

IRG-Rail (13) 2

**Independent Regulators' Group – Rail**  
**IRG–Rail**  
**Annual Market Monitoring Report**

February 2013

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## **1. Introduction**

IRG-Rail is a group of independent regulatory bodies, whose overall aim is to facilitate the creation of a single, competitive and sustainable internal rail market in Europe. The group was founded in June 2011 and acts as a platform for national railway regulators in order to exchange information and to share best practices, so that in future regulatory challenges can be dealt with in a consistent manner across Europe.

Regulatory bodies have a formal duty to monitor the development of the competition in rail services market, and in particular in the rail transport market pursuant to article 10 of Directive 2001/12/EC. As part of this, IRG-Rail has established a market monitoring working group. One of the tasks of the working group is to produce an annual IRG-Rail monitoring report covering developments in the rail markets of some IRG-Rail members.

This report is the first market monitoring report of IRG-Rail and covers the year 2011, unless otherwise stated.

## **2. Aim**

Rail market monitoring is an important instrument for gathering market information, setting directions to the activities of the regulatory bodies and stimulating market participants to improve their activities. The objective of the IRG-rail market monitoring report is to present the results of the corresponding data collection process led by IRG-Rail. Members of IRG-Rail will use the report for developing their knowledge of the rail market.

### 3. Methodology

Since 2010, members of the IRG-Rail market monitoring working group have been collecting data on their respective rail markets based on a common list of indicators. Despite the differences in the scope of the national market monitors, the working group identified a number of common indicators, agreed on their definitions and on the form in which they should be collected. These indicators are listed in Annex 2 to this report.

A consistent definition of the data and limitation of the scope are necessary in order to ensure comparability of the data. In total, there are 95 common indicators used to assess the current situation in the respective rail markets. The main focus has been clearly set on competition and on infrastructure charges. In addition, IRG-Rail has used the indicators as a basis to determine further normalised key figures, e.g. average number of passengers per train.

The data originate both from external sources (e.g. state institutions for transport statistics) and our own market surveys of the individual members of IRG-Rail and the Belgian regulator. IRG-Rail is aware of the difficulties associated with producing a market monitoring report in terms of consistency and reliability of data and has carried out quality assurance checks on the data to ensure its accuracy. Moreover, thanks to the close cooperation between data contributors, it has been possible to improve the consistency and quality of the data. The 2011 quantitative data collection took place in June/July 2012. Results were finalised in November 2012, after further refinements and revisions of the data collected.

In addition to the quantitative data collection, a common qualitative survey was circulated to active railway undertakings in order to collect information on factors such as track access charges and licensing which may affect railway undertakings' business. The survey was circulated in June 2012 and was finalised in November 2012. The results of these qualitative surveys can be found in annex 4. Responses to the qualitative surveys have been aggregated to avoid publishing data provided in confidence.

The next period of data collection is planned for summer 2013. For the next report, IRG-Rail intends to use data covering both 2011 and 2012 to show evolution of the rail market.

IRG-Rail draws your attention to the fact that the figures presented in this report are not meant, nor could be used, to assess the relative performance of the national railway systems. As highlighted by a study issued by the Center of Regulation in Europe<sup>1</sup>, such an objective would require a much more intensive analysis.

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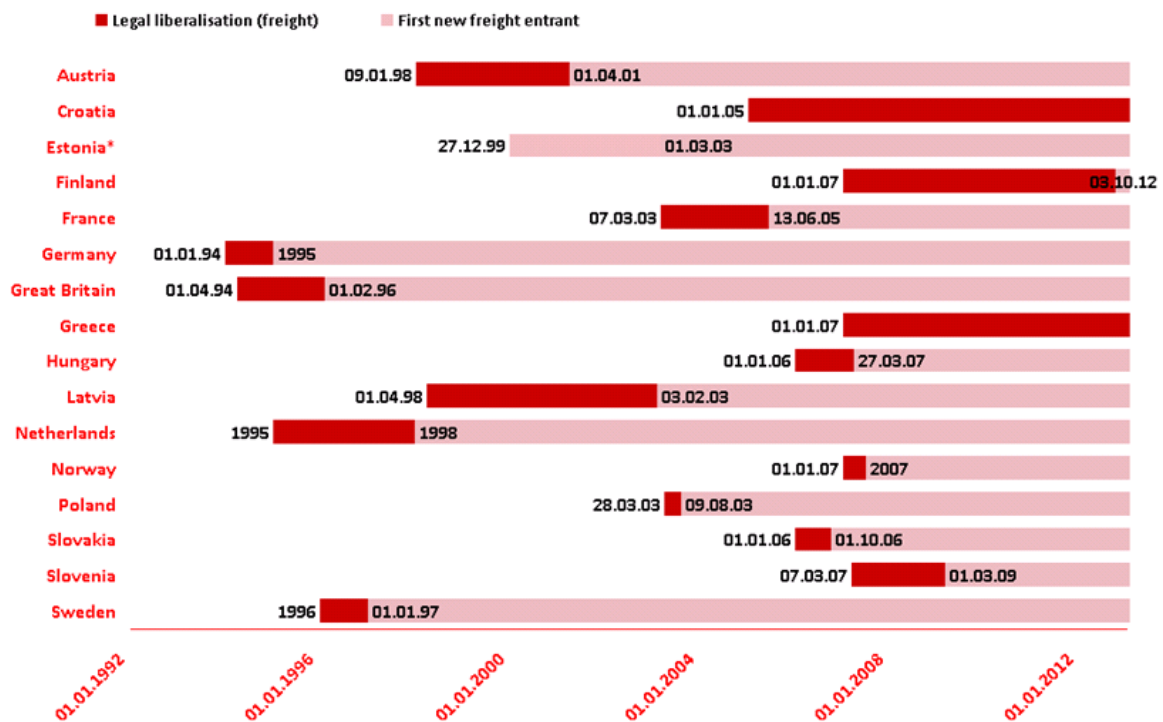
<sup>1</sup> A. Bottasso, M. Conti. *Quantitative techniques for regulatory benchmarking*. CERRE, (2011)

## 4. Findings

### a) *Market structure*

This section provides some background information on the current status of the rail market of the countries monitored which includes the timescales for the liberalisation of the rail freight and rail passenger markets, the ownership structure of the freight and passenger rail markets, the number of active railway undertakings in 2011 and the revenues of railway undertakings<sup>2</sup>.

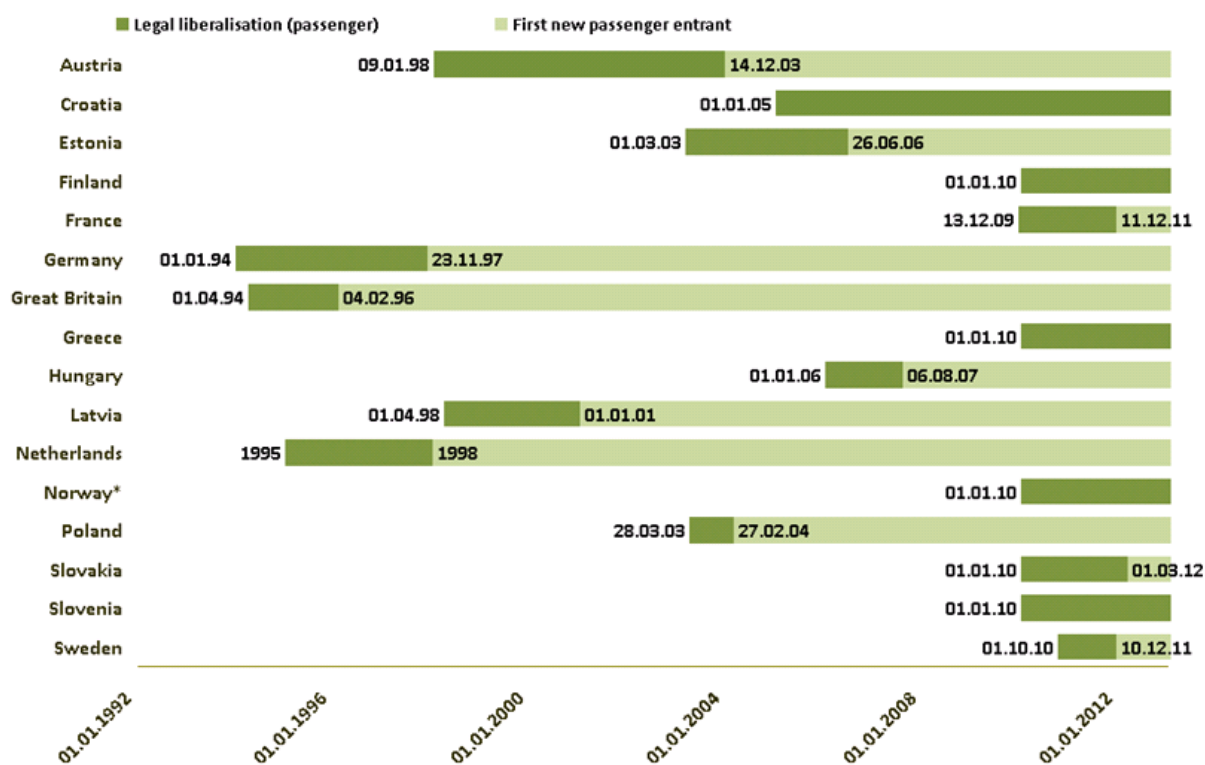
**Figure 1: Liberalisation of the freight market**



\* Estonia had a new freight entrant before legal liberalisation on 1st March 2003.

Where exact dates are not available, they have been set to the appropriate year.

<sup>2</sup> With the exception of the number of active railway undertakings, data refers to 2012.

**Figure 2: Liberalisation of the passenger market<sup>3</sup>**

Where exact dates are not available, they have been set to the appropriate year.

Figures 1 and 2 show the dates of the formal (legal) introduction of liberalisation in the freight and passenger market and the dates when the first competitors entered the freight and/or passenger markets.

The first countries to legally liberalise both the passenger and freight market were Germany and Great Britain in 1994. In each, it was the freight market that was first to have a new entrant with Germany having its first non-incumbent freight operator in 1995<sup>4</sup> and Great Britain following in 1996. IRG-Rail observes that in several countries the legal opening of the passenger market coincides with the legal obligation to open up international passenger market<sup>5</sup>. In 6 of the 17 countries monitored there have been no new entrant passenger operators during 2011, see figure 2.

Annex 1 provides details of the ownership structure of the major railway undertakings in the countries monitored. IRG-Rail observes that there is a significant number of railway undertakings with public ownership, both for passenger and freight operators.

<sup>3</sup> The chart does not necessarily show the liberalisation of the whole passenger market. Some countries have partial liberalisation, i.e. regional transport or international passenger transport. The graph is limited in this respect as it does not show the diversity of the stages of market opening and the details of new entrants.

<sup>4</sup> First entry under real competitive conditions.

<sup>5</sup> Directive 2007/58/EC

**Figure 3: Number of active railway undertakings**

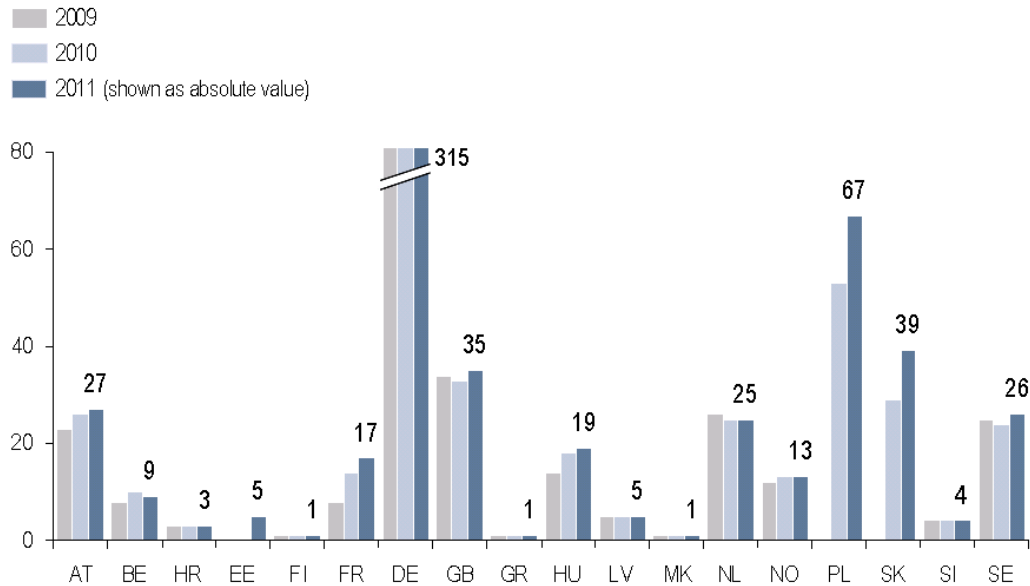


Figure 3 shows the number of active railway undertakings in a country at the end of 2009, 2010 and 2011. Germany has the highest number of active railway undertakings in each of the three years. Overall, there has been an increase in the number of active railway undertakings across the countries reported, the majority of which operate in Germany. The largest increase on 2010 is in Poland, where 14 new entrants have entered the market in 2011. The majority of countries have reported an increase in the number of market entrants compared to 2010 with the exception of Belgium, which has been reduced from 10 operators in 2010 to 9 in the latest year. The three countries that were operating with solely one operator in 2011 were Finland, Greece and Macedonia<sup>6</sup>.

<sup>6</sup> FYROM Former Republic of Macedonia



**Figure 4: Revenues of railway undertakings by type of transport**  
Percentage, 2011

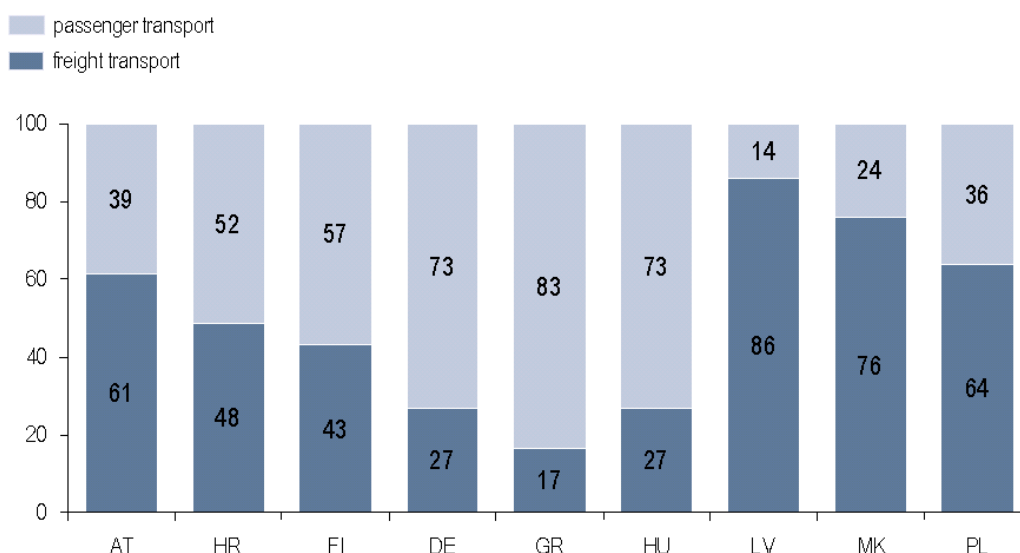


Figure 4 shows the share of revenues of freight and passenger undertakings although data is not available for a number of countries. Greece has the lowest share of freight revenue compared to passenger transport with 17% in 2011. Given that only 7% of total train kilometres are freight in Greece, as shown in Figure 8 this is to be expected. Those countries more reliant on freight revenue are Latvia (86%) and Macedonia<sup>7</sup> (76%). It will be interesting to monitor this revenue split in the forthcoming years to see how the respective markets evolve.

<sup>7</sup> FYROM Former Republic of Macedonia

## b) Infrastructure

This section reports on the characteristics of the network, including the size and its use. The measures of train kilometres and route kilometres give an indication of how the rail network is being used in the national passenger and freight markets and how they compare with other national markets. Similarly, the normalised track access charges data shows how passenger and freight charges differ between countries.

**Figure 5: Length of the network<sup>8</sup>**

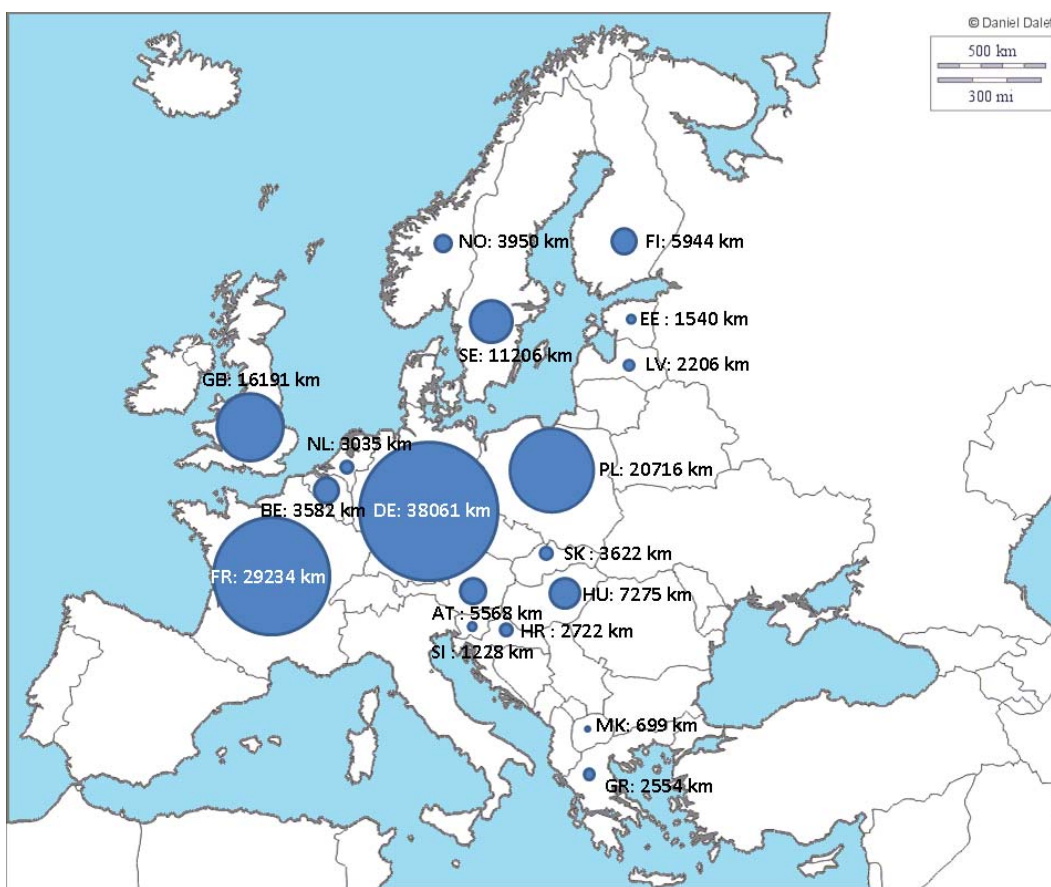
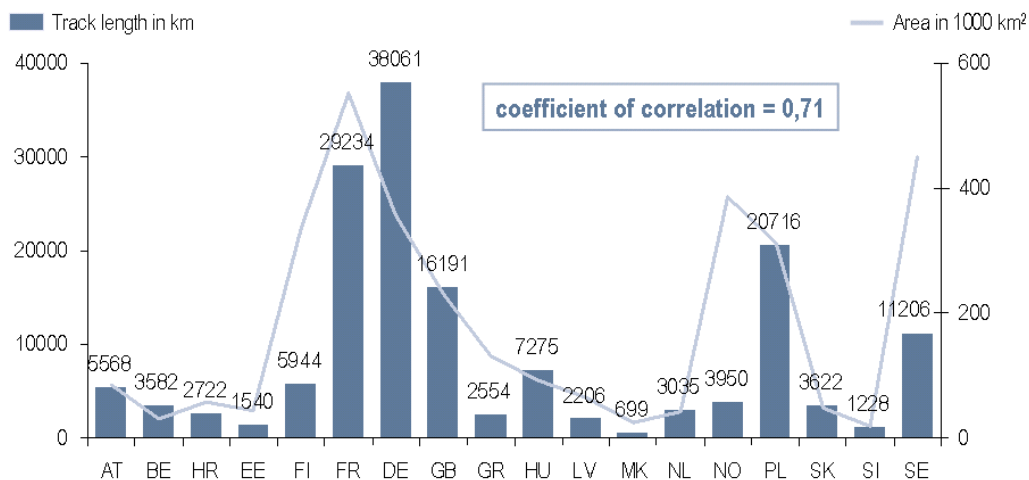


Figure 5 above highlights the heterogeneity in the track length among the countries monitored: the two largest networks can be found in Germany and France with 38 061 kilometer (km) and 29 234 km of tracks. The size of the network is correlated with the size of countries, as well as with the countries' population, as shown in figures 6 and 7, below.

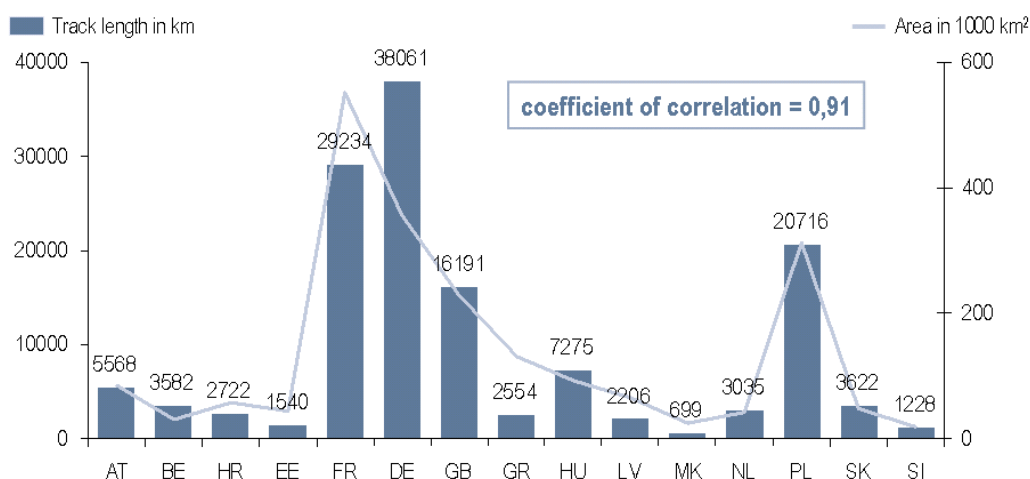
**Figure 6: Correlation of track length and countries' size, 2011**

<sup>8</sup> Reference year: 2011

## IRG-Rail Annual Market Monitoring Report

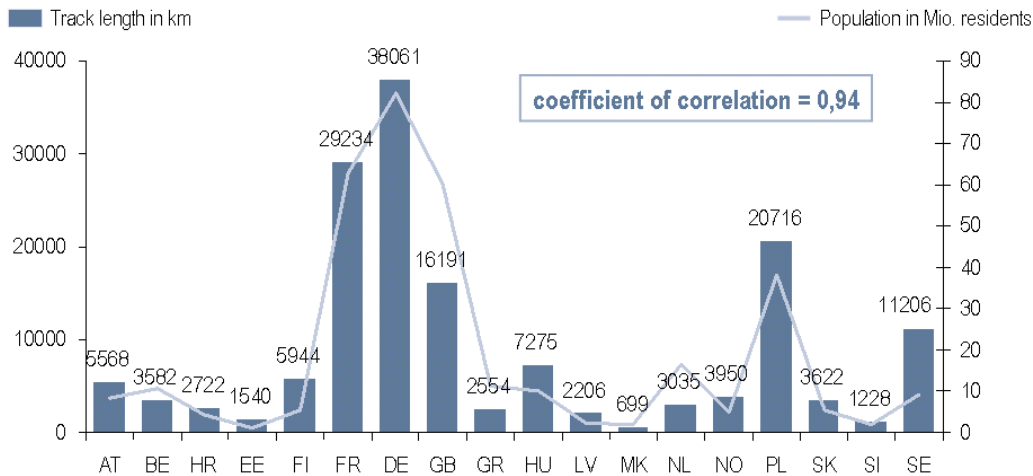


### without Nordic countries



The track length and the respective countries size are correlated with a coefficient of 0,71. By performing the correlation analysis without the Nordic countries, which have a distinctive geography, the correlation coefficient shows a factor of 0,91.

**Figure 7: Correlation of track length and countries' population, 2011**



With a coefficient of 0,94, the track length of the monitored countries shows an even stronger correlation with the countries' population than with the countries' size.

**Figure 8: Use of the network**

Percentages (by train kilometers), 2011

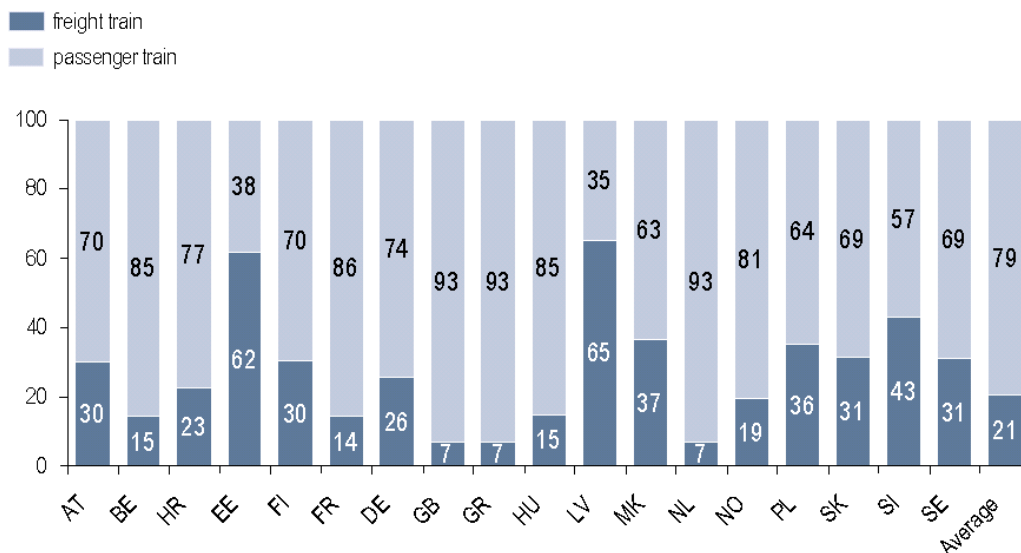


Figure 8 shows the use of the network, determined by taking into account the train km for freight and passenger transport. In 2011, most networks of the countries monitored were more dedicated to passenger services than to freight services. Only two countries stand out: Estonia and Latvia with 62% and 65% respectively of total train km dedicated to freight. Both Baltic countries have a lot of transit freight from CIS countries to the Baltic ports. For more details, see also section (4c) the passenger market and section (4d) the freight market.

**Figure 9: Network usage intensity**

Trains per route kilometer per day, 2011

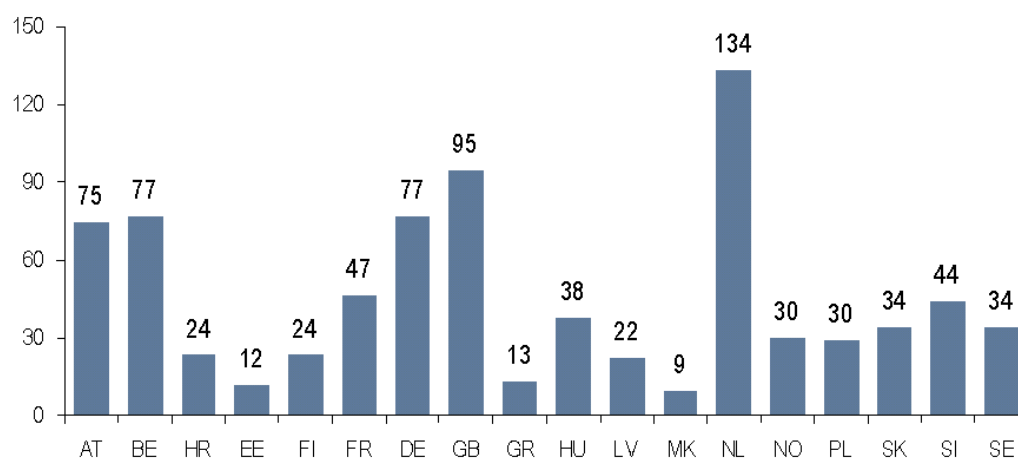


Figure 9 divides the total train km by the track length and by the number of days. The result shows the average number of trains per route km per day for each country monitored. The indicator varies from 9 trains per km and per day in Macedonia<sup>9</sup> to 134 in the Netherlands. This is a variation of a factor 14. The virtual average network usage intensity across the countries monitored would be 55 trains per km and per day.

<sup>9</sup> FYROM Former Republic of Macedonia

**Figure 10: Average track access charges**

Euro per train kilometer, 2011

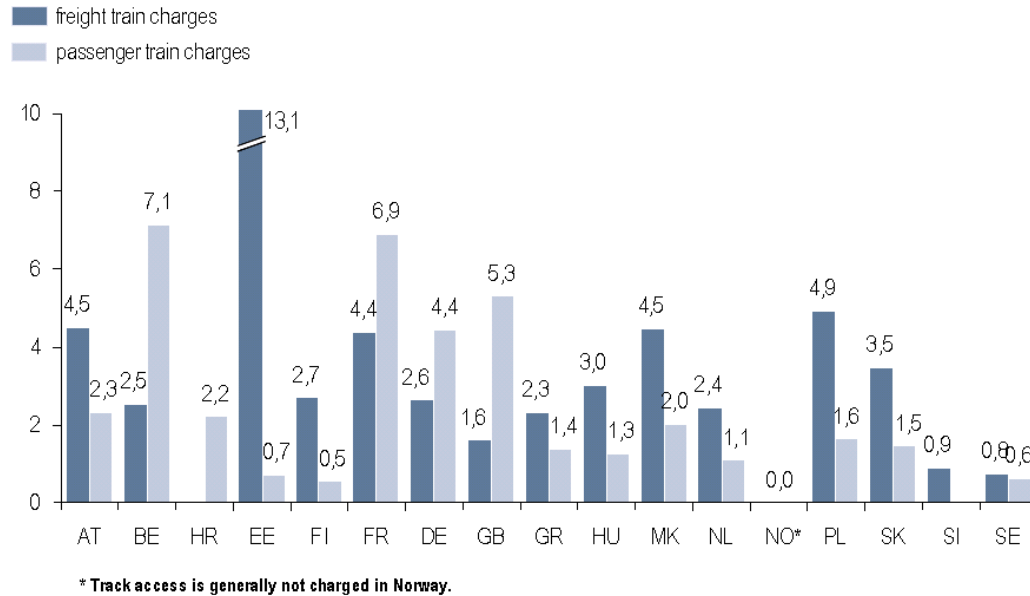


Figure 10 shows the average access charge per train km for the passenger and freight market. The freight train charges vary from €13.1 per train km in Estonia to €0.8 per train km in Sweden. The passenger train charges vary from €7.1 in Belgium to €0.5 in Finland.<sup>10</sup> The average track access charge across the monitored countries are €3.1 per freight train km and €4.2 per passenger trains.<sup>11</sup> The majority of countries monitored have higher average charges for freight than for passenger trains.

<sup>10</sup> The track access is generally not charged in Norway (€0,0).

<sup>11</sup> The averages across countries monitored are calculated by dividing the sum of charges for freight and passenger services by their respective train km.

**Figure 11: Share of track access charges by type of transport**  
Percentage, 2011

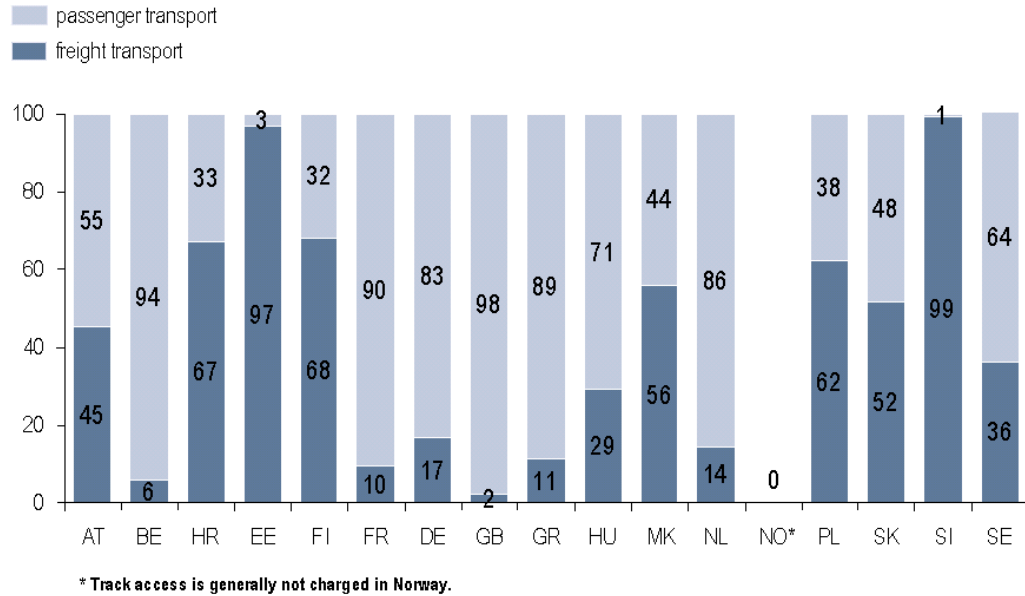


Figure 11 shows the distribution of track access charges between passenger and freight transport.

In seven countries, the freight access charges represent a significant proportion (50% or above) of the total charges collected, while freight traffic exceeds 50% in only two countries. The share of freight access charges is high in eastern and Nordic countries. Despite many networks being mostly dedicated to passenger services, freight transport accounts for a non-negligible part of the track access charges. The share of freight access charges is below 10% in only two observed countries (in Belgium and Great Britain).

### c) *Passenger market*

This section intends to give a picture of the passenger market. This is done by calculating the market share of incumbent<sup>12</sup> and non-incumbent railway undertakings based on passenger kilometres. Data on the number of active passenger railway undertakings is also presented services across countries monitored. By combining the passenger market indicators with other metrics collected, it has been possible to derive other measures such as the average number of passengers per train and the intensity of passenger use of the network.

**Figure 12: Passenger transport**  
Billion passenger kilometers, 2011

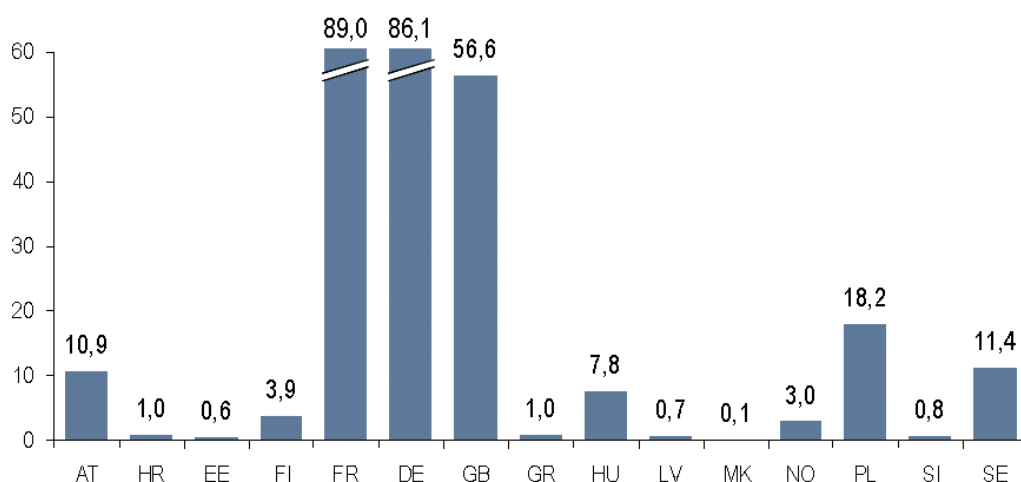


Figure 12 shows the absolute number of passenger km in the countries monitored.

In terms of passenger km, three countries stand out significantly due partly to their large population: France, Germany and Great Britain. They represent almost 80% of the total passenger amongst the countries represented in this chart. These three countries also represent the biggest railway networks in the countries monitored.

<sup>12</sup> IRG-Rail considers a railway undertaking incumbent when the railway undertaking was present before and at the moment of liberalisation of the national rail market and represented respectively represents a dominating position in this market.



**Figure 13: Distance travelled per resident**

Total passenger kilometers per resident, 2011

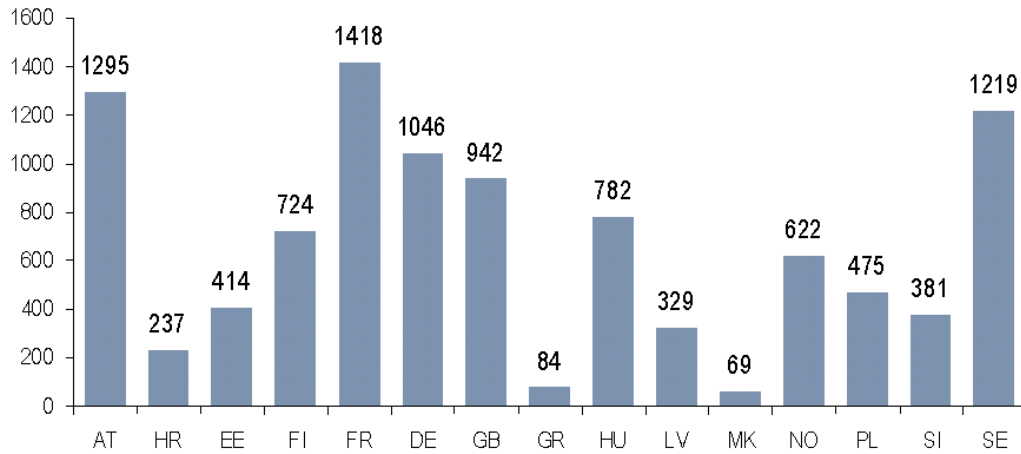


Figure 13 shows the average distance travelled per resident. The average distance is calculated by dividing the total passenger km by the number of residents. Nordic countries and Austria, show a longer average distance travelled per inhabitant than suggested by the previous chart.

**Figure 14: Average number of passengers per train, 2011**

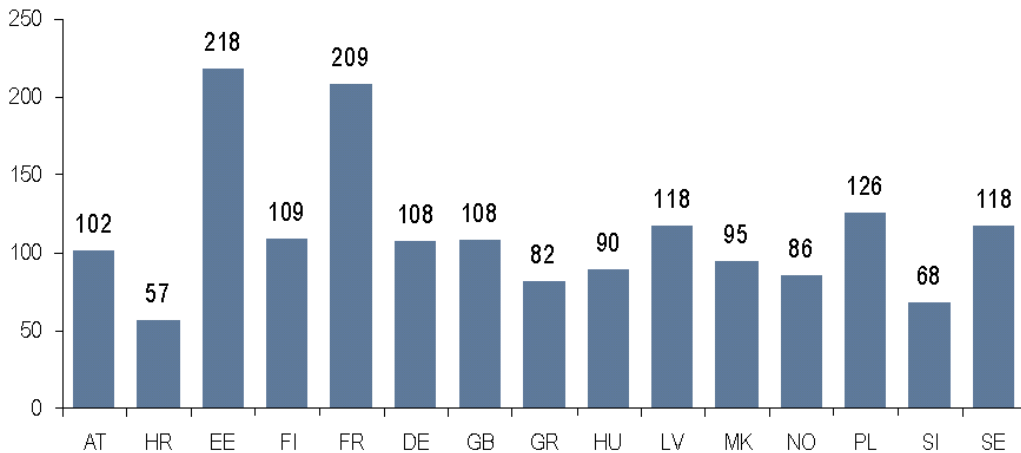


Figure 14 shows the average number of passengers per train calculated by dividing the number of passenger km by the number of train km for the countries shown. The average occupancy across the countries monitored is 126 passengers per train<sup>13</sup>. Two countries show a larger occupancy: France with 209 passengers per train and Estonia with 218 passengers per train.

<sup>13</sup> This figure is computed by taking the sum of passenger km over the sum of passenger train km.

**Figure 15: Passenger network usage intensity**

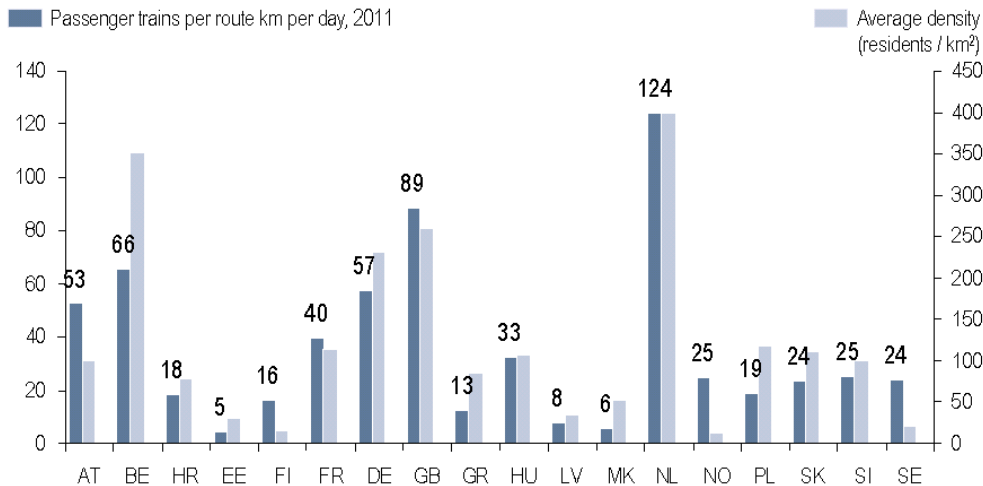


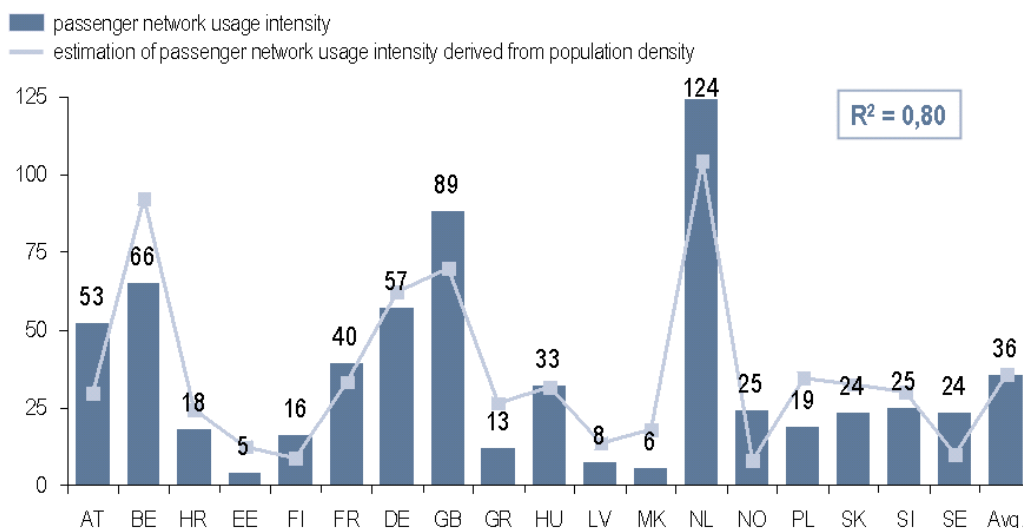
Figure 15 shows the average number of passenger trains per route km per day. The passenger network usage intensity is calculated by dividing the passenger train km by the route length and by the number of days per year. This gives an indication of the intensity with which the passenger market uses the rail network. It is necessary to note that the network can be used by both passenger and freight trains. As a consequence, countries with a higher proportion of freight transport systematically show a lower score.

There seems to be a correlation between passenger network usage intensity and the population density. This is illustrated particularly by the Dutch case: the Netherlands have the highest number of passenger trains per route km per day as well as the highest population density.

Using econometrics, it is possible to estimate the relative importance of the countries population respectively population density on the passenger network usage intensity and on the passenger km. From these econometric tests, we can deduce the curve of what these two measures would be, based on its relationship with the population respectively population density used as explanatory variable. The results of these estimations are shown in Figure 16 and Figure 17. Both estimates give only a relative insight. Here we only capture the relative influence of one explicative factor. This type of analysis is something that the market monitoring group will be looking to develop in future reports.

**Figure 16: Relationship passenger network usage and population density**

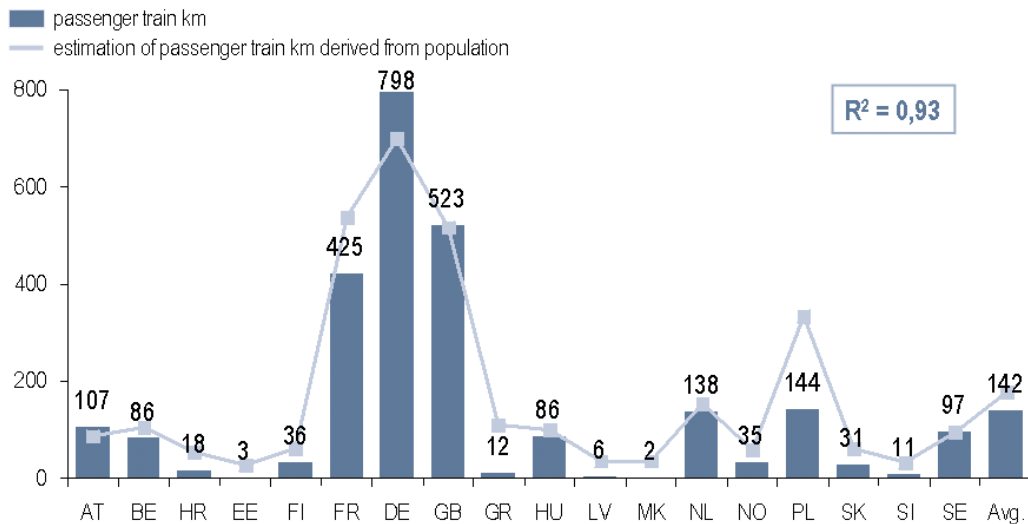
Passenger trains per route kilometer per day, 2011



In Figure 16 the population density is used as an estimator for the overall passenger network usage in the countries monitored. This estimation (performed as linear regression) shows a coefficient of determination of  $R^2=0,80$  and proves itself thereby as reasonably stable. The quality of the estimation is based on a highly positive correlation with a coefficient of 0,90 between the passenger network usage intensity and the population density in the countries monitored.

**Figure 17: Relationship passenger train km and countries' population**

Mio. Passenger Train km, 2011



In Figure 17 the total population of the countries monitored is used as an estimator for the passenger train performance (passenger train km). This estimation (performed as a linear regression) shows a coefficient of determination of  $R^2=0,93$  and proves itself therefore as exceptionally significant. The basis for this pretty precise estimation is the very strong correlation with a coefficient of 0,96 between the passenger train km and the respective countries' population.

The estimates given in figures 16 and 17 provide only a partial insight into the factors driving passenger network usage and passenger km as we are basing our estimates on only one explanatory variable.

**Figure 18: Market shares of passenger operators**

Percentage of passenger kilometers in 2011

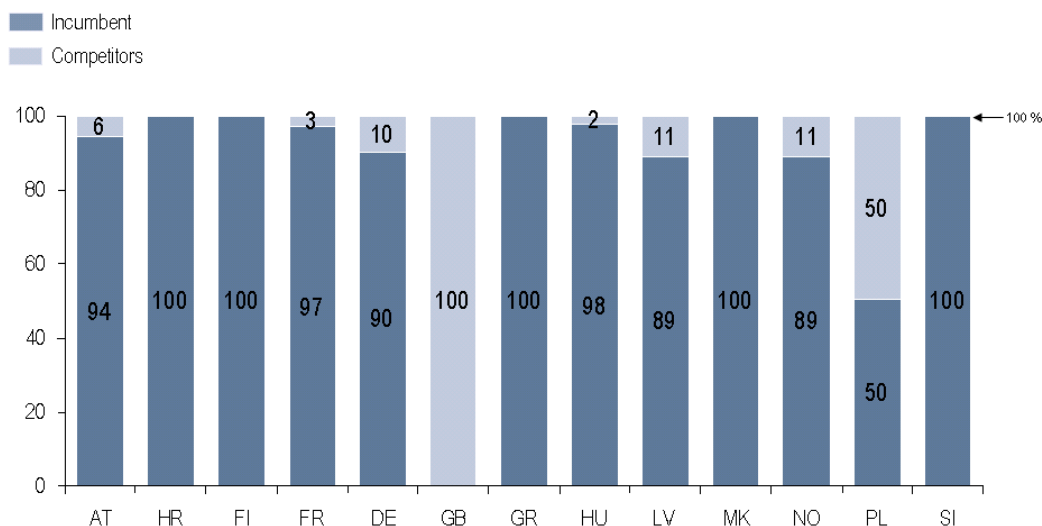


Figure 18 shows the share between the passenger transport performed by incumbent and by non-incumbent railway undertakings. In most countries monitored the railway market is still dominated by the incumbent railway undertaking. Two countries stand out: Great Britain has no incumbent railway undertaking and in Poland the incumbent has a market share of 50%<sup>14</sup>.

<sup>14</sup> In 2008 the Polish passenger operator Przewozy Regionalne was separated from the PKP group (the Polish incumbent) and transferred to local governments. Przewozy Regionalne has now the largest market share in terms of regional trains and passenger km.

**Figure 19: Revenue of passenger operators per passenger train km**

EUR per train km performed by passenger trains, 2011

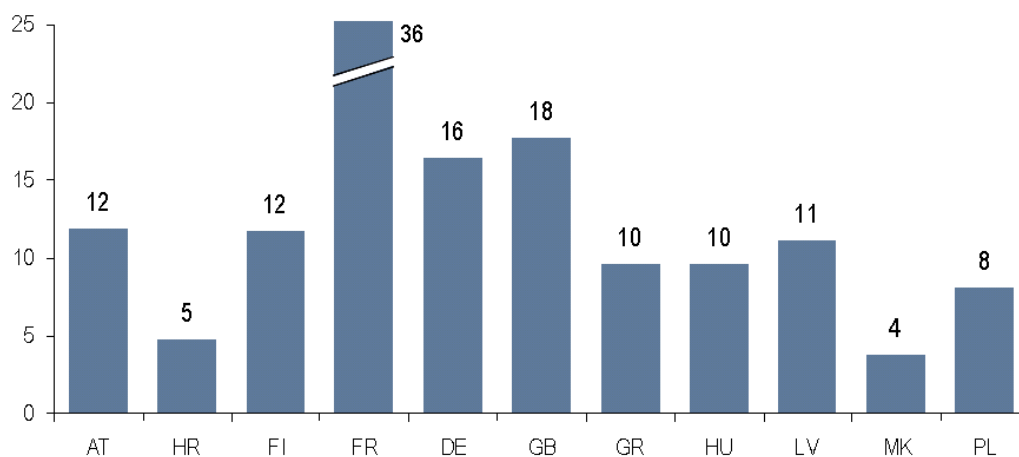
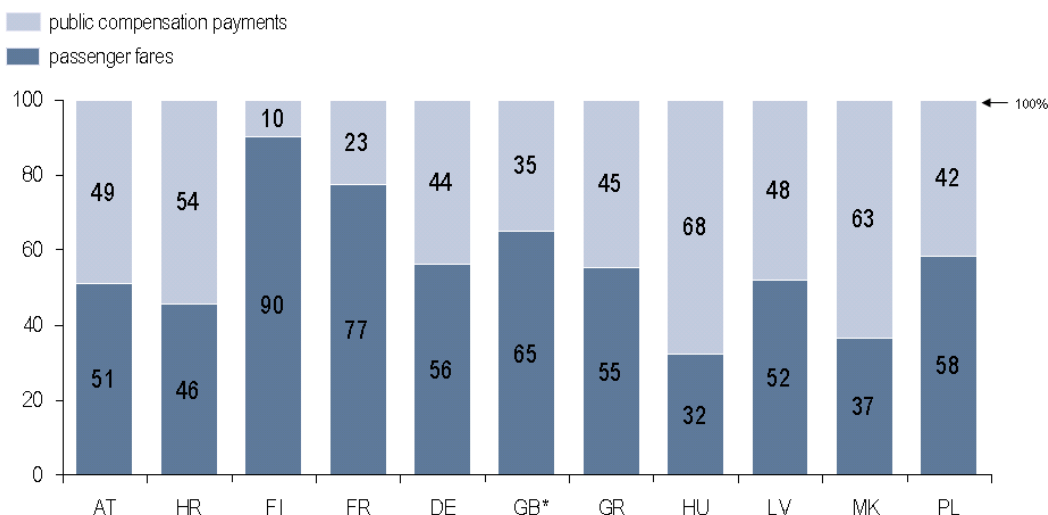


Figure 19 shows the average revenue of passenger operators per train km and was calculated by dividing the total revenue of passenger railway undertakings by the number of passenger train km. France shows by far the highest passenger service revenue per train km performed by passenger trains.

**Figure 20: Sources of revenues of passenger operators**

Percentage of total revenues of passenger railway undertakings, 2011



\* The share of public compensation for GB shows the government support to the whole industry (including infrastructure manager).

Figure 20 shows the revenue of the passenger railway undertakings broken down to distinguish the share of fares and public compensation payments. In most countries monitored the public compensations represent an important percentage of the revenue.

#### d) *Freight market*

This section on the freight market comprises similar measures to those used for the passenger market. It intends to give a picture of the freight services across countries monitored and derives measures such as the average load per train and the intensity of freight usage on the network. The section gives as well an insight on the state of new entry in the freight market by calculating the market share between incumbent and non-incumbent railway undertakings based on net tonne km.

**Figure 21: Freight transport**

Billion net tonne kilometers, 2011

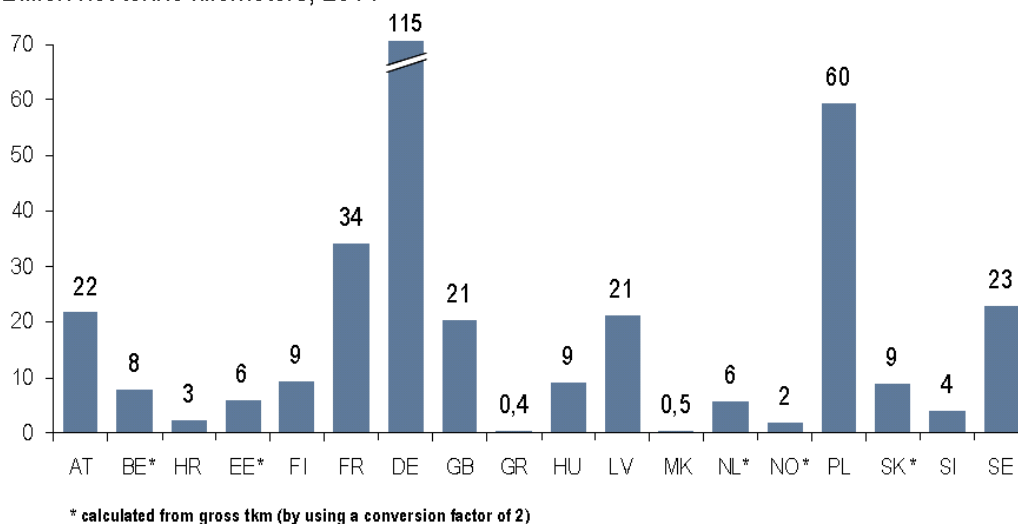


Figure 21 shows the freight transport performance in 2011 in billion net tonne km per monitored country. For countries where the data was only available for gross tonne km a conversion to net weight was estimated with a factor of 2.<sup>15</sup> The comparison of all countries monitored shows that Germany has the highest volume of tonne km, followed by Poland and France.

<sup>15</sup> Gross tonnes are not available from all countries and so in some cases an estimate has been calculated based on net tonnes. An analysis of the net/gross ratio from various data sources reveals that this ratio does not vary a lot; in this way gross tonnes can be calculated from net tonnes within some bandwidth.

**Figure 22: Freight traffic shares of total train km**

Percentage, 2011

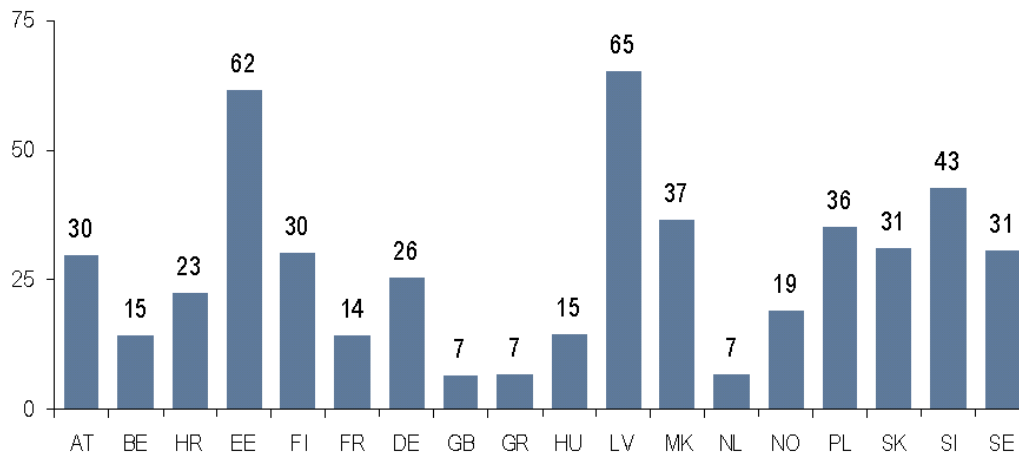
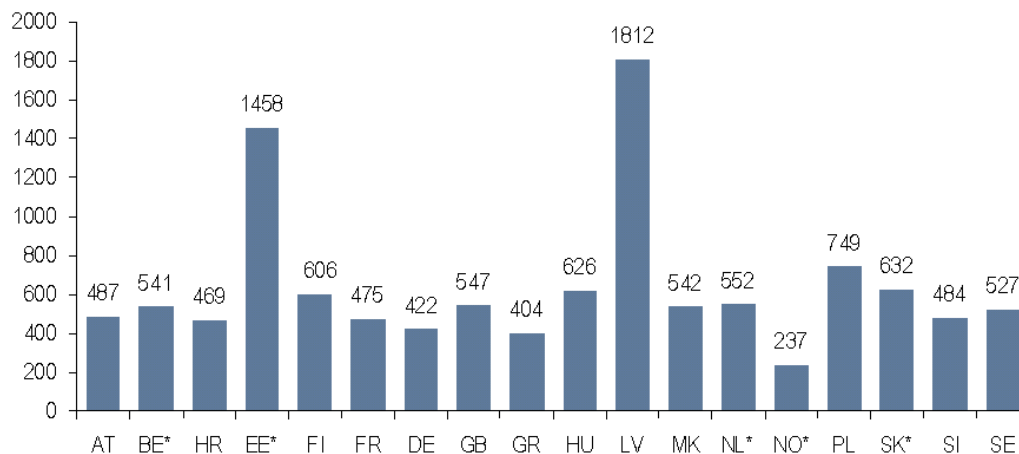


Figure 22 shows the share of freight traffic to total train km. With regard to the relative importance of rail freight for the railway network the picture shows a different distribution than in Figure 21. The share of freight of total train km varies between 6.7% (Great Britain) to 65.4% (Latvia). Also Estonia has a very high level of freight usage, both Baltic countries have a lot of transit freight from CIS countries to the Baltic ports (see also section 4.1 Infrastructure).

**Figure 23: Load factor (net weight per freight train)**

Average Freight Load per Train (excluding rolling stock weights) in tonnes, 2011



\* calculated from gross tonne kilometers (by using a conversion factor of 2)

Figure 23 shows the average net weight per freight train. It is calculated as load factor by dividing the countries' net freight transport performance (see Figure 21) by the total freight train kilometers. This figure does not differ a lot across the countries monitored with two exceptions: Estonia and Latvia. In these two countries the technical parameters of freight trains are completely different to other countries due to the wide gauge. Finland also uses wide gauge but has similar train weights as the rest of Europe, which can be explained by the use of European standards for Finnish rolling stock.



**Figure 24: Market shares of freight operators**

Percentage of net tonne kilometers in 2011

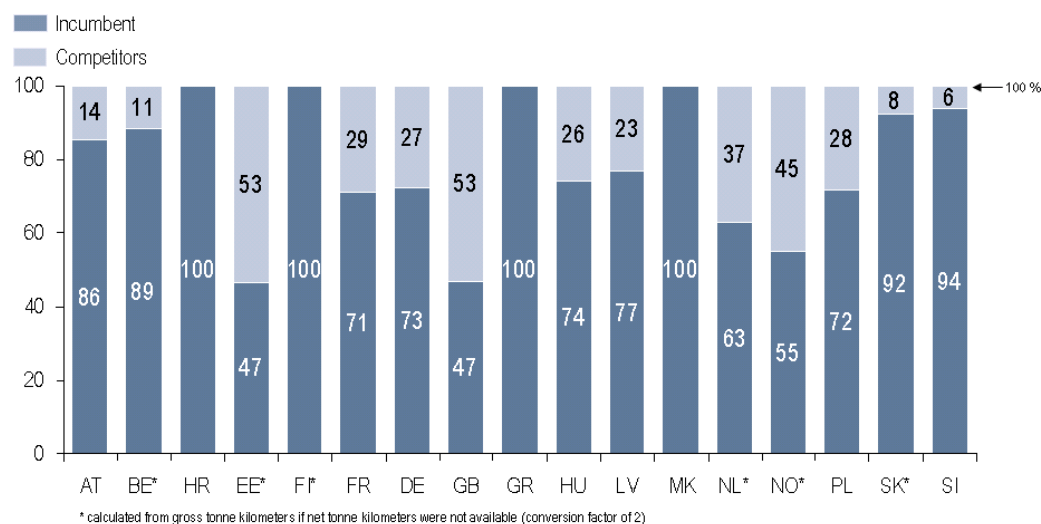


Figure 24 shows the market shares of incumbent and non-incumbent freight operators. The shares of non-incumbent railway undertakings are in general higher compared to those in the passenger market. It seems that the market shares of non-incumbents are higher in those countries with early liberalisation of the freight market, most notably in Estonia, Great Britain and the Netherlands where non-incumbents entered the freight market in the 1990s.

## 5. Summary of findings

In general, the rail market structure varies between countries monitored, although most railway undertakings have some form of public ownership. The first countries to legally liberalise both the passenger and freight market were Germany and Great Britain in 1994. Also the size of the network varies significantly amongst countries monitored. This report underlines the positive correlations between the track length of the network and both the size of the countries and their population. Overall, there has been an increase in the number of active railway undertakings across the countries reported, the majority of which operate in Germany.

In terms of network usage, with the exception of Estonia and Latvia, all countries recorded have a greater proportion of passenger train kilometres. The proportion of freight train kilometres in Great Britain, Greece and Netherlands is under 10% while the average across all countries is just over 20%. Despite this fact, in 7 countries the freight services account for more than 50% of the track access charges. This is due to the diversity of choices made concerning track access charges. For most countries monitored, the incumbent passenger operator has the largest market share relative to other passenger operators. Of the countries recorded, only Poland and Great Britain have a market in which non-incumbent passenger operators account for more than around 10% of the market. Analysis on the relationships between variables showed that population respectively population density is, one of the drivers behind passenger network usage and passenger kilometres.

In the freight market, Germany has by far the highest figure in terms of net tonne kilometers, followed by Poland and France. The shares of the non-incumbent railway undertakings are in general higher compared to those in the passenger market. In terms of net tonne km, 11 countries have a non-incumbent share of greater than 10% and in Estonia and Great Britain non-incumbent freight operators account for over 50% of the freight market. The average load carried by train does not differ a lot across the countries monitored with two exceptions: Estonia and Latvia. In these two countries the technical parameters of freight trains are completely different to other countries due to the wide gauge.

At last, IRG-Rail draws your attention to the fact that the figures presented in this report are not meant, nor could be used, to assess the relative performance of the national railway systems<sup>16</sup>. For its first report, IRG-Rail emphasises the current situation of the railway systems across countries monitored and therefore the report presented a static overview. Over the next years, we intend on providing insights on the dynamic effects driving the evolution of the railway market.

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<sup>16</sup> As highlighted by a study issued by the Center of Regulation in Europe, such an objective would require a much more intensive analysis. See also A. Bottasso, M Conti. Quantitative techniques for regulatory benchmarking. CERRE, (2011).