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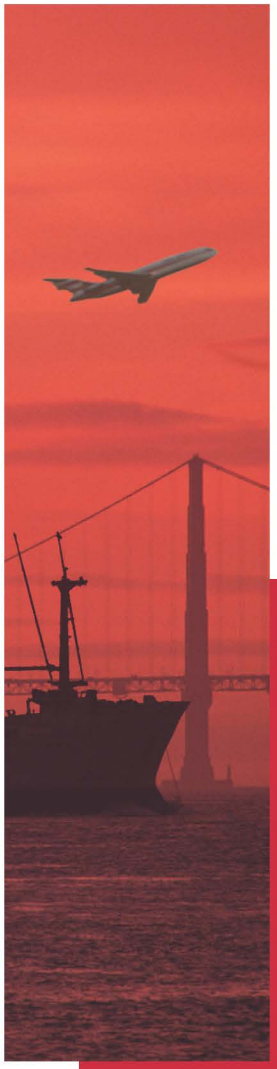

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FREIGHT ON ROAD: WHY EU SHIPPERS PREFER TRUCK TO TRAIN

STUDY

EN

2015

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This document was requested by the European Parliament's Committee on Transport and Tourism.

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Abstract

This is an assessment of the influences on the transport mode choice of shippers in the EU, highlighting why they often prefer road to rail. Drawing on the analysis of long-term trends of freight transport, a number of national case studies (Germany, Poland, France, Italy and Spain) and interviews with industry actors, the study investigates the main underlying factors driving freight mode choice. The concluding chapter provides recommendations on the key elements of an effective strategy to incentivise the use of rail, building on the lessons learnt from previous policy experience.

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CONTENTS

LIST OF ABBREVIATIONS

ADIF	Administrador de Infraestructuras Ferroviarias (Spanish infrastructure manager)
AFA	Autostrada ferroviaria Alpina (rolling highway between Italy and France)
AGTC	European Agreement on Important International Combined Transport Lines and Related Installations
ARAF	Autorité de régulation des activités ferroviaires (French rail regulation authority)
CEF	Connecting Europe Facility
EEA	European Environment Agency
ERTMS	European Rail Traffic Management System
EU-13	The 13 Member States which joined the European Union since 2004 (Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia).
EU-15	The 15 Member States of the European Union before the EU-13 joined the EU (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom).
FOC	Freight Operating Company
FTE	Full-time equivalent (unit of measure of workloads)
GDP	Gross domestic product
HGV	Heavy goods vehicle
LGV	Light goods vehicle
MS	Member State
OECD	Organisation for Economic Co-operation and Development
SNCF	Société nationale des chemins de fer français (French national railway company)
TEU	Twenty-foot equivalent unit (unit of cargo capacity)
TICPE	Taxe intérieure de consommation sur les produits énergétiques (French tax on energy products)
TRAN	Committee on Transport and Tourism of the European Parliament
TSL	Transport – shipping – logistics

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EXECUTIVE SUMMARY

STRUCTURE OF THIS STUDY

This study provides an assessment of the influences on the transport mode choice of EU freight shippers, highlighting why they often prefer road to rail. The assessment is informed by four analytical components.

First, the main trends in road and rail freight transport volumes are analysed. Historical trends are observed across different geographies (EU Member States, and Switzerland and the US for comparison purposes), and across different commodity types. The data analysis section is presented in Chapter 1.

Chapter 2 presents the main findings of the second component, namely a review of the literature on the factors contributing to shippers' mode choice. This chapter also assesses the potential for mode shift from road to rail in the EU, based on a number of studies.

In Chapter 3, we review the existing policy measures for achieving mode shift, both at the EU and at Member State level. Insights from five case studies (covering France, Germany, Italy, Poland and Spain) inform both Chapter 2 and Chapter 3.

Chapter 4 provides recommendations on the key elements of an effective strategy to incentivise the use of rail freight, building on the lessons learnt from previous policy experience both at the EU level and nationally.

TRENDS IN ROAD AND RAIL FREIGHT

On average, rail freight transport has experienced low levels of absolute growth across the EU since 2000. In relative terms, the share of rail freight has declined at the expense of road freight. The average trend masks substantial differences between Member States, with some experiencing strong growth in rail freight volumes (e.g. Germany and the Baltic Member States) and others experiencing a sharp decline (e.g. France, Bulgaria and Slovakia).

National trends depend on a number of factors, including the extent of railway networks, the proportion of international traffic in total traffic and the extent of competition from other modes (e.g. inland waterways). The share of freight carried by road and rail varies greatly depending on the type of goods transported. Heavy bulk transport (such as coal) is predominantly transported by rail, whereas goods that are lighter and/or more perishable are transported by road.

FACTORS CONTRIBUTING TO SHIPPERS MODE CHOICE

In between the extreme cases of goods that are almost always carried by rail and those most likely to be transported by road, a number of micro-level factors influence mode choice. Decisions made by shippers (the key decision makers in this process) are a function of the characteristics of past experience, the type of goods carried, the carriers' attributes and distance/time requirements.

In addition, some overarching and structural factors also contribute to long-term changes in modal share. These include the relationship between economic growth and freight transport, with road generally more responsive to changes in the economic cycle than rail. Changes in the industrial production process and the fragmentation of logistics have negatively affected rail freight; new forms of intermodal transport conversely represent a high-growth market segment for rail.

Evidence about shippers' preferences from national case studies points to the importance of cost considerations in some countries where rail freight is perceived to be too expensive (France, Italy). More broadly, the need for high-quality and better connected rail infrastructure is demonstrated by all case studies, with a focus on bottlenecks (Germany), capacity (Italy, France) and reliability (Spain, Poland).

Various studies have assessed the potential shift from road to rail or intermodal services; estimates of the shift range from 1 to 14 percentage points. The literature also points to a threshold of 200-300km above which rail is particularly competitive and the potential for modal shift is higher. A realistic overall target for the share of freight carried by rail in the EU could be, in the medium term, around 20% of all inland transport volumes, measured in terms of tonne-km.

EXISTING MEASURES AIMED AT MODE CHOICE

A number of initiatives targeted at modal shift from road to rail have been introduced at the EU level. These include the Eurovignette Directive, introducing road charging based on external costs, railway reforms opening freight markets to competition and improving interoperability, and programmes for funding investment in intermodal infrastructure and operations, such as TEN-T and Marco Polo programmes.

In parallel, Member States have implemented a range of measures, including direct financial support targeted at rail infrastructure development (for instance by providing better gauge clearance for heavier trains and reinstating sidings). Taken together, however, national measures have not had a major impact on modal shift. This can be attributed to the generally small scale of the investment in rail and intermodal transport relative to investment in roads, and to a lack of coordination of rail freight policy initiatives at the EU and national levels. Road charges have been introduced in a number of countries, although the impact on road freight has typically been offset by other measures tending to encourage the use of road transport

The most effective policies appear to have been those targeting intermodal transport, either through targeted subsidies to intermodal operators, or through specific agreements at key intermodal nodes, with a particular focus on ports, such as in Germany, Spain and the UK.

STRATEGIES FOR MODIFYING SHIPPERS' MODE CHOICE

The analysis carried out for this study suggests that active policies to encourage mode shift can have an impact on shippers' choices by targeting the key factors affecting the competitiveness of rail freight. These policies encompass both targeted regulatory incentives and infrastructure investment measures.

Three main conclusions can be drawn from the lack of effectiveness of past policies, as well as from the good practices identified by the national case studies:

- First, better coordination of strategies at different administrative levels, as well as across modes, will be critical. Mode shift programmes need to avoid a patchwork approach to monetary incentives. Lessons learnt from each scheme need to be better shared within the industry. The forthcoming Shift2Rail initiative should serve this purpose by focusing on solutions to enhance capacity, consolidate reliability and improve the life cycle of the European rail systems. Coordination of rail and road policies is also needed as any measures affecting the competitive position of one mode have repercussions on the other.
- Second, it is important that mode shift strategies are tailored to the specific circumstances in which they are implemented. For example the recognition that longer-distance, cross-border transport is most likely to shift from road to rail is being reflected in the development of EU policies.
- Third, the implementation of effective strategies will require stable and sufficient funding from both the EU and Member States. The Connecting Europe Facility (CEF) will help in this respect by providing substantial resources to co-fund the development of the TEN-T network and ERTMS. While transport funds are not ring-fenced under the new CEF policy, this could incentivise project sponsors to compete for funding and demonstrate the real value added of each investment scheme.

More effort will be needed to reverse the trend decline in the mode share of rail freight. In the light of future parliamentary debates on the actions to be taken by the EU to affect the mode choice of shippers in favour of rail, the above recommendations should be taken into account to ensure that future strategies prioritise pro-rail policies with high leverage potential, are suitably tailored to the characteristics of national markets, are well coordinated across levels of administration and modes, and receive an adequate level of funding.

1. OVERVIEW OF THE GENERAL CONTEXT

1.1. Introduction

The share of rail freight in intra-EU transport has been constantly decreasing over recent decades. Conversely, the share of road freight has been increasing. This general trend has held during both periods when the volume of goods transported has increased and periods of decline in transport activity. It has also continued through periods of strong economic growth as well as during economic recession.

From 2000 to 2012, the relative decline of rail freight compared to other modes has been accompanied by moderate growth in absolute terms (+0.4%). In addition, the overall figure for the EU hides some significant differences between Member States: in some, rail freight volumes have grown by more than 15% (e.g. Austria, the Netherlands, Latvia and Lithuania), while in others they have declined dramatically (e.g. Ireland). Note also that around 40% of all freight traffic in the EU took place in Germany and Poland in 2012.

These trends are in sharp contrast to EU policy objectives, which include a target shift of 30% from road freight to rail freight for journeys over 300km by 2030, and a shift of over 50% by 2050, as set out in the 2011 White Paper on transport[1]. At the same time, they tend to strengthen the need for other objectives set out in the White Paper, including the removal of major barriers and bottlenecks through improvements in rail signalling technology (European Rail Traffic Management System) and information management. The EU has also been providing financial incentives to modal shift through the funding and financing of specific infrastructure projects and policy initiatives. In particular, the Cohesion Fund, the European Regional Development Fund, Trans European Transport Network (TEN-T) funding, the Marco Polo and INTERREG Programmes (as well as funds from the various research programmes) have contributed to a number of freight specific projects across Europe.

The following chapter examines freight trends in more detail, analysing the variation in volumes by mode, geography and type of goods transported, providing context for the remainder of the study in which the reasons for shippers' preferences for road as opposed to rail are identified and analysed.

1.2. Trends of modal share of freight transport in the EU

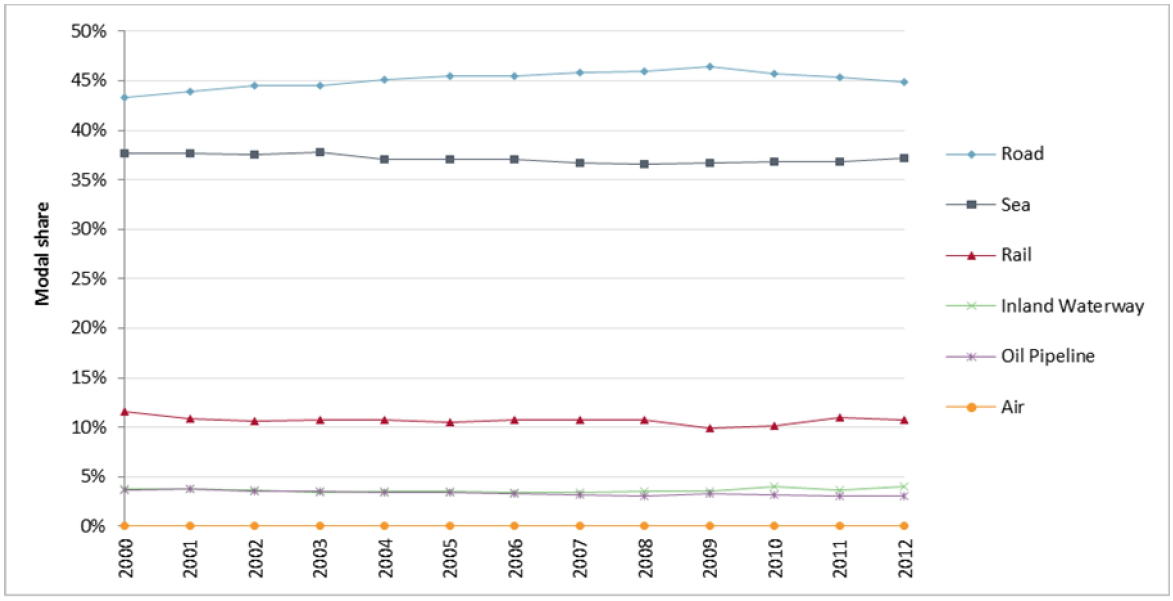
The total volume of freight transported in the EU28 rose by over 7% between 2000 and 2012, from 3,513 billion to 3,768 billion tonne-km. Volumes and growth rates of freight transported by road, sea, rail, inland waterways, oil pipelines and air are shown in Table 1. The changes in modal shares between 2000 and 2012 are shown in Figure 1.

[1] Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system (COM(2011)144 final).

Table 1: Changes in volume of freight transported, by mode, in billion tkm

Freight transport in the EU	2000[2]	2012	Variation 2000/2012
Total tkm (billion)	**3513.3**	**3768.1**	**+7.3%**
Road	1521.6	1692.6	+11.2%
Sea	1322.8	1401.0	+5.9%
Rail	405.5	407.2	+0.4%
Inland Waterway	133.9	150.0	+12.0%
Oil Pipeline	127.1	114.8	-9.7%
Air	2	3	+50%

Figure 1: Change in the modal shares in freight transport, in % of the volume transported



Source: SDG elaboration on Eurostat data.

Road is the dominant transport mode, its share of total freight transported increasing from 43% in 2000 to 45% in 2012. Sea is the second most important mode in freight transport, its share having remained broadly constant at around 37% since 2000. Rail's share has been substantially lower, at between 10% and 12%, and transport by inland waterway and oil pipeline each accounted for around 3.5% throughout the period.

1.2.1 Analysis of trends by geography

Volumes and growth rates of freight transported by road and rail in the EU Member States – and, for comparison, in Switzerland and the US – are shown in Table 2.

[2] Data for 2000 refer to all 28 Member States – thus including also those that joined the EU later on. Source: EU transport in figures Statistical Pocketbook 2014.

Table 2: Volumes and growth rates of road and rail freight transport in the EU Member States, Switzerland and the US, 2000-2012 (billion tkm)

	Road			Rail		
	2000	2012	Variation	2000	2012	Variation
EU-28	**1,521.6**	**1692.6**	**11.2%**	**405.5**	**407.2**	**0.4%**
EU-15	**1,328.9**	**1234.5**	**-7.1%**	**257.1**	**263.8**	**2.6%**
EU-13	**192.7**	**458.1**	**137.7%**	**148.4**	**143.3**	**-3.4%**
Austria	35.1	26.1	-25.7%	16.6	19.5	17.5%
Belgium	51.0	32.1	-37.1%	7.7	7.3	-5.1%
Bulgaria	6.4	24.4	280.6%	5.5	2.9	-47.5%
Croatia	2.9	8.6	202.8%	1.8	2.3	30.4%
Cyprus	1.3	0.9	-31.6%	-	-	-
Czech Republic	37.3	51.2	37.3%	17.5	14.3	-18.5%
Denmark	24.0	16.7	-30.6%	2.0	2.3	12.1%
Estonia	3.9	5.8	47.3%	8.1	5.1	-36.7%
Finland	32.0	25.5	-20.4%	10.1	9.3	-8.2%
France	204.0	172.4	-15.5%	57.7	32.6	-43.6%
Germany	280.7	307.0	9.4%	82.7	110.1	33.1%
Greece	29.0	20.8	-28.1%	0.4	0.3	-33.7%
Hungary	19.1	33.7	76.4%	8.8	9.2	4.9%
Ireland	12.3	10.0	-18.7%	0.5	0.1	-81.5%
Italy	184.7	124.0	-32.8%	22.8	20.2	-11.3%
Latvia	4.8	12.2	154.3%	13.3	21.9	64.3%
Lithuania	7.8	23.4	201.8%	8.9	14.2	58.9%
Luxembourg	7.6	8.0	4.5%	0.6	0.2	-61.9%
Malta	0.3	0.3	0.0%	-	-	-
Netherlands	79.6	67.8	-14.8%	4.5	6.2	36.2%
Poland	75.0	222.3	196.4%	54.0	48.9	-9.4%
Portugal	38.9	32.9	-15.4%	2.2	2.4	10.9%
Romania	14.3	29.7	107.6%	16.4	13.5	-17.6%
Slovakia	14.3	29.7	107.1%	11.2	7.6	-32.4%
Slovenia	5.3	15.9	199.8%	2.9	3.5	21.5%
Spain	148.7	199.2	34.0%	11.6	10.0	-14.3%
Sweden	35.6	33.5	-6.0%	19.5	22.0	13.2%
United Kingdom	165.6	158.5	-4.3%	18.1	21.4	18.5%
Switzerland	*9.8*	*13.0*	*+32.3%*	*11.1*	*11.1*	*-0.2%*
USA	*1,741.2*	*2,038.9**	*+17.1%*	*2,257.6*	*2,649.2**	*+17.3%*

(*) 2011 data

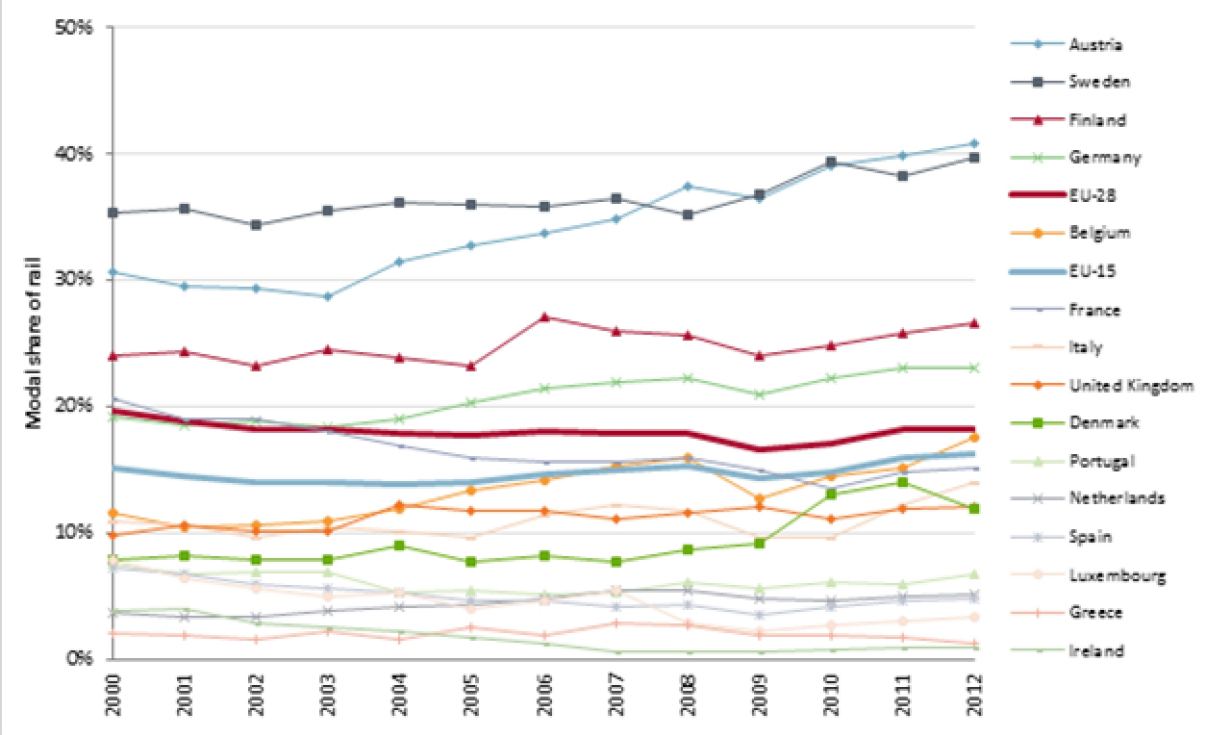
Source: EU transport in figures statistical pocketbook 2014.

In 2000, the modal share of rail in EU inland freight transport (i.e. including road, rail, inland waterway and oil pipelines and excluding air and maritime transport within the EU) was 18.5%, falling to 15.7% in 2009 as a result of recession but then rising to 17.2% in 2012 in response to mild economic recovery in most Member States. However, the

performance of rail freight has not been homogeneous across Europe, with trends among the EU-15 and the EU-13, in particular, differing substantially.

In the EU-15, the average share of rail in total inland freight transport was 15.1% in 2000 and, after a slight fall over the following four years and a further dip in 2009 (see Figure 2 below),increased to 16.3% in 2012. However, rail's national share of freight has varied considerably across Member States. In 2012, five EU-15 Member States had a modal share higher than the average: Austria (41%), Sweden (40%), Finland (27%), Germany (23%) and the United Kingdom (18%). By contrast, six Member States had rail modal shares less than half the average: Ireland and Greece (both with 1%), Luxembourg (3%), Spain and the Netherlands (both with 5%) and Portugal (7%).

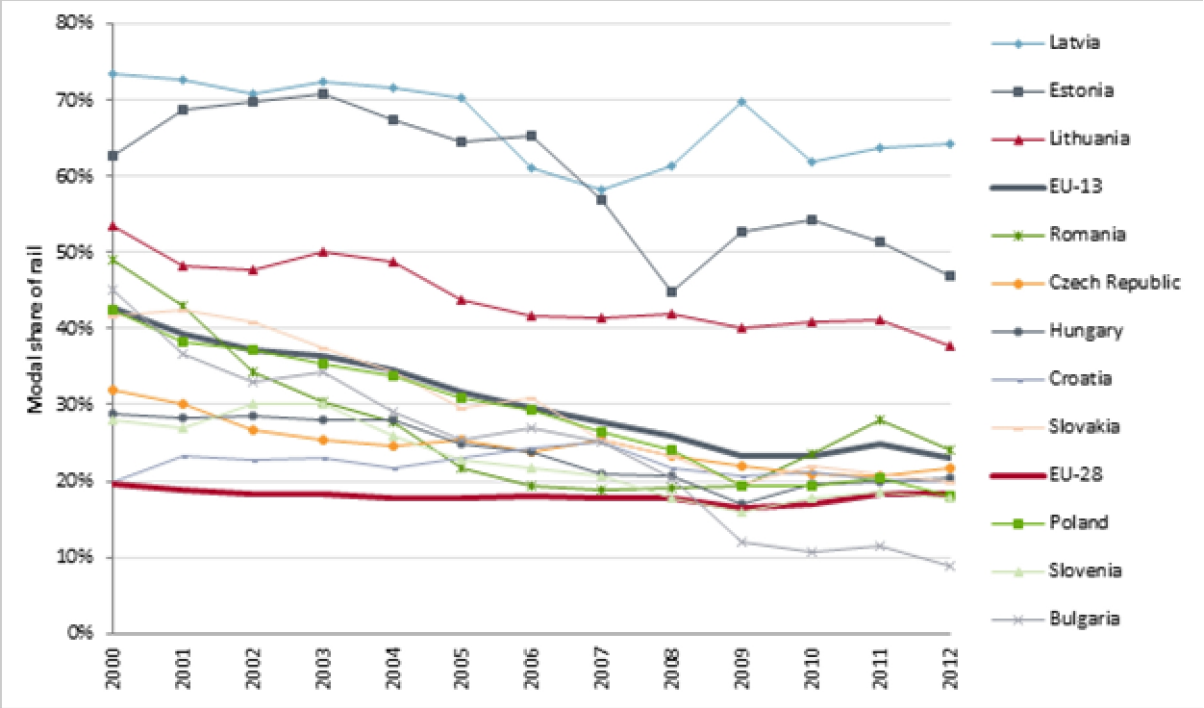
Figure 2: Modal share of rail in inland freight transport in the EU-15, 2000-2012



Source: SDG elaboration on Eurostat data.

In the EU-13, the modal share of rail in inland freight transport decreased from 45.2% in 2000 to 30.2% in 2008 and then remained around this level until 2012 (when it reached a level of 29.1% as seen in Figure 3 below). At the end of the period, the three Baltic Member States had a modal share of rail higher than the average: Latvia with 64%, Estonia with 47% and Lithuania with 38%. The other Member States had shares between 18% and 24%, with the exception of Bulgaria (9%).

Figure 3: Modal share of rail in inland freight transport in the EU-13, 2000-2012

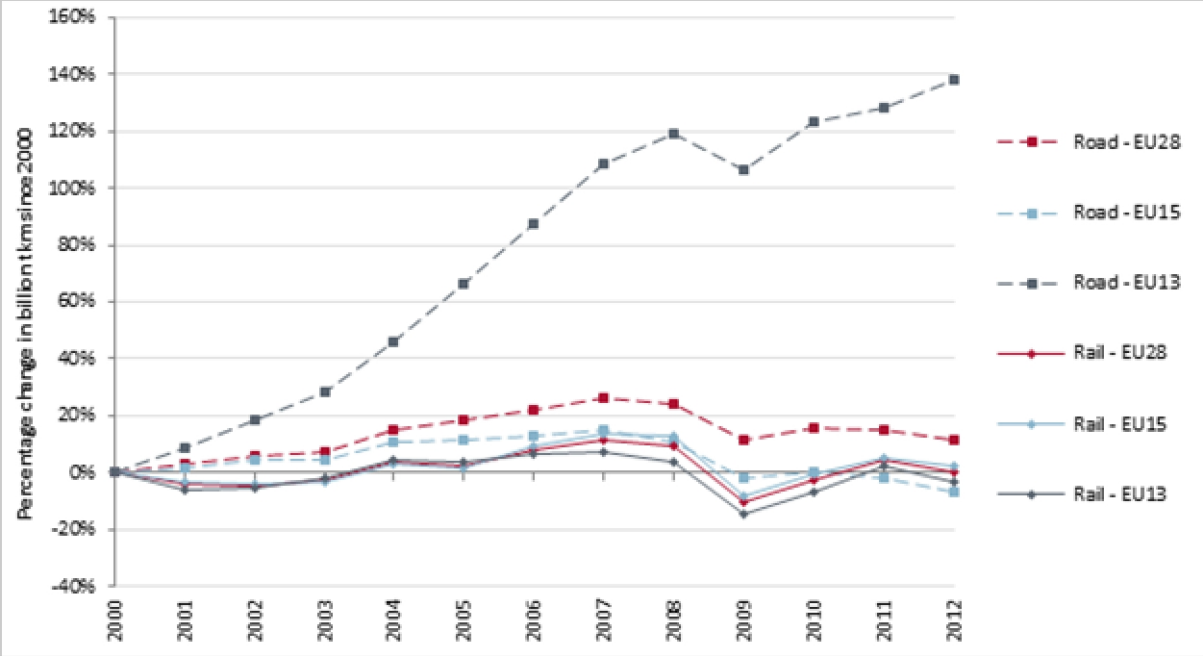


Source: SDG elaboration on Eurostat data.

Overall, there is a pattern of convergence towards the average share for the EU-28 among many of the EU-15 and EU-13 Member States. In particular, the modal share of rail in the EU-13 has fallen significantly and the gap between this value and the average for the EU-28 has decreased correspondingly. As shown in Figure 4, this trend has been mainly driven by a strong increase in the volume of freight transported by road in the EU-13, which in 2012 was 2.4 times the 2000 value. The Member States which have experienced the strongest growth in road freight transport are Bulgaria (+281%), Croatia (+203%), Lithuania (+202%), Slovenia (+200%), Poland (+196%), Latvia (+154%), Romania (+108%) and Slovakia (+107%). Over the same period, volumes of freight transported by road in the EU as a whole have grown by 11.2%, and have decreased by 7.1% in the EU-15. Note, however, that tonne-km transported by rail have remained stable (+0.4% in the EU overall, -3.4% in the EU 13 and +2.6% in the EU-15).

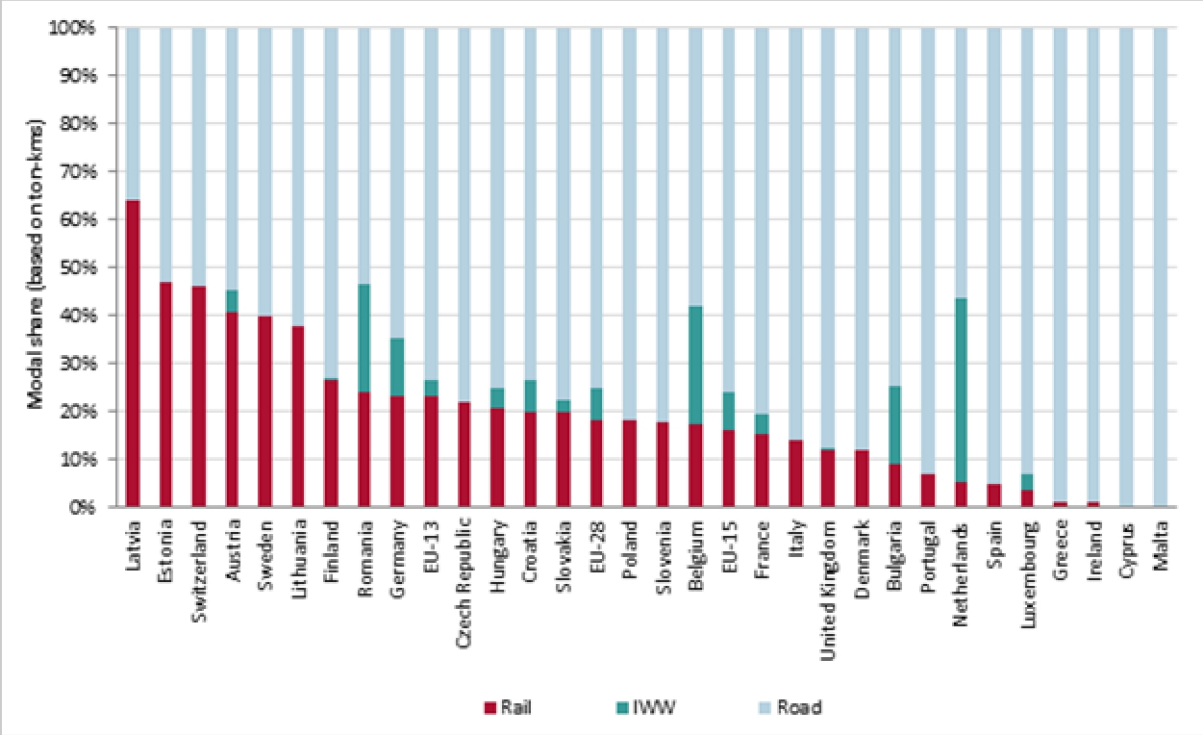
A comparison of EU Member States (plus Switzerland) by modal share of inland freight transport is reported in Figure 5 below. In general, road accounts for almost the entire share not taken by rail, except in those Member States where inland waterways are important. In Cyprus and Malta, which have neither railway networks nor inland waterway transport networks, share of road is 100%.

Figure 4: Change in volumes of freight transported by mode, 2000-2012



Source: SDG elaboration on Eurostat data.

Figure 5: Modal share of inland transport by MS (based on tonne-km), 2012

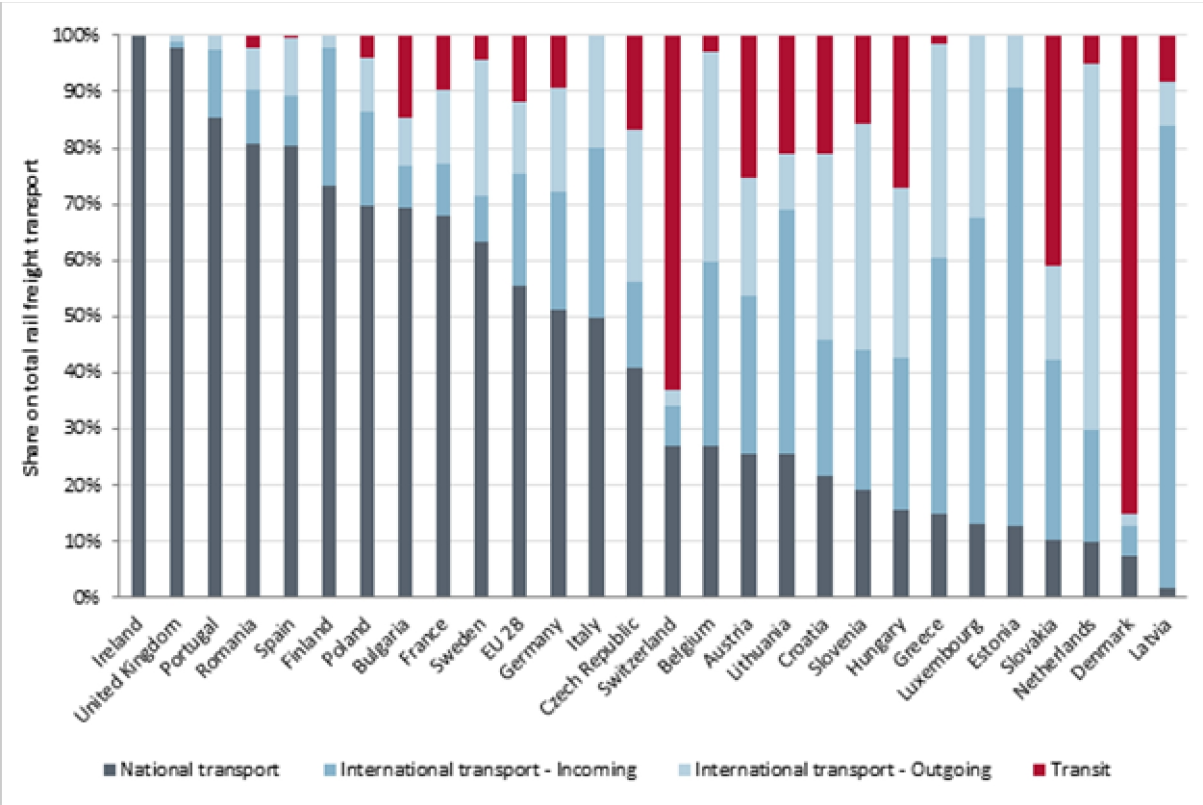


Source: SDG elaboration on Eurostat data.

The following chart sets out data on rail freight transport by type of transport – domestic, international, and transit transport – and country. In ten Member States, domestic rail transport is higher than the EU average of 55%. In particular, in five countries the share of domestic transport is greater than 80%: Ireland (100%), the United Kingdom (98%), Portugal (85%), Romania and Spain (both with 81%). International transport accounts for the majority of volumes transported in Latvia (90%), Estonia and Luxembourg (both with

87%), the Netherlands (85%), Greece (84%), Belgium (70%), Slovenia (65%), Croatia and Hungary (both with 57%), Lithuania (54%), and Italy (slightly more than 50%).
As regards transit transport, it accounts for a significant share in Denmark (85%), Slovakia (41%), Hungary (27%), Austria (25%), Croatia and Lithuania (both with 21%).

Figure 6: Railway freight transport, by type of transport and MS (million tonne km), 2012

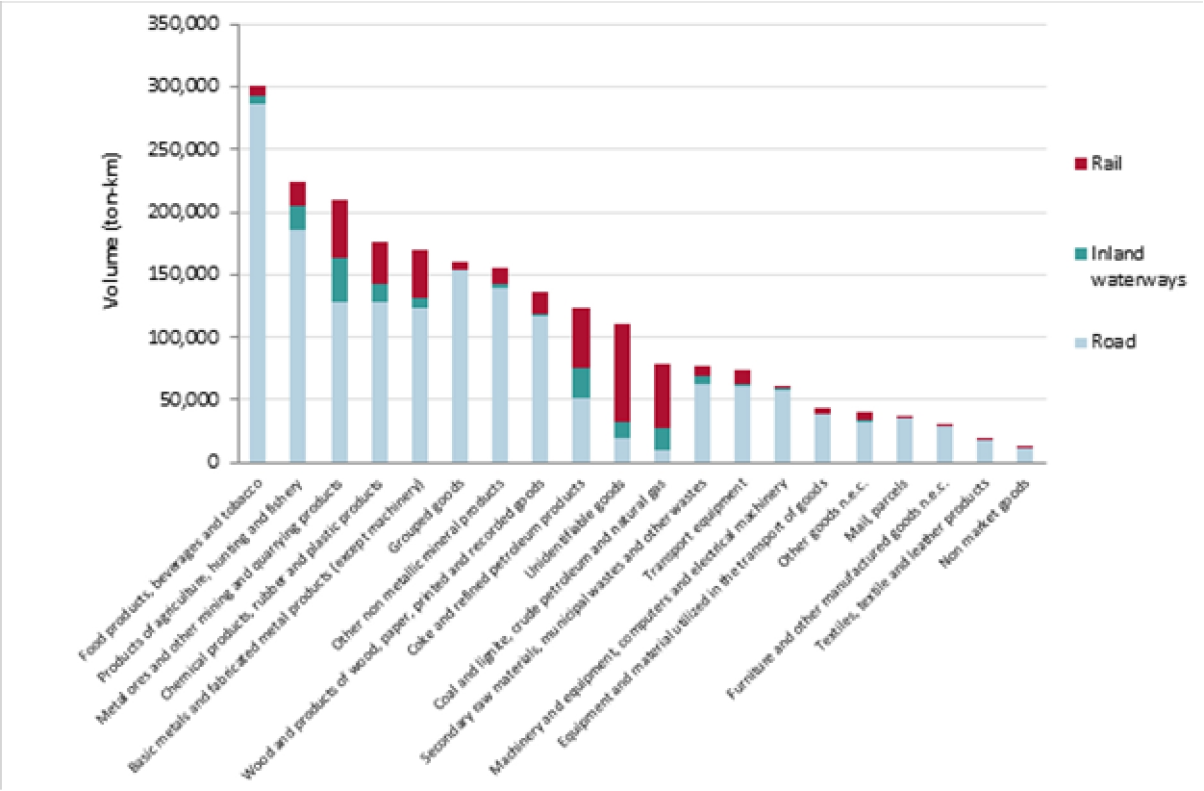


Source: SDG elaboration on Eurostat data.

1.2.2 Analysis of trends by type of goods

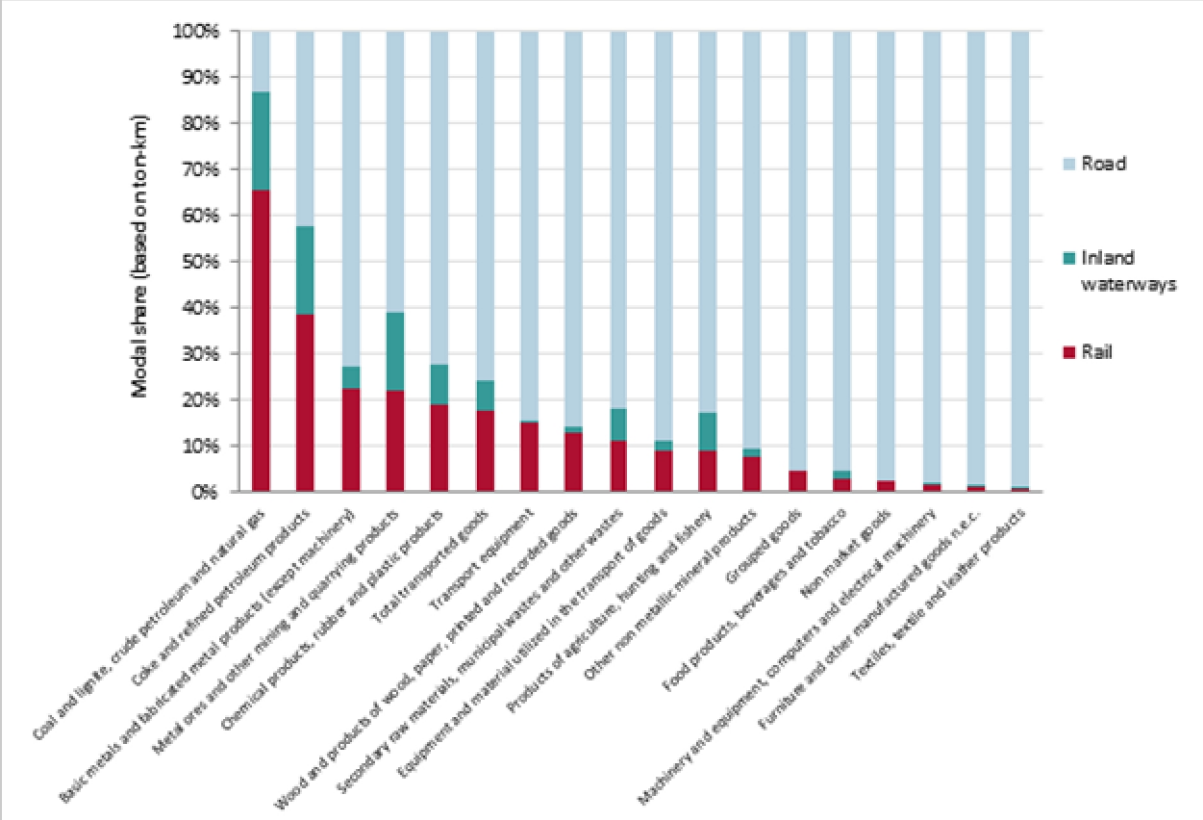
It is useful to categorise the transport of goods by different commodity categories, since the choice between rail and road is often linked to the attributes of the goods transported, as discussed further below. Figure 7 shows disaggregated data on inland freight transport in 2012 by commodity category and transport mode. Food and beverages account for the highest volumes, followed by agricultural products, hunting and fishery, metal ores and other mining/quarrying products, chemical, rubber and plastic products, and basic metals and metal products.

Figure 7: Total freight transported in the EU-28 (ordered by commodity category), 2012



Source: SDG elaboration on Eurostat data.

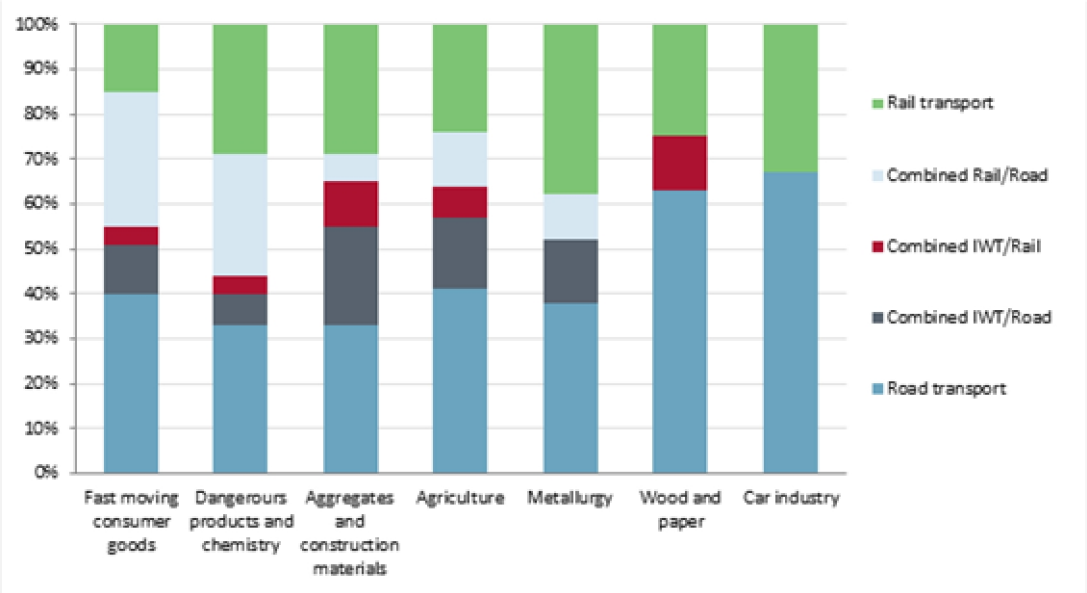
Figure 8: Modal share by commodity category (based on tonne-km) in the EU-28, 2012



Source: SDG elaboration on Eurostat data.

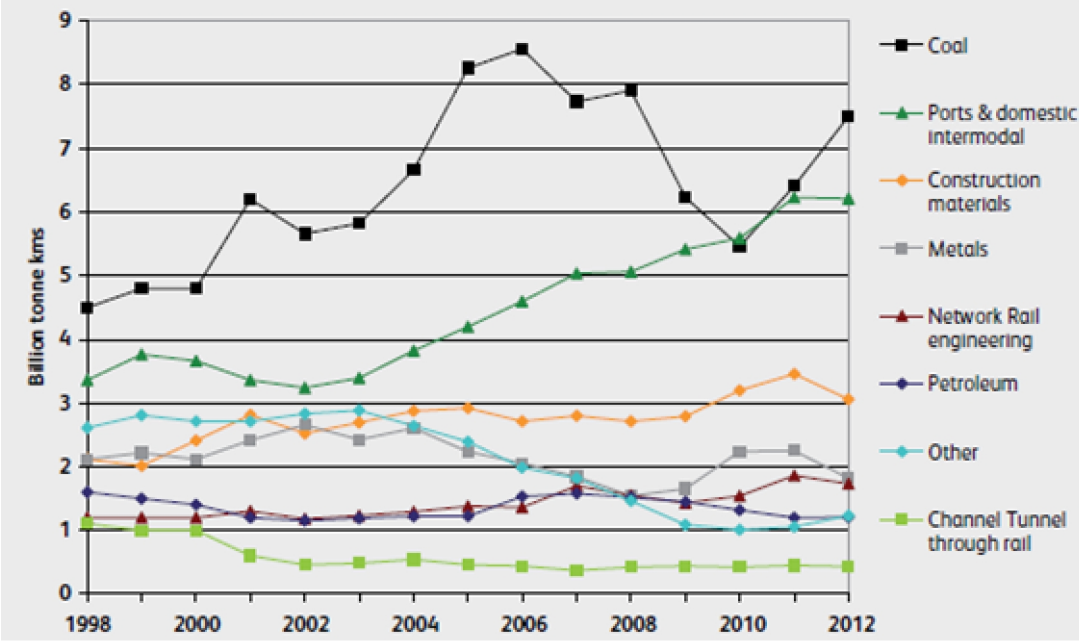
In Figure 8, the commodity categories are arranged by share of freight transported by rail. "Coal and lignite, crude petroleum and natural gas" is the only commodity group for which rail accounts for a higher share than any other mode (65.5% of total freight). Only 38.6% of "coke and refined petroleum products", the second ranking commodity group, is transported by rail, and for only three other commodity categories - "basic metals and fabricated metal products (except machinery)", "metal ores and other mining and quarrying products" and "chemical products, rubber and plastic products" – is rail's share above the average. Rail accounts for less than 5% of volumes transported in the case of six categories: "grouped goods", "food and beverages", "non-market goods", "machinery and equipment (included computers and electrical machinery)", "furniture and other manufactured goods", and "textile and leather products".

Figure 9: Distribution of transport modes by good type in France, 2014



Source: Eurogroup Consulting, Baromètre de perception des chargeurs sur le transport ferroviaire, 2014.

Figure 10: Evolution of good types transported by rail in the UK, 1998-2012



Source: Network Rail 2013.

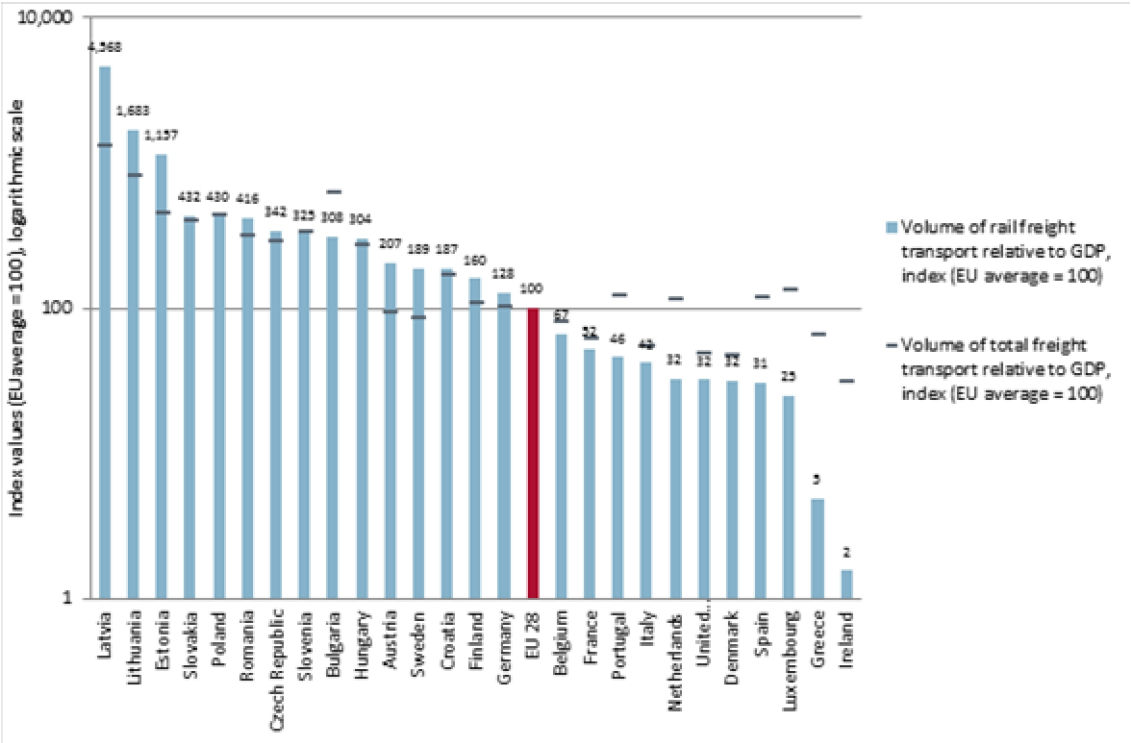
Using country-specific data emerging from the case studies, Figure 9 show the disaggregation of transport modes by commodity category in France. Road is the most frequently used mode for all types of goods. Rail freight is mostly used to transport metal products, dangerous goods and chemical industry products, aggregates and construction materials and cars. Combined rail/road transport is mainly used to transport consumer goods, dangerous products and chemical industry products.

1.2.3 Analysis of trends with economic variables

Volumes of freight transport can be compared to the overall level of economic activity, as measured by Gross Domestic Product (GDP). In Figure 11, Member States are classified according to the volume of rail freight transport relative to GDP, where the EU average is set equal to 100. A similar classification representing the volume of total freight transport relative to GDP is reported within the same figure (to simplify the comparison, the vertical axis is in logarithmic scale).

Fifteen Member States are characterised by levels of rail freight relative to GDP higher than the EU average. In particular, in the three Baltic States this ratio is more than ten times higher than the EU average, due to the significance of freight transport activities in the national economy and the significant share of rail in freight transport. In a further eight Member States (Slovakia, Poland, Romania, Czech Republic, Slovenia, Bulgaria, Hungary, and Austria), the ratio of rail freight transport to GDP is between two and five times the EU average. Seven Member States (the Netherlands, the United Kingdom, Denmark, Spain, Luxembourg, Greece and Ireland) have ratios lower than one third of the EU average. The ratios for Greece and Ireland, respectively 5% and 2% of the EU average, are particularly low given the limited size of their railway networks.

Figure 11: Volume of rail freight transport relative to GDP by country, indexes (EU average = 100), 2012



Source: SDG elaboration on Eurostat data.

KEY FINDINGS

- On average, rail freight transport has experienced low levels of absolute growth across the EU since 2000. In relative terms, the share of rail freight has declined at the expense of road freight.
- The average trend conceals sharp differences between Member States. Rail freight volumes have grown by more than 30% in Germany, the Netherlands and the Baltic Member States, but have declined sharply in France, Bulgaria and Slovakia. National trends depend on a number of factors, including the extent of railway networks, the proportion of international traffic in total traffic and the extent of competition from other modes (e.g. inland waterways).
- The share of freight carried by road and rail varies greatly depending on the type of goods transported. Heavy bulk transport (such as coal) is predominantly transported by rail, whereas goods that are lighter and/or more perishable are transported by road.

2. FACTORS CONTRIBUTING TO SHIPPERS MODE CHOICE

2.1. Introduction

This chapter provides an assessment of the factors influencing the choice of freight transport mode made by shippers, based on a review of the relevant literature and a number of case studies on EU Member States.

As shown in Chapter 1, some types of goods are intrinsically better transported by certain modes. For example, heavy bulk goods (such as coal) are predominantly transported by rail as they tend not to be time sensitive and the quantities involved favour the economics of rail freight. However, even bulk goods may be transported by road over relatively short distances. By contrast, perishable foodstuffs that are subject to a short production-to-outlet window can generally only be transported by road. While some food products are transported in refrigerated rail wagons, this form of transport is not suited to all perishable products.

In between these extremes there are products that may be transported by road, rail, or a combination of the two. Comparisons are usually made between road-only transport and transport combining rail and other modes – intermodal transport – as door-to-door rail services that can compete with the equivalent road service are comparatively rare. The choice between road and intermodal transport is affected by a number of factors, categorised as micro-level factors affecting individual decision-making processes in the short term, and macro-level factors which influence long-term trends at a more aggregate level.

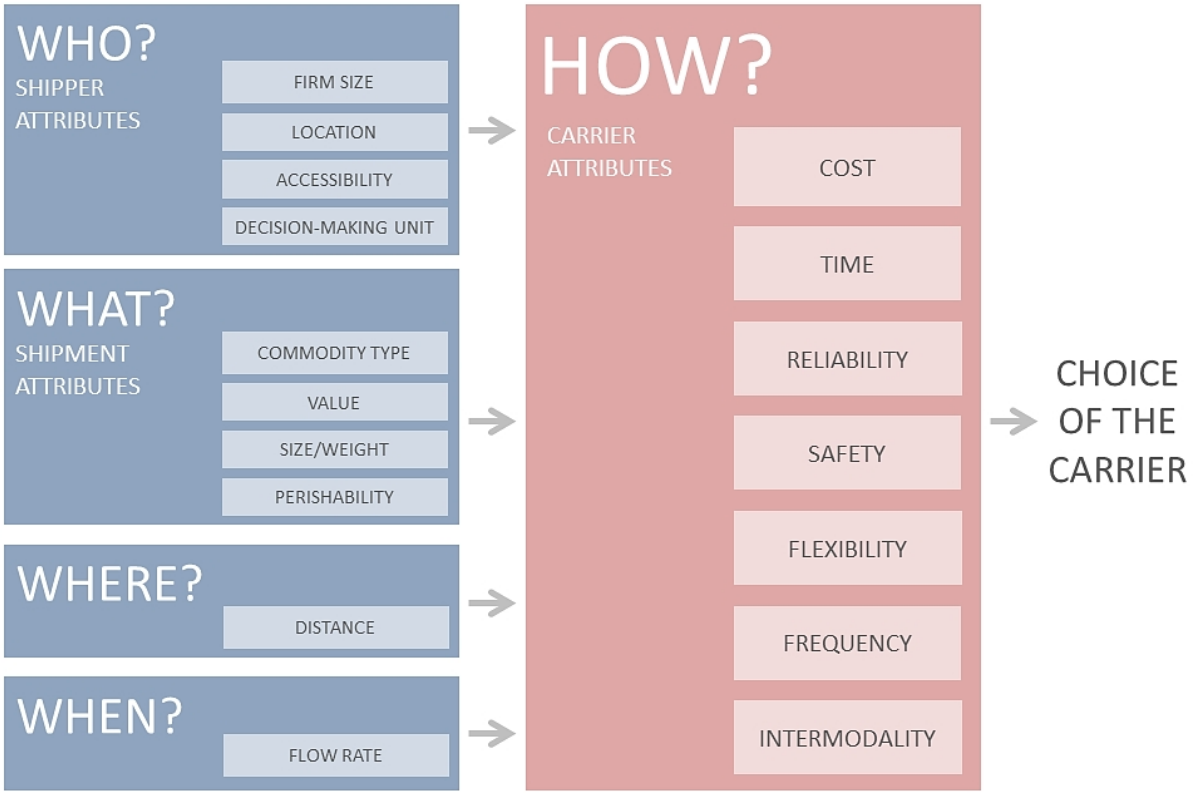
2.2. Literature review

2.2.1 Micro-level approaches to mode choice – identifying key attributes

The following summary of relevant literature on mode choice provides a framework for understanding micro-level factors influencing individual preferences for road and rail transport.

The preferences of two different parties, the shipper and the carrier, can determine whether freight is transported using road-only solutions or intermodal services. Patterson et al. (2008) find that, even if carriers generally organise the movement of consignments from shippers to receivers, their decisions about using intermodal services are constrained by shippers' preferences, and thus shippers can be seen as the principal decision-makers affecting the demand of intermodal services. Based on this observation, it is possible to describe a simple model of modal choice in which the shipper determines the appropriate carrier according to a number of attributes. A graphical representation of this simplified environment is shown in Figure 12.

Figure 12: Micro-based approach to freight transport modal choice: a simplified framework



Source: SDG elaboration.

In this model, factors contributing to modal choice can be divided between shipper and shipment attributes, geographic and time characteristics, and carrier attributes[3].

Shipper attributes include firm size, accessibility – in particular the ability or otherwise to directly access the rail network – and custom and practice among decision-makers in shipping companies. Custom and practice, in turn, is influenced by past experience of the shipper with respect to different transport modes, with shippers who have already made use of rail/intermodal solutions in the past likely to behave differently from shippers who have not.

Shipment attributes include the type of goods, density (in terms of weight per unit of volume) and value per unit of product transported, degree of perishability and shelf-life, and package characteristics.

Carrier attributes and modal characteristics include total shipment costs, total delivery time, infrastructure capacity, service reliability (in particular in-time reliability), degree of safety, service flexibility, service frequency, availability of special equipment (e.g. refrigerated wagons, location trackers, etc.), quality of customer service and handling operations, and the level of environmental sustainability ensured by each mode.

Other factors affecting modal choice are the distance covered and the flow rate at which shipments are carried out. For all distances below some 200 km, road transport is markedly superior to rail transport in terms of cost and feasibility (Cambridge Systematics).

[3] This is the approach followed, for instance, in Patterson, Ewing and Haider (2008) and Samimi, Mohammadian and Kawamura (2010).

Similarly, rail flow rates are less competitive due to the lack of flexibility on timetabled routes sharing both passenger and freight flows.

Within this framework, each shipper chooses the best transport solution (i.e. the best carrier) by considering the various shipments and carrier attributes of each transport option. Mode choice by individual shippers can therefore be seen as an optimisation process based on both matching and trading off of attributes. By way of example, consider a medium-sized shipper, located in close proximity to a freight terminal, which has used intermodal transport before. The shipper wishes to dispatch a large quantity of bulk goods to a destination some 400 km away, which is relatively accessible from the rail network via a short journey by road. As long as the freight services available are considered reliable and safe, this shipper is likely to choose a rail carrier.

In practice, many decisions are more complex, and understanding the outcome in a particular case may require explicit quantification of the value of different attributes. Stated preference (SP) techniques are widely used to support this quantification, providing an insight into the relative importance of time, cost and other characteristics in making decisions at the margin between road and intermodal transport[4] In addition, recent advances in freight transport modelling (De Jong et al 2012) are allowing a more precise identification of the importance of different factors, the interdependencies between them, and the integration of different elements of the journey such as long-distance transport and last-mile connectivity.

A number of trade-offs clearly emerge from the literature. When shippers are mostly concerned with the timely delivery of goods, they are more likely to choose road. Conversely, when considerations about the costs of consignments are more important, shippers are more likely to view rail favourably. This is because shippers preferring rail are more sensitive to cost than time.

In support of this view, Danielis et al. (2004) found that road mainly enjoys a time-related advantage over other modes, and that the shorter the travel time, the more important time becomes relative to cost. Research by Samimi et al. (2010), covering approximately 900 shippers in the United States, confirmed these results and found that use of road is more sensitive to haul time than use of rail. Over longer distances, rail becomes more competitive because its cost advantage increases and its time disadvantage decreases relative to road, and shippers are therefore more likely to use rail transport for longer distances. (Patterson et al. 2008).

In addition, the relative competitiveness of rail can be enhanced during times of sharp and substantial fuel price increases. Any significant and unexpected increase in fuel costs will affect the costs of road transport, but the effect is greatest when the increase is sudden (e.g. due to a sudden change in market perceptions of the supply of oil relative to demand) and fuel costs account for a large proportion of total costs. However, fuel price impact tend to be offset by specific contracting arrangements, whereby shippers pay for the fuel costs incurred by carriers, as well as policy measures offering reimbursement of carrier fuel costs.

The importance of factors other than time and cost is also highlighted in the literature. The reliability of services – that is, on-time reliability and availability of the equipment at the

[4] The SP approach involves the use of specially designed surveys in which respondents are asked to express their preferences by choosing an outcome from a series of proposed alternatives, usually involving a trade-off between cost and time, or cost and quality of service.

required time and in required amounts – was found to be the most important deciding factor in mode-choice in a study of the Indian freight market by Cook et al (1999). Research carried out by Danielis et al. (2004), based on a SP survey conducted in the Italian market, confirmed these findings and recorded a high willingness to pay for quality in freight transport services, especially for reliability and safety. On-time reliability was found to strongly increase the probability of choosing a carrier, a finding confirmed by Patterson et al. (2008) based on analysis of shippers' behaviour on a Canadian freight corridor. Reliability of the transportation service was similarly found to be an important factor in carrier choice in Turkey in a study by Kofteci et al. (2010). For shippers requiring very reliable transport flows, as in the case of shippers of chemical goods, reliability is of particular importance (Cook et al. 1999).

In Shinghal and Fowkes (2002), frequency of service also appeared to be an important factor in mode choice, especially for shippers making frequent, low volume shipments. These findings were confirmed by research conducted by Combes (2012) on the basis of a large database of some 3,000 shippers in France. Combes indicated that the rate of the commodity flow to which a shipment belonged appeared to play an important role in determining shipment size and mode choice. At the same time, a study of transport logistics and modal split of Spanish exports to Europe, conducted by García-Menéndez et al (2006), concluded that while quality of service attributes influence modal choice for the relatively high-value sectors (e.g. vehicle parts and household appliances), relatively low-value sectors (e.g. agro-industrial and ceramics products in their study) are mainly affected by transport costs.

In Samimi et al. (2010), shipment weight/size emerged as a significant variable, indicating that larger shipments are more likely to be transported by rail. Combes (2012) finds that shipment size is dependent on transportation mode, but that freight mode choice also depends on shipment size, and concludes that shipment size and mode choice are determined simultaneously.

Independently from shipment attributes, the role of managers in charge of decision-making, in particular their past experience with each mode, was also found to play a significant role. Absence of past experience with rail indicates that the shipper is unfamiliar with the mode in terms of service quality, cost and other factors, and could be unaware of the potential benefits of rail transport. Furthermore, shipments that are organised by a third-party logistics company are more likely to be shipped by rail as these companies have a broader knowledge of available modes and perform a more comprehensive analysis for mode selection.

The issue of the reputation of rail was raised in Patterson et al. (2008). From this research it emerged that there is a very strong bias against the use of rail and intermodal services in freight transport. In the authors' words, "even if a carrier had the same cost, on-time performance, etc. as another carrier, but used intermodal services, the odds of its being chosen would be halved". This was interpreted as a bias which probably reflected general shipper perceptions of rail versus road-only transportation services. The study concluded that increasing the rail share of freight transportation would require a change in reputation as well as improvements in the standard attributes.

Cook et al. (1999) took into account the influence of a series of other parameters such as loss and damage, access to decision makers, the attitude of the staff of the transporter to customers, ease of payment, negotiability, time involved in processing claims and information available to customers. The authors acknowledged that these variables can

become very important on a case-by-case basis, but concluded that they were generally less important than the attributes mentioned above.

Overall, the analysis of micro-level factors affecting the mode choice of shippers supports the model illustrated above. Shippers' preferences are a function of the characteristics of the shippers themselves, the type of goods, the carriers' attributes and the distance / time requirements. Cost considerations are important and the competitiveness of rail is greater over longer distances due to the costs falling relative to those of road along with the value of road's time advantage.

However, recent studies have also highlighted the importance of reliability considerations, and quality of service. In addition, past experience tends to influence current choices, and the past mode choices of managers in shipper companies tend to be reinforced over time.

2.2.2 Macro-based approaches to mode choice – economic drivers

Macro-level factors contribute to longer-term trends of modal shift at a more aggregate level. These trends can be seen as overarching and additional to the micro-level decision-making processes described above.

Over time, freight volumes correlate with the general economic cycle, with a higher rate of economic growth corresponding to higher growth in transport volumes. More specifically, the relationship between GDP, in particular the industrial production component of GDP, and freight transport demand is well established in the literature (ITS 2012, Vickerman 2002). However, the impact of growth on road and rail freight can differ for a variety of reasons.

On the one hand, many European countries have experienced an extended period of de-industrialisation, with a long-term decline in the size of previously major industries (e.g. mining, chemical) and a dispersion of the industrial production process across Europe linked to geographic specialisation (Krenz and Rübel 2010). On the other hand, the fragmentation of logistics and distribution trips linked to the rise of e-commerce and on-time delivery has generated new demand that is met by light goods vehicles travelling by road, particularly in and around urban areas (Casullo and Kohli 2012).

As a result, there has been a trend towards transporting smaller sized volumes more frequently, making road more competitive than rail. This weakens the relationship between economic growth and rail freight since, for any increase in industrial output, the associated transport requirements are likely to favour road rather than rail.

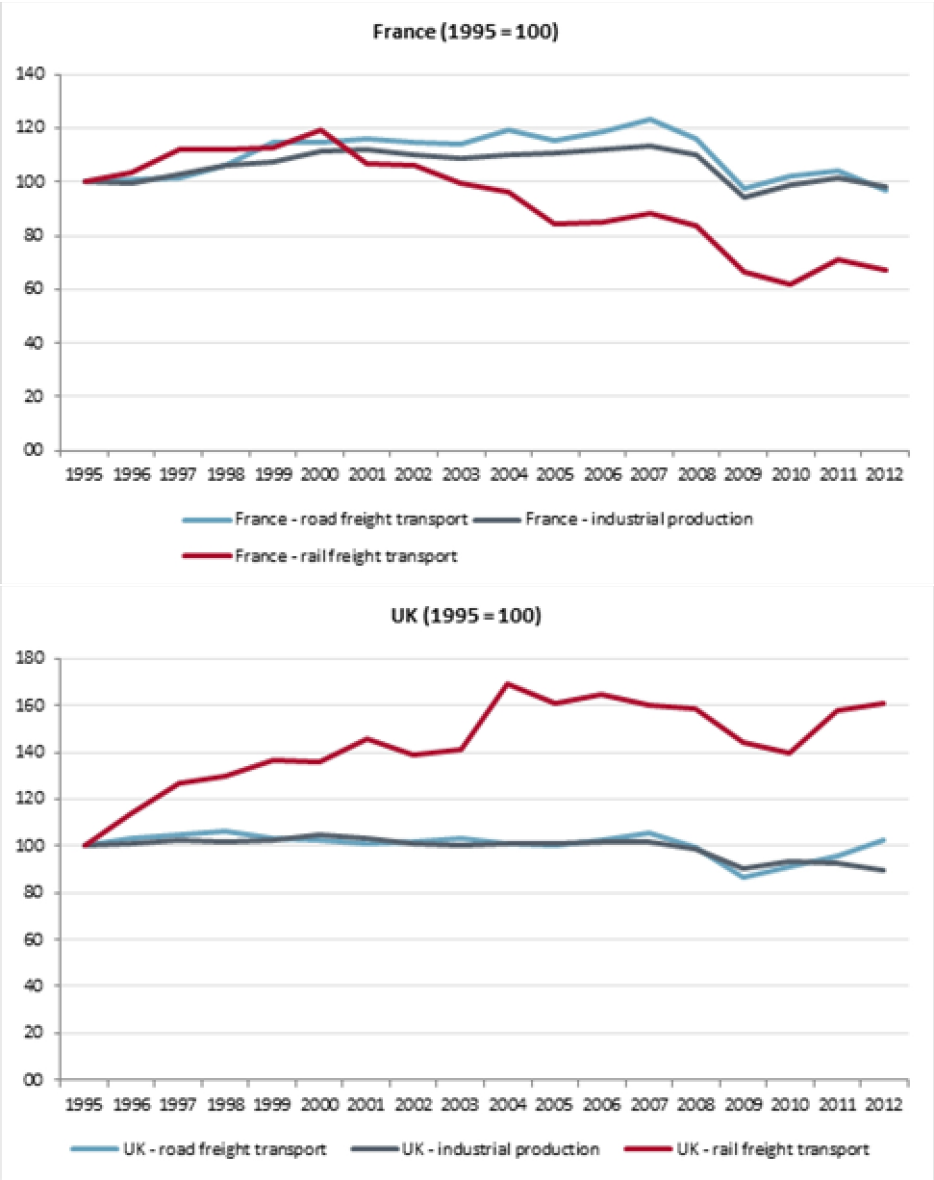
The weakening of the link between rail volumes transported and industrial production can be observed in Figure 13 below with reference to France. Since 2000, rail freight has declined proportionately more than industrial production. This reflects, among other factors, the stable investment in road infrastructure (around €1.3 billion in 2014) compared to a decline in rail freight infrastructure investment. By way of example, rail links to two large French ports (Le Havre and Marseille) have significantly lower speeds than their road alternatives, with the average speed between Le Havre and Paris being 6 km per hour.

The decoupling of rail freight trends and industrial production can also be seen in Figure 14 with reference to the UK. However in this case, rail freight volumes grew faster than the economy overall (that is freight had a multiplier greater than one) with the exception of the recession period 2008-2010. As discussed in Chapter 3, this can partly be explained by the

presence of investment strategies to strengthen the role of rail at major ports, underpinning the growth of intermodal transport.

Conversely in both France and the UK, road freight transport volumes have been closely related to industrial production since 1995.

Figure 13: Index of road and rail freight against industrial production, 1995-2012



Source: SDG elaboration on Eurostat data.

Recent econometric studies (Müller et al 2014) have concluded that the majority of the overall (small) increase in rail traffic volume in Europe over the last two decades came from the emergence of new markets for transport services. The remaining growth was driven by market share gains at the expense of other transport modes, driven for instance by the growth in transit and international traffic over longer distances and across transport modes (e.g. port-rail integration). Furthermore, the European Intermodal Association (which includes many of the major European players) has indicated that some factors adverse to rail freight have emerged in the aftermath of the recent period of economic recession and stagnation. The persistent lack of confidence in the recovery of the market has discouraged

traders from taking up new opportunities – in this case new infrastructure and technology supporting freight transport – which are perceived as more risky. Lower investment and innovation in the rail freight sector can hamper its competition position.

We have noted that, in contrast with the EU long-term trend of declining rail freight shares, the US has experienced significant growth in rail freight transport. In a comparative study, Vassallo and Fagan (2007)[5] drew on the observation that the evolution of modal shares in the US and Europe has differed significantly in recent decades. While the share of freight carried by rail was similar in the US and Europe during the 1950s, the two markets began to diverge in the 1960s and by 2000 rail's share of freight (in terms of volumes transported) had increased to 38% in the US but had fallen to 8% in Europe.

This difference in trends in modal share has a number of causes. It is clear that the geographic characteristics of the US tend to favour investment in rail freight. In particular, longer shipment distances combined with low competition from maritime transport, especially along the East-West axis, enable railways to compete effectively with coastal shipping. In Europe, however, coastal shipping is more competitive, tending to reduce rail's share. In addition, public policy in the US has generally been more supportive of rail freight than in Europe.

However, Vassallo and Fagan (2007) have identified some aspects of transport policy that have been more favourable to rail freight in the EU than in the US. In particular, in Europe railways have been subsidised for much of their history and road fuel prices have generally been higher and road tolls more prevalent as compared with the US. However, the study also suggested that the lack of an interoperable infrastructure network in the EU has significantly disadvantaged the European rail freight industry relative to the US industry. The latter also benefitted from, inter alia, the sale of light-density lines to specialised short-line operators, and the fact that rail infrastructure (not electrified) allowed for longer freight trains and double-stack container services.

A further important difference between the US and European industries lies in the fact that market opening, which took place in the 1980s in the US, was not achieved until the 2000s in the EU. Moreover, European rail networks have invariably given priority to passenger services, with complex scheduling designed to accommodate a range of services within constrained infrastructure capacity. By contrast, the US released the private railways from the obligation of providing passenger services between the 1950s and the 1970s and then eliminated government controls over freight rates in 1980, thus allowing railway companies the freedom to focus on freight.

In summary, the evidence relating to macro-level factors affecting the mode choice of shippers indicates that several structural trends contribute to long-term changes in modal share. In particular, while road is more responsive to changes in the economic cycle, rail has been more affected by the process of deindustrialisation and the fragmentation of logistics, which have tended to reduce the demand for rail freight transport, although this has been offset to some extent by the development of new forms of intermodal transport. A comparison between the EU and the US also shows that public policies can have a strong long-term impact on modal trends, an issue explored in more detail in Chapter 3.

[5] This research covers only EU-15 data.

2.3. Potential for modal shift from road to rail

Having identified the main factors affecting modal choice, it is important to understand what the size of the contestable market for rail is. According to the theory of contestable markets, the competitiveness of a market depends on the presence of entry and exit barriers, the degree of sunk costs required to enter it and the relative technological development of competitors. In the case of rail freight, these characteristics determine the extent to which the portion of the overall freight market currently dominated by road could be contested by rail operators.

In recent years, several studies have sought to assess and quantify the opportunities for rail and intermodal freight services to secure market share in competition with road. The major findings, categorised according to the different techniques used for estimating impact on market share, are summarised in this following paragraphs.

2.3.1 Estimates based on changes in costs

The potential for internalisation of external costs has been investigated in detail by the European Commission. For example, impact assessments were carried out prior to the introduction of the Eurovignette Directive, as well as during the monitoring of its implementation. Further, a number of studies produced as part of the "external transport cost calculator" project for the International Union of Railways (UIC)[6] assessed the effects of various scenarios for internalising external costs using a bespoke model. The analysis covered policy options involving charges reflecting both variable infrastructure costs and external costs on road and rail. The results indicated that if road pricing were in place across Europe in 2020, road transport demand would fall by 7% while rail transport demand would increase by some 10%.

A study carried out by the Policy Research Corporation (PRC) (2007) for the Ministry of Transport of the Netherlands examined the possibility of incentivising modal shift towards rail freight transport through measures such as road pricing. The study concluded that increases in road haulage prices could induce a maximum potential shift of freight transport volumes from road to alternative modes of approximately 3%. Most of the modal shift would occur in the so-called "fight market" (transport of freight over distances of between 400 and 600 km) where rail and inland waterways can more easily compete with road transport. The required price increase differed between market segments, ranging from 20% in the fight market to nearly 400% on shorter distances. Under the assumption that price increases were similar to those resulting from the introduction of the heavy vehicle toll in Germany (see Chapter 4), the potential modal shift in volumes was estimated at around 0.4% to 0.6%.

Further insights come from a study by Significance and CE Delft (2010) on potential freight modal shift resulting from changes in relative prices, which included reviews of several survey articles on elasticities of transport demand for each commodity and mode. The price elasticities reviewed included own-price elasticities (change in demand with respect to changes in price within the mode) and cross-price elasticities (change in demand with respect to changes in the price of one mode, such as road haulage, relative to the price of another, such as rail freight). Significance/CE Delft estimates of price elasticities vary significantly across samples, indicating a high level of uncertainty about actual modal shift in response to price changes. Moreover, the effectiveness of strategies involving altering

[6] Van Essen, Boon, Schroten and Otten from CE Delft, Maibach and Schreyer from INFRAS, Doll from Fraunhofer ISI, Jochem from IWW, Bak and Pawlowska from the University of Gdansk (2008).

relative prices (e.g. fuel taxes and costs of environmental regulation) varies substantially by commodity as well as by market and trade flow. Overall, the demand for transport of commodities was found to be relatively inelastic for both rail and road modes (elasticities were generally between zero and -1), tending to confirm the view that the potential for achieving modal shift through price changes alone is limited.

Müller et al. (2014) investigated the potential growth opportunities for European rail freight and found that intermodal competition is likely to be unstable over the coming years, strengthening the case for policy intervention in favour of rail freight. In their central case scenario, rail's share of freight traffic was broadly constant until 2025, while in their high and low case scenarios it varied between 5% and 15% depending on a number of factors and policy interventions.

2.3.2 Estimates based on commodity type and distance

In research conducted for the European Environment Agency (EEA), Zimmer and Schmied (2008) estimated the potential for modal shift from road to rail in the EU by considering the suitability of different commodity types for transport by rail, taking account of the importance of transport distances. They estimated the modal shift potential for the EU-27 to be 362 billion tonne-kilometres, corresponding to a shift from road to rail of some 14 percentage points, based on consideration of the physical characteristics of commodities alone. However, after taking account of other factors such as cost, access to infrastructure and service quality, they found that only one per cent of freight transport volumes could shift from road to rail. Hence, while they concluded that the theoretical potential for modal shift was significant, they also noted that in practice a number of supply side factors such as high costs, unattractive schedules and poor service quality continued to limit the demand for rail freight transport.

2.3.3 Estimates based on supply-side measures

A study by NEA7 (2004) for the European Commission estimated the potential changes in traffic volumes as a result of the completion of the Trans-European Transport Network (TEN-T). It concluded that, compared with a reference scenario, an additional 100 million tonnes of freight would be shipped by rail in 2020 as a result of some 10% of EU international freight traffic shifting from road. Overall, approximately 2% of road transport, or 1.4 percentage points of total freight transport, could be expected to shift to rail.

Research into the German freight transport market, conducted by the German Federal Environment Agency (UBA) (2010), indicated that a doubling of national rail capacity and transport volumes could be achieved by 2025 as a result of a range of supply-side measures. One-third of the growth in rail traffic would come from better use of the current infrastructure, while the remainder would be delivered through enhancement of the network.

A study of the potential for modal shift, carried out by den Boer, van Essen and Brouwer from CE Delft and Pastori and Moizo from TRT (2011), showed that only by maximising the use of existing infrastructure, a 30 to 40% growth in train-kilometres could be accommodated by 2020. Moreover, if the increased capacity were allocated equally to freight and passenger services, rail freight traffic could grow by 83% and passenger transport by 23% overall.

[7] M. Gaudry, COWI, PWC, TINA, IWW, NESTEAR, Mkmetric, HERRY and IVT (2004).

2.3.4 Estimates based on international benchmarking

Based on their analysis of the differences between freight modal shares in the EU and the US, Vassallo and Fagan (2007) estimated how rail transportation volumes in the US would have changed if the market share of shipments and the commodity mix had been the same as in Europe, holding policy interventions constant. They estimated that some four fifths of the difference in modal shares was the result of natural or inherent differences, with the remainder due to policy. The study concluded that if the residual policy gap were closed, rail's share of freight volumes in Europe would increase by 8 to 13%.

Table 3 summarises the main results of the research attempting to quantify the potential for modal shift. The estimates produced are not directly comparable as they are based on different methodologies and modelling scenarios, and are expressed in terms of different units of measure.

Table 3: Summary of research conclusions on modal shift potential

Source	Unit of measure	Potential mode shift to rail	Notes
Vassallo and Fagan (2007)	Volume (tonnes)	5 percentage points	Macro approach (comparison of mode split in Europe and the US)
Zimmer and Schmied (2008)	Volume (tonne-km)	14 percentage points	Only physical constraints to mode shift considered
Zimmer and Schmied (2008)	Volume (tonne-km)	1 percentage point	Physical, economic, access and quality constraints to mode shift
NEA et al. (2004)	Volume (tonnes)	1.4 percentage points	Potential mode shift due to the completion of the TEN-T network
PRC (2007)	Volume (tonnes)	3 percentage points	Effect of fiscal measures disadvantaging trucks
PRC (2007)	Volume (tonnes)	0.4 – 0.6 percentage points	Effect of fiscal measures disadvantaging trucks (price)
CE Delft et al. (2007)	Volume (tonne-km)	+10% of current rail volume	Scenarios for internalising external costs
Müller et al. (2014)	Volume (tonne-km)	5 percentage points	Upper range estimate
Ce Delft and TRT (2011)	Mileage (train-km)	+23% of current rail traffic	Effect of maximising the use of existing infrastructure

Overall, a number of studies have found that there is potential for modal shift from road to rail (or intermodal services). However, their conclusions on the size of this shift differ significantly, ranging from 1 to 14 percentage points. The literature also indicates that the potential for a shift in long distance transport is higher than in the shorter distance market, with rail being more competitive above a threshold of 200-300km. This is in line with the EU policy objectives referred to in Chapter 1.

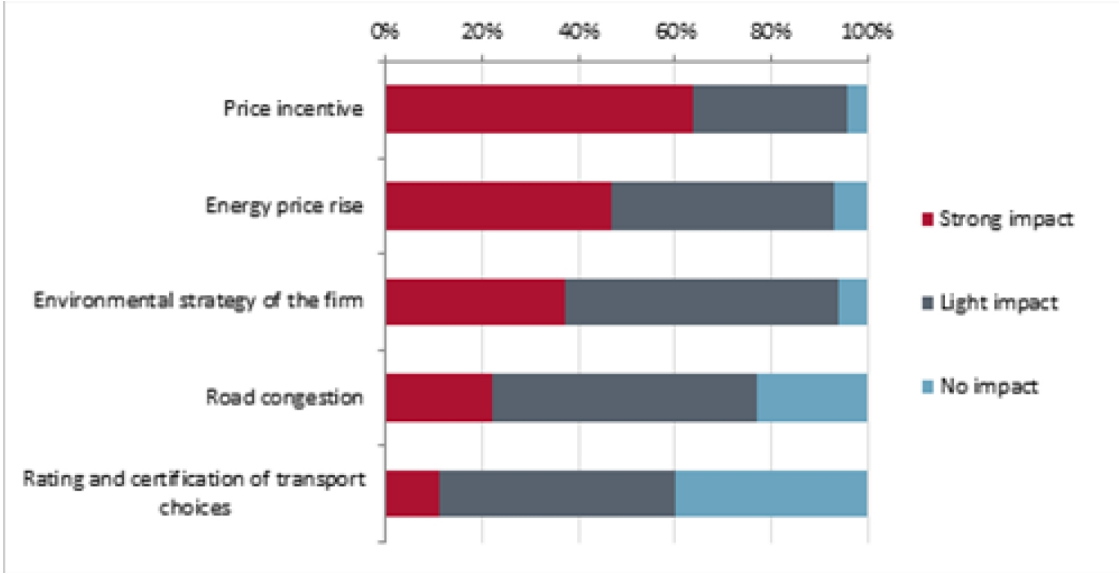
2.4. Evidence from case studies

In order to validate and complement the findings from the literature review, we have carried out a number of country-specific case studies. Our findings from these studies are described in the following paragraphs.

2.4.1 France

A recent survey conducted by Eurogroup Consulting (2014) suggests that the attractiveness of rail freight in France is hindered by poor reliability, higher costs relative to road over comparable distances and inadequate connectivity with the main logistics sites. As shown in Figure 14, price is the main factor determining the modal choice of shippers, reflecting the fact that transport costs represent a significant proportion of total production costs and that, consequently, shippers are price sensitive when procuring transport services. Road transport is generally perceived to be cheaper, and pricing structures for road haulage are considered simpler.

Figure 14: Factors impacting on modal choice in France



Source: Eurogroup Consulting, Baromètre de perception des chargeurs sur le transport ferroviaire, 2014.

In addition, shippers perceive a gap between demand and supply: rail capacity along the most important corridors cannot always accommodate demand, and service frequency is not sufficiently attractive. Shippers also consider booking procedures to be inflexible, and the fines they pay when they need to cancel a path unreasonably high (although we note that ARAF, the rail regulatory authority in France, is currently seeking to rebalance this over time).

The survey also provided an opportunity for interviewees to highlight the main advantages of using rail freight. These were identified as being:

- Protection of the environment;
- Guaranteeing the safety and integrity of goods transported (this is particularly true in the case of dangerous goods); and
- Suitability for goods with certain characteristics (in terms of volume, weight, etc).

While recognising that rail freight has some important advantages, stakeholders noted the lack of effectiveness of recent incentive measures and the withdrawal of plans to introduce an environmental tax for road hauliers. They considered that while the infrastructure improvements planned over the next few years should help to strengthen the competitive position of rail, price considerations would continue to be the primary determinant of mode choice.

2.4.2 Germany

Both road and rail freight transport have grown significantly in Germany since the mid-90s. Between 1995 and 2012, national road freight grew by 26%, international road freight by 44% and rail freight by 56%. The evolution of freight movements in Germany has been driven by a number of factors, including the enlargement of the EU which resulted in a strong increase in transit freight traffic between East and West as well as between Western and Southern European Member States. In addition, the location of a number of major ports (e.g. Hamburg and Bremerhaven) along the northern coast of Germany has encouraged major freight flows from locations elsewhere in the country requiring port access.
Despite the high share of rail freight (23% of tonne-km in 2012), policy-makers consider that there is potential to increase it by addressing a number of factors reducing rail competitiveness. A recent survey carried out by HSH Nordbank[8] (2014) amongst railway undertakings and rail freight forwarders highlighted four main barriers to further expansion of rail freight transport in Germany, namely:

- Strong price competition with road freight hauliers;
- Non-adequate infrastructure conditions;
- Technical and organisational barriers with respect to cross-border traffic; and
- Lack of flexibility, reliability and punctuality.

2.4.3 Italy

The geographical characteristics of Italy have a direct impact on where and how goods are transported. In particular, the shape of the peninsula means that freight travels long distances along a limited number of North-South routes, as well as along the East-West Corridor in Northern Italy. In addition, there are a number of corridors that carry freight internationally including, the Corridor from Genoa to the Swiss border, the Brenner Corridor to the border with Austria and the extensions of the East-West Corridors to Slovenia and France.

All these corridors are served by both rail and road, with road offering door-to-door connectivity while rail transport usually involves at least one transhipment. In addition, a significant amount of freight arrives at (and departs from) the main Italian ports: only some of them have adequate railway connections while all of them have road connections.

The main factors making road transport more attractive than rail in Italy relate to costs and the quality of infrastructure. Thus, it has been estimated that the average cost of road transport in Italy is approximately €1 per km while the cost of rail transport is closer to €18 per train-km[9]. The differential is significantly lower when calculated in terms of tonne-km (because trains carry much larger loads than trucks) but it remains the case that the cost of rail transport is higher than the cost of road transport unless longer distances are covered. This is attributed to:

- The higher cost of labour in the rail sector (for example two drivers are needed on most freight services and the employment contracts are less flexible); and

[8] HSH Nordbank (2014) Zukunft des Schienengüterverkehrs.
[9] Mercintreno Conference 2014, Rome.

- The relative costs of access to infrastructure in Italy, equivalent to some €3 per train-km for freight trains compared to road charges that are only applied on parts of the motorways network.

In addition, the lack of appropriate rail infrastructure is considered to be a strong barrier to modal shift, in particular because of:

- Low gauge clearance limiting the possibility to piggyback heavy goods vehicles on trains;
- Maximum allowed train lengths being much shorter than in other Member States (with most trains on the Italian network being limited to 550m compared to over 700m on other European networks); and
- Maximum allowed trainload weights being lower than in other Member States.

2.4.4 Poland

Based on interviews with the Association of Independent Freight Operating Companies in Poland, we have identified the following as the main barriers to modal shift:

- The low quality of railway infrastructure (in relation to road infrastructure);
- The high level of track access charges on the rail network; and
- Existing administrative procedures discouraging customers from using rail.

The Association also suggested that the following initiatives could encourage freight modal shift:

- Large-scale modernisation and development of rail infrastructure;
- Liberalisation of regulations, especially for users of railway sidings;
- Lowering track access charges;
- Introducing a regulatory framework that would equalise the competitive positions of railway and road; and
- Reduction of administrative, regulatory and technical (e.g. interoperability) barriers to using rail in Poland.

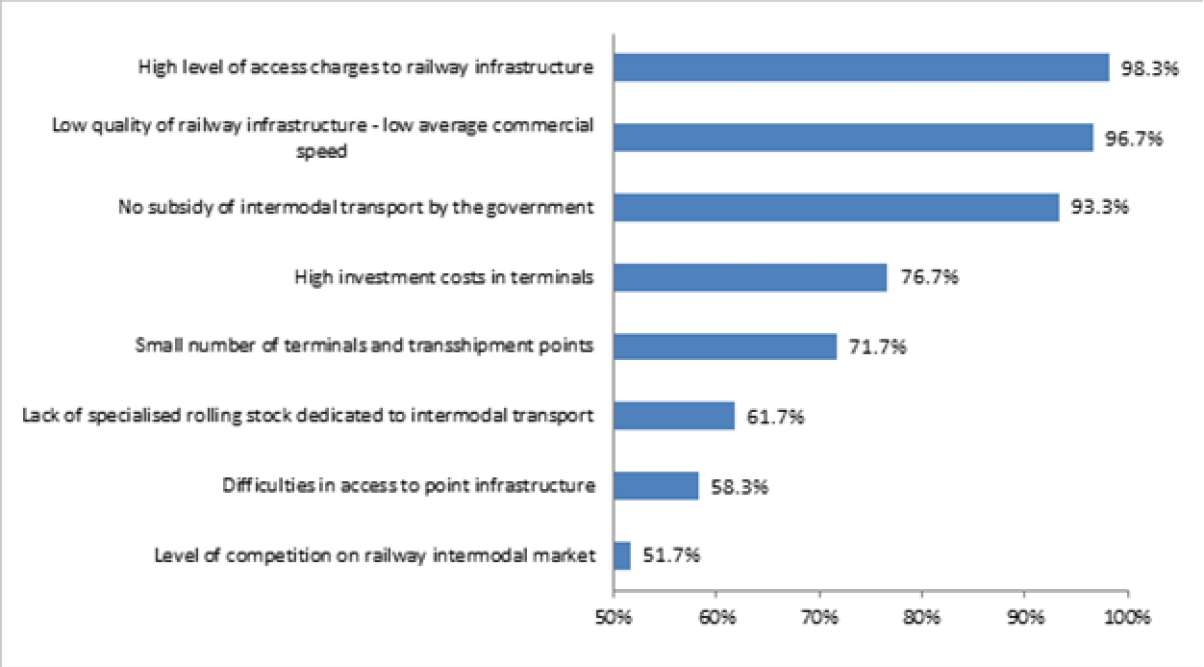
The perception is that road transport performs much better in Poland in terms of transit time (as a result of door-to-door solutions), reliability and availability. This competitive advantage is primarily due to the rapid development and improvement of the road network relative to the railway network, which has not benefitted from significant renewal or enhancement in recent years. Indeed, such modernisation of the national rail infrastructure as has occurred has focused on passenger services, with 'unnecessary' secondary lines as well as stations and passing loops frequently used by freight trains being frequently closed. Moreover, in recent years, many railway sidings have fallen into disuse because of a lack of investment and the complex regulatory procedures governing access to them (e.g. the need to obtain certification).

At the same time, attitudes towards road and rail transport vary depending on the characteristics of the shippers themselves. For example, the larger the shipper, the more likely it is to transport goods by rail because of the potential economies of scale, and those located relatively close to the rail network also tend to make greater use of rail freight transport. A number of stakeholders noted that railways can be competitive, depending on

the route, shipment size and market segment in question, and several confirmed that rail freight tended to be more competitive over distances above 200km.

A study of the Polish railway intermodal market commissioned by the Polish Office of Rail Regulation (2012) included a survey of the opinion of freight operating companies and reached similar conclusions. The results of the survey are summarised in Figure 15. The companies perceived the high level of access charges and low quality of infrastructure as the main barriers to using rail freight in Poland. More than nine out of ten respondents highlighted the lack of subsidies for intermodal operators and the high cost of terminal investment; the limited number of access points and difficulties in accessing infrastructure were identified by some two-thirds of interviewees. In addition, more than 60% of freight operators pointed to a lack of available specialised rolling stock dedicated to intermodal transport as the barrier to growth of rail freight. Rolling stock statistics support this conclusion as the Polish domestic freight fleet is dominated by obsolete coal wagons.

Figure 15: Importance of selected barriers to growth of the intermodal transport market, in the opinion of Polish Freight Operating Companies



Source: Polish Office of Rail Regulation (2012) Analysis of railway intermodal market. [Original title and content in Polish: Analiza rynku kolejowych przewozów intermodalnych], p. 33.

2.4.5 Spain

In Spain, rail freight transport has been declining both in absolute terms and in terms of modal share over the last two decades. This has left the Spanish rail freight market with a modal share of less than 5%, one of the lowest in Europe. Long-term investment programmes by national and regional governments has tended to favour the expansion of the road network, and motorways in particular. Moreover, while there has been significant investment in the rail network over the last 10 years, this has been focused primarily on passenger rather than freight services. Rail freight also suffers from other structural barriers, including a polycentric geography, dispersed industrial production patterns and the difference in the rail gauge with France and other EU Member States.

A survey of shippers carried out by the Chamber of Commerce of Zaragoza (2010)[10] showed that rail is considered to be a slightly cheaper alternative to road, receiving a score of 3.3 out of 5 on price as compared with 3.1 for road. However, rail services are rated worse than road for all other indicators. In particular, rail is considered to be particularly inflexible, receiving a score of only 1.5. A summary of all scores is presented in the table below.

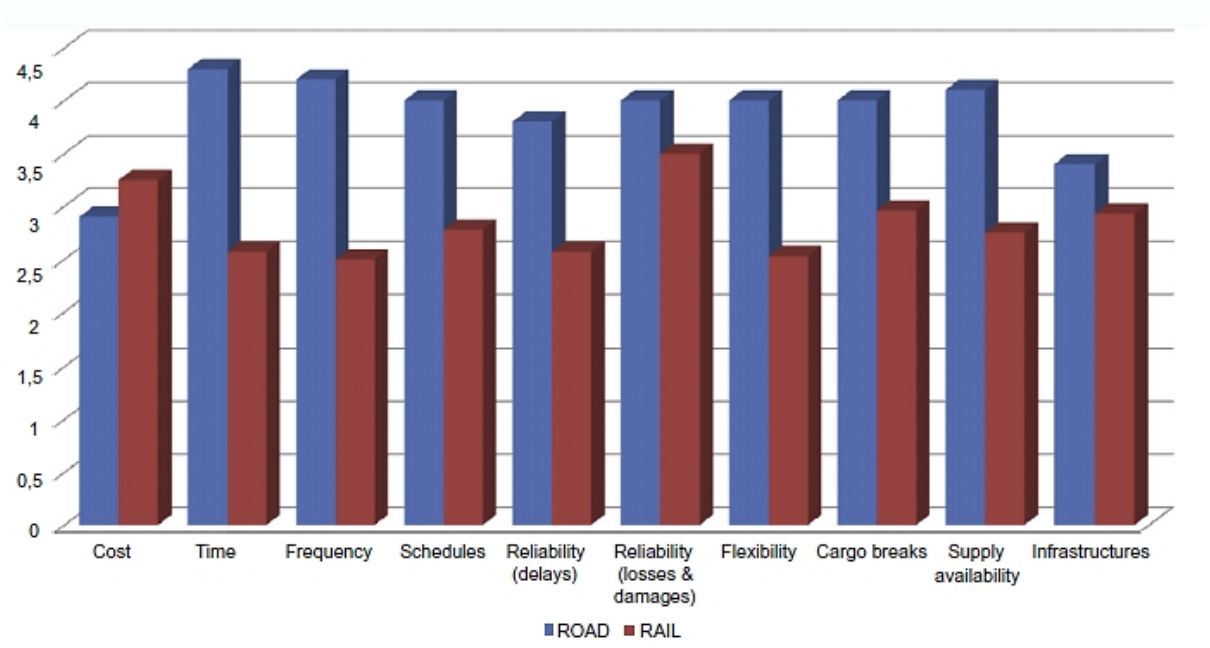
Table 4: Survey of shippers in Aragon – scores by mode and characteristic (scores between 1 and 5)

Characteristics	Rail	Road
Price	3.3	3.1
Quality	2.6	3.6
Speed	2.3	3.6
Flexibility	1.5	3.7
Punctuality	2.6	3.6

Source: Zaragoza Chamber of Commerce (2010).

The survey highlights the importance of flexibility, speed and punctuality in mode choice. It also indicates a significant difference between shippers according to whether they operate on their own account or for hire and reward. Companies that have internalised haulage functions and operate own account transport services express a preference for rail over road across all of the indicators. This may be evidence of the fact that shippers would prefer rail over road if the supply-chain were to be simplified and rail infrastructure more widely accessible.

Figure 16: Shippers' preferences in Spain – average scores for road and rail transport (scores between 1 and 5)



Source: Feo-Valero et al. (2011).

[10] Estudio del sector del transporte de mercancías por carretera en Aragón, Camara de Comercio de Zaragoza, 2010.

KEY FINDINGS

- In between the extreme cases of goods that are almost always carried by rail and those most likely to be transported by road, a number of micro-level factors influence mode choice. Decisions made by shippers (the key decision makers in this process) are a function of the characteristics of past experience, the type of goods carried, the carriers' attributes and the distance/time requirements. Cost considerations are important and the competitiveness of rail is enhanced over longer distances.
- Several overarching and structural factors also contribute to long-term changes in modal share. These include the relationship between economic growth and freight transport, whereby road is more responsive to changes in the economic cycle than rail. Trends of delocalisation of the industrial production process and the fragmentation of logistics negatively affect rail freight; new forms of intermodal transport conversely represent a high-growth market segment for rail.
- Various studies have assessed the potential shift from road to rail or intermodal services; estimates range from 1 to 14 percentage points. The literature also shows a threshold of 200-300km above which rail is particularly competitive and the potential for modal shift is higher.
- Evidence from national case studies about shippers' preferences points to the importance of cost considerations in some countries where rail freight is perceived to be too expensive (France, Italy). More broadly, the need for high-quality and more capillary rail infrastructure is emphasised across all case studies, with a focus on bottlenecks (Germany), capacity (Italy, France) and reliability (Spain, Poland).

3. EXISTING MEASURES AIMED AT MODE CHOICE

3.1. Introduction

This chapter sets out the policy initiatives intended to support modal shift that have been undertaken at both the EU and national/regional levels. The analysis reveals that, despite numerous policies being adopted, their impact on modal shift has been minimal. We analyse and discuss some reasons for this lack of effectiveness below.

3.2. EU level assistance and policies

3.2.1 Main policy measures

The main EU level initiatives to affect the relative competitiveness of freight transport modes are as follows:

- In the case of roads, the Eurovignette Directive (1999) was adopted with a view to increasing the contribution that the road sector made to covering its external costs. The Directive also set out the principles for applying tolls. Since 2006, Member States have been able to differentiate tolls according to a vehicle's emission category ("EURO" classification), the level of damage it causes to roads, place, time and amount of congestion. This makes it possible to address the problems of traffic congestion as well as damage to the environment, on the basis of the "user pays" and "polluter pays" principles.
- In the case of rail, the First Railway Package (2001, modified by the Rail Recast in 2012) requires infrastructure managers to levy access charges that cover the marginal cost of running the railway, adding a mark-up only where the market can bear it. Since 2007, the European rail freight market has been completely liberalised. Competition from new entrants is seen as a way of increasing the quality of service provided by freight operators whilst also bringing prices down. The Fourth Railway Package (currently under negotiation between the European Parliament and the Council of the European Union) features several proposals aimed at improving the competitiveness of rail. These include an increased role for the European Railway Agency in authorising and certifying railway vehicles, making the process simpler and more efficient for cross-border traffic.
- In addition, intermodal transport has been promoted and implemented through programmes, such as Marco Polo and Trans-European transport networks, designed to stimulate investment in infrastructure projects of common interest across modes of transport.

The biggest direct monetary contributions to supporting modal shift have come from the funding and financing of specific infrastructure projects and policy initiatives. In particular the Cohesion Fund, the European Regional Development Fund, Trans European Transport Network (TEN-T) funding, and the Marco Polo and INTERREG Programmes (as well as funds from the various research programmes) have contributed to a number of freight specific projects across Europe, some of which had the aim of taking freight off the road network.

Table 5: Funding and financing for transport at the EU level 2007-2013[11]

Project	Period	Total budget
Cohesion Funds for transport	2007-2013	€ 82,000 million
TEN-T	2007-2013	€ 8,013 million
Marco Polo II	2007-2013	€ 450 million
INTERREG	2007-2013	€ 321 million

Source: European Commission and DG MOVE.

Over the period 2007-2013, TEN-T funding focussed on "the need for sustainability". Of a total of 30 Priority Projects, 18 related to rail, 3 to mixed rail-road and 2 to inland waterways. The horizontal Priority Project "Motorways of the Sea" was designed to enable short-sea shipping to compete on more door-to-door corridors. In addition, Regulation EU 913/2010 concerning a European Rail Network for Competitive Freight requested Member States to establish international, market-oriented rail freight corridors. This Regulation encouraged the strengthening of co-operation between Infrastructure Managers and promoted inter-modality between rail and other modes.

The financial mechanism for TEN-T during the current programming period (2014-2020), the "Connecting Europe Facility" (CEF), will make €26.25 billion available to co-fund TEN-T projects in Member States, €11.31 billion of which will be allocated to TEN-T projects in Member States eligible to receive Cohesion Funds. There has been a shift from the patchwork of Priority Projects to a real network approach. Core network corridors will assist in removing bottlenecks, building missing cross-border connections and promoting modal integration and interoperability. These corridors will integrate the rail freight corridors discussed previously.

The Marco Polo programme was launched in 2003[12] to fund direct modal shift or traffic avoidance projects and to provide support to enable freight to switch from road to other modes of transport. The last calls for proposals were issued in 2013. The programme comprised five funding areas:

- Modal shift from road to rail and waterborne systems;
- Catalyst actions which promote modal shift;
- Motorways of the sea between major ports;
- Traffic avoidance; and
- Common learning actions.

These objectives are to be achieved through the new "Shift2Rail research initiative launched in 2014, which seeks to accelerate modal shift to the rail sector. The research instrument will be managed in a joint undertaking under Horizon2020, the EU's Research and Innovation programme for 2014-2020. The overall budget is estimated to be €1 billion over a six to seven year period and will be co-financed by the private sector and the EU. The initiative will concentrate on developing solutions to enhance capacity, consolidate reliability and improve the life cycle of the European rail system. Both CEF and Shift2Rail are still in their infancy and it has therefore not been possible to assess their effect, but their potential impact is described in Chapter 4.

[11] http://ec.europa.eu/regional_policy/how/policy/doc/strategic_report/2013/factsheet8_road.pdf
[12] Regulation (EC) No 1382/2003 of 22 July 2003.

3.2.2 Effectiveness of the measures

Although the policies implemented at the EU level over the past 15 years have shared the goal of fostering modal shift, the analysis presented in Chapter 1 shows that their overall impact on the modal share of rail in the EU freight transport market has been minimal. The main reason for this lack of effectiveness is the failure to coordinate the various policy initiatives and funds, both within the European framework and between the EU and individual Member States.

The Eurovignette Directive is not mandatory. In addition, the legislation does not specify how road user charges should be developed. As a result, Member States have applied different methodologies for calculating the charges and they can be based on a range of factors such as vehicle weight, emissions and road type. This, in turn, has led to a considerable variation in the level charges applied across the EU. As of February 2014, 23 Member States had introduced some form of road charging on heavy goods vehicles (European Commission) with nine levying charges through vignettes, five using electronic tolls and nine having conventional tolls. Five Member States had no road user charging in place.

The liberalisation of international rail freight has had varying levels of success. A number of new entrants have emerged; some of these have "cherry-picked" existing freight flows, while others have created new traffic and moved freight from road to rail. In addition, the effectiveness of intra-modal competition depends on the presence of a level-playing-field across modes.

In its 2013 Special Report on the Marco Polo programme, the European Court of Auditors found that the programme had been ineffective, and recommended that it should be discontinued in its current form. The funded programmes did not meet targets, had little impact on shifting freight off the roads and there was no data to assess the achievement of the policy objectives (e.g. the environmental impact of freight transport, road congestion or road safety). There was a lack of relevant project proposals put forward because of market conditions, and the programme rules discouraged operators from taking part in the scheme. The audit also found that many of the projects would have gone ahead even without an EU subsidy, with 13 of the 16 beneficiaries audited stating that they would have started to run the transport service even in the absence of additional EU funding.

Just under a quarter of all Cohesion Policy funds (some €82 billion) between 2007 and 2013 were allocated to transport projects. These were distributed through 238 operational programmes covering all modes of transport, although again there was a particular emphasis on road projects (approximately €41 billion or 50% of transport funding), with rail projects accounting for approximately €23 billion (30% of transport funding) and other projects (in urban transport, ports, multimodal transport, airports and inland waterways) for the remaining €16 billion. Between 2007 and 2013, over 75% of Cohesion funds for road were spent in the EU-13 Member States, where a marked decline in rail freight has been observed over the same period.

With respect to EU policies, the stakeholders interviewed agreed that there was a systemic failure with the Marco Polo programme and agreed that alternatives should be found. A majority of stakeholders gave a positive assessment of the regulatory and financial measures taken in the past five years, which had the effect of bringing the issue of rail freight and inter-modality to the forefront of the public debate and increasing public awareness of the importance of the logistics sector. However, it is still the case that

intermodal freight transport is often not able to survive without some form of public funding, in particular to provide the necessary infrastructure and kick-start operations. To date, EU funding has not been able to secure the long term growth of the intermodal sector, although it has achieved short term improvements in its competitive position.

3.3. Member States assistance and policies

The national case studies provide examples of Member State specific policies that have been introduced to incentivise modal shift. In this section, we set out the main findings from these case studies and provide a summary of those national policies aimed at incentivising modal shift, as identified by the UN Economic Commission for Europe[13].

3.3.1 Main policy measures: France

In France, pro-rail policies have focused mainly on supporting infrastructure investment and improving technical standards for rail freight. The failure to achieve significant modal shift can be attributed to insufficient financial incentives for expansion of the rail freight sector and ineffective interventions targeting the external costs of road transport.

Pro-rail policies

In France, in recent years there has been increased public sector support for freight transport, and rail in particular, in order to internalise the impact of road transport and to provide support for a rail sector whose financial sustainability is in doubt. Specific measures include simplification of technical regulations for rail freight, a system to develop priority paths for freight trains and the creation of a network of major rail corridors. In addition, rolling motorways through the Alps and from the Spanish border to Luxembourg are now in operation on a daily basis, and others linking Calais and the Spanish border (Boulou and Tarnos) are planned to open in 2015 and 2016. In parallel, measures addressing cross-border barriers and bottlenecks are being implemented, such as the planned Turin-Lyon link across the Alps.

The government supports combined transport operators for the transhipment of containers. The objective of those measures is to compensate for the additional costs of handling, which do not occur in the case of road transport operations. The government also provides financial support for the creation, improvement or extension of combined transport terminals, including those located in seaports. However, to date only 23% of containers are transported by rail and inland waterways whereas 77% are carried by road.

Investment is being channelled into improving the rail connectivity of the main ports with the hinterland. "Opérateurs ferroviaires de proximité" are also developing to meet a demand for flexible transport that the main rail operators are not able to satisfy in the smaller ports. Regulations have been modified in order to compel leading terminal operators to remove barriers to access to their facilities, in particular by offering fair and transparent access terms.

Support has also been provided at the local and regional level. More specifically, public institutions (central government, regions, departments, municipalities) provide financial support for investments in the construction and extension of terminals and related equipment. Support may cover up to 50% of total investment. In addition, initial and

[13] UNECE Working Party on Intermodal Transport and Logistics (WP.24).

terminal hauls by road enjoy an exemption from the vehicle axle tax up to a maximum of 75%. However, this initiative has only had a limited impact on modal shift.

Tests of longer trains were also carried out at Sibelin marshalling yard (Rhône) in January 2014, with the joining of two 750-metre trains to form a 4,000-tonne, 1,500m train[14]. A double train of this kind can transport up to 70 wagons compared to 35 wagons carried by a conventional 750-metre train. Allowing longer trains would therefore enable rail companies to carry additional traffic without paying for extra train paths and secure important productivity gains.

The test took place within the framework of Project Marathon (MAke RAil The HOpe for protecting Nature, a project co-founded by the European Commission) and was designed to validate the technical feasibility of the "double train" ahead of a possible commercial launch in 2016. Technically, the innovation focuses on a radio control system which makes it possible to link the head locomotive manned by a driver with the driverless locomotive situated in the middle of the train.

Intermodal transport was previously further incentivised by the provision in Directive 96/53/EC allowing heavy goods vehicles of up to 44 tonnes to operate in France if they were part of a combined rail-road transport journey (trucks not part of a combined transport being limited to 40 tonnes). As of January 2013, this limitation was removed for all heavy goods vehicles, thus removing the competitive advantage of combined transport.

Anti-road policies

Road freight taxation includes the "taxe intérieure de consommation sur les produits énergétiques" (TICPE) and an additional axle tax. The TICPE tax is set at the national level (currently 0.45€/L) but since 2007 Regions can add an additional rate (up to a maximum of 0.015€/L of fuel) and with the exception of Poitou-Charente and Corsica, they all do so. An additional rate has applied since 2011 (up to a maximum of 0.0135€/L). Revenue from this second funding stream must exclusively finance infrastructure projects for sustainable transport. In the end, regional rates for TICPE range from 0.4169 €/L to 0.4419 €/L. Transport operators can claim a partial refund on those taxes (as happens in Italy, Belgium and Slovenia) up to a maximum of 0.0474 €/L if they opt for a lump sum. The axle tax is consistent with the requirements of the Eurovignette Directive.

The French government had signed a contract with the company "Écomouv" to introduce a road tax known as "Écotaxe", proportionate to the level of emissions of heavy vehicles. This tax was meant to be introduced in 2012 on all the motorways currently not under concession agreements. One of the main objectives of Écotaxe was to internalise external costs of road transport and stimulate a modal shift towards rail. After postponing its introduction several times, the government has decided to cancel the tax, replacing it with an additional tax on diesel fuel (potentially at a rate of around 0.04 €/L of diesel).

[14] Information published on 29 January 2014 in the UIC electronic newsletter "UIC eNews" Nr 383.

3.3.2 Main policy measures: Germany

Germany has incentivised combined transport through a mix of financial support and regulatory measures. The rehabilitation of railway sidings has also contributed to improving infrastructure quality and availability for rail freight. This, coupled with the introduction of a specific road toll, has contributed to the growth of rail freight volume by more than 30% between 2000 and 2012.

Promoting the use of combined transport

Combined transport plays an important role in the German integrated freight transport strategy. It supports the objectives of the government, which are aimed at strengthening the position of rail and inland waterways as environmental friendly modes of transport within the logistic supply chain by increasing their respective shares in total freight transported in Germany.

Since 1998, the Federal Government has granted subsidies to private companies for the construction or extension of transhipment facilities for combined transport. The most recent rules on the promotion of combined transport, in force since January 2012, limit the maximum amount of subsidies to 80% of investments directly related with transhipment facilities. In order to receive a subsidy, a company must demonstrate that this money is essential if the investment is to be undertaken and that access to the new facilities will be non-discriminatory. This support is intended to encourage growth in the use of combined transport services, even over relatively short distances.

In addition to the rules on financial subsidies, other policy measures have been applied to incentivise the use of combined transport[15]:

- An increased overall weight of 44t for heavy goods vehicles on pre- and post-rail hauls;
- Exemptions from the Sunday and public holiday driving restrictions for vehicles on pre- and post-rail hauls;
- Time spent by drivers on a rolling motorway (on the train) may be credited as part of the mandatory rest period;
- An exemption from vehicle tax for vehicles used exclusively for pre- and post-rail hauls; and
- A refund of vehicle tax for the use of the rolling motorway.

Promoting the construction or rehabilitation of private sidings

Private sidings are an important interface between the industry and the transport network, and a wide network of private sidings is crucial for strengthening the competitive position of rail transport. This is demonstrated by the fact that, in Germany, 85% of rail freight volume starts from/ends at private sidings[16]. Since 2004, the Federal Ministry of Transport has been providing subsidies for the construction and rehabilitation of private sidings in order to increase the share of goods transported on rail.

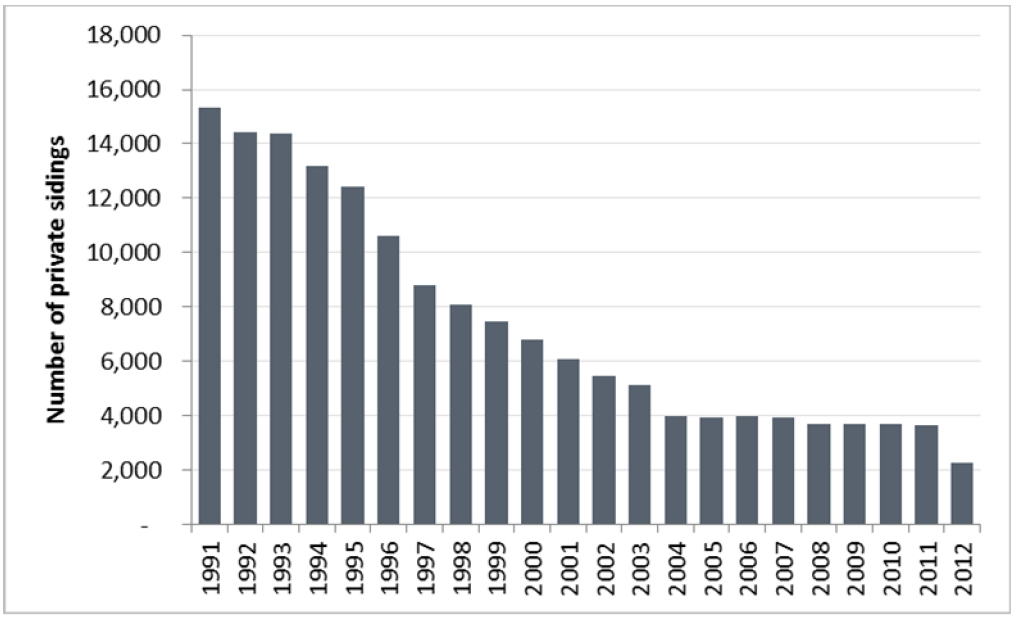
The rules on the promotion of the construction and rehabilitation of private sidings allow the granting of subsidies up to 50% of eligible investments. Beneficiaries are required to

[15] http://www.forschungsinformationssystem.de/servlet/is/288106/

[16] Responses to a parliamentary question of the Green Party to the Federal Government, http://dipbt.bundestag.de/dip21/btd/17/071/1707163.pdf

guarantee a volume of newly or additionally generated freight handled over the siding for a period of at least five years. The agreed amount of freight handled needs to be achieved at the latest five years after the start of operations of the private siding.

Figure 17: Evolution of the number of private sidings in Germany



Source: Forschungs-informations-system.

Since the rules on the promotion of private sidings came into force, 120 projects across Germany have been granted subsidies (as at December 2012) and the decline in the number of private sidings has been stemmed: this number remained almost constant between 2004 and 2011, as illustrated in the figure above. At the same time, the competitive position of rail has been strengthened by the introduction of a heavy goods vehicle toll. This has led to an increase in the number of new entrants into the German rail freight market which, in turn, is likely to have had a beneficial effect on the profitability of private sidings.

Anti-road policies

Germany has introduced a number of anti-road policies since the early 2000s. For example, since 2005 heavy goods vehicles (HGVs) beyond a gross vehicle weight of 12 tonnes have been required to pay a charge for the use of the federal motorway network. In 2013, total HGV tolls collected on German motorways and similar federal roads amounted to around €4.39 billion[17]. The main objective of the introduction of the HGV toll was to internalise the external costs of road transport and promote modal shift of freight transport from road to rail. However the toll was soon perceived to disadvantage German hauliers against their European competitors. Hence, two years after its introduction the Federal Government launched a programme to alleviate its impact on the national road transport industry through €600 million of tax reductions, including:

- A reduction in vehicle tax for HGV (resulting in lower revenues of around €150 million); and
- A reduction in motor vehicle taxes equivalent to €450 million.

[17] http://www.bmvi.de/SharedDocs/DE/Artikel/UI/lkw-maut-innovativ-oekologisch-und-gerecht.html

Overall, the net impact of anti-road policies has therefore not been as large as it could have been in the absence of the tax reductions.

3.3.3 Main policy measures: Italy

In recent years, both road and rail have received some form of subsidy/incentive in Italy. However, the progressive reduction in rail freight's modal share suggests that incentives to use road transport have been stronger overall. This can be attributed to both the structural nature of road transport funding (by way of annual budgetary commitments as opposed to the uncertainty of rail freight funds), and the fragmentation of rail incentives at the regional level.

Pro-rail policies

Since 2002, the Italian Government has sought to incentivise rail freight transport, in particular combined transport, by granting incentives to freight companies for the period 2004 to 2006. Under Article 38 of Law 166/2002, a company could receive incentives:

- If it was entering into a contract with the Ministry of Transport and a railway undertaking to run a complete combined transport (or dangerous materials) train; or
- If it bought equipment which directly benefitted the development of freight with particular focus on combined transport, dangerous materials or rolling motorways (a form of combined transport involving the conveying of HGVs by rail, which is relatively common in Alpine regions); or
- If it was a railway undertaking entering into a framework contract with the Ministry of Transport to provide combined or accompanied freight transport.

The total funds available amounted to €20 to 25 million. Subsidy under the first and third of these provisions was paid on a per km basis, while subsidies under the second case were paid as a lump sum. The first case was subsequently extended for a further two years beyond 2006, while the other two were extended for three years. All three provisions were renewed for a further year under the Financial Law of 2008. In each case, receipt of subsidy was conditional on the majority of the benefits being passed on to customers.

There is a correlation between the provision of these funds and growth in the rail freight market, although it is difficult to determine the direct impact of these measures with any precision: rail freight traffic (in terms of tonne-km) grew by 9% in 2004, 3% in 2005 and 6% in 2006, with volumes in 2006 reaching a level some 19% higher than in 2003. Over the same period, road freight traffic grew by 7%.

The most recent scheme (described in the box below) was set up by the Ministry of Transport in 2010[18]. Known as the "Ferrobonus", it incentivised switching of freight traffic from road to rail. Ferrobonus has been credited with increasing rail freight volumes by 6% in 2011, a year which saw a continued economic decline and a fall in freight volumes in all sectors.

[18] Through Ministerial Decree 592 of the 4th August 2010 subsequently modified by Ministerial Decree 750 of the 14 October 2010.

Box 1: Monetary incentives to rail freight

The Ferrobonus in Italy

The Italian Ministry of Transport set up a direct incentive to intermodal transport in 2010 known as the "Ferrobonus". It incentivised the switching of freight traffic from road to rail. In order to apply for the bonus, operators were required to provide intermodal freight transport services with one leg undertaken using rail and other legs using other forms of transport (rail only services were excluded). All companies meeting the eligibility criteria were eligible for funding. The incentive was calculated by taking the total amount of funds available and dividing it by the total number of train-km travelled by the approved services. The final incentive was set at €1.078 per train-km. If the beneficiary was a combined transport or intermodal operator, they were required to pass at least 40% of the value of the incentive on to the ultimate customer.

Notwithstanding a period of prolonged economic decline and a fall in overall freight volumes, volumes moved by rail increased by 5% in 2011 and by 9% in 2012, an effect attributed to Ferrobonus. As reported by the European Court of Auditors in 2011, the Italian administration managed the programme with a multi-million budget that was paid out almost in full (82.3% of funds were allocated). 15 employees were required to administer the scheme, at a cost of 1.2 % of the total programme budget. However, the scheme was discontinued in 2012 as a result of budgetary pressures.

Trenitalia – the incumbent train operator in Italy – also currently benefits from a public service contract with the State to carry freight by rail to the south of the country. This contract is valued at €128 million per annum and covers some 11 million train-km. Due to a recent European Commission investigation under State Aid legislation, this contract was not renewed at the end of 2014.

Another €7 million per annum have been granted by the Ministry of Transport to the "Alpine rolling highway", a combined transport service operating over a distance of 175 km between France and Italy via the Mont Cenis Tunnel. The service has been operated by Autostrada Ferroviaria Alpina (AFA), a subsidiary of SNCF and Trenitalia, since 2003.

Regional policies

In addition, a number of Regions in Italy have set up schemes to encourage the transfer of freight from road to rail. These regional interventions have taken the form of public service contracts, open to all operators, with the aim of serving freight locations that previously had not been served within a region or that could no longer be considered economically viable in the absence of financial support.

In 2004, the Friuli Venezia Giulia region introduced measures aimed at encouraging the development of combined transport and reducing access charges. The plan was limited to a three-year period and a budget of €2.7 million. Funds were allocated to rail businesses that provided combined transport services by rail and originated in the territory of the region (€1.5 million) as well as to shipping companies that established regular lines for the transport of intermodal loading units (€1.2 million). Grants were limited to offsetting the difference between the external costs of road transport and combined transport. More recently, the Friuli Venezia Giulia region has allocated €12 million to logistic companies over six years (2010-2015) for the development of rail/road combined transport and roll-on/roll-off (Ro/Ro) maritime services, and another €12 million over the same period for new combined railway and motorway services.

Within the Programming Period 2007-2013, the Veneto Region allocated a total of €55 million in funding for the implementation of three projects involving investment in intermodal transport: (i) the construction of an intermodal terminal at the logistic centre of Padua, (ii) the construction of a warehouse for the management of cargo handling at the logistic centre of Rovigo; and (iii) the enhancement of the logistic terminal at the port of Chioggia.

The Emilia Romagna region has offered subsidies for freight companies wishing to transfer freight from road to rail for a number of years. The latest incentive plan provides for maximum subsidies of €150,000 per company, less generous than the previous (2009) plan under which subsidies of up to € 400,000 were available. Over the period 2010-2012, the region has also granted funding of €9 million for the development of traffic to and from the port of Ravenna.

In 2009, the Campania Region allocated €1.3 million to launch a new rail freight service between the port of Naples and the intermodal centre of Nola. The objective was to shift 15,000 HGVs per day (8.5% of all such traffic) from road to rail within three years. No monitoring reports are available yet to assess the impact of these measures.

Impact of rail policies

However, even though significant funds have been directed towards increasing the competitiveness of rail freight, many more are directed at increasing the competitiveness and effectiveness of road freight. Road transport in Italy in the period 2006-2013 is estimated to have received some €5.2 billion of public funding, of which €3.0 billion were ordinary funding provided through national Budget Laws and €2.2 billion by means of other funds, while over the same period rail freight transport was granted €1.1 billion. Moreover, the piecemeal nature of both national and regional initiatives in Italy has tended to limit the impact of incentives intended to encourage modal shift to rail. Although the modal share of rail freight grew from 11.4% in 2006 to 14.0% in 2012, this seems to have been the result of road freight traffic declining much more than rail freight traffic during the recession (over the period, road freight fell by 34% while rail freight fell by 16%). Nevertheless, the experience of the Ferrobonus is generally regarded as demonstrating the potential for incentive-based policies to deliver positive results if implemented over a sufficiently long timeframe.

3.3.4 Main policy measures: Poland

In Poland, road transport has improved its competitive position in relation to rail in recent years. Relatively ineffective policies for discouraging road use, coupled with insufficient investment in rail freight infrastructure and similarly ineffective policy incentives to use rail instead of road, resulted in a decrease of rail's share of goods transported (measured in terms of tonne-km) from 35% in 2003 to 18% in 2012.

Pro-rail policies

In 2002, Poland ratified the AGTC Agreement[19] and currently 4,278 km of railway lines meet AGTC standards. Poland has also started implementing the European Rail Traffic Management System (ERTMS) on the main railway corridors, as outlined in the National Plan for ERTMS Implementation. Projects are co-funded by the EU Cohesion Fund[20]. More

[19] European Agreement on Important International Combined Transport Lines and Related Installations.

[20] Operational Program Infrastructure and Environment, the National Strategic Reference Framework for the years 2007–2013, action 7.1: Development of Railway Transport.

projects are to be launched in the 2014-2020 programming period to provide additional capacity on heavily congested lines, assure interoperability and meet EU legal obligations. The choice of lines on which ERTMS is, or will, be implemented shows some consideration of the requirements of freight train operators as a number of key freight corridors[21] are included in the investment plan.

The government's aim has generally been to focus financial support for the rail sector on unprofitable but socially important public passenger services with the expectation that all freight trains can be operated on a purely commercial basis. Hence, unlike in other EU countries, no subsidies were granted to compensate shippers for longer rail journey times (in comparison to road transport) resulting from the low quality of railway infrastructure.

However, in 2010 the Infrastructure Manager introduced a pilot scheme whereby track access charges for fully loaded container wagons operated as block trains were reduced by 25%. The discount validity period and scope have been extended and currently all intermodal wagons, loaded or unloaded, qualify for the discount (although the block train requirement remains). According to the Polish Office of Rail Regulation, intermodal rail transport is expected to grow by some 8% per annum from 2014 onwards.

Another attempt made by the Polish government to make transporting goods by rail more attractive was the introduction of tax reductions for combined transport. The amended Act on taxes and local charges[22] states that taxpayers transporting goods as part of a combined transport service may be eligible to obtain a refund on vehicle tax. The amount of reimbursement is determined according to the number of trips (both with and without load) made by the rail element of the transport service in a given tax year (with provision for up to 100% reimbursement). In addition, there are exemptions from traffic bans for vehicles used in combined transport on Sundays or bank holidays, and the maximum permissible weight of road vehicles operating as part of a combined transport service is 44 tonnes, while the national limit is 40 tonnes[23].

The Polish Act on Rail Transport opened up the market for rail freight and, following liberalisation, the Polish freight railway market is one of the most contested in the EU with more than 75 active FOCs (Freight Operating Companies). Nevertheless, the high level of track access charges, low quality of infrastructure (leading to extended journey times), limited number and inadequate spatial structure of terminals as well as investment policy giving priority to passenger trains, continue to be major barriers to transporting goods by rail. Against this background the limited incentives for the development of rail freight, while positive, have failed to reverse the trend decline in volumes carried.

Infrastructure investment

Discussions with the Association of Independent Freight Operating Companies highlighted the Polish government's primary focus on road infrastructure development. In the 2007-2013 programming period, funding was allocated between road and rail in the ratio 86:14, although the EU had initially required Poland to allocate at least 40% of funds to rail. In the 2014-2020 programming period some 60% of funds were initially earmarked for rail

[21] An example of this is Line 131 (Coal-Trunk Line) linking the southern industrial region Silesia with the Baltic Sea ports in northern Poland.

[22] The Polish Parliament (2002) *Act on taxes and local charges (amended)* [in:] *Journal of Laws,* Article 8 and 11a. [Original content and title in Polish: Ustawa o podatkach i oplatach lokalnych].

[23] The Ministry of Transport, Construction and Maritime Economy (2012) *The effect of planned changes introduced by the European Commission Directive 96/53/EC of July 1996 on establishing for certain vehicle categories maximum dimensions in national and international transport and maximum weights in international road transport in Poland* – expertise.

investment, but the final allocation has again favoured the road sector. The Secretary of the Association also stated that the current condition of railway infrastructure required at least 1,000 km of railway lines to be modernised each year, although in the last decade annual renewals amounted to only 100 to 200 km. While EU co-funding has accelerated the process, a prolonged period of underinvestment has inevitably resulted in a deterioration in the quality of rail infrastructure and hence in rail's competitive position in the freight transport market.

Box 2: Bringing together the key elements of mode choice

A strategy to reverse mode share decline in Poland

The Master Plan for rail transport 2030, drafted by the Polish Ministry of Infrastructure in 2008, sets out a strategy for improving the competitiveness of rail freight over the long term. The government predicts that rail will transport 67-71 billion tonnes of freight in 2030, compared to 49 billion in 2010. In the same period, freight transported by road will grow from 259 billion to 427-460 billion tonnes, assuming no major changes to investment levels or existing regulations.

The Plan also anticipates that goods transported by rail will increasingly be carried by intermodal transport, and that the transport of bulk commodities by rail will decline in importance. It recognises that rail must respond to such changes in order to remain competitive and commercially viable, and that the development of intermodal transport must therefore be a priority. The following activities are considered necessary to achieve this objective:

1) Development of line and point railway infrastructure on the AGTC network in order to adapt it to the needs of intermodal transport users.
2) Development of multimodal terminals on the TEN-T network.
3) Development of multimodal functions of airports and maritime ports on the TEN-T network through their better integration with the road and railway network.
4) Improvement of operational parameters of inland waterways to enable integration of river transport with the intermodal supply chains.

Investment will be funded through a combination of European, national, regional and local funding sources.

In addition, the Plan emphasises the need to invest in rolling stock with a view to modernising the existing fleet of freight trains. There is a lack of specialised, dedicated carriages for intermodal transport (in 2010, the share of customised wagons was 10-15% of the total), the average age of the simplest platform cars is more than 24 years and the fleet is dominated by coal wagons. Further, development of intermodal transport in Poland will be supported by initiatives to improve skills and enhance the qualifications of managers and employees from the transport, shipping and logistics sector.

Anti-road policies

One of the main measures designed to internalise the negative externalities of road haulage was the microwave electronic toll collection system "viaTOLL", introduced by the General Directorate for National Roads and Motorways (GDDKiA) from the 1st July 2011.

The system is operating on 2,650 km of motorways, expressways and other roads. The toll amount depends on the road class, vehicle gross weight and the EURO emission class. However, although road tolling has increased the cost of shipping freight by road, it has not had the effect of reversing the long-term decline in rail's share of the market.

In summary, Poland has introduced a number of policies to shift freight from road to rail, but their implementation has been challenging. While the Master Plan for rail transport provides a long term strategy for the development of rail freight, substantial investment to improve the quality of the rail network will be required if incentives to use intermodal and other services are to prove effective.

3.3.5 Main policy measures: Spain

According to the European Commission's rail market monitoring report (RMMS) 2014, Spain has the lowest tariffs per train-km for rail freight. However, this has not been sufficient to increase the share of rail which tops out at just over 5% of inland modes. In recent years, an imbalance in investment in favour of road, coupled with moderate road taxes and the geographic characteristics of the country, have helped to sustain road's share of the market. Moreover, a combination of relatively low freight access charges and market liberalisation has not led to the level of competition in rail freight observed in other Member States (the incumbent operator Renfe retains 80% of the rail freight market), and the impact on final market prices for shippers has therefore been small.

Pro-rail policies

A key factor affecting the competitiveness of rail freight transport is the quality of infrastructure, which in turn depends on the level of investment in the network. In Spain, total annual investment in rail infrastructure, both passenger and freight, is estimated to have increased from €1.7 billion in 2000 to €10 billion in 2010[24]. This increase has been accompanied by a less than proportionate increase in road spending, leading to a growth in the share of spending allocated to rail from 33% in 2000 to 53% in 2010. This represents a reversal in the historic trend which has seen road investment being favoured over rail historically (rail only received around 9% of total investment between 1991 and 2000).

However, rail freight stakeholders have noted that most of the investment in rail has been in the Spanish high-speed network, which is exclusively dedicated to passenger transport. By contrast, freight transport networks have instead suffered from underinvestment (Serrano Martinez 2012), resulting in slow progress on key improvements such as electrification and gauge clearance. However, investment in the conventional rail network is now being undertaken with a view to exploiting spare capacity arising from the transfer of passenger traffic to the high-speed network and developing intermodal facilities.

In addition, longer trains of around 750 metres have been operating on the Spanish network since 2011[25]. These can carry up to 48 containers and have the potential to replace significant road freight flows. Initially, they are being used to provide overnight services along the Madrid-Valencia line, taking advantage of the 7-hour period needed to travel between these two destinations. The estimated annual cost savings for shippers during this pilot period are in the order of 15%, based on a comparison of costs pre and post the introduction of the new rolling stock, and the initiative is expected to make a

[24] Martinez, José María Serrano, Transporte de mercancías por ferrocarril en Espana, Boletin de la Asociación de Geografos Espanoles N 60 - 2012.

[25] http://blogs.elpais.com/eco-lab/2011/10/trenes-de-mercancias-extralargos.html

significant contribution to modal shift on the Madrid-Valencia corridor. (Alonso Timón 2011).

ADIF, the Spanish rail infrastructure manager, wishes to increase the share of intermodal freight transport from its current level of 5% to around 18%, in line with the average for the EU as a whole. The organisation's main focus is on upgrading the quality and capacity of logistics centres in order to address concerns that they too far away from the national rail freight network and increase their utilisation. Accordingly, in 2011 ADIF signed agreements with 17 port authorities[26] to facilitate rail access to ports as well as rail freight operations within ports.

Significant investment in intermodal transport is also being undertaken, including at major ports. In September 2013, the Ministry of Development and the Catalan regional government signed an agreement to build a new rail connection to the Port of Barcelona. Other partners in the project include ADIF and FGC, a regional train operator. The project will enable rail access to the new southern extension to the port.

Box 3: Maximising the impact of investment

Modal shift at the Port of Barcelona

Investment at the Port of Barcelona is intended to help counter the national trend of rail freight decline in Spain. Rail traffic to and from the Port has grown from 557,000 tonnes in 2008 to 2.1 million tonnes in 2012, and rail's share of the associated maritime container market grew from 3% to 12% over the same period. This share is still considerably lower than that observed at other ports in the EU (for example, the share of rail in the market for hinterland distribution of sea containers arriving at the port of Hamburg was 42% in 2012), but rail freight traffic through Barcelona is nevertheless having positive effect on the rest of the Spanish network.

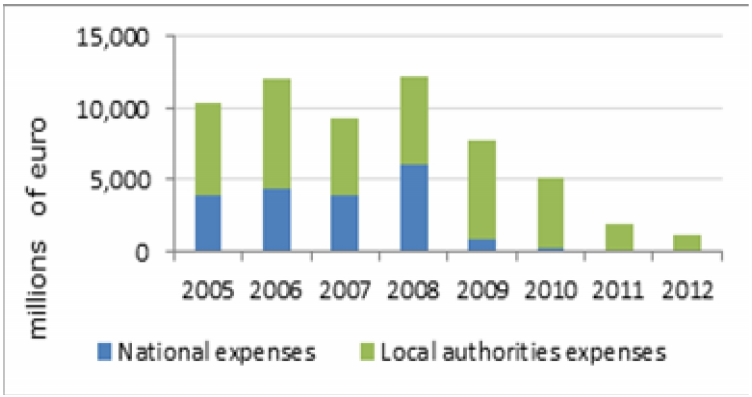
In 2013, rail services in Catalonia transported 10,331 TEUs, an increase of over 200% year on year (mainly due to increased traffic with Tarragona). Moreover, new products were carried by rail, including the transportation of 100,000 cars between the SEAT factory in Martorell and the Port, and 385,000 tonnes of bulk cargo from the mines in Suria and Sallent. This demonstrates that rail can compete for freight transport over relatively short distances if rail access to key facilities is established.

Road network investment

Road infrastructure spending in Spain is highly dependent on the availability of government funding, with expenditure divided between the National Government and Local Authorities. Following sustained spending on both new construction and upgrades, the length of the road network has grown by 249% over the past 20 years. However, this investment in road infrastructure has been interrupted as a result of the recession and subsequent slow pace of recovery, with a particularly large reduction in the National Government budget allocation for roads (a fall from €6 billion in 2008 to just €76 million in 2012).

[26] The ports are La Coruña, Algeciras, Alicante, Avilés, Barcelona, Bilbao, Castellón, Ferrol, Huelva, Marín, Pasajes, Santander, Sevilla, Tarragona, Valencia, Vigo and Vilagarcía.

Figure 18: Total expenditure in road infrastructure in Spain



Source: Ministerio de Fomento (2013).

Anti-road policies

Total road freight traffic in Spain grew steadily between 2000 and 2007, but declined thereafter as a result of the economic crisis, in particular the associated downsizing of the construction sector. International transport has, however, been more resilient, experiencing a small recovery between 2010 and 2011. The return to growth has been particularly marked in the market for freight transport between Spain and France.

Motorways in Spain are subject to distance-based road pricing, with tolls on national roads under public ownership levied by the Government, and concessionaires charging for the use of private roads. While tolls vary across the country, analysis conducted by the OECD[27] found that average toll rates in Spain were around €0.17 per km in 2012, just under EU of €0.20 per km, and rates have remained fairly stable over the past decade. The same analysis shows that both vehicle taxes and fuel duty are below the EU average. Moreover, levels of fuel and vehicle taxation have been relatively moderate. Hence, while the road haulage market continues to be driven by the economic cycle and associated effects on manufacturing and construction, it has not been materially affected by the cost of road transport relative to the cost of rail.

3.3.6 Other EU Member States

Financial support

Most EU Member States have sought to support the development of intermodal/combined freight transport in recent years. In the following paragraphs, we provide an overview of the funding schemes identified by the UN Economic Commission for Europe.

In Austria, the "Programme for the support of transhipment points for intermodal transport (road/rail/ship)" (2006-2012) and the "Innovation programme for combined freight transport" (2009-2014) have supported substantial investment as well as the purchase of mobile equipment for the transport or handling of goods using combined transport services. In addition, the Government has identified a number of combined transport services constituting "public service operations" under the Austrian Federal Railways Act, concluding annual contracts for the provision of high quality services with ÖBB (Austrian Federal Railways, the wholly state-owned group that manages rail infrastructure and operates passenger and freight services) as well as private railways. These services are eligible for

[27] OECD, International Transport Forum, Road Haulage Charges and Taxes, Discussion Paper 2013-08.

public sector financial support as they are considered to be in the public interest (e.g. because of the associated environmental benefits), and €46 million of funding was provisionally allocated for this purpose in 2005.

In Belgium, the Federal Government has also provided financial support to railway companies organising combined freight transport services. This took the form of payment of a flat rate subsidy per km and unit of goods, covering all intermodal services including a rail journey with a minimum distance of 51 km inside Belgium. The scheme was initially put in place for the period 2005 and 2008, but was subsequently extended to 2012. Support was provided to operators organising combined freight transport services by rail and to operators introducing regular international train services.

In Bulgaria, rail freight services were supported through the "Development of [a] Strategy for Integration of the Bulgarian Railway Infrastructure into the European Intermodal Transport Network". This initiative was in place until 2006, and supported through the Phare Programme 2000-2006 (one of the pre-accession programmes, financed by the EU, to assist countries of Central and Eastern Europe applying for membership of the Union). Since 2006, there has been a continued decline in rail freight in Bulgaria; however this cannot be directly attributed to withdrawal of intermodal initiatives.

In the Czech Republic the "Programme of Aid for Combined Transport" and its two sub-programmes - "Construction of the New and Modernization of the Existing Terminals with Public Access" and "Innovative Technology for the New Lines of Combined Transport" – was in place between 2006 and 2010. Under this programme, start-up phase funding was provided to support the operation of new unaccompanied[28] combined transport services.

In Lithuania, financial support for investment is provided in the form of State guarantees for loans from international financial institutions. Specific support for investment in new rolling stock and modernisation of railway infrastructure was also provided according to the "State Investment Programme for 2008-2010". In addition, the creation of three public logistics centres was partly financed through "European Union Structural Assistance for 2007–2013".

In Slovakia, subsidies equivalent to 30% of eligible operating costs can be granted by the Ministry of Transport in support of new combined transport services. Support is available for up to three years following start-up.

Other measures

Several EU Member States guarantee a reduction or an extension of the road tax for those freight vehicles that are exclusively used in initial and terminal haulage for combined rail/road transport. In Austria, all national vehicles exceeding 3.5 tonnes are exempt from the monthly vehicle tax if during that month they are used exclusively for initial/terminal haulages. Moreover, national vehicles exceeding 3.5 tonnes using the rolling road or used to provide unaccompanied combined transport are reimbursed 15% of the monthly vehicle tax for each combined transport journey made by rail (this reimbursement may reach 100% of the annual vehicle tax).

[28] Railway operators offer two types of intermodal transport: accompanied transport and unaccompanied transport. In the first case, also known as "rolling road", or "rolling highway", the whole truck is loaded on the railway wagon. In the second case, the loading units (e.g. container or semi-trailer) are carried by road or by vessel to a purpose-built transhipment terminal, where they are loaded onto trains to continue the journey by rail.

In the Czech Republic, full exemption from heavy vehicle tax is available for those vehicles that are exclusively used in initial/terminal haulage, and variable relief (of 25 to 90 per cent) is available for those vehicles making trips as part of a combined transport service. In France, there is a reduction in vehicle axle tax of up to 75% for vehicles used in combined transport, while in Germany there is full exemption from vehicle tax for vehicles used exclusively for initial and terminal haulage.

In Romania, agents involved in combined transport may be granted temporary exemptions from earnings tax in return for investment in infrastructure and in the acquisition/modernisation of installations relating specifically to combined transport. National road vehicles are exempt from vehicle tax in Slovakia if they are used for combined rail/road transport, with 50% reimbursement available for vehicles making more than 60 combined transport journeys in a year.

In a number of Member States, including Austria, France, Germany, Lithuania, Poland, Slovakia and Slovenia, the maximum permissible weight of road vehicles (including any trailers) has been increased from 40 tonnes to a maximum of 44 tonnes for vehicles operating on the initial and terminal road legs of a combined transport service. Other incentives include the application of less demanding regulations for drivers of HGVs using rolling motorways.

In the UK, investment strategies are in place to strengthen the role of rail at major ports. Rail freight has proven integral to growth at the Port of Felixstowe, where the volume of freight carried by rail has more than doubled and the number of scheduled rail services has increased by 50% over the last 10 years. Around 11,500 containers are moved every week on the 60 trains that serve Felixstowe. Modal shift has been substantial, and the Port estimates that more than 250,000 lorries have been removed from the road. The implementation of a £40 million (circa €50 million) investment plan, put in place in 2010, has further improved the port's rail freight facilities. One of the latest developments includes the opening of a third terminal and a number of new chords linking Felixstowe to 17 inland destinations within an hour, providing greater choice for shippers. This has made a major contribution to the growth of container freight, with volumes reaching record levels (830,000 TEUs) in 2013.

In addition, many Member States have pursued wider policies aimed at discouraging the use of road freight through the introduction of road tolls and increasing fuel duty. The evidence suggests that these have affected the demand for road transport significantly in the short run, but have been absorbed over the longer term through improvements in technology. For example, higher fuel duties have been partially offset by large increases in fuel efficiency over time. Moreover, there is no evidence that policies to discourage road use have been coordinated effectively with policies relating to the promotion of rail freight.

3.3.7 Effectiveness of the measures

Policy measures designed to change the relative price of rail freight transport compared to road, whether through investment or operating subsidies, only affect one of the factors taken into account by shippers in choosing between modes. Other factors, for example flexibility, reliability and punctuality, are more difficult to influence, often requiring substantial support for enhancement of rail infrastructure.

The following figures show the timing of key policy interventions in the Member States above-mentioned and relate these interventions to changes in rail freight modal share.

Figure 19: Policy measures in a selection of Member States

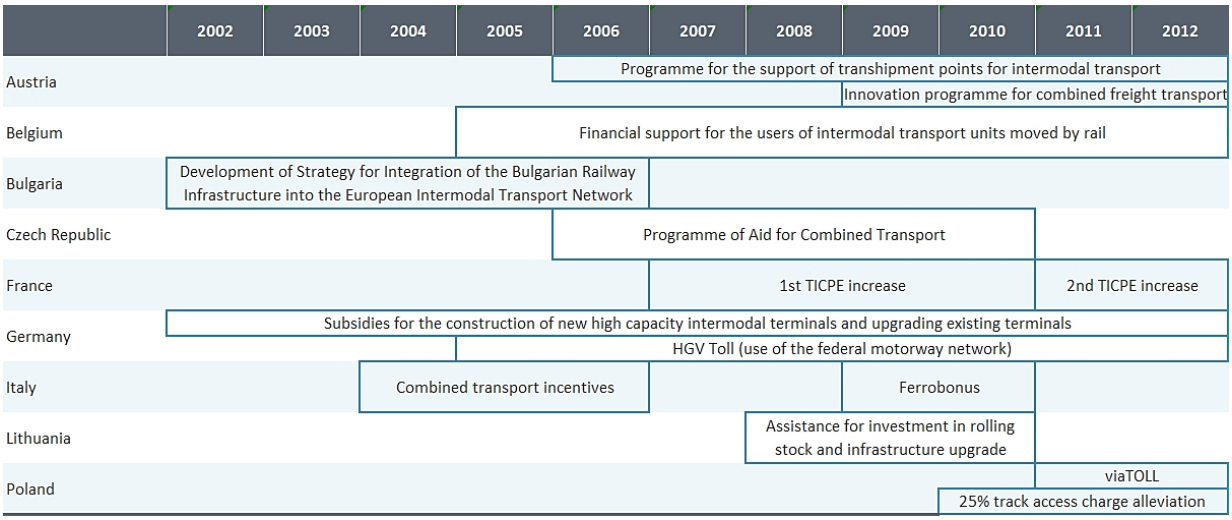


Figure 20: Annual growth rates of rail modal share in inland freight transport

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Austria	-1%	-2%	9%	4%	3%	3%	7%	-3%	7%	2%	2%
Belgium	3%	3%	9%	12%	6%	8%	4%	-19%	13%	5%	-4%
Bulgaria	-10%	4%	-15%	-13%	6%	-7%	-18%	-42%	-10%	6%	-22%
Czech Republic	-12%	-4%	-3%	3%	-6%	6%	-8%	-5%	-5%	-1%	5%
France	0%	-5%	-6%	-8%	-1%	0%	1%	-6%	-10%	11%	2%
Germany	1%	4%	2%	2%	5%	3%	1%	-6%	6%	4%	1%
Italy	-7%	8%	-3%	-4%	18%	8%	-6%	-18%	0%	27%	15%
Lithuania	-1%	5%	-3%	-10%	-5%	0%	1%	-4%	2%	1%	-9%
Poland	-4%	-3%	-5%	-8%	-5%	-10%	-9%	-19%	-3%	10%	-12%

Source: SDG elaboration on EU transport in figures statistical pocketbook 2014.

Direct financial support has been targeted at rail infrastructure development, for example by providing better gauge clearance for heavier trains and reinstating sidings. The impact of these measures is only likely to be observed in the medium to long term, with the utilisation of new infrastructure ramping up over time. However, where investment has been sustained over an extended period, as in Germany, a significant increase in rail's share of freight transport has already been achieved.

Road charges have been introduced in a number of Member States, but the impact on road freight has been reduced as a result of other policy measures tending to favour road transport, as in the case of the Écotaxe in France. In other countries where road tolls are levied, the costs of road freight may nevertheless be relatively low because of policy in relation to fuel and vehicle taxes.

The most effective policies appear to have been those focused on the development of intermodal transport, either through operating subsidies provided to intermodal service providers, or through specific support to improve connections to the rail network, for example at key ports. Measures of this kind have enabled a strengthening of rail freight's competitive position and supported an increase, albeit marginal, in rail's share of freight transport markets in a number of Member States.

KEY FINDINGS

- A number of initiatives targeted at modal shift from road to rail have been introduced at the European level. These include the Eurovignette Directive; introducing road charging based on external costs; railway reforms opening freight markets to competition and improving interoperability; and programmes for funding investment in intermodal infrastructure and operations, such as Marco Polo and the TEN-T.
- In parallel, Member States have similarly implemented a range of measures to incentivise modal shift. Direct financial support has been targeted at rail infrastructure development, for instance by providing better gauge clearance for heavier trains and reinstating sidings. In addition, road charges have been introduced in a number of countries, although the impact on road freight has typically been offset by other measures tending to encourage the use of road transport.
- Taken together, however, these measures have not had a major impact in terms of promoting modal shift. This can be attributed to the generally small scale of the investment in rail and intermodal transport relative to investment in other modes, and to a lack of coordination of rail freight policy initiatives at the EU and national levels.
- The most effective policies appear to have been those targeting intermodal transport, either through targeted subsidies to intermodal operators, or through specific agreements at key intermodal nodes, with a particular focus on ports.

4. STRATEGIES FOR MODIFYING SHIPPERS' MODE CHOICE

4.1. Introduction

This chapter outlines a number of strategies that could be introduced to further incentivise modal shift towards rail by affecting shippers' choices. The previous chapters of this report provide the necessary background to this exercise. Chapter 2 discusses the main factors that can affect modal choice and provides some quantification of the potential for modal shift, based on previous research. Chapter 3 offers an overview of policy measures that have already been implemented and a commentary on their effectiveness.

Based on our review of the evidence, we have concluded that there is potential to increase rail's share of EU freight traffic significantly. We also consider that the share of rail observed in Switzerland and the United States (where around half of all inland freight traffic is carried by rail) could usefully inform long term policy objectives, although achieving a similar market share for rail across the EU is unlikely except in the very long term.

A more specific, yet ambitious, target is set by the EU Transport White Paper (2011), which states that 30% of all flows above 300km should shift away from road by 2030. This would correspond to a shift from road of some 3.5% of the volume of freight transported within the Union, and a reduction of approximately 8% in EU CO_2 emissions[29]. Based on the analysis in Section 2.2., a realistic overall target for the share of freight carried by rail in the EU could be, in the medium term, around 20% of all inland transport volumes measured in terms of tonne-km (compared with 17.2% in 2012).

However, while targets help to inform the direction of policy, they can only be met through the implementation of effective strategies. In considering the relative merits of different strategies, the following conclusions from previous chapters should be kept in mind:

- Any strategies for modifying shippers' choices should focus on the key levers identified by industry players as having the greatest influence on modal choice.
- A number of policies aimed at promoting modal shift already exist, and any additional strategies should complement and improve upon the existing policy framework.
- There remain structural barriers that limit the ability of shippers to choose rail over road and thus constrain the size of the contestable market.
- Most incentives introduced at the national and EU level have not been successful at reversing the trend decline in rail's share of freight traffic, although an assessment of the effects of these policies in isolation is difficult given the range of economic and other factors influencing the demand for rail freight services.

4.2. Prioritising strategies with high policy leverage

Any assessment of the effectiveness of policy measures aimed at affecting mode choice must take account of shippers' preferences, as identified in the course of this study. While not exhaustive, the findings of the research summarised in Chapter 2 indicate a range of such factors, all of which have implications for policy at both the EU and national level.

[29] Tavasszy and van Meijeren, Modal Shift Target for Freight Transport Above 300 km: An Assessment (2011).

As shown in Chapter 2, mode choice is affected by both micro and macro level factors. Whereas some of micro factors fall predominantly outside the sphere of influence of policy makers (e.g. commodity type), others are integral to the design of effective, mode-specific, policy measures (e.g. service reliability and network capability). By contrast, macro level factors are generally more difficult to target other than through wider policy intervention of a fiscal or monetary nature, although the introduction of large-scale infrastructure improvement programmes influence behaviour at the macro level, as seen in the US. The table below summarises the main micro and macro level factors and a number of associated policy measures.

Table 6: Factors affecting modal choice and respective policy leverage

Factor	Higher policy leverage	Lower policy leverage
Shipper attributes	Location	Firm size, business planning and decision making
Shipment attributes	Size and weight	Commodity type, value, perishability
Carrier attributes	Cost, speed, reliability, safety, intermodal services	Flexibility, frequency
Infrastructure	Network capacity, quality and availability of terminals, intermodal facilities	Topography and territorial barriers
Macro variables	Large-scale interoperable infrastructure	Economic growth, industry size and production cycles, import and export flows

Source: Steer Davies Gleave elaboration.

The strategies with the highest leverage are those affecting the quality of service perceived by the shipper. Those with the lowest leverage tend to focus on factors that are less easily targeted by policy, including the volumes transported by shippers, the type of commodities transported, the flexibility of rail services offered and more general macroeconomic conditions.

A number of policy measures are available, intended to increase rail's share of the EU freight market. The following are considered to be particularly effective:

- Regulatory measures:
    - Reducing the cost of rail freight transport, in particular through lower infrastructure access charges and targeted discounts to incentivise mode shift;
    - In parallel, introducing road charging schemes that better reflect the external costs of road transport;
    - Providing a level playing field for competition in the rail freight market and improving its transparency by applying the provisions of the various Railway Packages;
    - Adopting a more flexible approach to rail capacity allocation processes in Member States, including by accommodating requests for freight paths on national rail networks currently dominated by passenger services;
    - Allowing the circulation of longer and heavier trains, while limiting the expansion of longer and heavier HGVs;

  - Accelerating the speed and ease of contracting by shippers, in order that they can compete more effectively against road by offering greater flexibility and availability than at present; and
  - Investing in the promotion of rail freight services to raise awareness of them among existing and potential customers and raise the profile of the industry more generally.
- Infrastructure investment:
  - Improving the interoperability of freight services and removing cross-border bottlenecks by investing in common signalling systems (e.g. through ERTMS deployment) and working towards uniform gauge sizes;
  - Promoting the construction and expansion of intermodal facilities, including railway sidings and dedicated connections to ports and industrial areas which incentivise combined transport and thus better integrate transport modes; and
  - Expanding the rail network to increase its density and coverage, particularly in Member States that have witnessed a decline in rail freight investment relative to spending on road infrastructure in recent years.

Different strategies can be deployed to address the priority measures summarised above. The available policy toolkit to develop strategies that target both rail and road is presented in the next section, together with recommendations for policy-makers.

4.3. The available policy toolkit

4.3.1 Targeting rail

The competitive position of rail freight can be improved through a number of regulatory measures and infrastructure investment measures. The former category includes monetary incentives which increase the price-competitiveness of rail, while the latter encompasses those investment projects that, inter alia, improve the quality and reliability of the rail freight infrastructure.

Regulatory incentives

One measure through which policy makers at the national level can reduce the cost of rail freight for shippers is maintaining **infrastructure charges** at a sustainable level, effectively internalising external costs while improving the competitiveness of rail vis-à-vis road transport. Member States in which infrastructure charges are the lowest also tend to be the most successful in terms of increasing rail's share of freight transport (e.g. Sweden and the United Kingdom). However, other factors also influence outcomes, for example road tolls and fuel prices.

The effectiveness of relatively low infrastructure charges also depends on the extent to which freight operating companies pass these on to their customers in the form of lower prices. Strong **competition between operators**, as in Germany, Hungary and the UK, can help to ensure this. In addition, the entry of new operators can be supported by reducing the administrative burden of processes related to market entry (such as granting licences and homologation) and ensuring non-discriminatory frameworks are applied in respect of access to services and facilities.

At the national level, the correlation between the presence of **direct monetary incentives** to shippers using rail and modal shift from road to rail is weak. Similarly at the EU level, the effectiveness of the Marco Polo Programme has been questioned by the European Court of Auditors. A key lesson from this Programme is that any incentive scheme must be supported by effective monitoring of results and should avoiding rewarding outcomes that would anyway have happened in the absence of incentives (the deadweight effect); in short, better targeting of funding is needed.

Monetary incentives for specific rail freight operations that form part of intermodal transport provide an example of effective, targeted funding. These types of incentive have had a significant effect on modal shift at the national level. They include the flat rate subsidies in Italy and Belgium and the grants for combined transport available in Austria. Incentives should not distort competition in the freight market, but should be designed to achieve clear and measurable outputs. In addition, incentives designed to encourage intermodal transport have tended to be more effective than rail-only incentives. This is because rail is already a component of an intermodal service and the incentive can therefore operate at the margin, encouraging shippers to extend the length of the rail journey rather than switch mode for the entire journey.

Infrastructure investment

It is difficult to overstate the importance of investing in the expansion and upgrade of rail freight infrastructure if rail is to compete effectively with road for freight traffic. The numerous barriers to interoperability and capacity mentioned by shippers, freight operators and their associations result in the **presence of bottlenecks** and in a mismatch between the needs of the industry and the availability and quality of infrastructure. More specifically, poor infrastructure contributes to poor industry performance in terms of reliability and punctuality as well as limiting the availability of train paths. Two areas of infrastructure investment are particularly important in enhancing the attractiveness of rail freight: intermodal facilities and cross-border transport.

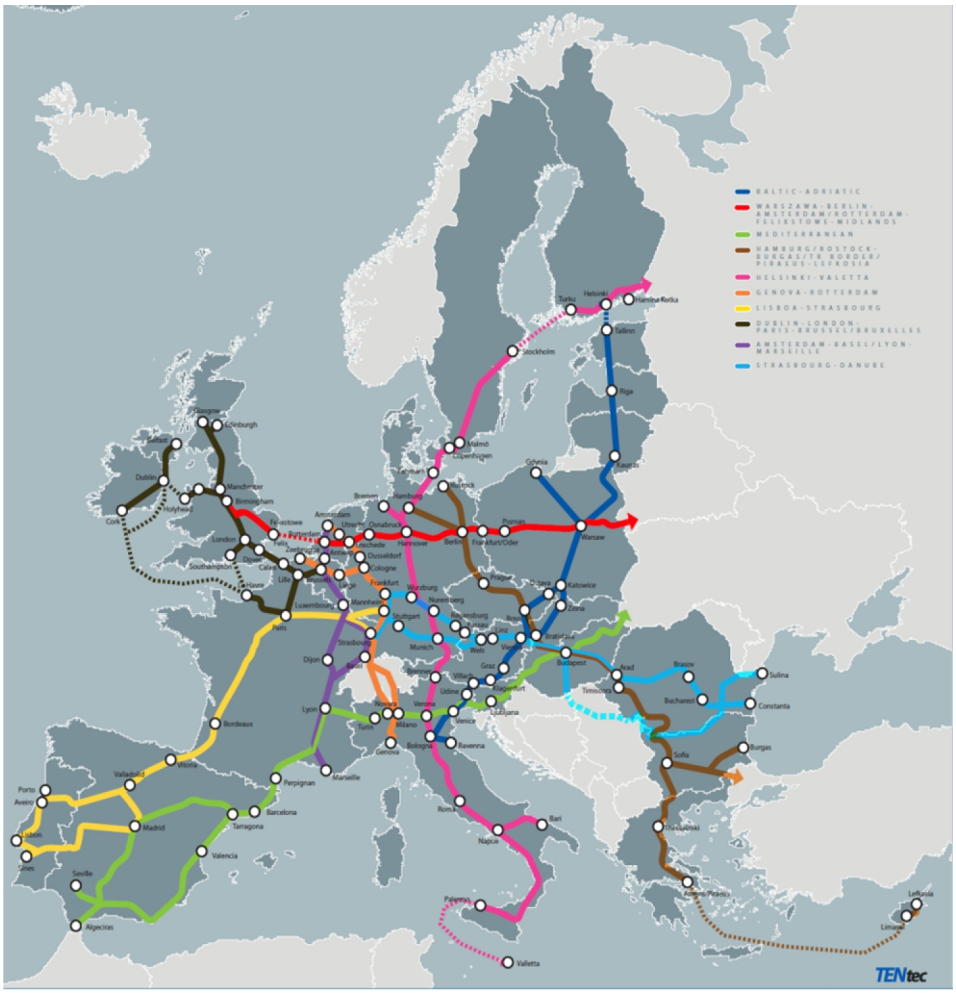
Infrastructure investment that supports **intermodal transport** is necessary because it is extremely rare for freight transport movements to rely exclusively on rail; hence better facilities enable shippers to make as much use of rail transport as possible while continuing to benefit from the flexibility offered by road connectivity. Transhipment facilities as well as terminals for handling containers are examples of infrastructure likely to increase the length of a freight journey undertaken by rail.

A focus on **cross-border transport** is also beneficial for the growth of rail freight. Shippers tend to be less sensitive to costs in the case of longer freight movements – typically above 300 km – on which the competitive position of rail vis-à-vis road is maximised due to a fall in unit costs. Since longer-distance journeys in Europe are likely to involve a cross-border component, ensuring that the barriers to cross-border transport are removed is of particular importance in improving the competitiveness of rail freight.

EU policies and funding programmes have been increasingly focused on rail infrastructure investment, including intermodal and cross-border transport. A Mid-Term Review of the 2007-2013 TEN-T MAP Project Portfolio recognised that the TEN-T programme was progressing well, aided by the appointment of European Coordinators and the TEN-T Executive Agency. Through increased resources and co-funding rates, in particular for cross-border projects, the programme contributed to the achievement of some mode shift.

Of the 30 Priority Projects underway in 2010, 18 were railway projects, three combined rail and-road infrastructure and 21 were cross-border projects. The focus of EU strategies in this area has been recently strengthened by the new TEN-T Guidelines adopted in 2013. These have marked a shift from a patchwork of Priority Projects to a dual layer network approach, consisting of the Core Network, to be completed by 2030, and the Comprehensive Network, addressing wider infrastructure links. The Core Network Corridors will facilitate project implementation, with a focus on removing bottlenecks, building missing cross-border connections, and promoting modal integration and interoperability. The nine Core Network Corridors are shown in the figure below.

Figure 21: TEN-T Core network corridors



Source: Steer Davies Gleave elaboration.

Targeted investment in ports and related intermodal facilities provides an example. Ports (both seaports and inland ports) are key points of modal transfer and 90% of Europe's international trade is handled at these locations. They also handle almost 40% of intra-Community trade[30]. The Core Network will connect 83 main European ports with better rail and road links. Similarly the Brenner Base Tunnel between Italy and Austria, co-funded by the TEN-T programme, aims to remove a major bottleneck in an environmentally sensitive area, shifting heavy traffic from road to a high quality rail service.

[30] TEN-T Policy Review Green Paper.

The **Connecting Europe Facility** (CEF) regulation was also adopted in 2013. It sets out the rules for awarding EU financial support for each type of project during the 2014-2020 programme period. Under the CEF, €26.25 billion will be made available from the EU's 2014-2020 budget to co-fund TEN-T projects.

The approach adopted at the European level could pave the way to targeting investment where it is more needed, providing shippers with better rail networks particularly for the purpose of cross-border transport. These initiatives will depend on a number of factors, and will rely on active involvement by Member States for co-funding.

4.3.2 Targeting road

A holistic strategy aimed at influencing shippers' choices should encompass measures targeting road as well as rail. The main historical drivers of growth in road freight transport have been sustained investment in road building and upgrading by Member States over many years, and a pattern of de-industrialisation and dispersion of the industrial production process. As noted in Chapter 2, both factors have made road more competitive than rail for transporting goods.

There are various policy measures that can reverse this trend, as discussed in Chapter 3. Road user charges intended to internalise the external environmental costs of road transport, and / or finance road maintenance and investment through the revenues collected, exist in a number of Member States. However, the charging principles that are set at the EU level by the Eurovignette Directive have been applied in just nine Member States, and there are only a few national, network-wide tolling systems in place (e.g. in Germany, Poland, Austria). The unsuccessful attempts to introduce the Écotaxe (an environmental tax on all HGVs on the national road network) in France point to the political and practical difficulties of implementing country-wide charging schemes.

In addition, the evidence around the impact on mode choice of higher road user charges is mixed: some Member States where road charges are in place have achieved significant growth in rail freight (e.g. Germany, Austria), but others without any tolling systems have also experienced substantial increases in rail freight volumes (e.g. UK, Denmark). This supports the conclusion that, in the context of relatively small cost differences between road and rail, attributes other than cost affect mode choice by shippers. Road charging should therefore be viewed as a useful, but not sufficient, element of a broader strategy for increasing the overall competitiveness of rail.

Against this background, a number of other policies targeting road can, directly or indirectly, favour a shift towards intermodal transport. As for rail-targeted strategies, these include **both regulatory and investment measures** and are most successful when improving modal integration.

On the regulatory side, examples of incentives designed to support the growth of intermodal transport include lower road taxes for hauliers involved in the provision of intermodal services as well as relaxing regulations on the maximum weight and height for HGVs used to carry goods to and from rail freight terminals. Examples of investment promoting modal integration include rolling motorways (a form of combined transport allowing trucks to piggyback rail wagons for a section of their journeys) and improving cargo handling facilities.

4.4. The elements of an effective strategy for mode shift

There are several factors at play that determine shippers' mode choice. Some of these factors pertain to the economic cycle and other macroeconomic and structural attributes that are beyond the control of policy makers. In addition, de-industrialisation and the fragmentation of the logistics process can be seen as macro level factors limiting the ability of shippers to choose rail over road and thus constraining the size of the contestable market.

However, the analysis carried out for this study suggests that active policies to encourage mode shift can have an impact on shippers' choices by targeting the key factors affecting the competitiveness of rail freight. These policies encompass both regulatory incentives and targeted investment measures, summarised in the following table. Each policy will need to be initiated at the appropriate level (i.e. by Member States or by EU institutions) and will address different factors.

Table 7: The elements of an effective strategy for mode shift

Mode	Policy category	Policy measure	Political level	Factors addressed	Key success indicators
Rail	Regulatory incentives	Infrastructure charges	Member States	Cost competiveness, innovation, final price to customers	Long-term stability of charges
		Market competition	EU Legislation		Transparency of frameworks
		Monetary incentives	Member States		Mode shift avoiding deadweight effects
	Infrastructure investment	Intermodal facilities	Member States and EU (CEF)	Quality of service, speed and reliability, intermodal connections	Growth in intermodal transport market share
		Cross-border transport	EU (CEF) and Member States		Growth in cross-border transport
		Stimulate investment	Freight and logistics companies, with support		Market growth and domino effects with better quality services
Road	Regulatory incentives	Incentives for intermodal transport	Member States	Cost competiveness, modal integration	Growth in intermodal transport market share
	Infrastructure investment	Intermodal facilities	Member States and EU (CEF)		Market growth, private investment

Source: Steer Davies Gleave elaboration.

Two main conclusions can be drawn from the lack of effectiveness of past policies, as well as from the good practices identified by the national case studies. First, better coordination of strategies at different administrative levels, as well as across modes, will be needed. Second, it is important that mode shift strategies are tailored to the specific circumstances in which they are implemented.

The need for better **coordination of mode shift strategies** has been highlighted throughout this study. As seen in the previous chapters there have been, and still are, a number of national and EU level programmes aimed at incentivising a shift to rail through monetary incentives. However, these programmes have been subject to a number of shortcomings. First, a patchwork approach to monetary incentives across, and within, Member States diminishes the effectiveness of each scheme, although the partial failure of an EU-wide approach to mode shift incentives (through the Marco Polo programme) suggests that achieving coordination at this level may be too difficult. Second, the lessons learnt from

each scheme need to be better shared within the industry. The forthcoming implementation of the Shift2Rail initiative should serve this purpose by focusing on solutions to enhance capacity, consolidate reliability and improve the life cycle of the European rail system. Shift2Rail should therefore be supported by Member States and private funders.

The second level of coordination needed is between rail and road policies. Shippers typically trade the cost, time and convenience of these two modes against each other. Any measures affecting the competitive position of one mode have repercussions on the other. The failure to implement common road charging principles through the 1999 Eurovignette, and the difficulties witnessed by Member States in implementing national charging schemes, act as reminders that mode shift strategies should not rely on road policies only.

While recognising the relative importance of regulatory incentives, this study identifies targeted infrastructure investment as critically important in mode shift strategies. The recognition that longer-distance, cross-border transport is most likely to shift from road to rail is being reflected in the development of EU policies. In particular, the new TEN-T policy and the establishment of a Core Network, with key corridors along which to focus investment, are both directed towards encouraging the growth of longer distance rail freight traffic.

Better coordination can be achieved in the **identification and removal of persistent bottlenecks** that limit the growth of rail freight. A corridor-based approach provides an opportunity for national governments, rail freight companies, infrastructure managers and local authorities to cooperate in terms of identifying and addressing those major barriers. In this respect, targeting investment and incentives with a view to addressing issues at the local level will continue to be important. Incentives focused on outputs, such as the grants (50% of capital cost) provided by the German Government to halt the decline of private sidings, and the bonus for intermodal transport introduced by the Italian government (a fixed sum per train-km carried by rail), are likely to be particularly effective: the German scheme has had the effect of halting the decline in sidings observed since the early 1990s, while the Italian bonus scheme has clearly supported the growth of national rail freight volumes.

Finally, the implementation of effective strategies will require **stable and sufficient funding** from both the EU and Member States. CEF will help in this respect by providing substantial resources to co-fund the development of the TEN-T network and ERTMS. While transport funds are not ring-fenced under the new CEF policy, this could incentivise project sponsors to compete for funding and demonstrate the real value added of each investment scheme.

More effort will be needed to reverse the trend decline in the mode share of rail freight. This could come in the form of more strictly enforced long-term agreements between Member States providing more certainty around specific infrastructure projects to attract private investors, as well as the channelling of further investment in rail infrastructure from other sources of funding, including Structural Funds and funding for research and development. New tools, such as those contained in the Shift2Rail initiative, demonstrate the scope for policy innovation at the European level.

In the light of future parliamentary debates on the actions to be taken by the EU to affect the mode choice of shippers in favour of rail the above recommendations should be taken into account to ensure that future strategies prioritise pro-rail policies with high leverage potential, are suitably tailored to the characteristics of national markets, are well coordinated across levels of administration and modes, and receive an adequate level of funding.

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