

# **EFFECTS OF THE EU RAIL LIBERALISATION ON INTERNATIONAL RAIL PASSENGER TRANSPORT**

Hedi Maurer ✉

Arnaud Burgess

Pieter Hilferink

NEA Transport research and training

Eric Kroes

Significance and VU University Amsterdam

Tony Whiteing

Institute for Transport Studies, Leeds

## **ABSTRACT**

This paper examines the development of the EU27 cross-border rail passenger market prior to its liberalisation in January 2010, and assesses the possible future response in supply and demand under market liberalisation. The main contribution of this study is two-fold: firstly, in order to overcome the serious lack of information relating to international services in Europe various data sources were combined to provide the basis for quantitative analysis. Secondly, the analysis was carried out to allow policy makers to draw conclusions on the effectiveness of the EC rail market liberalisation directives.

## **1. BACKGROUND**

### **1.1. Restructuring of the European Rail Transport Market**

Over the past 20 years the European Community has been engaged in restructuring the European rail transport market and promoting the growth of rail transport. The Community's efforts in opening the rail market, improving interoperability and developing infrastructure have resulted in a growth of the rail market during the period examined in this study (2001-2009) and continued growth is expected. The third rail package anticipates the opening of the rail market for international passenger transport services in 2010. In addition, a pivotal element of the EU transport policy is the development of interoperability within the European Union and in relation to third countries.

In the following sections the most relevant terminology used in this paper is defined.

### **1.2. Geographical Scope**

The geographical focus of the first part of the study concentrates on EU international rail passenger transport within the EU27, with the exception of Malta and Cyprus. In the second part the geographical scope is extended to include international rail transport between the EU and third countries. These

are the neighbouring countries with a railway connection to the EU, namely Norway and Switzerland, Russia, Ukraine, Belarus, Moldova, the non-EU Balkan countries and Turkey.

### **1.3. Cross-border Rail Operations**

The international train services that are analysed relate to passenger train services connecting at least two stations in different countries, and where at least one of them is situated in a Member State of the European Union.

### **1.4. Market Segments**

The market segments that have been considered within the study are as follows:

1. High-speed trains (HST)
2. Intercity/Eurocity (IC/EC) trains
3. Long-distance trains (LD)
4. Regional trains (RT)

#### High-speed services

High-speed services are defined within this study as services advertised as high-speed (Train à Grande Vitesse (TGV), ICE, etc). This includes services that use high-speed infrastructure within one country but continue on conventional tracks on the cross-border section.

#### IC/EC Trains

IC (Intercity) trains may provide domestic or international services; EC (Eurocity) trains are by definition international. IC/EC services are operated on the main international lines (but not on the dedicated high-speed lines). Together with the domestic IC networks, the IC/EC lines offer a more or less complete network of long-distance services between major cities. The market position is strong on distances up to 300 km.

#### Long-Distance Trains (LD)

This category consists of all long-distance trains (mostly over 100 km) not branded as high-speed or IC/EC. They differ from RT by distance and by their relatively limited stopping pattern. Branch-line services are mostly regarded as regional services; however, the dividing line between RT and long-distance trains is somewhat arbitrary.

#### Regional Trains (RT)

RT cover shorter distances (mostly below 100 km), generally stopping at all stations and using either main-lines (together with other categories of trains) or branch-lines. Cross-border RT services can be part of a suburban or regional transport system, organised by regional authorities who also coordinate buses, tramways and/or metro services.

Compared with the domestic RT, the market for international RT is modest. As most of the borders concerned are not within densely populated areas, the demand for regional international services is relatively low.

### **1.5. Occupancy**

The occupancy of a train is defined as the average number of passengers per train at the border crossing, also referred to as the load factor. Wherever possible we have used direct sources, e.g. from Treni Internazionali, RENFE, Deutsche Bahn. However, where data were not available, average load factors by train category were assumed and multiplied by the train frequency; then the occupancy was computed. The Thomas Cook European Rail Timetable (2000, 2007 and 2009 versions) provided information on the daily numbers of cross-border services in the following categories: high-speed and Intercity Express (HST/ICE) Intercity/Eurocity/Interregio (IC/EC) other long-distance trains (other LD) and regional trains (RT). We assumed the following train load factors for EU15 – EU15 rail services for a first approximation:

1. HST/ICE: 300 passengers on average (and also for CH and NO)
2. IC/EC: 200 passengers
3. other LD: 100 passengers
4. RT: 20 passengers

For cross-border rail services that were not EU15 - EU15, we assumed for a first approximation:

1. HST/ICE: 100 passengers on average
2. IC/EC: 100 passengers
3. other LD: 50 passengers
4. RT: 10 passengers

The daily numbers of services each way were first doubled in order to account for the return trips and then multiplied by 365, and by the average load factor, to obtain the annual number of passengers for each border crossing. In this study train occupancy has been expressed as the ratio of passenger-kilometres to train-kilometres.

## **2. METHODOLOGY**

### **2.1. Methodology of Combining the TRANS-TOOLS and Eurostat Origin-Destination (O-D) Data**

For estimating rail passenger movements (within EU27 and third countries) three sources of information have been used to compensate for the absence of a single comprehensive data source:

1. Eurostat transport statistics provide data on cross-border passenger rail transport from 2000 up to 2008.
2. The TRANS-TOOLS transport model provides estimates of passenger flows in 2005.

3. Train frequencies were derived from timetable information dating from different years.

The differences between the sources led to interesting insights. Eurostat figures do not always give a complete picture, as several services (mostly short-distance PSO services, which means that there is an obligation to carry out a service with a certain number of trains per day and at a specified quality level.) are not reported in Eurostat. The results of the TRANS-TOOLS model, in this case, reinforce the analysis. If both, the TRANS-TOOLS modelled flows and trip frequencies were higher than those reported in Eurostat, then the TRANS-TOOLS data were taken as the reliable figure, otherwise the Eurostat figures were taken. Expert opinion has been used as a check in the cases where specific circumstances could be identified that had not been taken into account within the TRANS-TOOLS modelling.

## **2.2. Methodology for Calculating Demand at a Cross-Border Level**

As the next step, cross-border figures were estimated. O-D matrices from TRANS-TOOLS were assigned onto the network. In cases where in the previous step it had been decided to use sources other than the TRANS-TOOLS data, the cross-border data have been revised accordingly. Also, by using expert opinion some changes have been made to transit traffic; this relates to links where the TRANS-TOOLS data are (in the opinion of the experts) obviously too high.

## **2.3. Supply: Train Frequencies**

The monthly published Thomas Cook European Rail Timetables provided information on the daily numbers of cross-border services in each of the above mentioned train categories.

# **3. RESULTS**

## **3.1. Overview**

Results for rail demand are presented separately for passenger traffic across internal EU27 borders by geopolitical submarkets, namely EU15, who joined the EU before 2004, the new member states EU12, and traffic between the EU27 and neighbouring countries - Switzerland, Norway, the Balkan countries and Eastern Europe. The analysis of international rail passenger supply additionally took into consideration various submarkets by train type (high-speed trains, Eurocity/Intercity, long-distance trains, and regional trains).

The following aspects of international rail travel have been analysed:

- o Demand developments in the recent past
- o Supply idem

- o Projected demand for the period up to 2020
- o Developments with operators
- o Cross-border traffic
- o Niche markets, such as night trains
- o Barriers to entry and competition
- o Profitability

### **3.2. Evolution of international rail passenger demand and supply**

Nearly 100 million international border crossings were made in 2007 by rail passengers across internal EU27 borders, which represents an increase of 27 percent compared to 2001. The internal borders between the EU15, i.e. the “old members”, account for 85 percent of this traffic. Growth here is dominated by the developments in high-speed services between France and various countries and by the traffic between Denmark and Sweden. On other international crossings across EU15 - EU15 borders, the average growth rate has been below 10 percent over this seven year period.

International passenger services are modest in comparison to domestic services. On longer distance trips, i.e. trips of over 400 kilometres, rail has a relatively small market share. For such trips, the car and plane have largely captured the market. In short-distance regional rail markets, most demand is related to suburban rail services within agglomerations inside one country and hence the volume of international rail travel is modest. There are however just a few examples of suburban rail services where international transport takes place, one of these being the S-Bahn around Basel.

Approximately 90 percent of international rail passengers travel between neighbouring countries for distances of less than 300 kilometres. High-speed rail services, however, can be competitive on journeys with a duration of up to four hours, examples being the Paris-Amsterdam and London-Brussels routes.

The average growth in markets between old and new Member States is 51 percent, which is almost twice the total EU27 average. Here supply has also grown significantly, especially on cross-border regional services.

Traffic between the EU27 and neighbouring countries accounts for approximately 26 million passengers - 20 million across borders with Switzerland and Norway and 6 million to or from the Balkan countries and Eastern Europe. Table 1 presents a summarised overview of the developments in international rail passenger demand.

**Table 1 International rail passenger demand for 2001 and 2007**

<b>Submarkets</b>	<b>Rail passenger demand in 1,000 passengers for 2001 (cross-border)</b>	<b>Rail passenger demand in 1,000 passengers for 2007 (cross-border)</b>	<b>Growth of rail passenger demand between 2001-2007 (in %)</b>
EU15 - EU15	67,582	84,036	24%
EU15 - EU12	6,415	9,679	51%
EU12 - EU12	4,120	5,344	30%
Total EU27	78,293	99,059	27%
EU27 - CH/NO	15,745	20,386	29%
EU27 - Eastern Europe	4,341	6,092	40%
Total EU27 - non-EU	19,988	26,478	32%
Total rail passengers within EU27 and EU27 – non-EU (in 1,000 pass)	98,248	125,536	28%

*Source: NEA analysis*

### **3.3. Market Segments**

The market for high-speed trains has grown strongly in recent years. Through the use of new cross-border infrastructure, effectively linking improved domestic networks in France and Germany, more attractive international services have been developed. The increased market share of such high-speed services has reduced the market share of other, slower, long-distance train services.

IC/EC branded trains cover a core network between major cities and provide services offering high quality. Other long-distance trains are slower in comparison and (in most cases) less frequent. Many of such services are not profitable and supply is under pressure. The niche markets of night trains and car sleeper trains face strong competition from low-cost airlines and low-priced buses. Car sleeper services are also suffering from the availability of affordable car rentals at holiday destinations.

The international market for RT services that cross borders is relatively small, as in many cases border areas are not densely populated. In such cases, international Public Service Obligation (PSO) contracts are commonly applied to cover operational deficits.

### **3.4. Occupancy**

Despite the growth in traffic, the occupancy (measured in number of passengers per train) at the borders between EU15 and EU12 Member States is (still) only 43, suggesting that on average these services remain financially insecure. This compares with an average occupancy of 135 at borders between EU15 Member States. The international high-speed train services contribute strongly to the average occupancy at EU15 - EU15 borders. The development of the supply of RT financed by PSO contracts has been most notable on routes across EU15-EU12 borders, and on these types of services occupancy at borders is generally far below average.

### **3.5. Operators**

There is great diversity in the types of ownership and financial arrangement for rail passenger operators (see Annexes 1 and 2). The predominant group is the category of national incumbent operators, who draw up bilateral agreements for international rail passenger services. Sometimes they have set up jointly owned subsidiaries and it is argued that these have a greater ability to respond quickly to market conditions.

A key problem in the international rail passenger market is that most market segments, with the exception of some high-speed rail services, are barely profitable. In some cases, particularly on high-speed lines, high track access charges contribute to the weak financial performance, especially where competing modes – in particular air – do not pay their marginal social costs.

Regional services require subsidy through PSO contracts, but these are more challenging to negotiate internationally than for the domestic market, as they usually involve more than one franchising authority. Two models of cross-border services PSO contracts can be distinguished: (i) a contract between an operator and authorities on both sides of the border; (ii) a contract with just one authority; this authority is financially compensated by an authority on the other side of the border through a bilateral agreement between the authorities. This agreement is not included in the contract with the operator.

Technical requirements to operate in more than one country may raise the cost of rolling stock provision, forming a barrier to entry unless the franchising authorities themselves provide the rolling stock. A further problem is the delay in the implementation of previously passed rail legislation which leads to processes which favour incumbents over new entrants.

Assessing the situation of private and incumbent operators in the medium-term market based on empirical evidence, the incumbent operator seems to be in a winning position. It is very rare for two private railway undertakings to be involved in any one international rail business relationship.

### **3.6. Future Orientation**

Using the TRANS-TOOLS model it is predicted that up to 2020 passenger border crossings between the EU27 Member States will increase by 17 percent (compared with the base year of 2007) and passenger border crossings between EU and non-EU countries will increase by 21 percent.

Looking at different submarkets, different developments can be observed. High-speed services are operated on a commercial basis and new entrants are expected to take a share of this market in the future. At the same time, there are signs that the incumbent state-owned operators, which have hitherto cooperated in the running of international services, are beginning to compete with each other as well. Where they run services jointly, there is a trend towards doing this through a separate jointly owned subsidiary company (rather than through jointly operated services). This concept is believed to lead to better marketing and a more flexible approach to market developments. Increased competition and the completion of new infrastructure will facilitate further strong growth; any implementation of transport policy measures aiming to internalise the external costs of the airline industry could enhance this growth even further.

Night trains represent a niche commercial market where developments are less positive. Competition exists from low-cost airlines, low-priced buses and accelerated day trains. Moreover, aging rolling stock, relatively low levels of service and security incidents contribute negatively to the attractiveness of night trains. Incumbent operators that have cross-financed these services as part of their total concessions are no longer obliged to do so, nor are they prepared to offer loss-making services. Several services have ceased operation in recent years. Private operators are taking a larger share of this market.

A growing market is the regional market for trains financed under PSO contracts. In this market several routes have enjoyed a revival, after being neglected by their incumbent operators for many years. In many Member States private operators compete with incumbent operators for the PSO contracts and in other Member States this is expected to happen in the near future. Cross-border PSO contracts require a high degree of cooperation between franchising authorities in neighbouring countries, and whilst there are some excellent examples of this working well, there are also examples of missed opportunities. A condition for the development of these types of



services is the availability of subsidies; especially in the new Member States this is a bottleneck and it must be stated that the future of several international regional lines in Eastern Europe is insecure. In addition to financing regional trains, PSO contracts can also be used to safeguard international long-distance services. Many long-distance trains that are not branded EC or IC are not profitable and can survive only through co-financing by authorities.

### **3.7. Barriers to development**

In the subsidised (PSO contract) market, the involvement of various authorities complicates the organisation of international services. Nevertheless there are several good examples of international regional lines that are run under a PSO regime.

Many technical barriers to the operation of international services still exist, requiring solutions which come at additional costs. As international passenger transport covers only a very small part of the total rail service that is offered, technical standardisation is only feasible to a limited extent.

The incomplete implementation of existing EU legislation continues to be a barrier to the development of cross-border passenger services. In some countries fears remain of discrimination in the allocation of paths. Problems and delays in accessing facilities such as cleaning and maintenance depots can act as additional barriers. The lack of strong independent regulators, to whom appeal can be made in case of dispute, is also considered to be a barrier. High track access charges can also be a barrier, particularly on new high-speed lines. An additional barrier is the failure to charge air transport for its externalities or even to harmonise tax arrangements such as value added tax between the two modes.

Border delays still make cross-border rail travel unattractive between some countries. Poor organisation and fears of unreliability on the part of the railway companies are factors contributing to this barrier.

## **4. Summary**

In summary, the market for high-speed trains has grown strongly in recent years; the increased market share of the high-speed services has reduced the market share of other, slower, long-distance train services. The niche markets of night trains and car sleeper trains face strong competition from low-cost airlines and low-priced buses. The international market for regional train services that cross borders is relatively small due to the relatively low population in the border areas. The predicted growth between 2007 and 2020 (within EU27: 17%; between EU27 and non-EU: 21%) is lower than the

observed growth between 2001 and 2007 (within EU27: 27%; between EU27 and non-EU: 32%).

A key problem in the international rail passenger market is that most market segments, with the exception of most high-speed rail services, are hardly or not at all profitable. Although significant growth in rail markets is predicted, there are still barriers to entry and competition that will need to be overcome, such as the lacking technical standardisation and slow implementation of EU legislation.

## 5. Acknowledgement

This study has been financed by DG TREN.

## Bibliography

Activity Report on Cross-border Issues and Results of the Cross-border Surveys. <http://www.internationaltransportforum.org/Proceedings/Border2009/09Miltiadou.pdf>.

Annual Report Comboios de Portugal, 2008.

Annual Report AS Gorail, 2008 ([www.gorail.ee](http://www.gorail.ee)).

COTIF Appendix A to the Convention concerning International Carriage by Rail (COTIF) of 9 May 1980, OTIF, Berne, 1980. Text available on <http://www.unece.org/>.

COWI, NEA and IWW (2007) Feasibility study on Rail Baltica Railways, *Final Report for the European Commission*, Directorate-General Regional Policy, Brussels.

CREAM project <http://www.cream-project.eu/>.

Ecorys (2006) Study on Strategic Evaluation on Transport Investment Priorities under Structural and Cohesion Funds for the Programming Period 2007-2013.

Eurobarometer surveys: [http://ec.europa.eu/public\\_opinion/index\\_en.htm](http://ec.europa.eu/public_opinion/index_en.htm)

European Commission (2009) European High-speed Rail – An Easy Way to Connect, EC, Brussels.

Eurostat, website [/epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home](http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home).

Holsten, J.U. and Pulver, T. (2009) Überholspur oder Abstellgleis Studie zum europäischen Schienenpersonenverkehr 2009 *Internationales Verkehrswesen* 61(9).

[http://ec.europa.eu/transport/studies/index\\_en.htm](http://ec.europa.eu/transport/studies/index_en.htm).

[http://ec.europa.eu/transport/rail/studies/index\\_en.htm](http://ec.europa.eu/transport/rail/studies/index_en.htm).

Italferr, NEA, IIPP, W+B (2009) General Master Plan for transport in Serbia, Final report – Executive Summary.

Lisbon Strategy for Growth and Jobs National Reform Programme 2008-2010 (Interministerial Committee for EU Affairs, 2008).

Nagl, P., Kummer, S., Stranner, G. (2008) A Broad-Gauge Connection to the Vienna/Bratislava Twin City Region, Railway Market-CEE Review No. 2 2008, Institute for Transport and Logistics Management, Wien.

Preston, J (2009): Competition for Long-distance Passenger Rail Services: The Emerging Evidence. 18th international symposium on transport economics, International Transport Forum, Madrid.

PWC, NEA (2009) Impact Assessment Study On Amendments To The Rail Access Legislation In The Framework Of The Recast Of The 1st Railway Package, Annex H – Liability Rule.

*Railway Gazette International* (different issues) as well as [www.railwaygazette.com/](http://www.railwaygazette.com/)

RETRACK project <http://www.retrack.eu>

SIA (2008) NK Konsultaciju birojs, “Rail Baltica Corridor Study. Assessment of the Rail Baltica Railways Corridor Alternatives, *Final Report*.

Slovenian Railways in figures, 2007.

Technical Secretariat Pan-European Transport Corridor X (2009). Activity Report on Cross-border Issues and Results of the Cross-border Surveys; M: Main axis, B, C: Branches of Corridor X.

TEN-T EA data-sheet, 2009.

The iTREN-2030 Reference Scenario until. 2030 Deliverable D4 (2009) Project No: TREN/07/FP6SSP/S07.68203/044260 Instrument: SSA – Specific Support Action Thematic Priority 8.1: Policy-Oriented Research: Scientific Support to Policies – SSP.

Thomas Cook European Rail Timetable, various years.

TRANS-TOOLS instead of mentioning all reports we refer to the website <http://energy.jrc.ec.europa.eu/TRANS-TOOLS>.

SBB AG 2005-1006-2007-2008 Annual Reports

Serbian Statistical Office Publication on transport, 2009.

UIC Statistics, 2007.

Union Internationales des Chemins de Fer (2008) Infrastructure Charges for High Performance Passenger Services in Europe. UIC, Paris.

United Nations/UNESCAP <http://www.unescap.org>.

## Annex 1 Operators according to type of ownership

Group	Ownership of operator	Example
I	State-owned operators	This is the classical form and still exists in almost all Member States
II	Subsidiaries of state-owned operators: These are formed to carry out specific services. Sometimes a minority share is in the hands of other parties.	NS-Hispeed and CityNightLine (now owned by DB-Fernverkehr)
III	Joint ventures of state-owned operators (or their subsidiaries). These are formed to operate specific international services.	Thalys and Cisalpino
IV	Joint ventures of state-owned operators and private owners.	Eurostar; the original British shares have been privatised. Eurostar runs a commercial service.
V	Operators owned by regional authorities. In general these are regional services supported by PSO contracts.	Examples of international operations of this type are found between Spain and France (Euskotrain) and between Switzerland and Italy (Rhatische Bahn, FART).
VI	Private operators	These are run either commercially (as Tallinn-Moscow) or under PSO (such as Arriva on Groningen-Leer). Also many private operators work in the rail freight sector.

Source: NEA

## Annex 2 Services according to financial set-up

Group number financial	Description of type of service per financial set-up	Group number ownership	Ownership of operator
1	Cross-border services organised commercially by private operators	VI	Private operators.
2	Cross-border services organised commercially by a rail operator owned by the incumbent operators	III IV	Joint ventures of state-owned operators (or their subsidiaries). Joint ventures of state-owned operators and private owners.
3	Joint operations on cross-border services, sharing revenues and costs (reciprocity principle of EuroCity). This is not necessarily a joint venture as in Group 2, but can also be a PSO contract (Group 4). The difference is the focus on the joint service, e.g. Benelux train, with Belgian locomotives and Dutch carriages.	I-VI	In principle all forms are possible.
4	Cross-border services in a national PSO contract (mostly regional services)	I	State-owned operators.
5	Cross-border services organised in a regional PSO contract (regional services)	I V VI	State-owned operators. Operators owned by regional authorities. In general these are regional services supported by PSO contracts. Private operators (e.g. Arriva).

<b>6</b>	(Additional) Cross-border services of commercial lines which are co-financed by a region or city across the border	I-VI	In principle all forms are possible.
----------	--	------	--------------------------------------

Source: NEA

The six types of services and their financial set-ups, are described below.

*1 Cross-border services organised commercially by private operators*

These commercially run passenger trains are managed by private operators (non-incumbents) who operate the services on a commercial basis. Examples are:

- Go Train running between Tallinn and Moscow (run by a travel agent).
- Alp Express (ski trains).
- Holiday car & sleeping trains.

*2 Cross-border services organised commercially by a rail operator owned by the incumbent operators*

The neighbouring incumbent operators establish a joint venture to operate cross-border passenger trains, mostly for one type of service (e.g. high-speed trains). These joint ventures operate commercially. Examples are:

- Thalys (subsidiary of SNCF, NMBS, DB and NS Hi-speed).
- Eurostar (subsidiary of SNCF, NMBS and Eurostar UK).
- Cisalpino (subsidiary of SBB and FS).

*3 Cross-border services organised between incumbent operators sharing revenues and costs (reciprocity principle of EuroCity)*

All traditional long-distance passenger trains work along this EuroCity principle. Costs are generally shared between the incumbent operators. The number of coaches is divided between the operators. The costs are calculated on the axle-kilometre principle. The technical details of these calculations are quite complex. If the final costs do not balance between the operators, this discrepancy will be compensated for. This could entail losses incurred on these services being cross-subsidised from national operations.

Another option is that the international passenger activities of the incumbent operator are organised commercially by a company that is 100 percent subsidiary. This company runs only these trains, on which it is

making a profit. Examples include the ICEs operated by DB and by NS International.

A recent development is the involvement of a different operator instead of the incumbent operator in joint services. An example is the announced cooperation on the Brenner route between DB, Österreichische Bundesbahnen (ÖBB) and the Italian company Ferrovie Nord Milano (FNM).

*4 Cross-border services in a national PSO contract (mostly regional services)*

This model can be found most especially in the Central and Eastern European Member States. In general the regional border crossings are divided between the two incumbent operators on both sides of the border.

*5 Cross-border services organised in a regional PSO contract (regional cross-border services)*

This category is mostly found in Western European countries. Within a regional PSO the Terms of Reference include the obligation to run cross-border services. The costs are shared between both border regions. In general these trains only travel to the first border town.

*6 (Additional) Cross-border services by commercial lines which are co-financed by a region or city across the border.*

This involves payment of a subsidy to an operator in order to upgrade a specific service, for example the extension of a high-speed service into a neighbouring country. Cities or regions on the other side of the border have an interest in extending the services to their city or region. Examples of this structure are:

- The TGV services which run to certain Swiss cities.
- The TGV to Oostende.
- The direct link between Maastricht and Brussels.
- The high-speed line between The Hague and Brussels (which will be in operation from 2010): the city of The Hague negotiated additional services.