, of the "Pendolino" Type or the Swedish X-2000.

C. FREIGHT MARKET

1. Services

Despite remaining a minor freight carrier, Portuguese Railways managed to increase its role, increasing its traffic share between 1980 and 1990, from about 7.82% to 12.72%; corresponding in an absolute rise from 1 to 1.59 Thousand Million Ton-Km. Road was the main loser, falling from 11.8 to 10.92 Thousand Million Ton-Km and from 92.19% to 87.29%. Inland waterways and pipe-lines both play meaningless roles in Portuguese freight, however the role of coastal shipping is still important for bulk items such as oil and chemicals. The increase in freight share can be attributed to the adoption of a more commercial approach (in particular towards industries responsible for the generation of bulk traffics), a streamlining policy concentrating freight movements in a certain number of terminals and an increase in the number of private sidings. Yet this success hides a continuous loss of rail freight market share in favour of road transport, particularly perishables, cork and most high value-added goods. Mail, a commodity traditionally carried by the railway during past decades, was also abandoned. So despite becoming more competitive and business-orientated, the rail freight sector in Portugal is now more vulnerable to the fluctuations of the market.

A final note has to be mentioned regarding the lifting of all historic trade barriers between both Spain and Portugal (By 1986, both countries were in the European Community). In the short term this has helped increase rail's share of freight but the long term picture looks a lot more favourable towards road transport, given the highway construction programme which duplicates most of the old and neglected international rail trunk routes.

2. Pricing

There is no regulation of freight prices, so prices are free to vary with the market. To ensure consolidation of certain markets, a tying policy is frequently followed, by placing the responsibility of providing the freight stock in the hands of the client e.g. EDP (Electricity of Portugal), who own the hoppers employed on the Pego Traffic.

3. Competition

Coastal shipping is one of rail's competitors but is minor when compared to road transport. The only regulation to be found in Portugal's road freight transport is that regarding safety, for example, maximum speeds, maximum driving hours per day and maximum loading. Frequently these are disregarded and in some cases improve the

competitiveness of road over rail. An example of this is in the Estremoz-Vila Vicosa region, where the railway loses a significant part of the marble traffic to small concerns who use surveyor vehicles to clear the way for their overloaded lorries.

D. PASSENGER MARKET

1. Services

CP's share of the passenger market has seen a large fall from 11.1% in 1980 to 7% in 1990, whilst private cars have increased their share from 75% to 80.3%. There are five types of service on offer: ALFA, IC, International, Suburban and Regional. ALFA trains are fast expresses covering Lisbon-Oporto (337 Km) in just three hours, consisting of french type Corail Stock. There were initial plans to extend the ALFA service to the Algarve, but these seem to have been postponed indefinitely, at least, until the arrival of the tilting trainsets.

The IC network, consists of Expresses currently linking both Lisbon and Oporto to thirteen district capitals; however, only services from Lisbon to Aveiro and Lisbon to Braga may effectively be considered as true IC-services, given European Quality Standards: these are the two only services, apart from the ALFA, operating air-conditioned Corail stock.

International trains comprise the expresses from Lisbon to Madrid and from Lisbon to Paris with through coaches from Oporto. The first route offers a daytime Talgo and a night service, the Lusitania-Expresso (the only International Express capable of competing with air travel). The Sud Express, takes 27 hours on its daily journey and is used primarily by immigrants.

Suburban operations exist in the Lisbon Area, the Tagus Southern Shore, the Oporto Area and the Coimbra-Figueira da Foz Region. Finally, regional trains serve the Main-Lines as well as outlying branch lines.

2. Pricing

Prices are controlled by the Ministry of Transport. With the exception of suburban trains, fares are set on a kilometric base; for fast trains, like the ALFA, the cost per kilometre is higher, and a supplement is charged; the minimum distance upon which fares are set for an Express service is 50 kms. Prices for suburban trains are set on a zonal basis.

3. Competition

The railways are now facing free competition from Coach Companies and as a result have seen large numbers of long-distance rail users switch to coach travel, primarily due to the poor speeds achieved by CP's Main-Line Trains. The increase in car ownership in recent years has also had an adverse effect on both railway and public transport patronage. The only factor in rail's favour is its low price, which is achieved through high rates of government subsidy.

12. SPAIN - Red Nacional de los Ferrocarriles Espanoles (RENFE)

A. OBJECTIVES and MANAGEMENT

1. Ownership and Organisation

RENFE is a state owned company; it is headed by an administrative council appointed by the government. The current philosophy is, however, to reduce the amount of state control, with a possible long term aim of dividing it into a number of separate companies and introducing private capital.

RENFE has been sectorised into long distance, regional and suburban passenger services and freight; separate accounts are produced for each sector. However, stations, traction (including crews) and rolling stock maintenance remain common between the sectors. Infrastructure is provided and maintained by a totally separate division financed directly by the government.

It should be noted that there is a separate national narrow-gauge railway company (Ferrocarriles espanoles de via estrecha, or FEVE) and separate - mainly metre gauge - suburban companies, for instance in Barcelona and Valencia.

2. Objectives and Controls

A 3 year contract with the state was signed in 1988, covering the amount of subsidy to be paid and the service levels to be provided. Associated with this was a massive programme of over 2000 billion pesetas of investment by the turn of the century, including new high speed stretches of main line, upgrading of existing lines and major investment in the Madrid suburban system. Long distance services were to become fully self supporting, but the state would continue to subsidise - and control the fares on - regional and suburban services.

Since this contract expired in 1991, no new one has yet been signed, but as a result of the financial situation of the government, both subsidy and capital spending have been cut (the former by 6% in 1992). The emphasis in investment has swung away from high speed services towards the improvement of the Madrid suburban system.

RENFE has succeeded in reducing its dependence on state subsidy by means of an active pursuit of higher productivity; it has reduced its workforce by 42% in the last ten years.

B. FINANCE

1. Government Support

In 1990, RENFE received payments from the state covering its interest costs of 62 million pesetas, and PSO compensation and normalisation of 115m pesetas. Of the latter, 66% were in respect of infrastructure costs (which the state covers in full), 16% regional passenger services and 14% suburban passenger services.

2. Investment

Speeds in Spain are severely restricted by the fact that most main lines are single track and have steep and severely curved sections, particularly in mountainous areas. The long term investment plan which was agreed in 1987 covered the following new stretches of line on existing main lines:

Bilbao-Vitoria cutoff - 50km - to improve services to Bilbao
Guadarrama line - 60km - to improve services between Madrid and Valladolid

Work on the Madrid-Seville Alta Velocidad Espanol (AVE) high speed line was completed in 1992. Originally intended as a further cutoff on an existing route, this was built as a new standard gauge line (the rest of RENFE is broad gauge). At the time it was intended that all new high speed routes would be standard gauge and that most or all of the existing system would be converted. However, the cost of doing this is now seen as prohibitive, and it seems likely that further stretches of high speed line will be built to broad gauge with convertible sleepers, except for the route from Barcelona to the French border if that goes ahead. The next priority for new high speed services is Madrid-Barcelona.

In addition the plan involved extensive upgrading of existing lines for 200kmph running, double-tracking, electrification and improved suburban services.

In 1990, investment was as follows (m. pesetas):

High Speed line (AVE)	34.222
Suburban	25.930
Rolling stock	23.175
Infrastructure	29.149
Other	38.269
TOTAL	150.745

C. FREIGHT MARKET

1. Services

Freight traffic has been steadily declining; in 1990 RENFE carried 29 million tonnes (11206 million tonne km). Freight revenue totalled 58.773 million pesetas, of which 46 million was from complete wagons and containers and the rest from parcels, sundries and post. Commodities were as follows:

	tonnes (m)	tonne km (m)
Cereals	1.201	641
Solid fuel	2.190	523
Wood	0.623	447
Cement	1.057	224
Limestone	1.564	72
Minerals	2.495	253
Iron and steel	3.008	1,582
Oil	1.650	397
Chemicals	1.012	606
Butane and propane	0.723	248
Fertilisers	0.717	314
National cars	0.366	232
Military	0.135	73
Iberia tariff	0.202	121
International cars	0.352	184
Other international	1.982	966
Containers	3.865	2,473
Internal transport	2.593	464

Coal is imported; the major category of bulk traffic, which is steel, is declining. The best prospects are for inter-modal traffic.

2. Competition

Rail is in principle protected from road competition by a quantity licensing system. Licences are issues either for the entire country or for a specific area. In practice, the amount of protection given has been small, partly because of free entry into own account carriage by road.

D. PASSENGER MARKET

1. Services

The fastest trains are operated by the special TALGO stock, which has a low centre of gravity and can thus achieve higher speeds on poor quality infrastructure. TALGO trains also have adjustable wheels so that they can run onto the high speed line and the standard gauge tracks of French Railways. Other long distance trains include Electrotrenes, rapidos and night espresos. Long distance traffic is stagnating and RENFE faces growing problems as road infrastructure improvements make road journeys faster on an increasing number of routes. On the new Madrid-Seville line trains were 100% full during EXPO 92, but the load factor is now 65%. It will be impossible to cover the enormous infrastructure costs of this route out of revenue.

The big growth area is the Madrid suburban network where traffic has doubled in the last 3 years and is still growing at 30% pa. Regional traffic is generally declining.

Passenger km in 1990 were divided as follows (m km):

Talgos	1.687
Electrotrenes	1.083
Rapidos and others	1.309
Night trains	4.376
Total long distance	8.455
Regional	2.426
Suburban	4.595
Total	15.476

2. Pricing

RENFE has pricing freedom on long distance services, and has introduced new higher tariffs on the AVE. Regional fares are controlled by the state. In the Madrid region, RENFE services are part of the integrated ticketing system of the Consorcio de Transportes de Madrid, and the local authority compensates RENFE to the losses involved.

3. Competition

In the main cities, bus services are provided by the local authority or by a private company on a long term monopoly franchise. Elsewhere, bus services are mainly private and are free to compete with RENFE. There are domestic air services between many major cities, and it is widely believed that European air deregulation will make these much more competitive, with substantial reductions in price.

13. SWEDEN - Banverket (BV)
- Statens Järnvägar (SJ)

A. OBJECTIVES AND MANAGEMENT

1. Ownership and Organisation

Swedish railways were dominantly under state control by 1939, although a distinction was maintained between the national and the regional networks. The national network operated without subsidy until 1979. Despite being one of the most cost-effective operators in Europe a crisis of confidence emerged by the mid 1980s due to falling market shares, rising deficits (and forecasts of worse to come) and unclear/inconsistent objectives. The solution was the 1988 Transportation Act which proposed a "road model" for the railway sector. The main features were:

(i) The rail network was divided into a trunk system of main arteries and county lines.
(ii) Rail infrastructure became the responsibility of a new state administration, Banverket (BV).
(iii) Statens Järnvägar (SJ) became a train operator and marketing organisation keeping ownership of terminals, freight wagons, passenger cars and locomotives.
(iv) SJ would maintain a monopoly of passenger services on trunk lines and freight services on trunk and county lines (excluding the Iron Ore line).
(v) The 24 county public transport authorities would decide the level of passenger service to be operated on county lines and were free to choose other contractors for the local and regional passenger services.
(vi) If SJ or the County did not wish to exploit their transportation rights, BV was given the right to grant other interested operators the equivalent rights and responsibilities.
(vii) Infrastructure charges would be paid by train operators on the basis of marginal social cost. This would be consistent with the pricing regime employed by the Roads Authority.
(viii) The state would provide for a substantial improvement of the major network.

A study is being undertaken (to report in January 1993) that will examine measures to increase competition on the rail network and, in particular, the removal of SJ's monopoly by January 1995.

BV has a board of 10 members, including the Director General, appointed by Government. BV is highly decentralised, being split into five regions and 21 districts (see Figure 11.1). In addition, there is an Industrial Division having commercial responsibility for purchasing, production and storage of material. Within BV, there is an independent Railway Inspectorate responsible for safety checks and accident investigations.

SJ has a board of 13 members, including the Director General and representative members of Government, business and trade unions. Its organisation has moved from a regional basis to a product basis with four main divisions: passenger, freight, mechanical and real-estate. The company's organisational chart is given by Figure 13.2.

2. Objectives and Constraints

Responsibilities are divided between BV and SJ as follows:

BV is responsible for:

- Railway lines; substructure, superstructure and track, signals and other safety installations, overhead electric equipment.
- Terminals; all through tracks, certain storage tracks and sidings, passenger platforms, lighting and some major marshalling yards.
- Fixed installations for traffic supervision and safety.

SJ is responsible for:

- Locomotives, wagons and coaches.
- Terminal buildings and stations, including surrounding public services.
- Goods terminals (except for major marshalling yards and combined road/rail transfer terminals.
- Industry tracks.
- Workshops for rolling stock.

The boundaries are not always clear cut; particular concerns include timetable planning (currently done by SJ), traffic control (operated by SJ, infrastructure owned by BV) and telecommunications. The problem with the latter is one of joint use; the same cables can carry ordinary telephone connections (mainly SJ use), data transmission (SJ for ticketing, BV for safety installations), passenger information (SJ) and signalling information (BV). It was decided to have exchange installations and interconnecting cables assigned to the infrastructure (BV) while cables and facilities to portable equipment for direct use were taken by the user (SJ or BV). The right to exploit new cable capacity installations (e.g. glassfibre optics) along the tracks was included in the infrastructure.

Figure 13.1 BV's Organisational Chart

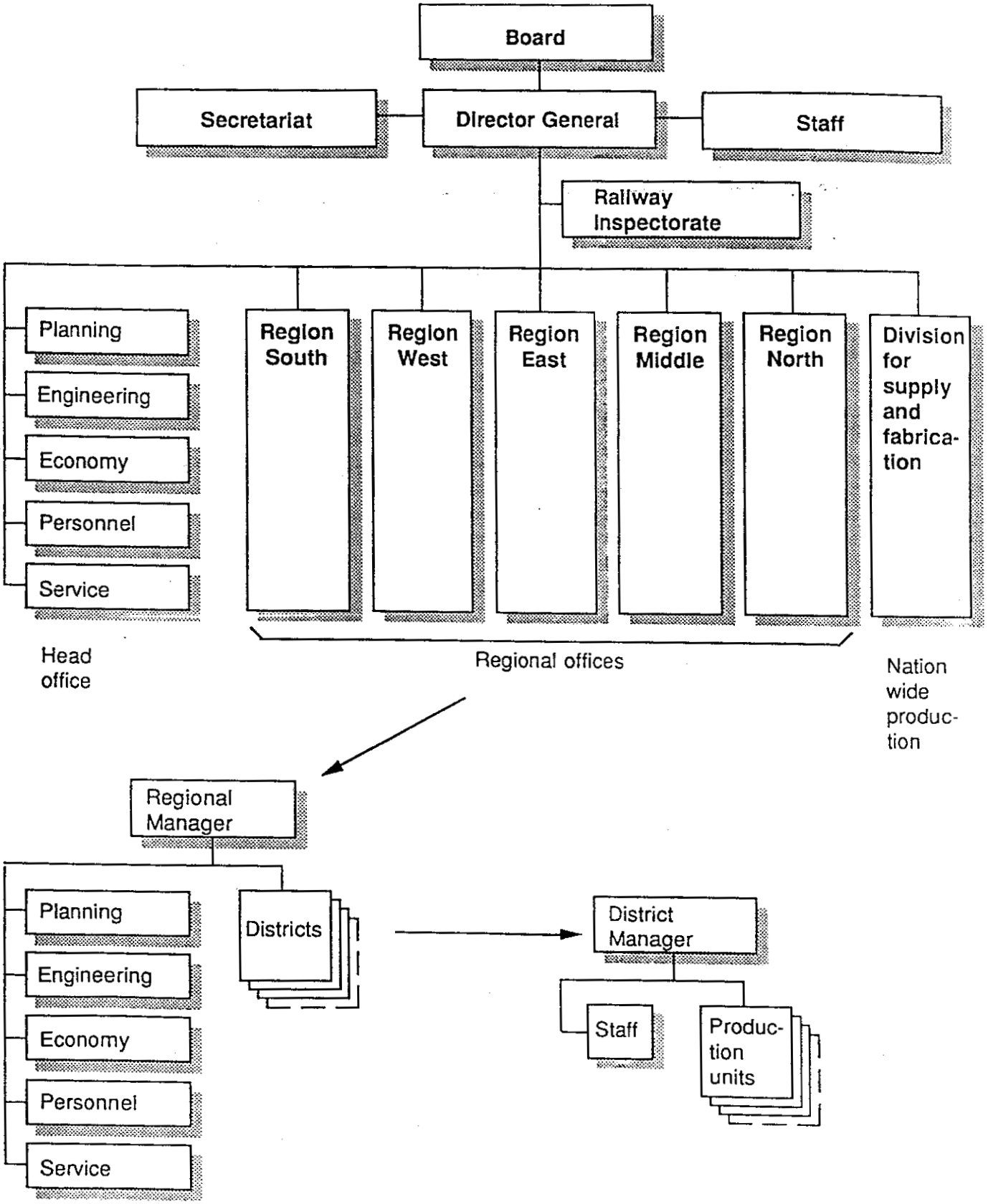
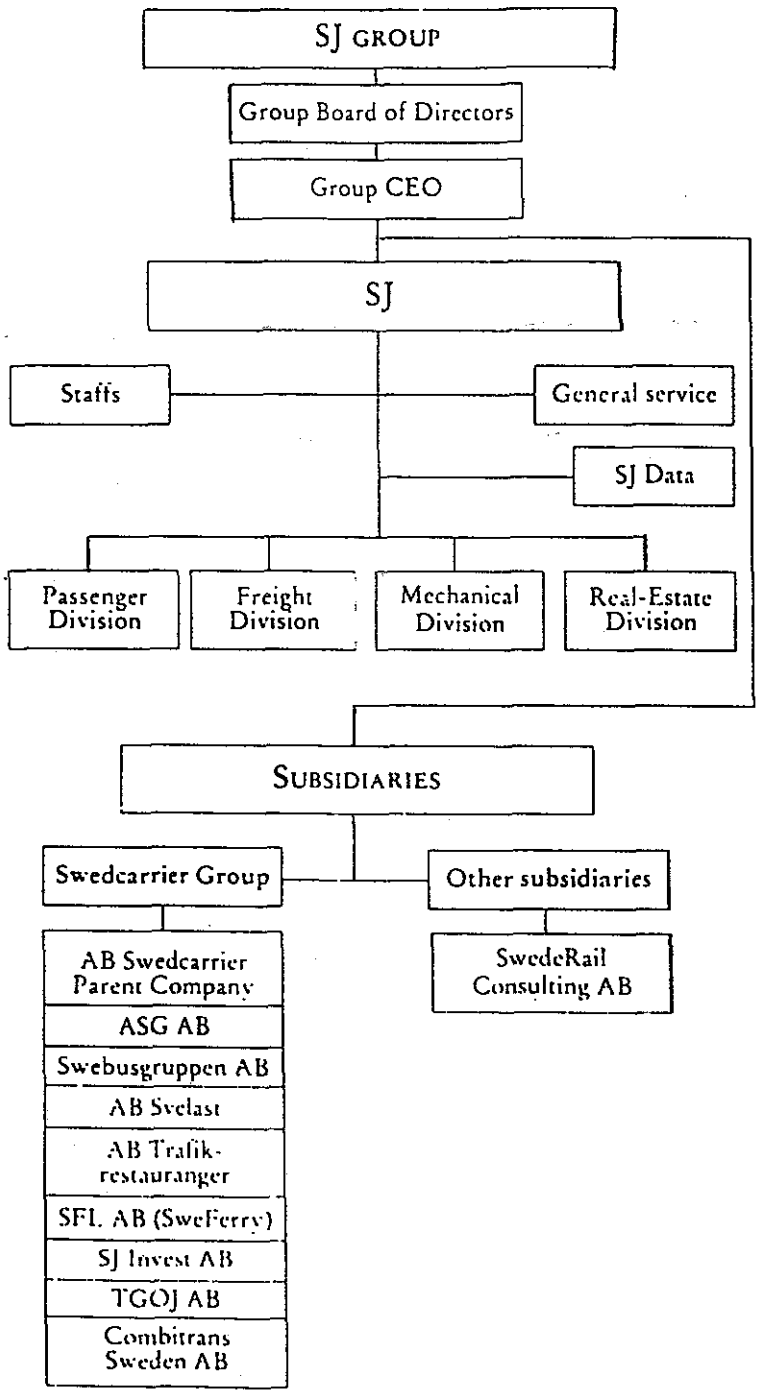


Figure 13.2 SJ's Organisational Chart



BV is responsible directly under the Swedish Government (Ministry of Transport) for the overall planning of the national railway network and the correct and efficient realization of the railway development plans established by the state. As a government agency it must plan for a neutral treatment of different transport companies. BV's goals are to ensure that rail travel is safe and efficient and to act in the most beneficial way for society as a whole.

By contrast, SJ is to act as a business company and turn deficit to a fair profit to cover costs for improved terminals and rolling stock. SJ is free to raise capital on the open market but cannot create new subsidiaries without Government permission. Some Government control regarding maximum tariffs and closure procedures remain.

3. Subsidiary Activity

SJ operates a number of subsidiary companies as part of the parent company Swedcarrier AB. These include:

(i) ASG AB concerned with the transportation, forwarding and warehousing of goods. SJ holds 45% of the capital stock of the company which (in 1990) had 5,171 employees and a turnover of SEK 7,312m.

(ii) Swedbusgruppen AB operates bus services under its own auspices and in collaboration with the County Traffic Authorities. It has 4,779 employees and a turnover of SEK 4,779m.

(iii) AB Svelast is a road haulage business with 700 vehicles providing feeder services to railway freight traffic. It has 814 employees and an annual turnover of SEK 378m.

(iv) AB Trafikrestuaranger provides on-board and off-board catering facilities. It owns 81 restaurant cars and four conference cars. It employs 1,551 and has a turnover SEK 654m.

(v) SFL AB operates SJ's ferry businesses under the name SweFerry AB. It operates five routes to Germany and Denmark with 14 ships. It employs 574 and has a turnover of SEK 979M.

(vi) TGOJ AB operates some freight and passenger traffic by rail together with a workshop operation for railbourne rolling stock. It employs 301 and has a turnover of SEK 155m. During 1991, SJ's maintenance workshops were brought under the management of TGOJ.

(vii) SJ Invest AB is administered by SJ's financial sector and handles certain internal financial services for the group.

(viii) SwedeRail Consulting AB operates as a consultancy, marketing SJ and BV's combined competence internationally and to major railway projects.

Some subsidiaries have been privatised, such as SJ Travel Agencies. SJ also has a 50% holding in Combitrans Sweden AB (which markets international wagon-load traffic) and Nordwaggon AB (a "private" wagon company.) SJ also jointly owns with ABB Traction AGEVE Maintenance AB, responsible for heavy maintenance of freight wagons. This subsidiary was restructured in 1991 with activities concentrated in Gothenburg and Gävle. Since July 1992, SJ has a 100% holding of Rail Combi AB, which is responsible

for marketing and production of national and international combined transport.

All subsidiaries are intended to be (and are) profitable, although bus services are responsible for a share of the SEK 3554m paid in 1990 by the County Traffic Authorities and the Swedish Board of Transport for bus and rail services. (The Swedish Board of Transport has subsequently been abolished). In order to concentrate on profitable activities Swebusgruppen has pulled out of the tourist and private hire markets but has moved into the taxi market. Overall, subsidiaries account for 59% of the SJ Group's revenue.

B. FINANCE

1. Government Support

SJ is expected to be profit making, once subsidies for passenger services (outlined above) and for certain freight services are taken into account. In 1990 the SJ Group earned profits of SEK 681m, of which the rail businesses accounted for SEK 372m. The results for the rail business were forecast to be a profit of SEK 200m. This target was exceeded but still falls short of the SEK 600m p.a. profit SJ believes is necessary to support forthcoming investments in locomotives, coaches, freight cars, stations, workshops and personnel premises. In 1990 SJ made a payment to BV of up to SEK 665m based on a two-part tariff designed to reflect marginal social costs (or, as a proxy, short run variable social costs).

Aside from infrastructure fees, BV is funded by an annual appropriation from central government which has increased as follows (SEK, M):

1988	3275
1989	4035
1990	4300
1991	5250
1992	6500

These increases are due to increased investment (see below).

2. Investment

BV investment levels have increased from SEK 600m in 1988/89 to SEK 2500m in 1991/2 and are expected to be at SEK 3000-4000m per year for the rest of the century. In addition, expenditure of around SEK 2000m will be made on maintenance per annum (see Figure 11.3). Around 18% of investment is currently financed by non-Government loans. Investments form part of a ten year plan (1991-2000) to upgrade the railway and includes the following projects:

(i) West Main line upgrading (1986-1992) at an initial cost of SEK 425m to allow operation of the high speed X2000 service between Stockholm and Gothenburg. A further SEK 500m is to be spent replacing level crossings with road tunnels or bridges.

(ii) Grödinge line (1989-1995) a new 30km line south of Stockholm, allowing faster InterCity trains to Gothenburg and Malmö and commuter services on the Svealand line. The total budget is around SEK 3000m, of which two-thirds will be contracted out.

(iii) South Main line upgrading (1991-1996) to allow operation of X2000 trains between Stockholm and Malmö, reducing journey times from 6 hours 15 minutes to 4 hours 30 minutes (down 28%). The cost of this project is estimated at SEK 2000m.

(iv) Hallandsas tunnel (1992-1996) and associated improvements on the West Coast line. The tunnel and 15km of double track has been costed at SEK 1000m whilst other improvements have included:

- Double tracking Gothenburg-Kungsbacka (25km at a cost of SEK 400m). One third of costs were covered by Local Government.
- Double tracking and re-alignment Varberg-Falkenberg (20km at a cost of SEK 300m).
- Remodelling of Helsingborg station at a cost of SEK 500m.
- Complete double track between Gothenburg and Malmö would require a further SEK 3000m and would only be possible with Local Government support.

(v) The North link to Oslo.
Improvements to this service involve the option of a westerly alignment (partially using the run-down Bohus line) or an easterly alignment (partially using the existing Gothenburg-Oslo line). BV favour the easterly alignment and have costed a scheme at SEK 9500m which, using X2000 technology, could reduce journey times from 4 hours 30 minutes to 2 hours (down 55%).

(vi) Rail connection to Stockholm airport (Arlanda) (1991-1996). This scheme involves quadrupling the existing double track between Stockholm and Roserberg and then providing new double track to the terminal, rejoining the main line at Odensala. Some 120km of new tracks would be provided at a cost of SEK 3500m, whilst an additional SEK 1500m would be required for the terminal buildings.

In most instances, the rail services are not expected to contribute to the capital costs of the schemes. An exception is the Arlanda scheme. It is proposed that this service will be franchised in such a way that a significant share of the investment costs can be captured ex-post. BV and the Airport authority will specify train type, minimum frequencies and service quality. The franchisee will be able to specify fares and check-in and baggage handling arrangements which will be evaluated as part of the bid. Guarantees for SJ to operate on the new line will be included but SJ will have to pay a fee per passenger using the Arlanda terminal to the franchisee. This, it is hoped, will maximise the share which does not need state funding.

A similar concept is envisaged for the proposed Öresund fixed link between Sweden and Denmark. Although tolls on motorists will pay for the bulk of construction costs, on the Swedish side, rail access to the fixed connection will cost SEK 1500m. It is believed that a share of this could be covered by charges to prospective train operators.

The other alternative source of investment funds is that of Local Government. In addition to the one-third funding in the Gothenburg region, two-thirds funding from Local Authorities is available in the Stockholm region, and up to one-quarter funding has been secured for the Lake Mälar schemes. Funding for part of this last scheme is on the condition that a major share of construction is carried out by local private contractors.

BV assesses investments using social cost-benefit analysis in the same way as the Roads Authority. The Study Alternative is compared with a Comparison Alternative, usually a do-nothing scenario. Sufficient funds appear to be available for the projects listed above

and extensions of the X2000 network and 200km/hr operations as follows:

(i) Stockholm-Eskilstuna/Västerås-Örebro known as the Lake Mälar scheme (1991-1998).
(ii) Stockholm-Arlanda-Uppsala-Gävle (by 1994).
(iii) Uppsala-Borlange-Falun (by 1995).
(iv) Laxå-Karlstad (by 1996).
(v) Gävle-Sundsvall.

More problematic appear to be:

(vi) The Bothnia line connection Sundsvall-Umeå.
(vii) The Götaland line which would involve new track between Linköping-Jönköping-Borås to provide a second high speed link to Gothenburg.

A more important budget constraint for BV is emerging with respect to maintenance work. Figure 13.3 shows that maintenance costs are increasing at a rate greater than inflation which is leading to budgetary control problems.

In 1990 the SJ Group's total investments were SEK 2040m (1989 SEK 1485m), whilst SJ's investments were SEK 880m (SEK 866m). This capital was mainly spent on vehicles and fixed assets, with a fleet of 20 X2000 units ordered. Investments are self-financed with a number of sources of private finance:

(i) Capital was raised by ASG AB being given a stock exchange listing in 1990. AB Transportförvaltning was a major investor.
(ii) SJ signed a so-called partnership finance deal in 1990, selling buildings in Stockholm and Solna to a consortium led by Svenskt Fastighetskapital AB for SEK 1800m. Following the sale SJ is leasing the premises back with rent and option price re-distributed over time so as to give an acceptable pay-back on capital. The re-distribution of interest also entails positive effects on SJ's income statement, since the annual market rental cost is less than the yield on the capital released. The sale resulted in a capital gain of SEK 1.755m. SJ has an option to repurchase these properties after 15 years and once every five years until 2015.
(iii) The Real-Estates division raised SEK 225m in 1990 and promotes external renting out of premises and leasing out of land areas.

C. FREIGHT MARKET

1. Services

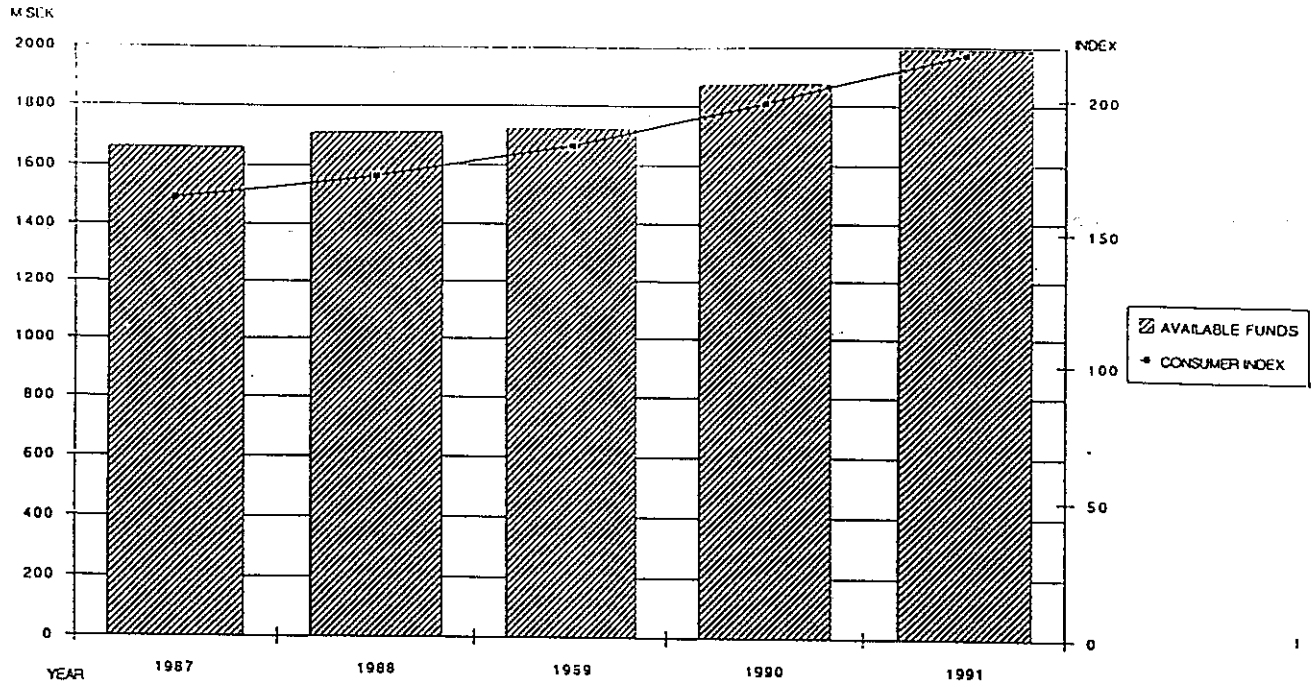
The main block train-load flow is iron-ore (43% of tons carried, 17% of ton-kms), with domestic wagon load being the other main traffic source (40% of tons carried, 49% of ton-kms). Foreign wagon-load traffic and a small amount of parcels traffic (Expressgods) make up the balance. The main traffic groups by product type are: (% of tons carried):

Ores and Metal Waste Products:	46%
Manufactured Products:	18%
Agricultural Products (including timber):	13%
Metal Products:	11%
Chemicals:	6%

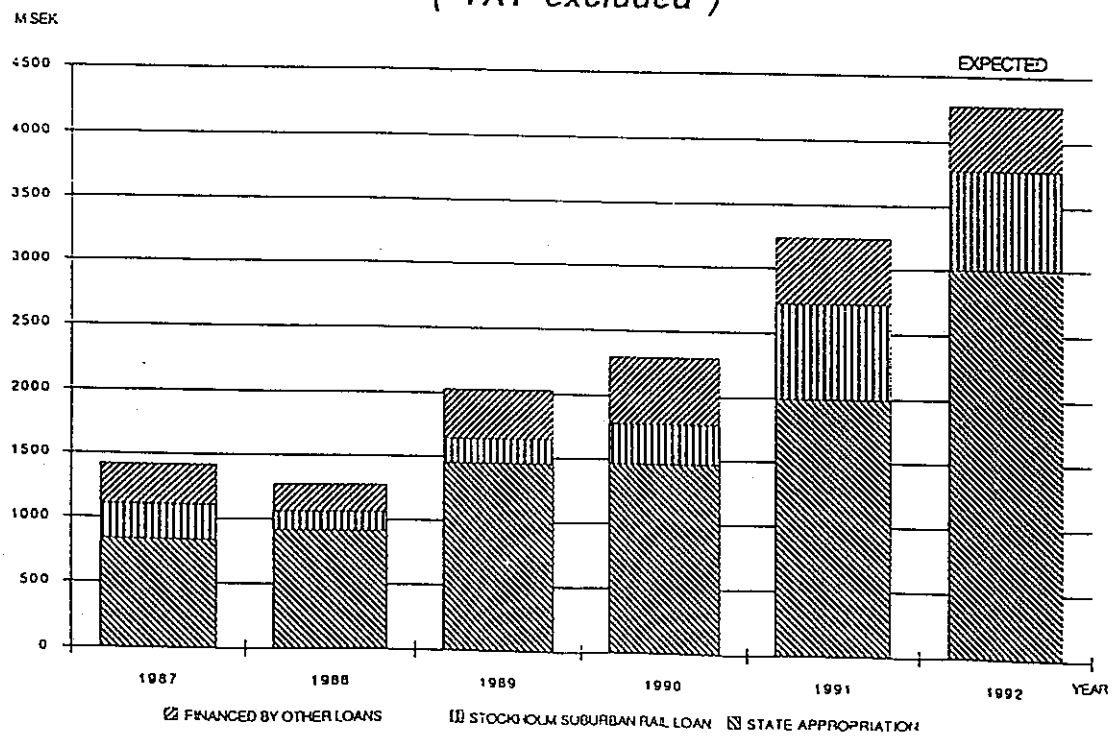
98.7% of ton-kilometres are operated by SJ, its subsidiaries (TGOJ) and its agents (other

Figure 13.3

SWEDISH RAIL INFRASTRUCTURE
MAINTENACE COSTS 1987-1991



SWEDISH RAIL INFRASTRUCTURE
INVESTMENTS 1987-1992
(VAT excluded)



national railways). There are, though, some private operations including Nordmark Klarälvens Järnvägar (NKJ) and the recently formed Österlentåg which has a foothold in the market in the Tomelilla area.

2. Pricing

Rates are based on direct costs plus what the market will bear, subject to a maximum. Over 90% of traffic is subject to confidential specially negotiated rates.

3. Competition

For hauls of over 100km, rail had, in 1990, a 28% market share, compared to coastal shipping and roads 30% each and inland waterways 12%. Road freight transport has been deregulated since 1963. SJ's road based freight services have been re-organised so as to be complementary to rail services rather than competing with them, as occurred in the past.

D. PASSENGER MARKET

1. Services

As noted above a distinction is made between national (main line) services, generally operated on hourly or two hourly regular interval timetables, and regional (county line) services, where timetables are broadly specified by the County Passenger Transport Boards. The inland line (Mora-Gällivare) is treated as a special case. There have been few recent cases of service withdrawls; of 24 county line services recently reviewed only 3 were discontinued for a "trial period".

2. Pricing

Fares maintain a relation to distance but include a taper and reductions for travel in non-peak periods (any day except Friday and Sunday). 40% reductions are available for students, pensioners and families.

3. Competition

Long haul trips (over 100km) accounted for over 70% of passenger kms on SJ's rail services in 1990. It was estimated that of trips over 100km, rail has a 13% share compared to car 74%, air 11% and bus 2%.

Tendering has allowed competition within the rail market. Four firms other than SJ have registered to receive tender documents, with one company, BK Tåg, being successful and another company, Linjetåg, having a number of "near misses". The competitive pressure has led to SJ reducing tender prices by 20-30%. Local services operated on the main line in the Stockholm, Malmö, Gothenburg and Västerås areas have been contracted out, although in these cases SJ is the only permissible bidder. These contracts tend to be of long duration (up to 20 years), whilst the competitive tenders are of much shorter duration (typically 3 years).

Local bus services were deregulated in 1989 and SJ faces stiff competition, particularly from Linjebuss and Waseatraeik. Express buses remain partially regulated but competing services do exist. Air services were deregulated in 1992 and SAS's monopoly ended. A number of new entrants have emerged (Malmö Aviation, TransSweden) and fares have fallen by up to 25%, on average.

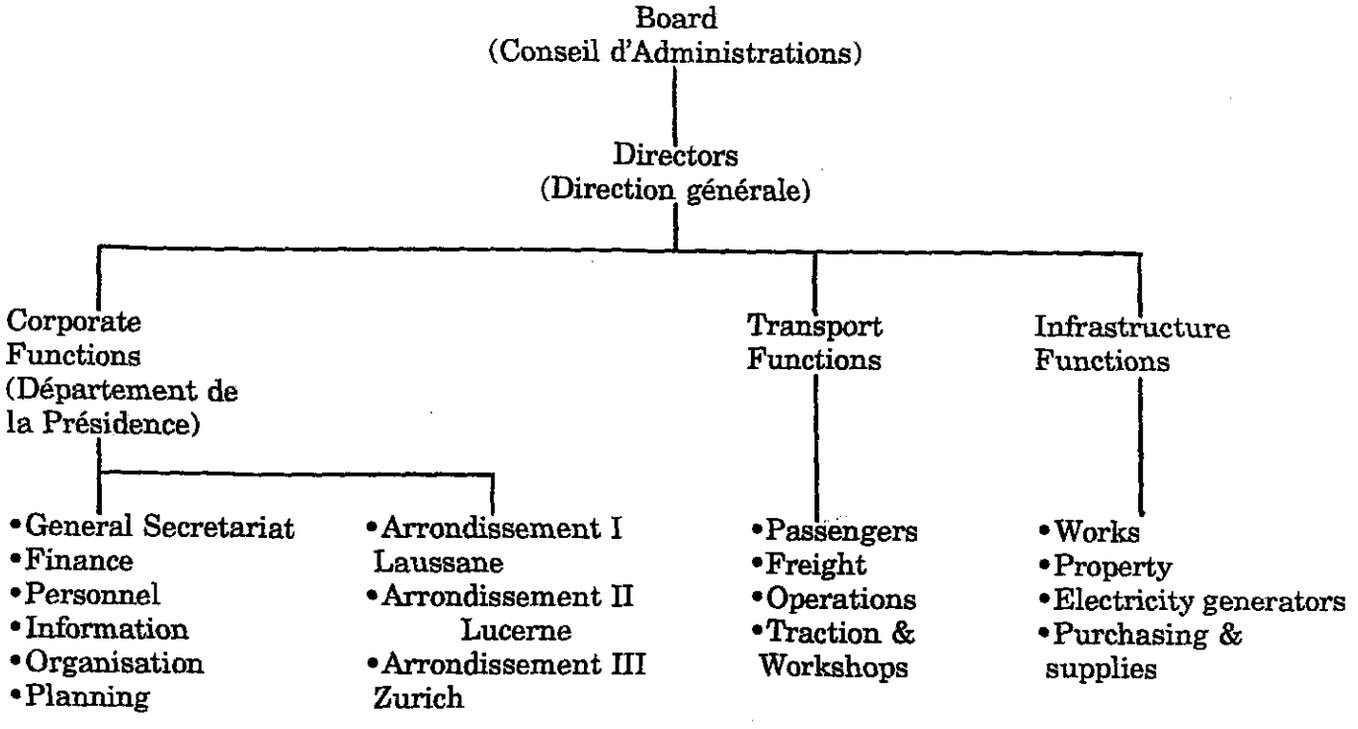
14. SWITZERLAND — Chemins de fer féderaux Suisses (CFF) a.k.a. Schweizerische Bundesbahnen (SBB) a.k.a. Ferrovie federali Suizzere (FSS)

A. OBJECTIVES AND MANAGEMENT

1. Ownership and Organisation

CFF was created in 1902 through the merger and nationalisation of several privately owned railway companies. CFF is a semi-autonomous public corporation. It has 17 board members (Conseil d'Administration) consisting of politicians, industrialists and trade unionists to which the Directors report to. CFF's internal organisation is based on a matrix of functions, regions and products and is outlined by Figure 14.1.

Figure 14.1: CFF Organisational Chart



2. Objectives and Constraints

CFF's objectives are set by the 1987 Service Mandate which will operate until a co-ordinated transport policy comes into force or until 1994, whichever is the earliest date. A distinction (first made in 1982) is made between commercial and social sectors. The commercial sector covers long distance passenger traffic, wagonload and sundries traffic. CFF were given full commercial freedom in these sectors. The social sector covers regional passenger transport and, for a limited start-up period, piggyback traffic. Social services are only provided by CFF if ordered by the service mandate and corresponding compensation is offered. Government accepts the financial responsibility for infrastructure. CFF have to pay a contribution towards these expenses, earned by the commercial sector. This contribution is fixed in advance by Government. Should CFF not be able to earn the contribution towards infrastructure costs, they have to show the deficit

in their balance sheet and carry it forward to the new account, if they cannot cover it by reserves from previous years. The level of contributions was fixed annually in 1987 and 1988 and for three year periods from 1990 onwards. In defining infrastructure, the main problem area was that of power generation. CFF maintains financial responsibility for power plants, frequency converters and power transmission lines to sub-stations but Government has responsibility for sub stations and power lines from sub-stations. Government also has responsibility for all administrative buildings, houses, warehouses and commercial facilities (station restaurants etc).

It should be noted that the Government has assumed the financial, but not the physical, responsibility for CFF structure. The main change is an accountancy one with a corporate profit and loss account and an infrastructure profit and loss account being produced. The latter, for 1989 and 1990, is shown by Table 14.1. It can be seen that infrastructure charges only cover a small percentage of costs (11% in 1989, 3% in 1990).

Table 14.1: Infrastructure Profit and Loss Account (SFr Mio)

	1989	1990
Expenditure	949.9	1089.5
Depreciation	281.2	289.1
Interest Charges	197.5	269.7
Maintenance	394.8	444.6
Other	76.4	86.1
Revenue	949.9	1089.5
CFF Contribution	102.0	37.0
Government Contribution	847.9	1052.5

Although Government has financial responsibility, CFF continues responsibility for infrastructure design. Government's influence is restricted to a review and approval of the investment budget for submission to parliament. The 1987 Service Mandate does provide for the Government to approve the long-term planning of CFF and to check, in particular, its agreement with the over riding objectives of the Confederation; to judge the medium term-corporate and investment plans derived from the long term planning; and to review the annual budget.

CFF is free to set fares at commercial levels for Inter City and Direct services in order to cover operating costs. Fares on Regional services are determined by Local Government (i.e. the 25 Cantons). Rail services may be withdrawn if they are not covering operating costs and Government support is not forthcoming, although bus substitution will normally be required. There is a trend towards decentralising the transport budget from the Federal government to the Canton governments, whilst for regional services tendering is being considered.

B. FINANCE

1. Government Support

In addition to Government support for infrastructure, Government supported regional and piggy-back services to the tune of SFr 550m in 1990 (SFr 523m in 1989). Given total

expenditure of SFr 5364m in 1990 (SFr 4975m in 1989), Government covers around 31% of costs (30% in 1989).

2. Investment

CFF's gross investments in 1990 were SFr 1932m (SFr 1631m in 1989). Net investment, given property sales and grants, was SFr 1775m (SFr 1509m in 1989). Investment has been planned in the Rail and Bus 2000 programme, which was supported by a plebisate held in December 1987. This programme has the following elements:

(i) Improve passenger services by increasing frequency of Inter City and Express services from hourly to half hourly, reducing journey times on key O-D pairs (e.g. Berne-Zurich) to under an hour and co-ordinating services with Regional bus and train services, so as to reduce interchange. It is hoped that public journey times will be reduced by up to 48%. This will require 120km of new lines (equivalent to 2.4% of existing rail tracks) in four main schemes, 26 track improvement schemes and modernisation of layout at nine key stations.

(ii) Improve passenger services by introducing new rolling stock. For long distance services orders in 1990 included 24 Rolling Stock Locomotives, 60 EWIV coaches and 70 Eurocity coaches, whilst for regional services this included 84 Kolibiri trains, 120 S-bahn locomotives and 390 double decker coaches. The piggyback transit corridor (see below) will require an additional 90 engines. Total orders for Rail 2000 are expected to be 340 engines and 1700 coaches.

(iii) Improve freight services by developing a network for liner trains running at regular intervals and two Transalpine Piggyback Corridors. This will require two new tunnels

  (a) the Gotthard base tunnel (49km) to be completed by 2010
  (b) the Lötschberg base tunnel (28km)

  as well as a new Golthard transalpine service between Arth-Goldau and Altdorf. piggyback services will be capable of carrying 40 tonne lorries, semi-trailers and swap bodies.

In developing piggyback services, CFF has formed a partnership with Hupac AG. They plan, organise and sell the piggyback services of the railways. Hupac operate the terminals and manage around 800 purpose-built wagons. By 1994, it is expected that Hupac will require 1000 additional wagons.

C. FREIGHT MARKET

1. Services

CFF transports freight as part-loads (Cargo Domicile), wagon loads and block trains (Cargo Rail) and containers and combined transport (Cargo Combi). These services are offered for inland, import, export and transit traffic. In 1990 tonnes lifted were as follows (million):

Cargo Rail	41.4	80%
of which Inland Traffic	18.1	35%
Export	2.1	4%
Import	11.3	22%
Transit	9.9	19%
Cargo Combi	8.9	17%
of which Piggy Back	4.7	9%
Containers	4.2	8%
Cargo Domicile	0.9	2%
Postal	0.6	1%
TOTAL	51.8	

2. Competition

In 1988 rail had a 40% market share (based on tonne km) of freight movements compared to 54% for road and 6% for pipelines. Despite a gross weight limit of 28 tonnes and bans on lorry use at night and on Sundays, road transport has grown rapidly, particularly for domestic traffic (for example, in 1970 road had a 38% market share compared to rail's 53%). However, rail is important for international traffic. Of Transalpine traffic through Switzerland, in 1987, 64% went by rail, 29% by pipeline and only 6% by road. However, Transalpine traffic via Switzerland has not increased at the same rate as elsewhere. In 1987, Switzerland only accounted for 22% of land based movements, compared to Austria 40% and France 37%. This is due to the less stringent regulations concerning road-based transport in these two countries.

D. PASSENGER MARKET

1. Services

Passenger services are divided into three main groups; Inter City (approximately 19% of train kms in 1990), Direct or Express (29% of train miles) and Regional (52% of train kms). Regional services include S-bahn services in the main cities and, in Zurich, an RER style service.

2. Competition

In 1988 rail had a 12% share of passenger traffic (in passenger-km) compared to car 83%, bus 4% and air 1%. There are around 60 so-called private railways, although in most cases the local Canton is the largest share-holder and they are heavily subsidised. The largest of these "private" companies is the Berne-Lotschberg-Simplon (BLS) railway. Both bus and domestic air services are regulated on a concession basis. Concessions are unlikely to be granted for services competing with train services.

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