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**Profitability of the different
services of RENFE**

by

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Introduction

This study is concerned with the financial situation of the Spanish national railway system RENFE (Red Nacional de Ferrocarriles Espanoles). In particular, it considers the profitability of the different business units created when the Company was reorganised. There are major problems involved in determining the profitability of internal business units, since this profitability will be partly dependent on the system of transfer prices used to value internal transactions within the organisation. In addition, there is the question of the appropriate treatment of joint costs, and particularly railway infrastructure costs, which reflect the costs of facilities shared by different business units.

This report proceeds by first reviewing trends in traffic and revenue on RENFE. We pay particular attention both to the changes in traffic volumes, and to the trends in real, inflation-adjusted, passenger fares and freight charges. We next outline the organisational changes in RENFE, and the creation of the new business units. This is followed by a review of the European Union's railway policy, and its relationship to the Spanish reorganisation. After briefly summarizing profitability trends, Section IV presents the set of accounts for RENFE for 1992 to show the inter-relationships between the different types of business units, and the structure of the overall financial losses incurred. As noted above, these financial results will depend on the transfer prices used, so Section V of the Report describes the logic and practice of the transfer price systems used by RENFE. Infrastructure costs are not allocated to business units, but Section VI shows the different methods by which railway track and signalling costs might be allocated to different types of business. Section VII then illustrates two alternative cost allocation methods: these allocation exercises are limited by the data we have available. The final section of the Report presents our conclusions, particularly with regard to the desirability of allocating infrastructure costs to business units.

Of course, railways should not be judged by profitability alone, and there are good social reasons for subsidising rail services. This does not mean that all subsidies are automatically justified, and the appropriate way to judge railway subsidies is to use social cost-benefit analysis to try to value the social benefits of RENFE which are not captured in railway revenue. These benefits can then be compared with the financial losses that need to be covered by Government subsidy. The second report in this study (John Dodgson and Mar Gonzalez Savignat "A Cost-Benefit Analysis Framework for Spanish Railway Services") outlines the cost-benefit analysis framework, discusses the relevant measurement and valuation issues, presents information on current valuations of social benefits of railways in Spain, and considers the relative importance of the different types of social benefit for RENFE's different business sectors.

I. RENFE: traffic and revenue trends

This Section of the report considers traffic and revenue trends in RENFE's different business units (Unidades de Negocios) as they are now defined. This section also considers the present structure of the railway network in Spain.

Traffic and market shares

Table 1 (see the Appendix) shows data on overall traffic levels and market share on the different transport modes in Spain for both passenger traffic (in passenger-kms) and freight traffic (in tonne-kms) from 1960 to 1991. In 1991 railways had a 7 per cent share of passenger traffic, whereas road had a 90 per cent share. As Figure 1 shows, rail had a 30 per cent share in 1960 and road a 67 per cent share. Although rail's share has declined, Figure 2 shows that total rail passenger traffic has nevertheless increased over this thirty year period.

On the freight side, rail had a 5 per cent share of the domestic Spanish freight market in 1991, whereas road freight had a 75 per cent share, sea transport a 17 per cent share, and pipelines 2 per cent. Figure 3 shows the trends in market shares, with rail having a 20 per cent share of the market in 1960, road 42 per cent, and shipping 39 per cent. As Figure 4 shows, total tonne-km hauled by rail in Spain have declined since 1988.

RENFE'S business units and their traffic characteristics are as follows:

Cercanías. These are the commuter services that operate in twelve cities. Table 6 (Appendix) shows the traffic in different cities in 1990, 1991 and 1992. In 1992 54 per cent of commuter passengers were in Madrid, 23 per cent in Barcelona, and 8 per cent in Bilbao¹. In 1992 this business sector carried 36 per cent of total passenger-km and about 89 per cent of RENFE's total passengers. The sector has seen rapid growth in traffic in recent years with the development of rail commuter services. These have an important role in reducing traffic congestion in the larger cities in Spain.

¹There have been several changes in the calculation methods. Before 1979 a global figure of traffic was obtained from the revenue data. In that year a new method was adopted, based on continuous surveys on certain routes and on a global survey in a representative week.

Before 1991 the traffic of Regional and Commuter services was not well known because the fact that Regional's trains carry Commuter's passengers was not properly accounted for. This means that the first reliable data about the two sectors separately were obtained in 1991. In this year, with the spread of the VISIR (Integrated selling of tickets without booking in advance) for the sale of both sectors' tickets, a new method of traffic assessment was adopted. According to this method, the 1991 traffic is 1900 million passenger-kms and 21.1 million journeys.

Regionales. These consist of services that connect capitals or relevant cities of less than 500 kms of distance, and those routes that the Largo Recorrido services do not serve. The proportion of Regionales in total traffic is diminishing, because it operates in low density flows. Nevertheless in the last years some new products have been introduced in markets with a considerable demand (Catalunya Express, and Regional Express).

Largo Recorrido. These services include long distance services on radial corridors from Madrid to different regions of Spain; some transversal corridors; and also international traffic. The number of passenger-kilometres has fallen, following a trend that was reversed for a period between 1982 and 1985. The loss of traffic is mainly due to the impact of the construction of new motorways and the competition from regular road coach services. Within this sector there has been some reallocation of service, concentrating the efforts on the higher quality services (Talgo, first class...) that are most in demand, and on the routes where the railways were more competitive. Tables 7 and 8 (Appendix) show breakdowns of long distance traffic between different corridors and different types of train.

AVE (Spanish High Speed). These services started operating in April 1992 on the new standard gauge route between Madrid and Sevilla. This sector can be considered in isolation because of its particular technical characteristics. The main services are between Madrid and Sevilla. Shuttle trains also operate between Puertollano and Ciudad Real, and the route also has some Talgo trains. Demand has grown considerably in 1993.

Cargas Completas. This freight sector includes full-load wagons (on trains carrying wagons for different clients), full-load trains (trains for a single client) and internal transport. Apart from the impact of road competition, this UNe has faced a decrease in its market because the traditional clients of Renfe have been losing importance in the economy in terms of their contribution to GNP as sectors like coal, minerals, cement and oil which move flows of bulk traffic have been reorganised. In addition, oil traffic has been lost to pipelines.

Transporte Combinado. This freight sector hauls conventional containers, and also express trains (TECO) with lower movement needs. The sector has achieved a share of 24 per cent of total rail traffic, though in the last few years its traffic has fallen. This market, together with long distance bulk traffic and urgent parcels is one of the more promising in the freight business, because of the support of the European Commission for intermodal transport.

Paquetería. This sector consists of three main products. Paquexpress deals with urgent delivery parcels, operating mainly with passenger trains, especially overnight ones. Cargoexpress transports less urgent parcels, of bigger size, on long distance trains (CEX). Both sectors have a network for distributing and concentrating parcels with some road transport. In 1992 Renfe lost its monopoly of providing mail services, and since then Correos traffic has decreased considerably.

Detailed traffic trends for all the above sectors are shown in Tables 2, 3, 4 and 5 in the Appendix. Table 2 shows passenger journeys and freight tonnes, and so does not allow for differences in journey length or length of haul. Table 3 gives a breakdown of the full load tonnage by commodity group. Table 4 shows the breakdown of traffic in passenger-kms or tonne-kms, while Table 5 gives the commodity breakdown of full-load freight.

Revenue and revenue per traffic unit

We next consider revenue earned from all of the above traffics. The most relevant here is revenue corrected for changes in the general price level in Spain. The index which we use to correct current revenue figures to revenue at 1992 prices is the retail price index.

Table 9 in the Appendix shows revenue from the different types of business at current prices, and Table 10 shows these total revenues converted to 1992 prices. Table 10 shows that real revenue from passenger services has been increasing since 1989, whereas real revenue from freight services has been declining since 1981, the last year for which we have full figures.

Table 11 in the Appendix shows unit prices in terms of real revenue per traffic unit (passenger-kms or tonne-kms). In 1992 the passenger business earned an average of 5.75 pts per passenger-km. The high-quality AVE services earned 16.45 pts per passenger-km. Largo Recorrido earned 6.91 pts per passenger-km. Revenue per passenger-km was lower for the Cercanías (3.79 pts) and Regionales (4.32 pts) services. Over the passenger business as a whole, the Table shows that real revenue per passenger-km has remained fairly stable, at between 5 and 6 pesetas per passenger-km at 1992 prices.

Table 11 also shows the decline in real revenue per freight tonne-km, from 9.07 pts in 1981 to 5.70 pts by 1992. The Table shows how the high value Paqueteria services earn much higher revenue per tonne-km than the other freight businesses (though these higher revenues do not necessarily compensate for the much higher handling costs). The trends in this Table are summarised in Figure 6, which shows trends in real revenue per tonne-km in the three main freight sectors between 1981 and 1992.

There are a number of reasons why unit revenue in the *freight* sector may have declined:

- (1) if length of haul has grown, then the proportion of terminal and marshalling cost will be a lower proportion of total costs, and so that could explain the reduction in the rates per tonne-km. Tables 12 and 13 in the Appendix show average length of haul for different types of traffic. The information on freight is summarised in Figure 7, which shows some increase in average length of haul for the average freight business.
- (2) if the composition of traffic changes towards bulk traffic, rather than wagon load and container traffic, less movement costs are caused and consequently lower rates per tonne-km would also be justified. However, some of the most important bulk products (coal, solid fuels, petroleum, ores,

- metal, building material) have declined, whilst some traditionally wagon-load traffic such as timber, cereals and iron/steel products have grown.
- (3) if freight rates are set on the basis of the value of the traffic carried (i.e. on the principle of "what the market will bear"), we can observe if products with a higher value have decreased in volume. This is the case for domestic automobile traffic, liquid fuels and military haulage. On the other hand, medium value products such as timber, cement and minerals have increased.
 - (4) if the load factor has risen then it also justifies lower rates. Average load factor is equal to tonne-kms divided by train-kms. Figure 8 shows average freight train load factor. This figure clearly shows a fall in average freight train load factors in Spain.

It appears unlikely that the above factors can account for all the changes in real rail freight changes in Spain, and so we conclude that the failure of these changes to keep pace with inflation cannot be easily explained in terms of reductions in the real costs of handling the traffics carried.

The railway network

In 1991 RENFE operated a network of 12,570 kilometres of railway route. The Table below shows the characteristics of this network. Twenty two per cent of the network was double-track, and the remaining 78 per cent single track, with the capacity problems that involves. Just over half of the network (51 per cent) was electrified, including almost all the double-track route.

The network is divided into four categories of route, A1, A2, B and C, depending on the density of traffic that each bears. Those that bear a high density of traffic are provided with better facilities in terms of signalling, quality of track, electrification etc. The other categories, B and C, are only maintained at low or minimum standards of quality.

	non electr		electrified		TOTAL NETWORK			
	single	total	single	total	KMS.	%single	%elect	with AB
1970	9981	10572	1684	3096	13668	85,3	22,7	2119
1975	9328	9832	2088	3665	13497	84,6	27,2	3121
1980	8016	8069	3255	3473	11542	97,7	30,1	3996
1985	6499	6510	3682	6200	12710	80,1	48,8	4147
1986	6492	6513	3652	6208	12721	79,7	48,8	4329
1987	6366	6386	3717	6300	12686	79,5	49,7	4347
1988	6215	6235	3723	6315	12550	79,2	50,3	4396
1989	6123	6143	3811	6422	12565	79,1	51,1	4473
1990	6051	6144	3805	6416	12560	78,5	51,1	4517
1991	6051	6144	3805	6426	12570	78,4	51,1	4539

The map in the appendix (Average of daily circulation/Promedio diario de circulaciones par lineas) shows the density of traffic on different sections of route, and the use of the network by passenger and freight trains.

The structure of railway costs

An important question in analysing railway policy is that of the way railway costs vary with the size of the firm, the structure of the network, and the composition of traffics handled. Provided sufficient data are available, this can be considered using econometric estimation techniques. European railway costs have been studied by the Institute for Transport Studies at the University of Leeds, and a companion study to the present one (Anibarro Garcia, 1993) has extended this analysis to include RENFE. This analysis uses the translog cost model to analyse railway costs, using annual data on 15 national railway companies for the years from 1971 to 1990 (see also Preston, 1994).

The results show that with regard to the effects of the size of firm there are increasing returns to scale for the smaller firms, constant returns to scale for medium sized firms, and decreasing returns to scale for the larger firms. The RTS measure for RENFE is around 0.7, indicating decreasing returns to scale. In turn, this implies that the size of RENFE was too large, though the switch to business units after 1990 might yield the type of cost-reduction benefits necessary to offset these apparent diseconomies of scale revealed from the RENFE data for the 1971 to 1990 period. Most railways shows evidence of increasing returns to density, indicating that costs could be reduced by concentrating traffic on fewer routes. RENFE is no exception, although there is a steady reduction in returns to density over the sample period. The evidence of returns to density indicates that costs could be reduced by abandoning lower density lines and (where geographically possible) concentrating traffic on fewer routes. Given that 78 per cent of RENFE's network was already single-track in 1991, the scope for reducing costs by reducing track capacity on individual routes is likely to be limited.

II. Railway policy in Spain.

In this section we consider railway policy in Spain, and how it influences the performance and profitability of RENFE. In 1987 the Law for the Ordination of Surface Transport was approved, to regulate both road and rail transport. This law determines that services should be provided in the framework of a free market, with the role of regulation being to ensure competition between operators and modes. In the case of Railways the planning and authorisation of the services will be decided by the State, while the operators will be responsible for the operation of the lines and services. RENFE's role will be to run the lines and services of the Integrated National Network which will be defined by the State (Pérez 1992: 30) .

The Railways Transport Plan (PTF) was also approved in 1987. This plan has the aim of promoting the railway selectively, defining the general principles of the policy until the year 2000, and providing the specific objectives of the infrastructure investment, the pattern of services and pricing policy. These objectives are as follows:

- the network and the services will be adapted to the demand needs, introducing new technology to provide a competitive service for the appropriate traffics.
- economic factors must guide planning and management, trying to restrain expenditure and to allocate resources efficiently.
- railways will compete with other modes and should cover their costs with revenue (or with government compensations in the case of social services).
- planning will follow:
 - PTF: the strategic plan to the year 2000.
 - Multiannual plans in the medium term: these are the Contrato Programa
 - Business plans which set the annual objectives for management from the economic and technical viewpoints.

The last Contrato Programa was from 1988-91, and is still in existence until the new one is approved. In this contract RENFE is committed to achieve the following objectives:

- carry a specific number of passenger and tonne-kms, with an increase in each year.
- supply the services with specified levels of quality.
- improve the economic results, according to specific targets.
- undertake the investments planned: for operations and management rationalisation improving safety.
- develop a new system of tariffs and pricing, trying to ensure that higher quality services cover their costs.
- rationalise the decision process.

The government's commitments concerned the investment programme, the payment of the railway's debts before 1988, and the payment of subsidies and compensations. As Carbajo et al. (1989: 213) show, in these guidelines there is no explicit remit to RENFE for pricing and investment policies, for instance which costs should be covered, and how to finance the other costs. It was necessary to wait until 1991 to obtain the answers to such questions with the implementation of the new structure of RENFE.

RENFE's new organisational structure

In 1991 RENFE adopted a new model of organisation. The Company is organised into twelve Business Units (UNes), classified as follows:

Transport Operators**Passenger**

AVE

Largo Recorrido

Cercanías

Regionales

Freight

Cargas Completas

Transporte Combinado

Paquetería

Providers of Services

Stations and Joint Services

Rolling Stock Maintenance

Traction

Infrastructure Management

Infrastructure Maintenance

Traffic Movement (Circulation)

This new model replaces the old one which was based on geographical areas and functional departments (production, maintenance and purchases, engineering, quality, commercial management...). Some of these departments continue operating and others have been restructured and converted into business units.

The first objective of this new model is to specialise in the different markets that RENFE operates which may be profitable or potentially profitable in social and/or in financial terms. The second objective is to obtain control over the costs.

Each business unit will be responsible for the consequences on revenues and costs of the different strategies adopted. The performance of each unit is to be judged against its Account of Results. They will consist of three categories:

- (1) The unit's own revenues and costs
- (2) Revenues earned from other business units, and the costs of services supplied by other business units. Calculation of these requires conventions on the valuation of the products or services that each business unit provides within the overall railway organisation ie a set of "transfer prices".
- (3) Depreciation charges on capital assets.

Consequently these accounts are intended to control the management of the different business units and also to act as a planning tool in the medium term. This is because they provide signals about the managers' successes in the achievement of their targets.

RENFE has decided that the business unit's accounts should include neither the interest payments for financing the deficits not covered by the state nor those derived from the investment plans which RENFE thinks should have been undertaken by the state.

In its Business Plan for 1992-93 RENFE set some strategies consistent with the study of its possibilities for operating in different markets. In the 1993 Budget the translation of such strategies in terms of economic objectives in the short term can be seen. They broadly consist of improving the margin between revenue and costs in the different business units. Each business unit also identifies the surplus capacity that should be removed. These objectives are consistent with the medium term objectives of obtaining a positive Contribution Balance in five years for Largo Recorrido, Cargas Completas and Transporte Combinado, and in three years for Paquetería, and maintaining a fixed unit cost per passenger in Regionales and Cercanías.

III. The Spanish approach and European Union railway policy

We now consider if this organisational model and the Spanish approach to railway policy are consistent with the kind of recommendations that come from the European Commission's railways policy (Directive of the Council, 29th July 1991, 440/91 on the Development of the Community Railways). These recommendations try to deal with the problems of the financial debts of the firms and the inadequacy of the railway infrastructure (Nash, 1992). They can be summarised as having the following objectives:

1. To create a framework that allows autonomy in the management of the railways.
2. To set contractual devices to provide transport services of social value (commuter and regional) between the government and the railways so as to guarantee economic viability of the railway organisation.
3. To improve the finances of the firms in dealing with the payments of historical debt charges.
4. To clarify the functions and costs associated with infrastructure management and transport operations.
5. To liberalise access to the infrastructure with user charges for access to the network.

We will analyse these objectives and issues in turn:

1. Autonomy in the management of the railways

The regulation of railways has been maintained largely by the belief that railways are a natural monopoly. This condition meant that the states tried to control fares and charges in order to restrict the possibilities of railways exploiting monopoly power, and to impose the obligation to accept whatever traffics were offered to them at these fares. The latter obligations are referred to as "common carrier" obligations. In most cases the railways were largely protected from outside competition in order to exploit

their economies. Nevertheless traffic shares have declined even in the markets in which rail was better suited, and deficits have grown. The solution to the railway crisis comes through defining its role, in terms of the routes to serve, the levels of service to offer and the prices charged for them. These solutions seek to deal with the problems of services with low demand, and others where costs exceed the price which rail users are prepared to pay.

In this context a closer relation between the managers and the results, so that managers have more responsibility and more autonomy, is needed. The first step towards this objective of autonomy was the split of RENFE into sectors, with separate responsibility for the different managers. Each sector manager has different objectives to the others, depending on the financial profitability of their sector and their efficiency in the use of resources.

The solution given to passenger and freight services is to separate out those that operate in competition with other modes, and should not receive any subsidy (AVE, Long Distance and Freight) from those that could not survive without subsidy but are required for social reasons because they provide an alternative transport service (Regional and Commuter). The problem with passenger services is that the separation between social and commercial services is not clear (Nash 1985: 114) because it is usual for the business units to operate on the same route and to share costs and revenue. For instance Largo Recorrido and Regionales have overlapping services, and the Largo Recorrido sector has to cover all its operating costs while Regionales does not. The existence of joint costs and revenues makes the profitability of the different services difficult to define because the allocation of revenue and particularly costs will depend on more or less rational conventions.

On the other hand RENFE does not have complete autonomy to decide on the routes to serve, the levels of service to offer, and the prices to charge. It is constrained because it has no choice regarding on the size of the network, it is not free to make major service rationalisations, and the fares for social services have to be approved by the government². These restrictions should mainly affect the social services, and not those which have to compete more directly in the market.

At the beginning of 1993 a plan to reorganise the passenger sector was presented. It broadly consisted in reducing long distance services by 5.8 per cent and regional services by 4 per cent. This objective would be achieved by combining some parallel services, or withdrawing them on certain days of the week. The plan that was initially devised has been modified, due to withdrawing agreements

²Article 252.2 of the Reglamento 1211/90, 28th. Sept. 1990, on the development of the LOTT (Surface Transport Ordination Law) says that when RENFE proposes to close any line or service or to modify any other basic conditions of operations (that is the closure or change in the use of stations; the withdrawal of more than 25 per cent of the services in any line/section of lines or any other action that affects the users), it will ask for the Ministry of Transport's authorization, which will be decided after taking into account the report of the Comunidades Autónomas affected.

with regional authorities and the Ministry. At the same time the Largo Recorrido sector is introducing some improvements in its train fleets to reduce the travel time to be competitive with road in terms of price and quality.

Since 1993 RENFE has been free to set fares on intercity services and rates for freight, while the increases in commuter and regional fares continue to be under government authorisation. Nevertheless Cercanías can charge a supplement at weekends. The Largo Recorrido sector is introducing a differential fare system by trains, depending on the demand in each corridor. The structure will be similar to the AVE's system, with different prices for peak and off peak periods.

The freight business has introduced some measures to reduce costs and to abandon some traffics. The most significant are that the minimum size of haul is now greater; the number of operating terminals for combined transport has decreased; the rates for wagonload traffic have been increased; and delivery times have been improved. One objective is to change this traffic (especially timber, cereals and iron/steel) into full train-load traffic ³.

2. Contractual devices to finance social services

We have seen above that RENFE faces restraints on its performance due to the imposition of certain obligations by government. In the Contrato Programa (point 5.2) the payment for the compensation of the Public Service Obligation (PSO) is set. It includes the following categories:

- Services on lines and branches with low traffic levels which are supplied because of regional or national interests.
- Regionales and Cercanías services: these sectors are compensated by the obligation of carrying passengers as was defined in 1191/69 EEC. This compensation covers the difference between the fare income from these services and the costs, estimated in advance.
- Maintenance, vigilance and depreciation of infrastructure: they are paid in accordance with article 3.1.b of 1107/70 EC. The justification of this subsidy is that the road hauliers do not pay the infrastructure costs they cause and so RENFE should be treated in the same way, until the appropriate road charges were set. This subsidy is also established in advance, though in 1992 it was modified to include the costs of the AVE.
- Normalisation of accounts: this includes some social security obligations of RENFE which are not borne by other modes (1192/69 EC).

³The importance of wagon-load trains on the profitability of the Cargas Completas business unit may be clearer with these figures: in 1992 this type of train represented 6 per cent of income, 20 per cent of costs and 80 per cent of losses of the business unit. The total losses of the business unit were 7934 million ptas, and 6392 million ptas of these were caused by wagon-load trains. (Lineas de Gestion nº 62, 19th May 1993, page 7).

We have to consider whether this method of payment gives an incentive for the efficient use of resources, and also if it provides a good way of monitoring managers' performance. Following Nash (1985: 113), these two objectives require different information to be used:

- to know the purpose of the subsidy requires detailed information about the receipts and expenses of each service/or group of services.
- to use the subsidies efficiency needs to be judged according to the achievement of clear objectives. This control has to be done in an aggregate level because the existence of joint costs means that the allocation of these costs is meaningful only at a certain level of aggregation of services.

There is another desirable condition which should hold: transparency in the subsidies' administration, which means that it should be possible to know the consequences of different levels of subsidy or different allocations between services.

First of all, the payments are agreed in advance, and so there is an incentive to be efficient, that is to obtain the objectives with the available resources. The key question is how to define such objectives for traffic and subsidy levels. The solution that Nash proposes would be to undertake a cost benefit analysis for regional and commuter services in order to set the level of subsidy, and then give managers the objective of maximising the number of passenger-km as the rule for day-to-day management. It has been demonstrated that this is a good approximation to the efficient economic objective of maximising social welfare, and it also gives the managers a clear rule to follow.

In the case of Cercanías, the business unit receives an additional incentive of 3 pesetas per extra passenger-km carried over the target. Consequently this sector has an incentive to maximise the number of passenger-kms. For Regional there is no such incentive, and so its objective is less clear. The cause may be the existence of services that carry large flows of traffic and so could be social or commercially profitable, and other ones that should be withdrawn according to cost-benefit criteria ⁴. There is then a clear cross-subsidisation between services, with a loss of welfare that can only be justified on political grounds. Most of the regions with unprofitable services both historically and currently have

⁴There are some Regionales services that show a very poor financial performance. In the review *Lineas de Gestión*, no. 56, pages 6 and following, some examples of this fact are presented. For instance:

- the service A Coruña-Lugo-Ourense earned, from January to August of 1992, 21.5 million ptas of revenue and incurred 251 m.ptas of costs (a revenue-cost ratio of only 8 per cent)
- Ourense-Zamora-Medina: 24 and 233.9 (10.2 per cent).
- Gijón-León: 54.3 and 246 (22 per cent)
- Vigo-Ourense-Ponferrada-Leon, 90.7 and 335.9 (27 per cent).

These poor results may be slightly improved if we add the contributory revenue to the other services of RENFE.

poor communications, and there is then strong opposition to reduction in their low levels of services even though the substitution of buses could be a more efficient and cheaper mode of transport.

RENFE's first intention was to reduce some regional services in cases where they carried less than 50 passengers per day (that is the traffic could be carried by one bus). The possibility of substituting rail services by bus services is also being considered. There are also changes in fares trying to reduce the differences between the reduced and the normal fare.

A more disaggregated subsidy, by groups of services, may give a better understanding about the value obtained from subsidy, and also should imply a lower amount of subsidy if the non-profitable services in social terms are withdrawn. One possibility would be for the regional institutions to finance the services. The payment should be based on the avoidable cost, that is the cost that could be saved if the service no longer exists.

The method of administering the grant is not transparent because there is no clear guidance as to what the social priorities should be, and which benefits could be gained by different combinations of fares and quality, and different allocations of subsidy between regions.

Finally, referring to the infrastructure subsidies, there is no way of knowing if they are justified in terms of economic efficiency or if they are merely a way of making up deficits, because there is no intention of allocating the infrastructure costs to the sectors. Therefore this grant does not pass the transparency test because we do not know how the figures are derived, and how the infrastructure business unit is going to control its costs, and whether it has incentives to reduce them.

3. Improve the finances of the firms, dealing with the payments of historical debts

There are two types of subsidies to RENFE to allow for the interest generated from the loans to finance: (a) the deficits not paid by the government, which are classified under the heading "State Account" and (b) the investments made by RENFE that should have been undertaken by the state.

These two items have grown considerably in the last two years, and this is also the case for depreciation (see page 21). Therefore this is an important constraint on the autonomy of RENFE to add to those mentioned above.

Apart from these two specific subsidies, the rise in interest and depreciation charges is also taken into account in the Contrato Programa. The Operating Results targets from 1988 to 1991 were adjusted to take account of this ⁵.

⁵In point 18.2 of the Contrato-Programa the way to modify the results before depreciation and interest, and the Operating Results is established:

4. Clarify the functions and costs associated with infrastructure management and transport operations

The EC argued that there were three reasons to separate infrastructure and operations:

- (1) so that railways would be in a similar position to roads;
- (2) to permit the introduction of competition in the operation of services (the contestability argument)
- (3) to facilitate the operation of international services by single operators.

The similarity with roads argument means that the state should provide the infrastructure for both modes and charge for its use. The provision of infrastructure on the two modes should be undertaken according to the same criteria, the most appropriate of which would be social cost-benefit analysis. Services should pay prices based on the marginal social costs they impose, though problems arise (as we shall see in Section VII below) in apportioning joint costs of infrastructure among services.

An important issue is how far the actual management of infrastructure and operations (as opposed to their financial accounts) should be separated. RENFE has been retained as a vertical organisation, whereas in the U.K. infrastructure and operations will soon become the responsibility of separate companies. Given the close relationship between investment in rolling stock and infrastructure, this might create problems in co-ordinating future rail investments in Britain.

The *contestability* argument is based on the assumption that operation of train services can be a contestable market. If a market is perfectly contestable individual operators have to charge prices equal to marginal costs because of the threat of entry of new operators if the incumbents' prices exceed marginal costs. As long as the industry is not a natural monopoly, prices will also be equal to average costs. One of the necessary conditions for a contestable market is the absence of sunk costs. This is certainly not true of railway infrastructure, hence the argument for separating out the allegedly-contestable component (operations) from the clearly not contestable one (infrastructure). However, attempts in Great Britain to devise a contestable market for railway operations have not yet proved successful.

The third reason for separating infrastructure and operations is the argument that separate management would facilitate the development of specialised operators providing international rail services in a more efficient way. This assumption is also based on fair access charges which allow new entrants to compete freely. In order to take advantage of economies of density it could be worthwhile to

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- (1) the results before depreciation and interests will be adjusted in line with the retail price index.
 - (2) the subsidised depreciation will be the lesser of the following two figures:
 - (a) that actually produced
 - (b) that projected for that year, plus an increase of 10 per cent.
 - (3) the financial expenses will be the result of the sum of types of financial debts, actualised according to changes in interest rates.

concentrate the flows on a few routes, and the current tendency is the creation of some joint ventures between different firms.

Now that we have considered the different arguments in favour of separation of infrastructure and operations, an important question arises: Does this model permit a better control over the infrastructure costs and quality than the existing one? The Infrastructure Management of RENFE is responsible for the functions of providing, maintaining and operating the infrastructure. The objective of this organisation is to optimise the resources in accordance with the economic and technical needs of the operators. The economic aspect may be guaranteed by a fair treatment in the allocation of capacity. The technical aspect means that there will be a need to provide good quality infrastructure, in terms of track quality, punctuality, safety, etc. As noted above, the infrastructure organisation will also have to be coordinated with the operators in order to make the appropriate investment to take advantage of investment in rolling stock assets.

5. Liberalise access to the infrastructure with access charges for use

These payments should be based on some measure of cost causation, such as train-kms, speed,time, axle weights, which attempt to charge the marginal social costs for the use of the track and other facilities. In practice this is extremely complicated in a system where a mix of different traffics operates, and even more difficult where there are different companies operating. Section VII considers the problems involved in assessing optimal infrastructure charges for rail services.

IV. Trends in profitability, and accounting results under renfe's new organisational structure

In this Section of the report we first review the trends in financial performance for RENFE over the period from 1984 to 1992. We next present the set of RENFE's results for 1992 under the accounting conventions used with the new business sector organisation. This shows how the business results for each sector are devised. It also shows overall make-up of the various forms of subsidy provided by the Government to RENFE.

Financial performance from 1984 to 1992

The Table on the next page shows financial trends over the period from 1984 to 1992. The trends in traffic and prices underlying the revenue trends were discussed in Section I of this report. A major feature is the increasing importance of passenger revenue in relation to freight revenue as a proportion of total revenue. On the cost side, staff costs have declined in real terms but have remained a constant proportion of total costs despite a substantial reduction in the total number of employees.

OPERATING RESULTS AT CURRENT AND 1992 PRICES. (million ptas)

	1984	1985	1986	1987	1988	1989	1990	1991	1992
Revenue									
passenger	48046	55308	55761	59453	64107	65537	75030	78749	93936
freight	50837	53221	52387	54431	56011	57857	58645	56864	53403
others	17332	20749	25661	29658	28485	31064	38066	32528	34894
total	116215	129278	133809	143542	148603	154458	174996	168141	182233
expenditure									
personnel	145689	142655	146242	147791	144063	150114	162044	178754	187862
materials	111205	101619	99310	97779	96985	100859	117728	125721	134880
depreciation	20252	23704	25848	28642	30958	35343	38400	50178	60038
interests	70134	64965	64247	62348	62515	58947	63051	68547	83553
extra.results	1730	0	0	-1067	0	0	-7323	6846	13876
total	349010	332943	335647	335493	334521	345263	373900	430046	480209
Subsidy									
PSO	98885	92115	96751	107111	109447	112661	118928	124098	1405800
Others	70134	64965	64247	62348	62515	58947	63051	74288	87262
total	169019	157080	160998	169459	171962	171608	181979	198386	227862
RBDI	-140679	-114996	-111743	-102028	-92445	-96515	-104776	-136334	-140509
Operating	-232795	-203665	-201838	-191951	-185918	-190805	-198904	-261905	-297976
Management	-63776	-46585	-40840	-22492	-13956	-19197	-20180	-63519	-70114
Management*	-62046	-46585	-40840	-21425	-13956	-19197	-12857	-56673	-56238
	1984	1985	1986	1987	1988	1989	1990	1991	1992
Revenue									
passenger	84143	87027	80643	79028	80925	78941	88458	83395	93936
freight	89031	83743	75763	72353	70705	69690	66266	60219	53403
others	30354	32648	37112	39423	35958	37418	43013	34447	34894
total	203527	203418	193518	190803	187589	186049	197737	178061	182233
Costs									
personnel	255145	224467	211499	196451	181858	180817	183102	189300	187862
materials	194753	159897	143625	129973	122429	121488	133027	133139	134880
depreciations	35467	37298	37382	38072	39080	42572	43390	53139	60038
interests	122826	102222	92916	82876	78916	71003	71245	72591	83553
extra.results	3030	0	0	-1418	0	0	-8275	7250	13876
total	611221	523884	485421	445955	422282	415880	422489	455419	480209
Subsidy									
PSO	173177	144942	139924	142377	138160	135704	130705	131420	140580
Others	122826	102222	92916	82876	78916	71003	71245	78671	872622
total	296003	247164	232839	225254	217076	206707	201950	210091	227862
Results									
RBDI	-246371	-180945	-161606	-135621	-116698	-116255	-118392	-144378	-140509
Operating	-407694	-320466	-291903	-255151	-234693	-229830	-224752	-277357	-297976
Management	-111691	-73301	-59064	-29898	-17617	-23123	-22802	-67267	-70114
Management*	-108661	-73301	-59064	-31316	-17617	-23123	-31077	-60017	-56238

SOURCE: PÉREZ SANZ (1992). MANAGEMENT REPORTS 1991, 1992.RENFE

NOTE: (A) THE SUBSIDY FOR ANTICIPATED RETIREMENTS (O.M. DEL Mº DE TRABAJO, DECEMBER 1986) WAS NOT INCLUDED, NEITHER AS REVENUE NOR AS EXPENSE, IN ORDER TO OBTAIN A CONSISTENT COMPARISON. THIS SUBSIDY AMOUNTED 8075 MILLION PTAS IN 1987, 11075 M. PTAS FROM 1988 TO 1991, AND 3000 IN 1992.

(B) PSO INCLUDES REGIONAL, CERCANIAS, INCENTIVO, INFRASTRUCTURE, AK LINES AND NORMALISATION.

(C) RBDI: RESULTS BEFORE DEPRECIATIONS AND INTEREST, IS THE DIFFERENCE BETWEEN TOTAL COST AND INCOME FROM TRAFFIC.

(D) OPERATING RESULTS: RBDI PLUS DEPRECIATIONS AND INTERESTS,

(E) MANAGEMENT RESULTS: OPERATING RESULTS PLUS SUBSIDIES

(F) MANAGEMENT* DOES NOT INCLUDES EXTRAORDINARY RESULTS

(G) REV/COSTS DOES NOT INCLUDE "OTHER REVENUE".

RENFE financial results for 1992

The next four tables show the financial results for 1992. The tables show

- Management Results (Total Revenues and Expenses)
- Revenues and Expenses of Operating Business Units before Subsidies and Common Costs
- Direct and Transfer Expenses and Revenues of Business Servicing Units
- Revenue and Expenses of Infrastructure Management Business Units

The contents of these four tables are as follows.

Management Results (Total Revenues and Expenses) 1992

This table shows the revenue for the different business units, together with the OSP and incentive subsidies allocated to specific business units. From this table it is possible to derive the total financial losses of RENFE in 1992 before receipt of government subsidy. This was 301,976 million pts., made up as follows:

OSP, Regional	19,139
OSP, Commuter	17,793
Incentive, Commuter	6,300
Infrastructure Compensation	92,670
Other Compensation	91,690
Subsidy Decree 86	3,000
Trading Loss	57,508
<u>Extraordinary Negative Results</u>	<u>13,876</u>
Total	301,976

This sum is equal to 1.65 times the revenue of 182,233 million pts from rail users.

Management Results (Total Revenues and Expenses), 1992

(Millions of Pesetas)

INCOMES

Passengers		137,168
AVE	8,440	
Long Distance	53,864	
Regional	9,303	
OSP*	19,139	
Commuter	22,329	
Incentive	6,300	
OSP*	17,793	
Goods		53,403
Full Loads	42,129	
Fractionalized Loads	11,274	
Others		34,894
Other Compensations		184,360
Infrastructure	92,670	
Others	91,690	
Subsidy Decree 86		3,000
Total		412,825

EXPENSES

Personnel	187,862
Traction Energy	29,220
Services and Materials	105,660
Retirements Decree 86	3,000
Total	325,742

RESULTS BEFORE DEPRECIATION AND INTERESTS

87,083

Depreciations	61,038
Interests	83,553

RESULT OF TRADING YEAR MANAGEMENT

-57,508

Also accounted for in the trading year are 13,876 million pesetas shown as extraordinary negative results.

* Public Service Subsidy

Source: RENFE Informe de Gestion del Ejercicio de 1992 June 1993.

Revenue and Expenses of Operating Business Units before Subsidies and Common Costs

This table shows the revenue and costs of the different operating business units shown in the previous table. As well as the traffic revenue, the table also shows income from transfers from other business units. The principles underlying the transfer prices are explained in the following section, section V, of this report.

There are two types of expenses for each operating business unit. The first, "operating expenses", consist of the costs of personnel, services and materials, depreciation and working capital expenses employed by each sector. The second, "handling charges", show transfer payments to the three business servicing units: stations and joint services; rolling stock maintenance; and traction. The next-to-last row of the table shows the operating loss of each of the operating business units. These figures will be used in the cost allocation exercise in section VII below.

Revenues and Expenses of Operating Business Units before Subsidies and Common Costs, 1992
(Millions of Pesetas)

	AVE Distance	Long	Regional	Commuter	Fully Laden Goods	Partially Laden Goods	Total
Customer revenue	9282	54953	9307	22758	42588	11403	150291
• By Traffic	8440	53864	9303	22329	42129	11274	147339
• Others	842	1089	4	429	459	129	2952
Income from transfers	1946	1025	2118	7187	3261	153	15690
Total Income	11228	55978	11425	29945	45849	11556	165981
Operating expenses	10301	28207	4682	25436	15436	12920	96982
• Personnel	2455	3678	2534	14825	5701	3887	33080
• Traction energy	680	0	0	0	0	0	680
• Services and materials	5625	18508	268	5341	1808	6186	37736
• Depreciations	1461	5718	1762	5238	7230	240	21649
• Working capital expenses	80	303	118	32	697	2607	3837
Handling charges	396	40549	16625	21823	50115	5950	135458
• Stations	96	9373	3416	4019	10690	1899	29493
• Maintenance material	25	6430	4435	4437	3148	485	18960
• Traction	0	22416	5425	10809	35086	2331	76067
• Others	275	2330	3349	2558	1191	1235	10938
Total expenses	10697	68756	21307	47259	65551	18870	232440
Contribution Balance-sheet							
Before Compensation O.S.P.*	531	-12778	-9882	-17314	-19702	-7314	-66459
Extraordinary result	0	242	89	839	491	22	1683

* Public Service Subsidy

Source: RENFE Informe de Gestion del Ejercicio de 1992 June 1993

Direct and Transfer Expenses and Revenues of Business Servicing Units

This table shows results for the three business servicing units. Their main source of revenue is the transfer payments from the six operating business units set out in the previous table, and, in the case of stations, from the infrastructure management business units. Their expenses, which consist primarily of the costs of the personnel and materials they employ, are broadly in balance with their income.

Direct and Transfer Expenses and Revenues of Business Servicing Units, 1992
(Millions of Pesetas)

	Stations and Joint Servs.	Rolling Stock Maintenance	Traction	Total
Customer Revenue	3079	16525	17	19621
By Traffic	0	0	0	0
Others	3079	16525	17	19621
Income from Transfers	51744	33143	81396	166283
Long Distance	9373	6430	22416	38219
Regional	3416	4435	5425	13276
Commuter	4019	4437	10809	19265
Full Loads	10690	3148	35086	48924
Partial Loads	1899	485	2331	4715
Infrastructure Management	21384	536	475	22395
Traction	773	13647	0	14420
Others	190	25	4854	5069
Total Income	54823	49668	81413	185904
Operating Expenses	50545	49339	71106	70990
Personnel	36273	27812	35652	99737
Traction Energy	0	0	28540	28540
Services and materials	11139	19273	710	31122
Depreciations	3054	1010	6173	10237
Working Capital Expenses	79	1244	31	3154
Handling Charges	5644	1118	15007	21769
Total Expenses	56189	50457	86113	192759
Contribution Balance-Sheet	-1366	-780	-4700	-6855
Extraordinary Results	-442	-46	-76	-564

Source: RENFE Informe de Gestion del Ejercicio de 1992 June 1993

Revenue and Expenses of Infrastructure Management Business Units

This table shows the income and expenses of the two infrastructure business units, infrastructure maintenance and traffic movement. However their income consists of minor amounts of revenue, so the table is largely one of costs.

Revenues and Expenses of Infrastructure Management Business Units, 1992
(Millions of Pesetas)

	Infrastructure Maintenance	Traffic Movement	Total
Customer Revenue	3867	35	3902
By Traffic	0	0	0
Others	3867	35	3902
Income from Transfers	671	139	810
Total Income	4538	174	4712
Operating Expenses	80822	5657	86479
Personnel	30649	4839	35488
Traction Energy	0	0	0
Services and Materials	22592	639	23231
Depreciation	25318	147	25465
Working Capital Expenses	2263	32	2295
Handling Charges	1288	29352	30640
Total Expenses	82110	35009	117119
Contribution on balance-sheet before compensations O.S.P.*	-77572	-34835	-112407
Extraordinary Results	-5903	22	-5881

*Public Service Subsidy

Source: RENFE Informe de Gestion del Ejercicio de 1992 June 1993

V. Theory and practice of transfer prices

As has already been mentioned, the business units' success in the performance of their objectives will be controlled through their accounting results. It is therefore necessary that each be responsible for the revenue and costs they generate, and that these are defined in a clear way.

As we saw in the previous section, in a vertically integrated firm like RENFE there are business units that provide services to one or more other units (here the problem of allocation of common and joint costs may also arise), and there are also relations between other units whose main objective is not to be a provider of services. In such cases valuation of services by means of "transfer prices" are needed.

RENFE has not tried to allocate all its assets to the business units because it thought that this would not allow the units to detect surplus capacity. (This is the opposite to the method adopted by British Railways in their sector management system before privatisation). What RENFE have done is to allocate those assets that are more specific: rolling stock, stations and marshalling yards that are devoted to Cargas will be managed by this business; stations that are used to control the traffic will be transferred to Circulation, etc.

The transfer price policy needs to be a policy of strategic coordination between the business units, since it will influence the demand and supply of services in the medium and long term, as well as the size of the Providers of Services business units.

As Gould (1964: 61) indicates, the transfer price mechanism may replace administrative coordination between the divisions in the same way that the price mechanism may coordinate a total decentralized economy. In the same way as this, the problems of imperfect competition, external effects and decreasing costs arise.

Gould indicates three main problems related to transfer pricing

- (1) Transfer prices should be specified in such a way that the division can use it to determine its individual output policies in a way consistent with the maximization of the corporation's profits. This means that the transfer prices should be equal to the opportunity cost of providing the service to the corporation.
- (2) The divisional profits may not reflect the efficient use of resources by the manager's division. This question has to be allowed for in order to judge the performance of the managers in a fair way. There is therefore a trade-off between the first two aims: one division may be acting in a consistent way with the objectives of the firm, but at the same time may be making losses.
- (3) Practical problems of devising procedures to obtain transfer prices within the firm.

Ezzamel (1991: 61) reviews the different market situations where transfer prices can be derived following the classic economic theory. To do this is necessary to assume that quite restrictive conditions hold ⁶.

If the product can be traded in a *perfect external market*, the transfer price should be the market price, because it reflects the opportunity cost of the product/service to the firm. The division has to be free to contract with this external market. Doing this, each division would maximise their profits as well as the firm's profit. There would also be savings in information transmission. The resulting transfer prices may also be used to judge the performance of the managers in a fair way.

⁶The assumptions are the following:

- (1) the firm has two divisions.
- (2) the work technologies are independent as well as the demand for their products/services.

The first condition means that the operating costs of each division are independent of the level of operations of the other. The second assumes that the external sales made for one division do not affect the external demand for the products of the other division.

(3) the main objective is the maximisation of the corporation's profits, and then the division does not have total autonomy in their activities. (Ezzamel, 1991: 61).

The existence of *imperfections in the outside markets* makes the internal trading between divisions more desirable because it can minimise some costs and uncertainties. There are some important features from the analysis of the case where the buyer and the seller prices are not equal:⁷

- if overall profit is the objective, some external rules have to be imposed to avoid the use of monopolistic power, thus reducing the autonomy of the divisions.
- there are incentives for only one division to trade internally, if only one receives all the benefits from this action.
- divisional profit cannot be used to assess divisional viability in a rational way.

If the outside market presents major imperfections, internal trading is much more desirable. The above limitations are also present and there is the possibility of business units using information in their own interest rather than in that of the overall profit.

In the *absence of outside intermediate markets*, the best solution would be to produce the level of output that maximises the overall profit. If the final market is competitive price should equal marginal cost.

Ezzamel continues by considering the limitations of the traditional economic theory model:

- the traditional model assumes independence of technology and demand, conditions that are quite restrictive assumptions.
 - it gives the most importance to the overall optimality at the expense of maintaining divisional autonomy, which may cause adverse behavioural consequences.
- It also supposes that the top level of management can get the managers to act in favour of the overall interest, but this may not be so: if the top level of management does not have the information to judge the managers' actions; or if the divisional managers act in their own interest and if the perception of risks of the managers leads to suboptimal actions.
- the use of TP being equal to marginal cost reflects the opportunity cost if the market for the intermediate good/service is highly competitive or if there is only one demanding division.

⁷We can devise the optimal transfer price when there are different prices for the seller (P_s) and the buyer (P_b). There are different cases, depending on the relative position of these prices in relation to P^* , that is the price where the marginal costs of the internal division (the curve that represents the opportunity costs for the firm to purchase externally instead of doing internally) intersects the net marginal revenue of the final division (the curve that represents the opportunity costs of selling externally when it is possible to do internally).

The case of RENFE is that of a firm faced with competition by road and other modes both in the freight and in the passenger markets. However these markets are quite regulated. Consequently the opportunity cost may not be the marginal cost. On the other hand, it is probable that more than one division demands the same resources, and then the opportunity cost would be the highest of the marginal costs or the revenue forgone by diverting resources from alternative uses.

As we will see in the joint cost section, the marginal cost is usually taken as the variable cost and then if the transfer price is set equal to variable costs the division would not cover its fixed costs and act as a profit centre. To avoid this problem, some intermediate system is sometimes used. This may consist of a unit variable cost plus a certain amount to cover the fixed costs. This charge may be negotiated according to the capacity that the seller devotes to the buyer. This method does not allow us to determine the existence of excess capacity in the seller division. Another method would be to charge the complete costs of the division, the fixed cost of the seller would then be translated into variables to the buyer. This procedure would neither show the surplus capacity nor allow us to find it.

In summary, the main limitations of the above analysis are the oversimplification of reality and not allowing for the organizational and behavioural considerations within the firm. One organizational issue in transfer pricing systems is their contribution to the requirements of differentiation and integration of company divisions. The system may improve the differentiation of the business units if the transfer price give the correct signals to those responsible for the different stages of production, for example to reduce surplus capacity. If the transfer price system is defined in a standard formula for instance, it can help to achieve integration between the divisions in the firms, facilitating trade within them and reducing the problems of negotiation, because in the case of absence of outside markets the transfer price may reflect the ability to negotiate rather than the ability to control their own costs.

In RENFE the transfer prices in 1991 were calculated by dividing the total costs between the different users, according to certain physical units. In 1992 this system was changed because it was thought that they transferred the costs due to excess capacity to the Transport Operators. In this way the providers of services lost all control over the improvement of any inefficiency in the provision of services.

In 1992 the prices were calculated by multiplying the 1991 transfer prices a series of coefficients that included (a) increases of the prices born by the Providers (energy, external services, unit cost of personnel, etc) and (b) specific targets of productivity improvements. In the case of Rolling Stock Maintenance, and Station and Joint Services, there was a readjustment of the transfer prices.

The Operators perceive the services as a variable cost, and there is then the possibility of translating the adjustments of their supply into better operating results. These changes affect the supply of the Providers of Services, because they may generate a resource surplus that would be translated into their accounts as a negative margin. The adjustment of their productive resources is the economic objective of these business units.

In 1993 the transfer prices, apart from those for energy, have been set equal to 1992 ones. This implies a global target of productivity improvement for these business units, that amounts to the increase in their unit costs. In the Operating Budget 93, an identification of excess capacity has been determined, broadly in the form of excessive personnel and locomotives.

We will consider some of the transfer prices of the different sectors, according to the most recent information we have (RENFE, 1990). In this document there is a comprehensive study of the different costs that each unit has to transfer, the desirable transfer prices and the physical units on which to base them, and also some conventions about the responsibility that each unit has for different actions. This is the way to ensure that each section is acting in accordance with the global interest of the company. Most of the transfer prices are based on costs, because there are few possibilities for trading in external markets. One important consideration is that there is a search for simplicity, because in the beginning of the system it was not thought to be helpful to use too exact or complicated a system.

1. Traction

Transfer prices have been based on loco-minutes (personnel), GTKH (energy), and loco-kms (depreciation and maintenance). These are variables that can represent causation of costs in a fairly clear way. In the first stages of the system there was no discrimination between diesel/electric, type and class of locomotive. There is a problem because the business unit has to use its resources in the most efficient way that may not coincide with the demands of the operators. Instead of this more realistic system, an average price has been set. This method could be improved when the transfer system becomes more developed. Responsibility for locomotive renewal was also allocated to the Traction business unit: the decision as to whether or not to replace a locomotive comes from a comparison between the average price and the unit costs of each locomotive.

2. Rolling stock maintenance

There were two systems in mind when the system was devised. The first consisted of charging the business units for any expenditure incurred with the technical responsibility of the program of maintenance being that of the owner of the equipment. The second and preferred option consisted of paying a charge per train-km as a payment for the commitment of the business unit to adopt this technical responsibility. With this system the maintenance includes all kinds of operations (apart from the major repairs). It also incorporates a premium or penalty for the quality, reliability and availability of stock.

Major repairs (in the case of accidents or renovation) are considered as a special case because of their importance. This is the appropriate time for assessing the desirability of investment in rolling stock as a part of the overall decision on services. For instance a program of complete renovation of old locomotives could be avoided if the service on which they are used is found not to be profitable.

3. Station and joint services

The document is not very explicit on the different kinds of services, and the appropriate transfer prices. It may be due to the non-specific type of the services offered. In general the charges should consist of a fixed amount plus a variable one. Then each business unit would receive a fixed cost depending on the number of stations used, and a variable one depending on the actual use made.

The services include a large list of activities:

- passenger terminals: the transfer price consists of a charge per passenger weighted by the services provided. This point seems to be a matter of negotiation rather than a fixed price.
- sale of tickets and freight check-in: they will be charged according to the number of tickets.
- loading and unloading of freight: the costs will be translated to the Cargas business unit in the form of an average price. It is possible to consider contracts with other parties.
- marshalling, shunting and cleaning of trains: the transfer prices suggested are quite vague, but they seem to be based on costs, as well as the services to particular divisions.
- traffic information: these will be incorporated as a percentage addition to the other services because there is no other basis for allocating them.
- circulation: the costs will be transferred to the Circulation business unit.
- delegated services: they may include activities done by the station as a result of its geographical situation: customers' attention, after-sales activities, concentration and dispersion of parcels, etc. This cost will be included directly, or as a percentage in the total service.
- use of buildings and other assets: there is no transfer to other business units for the use of buildings apart from the general expenses.

4. Paquetería

The special operating characteristics of this business unit makes the definition of transfer prices necessary. When the business unit uses their own trains (for instance Cargo Express) it has to pay the costs of traction and stations. It may operate by including some wagons on passenger or other freight trains. In the former case the passenger business unit will only charge the marginal cost caused, in terms of traction energy depending on the GTKH (gross tonne-km hauled or TKBR). In the latter case the system changes because Paquetería will receive transfer charges reflecting traction costs including personnel, energy and depreciation, and marshalling and station costs. The last possibility comes when this business unit does not use a complete wagon but a part of it, and then according to the marginal cost principle should not be charged at all apart from the extra stops it requires.

5. Cargas completas

This business unit will receive all the costs of the stations that it uses specifically, and also all the specific computer system it uses. It will also pay for traction and for station services, and will charge Paquetería those costs that could be associated with its activity.

6. Passenger operators

Frequently a train will consist of rolling stock from different business units. In such a case there is a transfer price at the cost price, including maintenance and traction.

VI. The joint cost question

In this section of the report we consider the joint cost problem of allocating costs to different railway sectors or business units. These problems arise in particular with infrastructure costs.

Alternative cost classifications

The literature on railway costs uses similar concepts under different titles. It may be worthwhile to mention different forms of cost classification:

(1) Variable, semi-variable and fixed

- variable: are those costs that vary with output, for instance train crew and energy.
- semi-variable: for instance vehicle maintenance, depreciation and terminals.
- fixed: are those cost that do not vary with changes in output. Under this heading would be track, signalling, administration and general expenses.

(2) Direct and indirect

This is similar to the above classification, the direct costs being those that vary with output (variable and semi-variable) and the indirect costs being those that do not (fixed).

(3) Avoidable and non avoidable

The first category are those that could be saved if a certain activity ceases operation. The other costs would continue to be incurred.

(4) Specific, common and joint costs

- specific: these are the costs that can be allocated to a certain activity/sector and that could be removed if the sector no longer exists. For instance, if a service is run with special trains that are not shared with another sector, i.e. AVE, all the personnel costs of operating the service could be allocated to it.
- common : these are the costs shared between two or more activities which can be attributed to them according to some physical unit of output. Such costs could be reduced by a certain proportion if one of the activities were removed. Most of the personnel cost could be included in this category, for instance station and marshalling staff. In the same way some of the signalling, terminal and track facilities are common to some services, and could be reduced with changes in their output.
- joint: the cost of providing two or more products or services whose production cannot, for physical reasons, be separated; providing one service automatically makes the facility available for another (British Railways, 1979: 25). These joint costs are then the costs of facilities shared with another service which cannot be reduced *at all* if the service under consideration is withdrawn. The typical example would be the earthworks, tunnels, bridges, etc.

The separation between these different cost categories is not fixed because it depends on the aggregation of the services. For instance some specific costs to freight, i.e. marshalling yards, are joint between the different types of freight traffic.

Beesley and Kettle define joint costs as the difference between total costs and the sum of avoidable cost if all the services were withdrawn alternatively, keeping the other sectors constant. They are then the costs that cannot be attributable to a single service but only to a mix of them. These authors distinguish two types of such non attributable costs: those arising from technical necessity (as with track capacity this would be the cost of one single track maintained at minimum standards) and those arising from economic convenience where the possibility of separate production does exist (for instance the use of big wagons, if well utilised, provides significant economies of scale) (Beesley & Kettle 1985: 21).

Measurement of the profitability of the overall activity of RENFE is not a problem because it is simply equal to revenue minus costs. However, if we are concerned with the profitability of the different sectors/subsectors the problem of how to allocate the costs arises. The analysis of sector costs is important because it allows managers:

- to know the financial/social worth of retaining, withdrawing or opening some services.
- to know the financial/social worth of accepting or refusing some traffic.

Stewart Joy (1964, 1971) was one of the authors who tried to change the classical view about the problem of common and joint costs. Joy argued that traditionally it was thought that the railways business had a large proportion of fixed costs. Then additional traffic could be attracted with a small

increase in total cost, and welfare could be maximised by charging the marginal cost of carrying this traffic. This practice was broadened to the rest of the traffic, only recovering the short run variable costs.

The mistake in this argument was the estimate of the marginal cost. Joy showed that some of the "fixed" cost could be avoided if the production of some services were reduced. For example double or multiple track may be converted into single track, the standard of track maintenance may be downgraded to a minimum level, administrative costs may be cut, etc. There is then "the possibility to change over the wide range of present costs and long-run fixed costs, and that all expenditure above the long-run fixed costs should be recognized for what it is: a variable cost, due solely to the level and pattern of demand, and avoidable at the railways' option" (Joy, 1964: 145).

The existence of different categories of track maintenance reinforces this idea. We have mentioned in section I that RENFE has divided its network into four categories (A1, A2, B and C), according to the number of trains and the speed at which they can travel. Each category is provided with the capacity needed to match the demand, with different signalling facilities and different quality of track maintenance.

We will next explain different methods of calculating the profitability of railway activities through the allocation of costs. However, the importance given to the allocation of costs does not mean that there are no problems on the revenue side. One of the reasons argued against the closure of certain unprofitable local services was that they may provide additional revenue to other rail services in the form of "contributory revenue".

1. Total cost allocation

Here sector profitability is obtained by sharing all the costs among the sectors, on the basis of some physical units of output. We have already mentioned the problem that some fixed or indirect joint costs (terminal, track and signalling) have to be allocated arbitrarily. This method ignores such difficulties and allocates such costs in terms of the train-kms, tonne-kms, train-minutes. This may be an acceptable method if the percentage of those costs is low or when the output is homogeneous.

This method does give a false view of the potential cost savings if a service is reduced or withdrawn. Let us consider the example of a route where a social passenger service and a profitable freight service operate, the first one causing the main part of the infrastructure cost of the route, and the second adding only a smaller part of such costs. If the total costs were shared according to the total cost allocation method, it might be the case that the freight service then appeared to be unprofitable and was withdrawn. The social service would have to support all the costs, and this is clearly a suboptimal situation.

2. Accounting contribution

This method only charges the sector/product/activity those costs that may be directly and specifically related with its output. The margin between revenues and costs is the contribution to the indirect joint, unallocated, costs. The sector's financial performance is then judged by the level of contribution according to some standard (per unit of output), rather than in absolute profit levels. These targets can vary to allow for some kind of constraints, to produce a flexible system of evaluation. The problem is that the appropriate level of contribution each service was expected to make is not always clear.

How can we use this method to assess the financial worth of traffics? The minimum level of acceptance would be that prices should cover the short run marginal costs, which should be obtained using the next method (avoidable costs). Some kind of discrimination is also needed to rank the value of traffics and then to ensure the optimum allocation of resources to the alternative traffics. The major theoretical justification for the retention of this method in Britain before the 1980s was the supposed invariability of infrastructure cost with changes in traffic volume, the traditional viewpoint that Joy has criticised. The accounting contributions method does not give sectors responsibility for infrastructure costs and there was a risk of under achievement and extending short-run activities into a longer period. (Allen, 1989 :101)

RENFE has adopted this method in the sense that no business unit is going to be responsible for the infrastructure cost that each may cause. We have seen that the justification of doing so was so that railways were to be treated in the same way as road haulage, rather than the classical argument that railways had a high proportion of fixed costs.

3. Avoidable costs

This method tries to identify those costs that can be associated with a specific activity, and those that are indirect joint costs. This latter category can only be allocated in an arbitrary way. This analysis tries to answer two questions: (British Railways 1979: 18)

- for each element of cost; does it vary with the output of any individual sector/service?
- if a particular activity/sector no longer exists, which costs would be avoided?

This separate identification of the specific costs gives a high degree of certainty in profitability evaluation. This is a useful approach in industries where the joint indirect costs are a high percentage and where it is necessary to have a reasonably exact view of the sector profitability, including some element of joint indirect costs. In this context the avoidable element of evaluation of the indirect joint costs offers some measure of what the contribution of a sector should be.

To determine cost causation Joy (1971: 11) suggests that the best way will be to find the peak period and study the mix of trains. If in this peak period there are some passenger services with a short headway (it could be the case of Cercanías in Madrid), they will determine the track and signalling

requirements. The trains that operate off-the-peak will cause a small amount of additional costs, for instance tear-and-wear costs. The question needed to determine the causation of costs would be that of which costs could be saved by eliminating trains and rearranging the remaining. Joy continues by saying that the effects of this method are that (1) if there are predominant traffics on certain routes, these services should pay most of the costs of the route and (2) on all routes, each traffic should earn enough to cover the costs of the facilities that they use exclusively.

The avoidable cost method gives us (1) the minimum revenues (or social benefits) that particular traffics should generate to survive, and (2) also sets the lower limits to their respective prices.

The application of first of these two principles to the closure of lines may be explained with the following example (Dodgson, 1977: 164). Let us suppose there is a route where two services operate. The first is a social passenger service obtaining social benefits B_s and causing specific costs by C_s (including all the avoidable ones). The second is a freight service with social benefits B_f and costs C_f . The unallocated joint costs for both would be J . These joint costs may be shared stations, signalling facilities etc. It is important to note that these joint costs could be avoided if both services were withdrawn. The rules for the closure of individual services would be $B_s < C_s$ and $B_f < C_f$. If one of them covers its specific cost and not the other, the latter service should be withdrawn. The condition for the remaining service to be maintained would be $B > C + J$. Another possibility is when both services cover their respective specific costs but together they do not generate enough contribution to cover the joint costs. In this case both services should be withdrawn.

The second principle is explained by Joy (1971). He argues that where the freight market is a competitive one, the railway should take the road haul price as given and accept the traffic if at this price (or a lower one allowing for the better quality of the road service) the railway can cover the avoidable costs of the freight traffic and if possible make a contribution to the unallocated joint costs. If possible, prices should then discriminate between traffics in order to maximise the contribution made toward joint costs.

RENFE is actually adopting this approach in the freight sector, but *without* taking the infrastructure costs into account as Joy suggested. The managers assume that at their actual operating costs they are "out of market" in some cases, because the price the market is prepared to pay is lower than their costs. There are two solutions: either abandon the traffic or reduce railway costs. The second possibility was the preferred one though the most unprofitable traffics are being abandoned. This policy requires a good knowledge of the costs and prices of the competitors and of course a better understanding of RENFE's own costs.

This strategy can also be applied to the commercial passenger services, where there is competition from regular coach services and also from airlines. RENFE would need to study the prices and costs of these operators to consider the desirability of undertaking different actions such as reducing or increasing services by a smaller or larger percentage. The case of AVE may be a good example. The

price of AVE has to be set with reference to the other modes. The AVE's fare is higher than coach's because of the higher rail quality, in terms of travel time. On the other hand, the AVE fare is cheaper than Iberia's flights, providing a similar level of service (Iberia obtains profits in certain routes of the domestic market, which compensate the losses that other unprofitable services generate (inland flights, for instance)). RENFE's policy may be justified in economic terms if revenue from traffic covers the avoidable costs it causes and also provides a contribution to joint infrastructure costs, and at the same if time there are considerable benefits to consumers. This latter point is evident by the large percentage of generated traffic. Another issue would be that at the first stages of its operations AVE may be trying to attract people, charging a low price to attract custom. The ratio of revenue from traffic/operating costs of 0.79 in 1992 may support this belief.

Finally it is important to note the problem that the non avoidable cost may be a large percentage of the total infrastructure costs. Allen (1989: 99) says that in the UK they amounted to over 50 per cent of all infrastructure costs. This did not meet the basic requirement that managers have responsibility for all costs. This was added with the next cost allocation methods, the prime user and sole user methods. These were adopted by British Rail with its system of sector management in the 1980s, but are being abandoned with privatisation and the split (see below) between infrastructure and operations.

4. The prime user costing method

This method allocates the infrastructure costs of each section of route (or other kind of joint cost) in a bottom-up way. Firstly, a hierarchy of users in an increasing order of importance is determined. The next step is to obtain the costs that could be avoided if the least important sector were removed, and so on. At the end the prime user is allocated all the remaining costs, including those that cannot be attributed to the other sectors. Therefore any surplus capacity is not identified.

The method presents a number of problems:

- the allocation of costs depends on the hierarchy. This ordering has to be chosen section by section in order to treat all the users in a fair way. However it could be a matter of dispute between sectors.
- it supposes that once one sector is removed the other will be operating its previous level of service. In practice there may be some benefits if the existing users were to reorganise their services to make better use of the remaining infrastructure facilities.
- the avoidable costs are influenced by variations in the timetable.
- the infrastructure cost on each section of route is an average of annual costs, if allowances for renewal of particular categories of infrastructure are included. The saving of costs, from the withdrawal or restructuring of services, has to take this fact into account, especially if renewals were imminent (Dodgson 1984: 229).

5. The sole user costing method

The process is the reverse of the prime user method before (top-down). The costs of having the optimal capacity for the services of the primary user in the hierarchy are calculated, and then those of the rest are added in. The advantage is that it is possible to compare the sum of the costs calculated for each user with the existing track costs in order to identify any surplus capacity. This surplus capacity may be of two main types:

- physical surplus: too many tracks, switches or signals for modern traffic requirements.
- technological surplus: this is rather more complex and relates to the most cost-effective pattern of services which can often be obtained with modern facilities and, in particular, modern signalling, and which by definition are not present where the facilities which actually exist are old and technologically obsolescent (Allen, 1989: 104).

We could consider a hypothetical example of how the prime and the sole user methods could work in the case of RENFE. Let us consider the section of route (code 102) between Villalba de Guadarrama and Herradón. In this section there are the following services: ten kms of line C-8A Madrid Atocha-El Escorial; Regionales (Regional and R.Express), Largo Recorrido (Diurno, Talgo, and Estrella), and also some freight trains. The cost of infrastructure maintenance was 352 million ptas. The hypothetical order of increasing traffic density could be Freight, Cercanías, Regional, and Largo Recorrido. The savings in costs would be, let us suppose, 30, 60, 90 if the first three were removed,. These would be the figures for which each one would have to be responsible. The remaining costs of 172 million ptas would be allocated to L.Recorrido, according to the prime user assumption. In the case of sole user, L.Recorrido would have to determine the optimal capacity it would need if it began to operate. Let us suppose that this business unit assesses its needs at 150 million per annum. The incremental cost of the other UNes could be 70, 50 and 20. The sole user, in this case L.Recorrido would charge the others these incremental costs. The remaining 62 million ptas would be the surplus capacity that should be reduced. These costs should be allocated to the different business sectors so that they do have the incentive to remove them.

6. Complete separation of infrastructure and operations with charging systems for access to the network

This is the approach which is being adopted in Great Britain as a consequence of the 1993 Railways Act. From April 1st 1994 railway infrastructure will be provided by a separate company, Railtrack. Railtrack will initially be in the public sector, but will eventually be privatised. Railtrack will set access charges, which will be required to cover all its costs and earn a rate of return on capital. The required rate of return on assets valued on a replacement cost basis is likely to be set at five per cent in the first year of operation, 1994/95, rising to eight per cent a year in later years.

Passenger services will be franchised on the basis of a division of the passenger sectors into about 25 separate businesses. Subsidies will be provided for unprofitable services, with potential franchises bidding on the basis of the lowest subsidy needed to operate the service. Rail freight operating

companies will be transferred to the private sectors, and there will be "open access" for new rail freight operators and, in due course, non-franchised passenger train operators. Both franchised and non-franchised rail operators must pay track access charges, which will have to be negotiated with Railtrack. Track charges for franchised passenger services will be negotiated between Railtrack and the government-appointed Franchise Director, who will be responsible for the allocation of subsidies through the Office of Passenger Rail Franchising (OPRAF).

An underlying principle of the access charges is that they must at least cover the avoidable costs of the train operator's services. These avoidable costs will first cover usage-related charges. The track usage charges reflect the costs of wear and tear of trains on track, and will vary with the type and number of trains. Electric trains will also pay for their current through traction current charges, since electricity supply through the catenary or third rail will also be provided by Railtrack. In addition, Railtrack intend to levy peak charges, reflecting costs of access to the network where infrastructure is congested at peak times: the basis for assessing such peak charges has yet to be determined. In addition to all these variable, or usage-related charges, fixed costs will be divided into two main components. Directly attributable fixed costs are the long-run avoidable costs that arise specifically because of the infrastructure requirements of a particular operator. For example, if a particular franchised passenger operator is the exclusive user of a particular section of route or signalling facility, all the costs of that route or facility will be charged to that operator. The remaining infrastructure costs which Railtrack will need to recover from its customers are the common costs. In turn these are divided into three categories.

- Common costs incurred for the use of specific sections of track. These are costs which cannot be counted as avoidable to any of the users of a particular section of route which carries the trains of more than one train operator.
- Common costs which can only be identified to a geographic area. These are costs such as those of power signal boxes which cover a number of routes used by different train operators.
- Network costs. These are costs of providing the network which cannot be allocated more specifically to individual routes or geographic areas.

Similar principles apply to freight train access charges, which must at least cover avoidable costs, and must also make a contribution towards common costs. Access for freight train operators will be charged on a two-part basis. The network charge will be linked to the planned route mileage used by the service, while the tonnage charge will be related to the gross tonne miles of traffic actually hauled. Some government grants will be available to cover such charges where the freight flow is not otherwise financially viable by rail, but where there are potential environmental benefits.

VII. Infrastructure cost allocation exercises

In this Section we report the results of two infrastructure cost allocation exercises.

1. Total cost allocation:

This infrastructure allocation exercise was conducted using infrastructure cost data from the *Manual para la Evaluación Económica de Proyectos de Inversión en Vía Ancha*, 1985, MOPT. This report showed the average cost of five categories of infrastructure, disaggregated between single and double track. They are reproduced in the next table.

	1984		1990		physical units
	single	double	single	double	
track, bridges and tunnels	0,3179	0,1677	0,4727	0,2494	ptas/GTKH
security installations	31,98	24,52	47,56	36,46	ptas/train-km
telecommunications	13,67	9,28	20,33	13,80	ptas/train-km
catenary	36,47	25,76	54,24	38,31	ptas/train-km
substations	29,09	16,13	43,26	23,99	ptas/train-km

We presume that the values were calculated by dividing the total cost of each item by the number of train-kms or GTKH. We did not have data on the total train-km and GTKH in 1985, and so we could not calculate the total infrastructure costs for this year. Instead we have translated the 1985 average costs data into 1990 values using the RPI. The physical units we used to allocate these costs were train-km and GTKH (gross tonne-km hauled) for each section of route, divided between passenger and freight traffic, for the year 1990. These were published in the document *Renfe en 100 Mapas*, 1990. We multiplied these physical units by the relevant average costs at 1990 prices to allocate infrastructure costs to the passenger and freight businesses (catenary and substation costs were only allocated to the electrified section of routes).

As a result of this exercise, 26,917 million ptas of infrastructure were allocated to the passenger business, and 15,159 million ptas to the freight business, a total of 42,076 million ptas. This total is less than the figure of 57,603 million ptas that appears under the Contrato-Programa for 1990 under the heading of vigilance and conservation. In addition, 18,980 million ptas were provided to cover the depreciation costs.

Some of the reasons for this gap may be:

- the figure of the Contrato-Programa includes "other works", that is building and machinery maintenance, works for third parties, level crossing, works that are considered investments; and also the costs of operating centres not devoted to maintenance.

- within the train km in electrified track, there are also a number of train-km and GTKH by diesel trains, though this is a small percentage.
- if the number of GTKH and train-km has fallen, average costs should have increased.
- the figures do not include internal service trains. These amounted to 23 per cent of total train-km and 4 per cent of GTKH in 1990.

2. Allocation to the main user.

This exercise is based on RENFE's data on the infrastructure costs of each section of route (there are some 225 such sections). All the costs of each section of route are allocated to the business sector which we assess to be the main user of that section of route. Freight is only presumed to be the main user of those sections of route which are freight-only and do not serve any passenger trains. This means that we did not allocate any other infrastructure costs to freight trains, even though freight trains will impose some infrastructure requirements (freight loops, marshalling yards, etc), and cause track wear-and-tear, elsewhere on the system. This means that the overall proportion of infrastructure costs allocated to the freight business will be low. Cercanías services are also allocated all the costs of the sections of the route they use. Regionales were allocated all the costs of the routes they used exclusively, plus some others where the trains were mainly from the Regionales sector. Finally, Largo Recorrido was allocated the costs of the remaining section of routes (the greater number). In order to determine the main user of each section of route it was necessary to study the RENFE passenger train timetable, link by link, to decide which were the main users of each section of route depending upon the number of passenger trains scheduled per day. The resulting infrastructure cost allocation was as follows:

- Freight: 881 million ptas
- Regional: 4,266 million ptas.
- Cercanías: 10,206 million ptas
- Largo Recorrido: 21,834 million ptas
- Total: 37,187 million ptas.

To this total we can add: costs caused by accidents (2,052 million ptas); by "other works" (2,748 million ptas); by level crossings (5,032 million ptas) and by non maintenance operating centres (1,212 million ptas). This yields a total figure of 48,231 million pts.

This figure also differs from the Infrastructure Maintenance costs for 1992, which were 82,110 million ptas, including personnel, materials, energy, depreciation and financial (the costs of AVE infrastructure are incorporated into the total costs). If we suppose that in the above figure of 48,231 million ptas, the financial expenses and depreciation were not included, the result would be 76,814 million pts which is much closer to the total costs of 82,110 million pts which appears in RENFE's 1992 "Revenue and Expenses of Infrastructure Management Business Units" table in Section IV of this Report.

The next step is to add the infrastructure costs we have allocated to the different business units to their operating losses. These operating losses before compensation appear in RENFE's "Revenue and Expenses of Operating Business Units before Subsidies and Common Costs", which are also reproduced in Section IV of our Report. The resulting overall losses are:

- Freight: $27,016 + 881 = 27,897$ million pts.
- Regionales: $9,882 + 4,266 = 14,148$ million pts.
- Cercanías: $17,314 + 10,206 = 27,520$ million pts.
- Largo Recorrido: $12,778 + 21,834 = 34,612$ million pts.
- Total (excluding AVE) = $66,990 + 37,187 = 104,177$ million pts.

These figures give us a very approximate idea of the losses that the different business units might actually incur if they were charged a part of the infrastructure costs. In order to have a better idea of the resources that are devoted to the business units from the rest of the economy we would have to add to these results the remaining infrastructure costs not allocated in this exercise plus the investments of each business unit.

VIII. Conclusions

As in other European countries, railways in Spain have been losing market share to other modes, and particularly to road traffic. This has been particularly the case with regard to freight transport. The result has generally been increasing financial deficits, which governments have needed to respond to. In particular, the role of the railway in the overall transport system has had to be redefined.

RENFE and the Ministry of Transport have accepted this need for change. Railway managers have been freed to make commercial decisions, and have become responsible for their own performance. For example, the Ministry of Transport has given RENFE increasing freedom to set their fares for Largo Recorrido services and their charges for rail freight services.

In determining responsibilities and objectives, an important distinction is that between services which are provided for social reasons, and those that should be operated commercially and without subsidy. The distinction between such services is not always clearly defined. Cost-benefit analysis might be used to determine the appropriate dividing line between commercial and non-commercial services, but in practice the precise boundary will be difficult to determine. Cost-benefit analysis might also be used to determine the appropriate balance between service levels and frequency levels, since a given subsidy level might be associated with a low fare, low frequency, service, or with a high fare, high frequency, service.

A major issue in determining the optimal level of railway service is the treatment of infrastructure costs. The total costs of providing railway service will depend on infrastructure costs as well as on operating costs. Consequently financial accounts which leave out infrastructure costs will be incomplete. Decisions to subsidise particular railway services for social reasons will usually have implications for the level of infrastructure to be provided, and these costs need to be included when assessing relative costs and benefits. As we have seen, RENFE's present accounting methods do leave out infrastructure costs when the profits or losses of the individual Transport Operator business units are assessed. This means that there is only a partial picture of the financial costs that have to be incurred in order to secure particular social benefits.

One result of this is that, as the discussion on page 23 indicates, the total losses of the Transport Operating business units, even after inclusion of OSP subsidies, sum to a much smaller total than the overall financial loss of RENFE in 1992. Consideration only of the financial losses of the operating business units might divert attention away from the fact that substantial financial resources are being absorbed elsewhere in the railway system. In addition, there may be insufficient pressure to secure efficiency in the provision of infrastructure, both in terms of only providing that infrastructure whose provision is justified by the benefits of the services which use it, and in terms of securing infrastructure provision at minimum cost.

Without such incentives for the effective use of infrastructure, RENFE and the Ministry of Transport may find infrastructure subsidies rising even if operating subsidies are kept under control. This will again create pressure for organisational reorganisation of the railways. We think that a much better alternative would be to allocate infrastructure costs to the operating business units so that they have the incentive to secure cost-effective provision of the amount of infrastructure necessary for their own services. In addition, cost-benefit studies can then consider all the relevant costs incurred in securing social benefits from the railway network.

In short, infrastructure is not a free good, and should not be treated as such. We think that the best way to allocate infrastructure costs would be on the basis of the types of prime user and sole user method used by British Rail and described above in Section VI of this Report. This would require a detailed exercise, but RENFE do already have very detailed data on the costs of individual sections of route. Railway managers and engineers would need to determine the hierarchy of users on each section of route, and the more complex question of the savings in infrastructure costs that would be achieved by withdrawing different types of traffic. Given that railways have almost always been vertically-integrated in the past, we are more sceptical of the new British approach of vesting the rail infrastructure in a separate company that covers all its costs by charging access fees to railway operators.

Finally, we do not think that rail operators should have free use of infrastructure on the basis of a comparison with roads. Road users make some payments for their use of roads through fuel taxes and annual vehicle licence fees. If these are not thought sufficient to cover the financial and external costs

of road traffic, then the appropriate response is to increase user charges for the road network, rather than providing railway infrastructure free in the hope that some road traffic will transfer to rail.

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Appendix: figures and tables

Figure 1

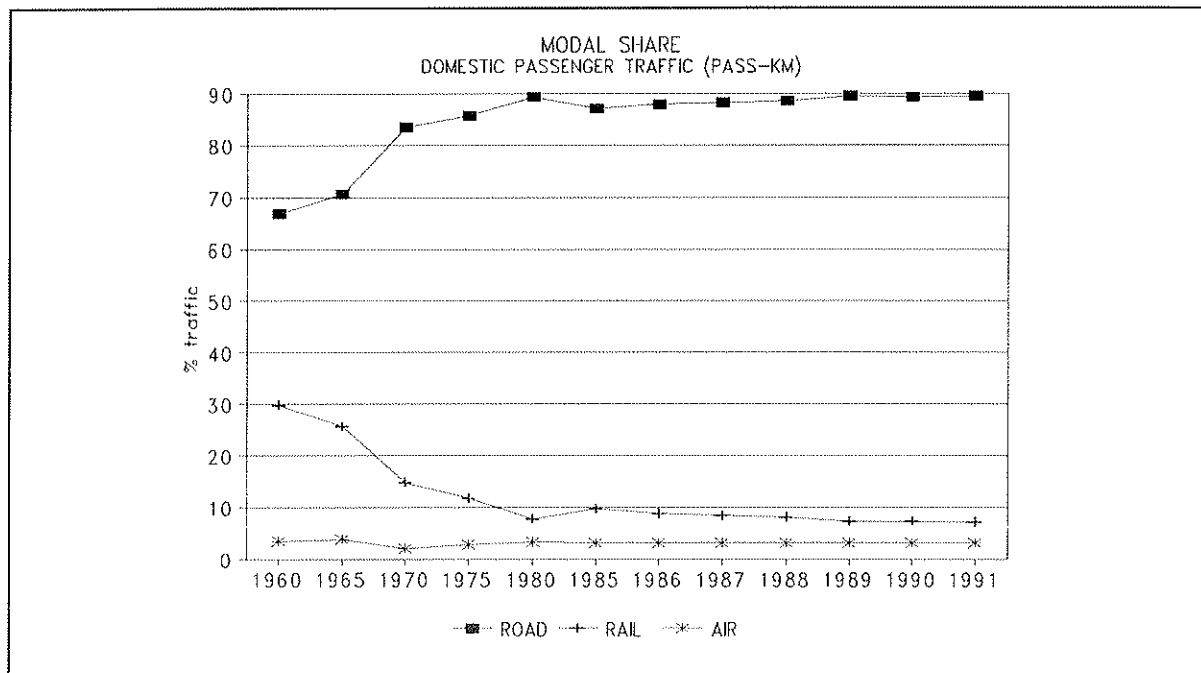


Figure 2

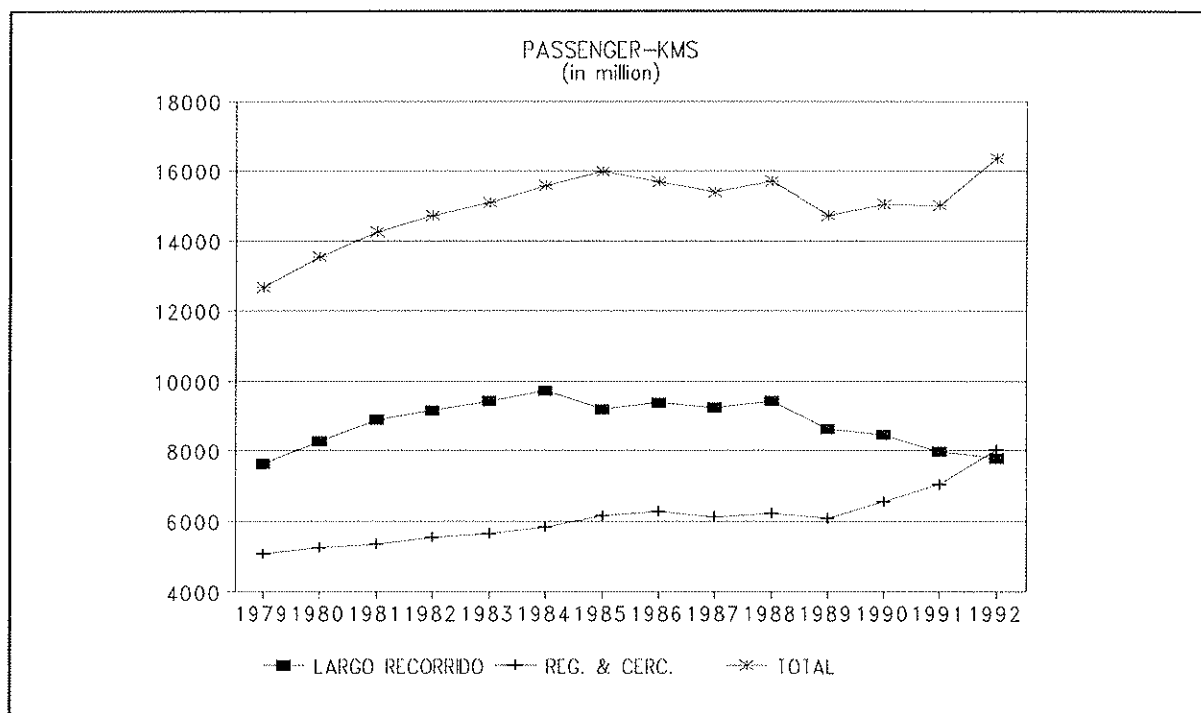


Figure 3

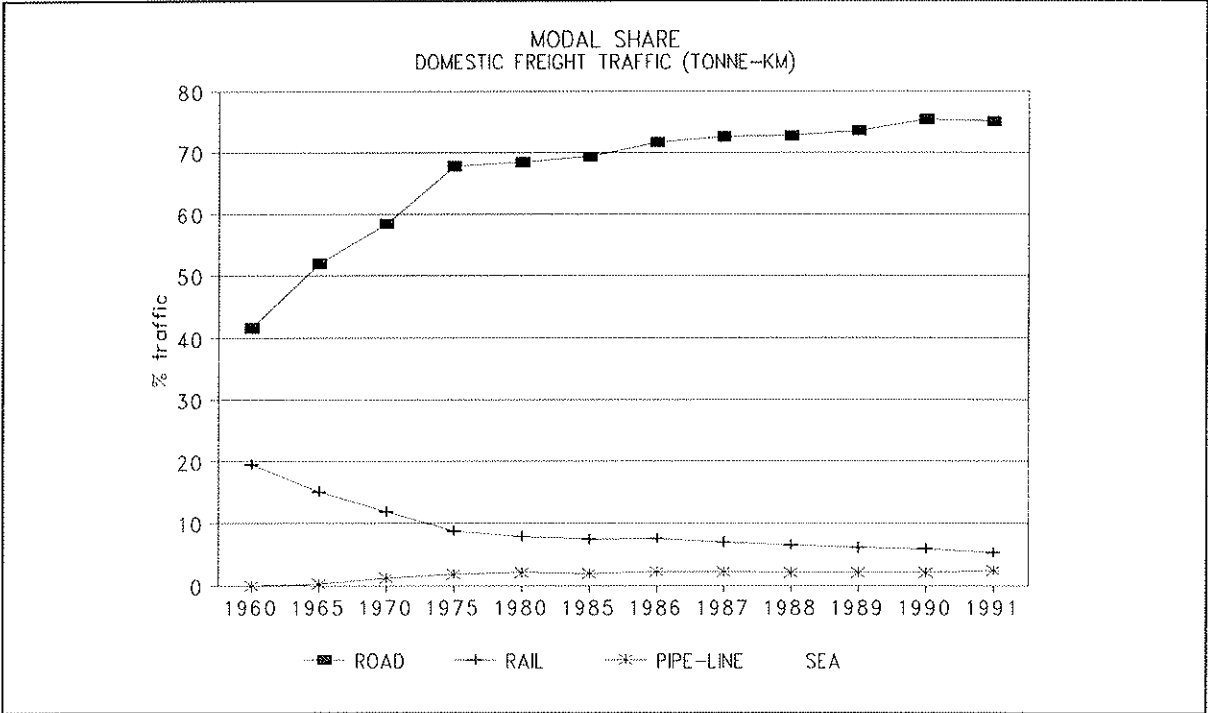


Figure 4

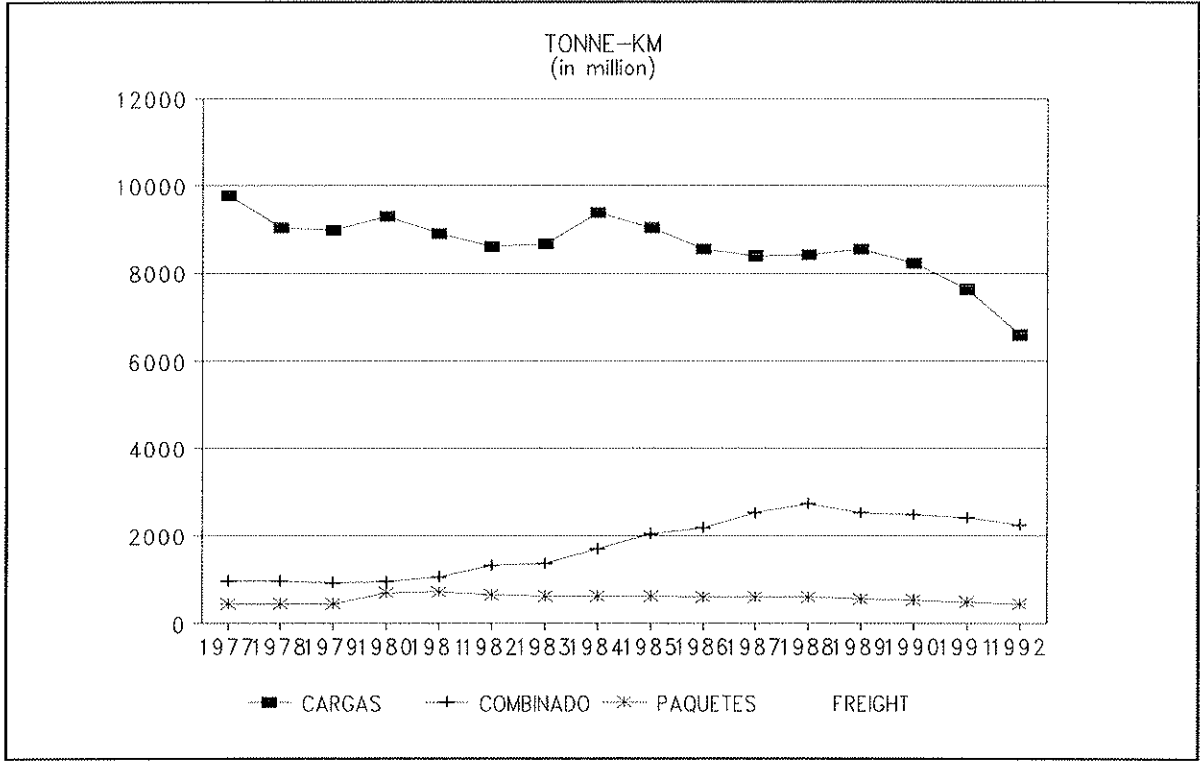


Figure 5

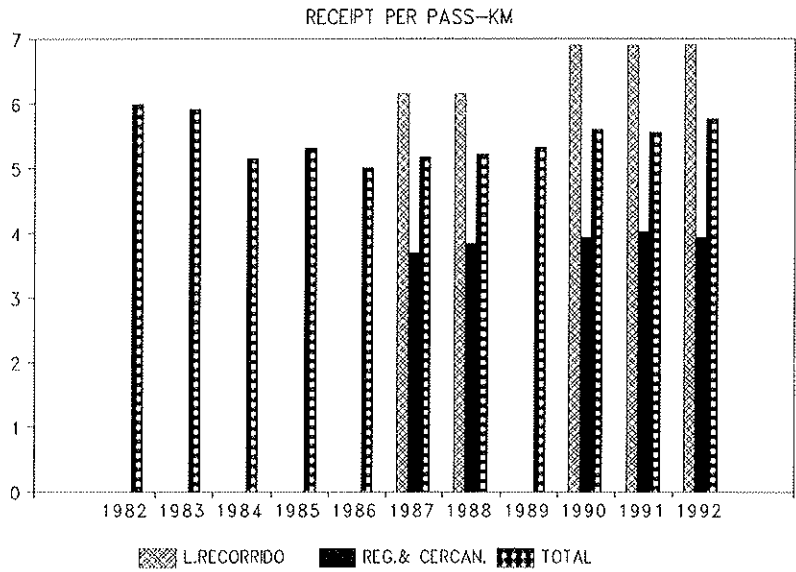


Figure 6

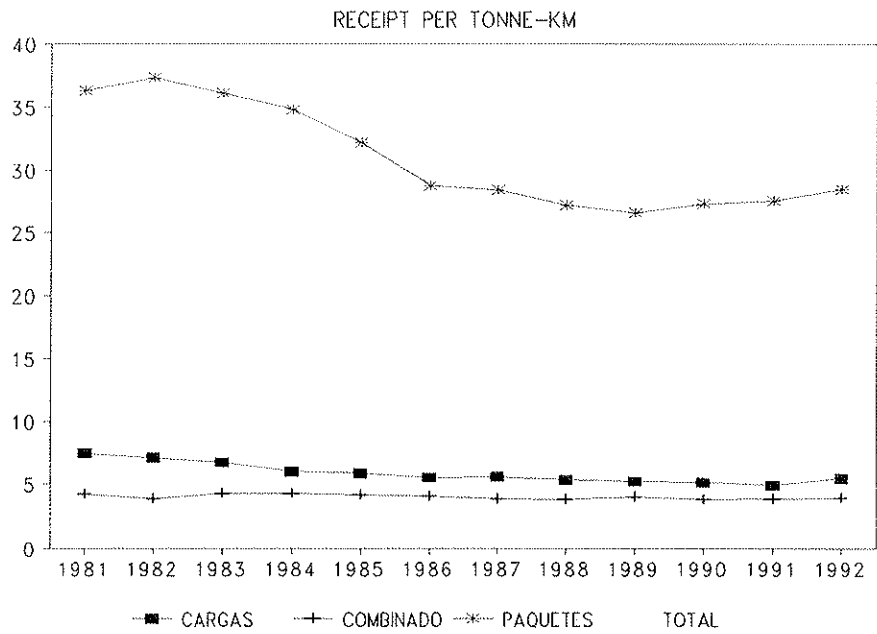


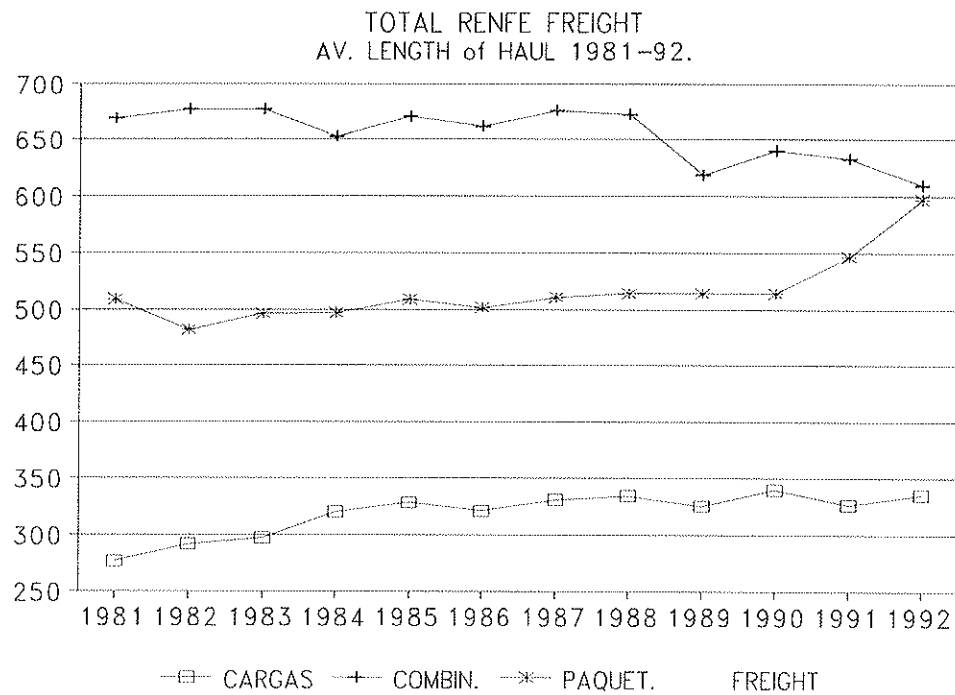
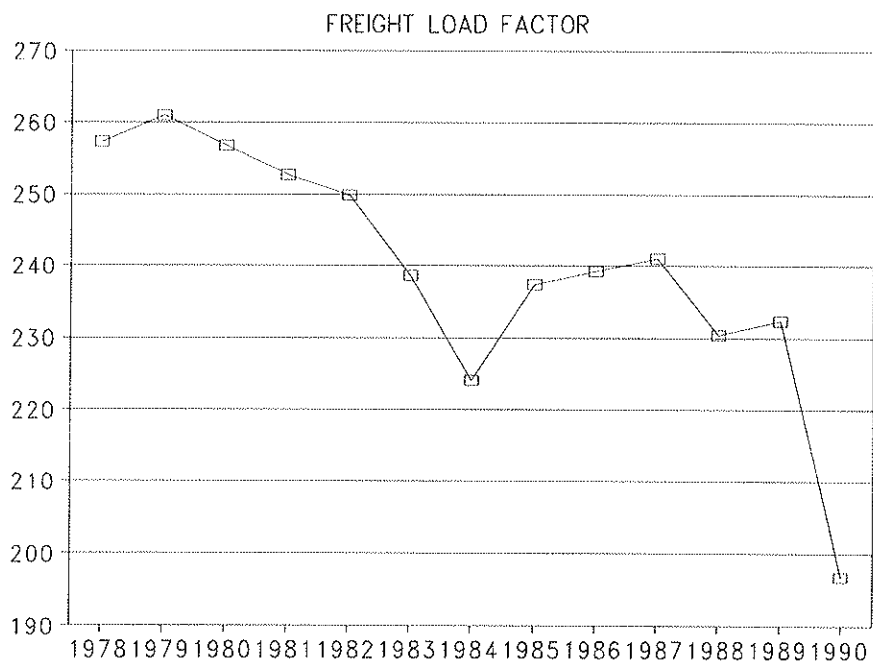
Figure 7**Figure 8**

TABLE 1: MODAL SPLIT OF THE DOMESTIC PASSENGER AND FREIGHT TRAFFIC (IN PASSENGER-KM AND TONNES-KM, in million)

	ROAD	RAIL	AIR	SEA	TOTAL	ROAD	RAIL	AIR	SEA
1960	20000	8900	900	-	29800	66,9	29,7	1,34	-
1965	38967	13901	927	-	53785	72,4	25,9	1,70	-
1970	85257	14992	1966	-	102145	83,4	14,7	1,90	-
1975	128946	17643	3928	-	150517	85,7	11,7	2,60	-
1980	165700	14047	6000	-	185747	89,2	7,56	3,23	-
1985	153680	17038	5216	888	176822	86,91	9,64	2,95	0,5
1986	164986	16429	5539	1001	187955	87,78	8,74	2,95	0,53
1987	175638	16601	6028	1018	199285	88,13	8,33	3,02	0,51
1988	186678	16888	6308	1095	210969	88,49	8	2,99	0,52
1989	197787	15999	6583	1066	221435	89,32	7,23	2,97	0,48
1990	206905	16733	7050	1057	231745	89,28	7,22	3,04	0,46
1991	210848	16357	7234	1258	235697	89,46	6,94	3,07	0,53

	ROAD	RAIL	PIPEL.	SEA	AIR	TOTAL	ROAD	RAIL	PIPEL.	SEA
1960	17048	7976	-	15912	-	40936	41,6	19,5	-	38,9
1965	31691	9202	109	19972	-	60974	52,0	15,1	0,20	32,7
1970	51000	10399	1023	24800	-	87222	58,5	11,8	1,20	28,5
1975	84533	11079	2118	26870	55	124725	67,81	8,89	1,70	21,56
1980	98898	11300	3005	31125	77	144402	68,50	7,82	2,08	21,55
1985	110500	11906	3165	33694	77	159342	69,35	7,47	1,99	21,15
1986	114000	12120	3632	29388	76	159216	71,6	7,61	2,28	18,46
1987	124600	11952	3923	31136	73	171684	72,58	6,96	2,29	18,14
1988	134900	12145	3886	34439	91	185461	72,74	6,55	2,1	18,57
1989	145000	12049	4092	35988	101	197230	73,52	6,11	2,07	18,25
1990	150000	11613	4215	33043	91	198962	75,39	5,84	2,12	16,61
1991	152250	10802	4780	34853	90	202775	75,08	5,33	2,36	17,19

Source: Anuarios Estadísticos. MOPT / Annual reports.RENFE

TABLE 2. PASSENGER JOURNEYS AND FREIGHT TONNES (thousands)

	PASSENGER					FULL LOADS			COMBINED	PARCELS			FREIGHT	
AVE.	LARGO RECORRID	REGIO NAL	CERCA NIAS	REG. & CERC.	TOTAL	FULL WAGON	INTERNAL TRANSP.	TOTAL	LOADS	CARGOEXP.	PAQUEXP.	CORREOS	TOTAL	TOTAL
1970	0	N.A.	N.A.	N.A.	125478	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	30898
1971	0	N.A.	N.A.	N.A.	127008	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	32107
1972	0	N.A.	N.A.	N.A.	136189	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	34545
1973	0	N.A.	N.A.	N.A.	147666	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	37621
1974	0	N.A.	N.A.	N.A.	152256	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	39667
1975	0	N.A.	N.A.	N.A.	153021	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	37672
1976	0	N.A.	N.A.	N.A.	157828	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	36031
1977	0	N.A.	N.A.	N.A.	162356	31831,5	1511,	33343,3	1135	1779,8	138,1	868,5	2786,4	37465
1978	0	N.A.	N.A.	N.A.	158454	30178,6	1855,1	32033,7	1348,5	1403,5	151	856,2	2410,7	35823
1979	0	N.A.	N.A.	N.A.	157000	30375,7	1744,3	32120	1343	1298,3	157,2	858,5	2314	35750
1980	0	N.A.	N.A.	N.A.	167200	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	36529
1981	0	N.A.	N.A.	N.A.	176300	29245,2	2938,6	32183,8	1578,1	382,4	144,7	844,2	1371,3	35133
1982	0	N.A.	N.A.	N.A.	181700	26847,3	2534,7	29382	1901,8	362,2	148,2	799,3	1309,7	32594
1983	0	N.A.	N.A.	N.A.	186600	26030,7	3053,7	29084,4	1985,2	349	142	733,8	1224,8	32294,4
1984	0	N.A.	N.A.	N.A.	193100	26776,7	2476,2	29252,9	2576	355,1	141,7	709,5	1206,3	33015,2
1985	0	N.A.	N.A.	N.A.	197050	25291,7	2164,8	27456,5	3023	338,3	130,8	733,9	1203	31682,5
1986	0	N.A.	N.A.	N.A.	184500	24463,3	2124,8	26587,6	3267,5	321,1	116,2	734,8	1172,1	31027,2
1987	0	N.A.	N.A.	N.A.	189700	23405,7	1883,5	25289,2	3734	316,3	112,5	710,5	1139,3	30162,5
1988	0	N.A.	N.A.	N.A.	194100	22741,5	2364,3	25105,8	4049,1	316,9	113,4	716,9	1147,2	30302
1989	0	N.A.	N.A.	N.A.	181600	23619,9	2567	26186,9	4073,7	257,5	102,3	708,9	1068,7	31329
1990	0	16600	22000	225400	247400	21581	2593	24174	3865	217	114	688	1019	29057
1991	0	15717	21110	279496	300606	20649	2688	23337	3783	180	116	587	883	28003
1992	1314	15035	22985	319274	342259	18031,8	1594,1	19625,9	3687	201,6	130,8	361,6	694	24597

Source. Annual Reports. Management Reports 1991, 1992. RENFE

TABLE 3: CARGAS COMPLETAS (FULL LOADS) TONNES (BY TYPE OF PRODUCT)

	CEREAL	COAL	TIMBER	CEMENT	LIME	MINE	IRON & STEEL	FLAMABL LIQ.	CHEMI-CALS	PROPANE BUTANE	FERTILISERS	MOTOR NATION	MILITAR	FRUIT	MOTOR INTERN.	OTHER INTERN
1970	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1971	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1972	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1973	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1975	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1976	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1977	1423	2547	N.A.	3086		6940	2906	6765	575	527	1301	440	N.A.	1152	N.A.	N.A.
1978	1244	2117	N.A.	3929		6829	2511	6566	609	533	1253	454	N.A.	1103	N.A.	N.A.
1979	1419	1911	N.A.	4065		7229	2254	5975	624	609	1286	425	N.A.	1013	N.A.	N.A.
1980	1390	2981	N.A.	3333		7012	2502	6035	686	591	1196	412	N.A.	N.A.	N.A.	N.A.
1981	1504	3962	316	3119		6638	2121	4959	711	562	1112	249	153	899	N.A.	N.A.
1982	1587	3669	319	3529		5745	2151	3369	740	513	1031	233	157	817	N.A.	N.A.
1983	1715	3328	389	3126		5724	2521	2440	753	525	1071	298	174	851	N.A.	1356
1984	1756	3440	679	2767		5983	2691	1850	905	519	1266	333	154	1042	N.A.	1584
1985	2024	2597	690	2867		5270	2846	1739	971	506	1148	336	157	671	N.A.	1680
1986	1846	3052	550	2559		4877	2737	1750	1001	505	1148	327	96	644	N.A.	1526
1987	1542	2692	550	1035	1561	3846	2970	1976	1043	459	1038	426	119	527	N.A.	1797
1988	1519	2388	559	1035	1381	3190	3144	1814	1029	551	899	396	155	339	N.A.	2103
1989	1159	2522	671	1029	1613	3721	3167	1819	1013	621	859	426	162	231	275	2149
1990	1201	2190	623	1057	1564	2495	3008	1650	1012	723	717	366	135	202	352	1982
1991	1025	2259	613	1130	1544	3140	2717	1138	884	701	705	353	72	150	384	2116
1992	929	2034	524	1162	1086	2395	2500	896	838	621	488	402	60	167	378	1821

Source: Annual Reports. Management Reports 1991, 1992. RENFE

TABLE 4: PASSENGER-KMS AND TONNE-KMS (millions)

	PASSENGERS					CARGAS COMPLETAS			COMBINADO	PAQUETERIA				FREIGHT
	AVE	L.RECO- RRIDO	REGIONAL	CERCANIAS	REG. & CERCANIAS	TOTAL	FULL WAGON	INTERNAL TRANSPORT	TOTAL	CARGO EXPRESS	PAQUETE EXPRESS	CORREOS	TOTAL	TOTAL
1970	0	7003	N.A.	N.A.	N.A.	(13293)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	9693
1971	0	N.A.	N.A.	N.A.	N.A.	(13467)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	9523
1972	0	N.A.	N.A.	N.A.	N.A.	(14391)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	10221
1973	0	N.A.	N.A.	N.A.	N.A.	(15640)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	11561
1974	0	N.A.	N.A.	N.A.	N.A.	(16079)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	11577
1975	0	8497	N.A.	N.A.	N.A.	(16146)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	10693
1976	0	N.A.	N.A.	N.A.	N.A.	(16686)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	10766
1977	0	N.A.	N.A.	N.A.	N.A.	(17163)	9350,1	400,3	9750,4	286,5	60,8	371,5	432,3	11425
1978	0	N.A.	N.A.	N.A.	N.A.	(16578)	8688,7	331	9019,7	295,5	66,5	364	430,5	10708
1979	0	7623	N.A.	N.A.	5048	12671	8628,3	329,5	8957,8	295,2	69,2	364,7	433,9	10592
1980	0	8287	N.A.	N.A.	5240	13527	8663,8	609,7	9273,5	322,5		360,4	682,9	10887,3
1981	0	8897	N.A.	N.A.	5364	14261	8370,7	513,5	8884,2	273,1	63,6	361,9	698,6	10603
1982	0	9151	N.A.	N.A.	5552	14703	8119,3	465,7	8585	224,6	65,1	341,3	631	10503,8
1983	0	9437	N.A.	N.A.	5655	15092	8118,5	529,4	8647,9	216,2	63	328,5	607,7	10598,7
1984	0	9730	N.A.	N.A.	5844	15574	8956,4	406,3	9362,7	207,5	62,8	329,4	599,7	11654
1985	0	9186	N.A.	N.A.	6163	15979	8676,9	335,2	9015,1	209,7	57,2	345,6	612,5	11653,8
1986	0	9387	N.A.	N.A.	6306	15693	8232,9	307,5	8540,4	199,3	47,5	340,9	587,7	11291,7
1987	0	9251	2903	3240	6143	15394	8066,4	303,2	8369,6	195,9	49,5	335,2	580,6	11474,8
1988	0	9432	2364	3870	6234	15716	7972,6	428,6	8401,2	196,4	50,9	342,9	590,2	11715,8
1989	0	8627	2323	3765	6088	14715	8086,7	460	8546,7	159	46,9	343,4	549,3	11618,6
1990	0	8455	1975	4595	6570	15025	7745	464	8209	2473	53	337	524	11206
1991	0	7991	1900	5131	7031	15022	7146	485	7631	2395	53	318	482	10507
1992	513	7793	2154	5890	8044	16350	6302,6	286,7	6589,3	125,5	60,2	227,9	414	9361

Source: Annual Reports. Management Reports 1991, 1992. RENFE

Note: (.) Denotes that before 1979 the figures were calculated by a different method than the current one, and they are inconsistent with later results

TABLE 5: CARGAS COMPLETAS TONNE-KMS (BY TYPE OF PRODUCT)

	CEREAL	COAL	TIMBER	CEMENT	LIME STONES	MINERALS	IRON & STEEL	FLAMABLE LIQUIDS	CHEMI CHALS	PROPANE BUTANE	FERTILI SERS	MOTOR NATION	MILITAR	FRUIT	MOTOR INTERN.	OTHER INTERN.
1970	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1971	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1972	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1973	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1975	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1976	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1977	734	404	N.A.	443		1144	1286	1440	336	244	458	233	N.A.	773	N.A.	N.A.
1978	612	298	N.A.	488		959	1081	1444	418	224	466	222	N.A.	761	N.A.	N.A.
1979	632	243	N.A.	458		1025	1085	1298	445	230	461	220	N.A.	683	N.A.	N.A.
1980	657,2	379	N.A.	375,5		994	1148	1311	489,5	223	429	213,4	N.A.	N.A.	N.A.	N.A.
1981	679,2	807,4	296	336,8		970	997,6	998	551,4	211,5	435,2	189,5	N.A.	596,8	646,5	
1982	659,8	908	301,7	326,1		799,2	1114,8	792,7	587,5	198,1	433,1	191	N.A.	544,1	647	
1983	821	832	342	278		762	1227	522	597	205	464	157	74	561	616	
1984	1019	758	550	244		795	1350	435	679	203	612	180	67	687	725	
1985	1107	497	606	254		667	1422	432	666	189	633	180	68	445	811	
1986	1046,6	573,3	445,4	193,6	51,4	623,5	1393,1	443,1	597,8	171,5	600,9	188,8	39,1	427	754	
1987	846	571	413	197	70	412	1526	518	614	148	508	267	46	354	843	
1988	800	516	422	195	60	338	1633	388	588	187	436	250	73	224	987	
1989	613	576	490	209	73	403	1778	386	571	214	395	265	80	153	1103	
1990	641	523	447	224	72	253	1582	397	606	248	314	232	73	121	184	6
1991	492	506	513	240	73	310	1407	336	560	262	316	213	38	91	189	
1992	422	397	431	240	46	234	1277	296	510	256	225	241	31	95	179	850

Source. Annual Reports. Management Reports 1991,1992. RENFE

TABLE 6.: PASSENGERS IN CERCANIAS

Cercanías: number of passenger (million)					
	1990	1991	1992	%90/91	% 91/92
Madrid	109,3	144,6	172,41	32,3	19,2
Barcelona	53,37	63,83	72,56	19,6	13,7
Bilbao	23,89	26,08	24,48	9,2	-6,1
Valencia	11,35	14,48	17,35	27,6	19,8
Asturias	4,61	5,07	5,48	10	8,1
Málaga	10,04	10,07	7,53	0,3	-25,2
Sevilla	3,81	3,18	6,14	-16,5	93,1
San Sebastián	4,83	6,8	7,28	40,8	7,1
Murcia	2,19	2,54	3,07	16	20,9
Cádiz	0,78	1,25	1,71	60,3	36,8
Santander	0,98	1,02	1,01	4,1	-1
Tarragona	0,3	0,54	0,16	80	-70,4
9 centres	38,89	44,95	49,73	15,6	10,6

Source: 100 datos estadísticos 1990-91-92. RENFE.

NOTE: 9 centres means all centres apart from Madrid, Barcelona and Bilbao.

TABLE 7: MAIN CORRIDORS OF LARGO RECORRIDO.

Largo Recorrido: passenger-km (million)					
	1990	1991	% 90/91	1992	% 91/92
Madrid-Cornisa Cantábrica	1004,1	898,6	-10,5	834,3	-7,2
Madrid-Zaragoza/Barcelona	946,6	889,7	-6	813,1	-8,6
Madrid-Valencia/Alicante/Murcia	703,9	739,8	5,1	745,8	0,8
Madrid-Andalucía/Extremadura	1210,5	1133,2	-6,4	986,1	-13
Transversal Estrella	1134	1100,7	-2,9	1094,4	-0,6
Transversal Mediterráneo	1217,3	1264	3,8	1570,5	24,2
Internacional	483,7	454,7	-6	466	2,5

Source: 100 datos estadísticos 1990-1991-92. RENFE

TABLE 8. PASSENGER-KM IN LARGO RECORRIDO BY TYPE OF TRAIN

	1980	1984	1985	1986	1987	1988	1989	1990	1991	1992
Rápidos y Expresos	5940	7063	7270	6952	7100	7004	5927	5251	4715	4389
Talgo	938	1324	1338	1381	1475	1572	1661	2121	2213	2375
Electrotrén	601	690	685	615	666	856	1039	1083	1063	1029

Source: Annual Reports. 100 datos estadísticos 1990-91-92. RENFE.

TABLE 9: REVENUE AT CURRENT PRICES.

	PASSENGER					CARGAS COMPLETAS			COMBINAD	FREIGHT				FREIGHT TOTAL
	AVE	L.RECORR.	REGION.	CERCANÍAS	REG. & CERCAN	TOTAL	COMPLETE WAGON	INTERNAL TRANSPOR		TOTAL	CARGO EXPRESS	PAQUETE EXPRESS	CORREOS	TOTAL PARCELS
1970	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1971	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1972	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1973	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1974	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1975	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1976	0	N.A.	N.A.	N.A.	N.A.	18357	14040	N.A.	N.A.	558	N.A.	N.A.	1836	N.A.
1977	0	N.A.	N.A.	N.A.	N.A.	21378	17193	N.A.	N.A.	698	N.A.	N.A.	2270	N.A.
1978	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	3060	N.A.
1979	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	3746	N.A.
1980	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	4474	N.A.
1981	0	N.A.	N.A.	N.A.	N.A.	N.A.	24917	2994	27911	1870	6044		4594	10638
1982	0	N.A.	N.A.	N.A.	N.A.	42228	26340	3009	29349	2395	6890		4426	11316
1983	0	N.A.	N.A.	N.A.	N.A.	48069	27088	4296	31384	3083	6910		4900	11810
1984	0	N.A.	N.A.	N.A.	N.A.	48046	30007	3679	33677	4305	6808		5687	12497
1985	0	N.A.	N.A.	N.A.	N.A.	55307	31633	2924	34557	5476	6860		6005	12865
1986	0	N.A.	N.A.	N.A.	N.A.	55761	30593	3073	33666	6219	5936		6076	12012
1987	0	42513	N.A.	N.A.	16940	59453	31906	2896	34802	7307	5809		6513	12322
1988	0	45403	N.A.	N.A.	18704	64107	32350	3117	35467	8008	5939		6597	12536
1989	0	N.A.	N.A.	N.A.	N.A.	65537	39971	3194	37165	8485	2590	2883	6732	12207
1990	0	51976	8100	14965	23065	75041	34275	3425	37700	8303	2208	3351	7211	12770
1991	0	51960	8203	18586	26789	78749	32086	3638	35724	8690	1918	3451	7119	12542
1992	8440	53864	9303	22329	31632	93936		35727	35727	8812	11719			11779

Source: Annual Reports. Management Reports 1991, 1992. RENFE

TABLE 10. REVENUE AT 1992 PRICES. (million ptas)

	PASSENGER					CARGAS COMPLETAS			COMBINADO	PAQUETERIA				FREIGHT TOTAL
	AVE	L.RECORR	REGION.	CERCANIAS	REG. & CERCANIAS	TOTAL	FULL WAGON	INTERNAL TRANSPORTS	TOTAL	TOTAL	CARGO EXPRESS	PAQUETE EXPRESS	CORREOS	TOTAL
1976	0	NA	NA	NA	NA	99820	76345	NA	NA	3034	NA	NA	9984	NA
1977	0	NA	NA	NA	NA	93371	75092	NA	NA	3049	NA	NA	9914	NA
1978	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11156	NA
1979	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11804	NA
1980	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12206	NA
1981	0	NA	NA	NA	NA	NA	59317	7127	66444	4452	14388		10936	25325
1982	0	NA	NA	NA	NA	87874	54812	6262	61073	4984	14338		9210	23548
1983	0	NA	NA	NA	NA	89231	50284	7975	58259	5723	12827		9096	21923
1984	0	NA	NA	NA	NA	80133	50047	6136	56183	7180	11355		9485	20843
1985	0	NA	NA	NA	NA	84783	48492	4482	52974	8394	10516		9205	19721
1986	0	NA	NA	NA	NA	78565	43104	4330	47434	8762	8364		8561	16924
1987	0	56938	NA	NA	22688	79627	42732	3879	46611	9786	7780		8723	16503
1988	0	58024	NA	NA	23903	81927	41343	3983	45326	10234	7590		8431	16021
1989	0	NA	NA	NA	NA	78422	40650	3822	44472	10153	3099	3450	8056	14607
1990	0	58290	9084	16783	25867	84157	38439	3841	42280	9312	2476	3758	8087	14321
1991	0	55025	8687	19683	28369	83395	33979	3833	37832	9203	2031	3655	7539	13282
1992	8440	53864	9303	22329	31632	93936		35727	35727	8812				11779
														53403

Source: Annual Reports. Management Reports 1991, 1992. RENFE

TABLE 11. REVENUE PER PASSENGER-KM AND TONNE-KM AT 1992 PRICES (ptas)

	PASSENGER						CARGAS COMPLETAS			COMBINADO	PAQUETERIA				FREIGHT TOTAL
	AVE	LARGO RECORR.	REGION.	CERCANIAS	REG. & CERCANIAS	TOTAL	FULL WAGON	INTERNAL TRANSPORT	TOTAL	TOTAL	CARGO EXPRESS	PAQUETE EXPRESS	CORREOS	TOTAL	
1977	NA	NA	NA	NA	NA	NA	8,03	NA	NA	3,19	NA	NA	26,69	NA	NA
1978	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	30,65	NA	NA
1979	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	32,37	NA	NA
1980	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	33,87	NA	NA
1981	NA	NA	NA	NA	NA	NA	7,09	13,88	7,48	4,22	52,68		30,22	36,25	9,07
1982	NA	NA	NA	NA	NA	5,98	6,75	13,45	7,11	3,87	63,84		26,99	37,32	8,53
1983	NA	NA	NA	NA	NA	5,91	6,19	15,06	6,74	4,26	59,33		27,69	36,08	8,11
1984	NA	NA	NA	NA	NA	5,15	5,59	15,1	6	4,27	54,72		28,79	34,76	7,22
1985	NA	NA	NA	NA	NA	5,31	5,59	13,37	5,88	4,14	50,15		26,63	32,2	6,96
1986	NA	NA	NA	NA	NA	5,01	5,24	14,08	5,55	4,05	41,97		25,11	28,8	6,48
1987	NA	6,15	NA	NA	3,69	5,17	5,3	12,79	5,57	3,88	39,71		26,02	28,42	6,35
1988	NA	6,15	NA	NA	3,83	5,21	5,19	9,29	5,4	3,76	38,65		24,59	27,15	6,11
1989	NA	NA	NA	NA	NA	5,33	5,03	8,31	5,2	4,02	19,49	73,56	23,46	26,59	6,05
1990	NA	6,89	4,6	3,65	3,94	5,6	4,96	8,28	5,15	3,77	18,48	70,91	24	27,33	5,88
1991	NA	6,89	4,57	3,84	4,03	5,55	4,75	7,94	4,96	3,84	18,3	68,96	23,71	27,56	5,73
1992	16,45	6,91	4,32	3,79	3,93	5,75	5,67	0	5,42	3,92				28,45	5,7

Source: Annual Reports. Management Reports 1992, 1993. RENFE

TABLE 12. AVERAGE LENGTH OF HAUL

	PASSENGERS					CARGAS COMPLETAS			COMBINADO TOTAL	PAQUETERIA				FREIGHT TOTAL
YEAR	AVE	LARGO RECORR.	REGION	CERCAN.	REG. & CERCAN.	TOTAL	FULL WAGON	INTERNAL	TOTAL	CARGOEX	PAQUEXP	CORREOS	TOTAL	
1970		n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	314
1971		n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	297
1972		n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	296
1973		n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	307
1974		n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	292
1975		n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	284
1976		n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	299
1977		n.a	n.a	n.a	n.a	n.a	294	265	292	161	440	428	155	305
1978		n.a	n.a	n.a	n.a	n.a	288	178	282	211	440	425	179	299
1979		n.a	n.a	n.a	n.a	80,7	284	189	279	227	440	425	188	296
1980		n.a	n.a	n.a	n.a	80,9	n.a	n.a	n.a	n.a	n.a	n.a	n.a	298
1981		n.a	n.a	n.a	n.a	80,9	286	175	276	714	440	429	509	302
1982		n.a	n.a	n.a	n.a	80,9	302	184	292	620	439	427	482	322
1983		n.a	n.a	n.a	n.a	80,9	312	173	297	619	444	448	496	328
1984		n.a	n.a	n.a	n.a	80,7	334	164	320	584	443	464	497	353
1985		n.a	n.a	n.a	n.a	81,1	343	155	328	620	437	471	509	368
1986		n.a	n.a	n.a	n.a	85,1	337	145	321	621	409	464	501	364
1987		n.a	n.a	n.a	n.a	81,1	345	161	331	619	440	472	510	380
1988		n.a	n.a	n.a	n.a	81	351	181	335	620	449	478	514	387
1989		n.a	n.a	n.a	n.a	81	342	179	326	617	458	484	514	371
1990		509	89,8	20,4	26,6	56,9	359	179	340	618	465	490	514	386
1991		508	90	18,4	23,4	47,5	346	180	327	617	457	542	546	375
1992	390	518	93,7	18,4	23,5	45,6	350	180	336	623	460	630	597	381

Source: Annual Reports. Management Reports 1991, 1992. RENFE

TABLE 13. AVERAGE LENGTH OF HAUL BY TYPE OF PRODUCTS (CARGAS COMPLETAS)

	CEREAL	COAL	TIMBER	CEMENT	LIMEST	MIN	IRON&S	FLAM-LI	CHEM	PROPAN	FERT	MOTOR	MILIT	TARIF	MOTOR	OTHER
1977	516	159	N.A.	143,6	N.A.	164,8	443	213	584	463	352	530	N.A.	671	N.A.	N.A.
1978	492	141	N.A.	124,2	N.A.	140,4	431	220	686	420	372	489	N.A.	690	N.A.	N.A.
1979	445	127	N.A.	112,7	N.A.	141,8	481	217	713	378	358	518	N.A.	674	N.A.	N.A.
1980	473	127	N.A.	112,7	N.A.	141,8	459	217	714	377	359	518	N.A.	ERR	N.A.	N.A.
1981	452	204	937	108	N.A.	146,1	470	201	776	376	391	761	N.A.	664	N.A.	N.A.
1982	416	247	946	92,4	N.A.	139,1	518	235	794	386	420	820	N.A.	666	N.A.	N.A.
1983	479	250	879	88,9	N.A.	133,1	487	214	793	390	433	527	425	659	N.A.	N.A.
1984	580	220	810	88,2	N.A.	132,9	502	235	750	391	483	541	435	659	N.A.	N.A.
1985	547	191	878	88,6	N.A.	126,6	500	248	686	374	551	536	433	663	N.A.	N.A.
1986	567	188	810	75,7	N.A.	127,8	509	253	597	340	523	577	407	663	N.A.	N.A.
1987	549	212	751	190,3	44,8	107,1	514	262	589	322	489	627	387	672	N.A.	N.A.
1988	527	216	755	188,4	43,4	106	519	214	571	339	485	631	471	661	N.A.	N.A.
1989	529	228	730	203,1	45,3	108,3	561	212	564	345	460	622	494	662	4011	0
1990	534	239	717	211,9	46	101,4	526	241	599	343	438	634	541	599	523	487
1991	480	224	837	212,4	47,3	98,7	518	295	633	374	448	603	528	607	492	446
1992	454	195	823	206,5	42,4	97,7	511	330	609	412	461	600	517	569	474	467

Source: Annual Reports. Management Reports 1991, 1992. RENFE.

TABLE 14. TRAIN-KMS (millions)

YEAR	PASSENGERS						FREIGHT
	AVE	LARGO RECORRIDO	REGIONALES	CERCANÍAS	REGIONALES CERCANÍAS	TOTAL	TOTAL
1970	0	N.A.	N.A.	N.A.	N.A.	80,497	N.A.
1971	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1972	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1973	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1974	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1975	0	N.A.	N.A.	N.A.	N.A.	83,754	N.A.
1976	0	N.A.	N.A.	N.A.	N.A.	86,2	45,4
1977	0	N.A.	N.A.	N.A.	N.A.	91,2	44,2
1978	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1979	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1980	0	N.A.	N.A.	N.A.	N.A.	94,859	42,311
1981	0	N.A.	N.A.	N.A.	N.A.	100,26	40,767
1982	0	N.A.	N.A.	N.A.	N.A.	103,361	40,899
1983	0	N.A.	N.A.	N.A.	N.A.	103,274	41,944
1984	0	N.A.	N.A.	N.A.	N.A.	104,308	46,606
1985	0	N.A.	N.A.	N.A.	N.A.	103,162	48,854
1986	0	N.A.	N.A.	N.A.	N.A.	105,921	50,402
1987	0	N.A.	N.A.	N.A.	N.A.	103,14	48,352
1988	0	N.A.	N.A.	N.A.	N.A.	110,156	48,959
1989	0	N.A.	N.A.	N.A.	N.A.	109,914	48,214
1990	0	N.A.	N.A.	N.A.	N.A.	120,449	48,631
1991	0	50,1	31,1	46,3	77,4	127,604	45,232
1992	2,1	48,6	30	52	82	132,7	47,01

Source: Annual Reports. Management Reports 1991,1992. RENFE / UIC STATISTICS.

	NUMBER OF	TRAFFIC	TRAFFIC PER 1000
1984	70172	27228	388
1985	65907	27633	419
1986	64165	26985	421
1987	55811	26869	481
1988	51757	27432	530
1989	49863	26334	528
1990	49380	26231	531
1991	48484	25529	527
1992	45971	25711	559

Source: Carbajo et De Rus (1991) / 100 Datos estadísticos 1988-89. Management Reports 1991,1992. RENFE

NOTE: Traffic is the sum of pasenger-kms and tonne-kms.