Rail Sector in the European Union: Current Challenges and Developments

DOLESCHEL Julia
ESPOSITO Giovanni
KALOUD Tobias
MARIOTTI Marco
MARZAHN Raphael
URBAN-KOZLOWSKA J. Agata

Corresponding Author:
KALOUD Tobias (h1250747@wu.ac.at or t.kaloud@hotmail.com)

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1. Introduction

Network services such as electricity, natural gas, telecommunications, railways, and water are crucial factors of economic well-being as they offer society the opportunity to coordinate, over time and space, large and complex flows of essential goods, people or services (Florio, 2013). Despite the different technological environments, these types of services all share the features of natural monopoly. Until the 1980s and 1990s they were all managed on the basis of vertically integrated public monopoly. Then, following the wave of New Public Management (NPM) reforms in national administrations, many governments in Europe adopted reforms that tried to inject competition in network industries' sectors. "Europe has been at the forefront of change. Elsewhere, in the USA, Latin America, Asia, and in formerly planned economies, there have been similar reforms, but perhaps nowhere have they been so consistently implemented as in the European Union. In the past two decades, first in the UK, then subsequently in all the other EU member states, governments have increasingly moved away from the direct provision of public services, from ownership of utilities, and from franchised monopolies. Ministries and independent regulators have shown a greater reliance on market mechanisms, and now consider the network service providers as market players. […] In Europe, the critical mass for the policy shift was achieved in the 1980s, after the social and political upheavals of the 1970s and the severe oil shocks that destabilized public finances" (Florio, 2013: 5-8).

At the EU institutional level, an important factor which has influenced the evolution of the governance of European network industries is European Commission's persistent commitment to create a well-functioning internal market. During the 1980s this commitment was reinforced in order to create a unique internal market for those services that were previously excluded by the Treaty of Rome (1957). In fact, an exclusion clause was subscribed by the six founders of the European Community (Belgium, France, Italy, Germany, Luxembourg and the Netherlands) allowing them to exclude from some common market rules services such as telecommunications, transport, energy and water. In 2009, the EU Lisbon Treaty abandoned this exemption by introducing competition in those sectors and forbidding state aid, except under special circumstances to be notified and approved by the European Commission (Florio, 2013).

Within this context, over the last 20 years many changes have occurred in the structure, regulation and performance of European network industries. These changes can be appreciated thanks to OECD's ECTR regulatory database – running from 1975 to 2007 – which measures the degree of public ownership, vertical integration, entry regulation and market concentration. ECTR regulatory indicators range from a minimum of 0 (describing a condition of full deregulation) to a maximum of 6 (describing most restrictive conditions for competition). Fig. 1 provides a graphical display of ECTR indicators on EU-15 countries and shows how change has occurred in key sectors of network industries. Three scenarios emerge when comparing countries' regulation between 1990 and 2007.

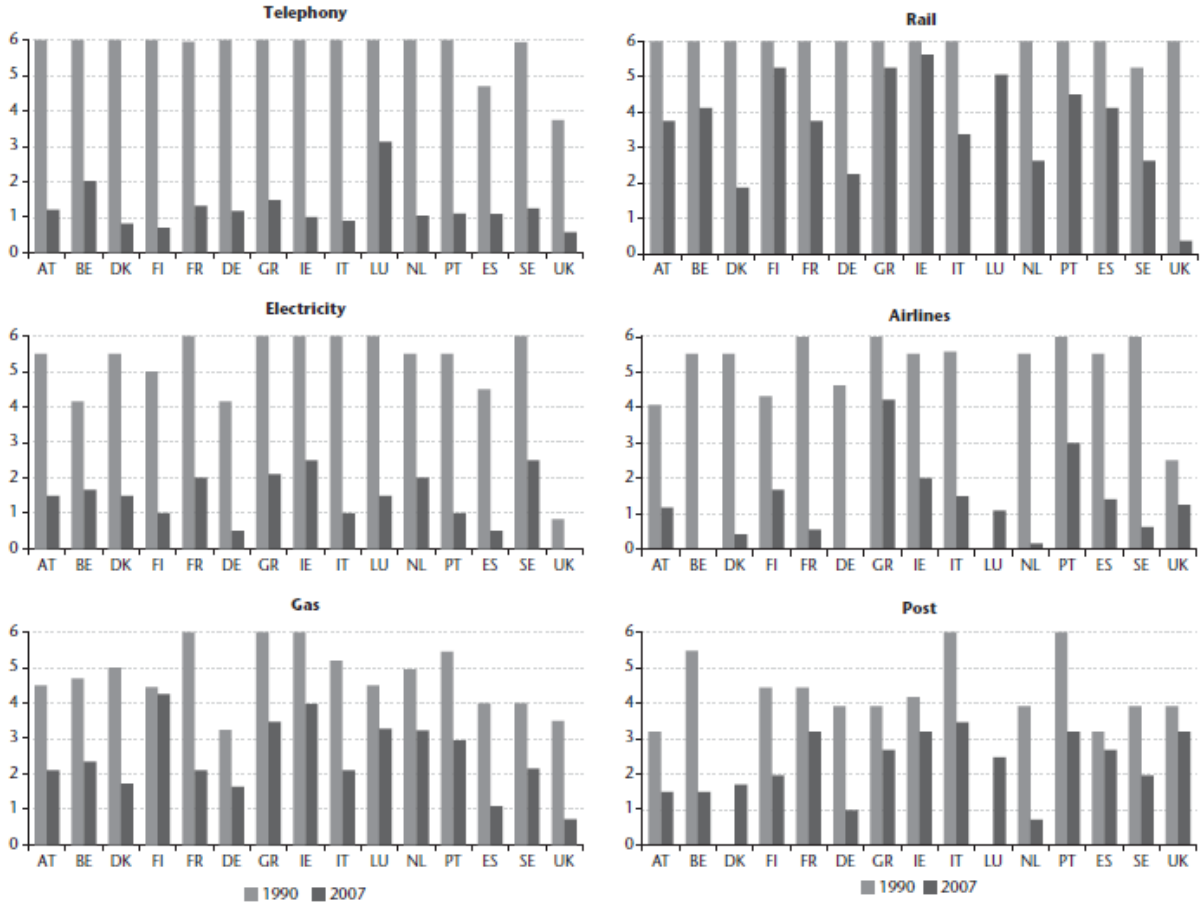


Fig. 1 - ECTR indicators, selected countries, 1990–2007. Source: Florio (2013).

The first scenario is the one characterizing telecommunication, electricity and airlines where, despite some differences, between 1990 and 2007 there has been an almost effective process of regulatory convergence from the standard industrial organization (public monopoly) towards the NPM model. This is particularly evident in the telecommunication sector where in 1990 all countries under examination, except UK and Spain, presented values equal to 6 whereas in 2007 these values resulted to be lower than 2.

The second scenario is the one characterizing postal services and gas where not all the countries were usually a government-owned public monopoly in 1990. When comparing the regulatory situation of these industries in 1990 and 2007 we notice that, despite some evolution from the standard industrial organization, in both sectors there is no clear convergence towards the NPM model as countries show very different ECTR values.

Finally, there is the rail sector scenario which represents a *sui generis* case as we see that since 1990 only few countries have actually modified the initial government-owned monopolistic structure of the industry. "In 2007 the UK, showed a mostly fully liberalized and privatized industry, with Denmark, Sweden, Germany and Netherland midway or fairly advanced in the reform process" (Florio, 2013:32). Despite little progress, the remaining countries still showed the fundamental features of the traditional industrial organization of the rail sector.

This paper will focus on the rail industries and will try to advance knowledge concerning the reform process in this sector. It is structured as follows: section 2 goes through the reform

context, whereas section 3 attempts to provide some empirical insights. Section 4 concludes by summarizing the results and providing recommendations.

2. Reform Context

In mid-20th century Burnham (1941) asserted that, early in that century, American state agencies came progressively to be dominated by a new ruling class of managerial professionals. This "managerial revolution" occurred in the wave of the opposition against the extension of government ownership and the setting up of new bureaus and governmental bodies. These were object of a constant stream of propaganda which depicted them as ridden with inefficiency compared with private business (Burnham, 1941; Preston and Post, 1974).

During the last 50 years European public sector organizations have experienced the same process of change where private sector managerial tools and principles have spread across both central and local governments with the aim of improving effectiveness, efficiency and economy (Aucoin, 1990; Stewart and Walsh, 1992; Hood, 1995; Walsh, 1997; London, 2002). These tools came to be established thanks to the NPM reform movement which emerged in response to a number of challenges resulting from the institutional, economic and political contexts of the Member States (i.e. Saint-Martin, 2000; Kernaghan, 2000; O'Flynn, 2007; Esposito, Gaeta and Trasciani, 2016). As referred by Christensen and Lægreid (2011), this reform movement has been more than a mere technical and political framework to modernize old-style bureaucracies (i.e. Scott Bushnell and Sallee, 1990; Hood, 1991) and has manifested itself in history as a political process driven by a powerful reform ideology (i.e. Hood, 1995; Fournier and Grey 2000). The spreading of this ideology experienced a sharp acceleration in the period between 1970s and 1980s and started to stabilize in the 1990s; as to political agency, right-wing parties played a major role during the acceleration phase of the 1970s and 1980s, whereas their contribution was progressively caught up by the left-wing parties during the stabilization phase which began in the 1990s (Esposito and Gaeta, 2014).

As to network industries, since the 1980s the NPM paradigm came progressively to modify their industrial organization which evolved from vertically-integrated state-owned monopolistic forms of management towards market-friendly and competitive management schemes. This transition occurred thanks to the regulatory commitment of the European Commission which since the 1990s has increasingly contributed to transform network industries in the member states. By narrowing down the focus on the rail sector, the following sections will primarily describe the organizational shift experienced by rail sector industries in Europe (section 2.1), then an overview of the European Commission's regulatory outputs will be provided (section 2.2), and, finally, the implementation of such reforms in selected countries will be discussed (section 2.3).

2.1. Rail Sector: Industrial Organization in Transition

The traditional organizational structure of most European railways in the post-war period was that of a vertically-integrated state-owned monopoly. During this period, this sector was managed as a natural monopoly because of the high fixed costs associated with providing infrastructure and the importance of offering affordable and attractive public transport to all income groups (CER, 2011). Nevertheless, in the 1950s the market share of most railways began to decrease compared to other transport modes as in many countries railways were unable to

compete with other modes. For example, the rapid expansion of the motorways which reached its peak in Western Europe in the 1970s by allowing for reduced road transport times and costs compared to railways. Because of these shortcomings in terms of competitiveness, many rail companies – particularly their freight branches – ran into traffic decline and financial difficulties. According to a recent publication of CER (2011) – the European association of national rail companies – there are two reasons behind these difficulties in competing with other transport modes. Firstly, railways were traditionally managed as a part of a government ministry with few incentives for managers to meet market requirements. Secondly, politicians expanded railway infrastructures and services without necessarily paying for it but rather by accumulating debt. These two characteristics of the railway sector – politically-driven management and debt-based investments – were the major causes which represented the driving force behind the reform process of this sector in the 1990s.

Following the NPM paradigm, the EU has played a key role in the reform process of national railway sectors by releasing several packages of rail directives (1991, 2001, 2004 and 2007) aimed at: 1) requiring MSs to establish rules which allow open access to railway infrastructure and fair competition between railway undertakings for freight and international passenger services, in the context of a single market for railways in the EU; and, 2) ensuring the financial viability of companies operating in the rail sector. In order to solve these problems, EU rail reforms have focused on liberalization: 1) to allow new entrants to compete with each other and, mainly, with incumbent operators; and, 2) to create the proper market conditions compelling companies to play the price competition game.

While the liberalization of national rail sectors was pursued by the European Commission through regulatory instruments (Directive 91/440 and three railway packages), the improvement of railway cross-sector competitiveness was pursued through the trans-European investment policy in high-speed infrastructures. In 1981 the introduction of High Speed Rail (HSR) services in Europe with the inauguration of the Paris-Sud-Est line was a break point for air-rail market share. Before the arrival of HSR services, railways were constantly losing market share in favor of roads (mostly for freight traffic) and air. Then, HSR represented a technological improvement that allowed the modernization of rail transport and effective competition in terms of medium and long distance trips. Similar technological jumps had already begun in the other transport modes with the introduction of modern jets for air transport services in the 1970s and with the expansion of the highway network in Europe (from 16.000 km at the end of the 1970s to 46.000 Km at the end of the 1990s). The modernization of air and road services led to the growth of air and road traffics, which in turn, resulted in congestion and saturation problems of the European transport system. Within this framework, railways emerged as an alternative and sustainable solution to meet the European transport demand. Supporting the rail mode became therefore one of the main axes of the European transport policies. Since 1994, the Trans-European Network - Transport (TEN-T) program has been established as the most important EU financial framework supporting MSs' investments in railway infrastructures and, namely, HSR.

2.2. EU Regulatory Framework: The Railway Packages

EU has decided to reform railways with a view of creating a single, efficient and competitive market for rail throughout Europe. In order to achieve these goals, the Commission has issued

three legislative packages so far, with the forth package being currently discussed at the EU level.

The First Railway Package, adopted by the European Commission in 2001, was composed of three directives. The Directive 2001/12/EC had as objective to: (i) introduce the 'open access' principle for the international rail freight market; (ii) create an independent body responsible for guaranteeing fair and non-discriminatory access to rail infrastructure, and (iii) avoid cross-financing by imposing the mandatory separation of balance sheets as well as profit and loss accounts for the infrastructure managers and train operators. Another component was the Directive 2001/13/EC, which stipulated the common criteria for granting the license to EU freight operators. The issue of capacity allocation was tackled under Directive 2001/14/EC. The deadline for implementing these legal instruments was 15 March 2003.

In 2006 the European Commission conducted the assessment of the transposition of the First Railway Package into national legal systems. In spite of the fact that the implementation process was not fully completed, the results clearly demonstrated the positive effects of introducing more competition in the rail market. These findings encouraged the European Commission to propose a new set of legal instruments (known as the "Second Railway Package"), which entered into force on 30 April 2004. It encompassed three directives scheduled to be implemented by 30 April 2006 and one regulation.

The aim of Directive 2004/49/EC was to develop a common approach to rail safety. The Directive 2004/50/EC harmonized and clarified interoperability requirements. The full liberalization of freight, nationally and internationally, was introduced by Directive 2004/51/EC starting from January 2007. Regulation 881/2004 (now amended by Regulation (EC) 1335/2008) created the European Railway Agency, a body designated to coordinate safety and interoperability efforts. The European Railway Agency has been a driving force in the policy for modernizing the European railway sector. Its main task has been to gradually align technical and security regulations in different member states.

The third step towards revitalization of the railways and the enhancement of an integrated European railway area took place in 2007 with the issuing of another set of legislative acts by the European Commission (the so-called 'Third Railway Package'). It was composed of two directives and a regulation. The main objective of Directive 2007/58/EC was the liberalization of the rail market with regard to international passenger trains. The opening up of the international passenger services within the EU was scheduled for 1 January 2010. As a result, cabotage to international rail services was introduced. Pursuant to Directive 2007/59/EC the European licensing system for the train drivers was created. It is in this legal instrument that the minimum requirements relating medical fitness, basic education and general professional skills for the train drivers were set out. Regulation 1371/2007 stipulated minimum quality standards that have to be guaranteed to all passengers on all lines. One of its main innovations was the introduction of the compensation system in case of train delay. Thanks to this instrument passengers were granted the right to partial reimbursement of their ticket cost, depending on the extent of delay.

On 19 April 2016, the European Parliament and the Council reached an agreement on the Fourth Railway Package, which consists of two main parts: the so-called 'market pillar' and 'technical pillar'.

The Fourth Railway Package should complete the Single Market for Rail services. Its aim is to establish the right for all European undertakings to operate everywhere in the EU and set the rules for competition more stringently. It is believed that the introduction of detailed rules shall ensure the impartiality of infrastructure managers, in particular in vertically integrated structures, so as to guarantee the non-discriminatory treatment of new operators wishing to access the network. As experience shows, this is of primary importance for creating a level playing field where competition can flourish. Moreover, the new rules on financial transparency shall reduce the risk of distortive cross-subsidization between state-financed infrastructure managers and transport operators. There is also strong support for the view that the tendering of public service contracts will optimize the use of tax payers' money while assuring an optimal level of public transport services for citizens. A further important improvement will include clearer rules on the definition of public service obligations and their scope of application. Finally, new framework will guarantee railway operators non-discriminatory access conditions to rail rolling stock which should incentivize them to participate in tender procedures for a rail public service contract.

To sum up, the EU reform of railway sector has had three main goals: 1) liberalization of the rail services; 2) unbundling of infrastructure and service level, and 3) creation of the common transport market. First, the provision of rail services has been liberalized by the gradual opening of the rail market for the foreign operators, guaranteeing them fair and non-discriminatory access. It is relevant to note that the freight market has been fully open since 2007, while in case of the passenger services the operators may still encounter some restrictions, which are supposed to be removed by the Forth Railway Package.

Second, the EU introduced and reinforced the principle of separation between infrastructure and operations (Directives 91/440/EC and 2001/14). In other words the EU legislator obliges national railway systems to implement vertical unbundling. This kind of unbundling requires legal and accounting separation of companies but not necessarily separate ownership. The reason for this is that EU law does not affect national rules governing the system of property ownership in member states (Article 345 TFEU).

Third, the creation of common railway market requires many preexisting conditions to be met. In order to achieve this goal, the EU law tried to harmonize the national legal and technical regulations, promoted interoperability between different railway systems, introduced EU licenses for operators and rail drivers, as well as created the independent regulatory body called European Railway Agency.

2.3. Actual Reform Implementation: The Case of Rail Passenger Sector in Italy, France, Germany and Spain

Over the last decades, EU policy action has aimed to create a single and competitive European railway market. Fig. 2 reports data from the LIB index and shows that status of reform implementation varies across EU countries: while few countries (UK, Germany, Sweden and Denmark) present an advanced stage of reform implementation, in the majority of EU's member states these reforms are either on schedule or even delayed. Positive achievements have been met with regard to the opening up of national freight and international passenger markets to cross-border competition. Nevertheless, progress towards creating an integrated European

railway area and a genuine EU internal market still need to be done in the field of national passengers.

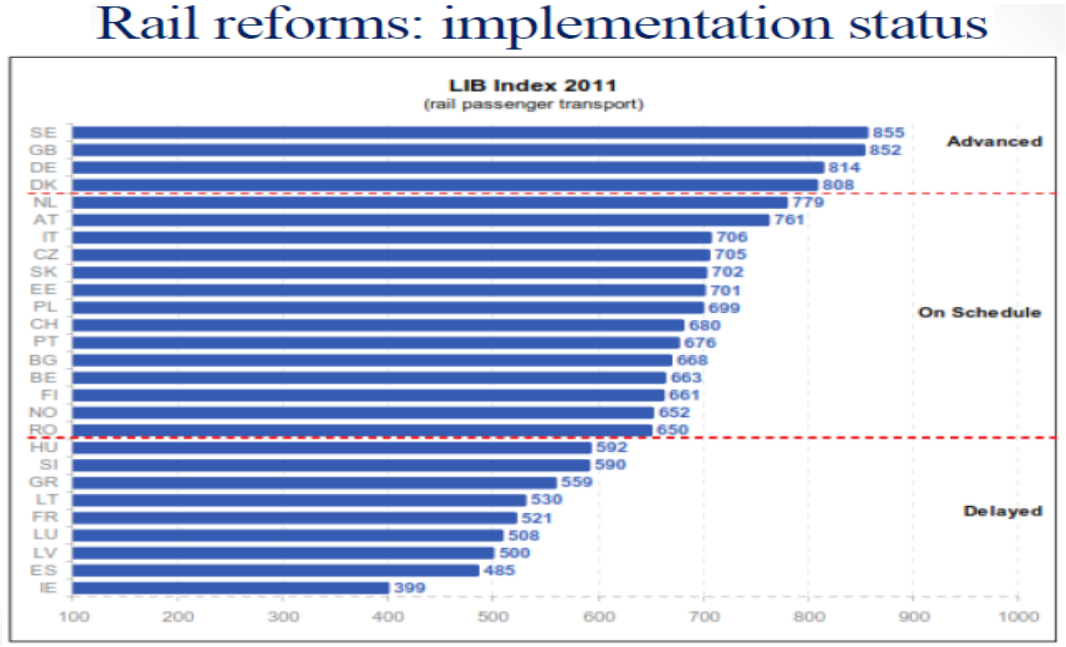


Fig 2 – Rail Liberalization Index

In order to test if the above-mentioned LIB index is a reliable source to acquire knowledge about the process of reform implementation we studied its correlation with the ETCR indicator provided by the OECD. On the one hand, ETCR regulatory indicators range from a minimum of 0 (describing a condition of full deregulation) to a maximum of 6 (describing most restrictive conditions for competition). On the other hand, LIB index goes in the opposite direction as higher values describe a condition of advanced reform implementation (and thus of full deregulation) whereas lower values describe a condition of delayed reform implementation (and thus most restrictive conditions for competition). Fig. 3 plots the ETCR and LIB scores and shows the existence of a very significant negative correlation (-0,75) meaning that the above-provided information on the status of reform implementation across EU countries can be considered reliable and representative of the actual situation in Europe.

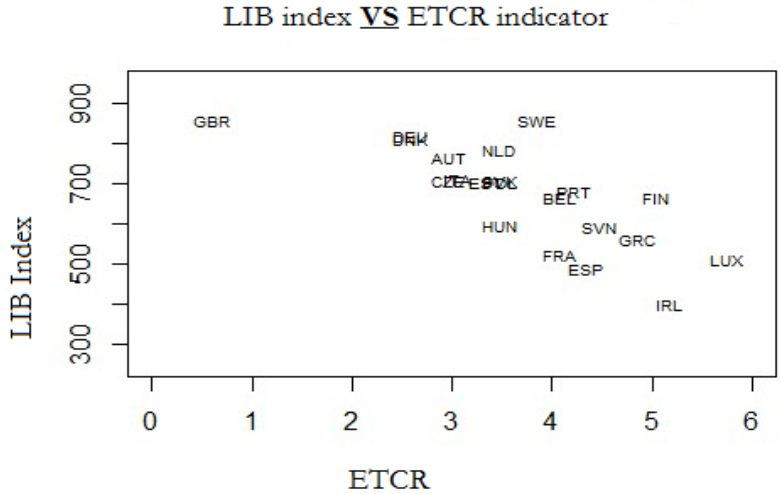


Fig. 3 – LIB and ETCR correlation

In order to have some in-depth insights into concrete cases of rail-sector implementation reforms we narrow down the focus of our analysis on four selected countries: Italy, France, Germany and Spain. These 4 countries have been chosen in order to account for the three different situations of reform implementation status presented in Fig. 3: advanced status (Germany), on-schedule status (Italy) and delayed status (France and Spain). Fig. 4 shows that between 1996 and 2013 the strictness of market access regulation (ETCR index) has decreased in the 4 countries under examination: nevertheless, coherently with LIB index, in France and Spain to smaller extent than in Italy and Germany.

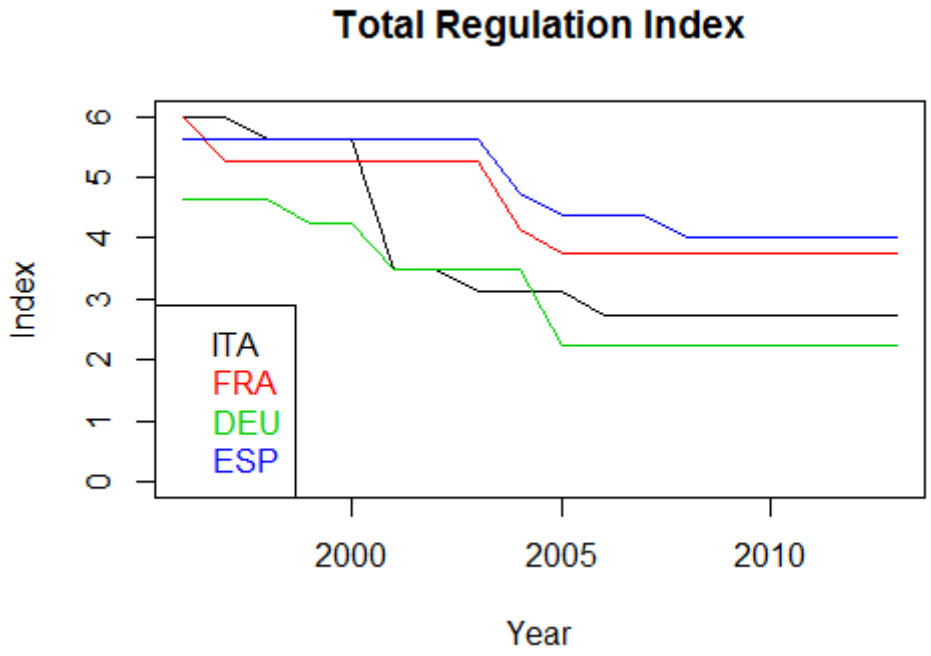


Fig. 4 –Global ETCR index

Despite the formal opening of market regulation promoted by EU regulatory effort, Beria et al. (2010) point out that in the 4 countries under examination the State still represents a crucial actor especially in rail passenger sector as it is contemporarily the owner, planner, client and the regulator.

State structures own both the network manager and the incumbent service provider, meaning that the transposition of EU directives resulted into a formal process of vertical accounting separation (known also as legal unbundling) where, in practice, the two organizations were still controlled by the same parent company and, consequently, by the state. As to Italy, Rete Ferroviaria Italiana - network manager - and Trenitalia - service provider – both participate in Ferrovie dello Stato, the public holding of the rail industry. A similar situation occurs in Germany where the federal state holds via Deutsche Bahn both DB Netz and DB Bahn. In France and in Spain - where the domestic market is open to competitors just for cross-border and freight traffic - the situation is the same: the public owns both entities. As to the French case, as of 1st January 2015 SNCF and RFF merged together (and RFF was renamed SNCF Réseau) in order to form one single state-owned railway company "to strengthen and modernize the railway service in France", said Alain Quinet (CEO of SNCF Réseau), letting the system to be ready by the deadline of 2019 when the network will be open to competitors even for domestic traffic.

As to planning, in all selected countries, the state still represents the key player. Indeed, in all the countries under examination, investments for maintenance and network development often result from a negotiation between the network manager and the public authority where the latter determines price and investment funding. Germany represents a *sui generis* case as investments concerning the regional network are managed jointly with regions.

Furthermore, in all selected cases the state is also the client of railways companies. Indeed, regional traffic – that is a Public Service Obligation (PSO) - is everywhere subsidized by states' or regions' budget. States' or regions' authorities negotiate with the provider standard service levels and prices. In Italy the regulatory framework is even stricter than elsewhere as there is no negotiation between regions and service providers about PSO. In fact, the region can unilaterally determine the service level required and the price that it is going to pay for the service.

As to regulation, there are different arrangements in place between France and Spain on the one hand, and Italy and Germany on the other hand. When it comes to fixing prices for PSO, this is a prerogative of regional authorities in Germany and Italy, whereas in France and Spain it is up to the state. Concerning the access of newcomers to the network, while in France and Spain the market is completely closed to new competitors; in Italy and Germany the state has the right to determine the access rules: particularly in Italy the licensing rules are clearly in favor of newcomers. In both Italy and Germany slot allocation rules are still missing due to the fact that traffic congestion only occurs in few rail knots and, however, never in the profitable tracks.

In a nutshell, in-depth insights into selected countries show that, despite the formal improvement of market access regulation, the actual organization of the rail industry still relies on state-controlled structures. In fact, as showed by Beria et al. (2010), the state is still a crucial actor and is contemporarily the owner, planner, client and, eventually, the regulator. It follows from these considerations that the EU objective of creating a single and competitive European railway market seems to be barely met by some member states which still prefer to manage rail-sector-related services by using state structures instead of market arrangements. Beria et al. (2010) argue that this happens because national governments consider railways as a strategic sector playing a crucial role in the design and implementation of overall national industrial and economic policy.

3. Empirics

In the preceeding chapters, we analysed the railway market and the process of opening up this former monopoly to a liberalised sector. In addition, the regulatory effort of the European Commission and its several reform packages have been outlined in detail. Finally, we focussed on the markets in Italy, France, Germany and Spain.

The aim of this chapter is to conduct a quanitative analysis of the relationship between the prices for railway services and the indicators of regulation in this sector which are published by the Organisation of Economic Co-operation and Development (OECD) . Furthermore, we will focus on the correlations between investment behaviour and regulations in the rail industry. Our questions will be adressed by an econometric strategy that is outlined in the following section.

3.1. Data and Estimation Strategy

In order to quantitatively depict the relationship between regulation and consumer prices for passenger railway services, we merge datasets from the OECD, the European Commission (EC) as well as Steer Davies Gleave and DICE Database.

The OECD regularly publishes indicators that summarize the regulation in the energy, transport and communication sectors (ECTR). With regard to the railway market, statistics are available in the fields of entry, public ownership, vertical integration and market structure. The calculated coefficients range between zero and six, where higher indicators imply greater levels of regulation (OECD, 2016).

With regard to the prices for passenger railway services, we use the harmonized consumer price index (HCPI) for passenger transport by railway from Eurostat, the database of the EC. In addition, our variables of total annual passenger transport in millions of passenger kilometers as well as the GDP at purchasing power parities also rely on Eurostat (European Commission, 2016).

Moreover, Steer Davis Gleave provides us with data for rail subsidies for the member states (Steer Davis Gleave, 2015) and DICE Database reports data regarding infrastructure investments (DICE Database, 2014).

With regard to our data structure, we were able to create a panel dataset that includes the EU-member states except for Malta and Cyprus as there are no ECTR-data available for these countries. Regarding the time dimension, our datast comprises the years from 1996 to 2013. Formally, the structure of our data leads to the following estimation equation.

$$y_{it} = X_{it}\beta + v_i + \varepsilon_{it} \, .$$

Here, the subscripts i and t denote an individual at a specific point in time. While y_{it} depicts the dependent variable (e.g. consumer price), X_{it} is a matrix of independent explanatory variables (e.g. regulation, passenger kilometers, price level, GDP) and β is a vector of their respective coefficients. v_i summarizes unobserved individual components and ε_{it} is the independent and identically distributed error term with its usual characteristics (Wooldridge, 2014) (Gstach, 2016). As we cannot verify that v_i and X_{it} are uncorrelated, we apply a within-group fixed effects estimator. The following section summarizes our results.

3.2. Estimation Results

In order to identify the relationship between regulatory policies and the price of passenger railway services, we first regress the price on the various regulatory indicators and include passenger kilometers, the overall HCPI as well as the GDP at purchasing power parities as controls. The results of the first estimation are listed in the first column of the following table.

	Dependent variable:	
	PRICE_Passenger	
	(1)	(2)
REGULATION_Entry	-2.704***	
	(0.713)	
REGULATION_Overall		-6.806
		(8.736)
REGULATION_Public_Ownership	-2.672**	-0.344
	(1.288)	(5.060)
REGULATION_Vertical_Integration	-8.183***	0.402
	(1.162)	(3.493)
REGULATION_Market_Structure	-0.095	0.266
	(0.825)	(2.604)
KILOMETER_Passenger	-0.197	0.086
	(0.272)	(0.390)
PRICE_Overall	0.059	0.938***
	(0.046)	(0.126)
GDP_PPP	0.00004***	0.00001
	(0.00001)	(0.00001)
SUBSIDIES		0.019
		(0.019)
Observations	363	108
R2	0.500	0.604
Adjusted R2	0.455	0.458
F Statistic	47.183*** (df = 7; 330)	15.624*** (df = 8; 82)
Note:		*p<0.1; **p<0.05; ***p<0.01

We find significant and negative correlations between the regulation-associated variables and the price of passenger railway services. Specifically, lower regulation (which would transform into lower ECTR-coefficients) in the fields of public ownership, vertical integration and the market structure is associated with higher prices. This remarkable relationship is coherent with other contributions to the literature, for example Brons et al (2014). We therefore conclude that our results are in line with contemporary research in the field of services of general interest in the European Union.

In addition, we find a significant and positive correlation between a country's gross national product and the prices for passenger rail. Finally, it should be mentioned that no significant relationship can be identified for the traveled passenger kilometers and the overall HCPI.

In order to even deeper analyse the relationship under consideration, we account for the fact that the railway sector is a highly subsidised industry (Steer Davis Gleave, 2015). Therefore, we include the grants which the railway companies receive as a control variable. However, as data for the subsidies are only available for the period between 2007 and 2012, our dataset is strongly reduced. Nevertheless, we report our regression results in the second column of the table above.

As can easily be seen, the only significant explanatory variable to remain is the overall price level. Increases in the general HCPI are associated with higher prices in the passenger railway sector.

It should however be noted that the results of this model could likely be driven by the dramatic reduction of our panel dataset to a period with small variations in regulation-related variables. We therefore conclude that further research is needed in order to clarify and to sustainably address the entire picture under consideration.

Furthermore, we focus on long-term decisions by examining the relationship of infrastructure investments and regulation. The following table summarizes our results.

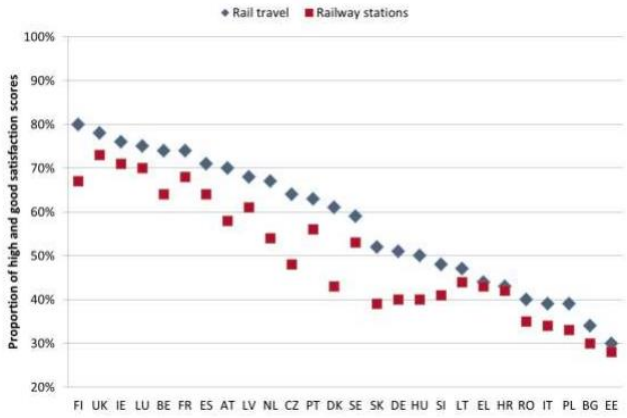
	Dependent variable:
	INVEST
REGULATION_Overall	361.892
	(240.307)
REGULATION_Public_Ownership	48.593
	(119.016)
REGULATION_Vertical_Integration	-444.995***
	(133.781)
REGULATION_Market_Structure	-265.819**
	(117.446)
KILOMETER_Passenger	6.208
	(24.032)
PRICE_Overall	-13.329***
	(3.744)
GDP_PPP	0.001
	(0.001)
Observations	276
R2	0.249
Adjusted R2	0.225
F Statistic	11.817*** (df = 7; 250)
Note:	*p<0.1; **p<0.05; ***p<0.01

We conclude that lower levels of regulation in the fields of vertical integration as well as market structure are correlated with higher railway infrastructure investments and explain these observations as follows: public transport companies face increased levels of competition. In order to defend their position as a market leader, they try to attract customers by delivering a higher level of quality in terms of service which includes a better network with reduced travel times. We further find that increases in the overall price level are associated with a fall in the infrastructure investements. Our remaining explenatory variables are not significantly correlated with railway investments.

3.3 Quality Aspects

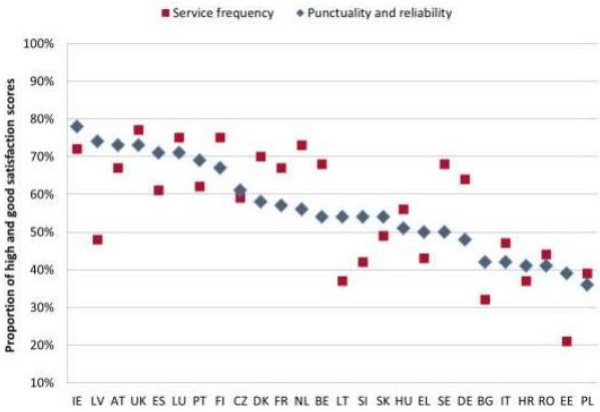
Furthermore, it is of interest to consider differences in quality in rail services across member states and the impact of competition and market liberalization on quality.

Quality can be observed by measuring customer satisfaction of rail services in general as well as punctuality and reliability, which are provided in the Flash Eurobarometer Survey on satisfaction with rail services conducted in 2012-13.



Source: Flash Eurobarometer 382a, Steer Davies Gleave analysis.
Note: "High" and "good" satisfaction scores have been combined.

Fig. 5a



Source: Flash Eurobarometer 382a, Steer Davies Gleave analysis.
Note: "High" and "good" satisfaction scores combined.

Fig. 5b

On average, approximately half of the respondents report their level of satisfaction with rail services as "high" or "good" (Fig. 5a). However, one can notice a large variation across member states with Western European countries generally reporting higher levels of satisfaction. Also with respect to punctuality and reliability as well as service frequency satisfaction scores vary substantially between member states (Fig. 5b) (European Commission SDG 2016).

Then, we checked if we could find any relationship between the perception of quality and the state of market liberalization (Fig. 6). While punctuality and reliability differ considerably between countries, there is no significant correlation to the regulatory management practices as captured in the ECTR score. Indeed, European Commission (2016) finds that punctuality and reliability rather depend on the size of the country and the number of passengers travelling on the line.

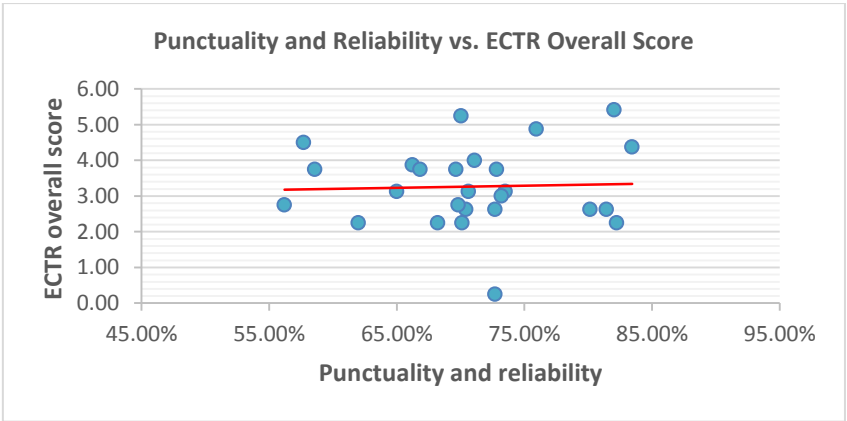


Fig. 6

The perception of the evolution of quality of rail services over the past years seems to be ambiguous on the aggregated European level (Fig. 7). While 34% of the surveyed persons report that the quality of rail transport has improved, 27% state that there is deterioration during the same time period (European Commission 2014).

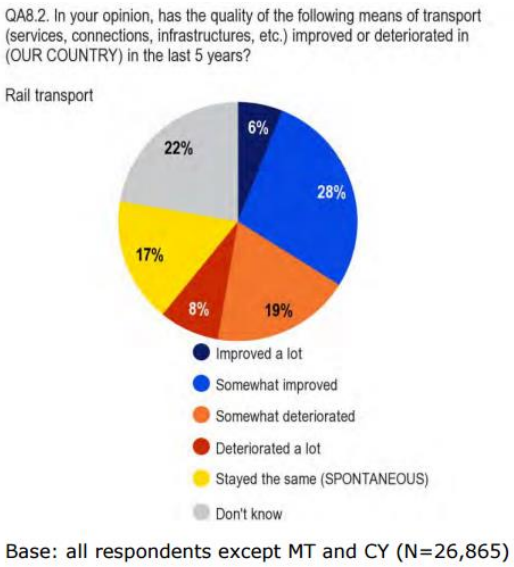


Fig. 7

4. Conclusions

The current developments in the railway service aim to set rules for competition more stringently in order to guarantee the non-discriminatory treatment of new operators wishing to access the network. Therefore, EU law also tries to harmonize the national legal and technical regulations and intensively promotes interoperability between different railway systems. However, state-owned enterprises still have a significant role in the railway market in Europe and hold a market share of around 80 %. Still, through open access and competitive tendering on both short-distance and long-distance level, the market entry of new competitors has occurred in recent years. While competitive tendering is more pointing towards cost savings, open access focuses so far on lower fares and additional service being provided. Therefore, keeping in mind that even in the countries more open to competitors the real competition level is low compared to the other network industries, the policymaker should verify whether a different EU policy can actually open the market pushing the operators to compete through better service and low fares. In fact, it can be assumed that the development of the member states will be different. Hence, it is crucial to take this national level into account when evaluating the improvements in future surveys and studies. Generally speaking, the state will remain a crucial actor in terms of planning, maintaining, service providing and market regulating (Brons and Tomasi, 2016). Overall, it seems to be difficult to create a single and competitive European railway market, as some Member States still prefer to manage their railway sectors by using public institutional structures instead of market arrangements, because railway is considered as a strategic component in their national industrial and economic policy. Also, the current lack of trust in the European institutions coming from several national movements (e.g. Hungary and Britain) could have an impact on the above-mentioned railway packages and their implementation.

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