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**REFORMAS DE MERCADO EN EL SISTEMA
FERROVIARIO EUROPEO: UNA
EVALUACIÓN DESDE LA PERSPECTIVA
DEL CIUDADANO**

**MARKET-ORIENTED REFORMS OF
RAILWAYS IN THE EUROPEAN UNION: AN
EVALUATION FROM THE CITIZEN
PERSPECTIVE**

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RESUMEN

Durante las últimas décadas, los países miembros de la Unión Europea han implementado ampliamente reformas con orientación de mercado en los servicios públicos, con el objetivo de incrementar el bienestar de los ciudadanos, mejorando la calidad, aumentando la eficiencia y bajando las tarifas. Sin embargo, las reformas no siempre han tenido el resultado esperado. Los reguladores han tratado de mejorar los análisis y la comprensión del comportamiento y percepciones de los ciudadanos, para incluirlo en las políticas regulatorias. Un enfoque utilizado con este objetivo es el enfoque de perspectiva del ciudadano (Fiorio and Florio 2007, 2011; Ceriani et al., 2011; Clifton et al., 2012, 2016) que consiste en el análisis de las preferencias declaradas de los ciudadanos para evaluar las reformas en los servicios públicos. En este trabajo aplicaremos por primera vez este enfoque al sector ferroviario. Desde el principio de la década de los 90, la Unión Europea ha promovido diversas medidas con el objetivo de convertir a los ferrocarriles en un mercado competitivo. Estas medidas han sido adoptadas con diferentes intensidades en los diferentes países europeos. El objetivo de este trabajo es evaluar si en los países donde se han producido reformas más profundas, los ciudadanos están más satisfechos con su sistema de trenes. Para ello se analiza la probabilidad de estar satisfecho con el sistema ferroviario a través de modelos probit y la información recogida en el Eurobarómetro Especial sobre competencia en ferrocarriles. Los resultados sugieren que los ciudadanos están menos satisfechos en los sistemas que presentan mayor separación vertical entre el gestor de infraestructuras y el operador de servicios. Además, los resultados muestran que los sistemas que permiten la competencia entre más de un operador en la misma vía, ya sea a través de franquicia o libre entrada, tienen menor probabilidad de satisfacción. Solo se encuentran evidencias positivas de competencia en el caso de que se trate de una licitación cuyo ganador adquiere una posición de monopolio en el mercado. Finalmente, la privatización es no significativa en el modelo. En un momento en el que la aplicación del 4º paquete ferroviario significará un paso más en la liberalización del sector, los resultados de este trabajo son una invitación a revisar y repensar la política Comunitaria en el sector ferroviario.

Palabras clave: Reformas de mercado, ferrocarriles, liberalización, separación vertical, perspectiva del ciudadano.

ABSTRACT

In the last decades, market-oriented reforms of utilities have been widely implemented in the European Union, aiming at increase citizens' welfare through raising service quality, improving efficiency and lowering fares. However, the reforms have not always achieved the results that were expected. Regulators and policy-makers intend to improve the analysis and understanding of real citizens' decisions and perceptions, and to incorporate them into regulatory policies. An approach that has been used for this purpose is the citizen perspective (Fiorio and Florio 2007, 2011; Ceriani et al. 2011; Clifton et al., 2012, 2016). This approach focuses on analyzing citizens' stated preferences as a way of evaluating reforms of public services. In this paper, I apply the citizen approach to the railway sector. Since the beginning of the 90s, the European Union has promoted several market-oriented reforms in order to transform railways into a competitive market. The reforms have been adopted at a different intensity depending on the country. The objective of this paper is to evaluate whether or not citizens are more satisfied with their national railways in countries where deeper reforms were applied. Using information gathered in the Special Eurobarometer survey on Rail Competition conducted in 2012, the model analyze the probability of satisfaction with national railway systems through probit estimations. The findings suggest that citizens are less satisfied in countries where vertical separation between the infrastructure manager and the operator of services is higher. Regarding market liberalization, the results show that systems that allow competition between more than one operator on the same tracks, either through franchising or open access, present lower probabilities of citizen satisfaction. There is only evidence in favor of competitive tendering in the case in which the winner of the tender has the right to hold a monopolistic position in the market afterwards. Finally, privatization of the main service operator is found to be statistically non-significant. In a moment where the implementation of the 4th Railway package will mean a step further in the liberalization of railways, the conclusions provided by this work represent an invitation to revise and rethink actual Community policy on railway sector.

Keywords: market-oriented reforms, railways, liberalization, vertical separation, citizen perspective.

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1. INTRODUCTION

Since the eighties and mainly during the decade of the nineties, European public utilities such as energy, electricity, telecommunications and transport, have suffered a deep transformation process that has not finished yet. The state-owned incumbents have been the focus of deregulation, market liberalization, vertical disintegration and privatization measures (Clifton, Comín and Díaz-Fuentes, 2003; Newbery, 2004; Boggetti and Obermann, 2008; Ceriani, Doronzo and Florio, 2009; Fernández-Gutiérrez, 2011). Under the umbrella of the “New Public Management”, the reformist wave has also led to the introduction of new ways of organization and management inspired in the functioning of the private sector in those services owned by the public sector (Ramíó, 2001; Costas, 2007). Thereafter, according to its definition as General Interest Services (EC, 2004; Van de Walle, 2006), public services are not defined by their ownership (that can be public or private) but by the objectives of their provision, which have an impact on the society as a whole and not only on the people that benefit from them. The introduction of public services into the market sought mainly that citizens could benefit from a higher utility by means of competition and free election. However, the reforms have not always achieved their objectives and their implementation is under debate in the public opinion and in the academia (Le Grand, 2007; Clifton and Díaz-Fuentes, 2010; Clifton et al., 2012, 2014, 2016).

The rail transportation is one of the sectors where the European Commission has promoted market-oriented reforms. In addition, railways can be defined as a General Interest Service under several arguments. Firstly, it contributes to improve regional cohesion and connectivity within the countries and among the national members, essential in both economic and social terms. The railway sector contributes significantly to the EU economy and directly employs around 900 000 people. Moreover, it is considered an energy-efficient transport option; therefore, its expansion would help achieving the EU energy and climate objectives. The European Commission, in its White Paper (EC, 2001), declared the development of the railway system a strategic priority for the European Development in the following decades. The three main goals mentioned in the White Paper were promoting new rail lines, increasing market share among other transport means and reducing public subsidies. According to the Eurobarometer 388 (2012), approximately 29% (150 million people) of the total population of the EU uses the railways several times a year or more, while more than 50 million Europeans, approximately 10% of the population, uses it several times a month or more. Furthermore, it has implications for national, regional and local budgets as well as consequences on the environment through infrastructure and required resources. Finally, railway policy has an impact on the lives of thousands of direct and indirect workers and on the labour relationship with property and managing of the service.

Since its initiation with the Directive 91/440 in 1991, the liberalization process of railway systems has been a priority in competition policy for the European Union. The European Commission (2008) asserted that liberalization and competition of public entities helped to promote rail transport efficiency and to reduce cost inefficiencies, by introducing competitive pressure. The ultimate goal is to create a single European market for railways (IRG-Rail, 2017). However, internal factors and national priorities have made the process slower compared to other sectors, particularly at the beginning of the process. The foremost policy implemented by the European Union was the vertical separation between infrastructure managers and railway service operator, which was later followed by four complete reform Packages. The Fourth Railway Package, approved by the European Parliament on February 26th 2014, and to be implemented by countries in 2019 at the latest, is so far the last initiative conducted by the European

Commission regarding the liberalization of the sector. In 2012, year where the survey used in this work was conducted, the only mandatory requirements for EU Members were a separation account between infrastructure and operator, an independent evaluator and open access status for international passenger services. Apart from this, each European national government had implemented market-oriented reforms very differently (Alexandersson, 2009; OECD, 2013; EC, 2014; Finger, 2014). In spite of the fact that it is complex to analyze and compare the evidence throughout countries, due to the diversity of systems, numerous scholars have addressed the topic of railways regulation focussing their papers on measuring efficiency (Friebe, 2005; Diessen et al., 2006, Asmild et al., 2009; Cantos, 2010; Cantos, 2012; Nash 2016).

The objective of this paper is to analyze the relationship between citizens' satisfaction and railway regulation systems across Europe. One simple question is being addressed: Are consumers more satisfied with the railway system in the countries where different reforms have taken place? For this purpose, I use self-declared individual attitudes collected in the Special Eurobarometer 388 on Rail Competition (Eurobarometer 2012) and a standardized, comparable set of reform indicators, such as those provided in the OECD Sector Regulation (NMR) database. Taking cross sectional data, I will test whether in the countries where reforms have been more intense, citizens' satisfaction is higher or lower. This work applies the citizen perspective approach previously used to evaluate other utilities (Fiorio and Florio 2007, 2011; Bacchiocchi et al., 2011; Clifton et al., 2012, 2016; Fernández-Gutiérrez 2017). This approach focuses on analyzing citizens' stated preferences as a way of evaluating reforms of public services. The decision of considering data on stated preferences is important for two main reasons: First, policy-makers are aware of the importance of the public debate since having people for or against can determine the success of a reform. Second, it is a tool to evaluate the welfare impact of reforms, which complement what objective evidence cannot measure. The contribution of this paper is that it is pioneer in evaluating the reform of the rail sector from the citizen perspective, extending this approach used in other sectors.

The rest of the paper is organized as follows. In the second section, an extended revision of literature is proposed including the definition of the main concepts, a historical context of the reforms in Europe as well as the debate regarding the reforms. The third section is divided into four subsections: introduction to stated preferences, hypotheses, description of the variables used and finally, an explanation of the econometric model. Afterwards, the fourth section includes the descriptive analysis and the econometric analysis. Lastly, the results are interpreted and discussed in the conclusion section.

2. LITERATURE

2.1. LEVELS OF MARKETIZATION: DEFINITIONS

The unique rail market structure in European countries in the decades after the World War II was the public monopoly. Each country presented a single firm that integrated the whole sector, including infrastructure and services. The price was regulated and the entity had to meet the demand of that given price. Furthermore, any reforms, construction of new lines or significant changes in management and service offering had to be approved by the government. Therefore, competition and private interference in the market was uncommon and often considered undesired, since the preservation of autonomy and the national character of the incumbent were the main priorities that shaped rail regulation (Cantos et al., 2011). This situation started to change in Europe in the late 80s and early 90s. The European Commission started in 1991 a program of liberalization reforms that lasts until today. Before, only Sweden had adopted some reforms such as splitting infrastructure from operations in 1988 (Nash and Nilsen, 2014).

We can divide the market-oriented reforms into three main levels: Vertical level, horizontal level and property level (Cantos, 2010; Cantos, 2012; Berutti, 2016).

The vertical dimension refers to the relationship between infrastructure and operations. It is the first measure the European Commission took at the beginning of the liberalization process. The vertical dimension of the railway system can be generally organized in three ways: vertical integration, separate accounting systems and legal separation. The first option corresponds to the traditional model of rail transport organization, explained above. It was the predominant form existing before the restructuring of the sector, although no European country maintains this model nowadays (Mizutani et al., 2015). The second option (separate accounting systems) represents the existence of some degree of separation. Balance accounts as well as profits and losses for the provision of services and operation of the infrastructure are conducted for separately. It may be the first step to open the tracks to stations available to other operators. Thus, other operators may be able to access to the infrastructure at a fair basis. Finally, the legal vertical separation scenario is characterized by a deeper separation between the management and the ownership of facilities, and the rail operators. Among the legal separation models, there might be organizational separation within the same company or institutional differentiation, which implies the existence of separate companies (Cantos et al., 2008). The idea behind the reform is to position the railways at the same level as road transportation. While the infrastructure remains a natural monopoly, it allows competition within the service operations encouraging third-party entrance.

The horizontal dimension covers the relationship among the different operators that provide the service, that is to say, the market structure. Historically, the rail market structure consisted of one single incumbent. This system is becoming less common, yet it is still the case in several European countries. If competition is considered to bring better quality to the services, it is important to set conditions for competition. There are two forms of promoting competition in railways: competition 'for the market' and competition 'in the market', also called 'on-track' competition. Competition 'for the market' occurs when after a public tender, one operator receives the right to operate a certain track for a period of time. Then, after the auction has taken place, entry is restricted to the winner of the tender. This is a form of mixing competition and the natural monopoly both in a single model. On the other side, competition 'in the market' refers to the situation in which different operators are allowed to operate services on the same tracks at the same time, competing for a similar demand. Depending on the entry legislation, operators can function in an open access/free entry basis or they may need to win a franchise beforehand (Nash et al., 2016). There are countries where the competition 'in

the market' is predominantly enhanced through franchising and others where more tracks present open access regulation.

Regarding property, we can consider public or private ownership. Between the two extreme cases, many others can be found (Galenson and Thompson 1993). Among the forms of public organization of management we can find a government department, a public enterprise still highly government-dependant or a reformed public enterprise. On the other side, the railway system may be full private ownership. Even though, there are not any more organic links between the company and the public administration, that does not mean there is not any sort of government participation or public funding.

2.2. REFORMS IN EUROPE

The fourth railway Package approved in 2016 is the last step in the deregulation of the European railways systems. The reforms started with the freight market and more recently, the international passenger services has been opened to competition too. The process that started in 1991 with the Directive 91/440 has been slow, especially when it comes to implementing European law in every country. The main objectives that have driven the liberalization process are enhancing competition, implementing commercial freedom reforming services adjudications and deep changes in infrastructure management. At the same time, the goal is to ensure safety and increase the share passenger carriage relative to other modes of transport (EC, 2008). In order to create a competitive, efficient and single market, the European Union has approved numerous legislative initiatives including four regulatory Packages (Holvad, 2009, Nash, 2010; Berutti, 2016).

Briefly, the EU legislation after the Third Railway Package (2007) required EU members to have at least a separation account of the management of infrastructure and the operators of services, and enhanced deeper separation. In the horizontal dimension, the access charges may not be discriminatory as well as fair capacity allocation. Moreover, there should be open access for international passenger services. In addition, each country should have established a fully independent regulator and a performance evaluation regime for the Infrastructure Manager, in order to ensure that the financial equilibrium was maintained. Finally, the 4th Railway Package was presented in 2013 and started its implementation on June 2016. Hence, since its implementation is in progress, the results of this work involves an evaluation of actual public policy. It is considered being the last step into the creation of a single legal framework for an integrated rail market. It introduces measures to promote competition 'for the market' by making competitive tendering of public service contracts mandatory for most of the cases, and competition 'in the market' by ensuring non-discriminatory access conditions, as well as removing barriers to open access in domestic passenger services. The package also includes an initiative to give more power to the infrastructure management to strengthen its independence.

Market-oriented reform have been implemented very differently depending on the national government (Alexandersson, 2009; OECD, 2013; EC, 2014; Finger, 2014). Every railway national system has implemented some sort of vertical separation of infrastructure and service, at least the accounting activities. The first country to implement a legal separation was Sweden in 1988. Few years later, United Kingdom was the next to reform its railways vertically in 1994. In 1997, French rail infrastructure was separated out in another public company, which was partially reversed in 2014 (Nash, 2016). The only countries that remained with the minimum degree of vertical separation required by the EU were Austria, Belgium, Netherlands and Romania. Regarding liberalization of the market structure, the diversity is wider. Before the 4th

Railway package, countries were only required to open access on international passenger services. In Sweden, where open access policy ended its implementation in 2012, competition is growing between the state incumbent, regional public companies and private operators. In Germany, there is open access for new operators to compete with commercial or subsidized services in an increasing number of services. Yet, real competition is still limited to few routes and at low frequencies. In addition, the new high-speed network in Italy is also experiencing intense competition. In contrast, in France as well as in other countries, the state-owned operator, holds a legal monopoly of passenger rail services (Nash, 2016). Only two countries have experienced privatization reforms: the United Kingdom and Estonia. In Britain, the infrastructure manager, Railtrack was privatized in 1996, but became insolvent and had to be replaced by a government initiative company. The passenger services were divided into 25 franchisers as it happened in 1997 (Bradshaw, 1996; Bowman, 2014). The Estonian rail transport was fully privatized in 2001 and renationalized again in 2007. However, the domestic inter-city was privately operated until 2014, when the state-owned operator Elron took over all domestic passenger train services. *See regulation details by country in charts 4.2 and 4.4.*

2.3. MARKETIZATION OF RAILWAYS: THE DEBATE

The reforms adopted over more than two decades by the European Commission aimed to provide a greater role for market forces, expecting an improvement in price, performance and deeper consumer focus (European Commission, 1996). According to the European Commission (2001), the measures should enhance competition in a way that the growth of the market will contribute to increase the share of a sustainable transport such as the railways. (EC, 2001). The 4th package is meant to solve long and costly procedures due to inefficiency, to finish with discrimination against new entrants and also to eliminate the patchwork of national regulatory regimes and rules (EC, 2017).

After mentioning the key elements that motivate the reforms according to the European Commission, this sub-section will be an introduction to the arguments exposed around the process of reforms. As an attempt to organize the discussion, first, the main arguments and evidence for and against the individual reforms (vertical separation, horizontal separation and ownership) are going to be presented and secondly, other works that study the interaction between the reforms will be reviewed. Finally, the last part will include examples of papers that used the citizen's perspective in other sectors, which is the approach applied in this work to the case of railways.

Regarding vertical separation, there is not an agreement among scholars on its suitability. According to Preston et al. (2002), an advantage of vertical separation is that it puts the railways at the same organizational structure as the other transport means. Evans (2003) states that the deregulation process leads to gains in efficiency, transparency and greater competition. At the same time, it allows specialization in infrastructure management or service operating. Moreover, it improves transparency and cost measuring which should push for lower prices and greater efficiency. Asmild et al. (2009) studies data from 23 European countries between 1995 and 2001, identifying how costs change with reforms and show that vertical separation reduces significantly staff and material costs and helps to increase the operating cost efficiency of the systems.

However, this separation can have significant drawbacks (Nash and Rivera-Trujillo 2004, Driesen, 2006). First, the railway market has been always considered a natural monopoly. By letting just one entity to operate the whole sector, it leads to the exploitation of economies of scale due to very high costs. Secondly, the separation could create coordination problems between infrastructure and service operators, since schedule designing may lose efficiency (Nash and Rivera-Trujillo 2004). Third, there is an

important issue concerning information asymmetries. While, only the infrastructure management knows the true capital costs and only the operators know the costs of the service (Laffont, and Tirole 1996). Wetzel (2008) as well as Cantos et al. (2011) do not find statistically significant influence on efficiency on the separation variable between the countries that have adopted vertical reforms against those that have not implemented them. Laabsch and Sanner (2012) go beyond this position and expose that vertical separation has not had any positive effect on the passenger segment, since the countries that have maintained the integrated model show much better performance.

Regarding market structure, the debate is also controversial. Liberalisation essentially is a combination of competitive tendering for public service contracts and open access for new commercial operators (Nash et al. 2016). Those in favour of the introduction of competition, liberalizing the rail sector mention the inefficiency of a monopoly, with high prices and little incentives to innovate and improve quality. Moreover, the single operator may be too slow to adapt the service to the demand, which could create great useless losses and aggravate public debt in case it is state-owned. Foster (1994) believed that a market driven contractual system would lead to cost reductions, which has been partly, confirmed. According to Nash et al. (2016), the liberalization of the rail market has contributed to an increase in traffic as well as a stabilization or decline on public resources on the sector in the case of Sweden and Germany, unclear in the British experience. There are also studies showing the role of the liberalization in price reduction as well as in increasing of certain frequencies (Tomes, 2016; Finger et al. 2016). In addition, Cantos (2011) finds that competition in the market could have a positive effect on network efficiency.

On the other side, those in favour of a unique public operator stress the importance of rail transport as a social service, away from profitability. Accordingly, it is a basic mechanism to regional and national cohesion, economic development of certain areas and the preferred mean of transport among certain groups of the population. If the sector turns into a competitive market, it would follow the criterion of maximization of benefits and would probably abandon some of the unprofitable services (Berrutti, 2016). Furthermore, another concern may arise if it seems there is conflict between revenues and safety, as well as low schedule reliability and abandonment of investments (Crompton and Jupe, 2006). Moreover, the need for large upfront investments along with the loss of economies of scale and density due to the fragmentation of services can also lead to higher costs (Preston et al., 1999). This hypothesis is shared in Casullo (2016). He uses a difference-in-difference estimator, and finds that national railways with on-track competition may be resulting in higher costs than models with monopoly passenger services.

Concerning open access, Finger et al. (2016) stress that although open competition has had positive effects such as price reduction for travellers on competitive routes, this does not mean that the economic cost of the system has declined. Actually, the introduction of competition produces a shift in costs towards the infrastructure manager and to the users of other routes that cannot benefit from competition, since competitors concentrate themselves on services that are more profitable. Hence, they suggest that further competition may cause financial stress not only to the public railway undertakings and new potential entrants, but also to numerous travellers on less popular lines and times. Similarly, Nash et al. (2016), arguments that in territories where most services are franchised, expansion of open access competition leads to less profitability of the franchises, a cost that will ultimately be transferred to the government and to numerous consumers. This is the case of Britain, where franchises have to pay to contribute on fixed costs of the infrastructure while open access operators just pay the track access charges.

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However, allowing new firms to operate, even if only on a limited scale, might lead to improvements in services through lower prices, better on board services and other innovations. They manage to do that through lowering wages and by adopting flexible working practice. Thus, the British Competition and Market Authority (2015) states that the reduction of costs of the new entrants outweigh the loss of economies of density by the franchisee. According to Bergantino et al. (2015), the introduction of open access on Italian high-speed network has had direct and indirect positive effects. They find that it lowers the fares and increase the frequency of the services in the first place, but it has also limited raises of fares in interregional air flight services, since both means of transport compete for a similar demand.

Some scholars have studied the package of vertical separation and liberalization reforms together, including the effects of the interaction between them. Using a production frontier model, Friebe et al. (2005) try to measure the effect of the deregulation on railways output, between 1980 and 2000. They consider the output of both passengers and freight as the dependent variable and a dummy variable for the regulatory measures as explanatory variables. They find that the implementation of deregulating measures lead in general to more efficient behaviour, however result may vary depending on the sequence and rhythm the reforms are applied. Employing Friebe's production frontier, Pham (2013) also finds the vertical split and market opening positive in terms of efficiency, which is coherent with previous results using this methodology. The conclusions found by Driessen et al. (2006) were more ambivalent. They analyze data at an international level to test the relationship between competition and railways production efficiency. They find that, while competitive tendering improves productive efficiency, more autonomy of management lowers it. Thus, increasing independence of the service operator may be counterproductive if it does not go along with an increase in competition. This contradicts previous studies on the topic. Finally, Cantos (2010) estimates levels of efficiency through non-parametric mathematical programming techniques of European railway systems for the period 1985-2005. He finds that countries with the largest improvements on efficiency are the ones that restructured both vertical and horizontal levels of their network. Furthermore, the combination of both measures has a positive effect, while tendering systems in passenger services has not significant effect.

The privatization of utilities is said to have several benefits (Cantos and Campos, 2005; Estache et al. 2002; Thompson, 2004). It could be a way of introducing private investment when public support is insufficient. Managers would act more freely without the political pressures and would focus just in the company's interests. The maximization of benefits criterion would push companies to improve quality and work on customer's fidelity. In addition, theoretically the state could cut costs and raise revenue, limiting public expenditure and reducing budget deficit.

However, numerous critics have questioned these arguments, especially with regard to railways. The first and deeper privatization of the rail system took place in Great Britain; therefore, the vast majority of papers focus on this case. Bowman (2013; 2014) considers that the extensive public subsidies provided to infrastructure and covering debt makes privatization meaningless in terms, though the financing channels allow the political elites to maintain their narratives about the benefits of privatization. Preston and Robins (2013) hold a similar position arguing that the increase of total industry costs funded with public money makes the Government the big loser of the operation. In addition, the sector has had to face under-investment tendencies existing in the years before the privatization. Furthermore, consumers may suffer as private monopolistic firms would increase prices and reduce services (Wolmar, 2001). Finally, states may lose money on the privatisation of railway infrastructure and services because it is difficult to know the real value of the assets (Bowman, 2014).

So far, the literature has consisted of a review of previous articles on the relationship between regulation and efficiency of rail outcomes. This has been the methodology of the majority of empirical literature, while the study of the impact of reforms in citizen's welfare is less developed. This work differs with others on the approach. The model presented here studies how regulation in railways may affect the satisfaction of citizens. As far as I am aware, there is no previous paper written with this intention. However, there are significant other articles with the same approach studying the impact of regulation in consumer's satisfaction with other utilities such as electricity retail markets, telecommunications, financial services or urban transport (Florio et al. 2007; Ceriani et al. 2011; Clifton and Díaz-Fuentes, 2010; Bacchiocchi et al., 2011; Fiorio and Florio, 2011; Clifton et al., 2012, 2014, 2016). Fiorio et al. (2013) is going to be a reference for this work.

Fiorio et al. (2007) question whether European consumers are satisfied with the services of electricity, gas, water and telephone after two decades of reforms. In addition, Ceriani et al. (2011) study both objective and subjective outcomes, considering prices and consumer satisfaction with network industries. Moreover, Fiorio and Florio (2011) wonder whether European consumers are satisfied with the price they pay for electricity supply services. They find that consumers' satisfaction about prices is higher in countries where public ownership of electricity industry is higher. On the contrary, liberalisation reforms seem to be associated with a more positive perception of electricity prices as well. In the same line, Clifton et al. (2012) contrast consumers' stated and revealed preferences for electricity, gas, fixed and cellular telephony and Internet, across European countries. The results indicate that consumers' with lower levels of education, the elderly and those not employed show lower satisfaction level with some utilities due to particular expenditure patterns. Using a similar methodology, Clifton et al. (2016) analyzes revealed and stated preferences on infrastructure service from a territorial perspective. Finally, Fiorio et al. (2013) addresses whether satisfaction is correlated to the number of providers of local bus transport services. Their results conclude that one single provider systems are correlated with higher satisfaction as opposed to a market structure where more providers compete among themselves. That is to say, they find evidence in favour of a monopolistic integrated organization of the public transportation service. To summarize, from the point of view of citizens' satisfaction, there is not clear evidence in favour of market-oriented reforms.

3. METODOLOGY

3.1. STATED PREFERENCES FOR EVALUATING PUBLIC SERVICES: DATA

In order to analyze and evaluate policy from the citizen perspective, one fundamental source is used: stated preferences. It refers to subjective evaluation based on individual opinions. The present work uses European citizens' stated preferences on rail transportation, gathered in the Special Eurobarometer 388 (2012). In the report, European citizens are asked about their attitudes towards their national rail transport including support for railway competition or improvements that may encourage citizens to travel by train. It also collects information on different individual characteristics such as gender, age, years of education, or type of community among many others. A similar type of Eurobarometer is used in Florio et al. (2009; 2011), Clifton et al. (2014; 2016) Fernández-Gutiérrez et al. (2017) for telecommunications, energy, transport and banking services. A brief discussion about relevant papers that use this technique has been included in the last part of the literature section. The data is delivered by the European Commission, with the Directorate-General for Mobility and Transport (DG MOVE) and co-ordinated by Directorate-General for Communication. The sample of this Eurobarometer is approximately 1000 surveys per country, which makes 25591 individual observations for xxx EU countries (excluding Cyprus and Malta, since railway sector do not exist).

The stated preferences are especially useful when revealed preferences do not allow to identify the motives behind the choices (Hensher, 1994). They are also used in markets where switching and information costs are high, fact that makes essential to take satisfaction into account (Clifton and Díaz- Fuentes, 2010). Moreover, stated preferences allow to evaluate the effects of policy, considering winners and losers, as well as the dynamics of the effects (Ferrari and Manzia, 2014; Frei and Stutzer, 2002). Adamowicz, et al. (1998) considers that using stated preferences the researcher is able to identify the passive use, which is the value given to an object for its very existence and not for active use. For example, someone could positively value a public service used by other people. This aspect would go unnoticed when using revealed preferences. At the same time, revealed preferences assumes consumption means preference while does not take affordability into account (Clifton et al., 2015). Finally, stated preferences are also a tool to measure subjective welfare, whose analysis could help to improve institutions and policy.

3.2. VARIABLES

The dependent variable used in the model corresponds to the responses of the following question in the Eurobarometer: *Overall, how satisfied are you with your national and regional rail system in (OUR COUNTRY)?* The possible answers to the question are 1. *Very Satisfied*, 2. *Fairly Satisfied*, 3. *Not very satisfied*, 4. *Not at all Satisfied*, and 5. *Do not Know*. Following a similar methodology as Florio et al. (2013), I introduce a binary variable, which differentiates between satisfied individuals (1 and 2) and the rest (3, 4 and 5). Thus, our dependent variable would be equal to 1 when the individual is Very or Fairly satisfied with the railway system, and 0 otherwise. Dichotomization makes the interpretation easier to compare with other papers, since the marginal effects associated to each independent variable are increments or decrements of the probability of being satisfied.

The different regulation systems are going to be the main independent variables of the model, in order to test the hypotheses previously presented (on vertical separation, market liberalization and privatization). All of them derived from the OECD Sector Regulation (NMR) database for the year 2013. It summarizes regulation details for every OECD country for the years 1998, 2003, 2008 and 2013, while the latter (2013) includes other EU countries such as Latvia Lithuania, Bulgaria and Romania. All of the variables have been constructed excluding the data from freight transportation, and considering only passenger services information, since it is what this paper is analyzing.

First, the work includes an independent variable that reflects the level of vertical separation of railways national systems. It is a binary variable that takes value 1 when the systems presents a *legal separation* between the infrastructure manager and service operator and value 0 when the system holds the minimum separation required in the European Union regulations (*accounting separation*). Thus, the legal separation category contains both organizational and institutional separation, according to the distinction made by the literature –*Levels of marketization: definitions*–, which is the furthest the OECD data reaches. This variable will test hypothesis 1 and will help us to conclude whether a deeper vertical separation is correlated or not with citizens' satisfaction.

Second, the market liberalization is going to be addressed through a set of four variables, each of them referring to a different legal condition of entry to operate passenger services in the railway market, according to the categories specified by the OECD data. The four binary variables are: *Franchised to one firm*; *Franchised to several firms, exclusive rights to a geographic area*; *Franchised several firms that compete*; and *Free entry*. The first type stands for the system in which one single firm operates the every national track. If the system franchises to several firms, the winners of the tender can either hold exclusive rights to operate a rail district (second form), or will have to compete in the same tracks with other operators (third form). Finally, the fourth form stands for a system in which operators have open access to operate services upon paying the required fees. The second system is a form of competition 'for the market' whereas the third and the fourth categories include competition 'in the market' or 'on-track'. The models where extensively presented and discussed in the literature section. Hence, I consider four binary variables, each of them capturing one form of legal entry. Franchised to one firm would be used as reference category. Then the three other variables capture the effect of each of them with respect to franchised to one firm (default option). These variables will test hypothesis number 2.

Third, the last market-oriented reform considered is the privatization of the main passenger operator. Therefore, this binary variable will take value 1 for the countries where the main passenger services operator is private, and value 0 for the countries where the incumbent is public. According to OCDE data, every European government *holds equity stakes in the largest firm operating passenger services in the sector* with the exception of United Kingdom and Estonia. The other public incumbents have 100% of its shares owned by its national governments¹. This variable will test hypothesis number 3 and will help us to conclude whether a privatization policy is correlated with citizen's satisfaction.

Several socioeconomic variables are taken into account in the estimations, in order to control for their possible effects on the dependent variable. The objective is to isolate the individual effects of each person's characteristics from the effects of the railways reforms

¹ Luxembourg is a particular case: 94% of the Luxembourg National Railway Company, CFL (Société Nationale des Chemins de Fer Luxembourgeois) is owned by the Luxembourg State, 4% is owned by the Belgium government and 2% owned by the French state. There is not any private participation.

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(Clifton, et al., 2014, Clifton et al., 2015a). The individual characteristics are obtained from the same Eurobarometer (2012).

One of the control variables included is gender, where value 1 correspond to females and 0 to males. Several studies have found gender as a factor that could influence personal satisfaction with services? (Deng, Lu, and Zhang 2010). Age could also represent a relevant factor on satisfaction. Especially elderly people could suffer from mobility disadvantages that make them a vulnerable group (Fiorio and Florio, 2011). In the model, three binary variables will be used, classifying people into three age groups: between 15 and 34, between 35 and 64, and finally, people older than 65. Another variable included in the model is the difficulty of paying the bills. The binary variable is constructed assigning 1 to the individuals who declared having difficulties for paying the bills sometimes or more often, and 0 otherwise. The effect will show the difference between both groups in terms of satisfaction with railways. It is a proxy of income and affordability, which has been shown as an important factor when measuring consumers' satisfaction (Clifton et al., 2015). The model replicates Clifton et al. (2012) in the occupation aspect since I want to measure the effect on satisfaction correlated with not-working citizens compared to those who are currently working. A binary variable is included that adopts a value of 1 when the person is not working and a value of 0 when the individual is currently working.

Another factor that can affect satisfaction is the type of community where the individual lives. Rural areas tend to be underinvested in terms of infrastructure (Clifton et al., 2015) and railways may be also the case (Whitelegg, 1987). In order to control for this effect, a binary variable is introduced. It takes a value of 1 when the individual lives in a city and 0, otherwise. The level of education is also incorporated, with a set of three variables reflecting basic education, high school education, higher education. The education is significant as a way of measuring socio-economic and cultura status (Alves, Centeno y Novo, 2010). In addition, the model also controls the effect of international migration with the variable foreign. Due to increasing language and other difficulties, it may present negative effects, although as a result of lower expectations, it may be positive (Ying, 1996). Finally, household size is also considered. The estimation includes four binary variables representing the number of people living in the same household: one, two, three and four or more.

In addition, macroeconomic control variables are included, in order to capture the effects of country's characteristics on individual satisfaction. First, the GDP per capita (2012) is used to measure the effects of average country income in satisfaction. Second, the growth of GDP per capita as an average of the three previous years to the survey (2010-2012). It is considered as an indicator of the economic situation at the time the survey was done, which may influence on average satisfaction. Both are obtained from the World Bank database. Third, population density (2011) is included according to Florio et al. (2011), in inhabitants per thousand squared kilometers. On the one hand, it is possible that the overcrowding of the service is correlated with lower satisfaction. On the other hand, it is probable that people living in isolated areas have a lower satisfaction with the rail transportation system of the country. Fourth, the size of rail tracks in thousands of kilometers (2011). The length of tracks could have positive effect due to the benefits of an extensive rail network, or a negative due to the cost of maintaining a large network. Lastly, I also include the public expenditure in transport as a percentage of the GDP as an indicator of public investment (2008-2012). It would not be a surprise if a higher investment on the national transport system would be correlated with a better perception of the service. The three last variables are provided by Eurostat database.

3.3. HYPOTHESIS

This work evaluates rail market-oriented reforms (vertical separation, market liberalization and privatization) from a citizen's perspective. In detail, I test whether the intensity of these market-oriented reforms in a country is correlated with more or less satisfaction with railways among its citizens. In detail, I propose three hypotheses, one for each dimension of reforms:

First, the model will test the effect of vertical disintegration, and I propose three different answers:

- $H_1 - a$: Citizens are more satisfied with the railway system in the countries where there is a deeper vertical separation.
- $H_1 - b$: Citizens' satisfaction with the railway system is not significantly correlated to vertical separation.
- $H_1 - c$: Citizens are less satisfied with the railway system in the countries where there is a deeper vertical separation.

Secondly, I will test the extent of market liberalization of the railways and the citizen's satisfaction with railways.

- $H_2 - a$: Citizens are more satisfied in the countries where the entry regulation is franchised to several operators, each one with exclusive rights to a geographic area.
- $H_2 - b$: Citizens are more satisfied in the countries where the entry regulation is franchised to several operators that compete in the same geographic area.
- $H_2 - c$: Citizens are more satisfied in the countries where the entry is open.
- $H_2 - d$: Citizens are more satisfied with the railway system in the countries where the entry regulation is franchised to one service operator, which means no reforms in this aspect.

Thirdly, the model will show whether the privatization of the public incumbent is correlated with more or less satisfaction with the railway system.

- $H_3 - a$: Citizens are more satisfied with the railway system in the countries where the incumbent has been privatized.
- $H_3 - b$: Citizens' satisfaction with the railway system are not significantly correlated to the private/public ownership of the main incumbent.
- $H_3 - c$: Citizens are more satisfied with the railway system in the countries where the incumbent is public.

3.4. EMPIRICAL APPROACH

The empirical approach of the work formulates a binary outcome probit model (Cameron and Trivedi, 2010). As it was explained in the methodological section, I use a dichotomized variable of satisfaction as a dependent variable. We do not know the exact level of individual satisfaction, S_i^* . We assume that satisfaction is generated by a latent variable model.

$$Y_i^* = x_i' \beta + u_i \quad (1)$$

Where $i = 1, \dots, N$ for a sample of N individuals, $x_i' \beta = \beta_1 x_{i1} + \dots + \beta_k x_{ik}$ contains individual characteristics (i.e. gender, age, education, etc.) to control individual effects,

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country macroeconomic variables (i.e. GDP per capita, GDP growth, population density, etc.) to control any country-specific effects and the regulation variables. Finally u_i is a continuous distributed variable, independent of x_i , that accounts for unobserved heterogeneity.

As Y_i^* is latent, unobservable variable, the formulation of the observable is as follows:

$$Y_i = \begin{cases} 1, & \text{if } Y_i^* < 0 \\ 0, & \text{if } Y_i^* \geq 0 \end{cases} \quad (2)$$

where the zero threshold is a normalization and there is no consequence if x includes an intercept.

Given both expressions, we obtain:

$$Prob(Y_i = 1) = Prob(Y_i^* > 0) = Prob(x_i' \beta + u_i > 0) = Prob(u_i > -x_i' \beta) \quad (3)$$

Assuming u_i presents a symmetrical cumulative distribution function (CDF),

$$Prob(Y_i = 1) = Prob(u_i < x_i' \beta) = F(x_i' \beta) \quad (4)$$

where $F(\cdot)$ is the CDF of $-u_i$ which is standard normally distributed $u_i \sim N(0,1)$ in our probit model. Note that in order to avoid a source of unidentification of the intercept we set $\sigma = 1$.

Hence, our probit model stands for the following formulation:

$$Prob(Y_i = 1) = \Phi(x_i' \beta) = \int_{-\infty}^{x_i' \beta} \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}} dz \quad (5)$$

Table 4.1 provides the average marginal effects of the variables in the probit binary model. They are defined as follows:

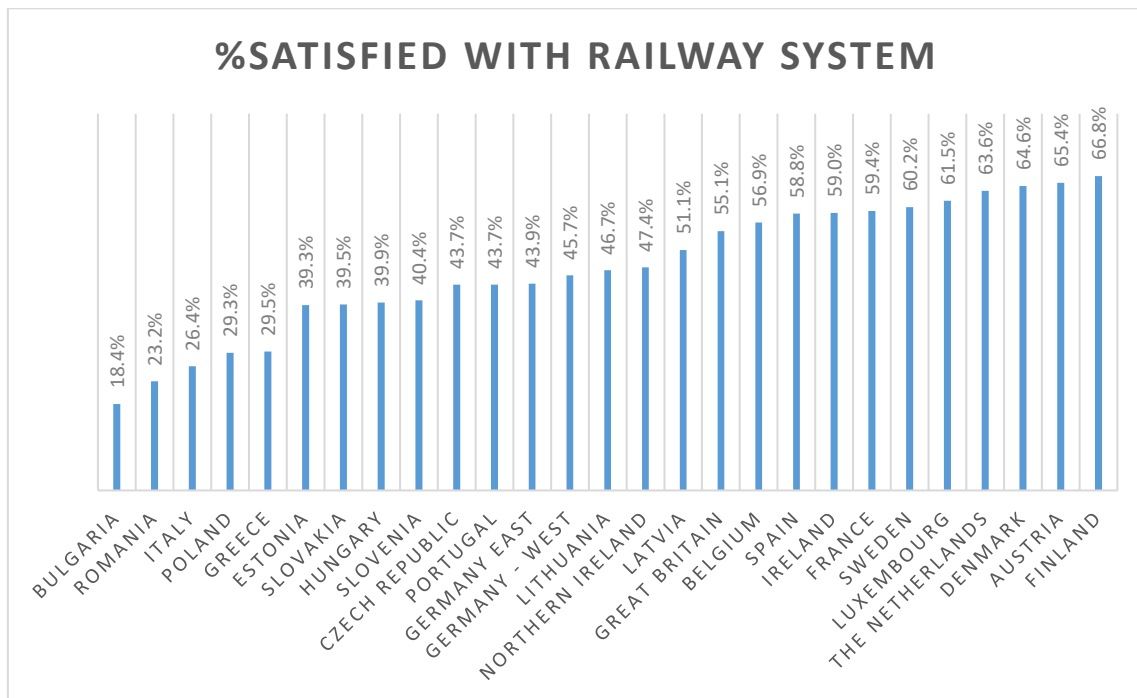
$$\frac{\partial Prob(Y_i = 1)}{\partial x_{ji}} = \phi(x_i' \beta) \beta_j = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(x_i' \beta)^2} \beta_j \quad (6)$$

4. RESULTS

4.1. DESCRIPTIVE ANALYSIS

Chart 4.1 shows the percentage of people satisfied with the services in the different European countries. The differences among the countries are remarkable. In Finland or Austria, 66 out of 100 people are satisfied with the national railways system. In contrast, in Bulgaria only 18.4% declared being satisfied with their railways. At a first glance, we can see how people living in the wealthiest countries tend to be more satisfied with their rail transport. In average, across Europe 46% of citizens declared they were satisfied with their national and regional railway systems.

Chart 4.1. Satisfied with railway system, by country



Source: Compilation based on OECD Sector Regulation (NMR), 2013.

The European railway systems also differ on the entry legislation (See Table 4.1). As explained before, it is an indicator of the extent of market liberalization. The four types of entry legislation (following the explanation in the literature section) are relatively equally distributed among countries. There are no clear apparent patterns among the countries according to macroeconomic variables such as GDP or size of the country. Richer countries such as Germany or Denmark are more liberalized while France or Belgium still hold the single firm model. On the other side, poorer countries in terms of GDP such as Romania or Latvia are more liberalized and Bulgaria and Slovenia are less. In the middle of the two extreme models we identify a model represented by Hungary, Netherlands, and Portugal where several franchised hold exclusive rights to certain areas. The last model is represented by the countries that opened their railways to competition 'in the market' but still require a franchise to operate in most of their tracks.

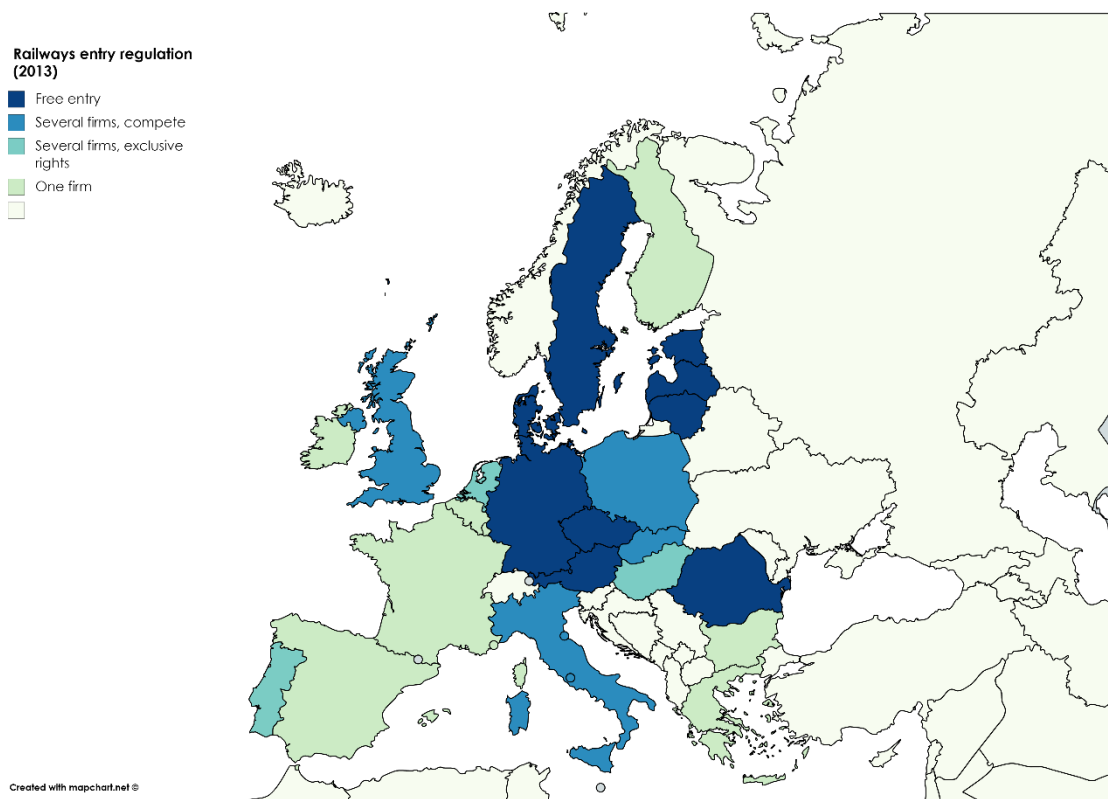
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Chart 4.2. Legal entry/Liberalization by country

COUNTRY	Legal entry/Liberalization
Austria	Free entry
Belgium	Franchised one firm
Bulgaria	Franchised one firm
Czech Republic	Free entry
Denmark	Free entry
Estonia	Free entry
Finland	Franchised one firm
France	Franchised one firm
Germany	Free entry
Greece	Franchised one firm
Hungary	Franchised to several firms, exclusive rights to a geographic area
Ireland	Franchised one firm
Italy	Franchised several firms that compete
Latvia	Free entry
Lithuania	Free entry
Luxembourg	Franchised one firm
Netherlands	Franchised to several firms, exclusive rights to a geographic area
Poland	Franchised several firms that compete
Portugal	Franchised to several firms, exclusive rights to a geographic area
Romania	Free entry
Slovak Republic	Franchised several firms that compete
Slovenia	Franchised one firm
Spain	Franchised one firm
Sweden	Free entry
United Kingdom	Franchised several firms that compete

Source: Compilation based on OECD Sector Regulation (NMR), 2013

Chart 4.3. Railways entry regulation, by country



Source: Compilation based on OECD Sector Regulation (NMR), 2013.

Regarding vertical separation and privatization, the distribution is more unequal. Most European countries had decided to go further on the vertical separation between the infrastructure manager and the service operator. Only four countries remain with an accounting separation model, which is the least degree of separation the European Union requires: Austria, Belgium, Netherlands and Romania. In the United Kingdom, the separation is not only legal but it is also in terms of infrastructure manager's ownership.

In addition, the main operator in the large majority of countries are under public control. As explained in the a)ii) section of the literature *-Reforms in Europe-* here, in 2013, there were only two exceptions, United Kingdom and Estonia.

Chart 4.4. Vertical Separation and Ownership of the main operator, by country

COUNTRY	Vertical Separation	Main operator
Austria	accounting	Public
Belgium	legal sep	Public
Bulgaria	legal sep	Public
Czech Republic	legal sep	Public
Denmark	legal sep	Public
Estonia	legal sep	Private
Finland	legal sep	Public
France	legal sep	Public
Germany	legal sep	Public
Greece	legal sep	Public
Hungary	legal sep	Public
Ireland	accounting	Public
Italy	legal sep	Public
Latvia	legal sep	Public
Lithuania	accounting	Public
Luxembourg	accounting	Public
Netherlands	legal sep	Public
Poland	legal sep	Public
Portugal	legal sep	Public
Romania	legal sep	Public
Slovak Republic	legal sep	Public
Slovenia	legal sep	Public
Spain	legal sep	Public
Sweden	legal sep	Public
United Kingdom	legal sep / ownership	Private

Source: Compilation based on OECD Sector Regulation (NMR), 2013.

4.2. ECONOMETRIC ANALYSIS

Our main aim is to test the effects of the set of variables that capture the three dimensions of regulation: vertical separation, market liberalization, which includes three binary variables (franchisers with exclusive rights, franchisers that compete and free entry), and privatization (private).

The table is divided in three columns. Each of them represents one of the three models. The first model shows the effects of the key variables without controlling for any individual or country effect. The second model includes control variables at individual level and the third model includes control variables at country level as well.

In the first model, the vertical separation variable is negative and significant. The effect remains the same when I include individual and country control variables (model 2 and model 3). The result in model 3 shows that the probability of being satisfied is 5.3% less in a legal separated system compared to accounting separated system.

Regarding the liberalization of the market, the three policy variables present a negative correlation with satisfaction in models 1 and 2, in comparison to the reference category, one firm. In the model 3, after controlling for macro variables, there is one regulation with a positive correlation compared to a single firm market: franchising several firms that hold exclusive rights to operate services in an area or rail district. It is significant at a statistical level of 95%. Citizens in countries with this type of market structure present a 2.8% higher probability of being satisfied with their railway system. In contrast, both a system with several franchisers that compete and a free entry regulation model are correlated with a lower probability of satisfying the citizens. Both present a high negative correlation: 20.1% and 13.5%, respectively.

Finally, the model shows a non-significant result for the ownership of the main operator variable. That is, there is not empirical evidence that privatization is associated with higher satisfaction with railways in the countries where it was applied, although the opposite result is neither demonstrated. One possible explanation might be the small number of privatization observation since only two out of twenty-five countries present a private main operator.

Among the control variables, the model shows that people younger than 34 have a higher probability of being satisfied compared to people older than 65. At the same time, citizens who declared having difficulties to pay the bills sometimes or more often were 4.5% less probable to be satisfied with the railways, which is coherent with the results on affordability shown in other papers (Clifton et al., 2015). Also, citizen's living in urban communities have a 4.4% higher probability of being satisfied compared to people living in other areas. A foreign citizen is an 8.3% more likely to be satisfied with the railway system than a native citizen. It could be explained through the difference in expectations between both groups. Finally, education is found to be significant. People with secondary education have a 3.7% higher probability of being satisfied with their railways system compared to people with primary education. It raises to a difference of 7% in the case of people with tertiary education. The variables shown as not significant are gender and household size.

On the macroeconomic side, all the variables are significant with the exception of the length of the rail network. GDP per capita is clearly significant as well as the growth of the GDP per capita. Both show a positive correlation to satisfaction with railways. It is coherent that richer countries have more resources to run a better railway network. Furthermore, the economic context could also explain the positive correlation. Third, the population density turns out to be correlated negatively with the probability of satisfaction. The higher valuation of railways in countries with a very much dispersed population such as Ireland or the Nordic countries, can be an explanation of this result. Fourth, the extension of the rail network has no significant effect. Lastly, as predicted, the government expenditure on transport is correlated with higher probability of satisfaction: specifically, satisfaction is 3.3% higher if expenditure on transport is increased by 1% of GDP, which is not a big effect.

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Table 4.1: Marginal effects of satisfaction with railways

VARIABLES	Model 1 No control variables	Model 2 Micro control variables	Model 3 Micro and Macro control variables
Vertical separation	-0.127*** (0.000)	-0.138*** (0.000)	-0.053*** (0.000)
Legal- Several, exclusive	-0.025** (0.041)	-0.024* (0.056)	0.028** (0.024)
Legal- Several, compete	-0.263*** (0.000)	-0.251*** (0.000)	-0.201*** (0.000)
Legal- Free Entry	-0.103*** (0.000)	-0.112*** (0.000)	-0.135*** (0.000)
Privatization	0.005 (0.769)	-0.008 (0.637)	-0.009 (0.599)
Female		0.003 (0.744)	0.002 (0.827)
Age young34		0.071*** (0.000)	0.076*** (0.000)
Age 34adult65		0.012 (0.390)	0.015 (0.286)
Diffpaying bills sometimes		-0.073*** (0.000)	-0.045*** (0.000)
City		0.028*** (0.008)	0.042*** (0.000)
Not working		0.038*** (0.000)	0.042*** (0.000)
Secondary education		0.041*** (0.001)	0.034*** (0.007)
Tertiary education		0.089*** (0.000)	0.070*** (0.000)
Foreign		0.109*** (0.001)	0.083** (0.012)
Household 1		0.002 (0.876)	-0.006 (0.694)
Household 2		-0.021 (0.107)	-0.020 (0.113)
Household 3		-0.021 (0.132)	-0.015 (0.295)
GDP per capita			0.009*** (0.000)
GDP growth			0.009*** (0.000)
Population density			-0.248*** (0.000)
Km lines			0.001 (0.266)
Govexp in transport			0.033*** (0.000)
P-seudo R-squared	0.0330	0.045	0.0581
Observations	25,591	25,591	25,591

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Omitted variables are: accounting separation, one single firm, public, male, age above 65 years, difficulties on paying the bills less than sometimes, other than city, household of four or more, working, primary education and native.

5. CONCLUSIONS

This work has presented a new empirical analysis of consumers' satisfaction for rail services in the European Union member states. I focus the econometric analysis on the impact on citizens' satisfaction of regulatory variables such as vertical separation, different forms of liberalization of the market structure as well as privatization. I use self-declared individual attitudes included in the Eurobarometer survey (2012) to answer a simple research question: Are citizens more satisfied with their railway system in the countries where market-oriented reforms have been implemented more intensively?

The ongoing Fourth Railway Package, is the last step in a series of market-oriented reforms driven by the European Union since 1991. Over time, the vertical integrated public monopoly has given way to more vertical separated incumbents and liberalized markets. The European Commission (2008) affirms that existing liberalization of public entities has helped to promote rail transport efficiency and to reduce cost inefficiencies, by introducing competitive pressure. Furthermore, competition in the market was meant to solve the lack of customer orientation that public monopolies presented. Some of the papers presented throughout this work support the vertical separation (Friebel et al., 2005; Asmild et al., 2009; Evans, 2013; Cantos et al., 2013; Pham, 2013) as well as the liberalization and introduction of competition in the market (Cantos, 2013; Bergantino et al., 2015; Nash 2016; Tomes, 2016; Finger et al., 2016). However, other studies have raised their concerns about these reforms (Preston et al., 1999; Driessen, 2006; Wetzel, 2008; Cantos et al., 2012; Laabsch and Sanner, 2012; Finger et al., 2016; Casullo, 2016). The literature presented above focuses on capturing the effects of reforms on efficiency of the railways. While I find this methodology still fundamental to explain the success or failure of a rail policy, this work applies a different complementary approach.

The objective of this paper has been to analyze the relationship between citizens' satisfaction and railway systems across European countries. Taking cross sectional data, I have tested whether the different market-oriented reforms are correlated with more or less citizens' satisfaction. The citizen perspective has been applied before to several sectors and utilities (Fiorio and Florio 2007, 2011; Ceriani et al., 2011; Clifton et al., 2012, 2016), however, to the best of our knowledge, this work is pioneer in applying the citizen perspective to railways. We formulate three hypotheses to be answered, one for each of the dimension of market-oriented reforms under analysis (vertical separation, market liberalization and privatization). As regards the first hypothesis, our findings suggest that citizens are less satisfied with a higher degree of vertical separation between the infrastructure manager and the service operator. Regarding the second hypothesis, I find evidence against competition 'in the market' (systems where more than one provider operate the same tracks). On the contrary, competition 'for the market' (competitive tendering for exclusive rights) could have a positive impact in satisfaction, although the evidence here is statistically weak. Finally, as regards the third hypothesis, the ownership of the main operator is found to be non-significant on the level of satisfaction with railways in the country.

Regarding the first hypothesis of vertical separation, our models tries to measure the difference in citizens' satisfaction between accounting separated railways and legal separated railways. The results suggest that further vertical separation may have a negative correlation with satisfaction. Using a different approach, this conclusion is coherent with Laabsch and Sanner (2012) showing that a more integrated model would enable to better exploit economies of scale. In addition, it would help to prevent losses in efficiency due to coordination problems as well as deficient schedule designing.

The second hypothesis concerns market liberalization. In the paper, we have considered the liberalization of the market structure in two forms: introducing competition ‘for the market’ and competition ‘in the market. On the one hand, our model tests whether competition ‘for the market’ is correlated with higher levels of citizens’ satisfaction. After controlling for individual and country variables, a model where competitive tendering with the award of exclusive rights to operate the tracks is positively correlated with satisfaction. However, the effect is statistically weak. Our findings suggest that competitive tendering for exclusive rights to operate could improve the quality of the service operations, lowering fares and increasing incentives to innovate, as well as to continuously adapt to the demand (Lalive and Schmutzler, 2007; Cantos et al., 2010). On the other hand, I also test whether competition ‘in the market’ is correlated with higher levels of citizens’ satisfaction. Our answer to the question is certainly negative. Both, the model where ‘on-track’ competition between franchisees is predominant as well as the systems where most of the tracks are open access show negative and significant correlation with satisfaction. This result is consistent with some of the concerns raised by several papers included in the literature section (Casullo, 2016, Finger et al., 2016, Nash, 2016). Although on-track competition has achieved a reduction on fares on a number of competitive routes, it has also shown numerous disadvantages. While consumers of rail services on competitive routes may have been benefited since operators tend to concentrate on those lines, other users that cannot benefit from competition could have suffered from a shift in costs towards them. At the same time, there may be drawbacks in terms of less efficient timetables as well as the use of scarce track capacity, which lead to congestion and coordination problems. Our results suggest that regarding competition ‘in the market’, the disadvantages outweigh the advantages.

Although the European Commission has not pronounced itself on the privatization of railways, I have included this variant in the model as the third hypothesis, since some governments and political agents have backed this proposition. In the model, the variable is not statistically significant. It is probably due to the limited observations presented since only United Kingdom and Estonia had their main operators privatized at the time the Eurobarometer survey was conducted. Note that while the ownership of the British railways is still under public debate with a wide support for nationalization², the Estonian government re-nationalized its railways in 2007 and has operated all domestic passenger services under public monopoly since January 1st, 2014. In this context, several scholars have described both experiences as examples of the negative consequences of privatization in terms of employment and work conditions, services quality, safety, affordability or public budget (Bowman et al. 2013; Bowman, 2014; Lust, 2016).

Based on this work’s evidence, reforms seems not to be working properly in EU countries, at least not as expected: the countries that have been more ambitious in the reforms show no higher satisfaction, but lower. In particular, going far in vertical disintegration, and different options in market liberalization, are associated to lower satisfaction in countries that promoted these reforms. Therefore, these findings can be added, with due caution, to the case for franchised monopoly of provision to one more integrated rail transport authority.

The results of the work become increasingly relevant since they are a piece of evaluation for ongoing actual public policy. As we have previously described, the goal of the 4th Railway Package is to grant access to domestic passenger services in all Member States by December 2019. Furthermore, competitive tendering will be the procedure for public service rail contracts and direct awards will be limited and discouraged. In addition, it will require further vertical separation –legal, financial and operational- between the infrastructure manager and the passenger operator. In this context, the European Union

² “Nationalisation vs privatisation: the public view”. YouGov. May 19, 2017
<https://yougov.co.uk/news/2017/05/19/nationalisation-vs-privatisation-public-view/>

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may consider evidence here and in other papers to rethink the convenience of these reforms. Our further suggestion is that EU institutions should focus on consumer protection and on cross-border market integration. The work done in developing international rail networks is a good example. The EU should probably play its own regulatory role and give more freedom to member states in the way they solve the issues of ownership, vertical integration, and market design. At a national level, it may be of interest to have a greater regulatory intervention in order to combine the benefits of competition 'for the market' with the benefits of the monopolistic provision of services.

This current work also presents a number of limitations, which may justify further studies in order to confirm the results. First, although it is indispensable to establish some sort of classification in order to study policy in detail and the OCDE is a very useful source of it, it is necessary to recall that national systems are complex and introducing each of them in fixed categories is not a straightforward task. In addition, the model applied only considers a single moment as a static image (cross-section data). Although individual characteristics as well as several country macroeconomic variables are included in order to control the regulation effects, we could not measure how satisfaction has varied after each policy was introduced. Unfortunately, there is not any similar data comparable over a period of time at the moment this work was presented. A difference-in-difference model will be useful to study these issues if a similar Eurobarometer on railways is to be published in the future. Finally, while OECD Sector Regulation (NMR) is very useful in terms of standardized, comparable set of reform indicators, it lacks in providing further desegregation of vertical separation models. It will be interesting to study if different forms of legal disintegration such as organizational or institutional disintegration, lead to diverse results on citizens' satisfaction.

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