Research Project:

OPTIRED: Development of the regulatory framework of rail passenger transport in Spain.

Optired

OPTIRED: Options for the opening to competition of rail passenger services in Spain and tools for decision

Funded by:

GOBIERNO DE ESPAÑA · MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

Expte: P-68/08

Research Consortium

ALSA · BB&J CONSULT · ETT · Fundación de los Ferrocarriles Españoles · UCLM · Universitat Jaume I

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1. GENERAL INTRODUCTION / *Optired Consortium*

1.1 Purpose of the project

The basic objective of the OPTIRED project, as defined in its scientific-technical memorandum, is to propose the scheme for opening up the intercity railway passenger services market in Spain. To this end, Optired has made a concerted effort to analyse and specify different decision-making instruments from a multi-criteria point of view, having managed to cover a very wide range of decisions that will have to be made in the future when it comes to opening this market to competition.

The approach of this project has focused on providing tools that help decision-makers to choose from among the various possible regulatory frameworks for the opening of the intercity railway passenger transport market the one(s) which is/are most efficient for achieving their railway policy objectives in particular and transport objectives in general.

In this respect, it should be borne in mind that pursuant to Spain's Railway Sector Act (Ley 39/2003 del Sector Ferroviario), the railway services provided on the General Interest Railway Network (Spanish acronym: REFIG) are no longer regarded as a state-owned public service but instead as general interest services (both passenger services and freight services) essential for the community, which are provided, in accordance with this Act, under a system of free competition.

Always according to this Act, there are two types of services for which (a priori) different access schemes are established: those of a "commercial nature", which shall be provided through free competition; and those of "public interest", which shall be developed in a market liberalization system, albeit necessarily through competitive bidding mechanisms. The third transitional provision of the abovementioned Act stated, prior to its amendment by Royal Decree Law 22/2012, with respect to railway passenger services, that these provisions would not apply until the European Union established a market liberalization system for this type of transport. Finally, Royal Decree Law 22/2012 sets 1 August 2012 as the date of opening of domestic rail services.

These liberalization provisions add to those already in force for international passenger traffic provided by Directive 2007/58/EC of the European Parliament and of the Council of 23 October 2007 amending Directives 91/440/EEC and 2001/14 which liberalized (from 1 January 2010) the international railway passenger services market within the Community. This liberalization of international services includes the possibility of domestic cabotage, except when the cabotage entails a risk for the financial equilibrium of the public service contracts established in each country. This will be decided by the railway Regulator by means of an objective study. In practice, no international service with authorized domestic cabotage has been established in Spain to date.

EU Regulation 1370/2007 on public passenger transport services by rail and by road was passed in 2007. This regulation represents an element of prime importance for this opening process, insofar as it establishes the legal framework of reference – to which all Member States must adapt – for the procurement of services that include subsidies (or another type of economic consideration) and/or the award of exclusive rights.

To date, at European Union level, no timeframe has been set for the opening to competition of the provision of domestic railway passenger services (as is the case in the freight transport and international transport markets). Regulation 1370/2007 continues to allow direct procurement on the part of Member States, but it does contribute the obligation – and this is a decisive element with a view to the future – to establish management contracts for those activities deemed to be Public Service Obligations (PSOs).

With things as they stand, the States have a considerable margin of discretion to decide "when" to open their different networks to competition, as well as "how" to establish the models of competition.

In this context, Optired provides valuable tools so that authorities can make decisions in various areas related to the future opening of this market in Spain.

Competition in the operation of intercity passenger services will give rise to an extremely complex situation at different levels, given that the intercity services with origin and destination in different Autonomous Communities (ACs) may or may not have public service characteristics, depending on each case. Furthermore, it is necessary to consider the possibility of these trains being able to make stops within the territory of a particular Autonomous Community (AC) in a such a way that might affect the financial equilibrium of any public service contracts the competent regional authorities may have awarded to other operators (in the railway mode or even in others). The Spanish Constitution, the different Statutes of Autonomy and the Overland Transport Regulation Act (Ley 16/1987 de Ordenación de los Transportes Terrestres) confirm the ACs' ownership of the overland transport services that operate entirely (or mainly) within their respective territories.

In view of the foregoing, it can be seen that the application and full validity of the Railway Sector Act, in the specific case of the opening of the passenger market, requires a preliminary analysis (and a thorough regulatory update) that addresses currently undefined issues such as: a) determining the technical-economic procedure for declaring whether or not a service is of public interest; b) how to establish the coexistence, in the same model, of international services, inter-regional services with origin and destination in different Autonomous Communities and those of regional interest due to their origin and destination being in the same AC; c) regulating incoming operators' access to the market; or d) the configuration of the model of economic relations on which the new transport system is based.

Another issue worth considering concerns the expiry of the concession periods corresponding to regular passenger transport by road – both national and regional –, which reach their critical point in the years 2013-2015. It is therefore paradoxical (and opportune) that the renewal of the Spanish public road transport concession system should coincide with the foreseeable opening to competition of rail transport. Thus, at the moment of opening to competition there will be various possibilities for organizing transport market access, with different effects on the objectives pursued by transport policy decision-makers, which need to be assessed.

1.2 Methodology and objectives

The basic objectives of the Project are to present the different options for the opening to competition of intercity railway passenger services in Spain, to create a series of tools to aid decision-making, and to establish the appropriate regulatory developments to ensure that the opening to competition is effective and beneficial for society. **OPTIRED does not offer a solution but instead a range of options and tools to assist decision-makers.**

The performance of the Task has focused on the provision of medium and long-distance intercity passenger services, without considering other forms of urban or metropolitan mobility.

The starting point of the research was an in-depth analysis of the state of the art from various perspectives. Analysis of the state of the art of the relevant legal aspects focused on railway regulation at the domestic and European levels, as well as the interrelations with the regulation of other modes of transport. This was followed by a detailed study of the state of the art of the economic regulation of the railway, together with a comparative analysis of the most significant experiences of railway passenger market liberalization in Europe. Finally, attention was paid to the state of the art of the theoretical analysis of issues relating to railway competition modelling tools.

The state-of-the-art analyses were followed by a study of railway policy objectives, as well as the supply/demand structure of Spanish railway services and the infrastructure charge. In accordance with the foregoing parameters, an OPTIRED Expert Panel selected the models of competition deemed to be feasible in the project for the Spanish case. In January 2010, the research consortium considered that there could be a mixture of competition in the market and competition for the market in Spanish intercity railway services, with the latter being more predominant in quantitative terms, given that the former is dependent on the railway mode obtaining a sufficient volume of demand to enable more than one operator to coexist on a route, especially bearing in mind the uncertainties and barriers to entry that characterise this sector, which hinder – in the opinion of the research consortium – effective competition in the market. This favourable situation for the railway (large market volume within the train's grasp) was considered unlikely on the vast majority of routes and especially on those without high-performance infrastructures. For this reason, modelling efforts are focusing on competition for the market, as this would be the most intense form of competition in the early stages of liberalization, in addition to there being successful examples in other countries.

After this phase, an experiment was devised to model the behaviour of competition for the market in a railway corridor (Madrid-Levante). In this experimental economic model, consideration was given to, among other variables, the objectives and instruments of the possible regulatory frameworks, highlighting the design of connectivity and stops on the part of the public authority responsible for designing and regulating the services. The modelling of the competition allowed us to obtain a methodology and a validated model that analyses the behaviour of the possible railway operators. Thus, in spite of working within the field of models, an advantage was achieved for the design of the future regulatory framework of the market, i.e. having a clearer idea of the functioning of the railway passenger transport market in Spain.

So as not to confine the research to the theoretical or laboratory sphere, a series of tools to aid the policy maker's decision-making have been developed.

An important aspect to consider relates to the effects arising from liberalization on intermodal competition. Apart from the effects of modal transfer, the analysis of the effects arising from a company's operation of railway services and that of other modes is of great interest. To this end, of special interest to the competition authorities, criteria for defining the relevant market and for modal substitutability in the Spanish case have been analysed and developed.

In order to ascertain the effects of different railway market access regulation options on the demand for public transport in general, and rail transport in particular, the Visum transport model has been used to simulate different regulation scenarios with different strategies of the incoming railway companies in the selected corridor (Madrid-Levante). For this reason, we have also developed tools that provide a more accurate indication of the current and potential demand for the railway mode, as well as the interactions with other modes of transport.

The final tool developed is a piece of software that allows us to ascertain the effects of railway operation on economic and social costs with regard to different route options and operating costs. In this way, by considering previous studies of demand, the economic, social and environmental benefit of operating a service or set of railway services can be approximated.

Finally, the legal and technical operating requirements necessary for the development of liberalization are set out in detail, whereby the analysis is not limited to a theoretical-scientific study, but instead considers the real problems of operation and the special characteristics of the Spanish situation. Thus, the decision-maker is given all the information necessary to ensure that the opening to competition is effective.

The project opens up future lines of research of unquestionable interest such as the extension of the modelling to competition in the market and the study of the territorial effects of the opening the railway sector to competition.

2. COMMUNITY LEGISLATION ON PUBLIC AID IN THE RAILWAY SECTOR: REGULATION 1370/2007 AND GUIDELINES ON AID FOR RAILWAY UNDERTAKINGS

/ Juan José Montero

2.1 Introduction

The liberalization of railway services requires a reformulation of public intervention instruments, and particularly of those used to finance such intervention through public aid. Liberalization policies are not going to put an end to public intervention in the railway sector, as is demonstrated by the experience of other sectors that have already been liberalized, such as telecommunications or postal services, which have held on to powerful instruments of public intervention, some of them particularly innovative..

2.2 Regulation 1370/2007

The Community authorities are making a great effort to specify the content of article 73 of the Treaty, concerning public aids for transport and, specifically, rail transport. This is the context in which Regulation 1370/2007 must be understood.

The Community authorities have defined the concept of public service obligations in order to channel public intervention in defence of the general interest and define the legal regime the intervention must comply with. Thus, they consider the offsetting of costs generated by the imposition of such public service obligations to be compatible with the Treaty. The compensation may take the form of a subsidy, but also the granting of exclusive rights on a given route, for example. Nevertheless, Regulation 1370/2007 defines strict procedural conditions for the imposition of public service obligations and for the award of compensation for such obligations.

Firstly, the Member States must precisely define the content of the public service obligations. It is no longer enough to declare a service 'public'; instead it is necessary to precisely identify the content of the obligations imposed on railway undertakings in terms of prices, frequencies, quality of rolling stock, etc.

In this respect, it is worth highlighting that the Community authorities do not limit the imposition of public service obligations to suburban or regional services. It is perfectly possible to impose obligations on long-distance services and even on international services, as expressly provided for in the Regulation, although it is important to point out that the obligations are imposed on passenger services, not on freight services (with the odd exception).

Secondly, it is necessary to formally include the public service obligations in a legal instrument that the Commission calls a 'contract', but which may take various forms such as legal provisions or regulations, an administrative act, or a contract-programme.

Thirdly, determination of the operator subject to public service obligations may be the result of a bidding process, but the service may also be directly awarded to an Administration or to an Administration-controlled company.

Finally, the key point regarding compensation for public service obligations is the amount thereof, since under no circumstances may the compensation exceed the net cost effectively borne by the operator owing to the public service obligations.

The bidding processes should ensure that the compensation covers the service production cost. On the contrary, if the service is directly awarded, the State must have at its disposal the cost analyses that justify the amount of the aid provided.

Therefore, Regulation 1370/2007 excludes excessive compensations, which would represent public aid subject to the regime of the Treaty. Neither does it guarantee the sufficiency of the compensation, so as not to affect the financial viability of the operators. The EC Directives, on the other hand, contain references to the financial viability of the operators.

2.2.1 Application of Regulation 1370/2007 to Spain

EIn Spain there is some concern about the diversity of existing legislation (Overland Transport Regulation Act –LOTT–, article 53 of the Railway Sector Act –LSF–, Sustainable Economy Act –Ley de Economía Sostenible–) and the government authorities' delayed conclusion of the contract-programme, which seems to have not been signed yet despite the fact that it should have entered into effect several years ago.

Even more importantly, it seems clear that the current price structure of Renfe Operadora's long-distances services offers evident incentives for market cherry-picking in a context of imminent liberalization.

The published data indicate that a large proportion of long-distance services would not cover the service provision costs and would benefit from domestic cross-subsidies from high-speed services, which are provided with substantial profit margins.

The opening of the market clearly encourages new operators to focus on niches in which it is possible to adjust prices to costs. This would force the current service provider to adjust his prices in long-distance services, which would prevent the cross-subsidisation of the other long-distance services, stretching the provider's financial resources to the limit, which in many cases could necessitate the withdrawal of services which were financed by cross-subsidies prior to liberalization.

If it were considered desirable to maintain these services, they could be declared to be of public interest. Long-distance services, however, have gradually been excluded from the public service obligations regime. Nevertheless, as we have already mentioned, the Community authorities do not limit the imposition of public service obligations to suburban or regional services. It is perfectly possible to impose obligations on long-distance services and even on international services.

The inclusion of these services in the regime of Regulation 1370/2007 does not necessarily mean they will be publicly financed. There are precedents of innovative market-based financing schemes (universal Service Funds in telecommunications and postal services, for example) that would permit the continuation of a scheme involving subsidisation of long-distance services by high-speed services, provided that the procedure established in the Regulation were followed, which requires the declaration of public service obligations, their quantification and the possibility of them being financed through contributions from the operators present in the market.

2.3 Guidelines on public aid for railway undertakings

The Community guidelines on State aid for railway undertakings (OJEU 22.7.2008) clarify the scheme for other aid beyond compensation for public service obligations.

Aids for financing railway infrastructures are generally accepted by the Guidelines, provided the infrastructure remains open to all operators, and the latter assume at least the marginal cost generated by each transport service as provided for by the railway directives.

The Guidelines devote special attention to aid for the repayment of historical debts and aid for the restructuring of railway freight undertakings in the framework of transition from monopoly to competition.

Finally, the Guidelines clarify the scheme of what article 73 of the Treaty calls aids for the coordination of transport. These aids are used to channel public policies promoting certain modes of transport as opposed to others. Thus, the Commission states that it presumes aids for the utilization of railway infrastructures to be necessary and proportionate if they do not exceed 30% of the rail transport cost, thus allowing promotion of the use of transport by rail as opposed to transport by road, which does not usually assume the cost of road infrastructure use. Along the same lines, aids for the reduction of external costs (congestion, safety, environment) are considered necessary and proportionate if they do not exceed 30% of the transport cost and 50% of the subsidisable costs. This facilitates migration from the road to the railway, a mode of transport that generates fewer negative externalities. Finally, the Commission deems aids for interoperability necessary and proportionate if they do not exceed 50% of the subsidisable costs. In all other cases it is the responsibility of the States to justify the necessity and proportionality of the aids.

2.4 Conclusions

At a general level, one of the objectives of the policy for transport and the sustainability of European growth is to increase the importance of the participation of the railway mode. One instrument for achieving this goal is the creation of a single European railway market open to competition in which the Member States can maintain the services they consider to be of public interest. In commercial services, the principle is free access limited only in the case where the financing of public interest services is affected by the interaction that may occur between both.

In this respect, rail transport has traditionally required considerable public intervention. Liberalization policies are not going to put an end to this reality. Nevertheless, liberalization requires a reformulation of public intervention instruments and the mechanisms used to finance this intervention through public aids, as well as of criteria and procedures for the Community authorities' supervision of these public aids. The Community authorities are making a great effort to specify the content of article 73 of the Treaty, concerning public aid for transport and, specifically, rail transport.

The aspect that has merited most attention is the financing of public service obligations. Everyone is aware of the need to have public intervention mechanisms in order to guarantee adequate levels of service provision in a sector of general interest such as rail transport. These instruments may consist of the imposition of unprofitable services, whether owing to the route, the frequencies, the timetables or the quality of the rolling stock, for example.

The Community authorities have defined the concept of public service obligations in order to channel public intervention in defence of the general interest and define the legal regime that the intervention must comply with. Thus, they consider the offsetting of costs generated by the imposition of such public service obligations to be compatible with the Treaty. It is perfectly possible to impose obligations on long-distance services and even on international services, as expressly provided for in the Regulation, although it is important to point out that the obligations are imposed on passenger services, not on freight services (with the odd exception).

The compensation may take the form of a subsidy, but also the granting of exclusive rights on a route, for example. Nevertheless, Regulation 1370/2007 defines strict procedural conditions for the imposition of public service obligations and for the award of compensations for these obligations.

In any case, the States must always justify the necessity and proportionality of their intervention in order to guarantee its compatibility with the Treaty. The Community authorities have defined specific procedures and criteria for assessing the necessity and proportionality of national public policies.

The requirement to prove the necessity and proportionality of public intervention represents a break with Spanish administrative tradition, since it has traditionally been considered that the mere presence of a public operator was sufficient guarantee of the appropriateness of the public intervention.

The opening of the market offer a clear incentive for new operators to focus on niches in which there is a broad margin between costs and prices due to public policies aimed at promoting certain services. This seems to be the case of many high-speed services. The broad margin of these services would finance a large percentage of the traditional long-distance services. As a result, liberalization would force the current service provider to reduce high-speed services, which would eliminate the margin for financing the rest of the long-distance services. In the medium term, this would threaten many services financed by cross-subsidies prior to liberalization.

If it were considered desirable to maintain the loss-making long-distance services, it would be necessary to declare them to be of public interest and apply the regime of Regulation 1370/2007. Long-distance services, however, have gradually been excluded from the public service obligations regime. In any case, the Community authorities do not limit the imposition of public service obligations on suburban or regional services. It is perfectly possible to impose obligations on long-distance services and even on international services.

The inclusion of these services in the regime of Regulation 1370/2007 does not necessarily mean they will be publicly financed. There are precedents of innovative market-based financing schemes (universal Service Funds in telecommunications and postal services, for example) that would permit the continuation of a scheme involving subsidisation of long-distance services by high-speed services, provided that the procedure established in the Regulation were followed, which requires the declaration of public service obligations, their quantification, and the possibility of them being financed through contributions from the operators present in the market.

It is essential that the Spanish authorities adapt their policies to the Community framework and exploit all the possibilities this framework offers. Thus, there is an urgent need to define a stable regulatory regime for the imposition of public service obligations, conclude the contract-programme with Renfe Operadora and consider whether it is desirable to maintain the current cross-subsidy, a new financing scheme for the long-distance services.

3. DIRECTIVE 2012/34 RECASTING THE FIRST RAILWAY PACKAGE /

Juan Manuel Míguelez

3.1 Introduction

It is understandable that the Community authorities should feel a certain sense of disappointment owing to the poor results achieved in such a long period of time: more than 20 years have passed since the publication of Directive 440/91, which marked the start of an ambitious process of change. The contrast with aviation is striking, if we focus our attention on the transport sector, and even more so if we look at other sectors, such as telecommunications, whose opening was relatively swift and successful. In the case of the aviation industry, the key seems to lie, first and foremost, in technical matters. The most noteworthy aspect is the importance of the infrastructure of this business. The interrelationship between rolling stock and infrastructure is much closer than in other modes of transport, and the quality of the service largely depends on the quality of the infrastructure and the services associated with it.

The fundamental problems highlighted in Europe in relation to infrastructure are:

- Deterioration of quality.
- Lack of information about its development.
- Lack of a stable financial framework.

As regards the objectives of promoting competition (measures aimed at facilitating the opening of the market), the Community authorities are critical of the following:

- Lack of transparency.
- Deficient institutional framework.
- Discrimination as regards access to rail-related services.
- Discrimination in the conditions of access to the infrastructure

Another aspect to consider is the insufficient strength of the regulatory bodies. It seems clear that where there is no complete separation between infrastructure management and railway operation, a strong regulator is even more necessary.

In spite of the provisions relating to restructuring, the indebtedness of the railway sector remains high, in a context in which it is clearly important for this indebtedness, which can sometimes impede sound financial management, not to form part of the national debt (which could happen in the event of failure to meet the accounting requirements imposed by the European System of Accounts for considering an entity to be outside the public administration). Although both infrastructure managers and railway undertakings have to balance their books, the latter have been seriously affected by the Commission's guidelines on public aid (OJEU C 184 of 22.07.2008), although it is true that the amounts received in accordance with the requirements established by Regulation 1370/2007 for public service obligations will not regarded as public aids.

3.2 Directive 2012/34/EU (recast)

The Council's approval on 29 October 2012 of the text of this Directive puts this *recasting* process back on the agenda. It should be regarded as a reformulation of the so-called *first railway package*, which consists of the following three Directives

- Directive 91/440/EEC of the Council, of 29 July 1991, on the development of the Community's railways.
- Directive 95/18/EC of the Council, of 19 June 1995, on the licensing of railway undertakings.
- Directive 2001/14/EC of the European Parliament and of the Council, of 26 February 2001, on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification.

These are the three key directives governing *railway deregulation* in the European Union. This becomes apparent if we review their content:

Directive 91/440:

- The management independence and principles of railway undertakings.
- Separating the management of railway operation and infrastructure from the provision of railway services and regulating access to the infrastructure.

Directive 95/18:

- Harmonizing the regulation of railway undertaking licensing

Directive 2001/14:

- "Network statement".
- Allocation of infrastructure capacity.
- Charging for the use of infrastructure.
- Regime of regulatory bodies.

The term 'recast' alludes to the objective of derogating the abovementioned Directives and incorporating their content into a single piece of legislation. There should be no confusion, however; this is not a refundición ('consolidation') in the Spanish legal sense. Instead, the text is going to modify the previous regulation, thus giving rise to an instrument that will help to achieve the objectives undertaken by the Community institutions.

The Commission's perception seems to be that these objectives have not been achieved to the desired extent, as demonstrated by the infringement proceedings initiated on the basis of what this authority deemed to be the States' failure to fulfil their obligations regarding the transposition of these three Directives into national law. These proceedings were brought against nearly all the Member States – if one bears in mind that some do not have railways – in June 2008, rather late considering the compulsory transposition deadline: 15 March 2003. In October 2009, reasoned opinions were issued to 21 States, and in June 2010, thirteen States were summoned to the Court of Justice of the European Union: Austria, Czech Republic, France, Germany, Greece, Hungary, Ireland, Italy, Luxemburg, Poland, Portugal, Slovenia and Spain. The main infringements denounced by the Commission were the following:

- Lack of sufficient independence between the infrastructure manager and the service operator(s).
- Inadequate Regulator regime.
- Inadequate charge-fixing scheme

It is worth mentioning that one of the criticisms levelled at the 'Recast' is that it was undertaken without waiting for the Court of Justice's rulings, which will soon provide a genuine interpretation of the first package on which the new regulation could have been based.

As regards the Kingdom of Spain, the Commission claimed that the Regulator did not have adequate regulation, that it lacked sufficient independence and sufficient means to perform its duties (alleged infringement of article 30.1 of Directive 2001/14/EC and of article 10.7 of Directive 91/440/EEC). After the modification of the regulator's regime (23rd final provision of the Sustainable Economy Act of 4 March 2001 (*Ley 2/2011 de 4 de marzo de Economía Sostenible*) and the procedural steps taken by the Regulator, the Commission would have withdrawn with regard to this point.

In addition, it was also considered that the infrastructure charging scheme is not consistent with Community Law: alleged infringement of articles 4.1 and 11.1 of Directive 2001/14/EC, concerning the infrastructure manager's power to determine the charge for the use of infrastructure and the establishment of a performance scheme within the infrastructure charging scheme to encourage the infrastructure manager to improve railway network performance; and that the legal criteria for the allocation of infrastructure capacity infringe the provisions laid down in articles 13.2 and 14.1 of Directive 2001/14/EEC.

The recently published conclusions of the Attorney-General do not augur well for a ruling in favour of the defendant, except in the case of the Regulator, thanks to the recently approved legislative changes that affect the latter.

Also of interest are the Attorney-General's conclusions regarding the proceedings against Austria and Germany, which do not consider contrary to Community Law the holding scheme that integrates infrastructure management and service operation within the same undertaking (valid in these countries), which contrasts with the Commission's stated preference for complete and radical institutional separation.

3.3 What regulation enhancement does the new Directive seek to introduce?

Two extremes should be avoided. One would be to regard the text of the new Directive as revolutionary, which might result from imagining what the rigorous application of the first package according to the Commission's criteria would entail. The other would be to underestimate the new aspects of this text in relation to the already operative content of the three Directives that are going to be derogated. A market is obviously not created automatically with legislative measures or with planning instruments. What can be done by means of a Directive is limited, especially when dealing with only one mode of transport.

It is important to take into consideration the economic operators and their (more or less free) decisions, as well as the behaviour of consumers and users. Nevertheless, to help solve the problems detected in the Community legislation sphere, in relation to the principle of subsidiarity, the aim is to simplify the legal framework: merging, consolidating, clarifying and substituting provisions. It should be assumed that clearer legislation will facilitate understanding, application and transposition into national Law, and perhaps also the initiation of infringement proceedings. The objectives, following the structure of the Commission, fall into three categories:

- Infrastructure:
  - Adequate, transparent and sustainable financing; predictability of its development and conditions of access.
  - More adequate structure and level of charges; improvement of competitiveness in relation to other modes and improved internalization of environmental costs.
- Competition:
  - Avoiding the distortion of competition with public funds.
  - Transparency, avoiding the use of commercially sensitive information against competitors and conflicts of interest, and increasing the availability of services for new operators
- Regulatory bodies:
  - Reinforcing their independence.
  - Extending their powers.
  - Increasing their means and resources.

3.4 Most interesting contents of Directive 2012/34 (recast)

3.4.1 The Commission's delegated powers

A matter of substance reflected in the Directive concerns the Commission's delegated powers. When detailed and demanding regulation is sought within the European Union, with hardly any measure of autonomy for the Member States, Regulations are passed. The measure of autonomy referred to is a presupposition of the Directives. In the present case, the Commission will have powers to adopt implementing measures of considerable importance, preparing detailed mandatory instructions for implementation and amending some parts of the Directive (annexes). The use of these powers may have the effect of distancing us from what a Directive is supposed to be and bringing us closer to the Regulation. The delegated powers, subject to Regulation 182/2011 of 16 February, have already been criticised for being excessive. The provisions that can be consulted in order to verify the extent of these delegated powers are the following articles: 10.4, 11.4, 12.5, 13.9, 17.5, 31.3, 31.5, 32.4 and 57.7.

3.4.2 Access to infrastructures

Access to infrastructures is regulated in articles 38 et seq. Although there is no revolutionary measure for opening up the domestic passenger market, which is due to form part of the 4th railway package, the right to access infrastructures connecting with ports and service facilities does exist and, as we will see in the next section on delegated powers, the Commission is expected to establish detailed rules regarding procedure and application criteria for access to infrastructure and rail-related services (ACA in the Spanish terminology).

It remains possible to restrict the entry of new operators in cases where they upset the equilibrium of public service contracts, an issue whose assessment lies with the regulatory bodies.

The utility of opening up access to infrastructures depends on the quality and predictability of the development of these infrastructures and on a stable financial framework for the Managers. Nevertheless, it is worth emphasising that the provisions which include that found in article 8, relating to the publication of the indicative rail infrastructure development strategy, place rather less stringent demands on the States in comparison with the initial proposal.

3.4.3 Separation between infrastructure management and provision of services

The separation between infrastructure management and operation was the main new feature of Directive 440/91. By applying network industry concepts, it sought to put an end to the traditional integration of infrastructure management and transport operations. However, the obligation did not take a radical form and was limited to the requirement of separation of accounts, which now appears in article 6. This has determined different forms of organization in the Member States, on which the Court of Justice has yet to pass judgment. For the time being we have the conclusions of the Attorney-General, which deny the compulsory nature of the Commission's guidelines on this matter.

It is clear that liberalization of the railway entails a higher regulatory cost and that the total separation of functions also increases the costs of the system, costs which, from the economic point of view, are justified in the opening of the market. It is patently obvious that institutional separation is the most rights-based system and the one preferred by the Commission.

The situation, in accordance with article 7, is now as follows: the essential functions of infrastructure management must be entrusted to independent entities:

- Capacity allocation.
- Infrastructure charging (determination and collection of the charges).

3.4.4 Cross-subsidies

The ban on cross-subsidies is typical of competition law and has a long history in rail transport. The idea is to prevent public funds from being used to defray the cost of transport activities in which there should be no public financing. The reference to Regulation 1370/2007 is almost obligatory. The article adds some references to how accounts must be kept separate, and the standardized presentation of accounts seeks to facilitate monitoring on the part of the regulators. Here, as in other sectors, cost accounting could become a fundamental instrument.

3.4.5 Rail-related services

SThe aim is to improve the classification of these services which Spanish legislation calls ACA: additional, complementary and auxiliary (Title III of Law 39/2003, articles 39 et seq.). However, it is necessary to point out that the delimitation found in domestic law does not coincide with Community Law. Indeed, from the Community point of view, there are other services not included in this category which are taken into consideration, such as rolling stock maintenance. The initial aim of forcing separation into separate maintenance organizations has been abandoned. It was rather illogical not to insist on the organizational separation of infrastructure management while being more demanding in this respect.

The Directive states that the management of the facilities where the related services are offered shall always maintain, in accordance with the provisions of article 13, a certain degree of independence with separation of accounts. There is no explicit recognition of the doctrine of essential facilities, which, as we know, has its origin in UK case law, but the article does invoke that of 'use-it-or-lose-it'. Thus, where a service facility has not been in use for a certain period (two consecutive years), and provided that it is not undergoing an exceptional process (reconversion), the owner must make it available to interested parties for lease or rent.

3.4.6 Reinforcement of the Regulators

We will now review articles 55 et seq. Without prejudice to the vitally important mission of market supervision entrusted to the European Commission in order to prevent conflicts of interest, the Directive seeks to ensure a stricter regulatory regime which more clearly emphasises the independence of public authorities and infrastructure managers alike. It also seeks to encourage cooperation between regulatory bodies, a matter of great importance with a view to ensuring smooth and efficient international traffic, the aim being to create regulatory network of which the Commission forms part. If the independence requirements regarding organization, hierarchy, legal structure, functions, decision-making and staff are fulfilled, Member States may establish a single regulatory body for various sectors, a set of integrated regulatory authorities which are competent for various sectors, or a joint body which performs several tasks, the latter solution being the option that is expected to be implemented in Spain.

In order to achieve these objectives, powers are extended to also cover rail-related services and their prices, as well as auditing to verify compliance with accounting separation, obligations relating to the submission of accounts in standardized format being provided for.

Another of the functions refers to the supervision of agreements between authorities and infrastructure managers, which aim to serve as an instrument for public and transparent long-term infrastructure development strategies designed to encourage operators.

The Regulator also has the power to decide on complaints and appeals arising from the decisions of railway undertakings, infrastructure managers or service facility operators regarding the following matters::

- Charges, services and fares.
- Capacity allocation and infrastructure access rights.
- Network statement and its content and criteria.

The Regulator may enforce its decisions with fines, sanctions and corrective measures, and is also granted auditing powers that it may exercise itself or through third parties. Its decisions must be published and subject to judicial review, although the relevant provision seeks to limit the possibility of an appeal having suspensive effect on any given decision.

A further goal is close cooperation between regulatory bodies, which shall also consult on the monitoring of competition with both the national bodies of other Member States and the Commission, with whom they ultimately share the same purpose. It seems that the objectives of regulation, public aid control and monitoring of competition are assumed to be closely related.

3.4.7 Infrastructure access charges

Given their importance in economic terms, articles 29 et seq. are bound to receive much attention. Infrastructure access charges in each of the national networks vary considerably. This situation is complex and this piece of legislation seems unlikely to resolve it. Nevertheless, it does represent an attempt to further harmonize the charging criteria.

Obviously, adequate pricing should encourage the effective utilization of the infrastructure without establishing barriers to entry for new operators or undermining equality of access. Pricing should comply with the marginal social cost principle, with the possibility of including a noise-reduction incentive, albeit dependent on it not being discriminatory between modes to the detriment of the railway. Nevertheless, the charges can be separated from the marginal social cost by means of mark-ups, fixed according to common criteria, with the aim of recuperating infrastructure costs. Moreover, the charges can also be used to promote technical harmonization in the field of running safety: implementation of the ECTS.

The reform of the charging principles involves reinforcing the system of incentives for the proper use of the network – social and economic profitability – and the improvement of the results of the infrastructure manager and service operators, hence the system for the application of mark-ups and discounts. In the framework of a minimum access charge equivalent to the cost directly attributable to the operation of the railway service, the Commission will define in detail the modalities for the calculation of this cost.

In order to promote efficiency and equal access, the Directive states that:

- The reservation charge is mandatory, in accordance with article 36, for systematically allocated and unused train paths.
- As regards the discount system, discounts shall be limited to the saving of administrative costs, time-limited discounts being permitted to encourage the development of new services or the use of underutilized lines.
- Mark-ups should be levied on the basis of efficient, transparent and non-discriminatory principles, respecting the productivity increases achieved by railway undertakings in order to guarantee the competitiveness of the market segments.
- The incentive system provided for in Directive 14/2001 is reinforced by allowing charging schemes to include penalties, compensation and bonuses.

Railway mode-promoting measures through access charging, such as support for low-noise technology, which involves the costly replacement of braking systems in freight wagons, are subject to specific conditions so that they do not affect the competitiveness of the railway in relation to other modes of transport.

3.5 Deadline for transposition into national law

Finally, without forgetting to refer to the importance of the some of the annexes of the Directive, it should be pointed out that the transposition deadline is 16 June 2015.

3.6 Conclusions

CWith the aim of constructing a single rail transport market, the railway sector is undergoing a process of reform driven by EU Regulations and Directives. So far, the degree of accomplishment of EU railway policy goals has been disappointing. Although the Community legislation has favoured a still incipient harmonization of the regulation and railway policies of the Member States, a genuine competitive European railway market has yet to emerge, and the railway's market share has yet to increase. The recast Directive does nothing to change the regulation of access to railway services; rather than open the domestic markets to competition, it seeks to promote competition by reinforcing the separation between rail services and the means necessary to provide them (infrastructures and related services), and to strengthen the Regulator with the aim of achieving a competitive European railway market.

In order to comply with the recast Directive, the Spanish Railway Sector Act will have to be adapted to its guidelines. Thus it will be necessary to reform the structure of the Railway Regulation Committee, increasing its powers and functions and giving it greater functional independence.

The recast Directive reinforces the separation between infrastructure and operation, as well as the accounting separation of the rail-related services Renfe offers to railway undertakings.

The current charging system will need to be reformed in such a way as to achieve two objectives: encouraging traffic while at the same time meeting the financial needs of the infrastructure manager and the requisites for complying with the requirements of the European System of Accounts.

4. OPENING TO COMPETITION OF RAILWAY PASSENGER TRANSPORT IN THE EU: DIRECTIVE 2007/58 AND THE FUTURE FOURTH RAILWAY PACKAGE

/ Rodolfo Ramos

4.1 Introduction

As has been analysed in previous sections, the EU Directives require a degree of separation between infrastructure and operation, as well as free access for the provision of rail freight services. Since 2010 there has been free access, with some restrictions, for the provision of railway services, cabotage being permitted during the course of the journey provided that it does not affect the economic viability of domestic services provided under a public service contract. The experience of this opening to competition in the international passenger services market over the last two year has been disappointing, and the objective of cabotage being a way to introduce competition in the domestic market of some countries has not been accomplished.

Although there have been major changes in the railway sector as a result of the first three packages, the railway still has a relatively low market share in comparison with other modes of transport.

Therefore, the European Commission is preparing a fourth railway package (4RP) with the aim of extending competition to the domestic railway market of the EU countries and adopting measures to facilitate competition. The 4RP provisions are expected to enter into force in 2017 at the earliest.

4.2 Directive 2007/58

The objective of the Directive is the opening, by 1 January 2010 at the latest, of the international railway passenger services market within the European Community. Services between a Member State and a third country are not included, and Member States may exclude those transiting the Community.

Thus, the right of access that was only enjoyed by international groupings for international passenger services is granted to any licensed operator or group of operators.

The Directive is a stepping stone towards liberalization inasmuch as it limits itself to liberalizing international traffic, but it does not provide for the subsequent opening of all other passenger services. In this respect, the European Parliament defended an opening of both international services and domestic services. Finally, the Directive does not include any timeframe for the liberalization of domestic services; it simply states that in 2012 the Commission will publish a report on the implementation of the Directive and the state of preparation for further opening.

As far as the implementation timeframe is concerned, an opening of the international passenger transport services market would not be possible without detailed provisions on the modalities of access to the infrastructure, without important advances in the sphere of interoperability, and without a strict framework for railway safety on a national and European scale. All of which requires a certain length of time.

Consequently, 1 January 2010 is the proposed target date for the opening of the market, with a two-year safeguard for those countries in which international passenger traffic accounts for the majority of revenue.

In some Member States the international market could be opened before 2010. In this case, in order to avoid "inverse discrimination", rights of access could be restricted for the railway undertakings of countries which had not opened their international market before 1 January 2010.

4.2.1 Treatment of cabotage

This liberalization of international services includes the possibility of cabotage. In this respect it should be pointed out that the number of railway services without intermediate stops is very limited, and in the case of international services these stops could be very important for ensuring the profitability of the service. Therefore, it is necessary to allow cabotage, not only the right to pick up and set down passengers in the country where the railway undertaking is established, but also in the other countries through which the international service runs. Moreover, it is important to consider that it is necessary to permit cabotage in order to avoid inequality between railway service operators; if cabotage does not exist, the national undertakings could have protected traffic flows that would allow them, for any given route, to be more competitive than a foreign competitor. This situation could inhibit the entry of new operators and limit competition.

Cabotage safeguards

First safeguard: the existence of public service contracts

Regulation (EEC) No. 1191/69 of the Council, amended by Regulation 1891/93, established the need for public service contracts in long-distance services, awarded directly or through a competitive tendering procedure. As we will see, the new Regulation (EC) No. 1370/2007 extends the need for the conclusion of public service contracts to all railway services of public interest. In return, the operator who concludes the contract may be granted exclusive rights and/or compensation.

Thus, the granting of exclusive rights stands in contradiction to the granting of cabotage rights to international services. In this respect it should be pointed out that the impact would be huge in those countries, such as Belgium, through which many international services pass and where the number of railway services of public interest is high.

Therefore, it is felt that Member States should be allowed to restrict the right of access to the market when this could compromise the financial equilibrium of those public service contracts and this were ratified by the Regulator on the basis of an objective study at the request an interested party (competent authority, infrastructure manager and railway undertaking).

This objective study must take into account certain predefined criteria such as: the impact on the profitability of any of the services included in a public service contract, including repercussions on the resulting net cost for the competent public authority that awarded the contract; the demand; the tariffs; the ticket sale modalities, the location and number of stops on both sides of the border, as well as the timetables and frequencies of the proposed new service.

In order to be able to facilitate the implementation of the safeguard it is necessary to be know the entry of a new service and whether it is detrimental to a country's contracts of public interest. Thus, the candidate who intends to apply for an infrastructure capacity with the aim of operating an international passenger transport service shall inform the infrastructure managers and the regulatory bodies concerned. The Regulator informs the competent authorities (those in charge of awarding the contract or other interested parties) affected and the railway undertakings that carry out public service contracts on the requested international service route.

If any of the competent authorities and/or the railway undertaking is considered to be affected, it may request the Regulator to carry out an objective study, for which it must provide the regulatory body all the information necessary to assess the situation. The Regulator will respond within two months of receiving the information.

Second safeguard: the existence of railway service concessions awarded through competitive tendering procedures

It is considered that by means of the competitive allocation of exclusive rights to operate both services of public interest and services of commercial interest, competition has been introduced. Moreover, it is considered necessary to respect exclusivity, granted contractually to the operators who have been awarded the exclusive rights. For this reason, access to international services may be limited to service contracts awarded through competitive tendering before 4 December 2007. The safeguard period is the lesser of the two: that of the concession or 15 years, which is the maximum duration provided for under the new Regulation 1370 on public services.

This safeguard reduces the cost (of a possible renegotiation) for the licensing authority. In this respect it should be pointed out that the lack of competition during the concession period increases revenue and reduces the operator's uncertainty, such that the operator offers a higher amount (premium) for the right to provide profitable services or demands a lower subsidy for the provision of loss-making services.

The problem that could arise is that if services of commercial interest are awarded through concessions (as is the case in the United Kingdom), this could hinder, up until the end of the safeguard period, the introduction of international services owing to the absence of revenue from these markets reserved for the licensed operators. Thus, even if there is competition for the market, the appearance of new services could be hindered.

Third safeguard: the international purpose

These cabotage rights are not meant to be a back door through which competition is introduced in all domestic services: this would occur if the railway undertakings of a Member State created services whose purpose, even if they were considered international services, was to compete in the traffic of another country.

Therefore, for a service to be considered international and to be able to enjoy cabotage rights, its main purpose must be international transport. The Regulator, at the request of an aggrieved party (a competent authority or a railway undertaking of the country where the "unlawful" competition

is going to occur), determines according to the turnover and/or distance whether the "main purpose" is international transport.

As services of public interest are already protected by "the first safeguard", this restriction should be regarded as a way of protecting from competition the services of commercial interest that are not protected by a concession awarded through competitive tendering. In any event, whether the intention of an operator is to compete lawfully in an international corridor or "unlawfully" in the domestic market of another country, the verification process adds bureaucratic costs and uncertainty. Therefore, it may discourage entry into the liberalized markets.

4.3 Fourth Railway Package

The measures that will be included in the Fourth Railway Package (4RP) are under discussion and have yet to be published (winter of 2012). The OPTIRED Consortium has held meetings with the EU's Directorate-General for Mobility and Transport and representatives of the European Independent Regulators Group (IRG) to discuss the progress of the measures under consideration. The basic issues to be dealt with in the fourth railway package can be divided into three main categories.

- The opening of the passenger market.
- The functions of the infrastructure manager.
- The role of the European Railway Agency.

4.3.1 The need to open domestic markets to competition

The competition in the international passenger services market permitted by Directive 2007/58 has not been very successful and has not contributed to competition in international and domestic services. The reasons for this failure are related to lack of competitiveness of international railway services due to geographical reasons (there are countries which, because they are not countries of transit, have a limited number of services, and where the distances, in many cases and in spite of the existence of high-speed infrastructures, do not make the services competitive). This is the case of Spain, owing to the barriers to access. These barriers to entry are greater than in a domestic service.

- On the one hand, it is necessary to consider the higher cost of acquisition and homologation of the means of transport that must comply with technical and operating regulations in the different national networks they have to run on.
- This problem is closely related to the problems of interoperability and its still limited development, which has been held back by budgetary problems arising from the economic crisis.
- It is also necessary to consider barriers to railway undertakings' access to terminal and related services.
- From a legal perspective, the practical criteria for determining whether the railway service has an international transport purpose are not clear. Another issue is the relationship between open international access versus domestic public service, and the interaction between domestic public service and international service in cabotage. There is uncertainty about the application of the financial equilibrium criterion in domestic public service and, especially, how to determine the percentage of financing absorbed by cabotage in international services.

Therefore, Directive 2007/58 has not favoured competition in international and domestic services. For this reason, it is necessary to go further and extend competition to all the domestic passenger rail markets in a coordinated manner. It is important to avoid an asymmetry in the process of opening to competition between countries, which gives rise to the known effect of regulatory abuse due to lack of reciprocity, which allows undertakings of countries whose railway markets are closed to competition to compete in countries with open markets without the undertakings of these countries being able to do the same in the country of origin of their competitors.

4.3.2 Objectives proposed by the Commission

The general objectives of the Commission's railway policy are:

- Greater competitiveness of the railway.
- Further development of a single railway market.
- Better value for money: More efficiency in the public funds used in public railway services.

The specific objectives (instruments) are:

- Opening to competition of domestic passenger market.
- Creating more uniform market conditions.

Therefore, competition is not an end in itself but an instrument for creating a single railway market in which this mode of transport, thanks to its modal competitiveness, achieves a significant market share, thus contributing to the transport policy objectives proposed in the White Paper (2011), leading to the sustainability of the economic growth of the EU.

The liberalization instrument can be used in two ways: through competition in the market and competition for the market (see Chapter 6).

Which is the option preferred by the Commission? The Commission opts for a "general" model consisting of competition in the market for commercial services, limited when the financial equilibrium of public service contracts is compromised, and competition for the market for services of public interest. Nevertheless, the railway regulation model of each country, owing to the principle of subsidiarity, is something that is left in the hands of the Member States.

4.3.3 Problemática de la apertura a la competencia

In order for opening to competition to be effective, four aspects need to be considered:

- Relationship between open access and public service.
- Definition of public service.
- Access to rolling stock and transfer of staff.
- Integrated ticketing system (network benefits

Relationship between open access and public service

CAs has been analysed earlier, the model of competition is one of free access. Nevertheless, access can be limited (if necessary) if the financial equilibrium of a public service contract is compromised.

As we have already seen, to avoid unjustifiably closing the market to free competition, it is essential for the Member States to provide a clear definition of 'public railway service' that would be declared in accordance with the Treaty and the principle of proportionality. It would be desirable to have a National Transport Plan in order to avoid discretion in decision-making and a possible intervention of the railway regulator to verify compliance.

In order for competition for the market to be effective, it is mandatory (except in very small contracts in which the costs of the tendering procedure exceed its benefits) for public service contracts to be put out to tender, thus eliminating the possibility of awarding them directly, as provided for in Regulation 1370, which allows for the direct award of the service to a public authority or to a state-controlled enterprise.

Another measure is to establish a maximum and minimum contact size. In order for competition for the market to be effective, it is necessary to encourage the maximum possible number of bidders. To this end, it is proposed that a flexible maximum be defined (to consider specific characteristics of the countries such as size or the complexity arising from the density and coordination of their network) for the size of the contracts put out to tender. The aim of this is to avoid a tender for contracts whose size would make it difficult for small and medium-size enterprises to compete. A reduced threshold is also established, beyond which competitive tendering is obligatory and whereby the direct award of contracts would be residual.

Another proposal concerns a gradual implementation of competitive tenders for existing direct contracts:

- Transitional clauses of withdrawal from directly awarded contracts in effect (phasing-in).
- Gradual objectives for opening (percentage of market total) to competition for the market.
- Ban on direct awards as from a certain date (to avoid strategic closing of the market).

Definition of public service

The contracts (which shall be mandatory when there is compensation for the provision and/or an exclusive right in return) must clearly state:

- Exactly what is contracted: which services (clearly delimiting the scope), and the quality and quantity thereof.
- The principles of compensation (risk-sharing agreements may be concluded between the public sector and the successful bidder).
- Accounting separation (to avoid cross-subsidies).
- Term of the contract.

Access to rolling stock and transfer of staff

EAs regards access to rolling stock, the Member States and the competent authorities shall take the measures necessary to guarantee non-discriminatory access to rolling stock suited to market conditions so that railway undertakings can provide transport services under public service contracts.

Three options for access to rolling stock are considered (for further details, see Chapter 13):

- Leasing company (best option according to the Commission); a company is in charge of the rolling stock and leases it.
- State contribution: the State or competent authority or a group of authorities puts this rolling stock at the disposal of all the operators.
- Providing a bank guarantee or another tool which the outgoing operator can hand over to the new entrant for the rolling stock used in the service.

As regards skilled staff, the Member States and/or competent authorities shall promote the use of the existing provisions regarding the transfer of staff, if deemed necessary.

Integrated ticketing system (network benefits).

The Member States/competent authorities will be encouraged to establish nationwide ticketing systems subject to non-discrimination requirements (and safeguarding the commercial interests of the parties concerned.

4.4 Infrastructure manager

The Commission is committed to the separation between infrastructure and operation, at least in legal, economic and financial terms (institutional separation being the preferred option), as well as the establishment of an adequate regulation that fosters efficiency and indicators of the functioning of this part of the activity in which it is not possible to introduce competition due to its natural monopoly nature.

The infrastructure must be managed by an independent entity, unified with clearly defined functions (including the rail-related services under its responsibility) and separated from the operators so that competition functions in the railway mode. This competition, together with an international and intermodal coordination of infrastructure managers, is crucial for the competitiveness of the railway.

A problematic aspect that could hinder competition (the integration of infrastructure and operation) concerns the possibility of a railway undertaking controlling the services related to access, the information relating to its competitors that it may acquire and use for its own benefit, and the possibility of the infrastructure receiving public subsidies that could be transferred (cross-subsidies) to railway services that compete with those of other companies domestically and even abroad.

According to the Commission, if the separated structure is designed properly there is no evidence to suggest that it will be more expensive than the integrated model. In this respect, it considers that separation of the essential aspects (charging and path allocation) to ensure equal access when infrastructure and operation are integrated is not a good solution, given that there are coordination and incentive problems such as those which could arise between path allocation and the charge with maintenance. The advantages of coordination between infrastructure and operation in the integrated models can be achieved with a coordinating body that includes operators, customers, users and public authorities.

4.5 The European Railway Agency

- Regulation 881/2004 states that the functions of the European Railway Agency (ERA) shall be reviewed in order to create a single railway market that fosters competition and efficiency. For this purpose, the ERA will be given new powers:
  - Issue of individual vehicle safety and homologation certificates valid for the whole of the EU (with the right to charge applicants for the issue thereof).
  - Reinforced control over the functioning of the National Safety Authorities (NSAs) (right to carry out audits).
  - Right to request the elimination of unnecessary national standards.
  - A more important role in supervising competitive tender procedures in the case of ERTMS.

4.6 Conclusions

In 2010, Directive 2007/58 liberalized international railway services in the EU and permitted cabotage with restrictions during the course of an international service. Whereas the Recast Directive focuses on a greater separation of the means necessary to provide railway services than that which currently exists among railway undertaking (infrastructures and related services) and the strengthening of the Regulator, the 4RP, which **in the most optimistic scenario would enter into force in 2019**, sees the Commission go further by proposing the opening of domestic markets with the aim of introducing competition in these markets while at the same time achieving a greater separation between infrastructure and operation than that provided for in the Recast Directive.

In the 4RP, the Commission leaves each country's model of railway regulation, owing to the principle of subsidiarity, in the hands of the Member States, thus permitting different existing regulatory models: each country may implement a particular model of market opening, since the extension of public railway services may be greater or lesser according to the desires of each country (or its budgetary capacity to finance them). The only limit to their extension is compliance with Community legislation and the criterion of proportionality in order not to unjustifiably close the market to free competition.

An important aspect to consider is that the model is largely determined by the infrastructure charge. Although the "general" charging principle proposed by the Commission is that of Marginal Social Cost (a low charge), there is freedom when it comes to fixing the charge insofar as countries are allowed to diverge from this principle in order to obtain a greater recovery of costs. Thus, the existence of commercial services and, therefore, competition in the market is more likely with a low charge than a high charge, as would be the need to extend competition for the market in the latter case.

OPTIRED considers that the 4RP should offer flexibility when it comes to choosing the model of opening to competition. This could take different forms with a balance in each country between competition in the market for commercial services and competition for the market for services of public interest. In this respect, the railway networks of the Member States are different in terms of size and structure, and countries may have different preferences as to what they consider a public railway service to be.

One thing that OPTIRED does think should be considered in the process of opening to competition is gradualness, both in the temporal sense and in relation to procedures. There should be flexibility in the design of public service contracts, given that different markets and regions may, even in the same country, require different approaches. For this reason, the 4RP should only lay down general guidelines to ensure competition in the tendering procedures.

OPTIRED attaches special importance to the interactions between services of public interest covered by a public service contract and commercial services, especially in the Spanish case where there are cases of cabotage in Autonomous Communities that may have their services covered by a public service contract and may find their financing compromised. The Member States that have adapted the financial equilibrium provision contained in Directive 2007/58 to their national legislation have facilitated the functioning of open-access international services together with the services deriving from public service contracts. A similar role could be contemplated in relation to domestic passenger transport, with the Regulator being responsible for assessing whether the financial equilibrium of public service contracts is compromised by the introduction of new services by a new operator.

In the process of opening to competition, maintaining network benefits is important. In this respect, the various agents involved in the passenger rail market (Member States, authorities, operators, etc…) should achieve the goal of establishing a nationwide integrated ticketing plan that operators can accede to.

As regards access to rolling stock, the Member States should have freedom when it comes to choosing the option for facilitating new entrants' access to rolling stock, and adopt different solutions as the case may be. In this respect, if there are different public service contract designs, there should also be different solutions, even in the same country.

5. OPENING TO COMPETITION OF RAILWAY PASSENGER TRANSPORT IN SPAIN: ROYAL DECREE LAW 22/2012

/ Juan García Pérez, Rodolfo Ramos

5.1 Introduction

In the mid-1980s and throughout the 1990s, the way in which the management of all things public was viewed underwent a radical change in Spain. There were also great advances as regards the participation of private initiative in this activity, to the extent that some of the laws that were passed during that period allowed for certain services, which until then had been run by government-owned corporations, to be managed and operated by private enterprise.

RENFE's Board of Directors, at a board meeting held on 2 March 1990, approved the company's new structure based on the creation of Differentiated Management Units, which later came to be called Business Units. These did not have legal personality, but they did have their own profit and loss account. They were also seen as having the capacity to generate specific goods and services, and the latter could be sold to third parties at market prices. Furthermore, such services could also be sold to other Renfe Business Units at "previously negotiated transfer prices".

The main reason for this restructuring was the need to adapt to future EU legislation and to the demands of the Single Market, taking into account the regulations that were being prepared by the EC, which were aimed at carrying out a comprehensive liberalization of transport within the European Community and, specifically, of transport by rail.

5.2 Towards the opening to competition of the railway in Spain

This is the context in which Directive 91/440/EC of 29 July on the development of Community railways in the EU was passed. Years later the Business Units improved and matured in terms of their system of management, alongside the regulatory advances that had occurred in parallel. This made it necessary to approve the Renfe Statute of 1994, which included a new structure in which these Business Units were referred to.

As a result of these developments, article 5.3 of this Statute stated that the Business Units could be substituted by entities with legal personality that would take corporate form, subject to authorization from what is now called the Ministry of Public Works, and subject to the provisions of article 6 of the General Budget Act (*Ley General Presupuestaria*). Therefore, the railway management system, through this modality, can be regarded as a step towards a holding model by converting the Business Units into subsidiaries. This process reached its culmination in 2011 with the creation of subsidiaries for the provision of rail freight services: Irion Renfe Mercancías, S.A., Multi Renfe Mercancías, S.A., and Contren Renfe Mercancías, S.A.

The organizational structure of the BUs evolved with the creation, within those dedicated to intercity passenger transport, of Market Units that took the form of mini business units and managed the railway services as radial corridors from Madrid to the Northeast, South and East, which were subsequently joined by the one running along the Mediterranean coast, a transversal corridor and another one covering the northern services.

The Railway Sector Act of 17 November 2003 (*LSF, Ley 39/2003, de 17 de noviembre, del Sector Ferroviario*), represented an important step towards opening to competition in Spain, with the incorporation into domestic law of the Community legislation known as the first railway package, the reorganization of the sector and the laying of foundations that facilitate the entry of new operators in the rail freight transport market within the Spanish State.

To carry out this and other objectives, infrastructure was separated from operation, and management of the infrastructure was entrusted to the public entity Renfe, which became Adif (*Administrador de Infraestructuras Ferroviarias* – Railway Infrastructure Administrator), while a new public business entity called Renfe Operadora was created, *ex lege*, to carry out, among other activities, the management and operation of freight and passenger transport, and the maintenance of rolling stock.

5.3 Sustainable Economy Act

The Sustainable Economy Act (LES, Ley de Economía Sostenible) of 4 March 2011 is one of the most important facilitators of the implementation of the structural reforms – both general and sectoral – necessary to overcome the current economic crisis. Among the most important sectoral reforms are those aimed at developing a competitive framework for railway passenger transport.

In the transport sector the aim is to increase competition through the LES. The Ministry of Public Works proposes classifying transport markets into three categories: a) free competition, b) no possibility of competition and, c) competition for the market (current system of intercity coaches). On the basis of this proposal, the Council of Ministers will prepare the market classification that will be valid for five-year periods. Although it will not have normative status, it will serve as a guide for the development of the regulatory frameworks for the promotion of competition.

In relation to rail transport, these provisions only affect passenger services. In the case of rail freight transport, it is already a free competition market, with free access in accordance with EU legislation and the Railway Sector Act (LSF).

However, the passenger markets currently correspond to type b): competition is not possible because they are reserved for Renfe Operadora. After the classification of markets, which has no normative validity but will serve as the basis for the future legislative development of the opening to competition, the railway passenger transport markets could be classified as 'competition in the market' or 'competition for the market'.

The LES defines the concept of subsidizable transport services of public interest as those which, despite not being financially profitable, are necessary to ensure the transport service between different localities or to guarantee its provision under reasonably acceptable conditions of frequency, price, quality or universality. This category would undoubtedly include all Suburban services and, depending on what the authorities decide, all other services, while Medium Distance and even Long Distance-AVE (High Speed) services could be included among those of public interest. It is worth highlighting that the LES does not specify whether a service of public interest should correspond to specific trains or transport lines/transport corridors.

In relation to the foregoing, the LES states that subsidies should be strictly linked to the provision of the public interest service in a loss-making geographical market in order to avoid what are called "cross-subsidies", i.e. passengers in certain geographical areas financing other areas. Thus, it is no longer possible to grant subsidies as traditionally occurred in the Contract-Programmes; on the one hand, to all the Suburban services and, on the other, to the Medium Distance services provided in the Network, but instead specifically by geographical areas.

The Council of Ministers is responsible for declaring public service obligations in transport services of public interest within the competence of the State (those not transferred to the Autonomous Communities). If the services affected by the public service declaration are provided in a market deemed to belong to the "competition for the market" category, the final amount of the compensation will be determined by means of tendering procedures in which the main award criterion is not necessarily the price, given that the LES states that "any tender that requests a lower compensation shall be duly weighted".

5.4 New horizons in rail passenger transport in view of its forthcoming opening to competition: Royal Decree-Law 22/2012

DFor quite some time now in Spain, considerable efforts have been made to improve public services and, in particular, efficiency in the management of transport services, including transport by rail. The latest example of these efforts in legislative terms is Royal Decree-Law 22/2012, of 20 July, adopting measures related to infrastructures and railway services.

The third transitional provision of the aforementioned Railway Sector Act passed on 17 November 2003 having provided for a waiting period for the complete liberalization of rail passenger transport, this Royal Decree-Law sets 31 July 2013 as the starting date for the opening and liberalization of passenger traffic, which will undoubtedly help Renfe Operadora, as well as other private railway operators, to compete in the provision of passenger transport services within the General Interest Railway Network, and which in turn will benefit those who use rail transport for travelling purposes.

In relation to the above, and bearing in mind the nature of Renfe Operadora as a public business entity, this Royal Decree-Law provides for its restructuring based on four lines of activity through the creation of such trading companies as those described in the Public Administration Holdings Act of 3 November 2003 (Ley 33/2003, de 3 de noviembre, de Patrimonio de las Administraciones Publicas), wholly owned by Renfe Operadora, and so that they meet the

demand for the following services: passengers, freight and logistics, manufacture and maintenance, and asset management.

It also alludes to the termination of the public business entity FEVE (Ferrocarriles Españoles de Vía Estrecha – Spanish Narrow Gauge Railways), distributing its assets, rights and obligations among the public business entities Adif and Renfe Operadora, or among the aforementioned companies incorporated within the latter entity, provided they are assigned or belong to the terminated public business entity, and that they are transferred in accordance with their book value.

5.4.1 Restructuring of the public entity Renfe Operadora

Renfe Operadora will be restructured according to the aforementioned Royal Decree-Law into four state-owned companies, corresponding to those provided for under article 166.2 of the Public Administration Holdings Act, and whose corporate purpose shall include at least the following functions and obligations:

- The functions and obligations currently performed by Renfe Operadora's passenger transport business unit or operating area.
- Those currently performed by Renfe Operadora's freight and logistics business unit or operating area, including, where appropriate, the corporate purposes of the freight subsidiaries Irion, Multi and Contren.
- Those currently performed by Renfe Operadora's manufacture and maintenance business unit or operating area.
- The performance of leasing operations and other binding obligations concerning railway equipment assets and, alternatively, the sale of and other forms of making available such equipment and facilities.

5.4.2 Authorization to incorporate these companies and their ownership

The Council of Ministers is responsible for authorizing the incorporation of these companies, the establishment of the share capital corresponding to each one, as well as the corporate purposes and other necessary elements for their effective incorporation, in accordance with the relevant provisions laid down in the aforementioned Public Administration Holdings Act. The entire share capital of these companies shall be held by Renfe Operadora.

Furthermore, the Government may, by Royal Decree and on a proposal from the Ministry of Finance and Public Administrations and at the initiative of the Ministry of Public Works, amend the Statute of Renfe Operadora in order to adapt it to the new corporate structure envisaged.

5.4.3 Termination of the public business entity FEVE (Spanish Narrow Gauge Railways)

Article 2 of the aforementioned Royal Decree-Law states that the public business entity FEVE will be terminated on 31 December 2012, the public business entities Adif and Renfe Operadora or the aforementioned state-owned companies assuming its rights and obligations and ownership of the assets assigned or belonging to said entity on the date of entry into force of this Royal Decree-Law, a Ministerial Order determining the assignment of the assets corresponding to each one of the public business entities or state-owned companies. Hence the broadening of the purpose and functions of the public business entities Renfe Operadora and Adif, on assuming the services, functions and activities hitherto carried out by FEVE.

5.4.4 Opening to competition of railway passenger transport services

The third article of the Royal Decree-Law amends the first paragraph of the third transitional provision of the current Railway Sector Act, which clearly states, among other points, that until 31 July 2013, the date set for liberalization of railway passenger transport, Renfe Operadora shall be entitled to continue operating the passenger transport services provided on the General Interest Railway Network in the manner set out in the Overland Transport Regulation Act (*Ley 16/1987, de 30 de julio, de Ordenación de los Transportes Terrestres*) and in its implementing legislation insofar as they do not conflict with the remaining content of this Act.

5.4.5 Transfers of responsibility for services to Autonomous Communities (Regionalization)

Article 4 enables Autonomous Communities to which, as of the entry into force of this Royal Decree-Law, the general competences of the Central State Administration corresponding to suburban and regional rail passenger services on the general interest railway network have been transferred in accordance with the provisions of the relevant applicable legislation and Regulation (EC) 1370/2007 of 23 October of the European Parliament and of the Council, to decide whether they prefer to maintain the regime established by this EC Regulation or vary the provision of services within a framework of competition.

5.4.6 Rationalization of railway services and infrastructures

As far as the restructuring of railway services and infrastructures is concerned, the first additional provision states that before 31 December 2012 the Ministry of Public Works shall submit a proposal to the Council of Ministers regarding those railway infrastructures that do not generate profitability from the economic and social point of view.

Within this same deadline, the Ministry of Public Works shall submit a proposal to the Council of Ministers in relation to the provision of medium-distance railway services that do not have public service obligation status.

5.5 Conclusions

The Railway Sector Act provided for the opening to competition of domestic passenger services until EU legislation imposed it. This situation changes in 2012 with RDL 22/2012, which provides for the introduction of competition for the market (concessions) for services with PSOs, competition in the market for non-subsidised commercial services, and the regionalization of suburban and medium-distance services on the General Interest Railway Network in Autonomous Communities with transferred competences in these types of services. Thus, two types of services can be distinguished:

State-owned: Commercial medium-distance and long-distance services, including high-speed services, are opened to competition in the market, and to competition for the market when they are not provided in a sufficient manner and the State authorities consider them necessary. Suburban services are always considered necessary and covered by a PSO, whereby they will be regulated through competition for the market. Renfe could temporarily continue to provide the services subject to PSOs and gradually open up a percentage of the market until the market is 100% open. In this way the process will be gradual, allowing Renfe to adapt to the new competitive framework.

Autonomous Community-owned: Suburban and conventional medium-distance services can be provided through competition for the market or direct award in accordance with the provisions of Regulation 1370. The operator could be Renfe, in accordance with the proposals for State services, until the transitional period expires.

The cornerstone of this arrangement is defining what is considered to be of public interest or not. Suburban services are clearly of public interest, whereas in order to classify the rest as such, it is necessary to apply a methodology, from an intermodal perspective, based on criteria of efficiency, economic and social profitability, as well contribution to territorial cohesion and structure and to sustainability. The public service can be defined for a train, a route, or for a certain type of passenger (recurring due to forced mobility, retired people, young people, the unemployed…). This declaration should be reviewable at reasonable intervals, given that the conditions that determine whether a service is of commercial or public interest may change.

Likewise, it is necessary to analyse intramodal service provision structures (some Medium Distance needs can be covered by Long Distance trains, with significant production savings and without increasing the price paid by this type of passenger) and intermodal structures in order to fulfil these services, as well as to design public service contracts that encourage the efficient use of public resources while at the same time meeting social needs with quality.

The definition and criteria of public interest and the forms of provision would clearly improve if they were framed within a national transport plan and their financing and the social profitability criteria (even when general) were specified. The transport aid framework needs to be rationalized from an intermodal perspective, laying down criteria for the establishment of contracts and public service obligations, allocating them to the most efficient mode of transport or combinations of modes for society. In this respect, the experience of the Swedish national transport authority, Rikstrafiken (now part of Trafikverket), based on the logic of cost-benefit analysis from an intermodal perspective for the provision of long-distance services of public interest, is of great interest.

It is also necessary to consider a methodology to establish in which cases to allow the cabotage of a commercial service that could affect the financial equilibrium of an Autonomous Community's public service contract.

The European experience shows that the incumbent operators of the countries in which competition has been introduced have reformed their organizational and ownership structures, not through privatization but by adopting legal forms of ownership that facilitate independent management; for example, by taking the corporate form of a state-owned limited liability company. In this respect it is important to point out that liberalization and privatization are distinct terms and that the former does not imply the latter and vice versa. Indeed, it is worth highlighting that no country except the

United Kingdom has privatized its incumbent state-owned railway passenger service companies.

Framed along these lines is the holding structure, similar to that of the major European railway companies (as regards the operation of services, given that in some cases the infrastructure forms part of the holding), adopted by RD 22/2012 and the measures for increasing Renfe's management independence.

In a context of opening to competition, the restructuring of Renfe Operadora into various trading companies can be regarded as a way of introducing competition, both in freight transport and in passenger transport, as well as a means to adapt it to the new competitive framework. The creation of manufacturing and maintenance companies together with those whose purpose is to lease rolling stock and other assets facilitates the opening of the sector to competition, since the limited supply of rolling stock can constitute a barrier to entry for new operators. These companies should act with full decision-making autonomy in order to prevent conflicting interests between these providers of rail transport and rail-related services.

One option for ensuring this would be absolute functional, legal and accounting independence, detaching them from Renfe. Nevertheless, although this situation would facilitate regulatory activity to foster competition, the EU does not consider it necessary in the Recast Directive, since it approves the integration of service operators and providers of related services and/or infrastructure management, albeit in exchange for some strong supervision powers on the part of the Regulator.

The holding structure with specialized business areas represents the culmination of the process of creating BUs in the 1990s, one of the first of its kind in Europe, and which aimed to forge a closer relationship with the markets through specialized management. Renfe Operadora's adaptation to the new competitive framework requires changing not only its organizational structures but also its management strategy, with profitability as a prime objective, adjusting its supply of services and resources (especially rolling stock) to the domestic market, and making a decisive commitment to internationalization and innovation. This adaptation to competition could be carried out gradually.

6. MODELS OF COMPETITION / *Rodolfo Ramos*

6.1 Introduction

CAs has been analysed in previous sections, the EU Directives require a degree of separation between infrastructure and operation, as well as free access for the provision of rail freight services. Since 2010 there has been free access, with some restrictions, for the provision of railway services, cabotage being permitted during the course of the journey provided it does not affect the economic viability of domestic services provided under a public service contract.

No date has been set for the **opening to competition** of domestic passenger service markets. Nevertheless, the future Fourth Railway Package which is currently being prepared (winter 2012) proposes to introduce competition in the provision of railway passenger services. In the case of public interest services, competition will be for the market, whereas in those deemed to be of commercial interest, there will be competition in the market (free access).

It will be the EU countries that, according to the principle of subsidiarity, decide the scope of the public service obligations in their railway services and, therefore, the percentage of competition for the market and in the market.

6.2 Competition in the market

By applying to rail transport the theory of natural monopoly in a multi-product activity, it can be determined whether it is more efficient for infrastructure management and the operation of services to be carried out the by same railway undertaking. If these two activities were separated, competition could not be established in the former because it is clearly a natural monopoly. However, it could be hypothesized that operation offers constant returns to scale. If this were the case, free competition could be considered for the provision of railway services. The market entry regulation model has advantages and disadvantages..

6.2.1 Advantages of competition in the market

Competition results in an increase in three kinds of efficiency: productive (lower costs), allocative (lower tariffs) and dynamic (more innovations). Those in favour of this method of regulating access to the market consider that competition in the market, whether real or potential, is more effective in accomplishing these goals than competition for the market, due to its disciplinary effect being more direct and immediate than the possibility of losing the market in the future.

They consider that there are no significant reasons to subsidise long-distance rail transport, due to its good commercial prospects and because the first-best arguments for subsidizing inter-city rail transport as opposed to that of other market segments, such as suburban rail, are weaker. From the first-best perspective, the Mohring effect does not occur in intercity rail transport, given that these services are less frequent, whereas the second-best arguments related to road congestion are less important.

Likewise, they trust that the output determined by business decisions regarding routes, frequencies and service quality is socially more efficient than that determined by means of regulation. Moreover, in free competition the operators can design their network of services in such a way that they internalize the externalities generated by the connections between their traffics (network effect), thereby ensuring its optimum nature. Thus, the market is considered a better option than public regulation for establishing these networks.

6.2.2 Disadvantages of competition in the market

Econometric studies on the cost structure of railways suggest the existence of economies produced by increasing the number of trains that use the line (economies of density), such that the introduction of competition in the provision of services would entail a loss of efficiency, in which case it would be desirable to have a single operator at least in each flow of traffic.

Furthermore, market mechanisms should be established to allocate rights of access to the infrastructure (paths) in order to ensure free access to the infrastructure. There are various methods based on market mechanisms, congestion pricing, simple auctions, combinatorial auctions, bidding for an existing time slot, or negotiated access systems. However, research is still being carried out to determine which is the most feasible method, and in any case, all of them involve excessive complications and high transaction costs. It should be borne in mind that in the time slots in which new entrants most frequently would like to operate (the "peak hours"), there may not be enough paths to establish competition due to capacity limitations.

It is also worth highlighting that the existence of several passenger operators could eliminate the benefits of the existence of a single nationwide operator for passengers (network benefits): integrated timetables; joint tickets for services provided by different operators; the interchangeability of tickets for a single route; or the existence of travel passes.

Another important aspect is that railway activity presents significant barriers to entry that could prevent mass access of new competitors. On the one hand there are sunk costs, especially in relation to infrastructure, rolling stock and human capital; and on the other hand, the established company relies on "innocent" barriers to entry such as economies of experience, brand image and customer loyalty, as well as advantages in terms of costs arising from economies of scale achieved thanks to its size.

Moreover, the established operator can develop strategic behaviours to block entry and anti-competitive practices such as predatory practices.

These barriers and possible practices, together with the advantages of the established operator, generated by the network effects, can cause a monopoly situation. This is a controversial aspect if such a situation, in spite of liberalization, also creates a monopoly situation in the transport market if the other modes of transport (coach, bus and plane) do not substitute intercity railway passenger transport.

A new operator's entry strategies in relation to volume of service, i.e. how to "attack" the established company, can be summarized as the following:

- Cherry-picking: only the established operator's most profitable services are "attacked".
- Face to face without price competition: the established company's timetable is equalled.
- Face to face with price competition: the established company's timetable is equalled and the price is reduced; the reduction of fares is profitable for the entrant as long as the established operator does not equal them. In practice, the established company is forced to lower fares with the risk of entering into a price war (face to face with price competition).
- Market niche entry: this involves meeting the marginal needs of customers who are satisfied by the current offer because it is not the core business or it is difficult to manage and/or it is not profitable. The established company does not respond to niche entry, one example being routes without changes as opposed to those with changes that the established company might offer. Other examples are routes abandoned by large operators because they have not managed to make them profitable, or charter markets.

For a certain supply of services, the new entrant can compete in terms of price, product differentiation, or both.

In relation to the above, another problem is that if new competitors enter and compete on the most profitable routes ("cherry-picking strategy"), this may lead to the elimination of services and to the erosion of network benefits. In any case, orientation toward economic profit could mean the elimination of the least profitable services, which would have to be subsidised with public funds if it were decided that they should continue to be provided.

From a theoretical perspective, and given the limited actual experience of this type of competition, models of competition have been developed (in the timeframe of the project) to analyse what competition in the market would be like, as well as its social desirability (see Chapter 8).

6.3 Competition for the market

Competition for the market through a concession (or "franchise") that grants exclusive rights in the provision of the railway service for a certain period of time, awarded through a competitive bidding process, permits the provision of goods and services with a minimum loss of allocative and productive efficiency in markets in which public intervention is necessary owing to their non-competitive structure. This model has advantages and disadvantages.

6.3.1 Advantages of competition for the market

One advantage is that is avoids some of the problems of introducing 'competition in the market'. In this respect, it should be pointed out that railway services have local monopoly characteristics due to their concentration in space and time: in "peak" periods there are not enough train paths to establish competition, whereas the rest of the time, although there are no capacity problems, there is still the problem of repetition among the different trains that use the same track. Moreover, it does not involve as large a degree of separation of services as in the case of free competition. Thus, it allows economies of density to be maintained while mitigating the loss of network benefits.

Also, if a significant proportion of rail passenger services need be subsidised, which is very likely if they have to assume all or most of the infrastructure costs, the best option is to "franchise" them: in this way, thanks to competition, information asymmetries and the volume of subsidies are reduced. It is also important to consider that franchising in the same package of commercial and social services is a safer alternative than classifying the services into commercial and non-commercial and introducing competition in the market in the former and competition for the market in the latter when it is not possible to distinguish, due to a lack of adequate cost accounting, which services are profitable and which make a loss.

Finally, another aspect worth highlighting is that "franchising" allows the level of services and prices to be controlled in order to achieve objectives of a social nature. In this respect, it is worth pointing out that by being able to include profitable and loss-making services in the same concession, the former could finance the latter in such a way as to reduce the necessary subsidies or even render them unnecessary.

6.3.2 Disadvantages of competition for the market

"TCompetition/investment "trade off"

One of the main benefits of a long-term contract would be that it would increase the profit possibilities of the "franchise" and facilitate investment. In this sense, short-term contracts discourage the creation of new railway services or products that rely on long-term – but not short-term – profitability, due to the fact that their "takeoff stage" is long. As far as investment is concerned, considering that the lifespan of rolling stock is approximately 20 to 30 years, an operator would hardly be inclined to invest if the "franchise" period were short. A solution would be to create public or private companies in charge of purchasing and leasing rolling stock, or for the public sector to offer guarantees to the operating company, if it were displaced, regarding the use of rolling stock. These guarantees could also be granted to private leasing companies to reduce the investment risk.

Nevertheless, long contracts involve five problems that discourage competition: they reduce the fear of loss of renewal and the competitive pressures typical of short-term contracts; they increase the probability of contract renegotiations, whose consequences we analyse below; they increase the likelihood of establishing informal relations with the aim of obtaining preferential treatment ("capture") from the body in charge of awards; they discourage the existence of a "critical mass" of companies interested in being railway operators, thus reducing competition in auctions; and, finally, they increase the probability of the established company benefiting from greater information advantages.

Competition/risk transfer and entrepreneurship "trade off"

The main impediments preventing the bidding for a railway "franchise" from being competitive are the existence of collusion and the advantages the established railway undertaking may enjoy. The bidders should be sufficiently numerous and diverse as to avoid the risk of collusion. However, as a consequence of the activity's low profitability, especially if the infrastructure charge is high, the number of interested parties may be small and, moreover, could also be limited owing to the risk undertaken. In this respect it should be pointed out that the contract can be:

- Full cost (gross cost): the operator receives the cost of offering the service (including the profit margin to pay for the entrepreneurial factor and the capital), whereas the public agency in charge of the "franchise" obtains all the revenue (mainly from ticket sales), whereby the latter assumes the demand risk (the cost risk is assumed by the franchisee). The charge increase cost can be covered by the authority responsible for the franchise) and the number of bidders increases. Therefore, there are no incentives for increasing revenue on the part of the operator.
- Net subsidy (net cost): the "franchise" operator receives all the revenue and receives from the authority that manages the "franchise" a subsidy to cover the losses, or pays the latter an amount (premium) when the auctioned services are profitable. Thus, the successful bidder assumes the cost and demand risks, whereby this greater assumed risk may reduce the number of bidders. With the aim of limiting the demand risk assumed by the parties, upper and lower thresholds can be established to limit the successful bidder's level of loss in the event of the demand being lower than forecast, and the level of profit in the opposite case. In return, the authority's management intervention is greater and entrepreneurship is reduced.

Ideally, the contract should be as complete as possible and should specify any contingency due to a change in demand or technology, thus reducing the regulation costs. However, this is not possible in railway activity, especially if the contract is long-term, due to the fact that changes in demand, technology, costs and supply conditions are likely. Renegotiation of the contract might be problematic because the established company may take

advantage of the following circumstances: having more information than the agency in charge of the "franchise"; because the authority in charge of the "franchise" may not be willing to acknowledge its mistake; because the cost of organizing another bidding process may be high; or because there is the problem of maintaining the service if the company that currently operates the service disappears. Knowing this, a bidder might "gamble" strategically, winning the contract with an unrealistic bid and renegotiating it later. One way to limit this strategic gamble is with gross contracts, which limits entrepreneurial initiative.

Private initiative/service specification "trade off"

Specification of railway services does not involve major difficulties. Basically, the aspects that would have to be specified are: frequency of the service; price; quality; and safety-related aspects. A specification of the level of service and prices contributes to the achievement of social objectives (avoiding abusive prices, ensuring frequent services, etc.). If in addition the structure of the services and/or the prices is specified, the integration of the railway services –and of these with other modes of transport– could be achieved.

The downside of this specification is less innovation in services and fares on the part of the "franchisee". Furthermore, it should also be noted that the public authority must configure the concessions in such a way that in turn gives rise to an optimal nationwide network, for which purpose it needs to have the appropriate decision-making tools.

6.4 International models

Although the domestic passenger services market is not liberalized, there are some pioneering EU countries in terms of opening to competition. Thus, it is worth highlighting some European experiences in the analysis and implementation of competition, which can be regarded as regulation models of interest for the Spanish case with a view to the process of opening up the railway passenger market.

- Germany, chosen for having a very significant specific weight within the European scheme and for its organizational structure, which has served as a model for other organizations, as is the case of the Polish PKP.
- United Kingdom, the only European country that has opted for complete privatization of all its railway activities while also introducing the system of franchises.
- Sweden constitutes a good representative of the Scandinavian companies, with a highly developed system based on social welfare.

Table 1. European experiences in the railway sphere of interest for the model

European Experiences	Características
British franchises	The British model is characterised by the complete separation between infrastructure and operation together with a high infrastructure charge. System of competition for the market throughout the network through passenger service franchises, which to a greater or lesser extent group together commercial services and services of public interest with PSOs, very small in commercial intercity services, with competition in the market on some Origin-Destination routes throughout the network. A regulatory policy of «Moderation of competition» limiting the capacity of passenger service operators to compete directly with franchised services except in cases where they do not take revenue away from the latter. Strong regulation and careful attention to financial incentives.
German geographical areas. No PSOs in Long Distance	In Germany the incumbent operator DB combines operation and infrastructure in the same holding which charges a medium-high fee. This integration has entailed repeated interventions according to its powers in order to safeguard competition, which until now has been limited. Two market segments can be distinguished in passenger transport: regional services (RRPS), whose responsibility is transferred to the Länder, and long-distance services (LRPS), in which no PSOs exist and access is free in purely commercial terms. In the case of regional transport, the contracting parties conclude licensing agreements and the award of tenders is increasingly carried out through competitive bidding processes. .
Capacity allocation systems and analysis of Swedish infrastructure costs..	Sweden has an institutional separation of infrastructure and operation with a very low infrastructure charge. Two market segments can be distinguished in passenger transport: regional services (RRPS), whose responsibility is transferred to the Länder, and long-distance services (LRPS) in which PSOs exist in the services of public interest which are awarded through competitive bidding processes, whereas access is free in purely commercial terms in all other services. The first case is not very common, since the low charge ensures that many long-distance services are economically profitable. In the case of regional transport, the contracting parties conclude licensing agreements and the awarding of tenders is carried out through competitive bidding processes. Regulation, although strong, is not as rigid as in Britain

Source: Independently produced

At first glance, we might that expect the British approach would be the most successful in achieving an efficient and competitive railway system, followed by Sweden and Germany. However, an examination of subsidy levels and passenger traffic trends confirms that Germany has the slowest growth of public financial support for its railways, as well as the lowest prices.

Both Great Britain and Sweden have had a more rapid growth in public financial support than Germany, although this has mainly been a result of the need to renovate infrastructure and renew rolling stock. It could also be argued that Germany has not undertaken sufficient investments to modernize its infrastructure. These renovation needs are exogenous to the model of opening to competition and are determined by the existing initial modernization, which in the specific case of Spain is significant both in rolling stock and infrastructure.

As far as levels of public support are concerned, in the majority of measurements Great Britain has lower absolute levels of financial aid than Germany, as well as a faster growth in traffic. Sweden has considerably more financial support, although this might be due to its low population density.

6.5 Feasible models of opening for medium and long-distance intercity services

We can classify access regulation models into those belonging to the 'competition in the market' (CIM) family and those of the 'competition for the market' (CFM) family. In all of them OPTIRED considers the separation of infrastructure and operation and classifies them according to the provisions laid down in the Sustainable Economy Act (Ley de Economía Sostenible).

6.5.1 Models belonging to the CIM family

We can distinguish between competition in the market throughout the network or in part of it (by market segment: for example, by type of product). Thus, in the Spanish case we can consider the Ave, Avant, Alvia, Diurno, Regional, Talgo, Estrella and Arco services, which receive an alphanumerical network annotation in a system of infrastructure and operation separation:

- Model A: whole network in competition without PSOs (German model).
- Model A*: CIM in all market segments (equivalent to A).
- Model B: Like A but with CFM for a PSO contract for all the unprofitable origin-destination pairs (or individualized for each O-D pair) to be maintained/created (Swedish model).
- Model B*: CIM in one or several market segments and CFM for the unprofitable origin-destination pairs to be maintained/created, where applicable, in these segments opened to competition. CFM or direct award (of services/flows) in all other services.
- Model C: Like B but with direct publicly funded procurement of the unprofitable public service origin-destination pairs to be maintained/created, where applicable (preferably to the dominant operator).
- Model C*: CIM in one or several market segments and direct publicly funded procurement of the unprofitable origin-destination pairs to be maintained or created in this segment (preferably to the dominant operator). CFM or direct award of flows or services for the rest.
- Model D: Bidding for train paths in a certain timetable.
- Model D*: Bidding for train paths in a given market segment. CFM or direct award of flows or services for the rest.

6.5.2 Mixed alternatives

A mixture between CFM and CIM. Within this family we can distinguish:

Model E: Only opening the profitable lines to CIM, and CFM (public service contracts awarded through competitive bidding) for the rest.

Model E*: Only opening the profitable market segments to free competition, and public service contracts awarded directly to the rest.

6.5.3 'Competition for the market' alternatives

Within the family of CFM models (with separation of infrastructure and operation), we can distinguish:

- Model F: Franchise(s) by traffic flows throughout the network and free access with no restrictions on any line.
- Model F*: Franchise(s) by market segments throughout the network and free access in any of them.
- Model G: Franchise(s) by traffic flows throughout the network and free access permitted under regulatory control (test of impact on the financial equilibrium of the franchise) on any line.
- Model G*: Franchise(s) by market segments and free access permitted under regulatory control in any segment.
- Model H: Franchise(s) by traffic flows throughout the network and free access with no restrictions on some lines and not permitted on others.
- Model H*: Franchise(s) by market segments throughout the network and free access with no restrictions in some segments and not permitted in others.
- Model GH1: Franchise(s) by market segments throughout the network and free access with no restrictions in some and controlled or nor permitted in the rest.
- Model GH2: Franchise(s) by traffic flows throughout the network and free access with no restriction on some lines, controlled on others and not permitted on the rest.
- Model J: Franchises throughout the network with no free access of any kind.
- Model J*: Franchises by market segment with no free access of any kind.

6.6 Feasibility of the models

The OPTIRED expert panel analysed the feasibility of the models and considered that all the models are technically feasible except model D, ruled out due to its intrinsic complexity.

As regards their feasibility in relation to current EU legislation and its foreseeable evolution, OPTIRED considers that a franchise model for the whole network without competition (model J) is probably not a feasible scenario in the long term, although it could serve as a transition towards more open models such as G, H and E.

As for whether it is worth considering a model of opening based on market segments or traffic corridors, in the case of the CFM models the franchises of a whole market segment (for example, a franchise of all the domestic high-speed services on the one hand, and one the other hand all the Avant services, in the case of the conventional services, a franchise for the Alvia services), it would be necessary to consider, as opposed to the advantage of operating a single type of rolling stock, the problems involved in the resulting extension of the franchises. If we are talking about a large country like Spain, the franchises could be too extensive in scope, which would hinder participation in bidding procedures and, therefore, competition for the market. Nevertheless, if the services of a market segment have a strong network structure, the franchises of a whole market segment would be more recommendable. In the case of a traffic-flow structure, as is the Spanish case, the best option is to create franchises by traffic flows.

Initially, no economies of scope are observed between the operation of high-speed and conventional services if different rolling stock is used (this incompatibility arises if the rolling stock is of a different gauge, as occurs in Spain). Thus, if high-speed and conventional services are operated jointly in a corridor franchise, the only advantage that could be exploited is that of the cross-subsidies from one to another if entry to the commercial sector is prohibited or limited (which would probably be that of high speed).

In the case of CIM, when considering opening by corridors or by market segments, it must be borne in mind that the supply may be differentiated in that which meets commercial demands and the PSOs, and that the type of rolling stock used is usually different. Therefore, opening by market segments is more appropriate when, within the market segment of profitable services, there is no mixture of profitable services and unprofitable services that receive cross-subsidies from the former.

Finally, it is understood that competition for the market generates cost savings that could be reinvested to maintain or increase the level of services. This situation of reinvestment to increase services would be more likely to occur in high-speed services with the aim of justifying the significant investment made in this type of line.

6.6.1 Models chosen as unfeasible by the OPTIRED Expert Panel

- Model A: free competition. The model of widespread free competition would only be feasible in a market in which the railway services were profitable or potentially profitable, whereby the commercially unviable services of public interest were few. At most, this might be the case only of the high-speed network, and possibly only a part of it.
- Model C. In this model, the public service obligations are assigned to the dominant operator who is in charge of providing the services in exchange for an objectively determined amount. Model C could be considered advisable if the free competition generates few socially profitable non-

commercial services. Furthermore, there would always be the problem of showing that there is no overcompensation for these services.

- Model J. From a theoretical perspective, the main disadvantage of the franchise model with no competition is the stifling of innovation in services. Nevertheless, this problem could be alleviated by means of a constructive tendering procedure in which the promoter gives general guidelines and the bidders construct their offer of services, albeit, in the opinion of the Consortium, at the expense of greater difficulty and discretion in the award. The lack of feasibility stems from that fact that it would difficult to justify total closure of the market, especially if the state-run services are the commercial intercity services and only the conventional regional and high-speed regional services could be considered public services (their social profitability would have to be proved).

6.6.2 Models chosen as feasible by the OPTIRED Expert Panel

- Model B. The model is not difficult to implement, it maintains an integrated network of services, especially if there is a dominant operator, and it can help reduce the promoter's financing. However, the model is essentially based on a single premise for its proper functioning: the non-commercial services must not be very numerous. Therefore, there should be a low charge together with great market potential. If the number of unprofitable services were very small, direct compensation to the dominant operator in respect of the public service obligation might be a better option (model C).

  We can assume that if the promoter's objective is to ensure a more intensive use of the network or part of it, for example, a new high-speed line, this would not be the best model.

  If there were a large number of unprofitable services and they were concentrated geographically in such a way that the commercial network could be clearly distinguished from the social network, model E would be better. If competition resulted in there being no services in large parts of the network, model G or H could be used.

- Model E. This is a model that allows a network of minimum services to be maintained while at the same time reducing the promoter's need for financing in the non-commercial network.

  Furthermore, it is easy to implement when there is a clear delimitation between the commercial network and the non-commercial network.

  Part of the network benefits could be preserved through impositions on the franchisee operators. Nevertheless, coordination between the commercial network and the non-commercial network could be complicated.

  For the model to function properly it is necessary to reduce the barriers to entry in the franchises. A strong regulator would be necessary for the model to function in the non-commercial network, as would the possibility of transferring rolling stock and specialized staff, together with sufficient information to facilitate the entry of competitors less familiarized with the railway environment.

  In the commercial network there needs to be entry potential, which is likely if the charge is low and/or the level of service before opening is low. Furthermore, to encourage at least potential competition in the market, which could occur with franchisee operators who wish to enter the commercial network, the franchises should not be too attractive in terms of risk limitation (for example, they should not be gross-cost franchises, an option that limits the risk of the railway undertaking).

- Model G. This model involves sharing the whole network among various franchises and only permitting the entry of an operator other than the franchisee, which we call "free", in the event that this entry were beneficial for society. It would normally be a service not offered by the franchises.

  This model could be the one that has the biggest effect in terms of increasing the supply of railway services, number of passengers and positive environmental impact. In this respect, it is necessary to point out that the public promoter could decide to use the savings to lower prices or reduce public funding needs instead of increasing frequencies. Moreover, it maintains an integrated network, with the imposition of a minimum of services on the part of the authority in charge of designing the franchise. If the profitable and unprofitable services are difficult to delimit and there are no train paths available for the entry of new competitors, it might be the best competition option.

  However, if the unprofitable services can be delimited, it would be feasible to choose either model E, if it is considered that the level of service will be sufficient in the commercial network, or model H if it is not considered sufficient.

- Model H. Consists in dividing the network among franchises, free entry being permitted in parts of the network. It could also be subject to authorization, thus giving rise to a hybrid situation between models H and G.

  This model has the advantage of being a possible stepping stone towards model E or model G. If the level of service in the commercial network were proved to be sufficient, migration to model E might be possible.

  Model H has all the advantages of a concession model such as G, except that the entry of "open-access" operators in the open network could entail the elimination of cross-subsidies. Thus, in order to maintain the same minimum network as in case G, the efficiency gains would be lower, whereby if the efficiency gains were invested in supply increases, these would also be lower.

6.7 The international experience

In the EU, international services have been liberalized since 1 January 2010, whereas the opening to competition of domestic markets has yet to be imposed. Some countries have still not opened their domestic market to competition, while those that have done so have used different models. Only the United Kingdom has opted to organize its railway services by means of competitive tenders for the market. In the British franchises, which may include both profitable and unprofitable long-distance services, as well as regional or suburban services, the authority in charge of the bidding procedures establishes the minimum characteristics of the service. Although the model was expected to evolve towards concessions in which the free entry of other competitors would be permitted, eventually entry was only permitted for new operators who do not take revenue away from the franchisees. This is the case of the "open-access" operators. Due to the restricted nature of entry (limited to the case in which the operator does not take revenue away from the established franchises), the "open-access" operators have little significance, the only cases being Hull Trains, Grand Central, and WSRM (bankrupt in 2011).

In the case of the Netherlands, after the failure of the trials to establish free competition in the conventional network, mainly due to the existence of a saturated network and some highly meshed services, the authorities opted for a 10-year concession awarded directly to the national railway company NS for the operation of inter-regional services on the conventional network, and a competitively awarded concession for high speed.

Germany is the only country to adopt competition in the market for the provision of its inter-regional intercity services without any public intervention to ensure the provision of loss-making services. In this country, the entry of new competitors has been limited, their market share having been marginal so far (1%). After 16 years of liberalization, there are only three services that compete with DB's: the Interconnex service, Netirea's (Trenitalia) Votlaghan and the HKX (Cologne Express), recently inaugurated in the summer of 2012.

In the rest of the Member States, opening to competition has been based on a model of competition in the market or a mixture between competition for the market and competition in the market. Competition for the market is established for the provision of the loss-making services that are considered to be socially necessary, while competition in the market is reserved for intercity services.

This is the model adopted by Sweden, with competitive tendering for the provision of the inter-regional services that, according to the public railway company (SJ), cannot operate profitably, whereas in all other services there is free competition. Veolia is bidding to launch a low-cost alternative to SJ's x-2000 services on the Stockholm - Malmö line.

In Italy there is competition between Trenitalia and the private operator NTV in high-speed services, and between Trenitalia and Arenaways in conventional services. In Austria, Westbahn competes with ÖBB on the Vienna-Salzburg line. In the Cezch Republic, Regiojet competes with CD on the Prague-Havířov line and, shortly, with Leo Express, which will make this the Czech railway line with the most competitors.

In any case, except in that of NTV, competition in the market is reduced to one line: the most profitable one of the established operator, the case of the Italian private high-speed operator being the most important example of competition in the market, with its replication of the Trenitalia service. Due to the fact that it only commenced its operations very recently (28 April 2012), the functioning of competition cannot be evaluated..

6.8 Infrastructure charge models

The adoption of a particular model of opening to competition is determined by the infrastructure charging policy. The following table shows the main characteristics of each one of the charging principles.

The charging methodology should differ according to the type of market and the competitive situation.

For the case of Suburban services characterised by being services with considerable public financing, with a stable and fixed demand for train paths over time and with no possibility of introducing competition in the market, but instead competition for the market, it might be advisable to opt for an FC charging methodology designed in two parts. The FC is justified in that the suburban services are the main users of the infrastructures in question and therefore generate most of the costs of these infrastructures. For the authorities that finance the service, adopting the FC gives greater clarity to the actual cost of the level of service they require. In this respect it should be emphasised that it is necessary to reconcile the service level requirements imposed by the authorities with the resources available in the state budgets for financing the infrastructure. For this reason it is recommended that the charge include a part that covers the capacity requirements and a variable part that covers the utilization costs.

In the case of high-speed services, two situations can be distinguished:

- If competition does not exist and there are no capacity problems due to other services using the infrastructure, an FC or FC- methodology is recommended if in the latter case the services are considered to generate social benefits.
- If competition exists or there are related capacity problems due to infrastructure use by another type of service, we recommend an MC+ methodology and, specifically, tariffs in two parts for the dominant high-speed operator, and an MC methodology for the rest of the services.

As regards conventional passenger services, there are also two possible situations: if competition in the market is possible, the recommended methodology is MC+ in order to facilitate the entry of small operators; if there is competition for the market, the situation would be similar to that of Suburban services and the recommended charging methodology would be FC applied in two parts.

Table 2. Infrastructure charging principles

Name	Acronym	Philosophy	Characteristics
Marginal social cost	MSC	The State subsidises the difference between and marginal and financial costs	Allocates to the companies the variable costs associated with a particular use. The one that places the heaviest burden on public finance.
Marginal social cost with mark-ups on the marginal cost	MC+	Seeks to reduce (or eliminate) the difference between marginal and financial costs	If designed properly, it ensures minimum loss of efficiency while at the same time complying with the budgetary restriction (thus achieving the FC-charging objectives).
Recovery of costs after public contributions	FC-	The charge is set at a level that allows the difference between the incurred costs and the public contribution to be recovered.	Covers costs but does not encourage productive efficiency. May generate inefficiencies in infrastructure use. Costs not covered by the public contributions, and revenues are distributed evenly and efficiently.
Total recovery of costs	FC	The charge is set at a level that allows the incurred costs to be recovered.	Entails high charges. Only applies when the position of the railway in the market is very competitive, e.g. freight in Baltic countries.

Source: CEMT (2005)

6.9 Conclusions

There is a menu of options for regulating access to intercity services that are compatible with EU legislation. All of them belong to the family of competition in the market (air transport model) or that of competition for the market (Spanish intercity coach model).

Competition in the market has weaknesses and strengths. Its weaknesses are: a) slim probability of real competition; b) duplication of services and losses of economies of density; c) reduction of the producer's surplus. Its strengths are: a) reduction of tariffs; b) (doubtful) reduction of costs; c) improved services; d) innovations.

It is better when: a) there is a significant volume of real and potential market within the railway's grasp; b) excess infrastructure capacity; c) low infrastructure charge.

For its part, competition for the market has the following strengths and weaknesses. Strengths: a) high levels of competition; b) integrated planning of services, c) promotion of marketing and levels of service; d) cost reductions (around 25%).

Much depends on the design of the franchise in terms of: a) duration; b) freedom as regards establishing prices and services on the part of the franchisee; c) incentives (risk allocation).

Its weaknesses are: a) little room for innovation and b) lack of competition in prices and levels of service.

Previous experiences offer some evidence of the benefits of competitive tendering (competition for the market). However, in the British case there have been cost increases that may be related to the modernization needs of British railways, which at the time of their privatization (1994) were obsolete and ill-prepared to cope with the increases in demand recorded by the railway system since its privatization. There is also evidence of cost savings in the Swedish case (and in the German regional service franchises). Nevertheless, it should be pointed out that the studies of efficiency-based savings in Sweden and Germany were based on the reduction of subsidies, without considering what happened in the whole of the railway system, in which the fragmentation of services may have caused an increase in costs and losses of quality.

However, free access competition has been very limited and there are doubts as to whether it is effective and, more specifically, whether it can actually become widespread in the networks in which access has been liberalized. Otherwise, as has been the case until now, in practice the only real way to introduce widespread competition is ex ante: for the market. Nevertheless, the failure to date of competition for the market, which may be due to the lack of a competitive environment that facilitates access, is an issue worth studying.

Current experience in Italy and, to a lesser extent, in Austria and the Czech Republic, promises to be very interesting in this respect, although when making comparisons it is always important to bear in mind the structural factors – apart from the institutional setting that facilitates competition – that could favour competition, such as the size of the potential railway markets (which are determined, among other factors, by the distribution of the population, the competitive position in relation to other modes and the amount of the infrastructure charge).

In short, it is not clear which model of competition has worked best in the countries concerned, given that the structural factors of the railway system, as well as the economic situation, are important as regards demand and subsidy levels. In any case, a more detailed analysis of these structural factors and the macroeconomic evolution is needed in order to reach a more conclusive answer.

Whatever the model of opening may be, the competitive environment, especially as regards access to the infrastructure and rail-related services and rolling stock, is an important factor for the success of liberalization. In this respect, the Regulator plays a key role in preventing anticompetitive practices, especially in relation to access to the infrastructure and related services and rolling stock. The Regulators must have sufficient resources, be independent of the government's direct control, and perform a balanced intervention that is neither too lenient nor too strict, and that does not impose unnecessary restrictions on the capacity of infrastructure managers and railway transport undertakings to respond to market pressures and changes.

A fundamental recommendation would be to choose a model that is flexible in the sense that it can be altered. The pioneering countries as far as opening the market is concerned have changed aspects of their model as time has gone by. In this respect, these countries are laboratories in which different models are tested, and the rest can learn from their successes and failures.

An important issue to consider is that railway networks differ across the countries of the EU. In this respect, the applicability of the access models

is determined by the level of the infrastructure charge and the attainable demand. A low charge facilitates the applicability of the models of competition in the market. Therefore, the charge is a fundamental issue, since it largely determines the model, or, viewed from another perspective, the charge should be fixed according to the model chosen. Therefore, the charge system should be determined at the same time as the access model is chosen. In any case, the charge model should be stable, because otherwise the uncertainty (for example, the fear of an increase and/or a change in its structure) would inhibit the entry of new competitors when they have to assume the risk of the charge increase (this would be in competition in the market and, if this risk is not covered, in competition for the market).

For this reason, a model might be suitable for one country but not for others; there is no single model of organization of access to the railway market, and the determining factors may be different. For example, there are countries whose railway infrastructures are undergoing major alterations in order to equip them for better performance. The cost of these investments would hardly be justified by a reduced utilization of the network on the part of the railway undertakings. Another factor to consider is that new services on new infrastructures may be at the "ramp up" stage of development and may therefore need a period of consolidation with a view to achieving profitability. Therefore, there is an important political cost that the authorities would wish to avoid.

For this reason, franchise models that ensure the existence of a minimum state-run network might be recommendable, before adopting more open models once the services have matured and the dividing line between what is commercial or what is not commercial has been established. One advantage of this gradual process is that competition for the market creates a critical mass of operators who know the market and can start to compete as soon as they are authorized to do so.

If a model of competition for the market were adopted partially or totally, it would be recommendable not to franchise the whole market at once, but instead gradually. It would be advisable to begin with the least complicated franchises and then, once the bidders and the promoting authority are more expert, tackle the complicated ones. Starting with the easiest franchises increases the number of bidders and limits the political risk of unsuccessful tender procedures.

Another advantage of the gradual option is that if the population is wary of liberalization and notices that the model is working well, it may change its mind. An important technical question, which makes gradualness advisable, is that a simultaneous process, especially if the lots are large, could saturate the rolling stock market if it has renewal needs and would put great pressure on the human resources available in the companies to prepare the tenders.

The coordinated opening of franchises can have an advantage: it immediately facilitates the existence of coordinated services among various franchises. This is the case, for example, in Germany, where the long-distance services that DB stop providing but which are considered to be of public interest by the Länder can continue thanks to the coordination of various regional franchises that cover the different territories through which the service passes.

In the case of competition in the market, gradual opening could prevent major imbalances in the market (services would disappear overnight due to the withdrawal of cross-subsidies) and would facilitate the dominant operating company's transition toward competition. One gradual option, following the air transport liberalization model, could be to start with the liberalization of charter services. Liberalization could then continue with the weekend services and, finally, all the other services.

Another model would be that of railway freight transport, which involves liberalizing a part of the network first, and then the rest.

It might also be worth considering, as an instrument of gradual opening, granting a second operating license to begin with (see Chapter 17) and then granting more licenses over time.

Finally, it would also be possible to open the market by business sectors; for example, starting with the night services, followed by the conventional daytime services, and finally the high-speed services.

Gradual opening seems advisable for the purpose of adapting the market to competitive forces. If competition for the market exists, the periods of gradual opening could be shorter, since there could be a critical mass of operators in the market who could immediately enter to compete. In any case, a gradual opening schedule is required to ensure the credibility and completion of the opening.

7. CHARGE MODELS: INFRACHARGES 2012: STUDY FOR THE UIC ON THE RAILWAY INFRASTRUCTURE CHARGE FOR EUROPEAN HIGH-SPEED SERVICES

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7.1 Introduction

As mentioned in the previous chapter, the infrastructure charge is a key factor in the model of opening to competition, and when considering the opening of the market, the structure and level of the charge must also be taken into account. Over the last two decades, the railway sector in Europe has undergone a reform in which its structure has changed radically. Infrastructure management has been separated from train operation in order to promote better management and competition in the provision of railway services.

In 2001, the European Commission passed a Directive (2001/14/EC) that focuses on the creation of the framework for the implementation of railway infrastructure charging schemes throughout the European Union. Previously, the UIC had carried out studies similar to the INFRACHARGES studies (2005 and 2007), concluding that the resulting charging systems have been heterogeneous both in their structure (charging principles, schemes and formulas) and their levels.

The UIC's 2012 study on the railway infrastructure charge in Europe assessed the charging situation and provided an update of similar studies carried out in 2005 and 2007. The scope of the assessment of other cost recovery and financial aspects of railway pricing was also extended.

The study included a quantitative assessment based on calculating the tariffs for a number of origin-destination pairs, estimating the railway companies' revenues per train and comparing them with the infrastructure manager's fees. Then it compared the infrastructure manager's income with the initial investment costs of a selection of European high-speed lines. The study also put the current situation in Europe in context by comparing the European system with other charging systems in North America and Japan.

The main objectives of this study are to determine the evolution of industry practice and the fulfillment of the objectives of European railway reform. It also assessed the cohesion among the charging systems of the different countries, as well as the pricing of cross-border services and other related policies.

7.2 Study methodology

The study is divided into two main parts. The first part analyses the charging systems in each of the 27 countries of the EU. The second part analyses the impact of the tariff systems in the EU. After drawing conclusions from the Report, the industry was asked for feedback.

The first part of the study summarises the tariff systems in the 27 countries of the EU and calculates the infrastructure manager's revenue for 102 origin-destination pairs. The first section of the first part of the study summarises the structure of the tariff system for each one of the 27 EU countries by looking at each country's Network Statement, producing a brief summary that shows how the charge is calculated and providing the data for the calculation of any charge for high speed. This section also includes an updated table that summarises the principles on which charging is based in each system. In addition, this section analyses the evolution of the tariff systems between 2005 and 2012, considering the types of changes that have occurred during this period of time.

The second section of the first part of the study calculates the corresponding charges for 102 European Origin-Destination pairs of a predefined train. These 102 Origin-Destinations include 27 international O-Ds and 75 domestic ones. Various sensitivity analyses are also carried out, changing the type of train under consideration. The evolution of charge levels was also examined for the period between 2005 and 2012. The standard train defined for this purpose is a 500-seat, 10-coach train weighing 400 tons, similar to a TGV Duplex. The train size was the same as that used in the 2005 and 2007 studies, so that the results can be compared.

The main purposes of this part of the study were to analyse whether the structures of the charging system are converging or diverging, whether the charging methodologies have changed, and whether the charges are increasing or decreasing.

The second part of the study estimated the revenues of the railway undertakings and the infrastructure managers. First, the infrastructure manager's revenues were compared with those of the railway undertakings in order to determine how important the charge is for the railway undertakings. The railway undertakings' revenues were estimated using actual ticket prices and compared with the infrastructure manager's revenues, using the infrastructure charging system published in its Network Statement.

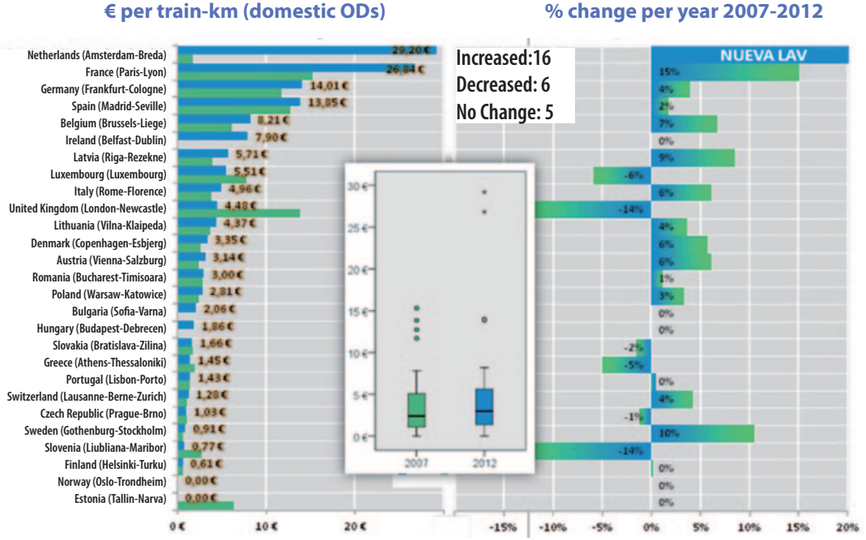
Then, using the collected traffic data, the infrastructure manager's revenues on key high-speed lines were compared with the initial investment costs and the maintenance costs. The annual cost recovery percentage was calculated in order to see how much of their costs the infrastructure managers were able to recuperate with their current charges.

7.3 Results of the study

If we look at the domestic origin-destination pairs, the charges range from € 0 to 29.20 per train-kilometre. Since 2007, there have charge increases in 16 of the 27 domestic O-D pairs, reductions in 6 and no change in 5. As regards average values and dispersion, the average increased slightly, as did dispersion: the values are more dispersed in 2012 than in 2007 (see Graph 1.

In the comparison of the tariff levels with the commercial speed, excluding the atypical values gives rise to a tendency with a correlation coefficient (R2) of 0.407 between the price and the speed. When prices are compared with traffic on certain high-speed lines, the R2 is 0.912 after excluding an atypical value.

Graph 1. € per train.km in domestic ODs and % change per year. 2007-2012 / *Fuente: INFRACHARGES 2012.*



Source: INFRACHARGES 2012

7.3.1 Impact of the charge on railway undertakings

On examining the effects of the charge on railway undertakings, the railway undertaking's revenues are estimated using the collected ticket price data. The infrastructure manager's income was compared with the collected data to obtain the percentages, which vary between 6% and 36% of the total income.

7.3.2 Recovery of initial investment costs

On observing the recovery of initial investment costs, the total revenues of each line were calculated using collected traffic data for 2012. After subtracting the maintenance costs, net income values of € 0.04 M per line-km to €1.82 M per line-km were obtained.

Considering them as a percentage of the total cost, the majority of lines were within the range of 0.3% to 3%, whereas in some cases (especially in France), the annual cost recovery percentage was as high as 20%.

7.3.3 Cross-border tariffs

An examination of the tariff levels in neighbouring countries reveals a lack of harmonization: in adjacent countries there seems to be no convergence in price levels or structure. This is already a problem for the transport sector, and when the European high-speed market develops and high-speed links between countries are constructed, it will become a major problem for high-speed systems if it is not properly addressed. This could be a problem in two ways: different tariff levels may affect competition in the railway market, and different charge structures may send out contradictory messages to the railway undertakings in terms of what type of incentives are offered. Doubts regarding capital recovery cost also remain for the adjacent infrastructure managers.

7.3.4 Comparative analysis of tariff systems in competition for the market and competition in the market

In order to compare the countries with charging systems that have competition in the market and competition for the market, France, Germany, Netherlands, Italy and the United Kingdom were selected from among the 27 countries of the EU. By analysing the classification of the models of the charging systems adopted, we can clearly see the diversity of charging principles across these countries.

The selected systems calculate the charge in different ways: simple (a base

Table 3. Comparative Analysis of Charging Systems (Passenger and HS systems in selected countries)

País	España	Francia	Alemania	Países Bajos	Italia	Reino Unido
Tipo de sistema[1]	CM+	CM+	FC–	CM/FC	FC–	MC/MC+
2012 € por km media	13.85	26.84	14.01	29.20	4.96	4.48
Calculo de Tarifa	Aditivo	Aditivo	Multiplic.	Simples	Complexo	Aditivo
Diferenciación por hora del día	+	+	-	-	+	+
Diferenciación por línea AV (geográph)	+	+	-			+
Tipo de servicio	+	+	+	+	+	+
(dis)Incentivos para utiliz. de capacidad		(↔Paris)		Indir.	Tarif. Por tiempo en nodos	Canon de 2 partes/HS-1: tarificación por tiempo
Competencia por/en mercado	-	+[2]	+[2]	+[2]	+	+

1 – Estudio RAILCALC, 2007
2 – Competencia limitada a servicios internacionales

tariff), multiplication (base payment, multiplied by the factors), additive (sum of multiplication of simple or complex parts) or complex (a complex mathematical formula). Only Italy has a complex charge calculation formula, whereas the United Kingdom and France use additive formulas. Netherlands has a simple formula that adds an increase for high-speed services, and Germany has a multiplication system.

Some of these systems apply differentiation according to the time of day, geographical differentiation by line, or franchise, differentiation by type of service or incentives/disincentives for traffic/capacity. Of all these countries, only Italy has real competition in the domestic market, whereas the other countries have competition in the international market.

By analysing the differences in prices we can see a wide variety, ranging from an average of around € 5 per train-km in Italy to nearly € 30 in the Netherlands for a 500-seat UIC type train defined for the study. In terms of absolute values, France has the widest range of prices, from nearly € 6 per train-km for the cheapest line at off-peak hours to € 28.45 for the most expensive line at peak hours. In general, the Netherlands has the highest price for use of the high-speed line, charging a low positive marginal cost and a mark-up for high speed.

The Netherlands has the lowest prices, around € 6 for an international high-speed train, whereas France has one of the highest station use tariffs, up to € 150 for a high-speed train.

7.4 Conclusions

The infrastructure charge is a fundamental policy instrument for determining the operator access model and regulating the functioning of the market from an intramodal and intermodal perspective. The conclusions regarding the experience in the EU centre around three aspects: charge stability, cross-border compatibility and competition in the sector.

Charge instability: while a significant number of the charging systems have matured, the charges continue to be unstable, with a general increase in the EU-27. In several countries the charges have undergone an increase in excess of the rise in the Customer Price Index.

In the complex tariff systems, the number of variables in general has increased, whereas the simple charge systems have remained simple. The total number of variables has remained similar to what it was in 2007, over 50 types of variables being used throughout the EU-27, with a subset of these in each country. Charge stability varies according to the charging system, and while a number of systems have matured significantly, others have not undergone major changes. In 13 countries of the UE-27, important changes have been made to the price scheme between 2007 and 2012.

From a quantitative point of view, a general tendency to increase charge levels can be observed, albeit with some exceptions. Generally speaking, high-speed line charges have increased significantly (in terms of average and dispersion), whereas conventional line charges have evolved more steadily (and have even tended to fall on average). In general, dispersion in the charging systems has increased both in price levels and in their structure.

Table 4. Comparative Analysis of Charging Systems (Passenger and HS systems in selected countries)

País	España	Francia	Alemania	Países Bajos	Italia	Reino Unido
Min (AV, linea mas barata fuera hora punta, sin estaciones)	4.95	5.92	7.39	29.20	depende del trayecto	depende del operador
Max (AV, linea mas cara, hora punta, sin estaciones)	12.65	28.45	14.45	29.20	depende del trayecto	depende del operador
Estaciones	depende de número de los pasajeros	17€ -150€	10€ - 30 €	~6€	-	depende del operador
Competencia	-	*Thalys, SNCF*	*DB/SNCF, Thalys,* Servicios Regionales	*Thalys, Fyra, NS*	*Trenitalia, NTV*	Competencia por mercado/ competencia internacional

Cross-border compatibility: dispersion in terms of charge levels and structure has increased. This represents a problem for the European railway market and will create new legislative barriers.

Impact of the tariff on railway undertakings and the revenues of infrastructure managers: the charges have a very significant impact on railway company revenues and this impact has increased over time. In the majority of O-D pairs there has been an increase in the ratio between the infrastructure managers' tariffs and the railway undertakings' revenues (indication of higher infrastructure manager tariffs and/or lower ticket prices). Nevertheless, on some lines there has been a reduction in charge costs as a percentage of the railway undertaking's total income. Although there have been some fluctuations, the percentage is still similar for conventional lines but has increased significantly for high-speed lines.

As regards the relationship between the revenues and costs of the infrastructure managers, the collected data suggest that they are capable of recovering a not inconsiderable proportion of the initial investment costs on the majority of high-speed lines. In some cases, this amount can be very significant.

The industry's point of view on the results of the study indicates that:

- Stability is a concern for operators, but infrastructure operators, in spite of changes in the market in the short term, require flexibility in the structure of the system and the charge levels and regard only predictability as relevant.
- The lack of coordination of the tariff structure and levels is seen as an international concern by railway undertakings. However, according to the majority of opinions, this issue should be tackled through a piece of EU legislation or a European body/regulator.
- The optimization of price levels from society's perspective requires the alignment of objectives between railway undertakings and infrastructure managers (through, for example, profit-sharing) and explicit regulation on compensation for externalities.

Competition in the sector: competition in the railway sector has yet to play an important role in a complete overhaul of its pricing systems. In other words, there is no single European high-speed market when it comes to infrastructure charge systems. As the international market develops, coordination between countries will be very important for ensuring there are no artificial barriers in the form of incompatible pricing systems.

8. MODELLING OF RAILWAY COMPETITION. THEORETICAL MODELS / *Ana María Fuertes, Timoteo Martínez, Israel Pérez, Ana Isabel Muro*

8.1 Introduction

This chapter analyses the main methodological developments relating to market competition, particularly those which refer to the liberalization of transport sectors and which could apply to the railway sector.

The research presents the state of the art of market competition models based on economic theory and their mathematical formulation. This review of the economic literature allows us to detect the theoretical approaches and the elements pertaining to the modelling of competition in the railway market and, subsequently, to guide the design of an experimental operating model (a matter which is dealt with later on), which will become operational within the framework of an experimental laboratory.

The analysis of competition in a regulated market, or in a market dominated by a state monopoly, as is the case of the railway sector, comprises three important aspects:

- The effect of liberalization on the user;
- The effect on the established companies and the new incoming operators in order to be able to ensure the balance of the sector;
- And regulation of the necessary elements that may affect competition. In the railway sector, the analysis of capacity allocation and access to the infrastructure is of particular significance from the theoretical-mathematical point of view and because of its topical relevance.

The first two aspects are included among the market-based models, with a longer implementation period and a development that covers the greatest possible number of railway sector agents. The third aspect relates to certain partial objectives and results of competition, and is included through the auction instruments that allow access to be regulated and efficient infrastructure objectives to be established (issues relating to capacity).

In the first group of market-based models, the analysis of the economic principles is based on the contributions of Berry, S (1992) and (1994) and Berry et al. (1995), which represented the main advance in these developments and which are still valid today.

The second group of models relates to the analyses based on the auction system and we analyse the principles applied to the different specific cases. It should be emphasised that the countries which have applied these models previously analysed and applied one of the models belonging to the first group (based on the market), since it is necessary to reach a certain maturity in the process of railway liberalization.

8.2 Market-based models

Different theoretical modelling approaches are analysed:

8.2.1 Models of partial balance with product differentiation

In this approach, the key articles for the estimation of interactions between supply and demand relating to a sector (partial balance) and considering multi-product are: Berry, S. (1992) and (1994).

Models of estimation of demand, cost and simulation of different forms of competition (impact of entry)

This category includes the models that analyse intermodal or intramodal competition in the transport industry, based on game theory models. We highlight the following contributions:

- Analysis of intermodal competition, with the works of Ivaldi, M. (2005); and Vibes C. (2008).
- Analysis of greater or lesser degree of intramodal competition, Glass, A (2003).
- Analysis of theoretical models of intramodal competition, SDG (2004); Preston, J. (2009); and Nash and Johnson (2010).

Homogeneous/differentiated product models. Oligopolistic competition

An oligopolistic model is a market characterised by the presence of few companies that compete with one another. In relation to the document that concerns us, the empirical evidence obtained in the articles analysed shows that oligopolistic competition is the one most likely to occur in the railway sector.

Consideration of the econometric techniques permits an alternative approach to the modelling applied to transport (aviation, in this case), where the behaviour of the companies in the market is explained through a system of simultaneous demand and price equations in order to estimate the conduct parameter (or conjectural variations) and cost parameter. We highlight the contributions of: Brander, J.A and A. Zhang (1990); Oum, T.H, A. Zhang and Y. Zhang (1993); and Bresnahan, T.F (1989).

8.3 Based on the auction system

Among the regulated markets in the early stages of the liberalization process imposed by Brussels is the railway passenger transport market. To carry out the applied research, in various countries, experimental design has been as an invaluable tool. The utility of the "laboratory experiment" has focused on two basic issues: (1) the study of different auction mechanisms for the allocation of rights of use, and (2) the analysis of different types of competition (for the network or on the network) as initial market opening possibilities. Now we will look at the most important ones.

8.3.1 Competition for the market and in the market through an auction system for capacity allocation

From the theoretical point of view, auctions are regarded as a special case of price competition under asymmetric information (Tirole, 1999). In its simplest form, an auction (first price auction) has the following characteristics: the buyer (who represents the consumers in the price competition model) has a unitary demand. Each seller (company) privately knows its own cost of providing a unit of the product or service, but not that of its rivals. In this type of auction the buyer chooses the bidder with the lowest bid. This auction is, therefore, equivalent to price competition with perfect substitutes.

Among the most developed models are those produced by Cox, J.A; Offerman, T, Olson, M.A and Schram, J.H.C (2002) and the German Trassenbörse Project currently in progress. These works study railway competition through auction systems and can be applied both to the specific case of competition for the market and to that of competition in the market.

8.3.2 Efficient allocation of the right to use the infrastructure through a pre-established price system

Framed within the first of the basic issues considered is the work called BICAP, which permits the efficient allocation of the right to use the infrastructure (capacity allocation). This is the system considered in the paper by Cox et al. (1998) for allocation of the infrastructure, reflecting the economic policy options of the Swedish government when making decisions about the evolution of the rail transport model from a centralized system to decentralized one.

8.3.3 Models that focus exclusively on capacity allocation

The Swedish railway case and its analysis have given rise to a large number of articles and methodological applications which have spread, in many cases, to Europe as a whole. In this respect we should bear in mind that the process of railway liberalization in Sweden began in 1999, Sweden being one of the first countries to analyse both its ex-ante and ex-post effects.

Of particular interest in this regard is the article by Isacsson G. and Nilsson J.E (2003), which analyses the results of the experiment carried out for four different auction systems applied to railway capacity allocation.

8.3.4 Models of choosing between frequencies and vehicle size and cost implications

The strategies for competing or the tactical decisions that operating companies have to face relate to the pricing system, frequencies and capacity-related issues, especially the size of the trains. Experience shows that the decisions made by operators in relation to these three matters tend to be uniform.

The article by Rietveld, P and Woudenberg, S (2007) analyses the possible welfare losses that these (uniform) decisions cause. The authors conclude that price differentiation strategies are good for transferring congestion problems and directional and directional symmetries to the demand, while differentiated supply strategies (in terms of vehicle size and particular frequencies) are preferred for dealing with demand variations on different segments in a network.

Table 5. Competition Modelling Studies / *Source: Independently produced*

❖ **Berry, S (1992), "**Estimation of a model of entry in the airline industry", Econometrica, Vol. 60, No 4, pp. 889-917, July.
❖ **Berry, S (1994),** "Estimating discrete choice models of product differentiation", RAND Journal of Economics, Vol. 25, No 2, pp. 242-262, Summer.
❖ **Bresnahan, T.F (1989),** "Empirical studies in industries with market power" en R. Schmalensee y R. D. Willig (eds.), Handbook of Industrial Organization, North Holland, Nueva York.
❖ **Brewer, P.J y Plott, C.R (1996),** "A binary conflict ascending price (bicap) mechanism for the decentralized allocation of the right to use railroad tracks".
❖ **Brander, J.A y A. Zhang (1990),** "A market conduct in the airline industry: An empirical investigation", Rand Journal of Economics, vol.21, pp.567-583.
❖ **Cox, J.A; Offerman,T; Olson, M.A y Schram, J.H.C (2002),** "Competition for versus on the Rails: A Laboratory Experiment". International Economic Review. Vol. 43, Nº. 3.
❖ **Isacsson G. y Nilsson J-E. (2003),** "An experimental comparison of Track allocation mechanisms in the Railway Industry". Journal of Transport Economics and Policy. Volume 37, Part 3, September 2003, pp. 353-382.
❖ **Ivaldi (2005),** "Intermodal and intramodal competition in passenger rail transport" IDEI Working Paper No 345.
❖ **Glass, A (2003),** "An Assessment of the Desirability of On-Track Competition: The Ipswich-London route", Institute of Transport Studies, University of Leeds, Leeds.
❖ **Nash, C y Johnson, D (2010),** "Competition and the Provision of High Speed Rail Services", UIC Symposium on High Speed Rail, Beijing, China, Dec.
❖ **Oum,T.H, A. Zhang y Y. Zhang (1993),** "Interfirm rivalry and firm-specific price elasticities in deregulated airline markets", Journal of Transports Economic and Policy, Vol. 27, No 2, pp.171-192.
❖ **Preston, J (2009),** "The future for interurban Passenger Transport: Bringin Citizens Closer Together." Discussion Paper No 2009-23. International Transport Resarch Symposium, OECD. Madrid, 18 de noviembre de 2009.
❖ **Rietveld, P y Woundenberg, S (2007),** "Second best decision making of railway operators: How to fix fares, frequency and Vehicle size".
❖ **SDG (2004),** "EU Passenger Rail Liberalisation: an Extended Impact Assessment", Steer Davies and Gleave.
❖ **Vibes, C (2008),** "Price competition in the Intercity Passenger Transport Market: A simulation Model".
❖ www.trassenbörse.de

8.4 Conclusions

As there is no universal theory that demonstrates the functioning of railway markets, it is necessary to use modelling representative of reality which, once validated, will serve as a tool to aid railway policy decision-making.

The main conclusion of the modelling carried out is that competition in intercity services would take the form of oligopolistic competition. If there is no product differentiation and infrastructure access costs are low and/or the volume of demand is high, there may be competition in which the new entrant replicates the services offered by the incumbent operator. However, it would not be socially desirable, as it would mean an excessive quantity of services (very problematic if capacity is limited), whereas the downward pressure exerted by competition on costs must be weighed against the loss of economies of density, which would limit the positive effect of competition on fares. With a high infrastructure charge, entry would be limited to cherry-picking the market, which would not be socially desirable either.

Unlike the aforementioned models of competition, if competition is based on product differentiation, for example, competition between a fast line and another parallel line with lower performances, the result may be socially optimal. Likewise, entry into market niches (for example, direct infrequent services that compete with an established supply of indirect yet frequent services) would be desirable from the social point of view.

An aspect that determines the entry of new operators is the attainable market share to achieve the efficient minimum size. The 'market capture' factors are the existing potential for demand enabling two or more operators to coexist, and the possibility of interchangeable tickets that allow users to travel on the train of the company concerned on that of one of its competitors.

Finally, it is worth highlighting that studies show that competition for the market and in the market through a system of auctions for capacity allocation are still at a very experimental stage of analysis.

9. MODELLING OF COMPETITION IN RAILWAY PASSENGER TRANSPORT: THEORY AND APPLICACIÓN TO THE MADRID-LEVANTE CORRIDOR / *Ana María Fuertes, Timoteo Martínez, Israel Pérez*

9.1 Introduction

The development of competition modelling carried out in the OPTIRED Project entails the development of an operational tool for decision-making in the process of liberalization of railway passenger transport in Spain which can be used to model different competition analysis alternatives, through a laboratory experiment (experimental methodology in economics), by applying game theory and industrial organization theory.

This experimental study has been carried out under the paradigm of "competition for the market" (franchises), a possible market opening alternative considered in different studies and experiences which, at international level, are taking place or have taken place in other countries prior to ours in the aforementioned process of liberalization. Choice of competition type has on various occasions been considered, through the discussions arising from the different expert panels and among the members of the consortium, as a feasible option, a first experiment within this process of liberalization. In a second phase, for certain corridors and high-speed services, the modelling can be based on a presumption of "competition in the market", with free access, as described in the section corresponding to future research (see Chapter 18).

In particular, the development of competition modelling carried out in the OPTIRED Project pursues:

- The proposal of an operational tool for decision-making in the process of liberalization of railway passenger transport which can be used to model different competition analysis alternatives. The task is performed by devising an economic laboratory experiment which considers an example experimental network that is as simple as possible but which also manages to capture all the intrinsic characteristics of the Spanish railway network. The purpose of the exercise is to determine which opening option is the best or the most suitable, but allowing the final decision maker to study the different models of competition that could be implemented.
- The analysis of competition intensity that can be applied to each one of the corridors (franchises) considered in the design of the experimental network. In the model we analyse the factors that determine the degree of intensity of competition (degree of rivalry), such as: degree of concentration, product differentiation and the entry and exit barriers that might exist in this railway passenger transport sector, as well as the results regarding competition obtained in this experiment, applied to the corridors considered in the network design.

The design of the experimental network proposed for the laboratory experiment for the modelling of competition should be a simple as possible but at the same time be able to capture the intrinsic characteristic of the Spanish railway network. The Madrid-Levante corridor was chosen mainly because it offers sufficient interconnections and demand asymmetries for the network analysis to be sufficiently rich, offering a range of analysis possibilities and conclusions.

9.2 Experimental design

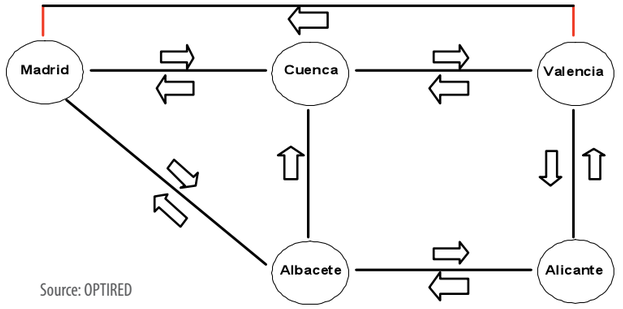
The laboratory experiment analyses the effect of establishing different service provision minimums on the bids made by operators in an auction process and the resulting schedule chosen after this process, under one of the theoretical market liberalization options: "competition for the market". The experimental model, carried out in the Experimental Laboratory at Universitat Jaume I, was jointly designed by this university and Universidad de Castilla-La Mancha. This experiment proposes an experimental network that, while being as simple as possible, manages to capture the intrinsic characteristics of the Spanish railway network.

This network is supposed to be characterised by the following underlying assumptions:

Considering each combination of a route and time slot as a market commodity, we assume the existence of complementarities between stations and substitutabilities between time slots for said commodity. Substitutability between time slots implies that the demand for any route between two stations in a certain time slot is greater if there are connecting trains in adjacent time slots. Thus we assume the transport demand: (a) is negatively related to the transport price; (b) is negatively related to the journey time; (c) is greater if there are connections between trains (complementarity between stations); (d) is lower if there are other trains on the same route in adjacent time slots; (e) is greater in some time slots (peak) than in others (off-peak time slots).

The proposed network consists of two regions, corresponding to two franchises, MCV (Madrid-Cuenca-Valencia) and MAAI (Madrid-Albacete-Alicante), and two franchises which act as connections, CA (Cuenca-Albacete) and VAI (Valencia-Alicante). There is a two-way route between each pair of adjacent stations. Besides these routes between adjacent stations, in both regions there is an additional franchise: a direct two-way route between Madrid and Valencia and between Valencia and Madrid. This allows a fast train to travel from Madrid and Valencia, which would prevent a local train from running in the same slot from Madrid to Cuenca or from Cuenca to Madrid.

Graph 2. Design of Levante corridor franchises



Source: OPTIRED

The use of a train in different time slots is limited by purely physical restrictions. At any station and in any time slot, a new train can be used (assuming the fixed costs and corresponding variables). A train that has been used in an earlier time slot can be used again (assuming the costs and corresponding variables) if it is available at the station from which it has to depart. To simplify, we will assume that there are five time slots, two of them (1 and 5) regarded as "peak time slots" due to their higher volume of passenger traffic, and the rest (2, 3 and 4) as "off-peak time slots" due to their lower volume of traffic.

In the experiment the subjects play the role of passenger service providers. The demand for these services will be simulated by the programmable software and made known to the experimental subjects. To determine the demand on any route, we take as reference a basic demand that varies between routes but is common to the time slots not regarded as peak slots.

The cost structure comprises some fixed costs –which reflect the amortization cost of the train in question– and some variable costs linked to the activity and which include infrastructure charges. For the sake of simplicity we assume zero marginal costs per additional passenger, i.e. we assume that there are no capacity restrictions. This cost structure will depend on the type of train established that offers the service on a certain route.

On the basis of the costs and demand functions, we use an optimization algorithm to determine the theoretical solutions (scheduling of routes and prices) in each of the following cases: (a) Maximization of Social Welfare, (b) Maximization of Social Welfare subject to the restriction that the operators obtain profits, and (c) Maximization of profit of a network-wide licensed operator. Due to the cost structure chosen, options (a) and (c) are ruled out at a practical level because they lead to non-optimal theoretical situations.

Therefore, we focus on option (b) which analyses the influence of the imposition of service minimums on the schedule established by the operators and the charges levied on the service, through three treatments: (T0) basic treatment in which there is no imposition whatsoever on service provision minimums; (T1) where the operators must comply with a low-requirement minimum; and (T2), whose minimum will entail meeting greater requirements.

Each experimental session consists of 5 rounds, each one having two parts. In the first part (part A) of each round, the franchises in each corridor of the network are allocated through an auction. In the second part (part B) the operators decide which routes to schedule according to the requirements established in the treatment and the fares pledged in part A. The route schedule is programmed by the subject with the assistance of a computer programme that prevents the collision of trains in any schedule of routes and timetables programmed by the subject. In all the rounds the markets are made up of four operators, one for each right of use or franchise available in the experimental network presented.

All the potential operators have identical access to the concession franchises of the corridors. The franchises are allocated through an auction in each round in which the operators bid by proposing fares for each route. The subjects

bid for the franchises in the two regions and the two connections described above. The winners must operate trains according to the concessions gained in the previous part of the round but occasionally (in T1 and T2, although not in T0) must fulfil a service provision minimums requirement in certain routes and time slots. The franchises are auctioned five times (once for each round) during the course of the experiment. Thus, the operators will be able to learn during the session which prices are worth proposing for each connection according to their profits in previous rounds.

Once the franchises have been allocated in part A of the round, they remain fixed during part B of the round. This part B consists of five periods in which the operators schedule their routes according to the minimum requirements of the corresponding experimental treatment (none in T0). Thus, in T1 and T2 the subjects will be able to establish a schedule that exceeds the established minimums, but honouring the prices pledged in the bidding process (part A of the round) for all the routes and time slots.

In each period the operators schedule their trains without knowing the decisions of the other network operators. Once all the schedules of the period have been established, each operator's demand will be simulated by the computer (following the structure of the demand function presented earlier) and this will determine their period earnings. Our experiment is carried out under the condition of imperfect information. The players do not know the form or the size of the market demand function; the only information available to the operators relates to the schedule established by each rival operator and their prices at the end of each period. In light of this information the operators may choose new schedules in the following period. Once this process has finished, a new round will begin in which the network franchises will be put up for auction again.

The number of subjects who participated in each treatment is shown in Table 6.

Table 6. Summary of experimental treatments

Tratamiento	Mínimo	Periodos	Sesiones	Sujetos
T0	NO	25	2	72
T1	SÍ (M1)	25	2	80
T2	SÍ (M2)	25	2	76
				228

Source: OPTIRED

The minimums have been designed to increase social welfare on the basis of the solution of the theoretical model presented, in the event that the network is managed by a single operator.

9.3 Conclusions

The experiment shows the importance of the network effects and that these are diluted in a competition situation. Thus, the empirical evidence obtained shows that the imposition of minimums manages to increase social welfare thanks to the positive effect produced on consumer surplus, but that it is not, contrary to what one might expect, detrimental to the operators who manage the network. The presence of an authority that obliges the operators to schedule trains on routes with low and medium basic demand clearly benefits the passengers who previously were unable to use such trains, but it also generates greater network connectivity, which in turn increases the total number of passengers who make use of the network. This increase in the total demand requires the operators to increase the number of scheduled trains, giving rise to denser traffic that in turn generates greater connectivity which again feeds the final passenger demand on the network. The benefits arising from this process of generating further demand (caused by an increase in network connectivity) far outweigh the losses caused by the obligation to provide the service on routes with lower basic demand.

Thus, the presence of a regulation that ensures a minimum traffic density in the network (especially in areas that are considered unprofitable by operators due to their low demand) is justified not only in terms of demand and the protection of consumers but also in terms of supply, since the operators are not adversely affected (on the contrary, their profits increase moderately) by this measure. In an area of competition such as the one described in this experiment, in which the network falls into the hands of more than one operator after the auction process, the operators offer their schedule wondering what their best strategy is given that of the other operators. This approach on the part of the operators is logical in terms of maximizing individual profits, but it may prove considerably short-sighted from the perspective of a monopolist who manages the network by exploiting all its possibilities. The actions of the regulator prevent these individual profit-maximizing strategies that lead operators to offer a poor schedule, incapable of taking advantage of a properly interconnected network that generates further demand for all the operators and impacts on their profits.

Consequently, the results of this experiment present a strong case for a public regulator whose actions guarantee a critical mass of traffic that allows the operators to take advantage of a dense, interconnected network that benefits not only the consumers but also all the operators who abandon their short-sighted view of their franchise in favour of a broader vision that takes into account all the possibilities of the railway network.

An interesting aspect demonstrated by the experiment is the acquisition of economies of experience on the part of the bidders: it provides them with a better understanding of network management (that is, a better understanding of the profitability offered by each network connection according to its basic demand and the connectivity), thereby reducing the operators' fares. Therefore, the network management learning process encourages competition in the bidding process, significantly reducing the service prices. The results of the experiment show a widespread and significant decrease in the prices generated in the auction as the subjects discover what profit they can obtain by bidding for the franchise in each area. Thus, the operators are increasingly competitive in the bidding process, offering the best price they can.

A result to bear in mind in the geographical design of franchises is that the five proposals may entail an excessive fragmentation. According to the analysis of the stages of competition generated in the auction process, in the majority of cases two or, at most, three operators end up sharing the railway network. In practice there might always be two operators sharing the franchises, a duopoly being the most likely scenario, benefiting even more from the network effect that could arise. Given this potential scenario, such a degree of fragmentation would clearly seem to be inadvisable, bearing in mind that neither the network management learning process nor the imposition of a minimum in the service affects the structure of the competition generated in the auction.

The design of the franchises permits the existence of competition between them, which is reflected in the fact that when the subjects learn how profitable each connection is, in T0 they bid with extremely low prices (close or equal to zero) in the aforementioned connections. The aim of this strategy is to reduce the weighted average price of the Madrid-Cuenca-Valencia area with which they bid, knowing in advance that they are not thinking of scheduling routes on these connections, and choosing to schedule a fast Madrid-Valencia train in any time slot. Conversely, this circumstance will not be possible for T1 or T2. The experience accentuates the collapse in the scheduling of unprofitable routes (Madrid-Cuenca and Cuenca-Valencia) in favour of the more profitable one (Madrid-Valencia) when the operators freely establish their schedule, without any imposition of minimums.

10. SIMULATION OF THE INTRAMODAL AND INTERMODAL EFFECTS ON PASSENGER DEMAND ARISING FROM COMPETITION IN RAILWAY PASSENGER IN THE MADRID-LEVANTE CORRIDOR / *Javier Bustinduy , Margarita Pérez*

A key aspect in the adoption of one competition model or another is, as discussed in Chapter 6, the amount charged for the use of infrastructure and the achievable demand.

As seen above, the achievable market share is a major factor to determine the potential for competition. The modelling carried out so far determined achievable demand in a static manner without considering that intramodal competition via fares and/or frequencies absorbs passengers from other modes in competition with the railway so that the share available to the railway is increased, along with the possible coexistence of more than one operator.

Modelling of intramodal and intermodal competition in different scenarios is therefore of great interest to gain an idea of the share that can be achieved by the railway mode, and by each operator in particular, and its comparison with the current situation. Scenarios previously selected by the OPTIRED Expert Panel have been chosen for modelling.

- Model G: entire network franchise with free entry only permitted when offering additional services not in competition with existing ones;
- Model H: in which the entire network is divided into franchises, lines existing where competitors of the franchisee are allowed and others where they are not
- Model E: a series of lines in free competition exist and the rest are grouped into one or more franchises closed to competition.

The following types of service are considered for railway services: Madrid-Valencia AVE non-stop trains, Madrid-Valencia stopping trains, Madrid-Alicante Alvia, stopping and non-stop trains, and the conventional Iberian gauge.

For the purposes of the modelling carried out in VISUM, scenario H is considered to allow competition in high speed and Alvia services. For the purposes of Model E, the high speed and Alvia are liberalized, and conventional services are franchised.

The specific scenarios modelled at VISUM are:

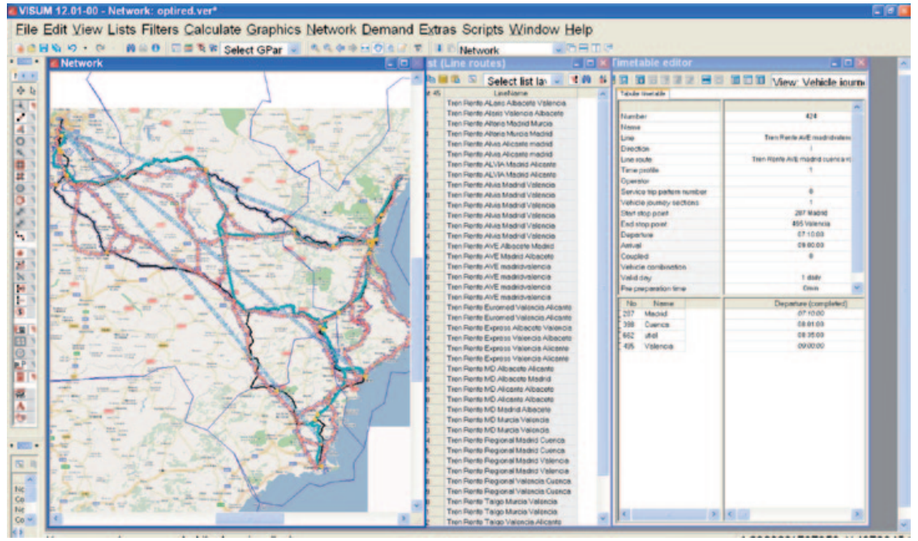
- Scenario G: there is a franchise on the Madrid-Levante (it includes M-V high speed, with stopping and non-stop trains and Madrid-Alicante with stopping and non-stop trains along with the conventional ones. The OSP are the AVE with stopping trains, plus the Alvia with stopping trains and the conventional ones.
- Scenario H: there is a franchise on the Madrid-Levante in which there is free access to provide the Madrid-Valencia and Madrid-Alicante services. The franchisee's OSP are the AVE and Alvia stopping trains along with the conventional ones.
    - Scenario H1: the Franchise is attacked by operator 2 offering Madrid-Alicante Alvia services with stopping and non-stop trains. The number of services to Valencia and Alicante are increased by 20% between both operators. The franchisee maintains the Madrid-Valencia services, whose fares fall between 20% and suppresses its Madrid-Alicante Alvia services, which are now provided by operator 2 with fares 25% lower than current ones while maintaining conventional services and fares.
    - Scenario H2: low cost operator 3 joins the attack by operator 2, with a Madrid-Valencia AVE non-stop service and fares 40% lower than current ones. The franchisee maintains its fares as in H1, 20% lower than current ones.
- Scenario E: Free access to Madrid-Valencia High Speed and Madrid-Alicante Alvia type services. Conventional services are franchised.
    - Scenario E1: The franchise is attacked by operator 2 in the same way as in scenario H1 for the Madrid-Alicante services. Low cost operator 3 increases the number of services, keeping fares 40% lower than current ones. The franchisee maintains the services and fares in scenario H1.
    - Scenario E2: Operator 2 reduces the number of Madrid-Alicante services, maintaining the fares, and low cost operator 3 increases the number of Madrid-Valencia services, keeping fares 40% lower than current ones. The franchisee reduces the number of services by 25%, both AVE and conventional ones, maintaining the fares in scenario E1.
    - Scenario E3: Operator 2 lowers fares an additional 10% while maintaining scenario H1 services. Operator 3 increases the number of Madrid-Valencia services, keeping fares 40% lower than current ones. The franchisee maintains Madrid-Valencia AVE services, reduces the number of conventional services by 25% and lowers Madrid-Valencia high speed fares by an additional 10%.

10.1 Modelling: Analysis of behavioural variability and sensitivity regarding regulatory inputs

For the analysis of behavioural variability and sensitivity regarding regulatory inputs, the different regulatory scenarios selected as feasible by the Consortium have been considered as inputs by the Optired Consortium, described above.

Using the VISUM transport modelling program developed by PTV AG and the University of Karlsruhe, for which BB&J is the licensee, the 428 daily services in public modes were modelled, for rail, air and bus and for the different operators, following classical methodology with its stages of infrastructure network construction in the model, nodes, arcs and connectors to the demand zones, entry of each of the services with their type and characteristics, allocation of origin-destination trip matrices to the different modes in the current situation, model calibration and validation.

FIGURE 3. Infraestructure network modelled



Source: VISUM OPTIRED model constructed. Own data

The characteristics of the main elements in the model constructed are summarized in Table 7.

Table 7. Main characteristics of the model constructed

Nodes	76
Stops	35
Arcs	435
Líneas (both directions)	101
Zones	6
Connectors	32
Allocation	Based on average interval

Source: VISUM OPTIRED model constructed. Own data

It has been considered that gains from private transport and the induced demand increase passenger demand for public modes by 10. The calibration results of the VISUM public transport model for the various public modes modelled in the current 2011 situation, considered as the base year, demonstrate the strength of the model.

Table 8. VISUM OPTIRED model calibration results

Anual trips	Model	reality	% difference
Plane	1,290,794	1,269,044	1.71
Bus	1,345,060	1,352,493	-0.55
Train	3,532,930	3,547,240	-0.40

Source: VISUM OPTIRED model constructed. Own data

10.2 Modelling results obtained

10.2.1 Scenarios considered

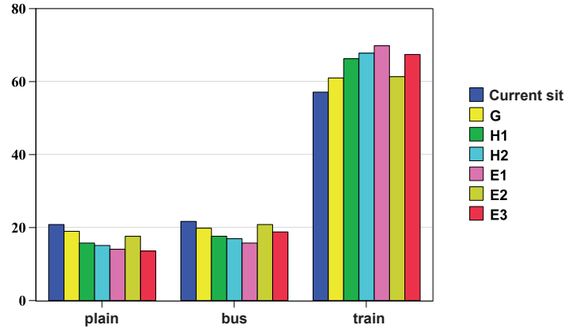
Four scenarios have been defined, known as current situation and franchises G, H and E, two alternatives being established in scenario H and three alternatives in scenario E, according to the number of new operators and assumptions made regarding the number and type of services and fares in each case.

These scenarios, which were described in the introduction, are detailed below in Table 3 in the various aspects of services and fares for each of the operators.

10.2.2 Results obtained: modal split

The modal split for the different public transport modes in the various scenarios modelled were as follows:

Gráfico 4. Modal split in the different scenarios modelled / *Source: VISUM OPTIRED model constructed. Own data*



It can be observed in the different scenarios, from G to E1, that there is a progressive increase in the market share of the railway in comparison to the current situation. Thus, the market share increased from 58% today to 70% in E1, which represents a 12% increase.

The market share increases are lower in scenario E2, when the franchisee reduces its services by 25% on the conventional network and operator 2 makes a lower reduction in fares on Madrid-Alicante services.

The increases are recovered when, although the franchisee reduces its services by 50% on the conventional network, it also lowers fares by an additional 10% on the Madrid-Valencia high speed lines, and operator 2 maintains the substantial reduction in fares by 50%, as in other scenarios on Madrid-Alicante lines in scenario E3.

The conclusion regarding the modal split is clear:

In all scenarios, there is an increase in passengers in the train mode, decreasing in plane and bus modes.

It should be pointed out that in the train mode analysis there is a decrease in conventional train passengers. It is also noteworthy that railway passengers are mostly gained from the plane, rather than bus services, which also experienced a reduction, although less so than the air mode in all scenarios.

Four scenarios have been defined, known as current situation and franchises G, H and E, two alternatives being established in scenario H and three alternatives in scenario E, according to the number of new operators and assumptions made regarding the number and type of services and fares in each case.

These scenarios, which were described in the introduction, are detailed below in Table 3 in the various aspects of services and fares for each of the operators.

10.2.3 Results obtained: scenario analysis

- **Scenario G**: the service is provided by a single operator. The simulated assumption is based on the franchisee maintaining the same services by reducing Madrid-Valencia AVE fares and Madrid-Alicante ALVIA fares by 15% as a result of trying to be competitive in the bidding. In conventional services, the franchisee maintains current services and fares.

  The modelling results show that demand increases on AVE trains on the Madrid-Valencia route by 22%, and also by 19% on the Madrid-Alicante route, while conventional services see current demand reduced by 2%, as can be seen in Figures 3 and 4.

  As for revenue, it increases overall by 3% for the franchisee, which indicates the apparent soundness of the strategy, as the number of services provided remains the same.

  The main conclusion is therefore:

  - In scenario G (sole franchisee), with fares reduced by 15%, and maintaining the number of services, demand for these routes increases (21.05%) and there is an increase in revenue (3.02 %), the same number and type of current services being maintained.

Tabla 9. Services and fares in simulated scenarios /

Escenarios			*Operadores*					
			Entrante 1		Entrante 2		Entrante 3	
			Nº servicios diarios	precio euros	Nº servicios diarios	precio euros	Nº servicios diarios	precio euros
1	Sit. Actual		operador actual, servicios	precio actual				
2	Franquicia G		AVE directo = actual Ave paradas = actual	AVE directo -15% Ave paradas -15%				
			Convencionales mantienen operador, servicios y precio actual	Convencionales mantienen precio actual				
3	Franquicia H	H1	AVE directo M-V 70% * AVE paradas M-V = actual	AVE directo M-V -20% AVE paradas M-V -20%	AVE directo M-A 50% * AVE paradas M-A = actual	AVE directo M-A -25% AVE paradas M-A -25%		
			Convencionales mantienen operador, servicios y precio actual	Convencionales mantienen precio actual				
		H2	AVE directo M-V 70% * AVE paradas M-V = actual	AVE directo M-V -20% AVE paradas M-V -20%	AVE directo M-A 50% * AVE paradas M-A = actual	AVE directo M-A -25% AVE paradas M-A -25%	AVE directo M-V +2 trenes en cada sentido	AVE directo M-V -40%
			Convencionales mantienen operador, servicios y precio actual	Convencionales mantienen precio actual				
4	Mixto E	E1	AVE directo M-V 70% * AVE paradas M-V = actual convencional = actual	AVE directo M-V -20% AVE paradas M-V -10% adicional convencional = actual	AVE directo M-A 50% * AVE paradas M-A = actual	AVE directo M-A -25% AVE paradas M-A -10% adicional	AVE directo M-V +4 trenes en cada sentido	AVE directo M-V -40%
		E2	AVE directo M-V -25% adicional AVE paradas M-V -25% adicional convencional -25%	AVE directo M-V = E1 AVE paradas M-V = E1 convencional = actual	AVE directo M-A -25% adicional AVE paradas M-A -25% adicional	AVE directo M-A = E1 AVE paradas M-A = E1	AVE directo M-V +4 trenes en cada sentido	AVE directo M-V -40%
		E3	AVE directo M-V 70% * AVE paradas M-V = actual convencional -25% adicional	AVE directo M-V -10% adicional AVE paradas M-V -10% adicional convencional = actual	AVE directo M-A 50% * AVE paradas M-A = actual	AVE directo M-A -10% adicional AVE paradas M-A -10% adicional	AVE directo M-V +4 trenes en cada sentido	AVE directo M-V -40%

AVE directos | AVE paradas | convencional

** AVE Madrid-Alicante es vía AV hasta Albacete, desde Albacete vía convencional, se acordó mantenerlo así en los distintos escenarios con mismos tiempos y tren tipo ALVIA como en sit actual en la reunión de 17 abril 2012

* +20% servicios entre 2 operadores

- **Scenario H1**. A new operator (Operator 2) attacks the franchisee, providing services on the Madrid-Alicante ALVIA route. Between the two operators, services are increased by 20% on the Madrid-Levante, AVE and Madrid-Alicante Alvia services. Operator 2 provides 50% of new additional services between Madrid and Alicante with non-stop trains, maintains existing services with stopping trains and lowers fares by 25%. The franchisee increases direct Madrid-Valencia services by 10%, and lowers fares by 20%, both to continue to maintain the Madrid-Valencia, as it does actually achieve, against other operators, and to try to compete on the Madrid-Alicante with the new operator, as it has much better frequencies to Valencia, which together with a conventional Valencia-Alicante train may make it competitive. In conventional services, the franchisee maintains current services and fares.

  The modelling results show that aggregate demand increases by 35%, similar on both routes, while conventional services see their current demand reduced by an additional 3% (5% in relation to the current situation), as can be seen in figures 3 and 4.

  Incoming operator 2 captures 26% of the total demand for railway passengers, while the franchisee loses 21% of demand in high speed services and 5% on the conventional network, when compared to the current situation.

  As for revenue, it increases overall by 6.13%, 25% of which corresponds to operator 2 and 75% is kept by the franchisee. The increase in revenue is higher than that for services performed, so it is also a satisfactory overall strategy. The franchisee operator sees its demand reduced by 23%, and its revenue by 25% but it also reduces its services by 30%. Operator 2, with a range of services that is 40% of the total for high speed trains, obtains 26% of passengers and 25% of revenue. Thus, for operator 2, the strategy is favourable only if it is able to make cost savings per train of 15% relative to the franchisee.

  This strategy provides an increased market share for the railway as a whole of 66%, 5% higher than that obtained in scenario G, and 9 points higher than the current situation.

  The main conclusion is therefore:

  - In scenario H1, the combination of the two operators increases passengers on these routes (35.45%) and revenue with respect to the original situation (6.13%).
  - However, the split between the two is not symmetrical. For the franchisee, the percentage reduction in demand and revenue is less than that for the reduction of services. For operator 2, the increase in demand and revenue is less than the increase in services, so it must be able to make cost savings per train of 15% to obtain the same profit.

- **Scenario H2:** a third low cost type operator appears on the Madrid-Valencia route with 4 direct trains, the franchisee and operator 2 maintaining the services and fares they had on this route in Scenario H1. Operator 3 offers fares for new trains with a reduction of 40%. In conventional services, the franchisee maintains current services and fares

  The modelling results show that aggregate demand increases by 39%, mostly on the Madrid-Valencia services in which a third operator appears, conventional services maintaining the demand level in scenario H1 (5% in relation to the current situation), as can be seen in Graphs 3 and 4.

  Operator 2, centred on the Madrid-Alicante lines, maintains its demand and revenue in relation to scenario H1, without being affected by the increase in services on the common section with the Madrid-Valencia corridor.

  Demand and revenue obtained by low cost operator 3 largely correspond (7%) to the loss of demand and revenue suffered by the franchisee operator. The franchisee operator loses an additional 7% of its demand and revenue in relation to scenario H1, while maintaining the same number of services. Regarding the current situation, the franchisee has lost 32% of its demand and revenue, reducing its services by 30%.

  The low cost operator is now operating 12% of the Madrid-Valencia services, while its demand and revenue account for 7%, so its strategy can only be beneficial if it is able to achieve cost savings per train of around 5% in relation to the franchisee operator.

  The main conclusion is therefore:

  - There is an increase in demand of 39.52% and an increase in overall revenue of 7.16%. Once again, although to a lesser extent, the same conclusion from scenario H1 applies to the new low cost operator 3: for operator 3 the increase in demand and revenue is lower than the increase in services, so it must be able to make cost savings per train of around 15% to obtain the same profit.

- **Scenario E1.** The franchisee and operator 2 maintain the same services as in scenarios H1 and H2. Operator 3 doubles its supply of daily trains, maintaining the fare in scenario H2. The franchisee and Operator 2 lower the fares of its stopping trains by an additional 10% in scenario H2. In conventional services, the franchisee maintains the services and fares. The modelling results shows that aggregate demand increases by 46%, mostly on the Madrid-Valencia services where the third operator has appeared, demand for conventional services being very slightly reduced with respect to the demand level in scenario H1 (6% compared to the current situation), as can be seen in figures 3 and 4.

  Low cost operator 3, doubling the service in relation to scenario H2, almost doubles its demand (+97%), revenue (+97%) and market share (going from 7% to 14%), this being increased by 7%, which largely corresponds with the balance of the loss of demand (-7.7%) and revenue by the franchisee operator (-10%) and operator 2, which while its increases its demand by 3%, reduces revenue by 4%, increasing its market share slightly (1%). The franchisee operator does therefore lose an additional 10% of its revenue in relation to scenario H2, while maintaining the same number of services. Regarding the current situation, the franchisee has lost 34% of its demand and revenue, reducing its services by 30%.

  As general conclusions:

  - There is an increase in demand of 45.65% and an increase in revenue of 5.77% in relation to the current situation.
  - The benefit is primarily for low cost operator 3, which doubles service, demand and revenue (increased share of 7%, primarily at the expense of the franchisee and, to a much lesser extent, operator 2, which increases demand but loses revenue.

- **Scenario E2:** the franchisee operator decreases Scenario E1 services by 25%, both in high speed and conventional services, maintaining the fares of all of them. Operator 2 decreases Scenario E1 services by 25%. Operator 3 makes no changes. They all have the same fare levels as in scenario E1.

  The modelling results show that aggregate demand increases by 26% relative to the current situation (significantly lower than in previous scenarios) with 4% reductions in the share of the franchisee, and 1% for operator 2, to the benefit of low cost operator 3, which increases its share by 4%, while maintaining services and fares, as can be seen in Figures 3 and 4.

  In terms of revenue, there is an overall reduction of 9%. Regarding scenario E1, the franchisee operator loses 19% of revenue and operator 2 loses 16%, while operator 3 increases it by 14%. 25% reductions in franchisee and operator 2 services involve revenue losses for them, although less than proportional, to the benefit of operator 3, which significantly increases revenue without having modified its offer, either services or fares.

  The general conclusions are:

  - There is an increase in demand of 26.52% in relation to the current situation, much lower than those achieved in previous scenarios. In relation to scenario E1, 14% of demand is lost. The overall growth of the train is less as the demand for franchisee operator trains decreases (conventional and high speed) due to a 25% reduction of services.
  - Overall revenue is decreased by 15% compared with scenario E1, being even lower than in the current situation.
  - Low cost operator 3, without modifying its supply or fares, substantially increases its revenue as a result of declining demand and revenue for the franchisee and operator 2, although at percentages below the reduction in services.

- **Scenario E3**: the franchisee operator and Operator 2 maintain Scenario E1 services, except in the conventional ones, where the franchisee decreases by an additional 25% with respect to Scenario E2. These two operators lower the fares of their high speed services by an additional 10% with respect to Scenario E2, maintaining the fares of conventional services. Operator 3 remains the same as in Scenario E2, with the same services and fares.

  The modelling results show that aggregate demand increases by 51%, relative to the current situation (notably higher than in previous scenarios), with share increases of 4% for the franchisee, and 1% for operator 2, to the detriment of the low cost operator 3, which reduces its share by 4%, maintaining services and fares, as can be seen in Figures 3 and 4.

  Regarding scenario E2, the franchisee increases its demand by 32%, and operator 2 also increases it by 25%, while low cost operator 3 reduces it by 18% as a result of increased competition from the franchisee, which has increased services and reduced fares.

In terms of revenue, there is a small overall fare increase of less than 1% compared with the current situation. Regarding scenario E2, the franchisee operator increases revenue by 19% and operator 2 increases it by 13%, while operator 3 loses 18% of its revenue. The return to the service levels in scenario E1 for the franchisee and operator 2, for high speed trains, will result in increases in revenue, although they fail to recover those they had in the former, having reduced fares and also having reduced conventional services. Low cost operator 3, who has still not changed its supply or fares, sees their revenue reduced significantly (-18%), the competition suffering from increased services and lower franchisee fares, without achieving the revenue in scenario E1.

The general conclusions are:

- There is an increase in demand of 51.57% and a small increase in revenue compared with the current situation (0.72%).
- Franchisee operator demand fails to reach the E1 scenario level, despite having the same services and lower fares due to the reduction of conventional services.
- Operator 2 does manage to meet and exceed the E1 scenario level in demand, but not in revenue, having lowered the fares.
- Low cost operator 3, which has not changed either services or fares, sees their demand and revenue reduced by 18% as a result of increased services and lower fares of the competition, without reaching scenario E1 levels in any of them (0.72%).

10.2.4 Important points to note regarding modelling results

The demand and revenue results obtained in the different scenarios, both overall and for different operators, correspond to the modelling process described.

This is based on the knowledge by the passenger of the various components in the services and fares offered and does not consider extremely important aspects of this, such as information and marketing activities, special offers, etc.

Both in general and most especially when there is competition between different operators, customers do not have the same information or knowledge about all services and fares, so that an active marketing campaign can substantially modify the results shown in modelling, which does not take these aspects into account.

Moreover, the assumptions made regarding the strategies of each of the operators, and particularly with regard to combinations of these in different scenarios, only represent isolated cases that have been selected by the Committee of Experts to illustrate the effects that occur. Obviously, very different strategies are possible and, in particular, combinations of these with different increases or reductions of services and fares, which would show different results.

Hence the great value of having developed the model, a tool that can simulate any strategy, and obtain the corresponding results in line with those presented at OPTIRED.

Figure 5. % variation in demand and revenue / *Source: VISUM OPTIRED model constructed. Own data*

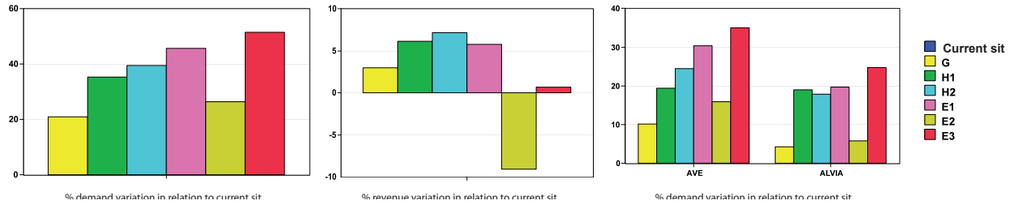
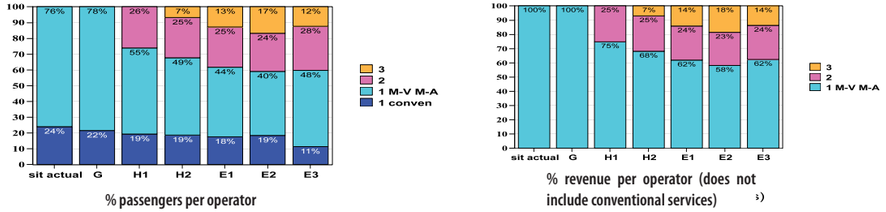


Figure 6. Distribution of revenue per operator / *Source: VISUM OPTIRED model constructed. Own data*



10.2.5 Resultados obtenidos: Relaciones individualizadas

LThe modelling also allows individual results for each route in the different scenarios. Shown as an example are the charts corresponding to the Madrid-Valencia relationship in each of the scenarios, which show the results in demand and revenue on the route, in terms of services and pricing policies applied in each scenario.

In conclusion, on the Madrid-Valencia route with increased services and lower fares in all scenarios, **there is an increase in train mode passengers in all cases, with levels reaching 50%, and an overall increase in income, except in scenario E2, where service reductions were proposed while maintaining the fare level.**

These results confirm those obtained overall for the train mode, and show the increased railway demand in all competition scenarios considered.

Figure 7. Madrid-Valencia AVE route in the different scenarios / *Source: VISUM OPTIRED model constructed. Own data*

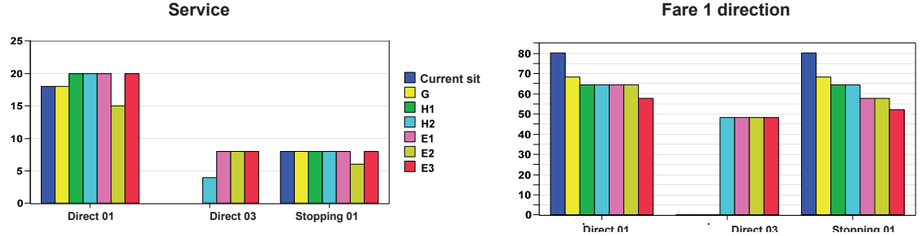
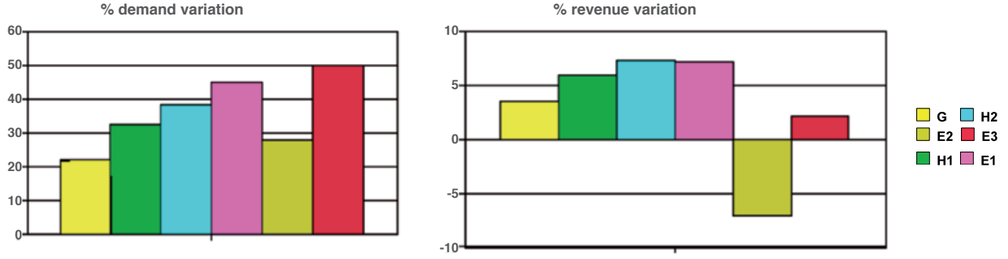


Gráfico 8. Madrid-Valencia AVE route in the different scenarios / *Source: VISUM OPTIRED model constructed. Own data*



10.3 Conclusions

Analysis of the various scenarios modelled leads to the following general conclusions:

The main conclusion to be drawn is that the introduction of competition has positive effects in increasing the market share of the railway mode in all the scenarios analyzed, with increases in railway market demand between 20% and 50% in relation to the current situation.

These increases in demand also result in overall increases in income in all scenarios analyzed, with the exception of scenario E2, in which the reduction of services was analyzed while maintaining the fare level.

The demand and revenue distribution among different operators is a result of both their services and pricing policy and that adopted by the competition, showing mixed results, both positive and negative, in the scenarios analyzed.

The increase or decrease in revenue of a given operator in a scenario should be related to the increase or decrease in costs involved in producing the service in question. Reducing costs relative to those in the current situation, or those of another operator, may make a policy in which revenue growth is less than the increase in services considered of interest to an operator.

11. INTERACTIONS OF THE OPENING TO COMPETITION IN THE OPERATION OF INTERCITY RAILWAY PASSENGER SERVICES ON THE INTERMODAL TRANSPORT SYSTEM

/ Alberto Cillero, Carlos Huesa

11.1 Introduction

The inclusion of this Task in the project was justified by the need to analyze the great problems that will occur in the gradual opening to competition of railway passenger services and their intermodal effects on the existing transport system. In Spain, unlike other countries where less modes coincide, there is high competition resulting from the overlapping of the railway with a regular public transport services network for road passengers, as well as air transport services on the major intercity routes nationally (some of them even operated by low cost operators).

- It was considered necessary to develop a series of tools to quantify aspects related to the decision of the railway competition opening model, from an intermodal perspective. The multimodal approach applied by the Project in this stage, considers the following modes:
- Railway passenger transport services, whether or not they are considered of public interest.
- Public road passenger transport services of general permanent use. Excluding management regular transport services with special, discretionary use, as they are not exposed to direct competition with the train.
- Regular domestic air transport services. Excluding other types of traffic such as charter services.

Task work has been restricted to the field of intercity middle and long distance passenger services, not considering other forms of urban or metropolitan type mobility that respond to regulatory and transport planning models in which more progress has been made in intermodal coordination (transport authority consortiums).

11.2 Tools for analysing the intermodal impacts of opening to competition

11.2.1 Characterization of supply and modelling of competitive pressure between transport modes

A tool was developed to analyze the competitive positioning and pressure of each mode in the intercity transport system, and the overlaps, considering the supply of train, regular bus and domestic airline services in Spain.

Methodology

A matrix was developed that interconnects the 47 mainland provincial capitals, thus characterizing a total of 1,081 origin-destination routes, resulting in a database with supply information (updated to second half of 2012), and considering three modes .

The sample for this analysis is vast, and clearly representative of national intercity mobility. For each origin-destination route considered, the existing transport supply has been characterized in detail. This multimodal transport database includes the following fields (for each route):

- Railway transport offer. For each of the possible products served by the train on each route (broken down into specific categories for “Ave”, “Avant”, “High Performance Day”, “Conventional Day”, “Middle Distance”, “Commuter”, “Night-time Tren Hotel” and “Night-time Estrella”), the following supply variables were identified: travel time, basic fare and frequency (day-type in each direction).
- Regular bus transport supply. Similarly, for each of the possible types of services available on each route (“Basic Bus Services”, “Class 1 Bus Services”, “Class 2 Bus Service” and “Class 3 Bus Service”), these three supply variables were identified, with the same reference criteria.
- Domestic air transport offer. In the case of aviation, the supply was differentiated for each operating company, with the same criteria in the identification of the supply.
- Data characterizing each O-D locality: population and distance.

Results

This database has provided a clear representation of the level of

competition and modal substitution possibilities currently existing in national internal mobility for each origin-destination route. General comparisons can also be made of the cost associated with the supply of each mode on each route, considering unit value assumptions regarding travel time and time-cycle by internalizing frequency.

11.2.2 Definition of the reference market and specification of relevant markets with an intermodal range

Need and use provided

The problem of defining the reference market and specifying the relevant markets was analyzed, these being fundamental aspects in the decisions of the competition authorities, with an intermodal scope (substitutable services in mode choice) rather than focusing solely on the railway.

Methodology

In this research task, the study focused on the conceptual framework to be considered in defining the relevant market in the provision of transport services, from a geographical ("point to point" traffic flows or "network" flows), and product viewpoint. Valid conclusions have been drawn which may be helpful to further analysis to be conducted by the national regulatory authorities, relating to the specification of reference markets in traffic corridors exposed to intermodal competition.

Reference legislation in the European Union (Communication 97/C 372/03 and Regulation 139/2004) and nationally (Law 15/2007 on Protection of Competition) was analysed. Methodologies used for analysis were reviewed, identifying the particular features to take into account when considering the specific problem of transport services. This involved collecting recent quantitative evidence regarding the evolution of demand and (own and cross) elasticities on corridors exposed to intermodal competition We have in particular studied - for possible future application in Spain - the methodologies used in the UK (Competition Commission) for the definition of the relevant market in the analysis of concentration records in the land passenger transport sector in corridors where bus and railway services are provided by the same company.

There was also an empirical check of the evolution of demand flows for the Spanish market, considering a representative sample of origin-destination routes where there have been recent changes in the supply of transport services as a result of the opening of high speed lines or the emergence of low-cost airline operators. This analysis was performed for the following routes: Madrid-Zaragoza, Madrid-Barcelona, Barcelona-Zaragoza, Madrid-Valladolid, Madrid- Asturias and Barcelona-Lleida. For these six routes, available historical data series about demand for competing transport operators (train, bus, plane) has made it possible to demonstrate the existence of very contestable markets from an intermodal perspective.

Results

With a view to the specification of reference markets with a multimodal scope, analysis of precedents shows that the level of substitution between transport modes is a key issue for the analysis of market definition. In a significant number of cases analyzed, regulators have considered railway transport services to be substitute goods that are sufficiently close to bus transport (and even private vehicles).

Empirical studies reviewed, and actual market evidence analyzed, show demand elasticity levels for transport services to be generally above the fare elasticity levels traditionally considered in scientific literature.

11.2.3 Empirical study of intermodal train-plane competition in Spain

Need and use provided

The above analysis confirms the existence of a major level of intermodal substitution in Spain. It was considered important to conduct a specific analysis of the forms of competition between air transport and the railway, given that aviation has so far been the mode that has advanced most in direct competition in the market, especially with high speed rail.

A study was carried out into the effect of the number of competitors, the presence of low cost airline operators and the high speed rail offer on air transport prices in Spain.

This is part of the feasibility analysis in the railway system of the various competition models (by market, in the market). Strong intermodal transport competition limits the volume of passengers who could potentially obtain a new railway operator (traditional or low cost) and thus inhibit its entry. Thus, this analysis requires knowledge of actual competition possibilities in the competition in the market model, depending on the number of operators on each route, what (compared to the route size and minimum efficient size of the operator) determines whether actual competition is possible in the market and, where appropriate, on what routes.

Moreover, as the plane is a strong competitor of the railway, this research has analyzed how that competition currently works and its results in the form of market share distribution, as well as the effect on routes where low cost airline operators exist.

Methodology

This study analyzes the regular air transport supply in Spain (operators, frequencies, prices) on major mainland routes (and some international routes in clear competition with the train), with a triple objective:

- To quantify this demand and the supply serving it, in order to identify the railway's potential of attracting passengers, both conventional and, especially, high speed.
- Characterize the supply (on the most important routes) from the point of view of the competition, notably in frequency and number of companies or alliances operating on each route.
- Analyze plane and high speed train fares by routes, companies and period before purchase in order to check the impact that fares have on factors such as number of operators (or alliances), distance and travel time on the route, railway competition with the plane, the effect of the existence of low-cost air operators, the number of frequencies, etc.

The analysis was performed on:

- The main domestic mainland routes.
- Some international routes where it is possible to imagine a future railway supply of some quality and with a relatively attractive travel time, such as Madrid and Barcelona to Lisbon and Oporto, Madrid and Barcelona to Paris and Lyon.

Data obtained from shares observed in Spain for the train and plane made it possible to identify those routes where the market share of the train is "abnormally" high or low; either compared with what would be expected from observations of all the routes ("fitting curve"), or compared with expected participation according to the "three hour curve".

Results

Among other conclusions, it was shown that in corridors in which high speed rail and aviation coexists, there is a relationship between the market share of the railway and its travel time: the so-called "three hour curve" This curve shows data from actual cases, since when the train has a travel time of less than two hours it always obtains market shares above 85%, and if it has a travel time of more than three hours, the shares are below 50%.

Data obtained from shares observed in Spain for the train and plane make it possible to identify those routes where the market share of the train is "abnormally" high or low; either compared with what would be expected from observations of all the routes ("fitting curve"), or compared with expected participation according to the "three hour curve".

11.2.4 Quantifying the volume of demand for public transport in a corridor by considering the intermodal supply

Need and use provided

As part of the activities in this Task, modelling was undertaken aimed at discovering the explanatory variables that characterize the formation of overall demand on a given transport route. Therefore, it was necessary to check the extent to which these supply variables were contributing, not just to characterization of actual demand and competitive modes, but how they actually contribute to the formation of overall demand in the corridor. In short, to understand what influence the supply characterization variables have, in every mode, in the formation of total demand in a corridor, compared to the significance of other social, economic and demographic variables, which are those traditionally considered in the classical demand generation models due to transport economics.

Another starting premise was to consider the "origin-destination route" level as a minimum unit in explaining demand. It was not intended to characterize or explain the demand for a corridor, but to find out,

at source-destination route level, what the actual weight of supply variables is and the actual weight of the other environment variables mentioned. This premise is particularly relevant for the purposes pursued by the OPTIRED Project: the explanatory model generated in this phase provides the decision-maker with a methodology tool, and initial analysis, to determine the overall size of the market that a given source-destination route has (or may have), depending on the supply attributes that define each mode, and the environmental characteristics of each town (and other variables such as travel distance /time).

Methodology

A model was developed to explain the factors that influence the total number of passengers using the bus, train and plane on 17 mainland routes with similar characteristics between one other, in order to compare and calibrate the impact of each of the factors in demand generation. The variable to be explained is the total demand for public transport on each source-destination route, considering actual traffic data for the three modes for a period between 2006 and 2011.

The explanatory variables considered in the analysis that provided the greatest weight of possible representation are: 1) "Potential demand" characterized in terms of "Population" (number of inhabitants of the O-D towns), "Tourism" (number of overnight stays in O-D autonomous communities, number of second homes), "Economic activity" (number of companies in the destination provinces). 2) "Income": Characterized in terms of "per capita GDP" in O-D towns. 3) " Events generating special mobility." Outlining with this variable the existence of major mobility generating events. 4) "Transport fares", variable taken from direct observations of average fares of transport operators.

Results

The proposed model has achieved a good overall fit (for all routes analyzed). Despite the significant differentiation in the variables characterizing the routes (in terms of supply and socio-economic context), overall demand appears to respond to a common causal pattern sufficiently well explained by the variables indicated.

This shows the great impact that reduced travel time has on demand generation, followed by socioeconomic variables of Population in main towns and GDP per capita.

11.2.5 Quantification of the modal share of the railway in terms of supply variables.

Need and use provided

It was considered necessary to have a specific model that would characterize the relative market shares achieved by each mode of transport on national intercity routes overall, and to specifically explain the share achieved by the railway. The above model makes it possible to approach and explain the formation of aggregate demand (total passenger volume) depending on supply variables for each mode and the overall environment of the O-D towns. It involved characterizing the modal split and also estimating the potential market share achievable by the railway in a new supply scenario derived from opening up to competition.

Methodology

The methodology for this study started from developing a travel matrix according to transport modes (bus, rail, bus, plane, private car) among all the Spanish provinces in the different autonomous communities. Distance matrices travel times and generalized costs for each transport mode were subsequently generated, among all the provinces.

A Logit type modal split model was calibrated for 30 routes with known railway traffic, based on parameters such as supply, travel time or fare. The calibrated model was checked for AVE routes after 2007 (Madrid-Barcelona, Madrid-Valencia, etc), estimating the induction of new passengers due to the entry into service of AVE lines.

Results

The model has made it possible to estimate the induction of passengers generated by a newly introduced high performance railway service, based on the reduction generated in railway travel time, corroborating the importance of reducing travel time in generating demand in a corridor, already pointed out in the aforementioned model.

The model also offers some functions allowing us to estimate the achievable market share for each mode, depending on different supply variables, including distance (travel time).

11.2.6 Model explaining the formation of trends and treatment of seasonality at origin-destination traffic level.

Need and use provided

The two models above have been used to characterize, firstly, the formation of overall travel demand at origin-destination route level (and to see the actual weight that supply variables have in each mode in the formation of the total); and, secondly, to have a methodology to characterize the market shares achieved by each mode and, especially, to see the potential of the railway to increase its share by improving its supply variables.

In this next research phase, modelling, the aim was to address a problem not studied to date on the impact of seasonality on demand formation at origin-destination route level, and the added impact (in demand formation) from the effect of the accompanying trend due to the passage of time.

This modelling is important when characterizing demand and analyzing the actual replacement threshold between coinciding transport modes. The same level of annual demand can be achieved through very different "seasonal forms": demand that is heavily concentrated in holiday periods or average days within the year (such as weekends) is indicative of predominantly family or leisure style travel profiles.

Methodology

A methodology and modelling was developed explaining the formation of trends and treatment of seasonality (seasons and average days) at origin-destination route level, validated for different modes.

To this end, an econometric model was calibrated with historical series of actual bus and train mobility data for the same route (Madrid - Alicante) in the 2008-2012 period. The model demonstrated the causal effect of different effects linked to the seasonal and trend cycle on the annual demand of an operator on a given source-destination route.

This methodology made it possible to model bus/train passenger travel behaviour using:

1. Explanatory variables. Collecting in the model any boosting or detracting effects that influence the decision of a possible passenger to decide to take the bus/train or otherwise.
2. Underlying dynamic or time component after obtaining the passenger boosting or detracting effects. Time dynamics include:
   - The trend dynamics in any decision to travel.
   - The dynamics of model error, correlated to previous errors with some regularity and with decreasing importance over time.
3. Entering the knowledge obtained by customers and common sense as they repeat journeys.
4. Joint estimation of the effects mentioned in a single model. The dynamic part, explanatory variables and prior knowledge or knowledge acquired by the consumer in making decisions about the travel service.

Results

The model has made it possible to clearly clarify and quantify the partial impact of each of the effects considered in the formation of the demand series.

The explanatory variables considered are of two types:

- Linear explanatory component. Inputs that are expressed in a linear fashion. Summer seasons, Christmas, Easter, national holidays, local holidays, etc, entered using dummy variables.
- Nonlinear explanatory variables. These operate on fare inputs, and their form is nonlinear. Nonlinearity implies that the effect of a fare change at any given time has present and future effects on the decision about whether to travel by bus/train.

11.2.7 Computer application developed for the calculation of optimized routings for railway services, with a multi-criteria approach focusing on operating costs, energy consumption and emissions, and associated calculation of economic and social profitability.

Need and use provided

A mathematical model was developed, leading to software that allows us to know the effects of railway service operations on economic and social costs when faced with the different rolling stock options, routes, frequencies, operating costs. It is thus possible to gain an idea, considering demand studies previously made, of the economic and

social benefit of operating a service or a series of railway services and their associated outputs, also allowing the application to estimate different network routing options and approaches.

This is a crucial application in the OPTIRED project, also pioneering in Spain, since it allows for comparative analysis of different railway routes and journeys, providing multi-criteria data about economic and environmental costs.

Methodology

RutasOptiRed is a programme for simulating travel times and searching for shortest paths on railway networks. The package not only calculates times, but also energy costs and expenses (diesel and/or kWh) and CO2 emissions. It is independent of the network topology and rolling stock characteristics and is being tested with the current ADIF network and Renfe Operadora rolling stock.

The package takes into account:

- The details of the infrastructure: track gauge, gauge changers in existence (and type of changer), electrification system (if any), signal type, average and maximum speeds on sections.
- Rolling stock characteristics: possible track gauges, compatibility with electrification types (if applicable), compatibility with signalling systems, maximum and average speed (maximum allowable centrifugal acceleration), acceleration and deceleration, time taken passing through changer (if applicable).

The package has a simple graphical interface. Once the files are loaded with the required information about infrastructure, stations and rolling stock, you choose the type of train (or ask for the best possible train) for an origin and a destination and stopping at (or passing through) a number of stations desired. The programme is able to immediately calculate the days for the case chosen (as well as costs, energy consumption and CO2 emissions.

In its mathematical development, to find the best train for a given route and for an origin and a destination, simply: 1. translate the network into a graph with a list of characteristics associated with each edge of the graph, 2. for each type of train, prune the graph according to its characteristics. 3. for each type of train, find the shortest path on the pruned graph for the chosen route (shortest path from the point of view of time) 4. Find the best kind of train for that route, comparing the best times for each type of train. (Compatibility of track gauge, traction system and signalling system of the infrastructure and trains for the route chosen is ensured by the use of pruned graphs). For step 3 a general algorithm is used to obtain the shortest path (such as Dijkstra or Floyd). It is however necessary to make a slight alteration to the algorithm chosen (in our case Dijkstra) to account for delays in passing through changers and due to direction changes.

The concatenation of shortest paths may not result in the shortest path (being impossible to do so) when there are, as on the ADIF network, dual gauge sections (with 3 rails) without changers at their ends. This entails a larger adaptation of the Dijsktra algorithm.

Results

Software application developed, with network and fleet data loading.

11.3 Conclusions

The conclusions reached by the research consortium at this stage of the project are:

1. **From an empirical point of view there has been a significant level of substitution between different modes of intercity public transport**. Competitive rivalry is more intense than what one might think a priori from estimates of the theoretical elasticities found in the scientific literature. It can be concluded that, overall, the evidence shows that substitution between the analyzed modes (railway vs. bus vs. aviation) is strong enough and should be considered in the market definition, although the specific conditions may vary depending on the origin-destination route in question.
2. **There is at present a clear overlap between public transport networks and services**. Especially among the middle and long distance intercity railway (commercial and public interest services) and public transport concessions for bus passengers. High incidence of low-cost airline operators, which affect both the train and the bus.
3. **The reality is that there are high levels of cross-elasticity of demand to changes in supply variables between different modes**. Higher than the estimated theoretical values in scientific literature, especially when compared to the elasticity values of each mode. Other functional non-price variables have a significant influence, such as frequency or travel time, and other non-functional variables (less widely studied) such as comfort, perception of safety, accessibility, etc.
4. **Importance of operating conditions other than price in consumer choice and actual substitutability between transport modes**, as well as the limitations of contrasts exclusively linked to elasticity - price, as a valid framework for defining relevant markets in passenger transport.
5. While traditionally the railway and road sectors could offer greater intermodal contestability, changes in supply and pricing policies of airlines in recent years **point to positioning all public transport modes** as part of the same relevant market.
6. **The "travel time / distance" variable is crucial to characterize the size of the mobility market at origin-destination route level**, and most especially for determining expected market share thresholds.
7. Development of the opening to competition of the railway will coincide in time (2013-2017) with the renewal process of a very important part of the concessions for public road transport passenger services nationwide.
8. **Regulatory developments in the transport system should take into account the factors modelled in this phase**:
   - Actual mobility potential in public transport offered by national domestic routes. Knowing the overall size of the passenger market (current and achievable). Depending on the weight that transport supply variables actually have in generating demand, as against socioeconomic variables (less manageable). Research has succeeded in determining travel generation patterns in which the movement of these two variables is clearly determined. It shows the great impact that reduced travel time has on demand generation, followed by socioeconomic variables like Population and GDP per capita.
   - Causal factors of modal split. Although they are different for each origin-destination path, research has shown that it is possible to estimate sensitivity values in the modal split model, with generalized validity at network level with respect to variables such as: commercial speed achieved by each mode, fares (own and competitors) or average daily supply.
   - Specific competitive rivalry between the railway and aviation. In corridors in which high speed rail and aviation coexist, we have seen the existence of a relationship between the market share of the railway and its travel time: the so-called "three hour curve" showing, from actual case data, how when the train has a travel time of less than two hours it always obtain market shares above 85%, and if it has a travel time of more than three hours, the shares are below 50%.
   - Impact of seasonality in traffic (daily, weekly, seasonally), and effect of trends in demand formation. This is a key variable in understanding the mobility and average customer profiles underlying quantitative data. Research has succeeded in developing a method of analysis that, based on historical series for different modes, enables us to determine the partial impact of factors related to the seasonal cycle, trends and relative fares.
   - Characterization of the level of competition and modal substitution at origin-destination route level. Research has determined a representative model of current competition routes between modes of transport, in terms of types of services dealt with and competitive rivalry in supply variables. General cost comparisons can also be made associated with the supply of "each mode" on "every route" considering assumptions of unit values of travel time and time-cycle (internalizing the frequency).
9. Adaptation of the market for providing services subject to Public Service Obligations through contracts.
10. With proper regulation, the operation of different modes on the same geographical corridor by single operators is perfectly compatible

12 BARRIERS TO ENTRY / *Rodolfo Ramos*

12.1 Introduction

Although in specialized economic literature there are various ways to classify the barriers to entry, in this chapter we have taken a practical approach through questions included in the LIB index questionnaires (2011), and the score of the situation in Spain in 2010, which must be tempered by the recent advances made in our regulatory framework. The entry barriers are classified into two groups: legal and access barriers. Table 10 provides an overview of the barriers to entry.

Table 10. Classification of barriers to entry / *Source: OPTIRED*

BARRERAS LEGALES
•L.1. Estrucutura organizativa del sector.
•L.2. Posibilidad legal de entrada.
•L.3. Competencias de los reguladores.
BARRERAS DE ACCESO
•*A.1. Informátivas.*
•Tiempo requerido para obtener información para el acceso.
•Calidad de la información impersonal.
•Calidad de la información personal.
•*A.2. Administrativas.*
•Licencia.
•Certificado de seguridad.
•Homologación.
•*A.3. Operativas.*
•Petición de surcos.
•Marco de tarificación.
•Servicios de infraestructuras no básicas.

12.2 Legal barriers

12.2.1 A1: Organization of the historical company

A positive highlight is the institutional separation of infrastructure and operation. Adif offers a lot of services to railway undertakings. But these threats have been detected:

- The infrastructure manager and the main operator are only formally independent (but not de facto) of the leading railway undertaking.
- It should be noted that there is no institutional separation between passenger and freight services in the established operator. However, RD Law 22/2012 of July 20, on adopting measures in infrastructure and railway services, does consider it.
- According to RD Law 22/2012 part of business services (workshops) and rolling stock are provided by Renfe so that interests could be divided.

12.2.2 A2. Legal possibility of entry

The legal possibility of domestic market entry is provided by the Railway Sector Law but was delayed until EU legislation compelled the opening up. This situation changed with the RDL 22/2012. So the situation until its entry into force on August 1, 2012 shows a closed market in which:

- The market accessible to a railway operator in Spain is small, below the EU average, because the domestic passenger market is closed. However RDL 22/2012 opened the Spanish domestic market up to competition on August 1 2013.
- Spain also has the lowest score in applying Regulation 1370/2007: the main cause is the failure to allocate contracts for the provision of passenger services of public interest by not offering competitively tendered concessions. However, the Railway Sector Law considers competitive bidding as the basic mechanism for allocating contracts of public interest, considering direct assignment as a residual mechanism. Therefore, this situation of not allocating contracts will change, at least in state administered ones, on August 1, 2013. Direct allocations could occur in regional competition services.

12.2.3 A3. Power of Regulator (CRF)

A regulator should be independent, transparent and powerful. The CRF has gained independence, evolving from the position of a governing or attached body, its provisions not being subject to appeal, to finally being independent in being included in the CNMC, which has meant that it is part of the European Independent Regulators Group. However, there are a number of circumstances that should be considered to improve its effectiveness in terms of transparency and regulatory power.

- The lack of clarity in the means to contact the CRF and accessibility to its website.
- Lack of transparency due to lack of advertising (a question clearly related to the previous problem) regarding its activities. An annual report of its activities was prepared and published for the first time in 2011.
- It is single-sector body, with a low budget, a small number of employees, not including any full-time experts specialized in economic sector regulation.
- It has coercive means to conduct research or implement its decisions, but perhaps not enough. However, the recently adopted Recast Directive of October 29, 2012, increases its power and can impose fines.

12.3 Barriers to access

This is the duration of the process of collecting all the information needed to access the market, i.e. information about administrative obligations. Information sources are Adif and the Ministry of Development. In this respect, Spain is in an intermediate position in relation to EU countries.

12.3.1 B1. Information

The time needed to identify the person responsible for providing non-personal information about procedures regarding market access and licensing is not considered to be much as it is easy to find, so that Spain is above average and has the highest score possible. The confidentiality of the process should also be stressed. However, the following problems have been found:

- The response time, one week, is slightly below the average.
- Information is available on the Internet, at least in one other national language (English), ranking below average, as there are countries in which there are three languages.
- As for the quality of the personal information, this relates to the existence of a qualified person to give information about the access system, license, approval, only 3-4 people being available in Spain, which places us below average, and only able to communicate in two languages of the EU, placing us below the average.
- Some bureaucratic cost is generated since information is not completely centralized, at least 2 institutions being contacted.

12.3.2 B2. Administration

Administrative barriers include license issue, approval of rolling stock and granting safety certificates.

License

- The authority granting the license is formally independent (but not de facto) of the leading railway undertaking.
- Although the legal period to grant the license is three months, in practice, as experienced so far, it is delayed much more: about four months.
- The fact that two licenses are necessary is negative if they wish to operate passenger and freight services. In other countries only one is necessary.
- The validation of a foreign license takes too long: up to three months.
- The fees for the issuance of the license are also higher than the EU average.

Approval

- The approval is formal but not really independent of Renfe.
- By law it takes more than the EU average to grant and the actual delay in practice, which is common in EU countries, is very considerable in Spain in both diesel and electric rolling stock.
- The Spanish approval is more "fussy" than in other EU networks.
- The validation of rolling stocks from other networks is difficult both in diesel TU and high speed vehicles, and the legal validation is above the EU average as well as what it takes in practice.

Safety Certificate

- Spanish operators considered the safety certificate (SC) tortuous (the Part B certificate is obtained in small stages). The level of detail compared with other European networks is high and it is not valid for the entire network, (only for certified lines in part B of the SC).

- The lack of any authority responsible for awarding it causes uncertainty. This shortcoming did not guarantee that the decision was sufficiently independent (the issuing authority is formally but not de facto independent).
- Once the information is supplied the time needed for the legal response is excessive, four months, which is more in practice: the granting of the SC takes about seven months.
- The time required for the validation of the certification in other countries is high. In addition it does not apply for passenger and freight services.
- The period lost if it is not used is less than the EU average.
- The cost of issue per train-km is high relative to the EU average.

12.3.3 B3. Operation

Operating barriers include access to rolling stock, qualified personnel, path allocation, the charges for the use of infrastructure and access to services relating to railway companies.

Rolling stock access

- Leasing little developed. However this situation will change with the creation of a rental company for surplus Renfe rolling stock provided for in RDL 22/2012.
- Undeveloped second-hand market: the different gauge limits the national second-hand market, which was opened by Renfe in 2010, in the case of the Iberian gauge network. As in the previous case the situation changed with the RDL 22/2012

Access to qualified personnel

- Recruitment and training of qualified personnel with several options existing for training schools independent of the leading operator. On the other hand, it is complicated and very expensive to hire a driver from the leading operator.

Assignment of paths

- The degree of Adif discretion is important in cancellations of the paths and in the criteria adopted in the Ministerial Order regulating these assignments.
- Renfe's privileged position in the Railway Industry Regulation in conserving allocated capacity once opened to competition, since it extends these privileges, which in the Law refers only to freight transport services, to passenger transport services. Lack of standard contracts governing the relationships between private operators and Adif (individual contract).
- The availability of free spots is only obtained when required by the operator.

Charge

- There is no clear breakdown of items: the charge is not broken down by application, right of use, use of track switches and branches; traffic control, provision of information.
- There are no rules in our legislation that take into account the possible non-use of capacity and the option of early cancellation, with or without a penalty.
- The reservation charge does not actually tax the reservation, but tries to recover the costs of the infrastructure so that it loses its role of promoting efficiency in use. Moreover, its low amount favours larger operators.
- Although the variable part of the charge is linear, there is a fixed component that is adjusted depending on the volume of traffic expected each year. This adjustment system does not favour small operators and discourages increased traffic, since it favours those at the top of a section with respect to the ones at the bottom of the next section. Payment is also made indiscriminately when activity begins (the same amount is paid if starting in January or on December 29) as it is payable per year of activity. However, this problem has been addressed in the amendment of the Ministerial Order (Order FOM/2336/2012).
- The charge should have some stability with a system of responsibilities, penalties and bonuses which is currently lacking as there is no charge reduction in the event of an Adif malfunction and/or a system of bonuses and penalties for the infrastructure manager.

Access to railway undertakings

- The operator is not paid for the energy returned to the grid and it is not possible to acquire the traction power from any supplier other than Adif.
- The Network Statement does not include access to passenger stations, travel information panels and a suitable location for ticketing services.
- The Network Statement does not include access to workshops and other technical facilities

12.4 Conclusions

A milestone for the development of the regulatory framework in opening the Spanish passenger railway market up to competition was RDL 22/2012, which has reduced the barriers to entry. However, there are still some that obviously persist and hinder entry, and others that we should assess in practice if they are very restrictive with respect to being able to inhibit the entry of new operators from August 1 2013.

In this respect, it is necessary to study through in-depth interviews with potential entrants whether the fact that Renfe and ADIF belong to the Ministry of Development, and that essential access functions are not independent of Renfe, is in practice considered an obstacle to competition.

It should be noted that, even considering the importance of coordination between infrastructure and operation, including Adif representatives on the Management Board of the railway undertakings, and vice versa, might not provide sufficient guarantees about the protection of competition. To ensure better coordination between infrastructure and operation, other methods should be considered, in which all railway undertakings could participate.

The division into a holding company, facilitating access to rolling stock through a new company is positive, but interests may be divided. For this reason this rolling stock company within the Renfe holding company must be supervised by the CRF, which should have more resources, transparency and powers to safeguard competition.

Some particularly important aspects that should be improved are the processes and costs for obtaining the license and, in particular, the safety certificate and approval. Barriers to the entry of foreign companies should also be reduced by providing access to necessary information and validation of market access requirements already met in their home countries.

It does not seem appropriate and effective that no operator has any inherited rights regarding the capacity given. Although it seems a restriction on competition, in practice this is not the case: only if there is competition in the market and there is saturation, which is difficult given the current levels of use and the possibilities provided by new technologies such as ERTMS. It should be noted that there is legal uncertainty about:

- The conditions of access to rolling stock.
- The development of the MO regulating the tenders services of public interest and for the system of access to rolling stock and qualified staff in tenders for public interest services.
- There is some legal uncertainty about the development of the charge in the light of any changes that may be involved by changes in the accounting regulations for the infrastructure manager (SEC 2010) and transposition of the provisions of the Recast Directive of October 29 2012.

Finally, we must stress the importance of the development of the CRF as a cornerstone of the opening process, highlighting its monitoring of access to related services that may need new entrants: training of drivers, services provided at stations by Adif to railway operators, workshops and other technical facilities, etc.

13. DEVELOPMENT OF ACCESS TO ROLLING STOCK / *Victor Sánchez, Rodolfo Ramos*

13.1 Introduction

Rolling means the whole series of vehicles that run on the railway network. For the purposes of OPTIRED, focused on the transport of long distance passengers, rolling stock refers to passenger trains that perform these services.

Rolling stock is essential for the operation of passenger railway services. Therefore, the operation of the railway transport market requires that the railway undertaking/s is/are able to access the rolling stock to offer their services. Any restrictions that may exist to rolling stock directly affect the passenger transport market.

13.2 Barriers to rolling stock access

Restrictions on access to rolling stock can be classed into two distinct types:

- Intrinsic to railway operations.
- Restrictions derived from the nature of the railway operation. In this respect, their analysis is outside the scope of the OPTIRED project study. However, it is necessary to know them and to take them into account because they delimit the possible rolling stock market forms.
- Derived from the structure of the rolling stock market.

From the above conditions, which are virtually inevitable, different formulas can be designed to facilitate access of railway undertakings to rolling stock. The design of the rolling stock market structure will directly affect access to it and, therefore, a bad design could result in a barrier to entry. Within the framework of the OPTIRED project it is important to identify potential barriers to entry that could limit competition in the long distance passenger transport market in the different regulatory frameworks.

13.2.1 Market Determinants intrinsic to the nature of railway operations

The most important elements of railway rolling stock that determine their market are:

- Costly investment. These are vehicles with high capacity and advanced technology (including rolling stock which is not high speed).
- Long life. In general, a minimum life of 25 years is usually considered.
- Design suited to the infrastructure where it will run. The effectiveness of the railway requires the interaction of rolling stock and infrastructure to be much higher than in other modes. The downside of this feature is the lack of flexibility of railway equipment because it can only run on the infrastructure for which it was designed.

The first two characteristics, high cost and life, are also observed in the market for aircraft and ships. However, the latter characteristic is a particular feature of the railway market. Neither the shipping or airline markets, even though very specialized vehicles exist in both, require such great adaptation of the vehicle to infrastructure.

This latter characteristic means the railway rolling stock market cannot have a global geographical extension as in the market for aircraft and ships. Although these limitations are somewhat lower for diesel trains and can be overcome by changing the rolling stock, they still have a significant impact on the development of the railway passenger market. The European Commission's efforts to achieve railway interoperability are trying to reduce these limitations.

13.2.2 Determinants derived from Rolling Stock market structure - Possible barriers to entry

There are basically three formulas for access by a railway company to rolling stock:

- Acquisition by purchase of rolling stock. In this case, we can distinguish between acquisition of new or second-hand rolling stock.
- Hire of rolling stock from a third party. There are various forms of hire. The most common are renting (leasing or operating lease), leasing and leaseback.
- Provided by a third party. In this case, the Public Administration, directly or through appropriate legislation, makes railway rolling stock available to a railway undertaking.

The structure of the rolling stock market will define the formula or formulas that operating companies have to access rolling stock. Each has its advantages and disadvantages, which not only depend on the access formula itself but the regulatory framework of the passenger transport market and the general conditions of the latter.

Purchase of rolling stock

The purchase of rolling stock is the riskiest alternative for railway undertakings. Although with this option the rolling stock becomes the railway undertaking's property, it is an expensive asset, with a long life and a restricted market for a possible sale. The financing of rolling stock may require external sources, which will make the purchase more expensive. Rolling stock manufacturers might be interested in financing such acquisitions if that would guarantee the maintenance of the units during their life.

One way to reduce costs is to buy second-hand rolling stock. The difficulties this alternative may present is the lack of suitable stock for the planned operation. In the event that this stock is in the hands of the incumbent undertaking or undertakings, they have an incentive to make access to such stock difficult for potential competitors.

One advantage that the purchase of rolling stock can represent is that it may allow more innovation by new competitors. Innovation in the design of the vehicles may have a significant impact, as with the aviation market, in which the so-called low cost airlines introduced an innovative fleet concept, with homogeneous fleets to reduce maintenance costs and more functional interiors looking to make maximum use of space. In the passenger railway market the possibility of new entrants innovating with vehicles is more likely if the rolling stock of the railway undertaking belongs to a third party that, to reduce its risks, prefers to limit amendments to existing standards. In the case of the second-hand market the opportunities for innovation are reduced, since the railway undertaking that wants to purchase railway rolling stock in this market will have to confine itself to what is offered and the possibilities that exist to modify it; the latter would increase the price and reduce the comparative advantage of the second-hand market.

The duration of the life of the rolling stock and the small size of the second-hand market increase the risk of purchase. If the operator is not able to develop a sustainable business over the long term, it may find itself with expensive assets that it cannot dispose of. In the event that there is competition in the market, it can be assumed that the company wishing to acquire rolling stock has a sustainable business case, especially if it obtains external financing, since there are third parties that sanction this.

In the event that there is market competition, franchises have to consider that they will most likely last less than the life of rolling stock. To ensure the viability of the railway undertaking it would be necessary to amortize the purchase during the franchise period, which, being less than the life of the rolling stock, would make its price more expensive. At the same time, if a railway undertaking competes for renewal of a franchise that it was awarded in the previous period, the party purchasing and amortising the rolling stock would have a distinct advantage to be able to reduce their operating costs significantly. This would reduce the effectiveness of market competition.

Rolling stock leasing

Rolling stock leasing gives the railway undertaking the advantage of reducing the risk of acquiring expensive assets (stranded costs) in a market with uncertainty. In addition, the railway undertakings might find advice about rolling stock and its suitability for the services that they want to operate in specialized rolling stock leasing companies.

This scenario requires the existence of a railway rolling stock leasing market. I.e. there are companies that specialize in leasing railway traction capable of providing suitable rolling stock for the operation. In a market of small proportions, as in the case of rolling stock due to its intrinsic characteristics, there are likely to be few leasing companies and more bargaining power for railway operators (oligopoly). These conditions may significantly increase the risk for the railway operator and reduce operator innovativeness since they are forced to accept the offer of the leasing company. Railway interoperability at EU level would increase the size of the rolling stock leasing market, facilitating the entry of new players in the market and expanding the range of supply to the railway undertakings.

There are various forms of rolling stock leasing. The most common are renting (leasing or operating lease), leasing and leaseback. Each of these has financial advantages and disadvantages and they even have certain regulatory requirements to prevent them being used for hidden purchases with better fiscal conditions.

Initially, rolling stock leasing to specialized third parties is a flexible formula that can be used in any regulatory framework. The limitations of

this formula are derived primarily from the existence and size of the rolling stock leasing market. The smaller the size of this market, the greater the likelihood that the rolling stock leasing companies exercise their market power, and reduce the competitiveness of the operating companies by increasing their expenses (transfer of all inherent risk to the rolling stock) and decreasing its ability to innovate (imposition of standards).

Use of rolling stock owned by a third party

The alternative covered by this scenario is one in which a Public Administration aims to provide railway services. In this scenario there are two basic alternatives: the Public Administration is the owner of the rolling stock (pool) or it is the railway operator.

In the first case, when the Public Administration is the owner, the services operator would use the rolling stock in the pool in the manner stipulated by the owner Administration. This case presents obvious advantages for the operator to reduce stranded costs and risks associated with rolling stock. For the Public Administration it can be beneficial when it wants to maintain ultimate responsibility for operation design (define the characteristics of the rolling stock) and it also allows it to reduce purchasing costs by increasing the number of units demanded. Several administrations could join up to achieve these savings, as some German Länder have done.

This solution could be applied, in principle, to any regulatory framework. However, it seems unadvisable for the case of competition in the market because, in this case, the Public Administration would act as a monopoly leasing company. In this situation it could exert its monopoly position or, more likely, if its goal is to facilitate market entry at all costs, it would lead to inefficient results caused by oversupply. This situation would occur because operators have an incentive to use the rolling stock inefficiently (low occupations and higher performance than required) or strategically (occupying paths to prevent the entry of competitors).

In the case of market competition, the possible advantage of using a pool owned by the Public Administration is to reduce the risks to operators. For services where innovation is not as necessary as integration into complex transport systems planned and centrally regulated (metropolitan area with fare integration), the advantages of this solution are most noticeable.

Meanwhile, if the owner of the rolling stock is the railway operator, this refers to the market competition scenario in which the rolling stock is considered an essential resource that must be transferred to the company that is going to operate the service. In this case the concession contract or franchise should be designed properly so that the incumbent has the right incentives to leave the rolling stock in good conditions to the possible entrant.

13.3 Conclusions

Access to rolling stock can be especially problematic in the case of rolling stock for the Iberian gauge and the variable gauge. In the case of specific high speed rolling stock, this could be lower. It should be considered, on the one hand, that the gauge difference does not occur and Spanish high speed lines are highly interoperable, expanding the market by making it easier for foreign trains to be able to travel on them. On the other hand, it allows the entry of trains from other countries, which continue their journey through Spanish territory.

There could also be access to rolling stock by a new entrant through integration within a company in an organization responsible for leasing of rolling stock. This strategy, which is more likely to be adopted in a large scale entry, is used by the Italian operator NTV and the Czech organization Leo Express.

To facilitate access of rolling stock, the solution prepared by Spain is the provision of excess rolling stock from the incumbent operator (a total of 26 high speed trains are currently considered). This might not only be excess high speed stock, but also the amount needed for the provision of services provided by the competitive allocation of public service contracts on both conventional and standard gauges. Rolling stock suitable for conventional services and withdrawn from circulation, but that might be suitable for use (cars, locomotives, TU, etc.), could also be made available, following the model of the SNCF subsidiary of the Akiem.

The monopoly situation in the supply of available rolling stock by this company, and its relationship to the incumbent operator, will require supervision by the Regulator of the leases to prevent anticompetitive practices.

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14. DEVELOPMENT OF THE INFRASTRUCTURE CHARGE

/ Javier Fernández

14.1 Introduction

The charge for the use of infrastructure has been amended by the Ministerial Order FOM/2336/2012. However, this reform does not substantially change the current model, and it should be followed by another reform that adapts the charge to the requirements of EC authorities expressed in the Infringement and the transposition of the provisions of the Recast Directive and the PITVI. There is no doubt that the charge is a key instrument that determines the model for opening to competition and it should be established alongside the latter.

14.2 Diagnosis of the current model

The first major issue that we have to study in evaluating our charge model, after nearly seven years of operation, is the legal process opened by the European Commission against the Kingdom of Spain concerning the transposition of Directive 2001/14/EC, on the allocation of railway infrastructure capacity and the levying of charges for their use and safety certification.

In this process, we have the conclusions of the Advocate General of the European Court of Justice, which proposes that the Court declare that Spain has failed to complete the transposition of the Directive in two aspects related to the charge:

- In the process of establishing the charges the government goes beyond setting a framework for pricing, determining the charges to the detriment of the management independence of the infrastructure manager required by Article 4 of Directive 91/440/CEE.
- The charge system does not include a system of incentives that leads the infrastructure manager and railway undertakings to minimize disruption and improve the network performance.

Beyond these two legal issues, which also have management implications, there is a consensus that the current structure and level of charges for the use of infrastructure has other weaknesses such as:

- It does not encourage the use of the network when the latter is clearly underutilized. Infrastructure investment has strong indivisibilities, a large number of kilometres of new lines have been opened very recently and the economic crisis has greatly reduced mobility, both obligatory and non-obligatory. A significant sized traffic charge, the same for all lines and proportional to the supply, both discourages and limits the possibilities of pricing policies that allow the operator to adapt to these market conditions.
- They do not generate the revenue needed to finance reasonable operation of the infrastructure. Revenue that we should look for in increasing the volume of traffic willing to pay to use the infrastructure, rather than taxation of existing traffic.

14.3 Framework. Recast Directive

The regulatory framework for the standards set by the Directive is clear, although since it is expressed in general terms it has led to a wide disparity in its application in different countries.

The rules clearly laid down by the new Directive state that:

- It must consist of a basic rate set in accordance with the short-term marginal cost of infrastructure to ensure that it does not exclude the use of the infrastructure by any market segment able to pay at least the cost directly attributable to the railway service operation.
- It allows the addition of external costs (if there is comparable pricing for all modes) and includes a payment that reflects the scarcity of capacity in infrastructure segments during periods of congestion.
- It supports surcharges, designed to recover costs in those market segments that can admit this. It introduces a special mention which enables the calculation of charges based on the costs of long-term investment projects that encourage infrastructure managers to make the appropriate investments needed from an economic point of view and that, in the Spanish case, apply to all lines on the high speed network.
- It supports the use of discounts to promote the efficient use of infrastructure, fostering the development of new services and use of underutilized lines.
- It forces the inclusion of incentives to improve network performance.
- Finally, it establishes a reservation that may apply to the capacity that is allocated but not used.

14.4 Strategic Framework. The PITVI

The Plan for Infrastructure, Transport and Housing (PITVI 2012-2024), recently published by the Ministry of Development, proposes some general guidelines for revising the charge for use of railway infrastructure in the section devoted to the development of the railway model, directing it towards efficiency and competitiveness.

Changing the charge structure was directed, according to the PITVI, towards two objectives: covering the financial obligations of the infrastructure manager and stimulating traffic growth.

In does in particular state that, for the conventional network, the charge shall be equal to the cost directly attributable to the railway service operation, and for the High Speed network, which will aim to recover costs, the charge including surcharges based on principles of efficiency, transparency and non-discrimination.

14.5 Theoretical Framework

It is important to ensure that charges applied impose minimal distortion on allocation efficiency. It must be ensured that the charges permit the use of railway network traffic that can at least pay the marginal cost it establishes. In the absence of an opportunity cost, no train able to cover avoidable costs it produces in the system is expelled from it, generating a loss in terms of well-being for society.

Economic theory says that a price equal to the short-run marginal cost (first best) promotes the efficient use of the existing railway network. However, in an industry characterized by very low, non-increasing marginal costs, cost recovery will not exceed, according to available studies, 10-20% of network costs. Therefore, it will be necessary to finance a significant part of the infrastructure costs with taxes. In this case, economic efficiency would be maintained as long as the costs to society of the taxes dedicated to covering this deficit do not exceed the social losses from preventing train operations, which could only cover their avoidable costs, and not a higher charge.

When it is necessary to recover costs above the marginal rate, we must find a second best solution to increase revenue with minimum distortion of allocation efficiency and with minimal traffic expulsion. In this sense, we must support the surcharges based on the Ramsey Principle (rising prices inversely related to the elasticity of demand). Thus, the price charged to different types of traffic will be based on one or more observable variables (type of train, type of service, travel timetable, line used, revenue level of the train ...) that we can relate to the price sensitivity of different types of traffic, without the application of these variables discriminating against different operators providing equivalent services.

In the case of several operators competing in the market, the structure of this charge must be variable and decreasing in unit terms with the traffic volume. With these two precautions, we will encourage maximum uptake of new passengers who, reasonably, are less willing to pay in relation to their income and the modal decision being taken at present, and which is strongly influenced by the supply price.

In those markets where a monopoly remains or exclusive rights are determined based on a process of market competition, a flat fee for unlimited use of a capacity quota would be the most appropriate thing to encourage greater use of the lines.

One final and very relevant thought in relation to the theoretical framework: only the fraction of the charge derived from the concept of marginal cost should be based on costs and any surcharge above this amount must be market driven.

Any surcharge based on an allocation of fixed costs produces inefficiencies and expels traffic from the network. And, besides, it is based on an accounting device, not on a real cost. Fixed costs can be allocated for accounting but the "full cost" per train that is obtained would only be a mathematical creature, not a real cost. Use of shared fixed costs to set prices can only expel you from the market when the average resulting price is above what the market can accept. Market share would be lost by committing a fundamental error: allocated costs are not caused by the train (which induces only marginal avoidable cost). Revenue would be lost, but it would be necessary to continue supporting all fixed costs even if the train was not in operation.

It only makes economic sense to transfer the costs of installed capacity to prices when there are opportunity costs, not when there is no alternative use for the path that the expelled train did not consume.

An efficient price system can only be set by relying on the market value of the infrastructure offered to operators, because this is its only real value, while the book value resulting from an allocation is only a mathematical creature.

14.6 Conclusions

In the time frame covered by this project, reform of this charge is being studied in Spain. Charges shall encourage, by issuing clear economic signals to the infrastructure manager and railway undertakings, optimized use of the latter and the adoption of rational decisions.

The operating charge will be equivalent to the cost directly attributable to the railway service. It will consider infrastructure material characteristics and the type of service.

Surcharges will apply primarily to specific investment projects, avoiding the establishment of off-market amounts. In setting the amount, it must be ensured that the market can support them. They should be guided by the market, by the ability to pay. They also should be directed towards financial profitability without sacrificing socioeconomic profitability. The essential increase in revenue must come from more traffic, multiplied by a reasonable charge amount, not little traffic multiplied by a very high unit charge.

Even if it was possible to obtain the necessary revenue through this second route, which would not be easy, we would ultimately be ruining the whole process by which it was decided to build the lines.

This process begins by evaluating the social benefits derived from energy savings and environmental improvement, reduced congestion, time savings or reductions in accidents. The ex-ante economic assessment of these benefits, matched with investment and operating costs, result in a socioeconomic benefit that justifies devoting public resources to a high speed project and not to any other public purpose.

The amount of such benefits and, therefore, the acceptability of the project, depends on a fundamental variable: demand; how many passengers we will bring to the railway mode, meeting their mobility needs at a lower social cost than before the project. And that demand has a fundamental relationship with the fare.

Years later, usually a decade after completing the feasibility study, the line enters operation and charge and ticket levels are established. Neither the infrastructure manager nor the operator record savings from reducing accidents or emissions in their income statements. They do therefore ignore them in their decision making process. So, economic events that contributed greatly to justifying ex-ante investment decisions are ignored ex-post when the infrastructure manager and operator take decisions about how to operate the service.

The structure of the surcharges should be decided based on the structure of existing competition in the market. So, we propose a variable surcharge depending on traffic, with a decreasing unit value when there is competition in the market, using discounts in launching new services or lines if advisable. However, a bigger incentive to traffic growth is the fixed surcharge for unlimited use of a certain capacity quota when there are exclusive rights to use the infrastructure.

Finally, it is worth noting that the incentive system should be directed at both reducing the disruption to the service and ensuring that operators and infrastructure managers make reasonable use of infrastructure potential.

15. DEVELOPMENT OF MANAGEMENT CONTRACTS FOR THE PROVISION OF SERVICES OF PUBLIC INTEREST IN RAILWAY PASSENGER TRANSPORT. CONCESSION PERIODS AND OTHER ASPECTS TO BE REGULATED

/ Carlos Huesa, Alberto Cillero

15.1 Introduction

EThe purpose of this chapter is to analyze the minimum contents that a future management contract of public passenger transport by rail should have. In the new framework established by the EU Regulation 1370/2007 on public passenger transport services by rail and road, and having regard to the provisions established by Railway Industry Law 39/2003 (the contents of these to be adapted to the new framework of Regulation 1370/2007).

Regardless of the final model established by the authorities for access by operators, and competitive regulatory standards to be defined, it is necessary to clarify the current content of service management contracts established for the provision of those activities that are considered of public interest (and are therefore subject to Public Service Obligations)

15.2 Current regulatory framework affecting the definition of management contracts for services of public interest on the railway

It is necessary to explain, first, the impact of EU Regulation 1370/2007 (effective since December 2009) for the management of railway passenger services, when defining and establishing the constraints of Public Service Obligations (PSOs) on certain activities that need to be managed by Public Service Contracts.

And to define the scope of this management framework, which applies to activities that are declared of public interest (loss-making or otherwise), provided that: 1) the PSOs imposed arise from compensation of various kinds (economic or otherwise) for the Operator from the Competent Authority, and/or 2) are derived from the granting of exclusive rights.

If the establishment of PSOs lead to either of these two circumstances (compensation or exclusive rights for the operator), EU Regulation 1370/2007 requires that such concessions are conducted under a Public Service management contract specific to that activity subject to PSO impositions.

Furthermore, the Regulation results in criteria that must be applied in the case of establishing "General Rules" (measures taken by a Competent Authority that equally affect all public services of the same type and in a specific geographical area).

Meanwhile, nationally, Railway Industry Law 39/2003 states that the declaration of public interest services corresponds to the Council of Ministers. This will occur when it is necessary to ensure communication between locations and the commercial operation does not ensure proper performance in terms of frequency and quality.

These services may only be operated by railway undertakings that have obtained the corresponding Authorization. The regulatory authority able to grant these authorizations is the Ministry of Development (MFOM), and it will award them (except direct award in contracts costing less than €1m) following a procedure: public, transparent and non-discriminatory tender.

From the point of view of financing services, the MFOM may conclude agreements with the Autonomous Communities (ACs) and local authorities. In any case, when the declaration of public interest services is made at the request of the autonomous communities or local authorities, the latter will be responsible for their financing.

Authorisations will be granted on an exclusive basis; even though the definition of the system of authorizations is subject to subsequent legislative development, through the Ministry of Development Orders.

However, this system established by Law 39/2003 must be adapted to the new management framework defined by Regulation 1370/2007, as well as being adapted to changing legislation- for the same reason – occurring in Law 16/1987 Management of Land Transport.

15.3 Regulation 1370

Before analyzing in detail the provisions of Regulation 1370, it is necessary to establish the previous definitions laid down in Regulation 1370 on public service contracts and general rules.

- "Public service contract": one or more legally binding acts confirming the agreement between a competent authority and a given public service operator, entrusting the latter with the management and operation of public passenger transport services subject to public service obligations. The contract may, under the law of the Member States, also consist in a decision taken by the competent authority, taking the form of an independent legislative or regulatory act, or which contains the conditions under which the competent authority provides by itself or entrusts the provision of such services to an internal operator.
- "General Rule": measure applied without discrimination to all public passenger transport services of the same type in a given geographical area for which a Competent Authority is responsible.

15.3.1 Minimum obligatory content of public service management contracts and general rules (according to Article 4 of the Regulation).

Definition of the PSOs established by the Contract

The Regulation requires clear definition of the Public Service Obligations that the public service operator must comply with, and the corresponding territories (geographic market) where the transport will run. In relation to the correct definition of the PSO it is important to consider the following questions:

- Traffic rights: establishment of origin-destination routes that can be addressed (present and future) on a particular geographic corridor.
- Level of supply: definition of the minimum supply that will be required in terms of, schedules, facilities and timetables.
- System of exclusivity: definition of exclusive rights on traffic, present and future, under the contract.

Parameters for the calculation of compensation (if applicable)

The Regulation makes it necessary to establish in advance, objectively and transparently, the parameters used as the basis of the compensation to be calculated, if applicable. In the specific case added of Public Service Contracts that are awarded by a NON-competitive procedure (this includes direct management by dependent public railway undertakings), the Regulation sets out specific criteria to be considered for the determination of compensation:

- The compensation may not exceed an amount corresponding to the net financial effect, equivalent "to the sum total of the effects, positive or negative, of compliance with the public service obligation in the costs and revenue of the public service operator". The effects will be assessed by comparing the compliance of the public service obligation with the situation that would have existed if the obligation had not been fulfilled.
- To calculate the concept of "net financial effect", the Regulation provides that the Competent Authority shall be guided by the following scheme:
  - Costs from PSO minus any positive financial effects generated within the network operated according to the PSO/s,
  - Less revenue from fares or any other revenue generated by meeting PSO/s,
  - Plus a reasonable profit.
- To increase transparency and avoid cross-subsidies, when a Public Service Operator operates compensated services subject to PSOs and other activities at the same time, the accounts of such services must be separated so as to meet at least the following conditions:
  - The accounts for each of these operating activities must be separate, and the part of assets corresponding to fixed costs.
  - No variable cost, no contribution in accordance with fixed costs, or any reasonable profit pertaining to any other activity of the Public Service Operator may be charged, in any case, to the public service in question.
  - Public service costs will be balanced by operating revenue and payments from public authorities, without the possibility of transferring revenue to another activity sector of the public service operator.
- By "reasonable profit" the Regulation means a rate of return on capital that is normal for the sector in a given Member State and taking into account the risk or absence of risk incurred that intervention of the public authority involves for the public service operator.
- The method of compensation must promote maintenance or development:

- of effective management by the Public Service Operator, which can be judged objectively, and
- provision of passenger transport services with a sufficient level of quality.

It will be essential, ultimately, to define the pricing system in the public service management contract. In terms of criteria for determining maximum/minimum fares, the operator's ability to modify fares and/or establish discounts and promotions, and the fare change system in response to increased costs.

Nature and scope of exclusive rights (if applicable)

The regulation requires defining the nature and extent of any exclusive rights that will be granted so as to avoid overcompensation.

Distribution of costs and revenues

The regulation requires that the Public Service Contract defines the forms of distributing the costs derived from providing services. These costs may include, in particular, staff, energy, infrastructure costs, maintenance and repair of public transport vehicles, rolling stock and facilities necessary for the operation of passenger transport services and fixed and an adequate return on capital.

The Public Service Contract and the General Rules should also define the forms of distributing revenue from the sale of tickets. Revenue that may be kept by the public service operator, returned to the Competent Authority or distributed between both.

Duration of contracts

The contract duration will be limited and may not exceed 10 years for bus and coach services and 15 years for passenger transport services by rail or other rail modes.

The duration of a Contract for various modes of transport will be limited to 15 years if railway transport accounts for over 50% of the value of services.

If necessary, taking into account the depreciation of assets, the duration of the Public Service Contract may be extended, at most, by an equivalent period to half the original period if the operator provides elements of the assets which are both significant with respect to all the assets needed to provide the passenger transport services under Contract and are predominantly associated with these.

A Contract, provided that it has been granted by a fair competitive tendering procedure, can be longer if justified by capital depreciation in relation to an exceptional infrastructure.

The Term of the contract is critical to make the system attractive and economically viable. In order to facilitate the entry of new operators, regardless of the access model to be determined, it is important to set contract terms long enough to allow the proper development of the system. Regardless of the requirements related to investments in assets, the high fixed costs of organization, implementation and training must also be taken into account, as well as the risks associated with information asymmetries between candidates.

For the first tenders that may be established for awarding contracts, it would be reasonable to establish limits at a maximum of 15 years; provided they do not involve investments involving a higher amortization period. The granting of a long time period does not in any way involve loss of control by the regulator of the service operation, given that the ownership of the service and the responsibility for effective implementation of the contract still corresponds to the Administration.

Ability to include replacement of staff previously linked to the contract (obligatory replacement for the operator, voluntary for the worker)

Without prejudice to national and EC law, and the provisions of the Collective Agreements, the Regulation empowers the competent authorities to request that the selected Public Service Operator offers staff previously hired to provide services, rights they would have had if there had been a transfer pursuant to Directive 2001/23/EC.

When the Competent Authority requires a Public Service Operator to comply with certain social norms, the tender documents and the actual Public Service contract will list the staff concerned and will clearly outline their contractual rights and the conditions under which employees are considered related to services.

Compliance with quality of service parameters.

Where the competent authorities, in accordance with national legislation, require public service operators to meet certain quality standards, these are included in the tender documents and public service contracts.

Subcontracting system

Tender documents (for contracts awarded by competitive procedures), and the Public Service Contract itself, should clearly indicate whether or not subcontracting is possible and, if so, to what extent.

Other items

The intermodality and connectivity of public transport networks, accessibility and scope of the commercial networks, safety, quality and environmental policies shall be positively valued elements in the Tender documents.

15.4 Guarantees to safeguard the economic balance

We are devoting a final section to analyzing the relevance of the concept of economic balance, both in the future development of the terms and contents of public service management Contracts, and in the preparation of the administrative Specifications governing tenders for their award.

The Spanish Law on Public Sector Contracts (LCSP) establishes, for all contracts (whether for public works or public service management) the right to maintain the economic balance of the concession over the life of the contract.

The Specifications, in defining the regulatory framework governing the contract, shall include references to Spanish law that develop the concept of economic balance. In this sense, it would be advisable to include a direct reference in the Specification clauses to the treatment of economic balance in the contract, and most especially the assumptions applied in accordance with the provisions of the LCSP and the Regulations on Land Transport.

We understand that it will be necessary for the Administration to produce, before the start of each of the tenders, a Technical and Economic Feasibility Draft of the transport service to be tendered. It is also recommendable to include a projected income statement in economic studies before each tender, covering the whole period of the contract, and which not only takes into account costs but also demand revenue and investment forecasts.

These economic studies shall be used to calculate a Contract Balance Rate that actually covers Public Service Obligations established in each contract, taking into account the reasonable expectations of Demand and Revenue evolution for the whole life of the concession.

In the prior determination of costs, it will be essential to make actual assumptions for each concession contract regarding average commercial speeds and resource requirements based on the supply structure of the public services management contract, train needs and availability costs, planned supply volume, etc., in order to ensure that the regulated rate/compensation provided in the tender documents covers the actual costs incurred by the concessionaires at all times.

With respect to Rates, Specifications shall outline the procedures to follow in reviewing them. Both for regular reviews (periodic adjustment of the rate to costs through proper indexing to their evolution) and extraordinary ones (immediate adaptation to changes in relevant costs).

Finally, it is necessary for the Contracting Authority to explicitly define in the Specifications for each contract the form of allocating risks involved in the concession between the Administration and the Operator (demand, availability, investment risks, etc.) and mitigating rebalancing mechanisms.

15.5 Conclusions

The Railway Sector Law provides for the development, by decree, of the system for granting authorizations to provide railway transport services of public interest. In public service contracts under Regulation 1370/2007, both the service obligation that justifies the existence of the contract, as well the legal form of this contract (which under the Spanish framework shall be adapted to the general legislation on contracts with public administrations) shall be clearly established.

The final amount of compensation will be defined by public tender procedures in which the main factor for the award shall not necessarily be the price, but shall also be based on a variety of criteria to properly weight the quality and improvements to be introduced in the service provided with the monetary amount requested by the operator (the lowest compensation).

Contracts shall be allocated according to principles of transparency and non-discrimination.

There shall be, clear legal provisions established in advance, in compliance with quality, incentives and penalties.

The contract duration will depend on the investment needs and particularities of the rolling stock, taking into account the particularities of this industry, most especially the entry barriers specifically referred to in another chapter of this document.

In Spain there is a unique feature, which does not exist in other countries, as a result of the current existence of a very solid, wide network of intercity public service contracts for passenger transport by road. So far, the awarding of these contracts (always by public tenders) occurs in parallel and without regard to the opening to competition of the future train services network. In the future, the establishment of new PSO service contracts for the railway must take into account this fact, and it is also an opportunity to develop co-modal approaches based on the complementariness and coordination of railway and road services.

16. DEVELOPMENT OF THE RAILWAY REGULATOR IN SPAIN. THE RAILWAY REGULATOR AND PASSENGER RAILWAY TRANSPORT LIBERALIZATION IN SPAIN

/ *Juan Miguel Sánchez*

16.1 Introduction

All public and private stakeholders have a role in the liberalization process. The regulator will play a role in the process and in the final stage of liberalization. Insofar as it strengthens the CRF, it may be more effective in its work.

Although not required, the CRF has been invited to participate in discussions to establish the necessary reforms in the railway sector, and indeed CRF members are participating in 2012 in the five working groups set up by the Ministry of Development to define the changes in the model that enable liberalization, which is welcome because it shows a high level of trust and collaboration.

16.2 Reforming the institutional model

First, and together with the full definition of the business model, there must be an accompanying action aimed at improving the institutional model. This will make the system effective and credible. In this sense it is necessary to take steps to strengthen the role of each stakeholder in the opening to competition:

- Ministry of Development, through its competent management centres, which must carry out the general organization of the industry and be impartial with all those competing in the market.
- CRF, as an independent regulator of the activity, strengthening its resource capacity and completing its duties with those contained in the new Recast Directive, and strengthening it so that it can be integrated into the new CNMC with a sufficient and capable team of transport regulation experts.
- Adif, as the infrastructure manager, recovering the powers granted by European directives, especially on infrastructure pricing (charges and rates), performance and incentive scheme, capacity allocation, etc.
- Renfe Operadora, with a reinforcement of its decision-making and management autonomy, becoming a state company and becoming dependent on the SEPI. It must become just another operator and, therefore, with a standard relationship with the state in terms of obligations and rights.
- Creation and promotion of a state agency, the Railway Transport Safety Agency as a national safety authority responsible in areas of state competence for the inspection and supervision of railway safety on both infrastructure and in operation.

16.3 Reforming the business activity model

Two types of competition exist within the reform of the business activity model: One, Competition in the market for general access to the market requires a license (good reputation, financial and professional capacity), an activity statement, liability insurance, etc. It affects all services that are declared of public interest and is limited only by the actual availability of capacity under the supervision of the railway regulator. Two, Market Competition: services declared by the Government to be of public interest and, therefore, subject to government intervention. We must take into account the competence of the ACs in the services performed within the territorial scope of an AC. It requires general access to the market: a business license and statement, liability insurance, etc., and special access to the market: competition for the provision of services subject to public service obligations (discussed in the previous chapter).

It will be necessary to clarify the content and limitations of services of general interest if this affects traffic between stations in certain times and schedules, etc.

In this context, Rules will be required for the coordination of services in open competition and services under a PSO Contract. Issues to consider in this regard are, on the one hand, the marketing of services between stations where there is a public service obligation contract. On the other hand: the extension to domestic transport of the regulator's role in international services (effect of economic balance of competition services in the market on public service contracts).

As regards access to the network, capacities and services, one aspect to

consider is to enabling public authorities and public service owners to be authorized candidates for the allocation of paths for these services, as provided by European legislation. It is also necessary to promote the development of the Framework Agreements linked to reforms on infrastructure pricing, which should move to a less rigid framework than the current one.

All this planning must be carried out by achieving a high protection of the passenger rights contained in a Charter of Users (this is currently Regulation 1371/2007 which directly regulates the rights of passengers, and the Council of Ministers Agreement adopting certain decisions) in which they are outlined, including their rights in terms of transport, information, compensation. In this regard it is very important to integrate information and ensure the possibility of integrated rates of different operators. We must also consider the obligatory submission of disputes and litigation to transport Arbitration Boards.

Other aspects to consider are; firstly, safety certificates, approval of trains, commissioning authorization, operating authorization, entities in charge of maintenance, etc. Secondly, the supervision of companies and service statistics: market monitoring by the CRF, and Inspections of MFOM and Adif.

In addition, we have to consider reforms of charges and rates, as well as capacity allocation (effects of a possible judgment by the ECJ against Spain for incorrect transposition of directives in the first railway package).

16.4 Transitional situations and periods

For an orderly process of transition to competition, transitional periods and situations could be envisaged in relation to the management of the activity of Adif and Renfe Operator.

- Related to the management of the activity. On the one hand, the establishment of competition phases: to ensure that at least two operators exist in the corridors in the first phase. On the other hand, studying the establishment of mechanisms restraining competition in the early phases to progressively assess the impact of new entrants on investments made by operators.
- Related to Adif. It should incorporate the power to fix prices for use of infrastructure and railway services.
- Related to Renfe Operator. On the one hand, in the short term, rights acquired for capacities should disappear and change to a series of Framework Agreements. On the other hand, the extension of the safety License and Certificate, and the access rights to be passed to operating companies in the Renfe Holding: there should be no discrimination in addressing transitional measures through recognition of current Renfe rights and capabilities in favour of companies that are to be the railway undertakings that own them.

16.5 Key aspects in the introduction of competition

There are several issues that seem essential and warrant the special attention of the regulator in order to avoid them occurring. These specifically relate to:

- Safety at all levels: infrastructure, operational and commercial, i.e. physical, operational and legal safety.
- Clear rules for management of the competition and activity.
- Access to infrastructure in terms of equality and non-discrimination.
  - Stations: lockers, waiting rooms, shopping centre staff, train operation staff, train logistics, cleaning, catering, any possible baggage handling services, etc.
  - Access to general and special Adif services.
  - Railway sidings and parking.
- Access to network information (e.g. available information on board trains of new entrants regarding delays in Renfe trains with connections to theirs): In this regard we must consider the recent judgment of the ECJ on the preliminary ruling[1] on Shienen Control (competent authority of the Austrian railway regulation) in Austria.
- Hiring drivers and initial and continuing training, access to simulators and practices, verified by the regulator.
- Access to available trains: property leasing, making surplus Renfe trains available to the system operator.
- Access without discrimination in maintenance services and prices.

(1) The preliminary ruling allows the courts of the Member States in the context of a dispute heard to ask the Court on the interpretation of EU law or the validity of a European Union act. The ECJ does not decide the dispute itself, and it is the national court that must settle the case in accordance.

16.5.1 Elimination of discriminatory and unnecessary aspects of the Railway Sector Law

There are several aspects that may be considered discriminatory and unnecessary, since in practice they do not represent an advantage for Renfe:

- Incumbent rights of the State Operator: LSF (Railway Sector Law) DT3 on the paths granted to Renfe and which remained available on August 1, 2013.
- Aspects of reciprocity: LSF DT2 on the granting of access rights only to companies in EU countries in which Spanish companies can compete.

16.6 Role of the CRF at present and future changes in its functions

The role of the CRF, today and in the future, should be considered in the ongoing process of integration in the National Markets and Competition Commission (CNMC) and, therefore, integration of functions in the same body together with functions protecting competition. Functions derived from the new CNMC body shall therefore be considered as strengthening competition issues. The railway regulator is not currently a body that promotes competition and with the creation of the new body it will be.

A key aspect is the incorporation of functions to the Regulator through the immediate transposition of Recast Directive 34/2012 (which involves possible amendments to the draft law establishing the CNMC). With particular reference to:

- Strengthening the resources of the Regulator, an obligation imposed by Directive 34/2012 on the State. It will probably have to reflect on moving from the support of the regulator in general budgets to a system in which it is the system that bears the cost of the regulator and of the future railway transport safety agency that will be the national safety authority.
- Capacity to sanction the implementation of decisions by the Regulator, both in the request for information and the fulfilment of decisions passed.
- Performing audits on both the infrastructure manager and railway undertakings, as well as related service operators regarding separation of accounts.
- Drawing conclusions from its audits on state aid.
- Its functions will include monitoring issues related to competition in the railway market, giving notice to the relevant authorities to investigate a case.

There are functions the CRF may have following the entry into force of Directive 34/2012, without requiring its transposition:

- Participation in the network of railway regulators coordinated by the European Commission.
- Power to inform the Commission of measures taken by the country in relation to compliance with the Directive for its review, if it is believed there may be doubts in being contrary to the provisions of the European standard.
- Collaboration with the national safety authority.
- As for new functions that ensure the proper functioning of the market, some new features should be incorporated into the regulator with a view to greater competition efficiency on the railway.
- Issuance of non-binding reports relating to drafts of the programme of activities of the infrastructure manager, contractual agreements between the Member State and the infrastructure manager and capacity expansion plans regarding whether they are in keeping with the competitive situation of railway markets.
- Preliminary report on the procedures for declaration of public interest services with criteria of necessity and proportionality established by European jurisprudence.
- Report on standard specifications and conditions in general interest service tenders.
- Tracking and monitoring of the market.

Functions derived from sentences should also be taken into account: in this respect we must consider the position of the Luxembourg Court which considers that regulators can fulfil the condition of a legal body in order to bring a legal matter before the former.

Finally, it is necessary to consider functions relating to alternative dispute and litigation resolution within the industry: resolving disputes between railway undertakings; arbitration in resolving disputes arising from relationships and contracts between infrastructure managers or railway services and railway undertakings or between other market stakeholders and railway undertakings.

16.7 Conclusions

The new railway model opened to competition in passenger services will have new institutions, such as a national safety authority and a CRF that, integrated into the CNMC, will be completed and strengthened in its functions with those outlined in the new Recast Directive and the increase in their resources contemplated in the latter.

In this model, in which competition could be introduced gradually through transitory situations and periods, the role of the CRF should be important regarding supervision in the award of contracts for services of public interest and its interactions, especially in regard to the possible effects of the economic balance of contracts due to the overlapping of the services covered by these with services of commercial interest, as well as fair and competitive access to the services needed by new entrants, all in the context of high protection of passenger rights.

17. LEGAL DEVELOPMENTS FOR THE OPENING OF THE MARKET / *Juan José Montero*

17.1 Introduction

Full opening to competition is not currently provided for in EU directives on the railway. In fact, until 2019, at the earliest, no obligation will be hypothetically introduced for full liberalization in the framework of the fourth railway package.

In these circumstances, it seems appropriate to consider options for gradually opening up competition to rectify the position of the incumbent operator and overcome cross-subsidization policies inconsistent with a competitive system.

17.2 Gradual opening to competition

In recent decades we have proceeded, at the EU's initiative, to liberalization of the main network industries: telecommunications, energy, postal services, etc. EU authorities declared the exclusive rights for the provision of various services to be incompatible with the Treaty. As a result it has gradually restored the freedom of enterprise, and interested operators have entered the market to provide services in competition with the traditional monopoly.

The process is sometimes accompanied by the privatization of the traditional monopoly (e.g. Telefónica), but it has not always been the case either in Spain (Correos has not been privatized) or the rest of Europe (France Telecom is still controlled by the French State).

The phenomenon of liberalization has also reached railway services. The EU authorities have adopted a strategy of gradual opening to competition and they have liberalized an increasing number of segments: international freight transport, domestic freight transport, international passenger transport, etc. The process has not yet been completed with the full opening to competition.

The Railway Directives do in any case show specificity with respect to other liberalizing directives: they contain no specific obligations for the removal of exclusive rights in the provision of railway services. Instead, they have opted for an indirect, periphrastic, approach, imposing on states the obligation to provide access to railway infrastructure for the provision of services to be opened to competition. This approach is essentially the result of compromise and evidence of the resistance of States to transform the sector.

Beyond this, Regulation 1370/2007 expressly contemplates the possibility of maintaining exclusive rights even in segments open to competition, although restrictions and procedures are established to justify the proportionality of a measure that is considered exceptional.

At present, the bulk of railway services, national passenger transport services, are still not covered by liberalizing EU intervention.

Member States have adopted different strategies regarding national passenger services. Some States are committed to maintaining the exclusive right of the public operator, exhausting the possibilities offered by the EU framework. This is the case of France. Other States have chosen to introduce competition in this segment, but the most common way has been the introduction of controlled competition. The most common model has been market competition, maintaining the exclusive right but bidding for the award of the exclusive right between stakeholders. This is the case of the UK.

In Spain, public authorities opted for the French model and the exclusive right of the public operator Renfe Operadora remains, to this day, in all medium and long distance services, as well as commuter trains, even if regional powers allow developments in this field.

However, Royal Decree-Law 22/2012 has put an end to this policy. It has set the date of July 31, 2013 for the opening to competition of national passenger services. It excludes a market competition model and supports competition in the market.

This rule has created some uncertainty at a time of significant changes. First, the institutional framework is being reviewed The Congress is passing a bill to create a National Commission on Financial Markets and Competition, which will have powers in railway subjects. Second, completion of the contract programme with Renfe Operadora it is pending. Third, the EU framework is being reviewed (Fourth Package). Finally, it appears that the current national regulatory framework, adopted ten years ago, is not fully developed to cope with liberalization. .

Furthermore, it does not appear that the traditional monopolist has been fully prepared for the full opening to competition. For example, there is a clear imbalance in the fares of long distance Renfe Operadora, given the internal cross-subsidization between high speed services provided with a

substantial profit margin, and other long distance services which practically all show losses. This imbalance creates a risk of skimming or cherry-picking strategies by new entrants, which will focus on services with artificial margins, preventing the incumbent operator from obtaining revenue to subsidize loss-making services.

New operators would benefit from a perverse incentive that would consolidate their market position without improving the efficiency of the current operator and threatening their financial stability and the provision many services of general interest. The gradual opening is designed to allow the incumbent operator to end this and other imbalances, in order to face up harmoniously to competition.

Finally, opening of the market in Spain would generate asymmetries with States around us who choose to maintain exclusive rights. Their public operators could participate in the opening of the Spanish market, but Spanish operators could not attack their position in the home market. EU legislation prevents the application of the principle of reciprocity in opening EU markets.

In this context, a more controlled model of opening to competition seems reasonable, with a real gradual nature, but consistent with the statutory requirement of opening to competition. The creation of a duopoly seems an appropriate choice for the situation of the sector in Spain.

There are international and national precedents for the duopoly model. The duopoly model was implemented in the telecommunications sector in the UK in 1984. It was also the model for opening to competition in Spain. Thus, the incumbent, Telefónica de España, S.A. was joined by a second operator, Retevisión, which received a second award in 1996 for the indirect management of the fixed public telephone service.

Retevisión was in fact a public company whose aim was the provision of television signal transmission services. A majority stake in the company was sold by tender, which was controlled by a technology partner, Telecom Italia, and several local partners. Then came a third concessionaire, France Telecom. Only at a later stage, in December 1998, when the EU opening requirement became effective, was the sector fully opened to competition. A similar technique was used for the opening of the mobile phone market.

This model has two important benefits. First, it allows a really gradual opening. Segments so far open have less weight in the overall activity of Renfe Operadora. Moving to full competition would involve an abrupt change that would hamper the incumbent's adaptation to the new framework. Tariff rebalancing is a good example. Limited competition would permit a more harmonious and less traumatic adjustment. Moreover, competition would provide an incentive for the adjustment, but without threatening the financial stability of the incumbent. .

Secondly, the duopoly model gives more control to the public authorities in the shaping of the new market structure. The granting of the second authorization right in the tender would allow public authorities to influence the market entry strategy, ensuring a minimum level of commitment (investment, service, etc.) and a positive impact on the public interest. A beauty contest seems preferable to a simple auction, which also raises doubts about its discriminatory nature, by not demanding payment to the incumbent operator (the precedent of the Airtel Affair).

The duopoly model could be presented by granting a second award for public service management. The concession would be awarded by tender after the appropriate competitive bidding.

The purpose of the concession could be defined more or less extensively, from all long distance services, including high speed, only high speed or even specific routes, all to the same operator or each one to a different operator.

Public authorities could shape the activity of the new operator by using tender evaluation criteria. It seems reasonable that these criteria include an incentive to a minimum commitment to activity by the new entrant: a minimum service commitment in routes and frequencies, investment commitment, commitment to job creation, etc. It might even require a compensation payment to help finance loss making long distance services.

17.3 Conclusions

In Spain there is indeed a substantial use of cross-subsidies as a financing instrument for long distance services. High speed services have wide margins that finance loss-making conventional long distance services. There are thus cross-subsidies between high speed and long distance conventional services that have not been formalized in any contract programmes.

The full opening to competition in these markets could present clear incentives for market skimming. There would be an artificial incentive for entry to more profitable services for operators with no specific competitive advantages, while threatening the continuity of the loss making services.

In this context, a more controlled model for opening to competition seems reasonable, with a real gradual nature, but consistent with the statutory requirements of open competition. The creation of a duopoly, as the first phase of opening to competition seems an appropriate choice for the situation of the sector in Spain. In any case, the gradual time periods should be established ex ante and enforced strictly to avoid damaging the credibility of the opening process

18. LINES OF RESEARCH AND FUTURE DEVELOPMENTS / *Ana María Fuertes, Timoteo Martínez, Israel Pérez*

Empirical evidence indicates that railway transport and especially the present one has evolved within national borders differently; each State has created its own railway system, based on local considerations and domestic industries, along with the railway undertakings, which adopted their own technical and operational standards. Where few regulatory models used to provide passenger services are pure, all show obvious adjustments to suit the particular circumstances of different countries.

So proposing different modelling alternatives that enable the end decider to contemplate different opening options and strategies becomes an essential tool in the decision making process.

This has been the prior objective of the competition modelling phase. Using the development of a laboratory experiment to create an operational tool for decision making in the process of market opening in railway passenger services in Spain, enabling the ultimate decision maker to contemplate different possible options.

In this context, and based on the results obtained by the project, we believe that future research should focus on the practical application of the regulatory framework chosen by the decision maker.

18.1 Extensions of the experimental model

Given that the experimental study has been carried out under the paradigm of market competition, the natural extension at a later stage should introduce competition in the market and use experimental evidence generated to date as a comparative framework. This would involve adding a new experiment to maintain both the theoretical model and the parameterization used in the analysis carried out into market competition.

Unlike market competition, where operators are competing to gain the right to monopoly franchise of the railway network, competition in the market enables operators to compete within the same franchise, scheduling routes in different time slots. Thus each combination of route and time slot becomes a very different asset for which potential operators must bid in the tender process. So, it would be possible to use the same network, demand and cost functions and the parameters used in the study carried out in the OPTIRED project. Therefore, the type of tender used for operators to submit their bids would still have an identical structure. The difference with the tender used in the market competition model would be that now, as already noted, the experimental individuals (in the role of operators) could bid on each of the usage rights arising from the network and made up of a particular connection and time slot. This would allow us to directly compare the results obtained in basic processing of the market competition case with the new evidence obtained under the paradigm of competition in the market. Since the type of competition to analyse is completely different, the software created to conduct the experimental sessions on market competition should be modified, but still maintain the same programming language and the same structure of communication between server and clients.

In the study carried out into market competition, particular stress was given to the importance it has, for both operators and users, who take advantage of the synergies provided by the network connectivity, as reflected in the demand function. This importance is highlighted through a minimal structure imposed on operators in some of the experimental processing carried out. In this new study it would be interesting to analyze how these synergies could be exploited by the possibility that the individuals were empowered to make combinatorial bids, by which they decided to choose a series of connections and paths. These bids allow the operator to link the purchase of the usage right to another one and would allow them to make use of complementarities between stations in adjacent time slots. Based on the railway network presented in the analysis into market competition, each new experimental session would consist of 5 rounds and each of these rounds would consist of two parts. In the first part (Part A) of each round a bidding process would be opened in which the individuals would bid for each of the available usage rights, formed by combinations between existing time slots and possible routes offered by the network. In the second part (Part B) operators would decide, from the usage rights gained, which routes to schedule. In order to establish possible comparisons with the basic processing analyzed in the study of market competition, the tender process would be open to four potential operators.

18.1.1 Part A. The combinatorial tender in competition in the Market

In this tender, each potential operator can obtain the right to schedule a route within a specific time slot. There are a total of 14 network connections and 5 time slots available which means that there are 70 usage rights that have to be assigned. However, since a fast train is nothing more than the combination of two slow train connections, it is necessary to assign separate usage rights for fast trains. This is so because an operator that gains the usage rights to run a train in a given time slot between stations 1 and 2 and also between stations 2 and 3, is able to run a fast train between stations 1 and 3. Consequently, 50 usage rights must be assigned in this tender process (10 connections* 5 time slots). Once the individual has obtained the usage right to run a train on a particular route and time slot, in Part B it must decide whether to run this train or not and this decision will rest solely with them and nobody else.

In principle, the operator can bid for 50 separate usage rights by offering EXCUS (Experimental Units of Account) for them. The more EXCUS offered the better the supply and the greater the chances of the operator of gaining the usage rights. However it is also possible to bid for several usage rights at once (in combination). In this case when the operator makes a combinatorial bid, it bids simultaneously for several routes in various time slots and each bid is only valid if you accept the other bids with which it is combined. Thus, if an operator that competes with another participant gains the rights on a single route, the rest of the bids for that participant, being combined, will be lost. A combinatorial bid beats individual bids when the amount of EXCUS offered through individual bids is lower than in the combinatorial bid.

The tender process takes place over several rounds of bidding. In each round of bidding each operator can make a maximum number of bids, which can be individual or combinatorial and their intersection is not necessarily zero. After the round of bidding has finished, the best bids are made public. In light of this information, the operators have the opportunity to improve their bids. After the last round of bidding, the computer system provides the final results, assigning each operator usage rights obtained in the tender process.

18.1.2 Part B. Scheduling routes and pricing

After the allocation of usage rights, operators would have 5 decision periods in which they must choose which routes to schedule and set their prices. In each period the operators schedule their trains without knowing the decisions of other network operators. Once they have made all the period schedules, demand for each operator will be simulated by the computer (following the structure of the demand function presented above) and this will determine their earnings for the period. This experiment was performed under the condition of imperfect information. Participants know neither the form nor the size of the market demand function. The only information available to operators is that referred to in the schedule established by each rival operator and their fares. In light of this information, the operator may choose new schedules in the next period. Once this process of 5 scheduling periods has finished, a new round starts in which franchises shall be allocated for the tendered network.

This extension of the model would generate a body of empirical evidence complementary to that produced in the OPTIRED project, which would not only allow new results in themselves regarding the most efficient tender process more in the field of competition in the market, but it would enable us to obtain results on the most efficient type of competition since it is directly comparable with some of the empirical evidence already obtained. Given the complexity of this new experiment, it would be necessary first to train the individuals participating in two areas: (1) the combinatorial bidding process and (2) the scheduling of experimental network routes and their pricing based on competition. This training will allow us to rule out individuals that do not provide good results in understanding the above concepts.

This experimental processing would be directly comparable to basic processing carried out in the analysis of market competition and would allow us to establish robust results on the degree of competition caused by the two types mentioned: market competition and competition in the market. Additionally, this presents the opportunity to study different tender processes within competition in the market as possible alternatives for improving the structure of competition in the network in order to exploit connection synergies between stations. This would lead us to implement two additional processing models of competition in the market with different tender processes to the process (S1) introduced in the initial processing presented. In addition to seeing in this competition case the impact of competition in the establishment of minimum services on certain origin-destination routes, a variant of competition in the market but with the establishment of minimum services.

Another possibilities that arises, in addition to this competition in the market experiment, is to study impact on the establishment of the infrastructure charge, an important factor in determining competition, as well as the most influential factor in the competition in the market option considered.

Outlined below is the number of individuals participating in each new processing of competition in the market.

Tabla 11. Number of target individuals participating in a future competition experiment / *Source: OPTIRED*

Process	Tender	Periods	Sessions	Individuals
T0	S1	25	2	80
T1	S2	25	2	80
T2	S3	25	2	80
	TOTAL			240

This number of individuals per process would allow us to have a sufficient number of independent observations in order to properly perform the subsequent statistical and econometric analysis.

18.2 Other experimental model extensions

OPTIRED project information will provide enough material to develop, broadly and in parallel, new extensions, one of the fields being related to the infrastructure and social profitability of economic investments in main lines and high speed in Spain in relation to territorial cohesion and regional development. Investments in infrastructure for the transport system should not be separated from regional development policies and territorial articulation. Nor should we consider those used on high speed railway lines as a simple response to congestion of other means of transport in metropolitan areas. Without these precautions, ex ante appraisal of such investments is reduced to a mere examination of explicit returns, ignoring their potential as growth and development factors.

Spanish economic policy is committed to the objectives of improving territorial cohesion and regional development proposed by the EU. The key question right now is whether the delineation of the high speed railway system in Spain really works in favour or against these targets for improvement. Professors Bel and Albalate indicate that the literature shows that passenger-oriented high speed (as in Spain, for now) does not generate significant additional economic activity, does not attract productive investment, and has no effect on the business location, but only consolidates existing processes. But not everyone agrees with this statement. It is possible that the greatest potential of passenger transport between major (metropolitan) population centres could give an advantage indeed to the largest and most remote urban concentrations, which could also open up more opportunities for business location for those areas where more companies are now located, but this does not mean that less opportunities than at present will arise for less important population centres, o for less dense and/or interspersed business locations. The two are not incompatible. Therefore, we need a detailed assessment of the objectives and results for comparing both positions.

On the other hand, one should also take into account the views of planners who believe that new fast high capacity intercity connections are placing us closer to the need for new models of population settlement and location of centres of residence, leisure, trade, work and production. Not all evaluation can therefore be based on current settlement patterns and it is not reasonable, in view of the serious problems generated by large conurbations, to insist on making them grow further.

As Gutiérrez Puebla indicates, secondary networks serve to strengthen the role of small and medium-sized cities and, in general, to open the territories located outside the main corridors. But they also can make transport flows converge toward the major networks, so as to reach the critical mass needed for long distance transport, fuelling profitability requirements. In this sense, the project's objective in this task will focus on the study of the different options which enhance regional development and territorial cohesion, through a Spanish railway system open to competition, and it will draw conclusions about the contribution that railway regulation may make to the specific objectives of regional economic policy in Spain.

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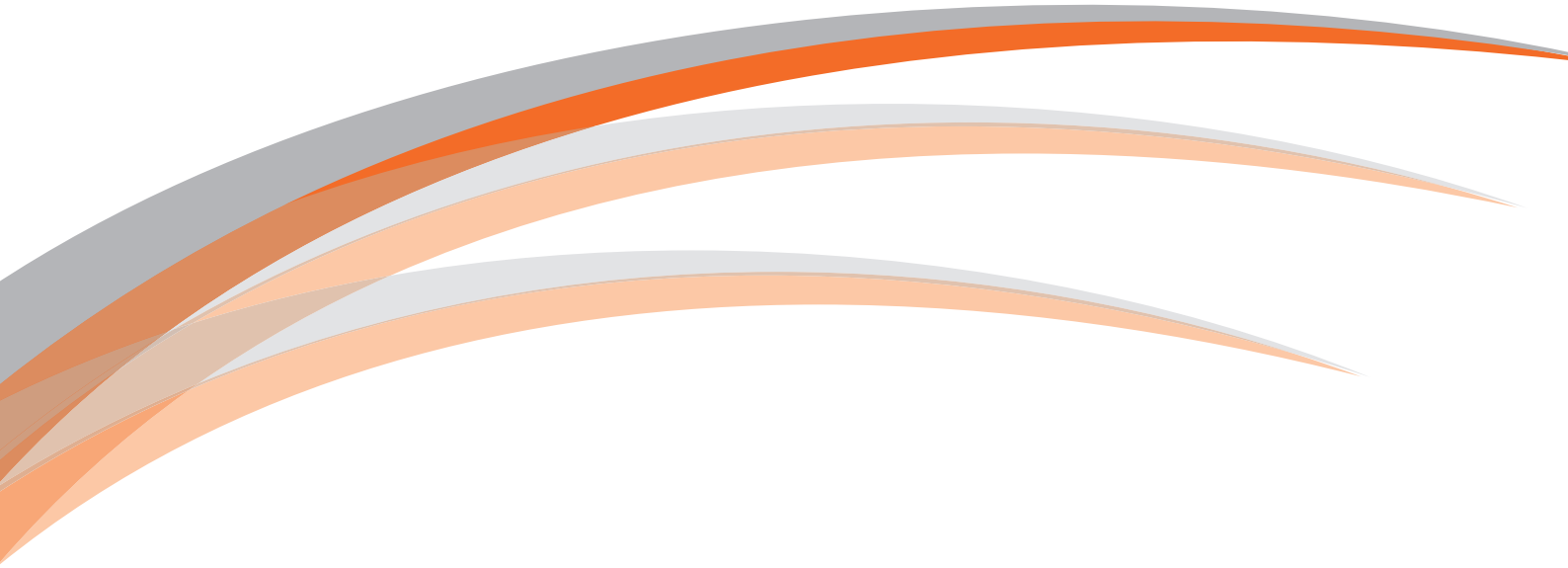

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