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Assessing the Impact of the Latest Deregulatory Developments in the EU28 Transport Industry Production: a Critical Review Based on Empirical Data

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Abstract

The European Transport Industry has been heavily deregulated during the past 30 years, through initiatives that increase competition among incumbents primarily by reducing the entry restrictions and by opening the market(s) for non-state owned companies. This paper discusses the impact the latest interventions by the European Commission in terms of further opening the transport industry have had. By analyzing current data, the impact of economic deregulation on the volume of transport industry production is studied. The empirical evidence confirm the positive impact on the system wide level suggesting the further use of deregulatory tools in order to support the industry growth. Additionally, recommendations for further research are made in order to understand more in depth the indirect effects of deregulation.

Keywords: deregulation, transport, impact, EU, economy.
JEL Classification: L51, L91, R40.

1. Introduction

The European Union has followed a pro-competition, pro-market approach and has adopted many deregulation initiatives during the past 30 years. The main supportive arguments included improving quality and reducing freight rates on the services offered but also at the same time protecting the public interest, improving transport services as well as achieving better compliance with the rules of fair competition. The role of governmental decisions is very important in setting the legal framework since a transport system is a multidisciplinary one and consists of different modes of transport, different service providers, different operational roles and different technological systems that make this analysis extremely complicated.

This paper focuses exactly on this, understanding the effect deregulation had on the system level. Using empirical evidence, this paper confirms the causality between deregulation and the production level of the transport industry. It is commonplace to suggest that the main objective of deregulation is to increase the transport industry's

product. Using publicly available data, this causality is tested using linear regression models and leading to important observations.

This paper is organized as follows. The next section reviews the latest deregulatory developments in the EU transport industry. Section 3 reviews key macroeconomic data pertinent to the European transport industry. Section 4 develops the hypothesis and the model and tests this hypothesis. In the last section, some key conclusions from this analysis are drawn as well as some recommendations on future research are made.

2. State of Play Sectorial Regulations of Freight Transport in Europe

2.1 Overview

The EU transport sector deregulation started in 1985, however, up until the mid-1990s not much was achieved, thus the European Commission increased the deregulation intensity after 1996. Still today, there is a need to further upgrade the European transport industry by removing obstacles of administrative or regulatory nature. Since the 2001 White Paper on Transport, the EU transport market was further deregulated across all sectors, including aviation, road transport and rail transport. However, a further and full market opening in the EU requires a uniform approach on many different aspects including safety, security, environmental, economic and social legislation. This further market opening approach has been followed as part of a 40 measure initiative described in the 2011 Transport White Paper. More precisely, the European Commission through the 2011 White Paper "Roadmap to a Single European Transport Area" (European Commission, 2011b) supports the modal shift towards environmentally friendlier modes, is concerned about providing a level playing field across all transport modes and intends to improve all services in terms of efficiency and attractiveness. To this extent, it is obvious across all EU Policy Documents that the EC is against the development of monopolistic environments and the main policy objective is to induce competition, even in the cases of natural monopolies.

Since then, a lot of transformation has taken place in the various sectors and the deregulation allegedly led to more competitive market landscapes. The next sections describe the state-of-play in the transport industry in Europe. It has to be noted that this section is not an exhaustive review of all the regulations pertinent to the European Transport industry, rather, it covers the most important efforts at the EU level to deregulate and/or re-regulate the Transport Industry, thus describes the main political documents and policy efforts issued at the EU level and adopted by the European Parliament.

2.2 Railways

The reform process in the EU rail industry started in the early 1990s. Similarly to the European airline industry, the railway sector was dominated by state owned companies which were responsible for both the infrastructure and the service provision (passenger and freight transport services) as well as the provision of ancillary services. Third-party access to the network was either legally restricted or practically impossible. The State heavily relied and used the rail services to induce growth in the economy, thus the railways in Europe were significantly influenced by the government.

The Railways sector was one of those the EC introduced the Single Market principles, in order to increase competition and lift entry barriers. The EC introduced the first legislative initiative in 1991 (Council of the European Communities, 1991). The Directive 91/440 set the legal framework and allowed open access to all interested parties. However, up until the early 2000s no substantial changes to the rail sector were introduced competition wise, thus the EC introduced the First Railway Package[1] in 2001, the first tangible initiative to significantly open the market EU wide and to improve interoperability. This initiative was followed by three additional Railway Packages; the Second Railway Package of 2004[2] further opening the market and establishing Railway Authorities across EU MS, the Third Railway Package of 2007[3] which intended to further improve the market conditions and open up the international rail passenger market to competition and most currently, the Fourth Railway Package [4] which includes interoperability, certification and other standards for rolling stock, workforce skills, vertical disintegration, independence and liberalization of domestic passenger services. In addition to that, the European Commission has already made provisions to establish the Single European Rail Area through the Directive 2012/34 (European Commission, 2012a).

Many European railway companies are still state owned, nevertheless, many initiatives for restructuring, unbundling and vertical and horizontal disintegration of the incumbents have been adopted. Depending on the specific business and political context, new entrants undertake various activities from non-core (maintenance, rolling stock, etc) to core activities (including infrastructure managers, provision of essential services, capacity-allocating services and of course provision of rail based services for passengers and freight). Nevertheless, there are still significant discrepancies among the EU MS, since every state and every company have had a different starting point and on top of that the specific business conditions require different strategies and different policies to be implemented. The domestic passenger market is still regulated in many states (in most of the cases due to the Universal Service Obligation or under the Public Good theory), however this will change when the 4th Railway Package is fully implemented. The ultimate objective is to create a uniform, interoperable Single European Railway Area, restricting technical and operational differences between the EU MS and opening the market to EU competition.

2.3 Road freight

Road freight transport was heavily regulated in EU, specifically through enforcing entry barriers and price regulations, although the number of the incumbents, the low individual market share and the limited scope for economies of density, scope and scale made this industry competitive enough. With the exception of the road network which was state owned, the service provision was mainly done by private sector

[1] The first Railway Package consists of three Directives, namely (European Commission, 2001b), (European Commission, 2001c) and (European Commission, 2001d)

[2] The Second Railway Package consists of Directive 2004/49/EC (European Commission, 2004d), Directive 2004/50/EC (European Commission, 2004c), Directive 2004/51/EC (European Commission, 2004e) and Regulation 881/2004 (European Commission, 2004f)

[3] The Third Railway Package consists of Directive 2007/58/EC (European Commission, 2007a), Directive 2007/59/EC (European Commission, 2007b), Regulation 1371 (European Commission, 2007c) and Regulation 1370 (European Commission, 2007d)

[4] The Fourth Railway package is still at a discussion phase (European Commission, 2013b), adopted by the European Commission but not yet approved by the European Parliament.

companies. Domestic operations were regulated on a national level and international operations were mainly governed through bilateral agreements between national governments with annual duration. One of the main arguments in favor of the regulation was that the road freight transport was directly competitive to the rail industry, thus through these restrictions, the rail sector was protected.

The sector has been significantly deregulated through introduction of uniform, on the EU level, rules for access to the profession and access rights to the markets. Additionally, bilateral international (extra-EU) transport agreements still exist in this industry. The cabotage restrictions on the EU level are still enforced but are expected to be further liberalized and currently the only restriction is the transit through Austria (through specific areas, i.e. Alps, etc). The entry to the profession is currently based on qualitative criteria ((European Commission, 1996b), (European Commission, 2009c)) and all quantitative restrictions have been abolished. As said above, cabotage (domestic transport) is not fully liberalized yet, since some EU MS have abolished it altogether, whereas other MS still enforce cabotage operations (3 operations or 7 day duration whichever comes first (European Commission, 2009a)). Although the EC has advocated for further liberalization from 01/01/2014 onwards, national governments still have in place certain national regulations[5] that prohibit cabotage operations. Latest EC efforts include improving fair competition in terms of fiscal rules, vehicle taxation and road infrastructure charges as well as improving social aspects of the profession, including working time and driver attestation. Significant effort is also put on the technical side (vehicles uniform weight and dimensions, interoperability issues, rest areas, security and safety). The national enforcement practices though are still largely different per MS.

2.4 Inland waterways

Similarly, the pre-1980s market structure in the inland waterways was heavily regulated by each national government (perhaps with the exception of the River Rhine navigable route). Most of the regulations concerned market entry, especially for foreign ownership companies, cabotage operations, capacity restrictions, shipment allocations (essentially revenue allocation), tariff restrictions and safety restrictions. Although the infrastructure market was essentially a natural monopoly with significant economies of scale, the operational side of the sector had significantly lower economies of scale and/or scope and the private sector was dominant with a large number of shipping companies being involved in this market.

Currently, the inland waterways sector is liberalized across Europe since 1996 (European Commission, 1996a), (European Commission, 1996b), although certain deregulation delays were observed in various EU MS. The deregulation included shifting many restrictions like the rota system and the tariff setting scheme among others, however, certain problems still remain like administrative and/or regulatory barriers. These are all linked to restrictions at the EU level for harmonization, from

[5] EU MS are allowed (European Commission, 1990) to enforce temporary quantitative restrictions on road freight transport in the following cases: (a) crisis, (b) when there is over-capacity in supply and only for a long period and it is unequivocal, (c) significant number of carriers suffer from financial imbalances and their commercial survival is unsure or (d) it is evident that in the short or medium term no market improvement can be expected. However, no one has adopted any measure based on these provisions.

the operational side like ship certification and mutual recognition of boat masters' certificates to technical issues like common safety and security regulations.

2.5 Short sea shipping

Short sea shipping was heavily regulated until mid-1980s, including permits, complex administrative procedures, exclusivity on certain routes, routes restricted by cabotage and preferential slot allocation from ports. Short sea shipping was liberalized in 1992 (European Commission, 1992a), although this was put into effect on 01/01/1999 with some exceptions like passenger services to/from mainland as well as the case of the Greek Islands market that opened in 2004. With the Motorways of the Sea initiative and through the Trans-European Transport Network (TEN-T) the EC is deregulating the market by introducing incentives so as to provide a level playing field across the different sectors of the transport industry. This is primarily done because the modal competition is very intense and the SSS sector is not completely deregulated, thus facing many market failures, for example the restrictive port system as well as administrative red tape, terminal operator monopolies on cargo handling, to name but a few. In this context, Koliousis et. al. (Koliousis, Koliousis & Papadimitriou, 2013) recognized that the cross sectoral competition dynamics, and more precisely the road transport sector deregulation, affected negatively the output of the SSS sector.

2.6 lntermodal transport

Since the early 1990s the EC adopted a set of policy measures, in order to increase competitiveness of the logistics and the transport sector as a whole. This initiative has been the most difficult to implement, since the intermodal transport being a intersection of different modes of transport, makes it cumbersome to provide a level playing field for all modes at the same time. One of the recent attempts from the EC (European Commission, 2014c) focuses on further deregulating ports and terminal facilities, with the primary deregulatory focus being on the ownership, especially of the ports / port systems and on the provision of port related services (pilotage, cargo handling, warehousing, etc), although the EC acknowledges possible implementation delays, primarily due to social factors.

3. Overview of the European Transport & Economy

3.1 Key Macroeconomic Data on European Transport & Economy

The following section presents an overview of the key macroeconomic data of the European Transport Industry, setting the scene for the analysis that follows and additionally, depicting the effect of the regulatory changes.

First of all, it has to be noted that the EU, as is the case with other industrialized nations, is recovering from the 2008 deep recession, and as such, is still trying to find its pace. This recovery is further delayed due to the continued fiscal crisis in certain EU countries (Italy, Spain, Portugal, Ireland and Greece) as well as due to the introduction of new Member States. Thus, it can be understood (Figure 1) that although in 2010-2011, European GDP grew marginally, in 2012 it decreased by 0,4% and in 2013 it remained almost the same. The industrial production in EU is declining during the 2010-2013 period, indicating a further de-industrialization of the EU-28 market.

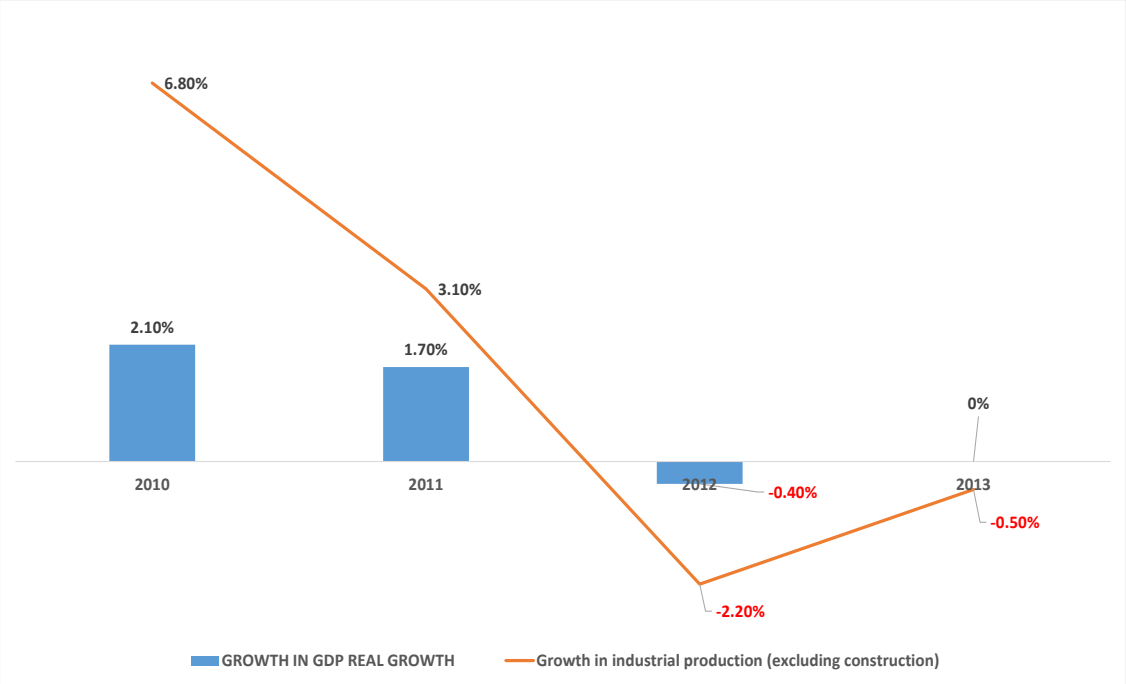
Regarding the EU Transport Industry, a complex and dense transport network supports a trade of more than €4.4 Trillion (in value of goods, 2013) imports and more than €4.5 Trillion (in value of goods, 2013) exports (European Union, 2015). Furthermore, it is interesting to look into the growth pattern of the transport sector for the EU-28 MS since 1995 (Figure 2). Up until 2007, the year before the fiscal and economic crisis occurred, the transport industry was growing close to the GDP rate with regards to the goods transported and at a slower pace for passenger transport. However post-crisis growth rate was significantly reduced (Table 1) to almost half the GDP growth rate.

Table 1 - Annual Growth Rates EU-28

	1995–2013 p.a.	2000–2013 p.a.	2012–2013
GDP (2000 prices and exchange rates)	1.6 %	1.2 %	0.0 %
Passenger transport (pkm)	1.0 %	0.6 %	1.1 %
Freight transport (tkm)	1.1 %	0.5 %	0.1 %

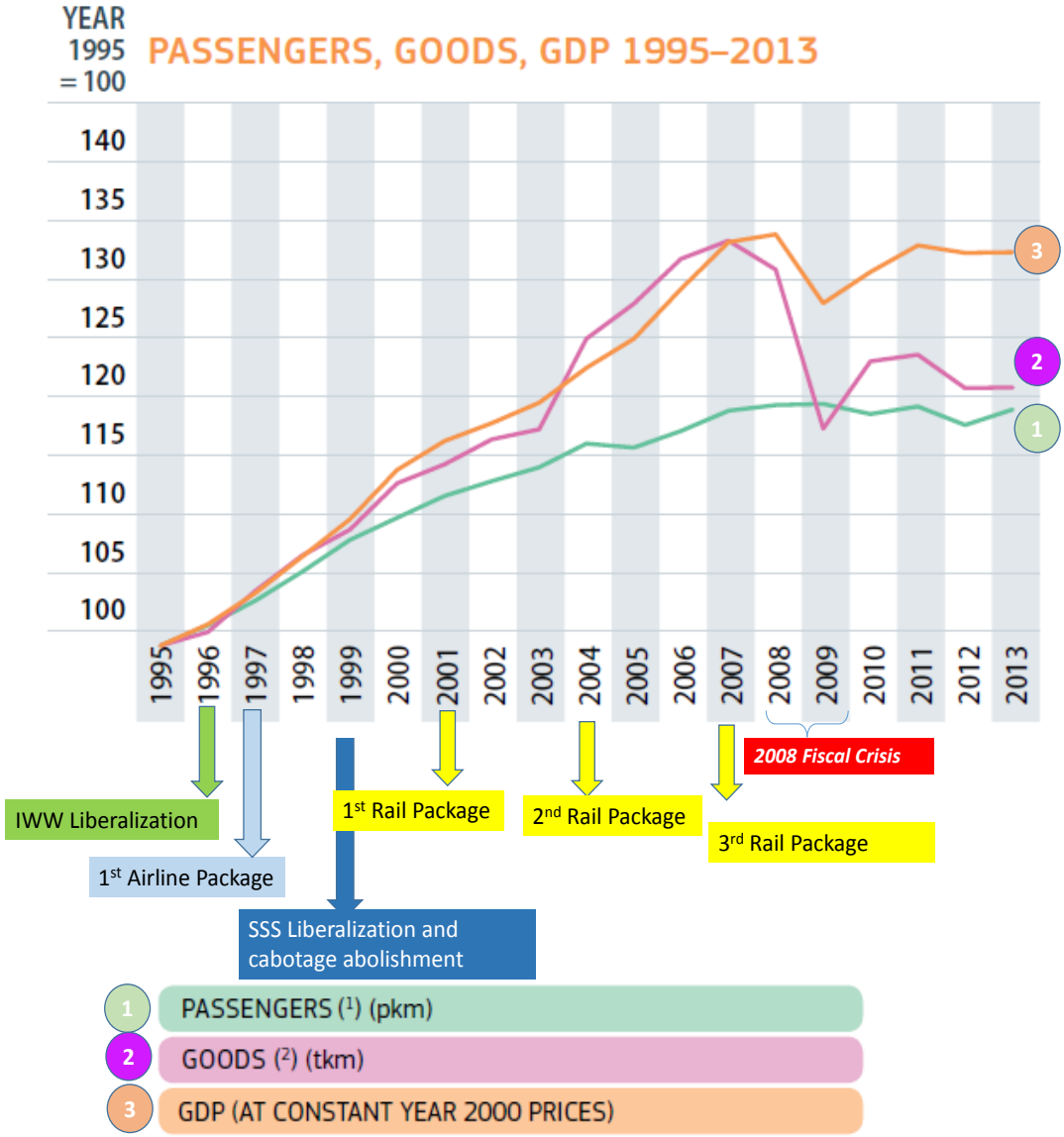
Source: (European Union, 2015)

Figure 1 - Growth in GDP and industrial production



Source: adapted from (European Union, 2015), author calculations

Figure 2 - Transport Growth EU-28



Source: (European Union, 2015) Notes: (1) Passenger cars, powered two-wheelers, buses & coaches, tram & metro, railways, intra-EU air, intra-EU sea. (2) Road, rail, inland waterways, oil pipelines, intra-EU air, intra-EU sea. GDP: at constant year 2005 prices and exchange rates. Additional calculations, graphics and commentary by author.

Concluding the macroscopic overview of the EU transport industry, it has to be noted that at the EU-28 level, the industry employs more than 10.5 Million persons (across all modes, across all EU MS), with the majority of them being employed in the road sector and in the warehousing. Additionally, in terms of enterprises, the total number in the industry is more than 1.1 Million undertakings, with the vast majority of them operating in the road transport sector. Last but not least, the turnover of the industry in 2012 was over €1.3 Trillion, with the majority of the turnover coming from the road sector (€ 312 Billion) and from the warehousing sector (€478 Billion), indicating the strong position of the industry on the European economy.

3.2 Freight Transport

The performance of the European Transport industry in terms of tonne-kilometer production has an expected course during the period 1995 – 2013. More precisely, based on the relevant statistics (European Union, 2015) some interesting observations are drawn:

- Up until 2007, the road transport sector was expanding, mainly due to the deregulation of the market and the reduction of the entry and operational restrictions. A CAGR of 1.61% for the period ’95-’13, similar to the GDP growth for the period is indicative of the growth the sector was experiencing. In addition, the gradual levy of the cabotage, especially in large economies like Germany, also contributed to this growth.
- The sea sector (intra EU) experienced a 0.88% growth, close to the GDP growth, although up to 2006 the sector was growing faster compared to the period 2007-2013. In 2008, the sector experienced a significant drop, as a result of the economic crisis.
- The rail sector had a limited growth, with a CAGR for the period 1995-2013 of 0.27%. The first railway package of 2001 changed positively the weak growth of the sector, however the 2008 crisis affected negatively the growth.
- With regards to the inland waterways, the growth rate for the period was 1.27% (CAGR) similar to the GDP growth rate (CAGR). It can be inferred that the deregulatory efforts helped boost the weak growth of the sector, although significant administrative burdens in the first deregulatory period might have limited this growth.
- The rest of the sectors (air, pipeline) had zero or negative growth rates during the reviewed period.
- Up until 2007, the growth rates (CAGR) across the transport sectors were higher (in some cases even triple the 1995-2013 rate), however, the economic crisis has directly affected those and reduced them significantly.

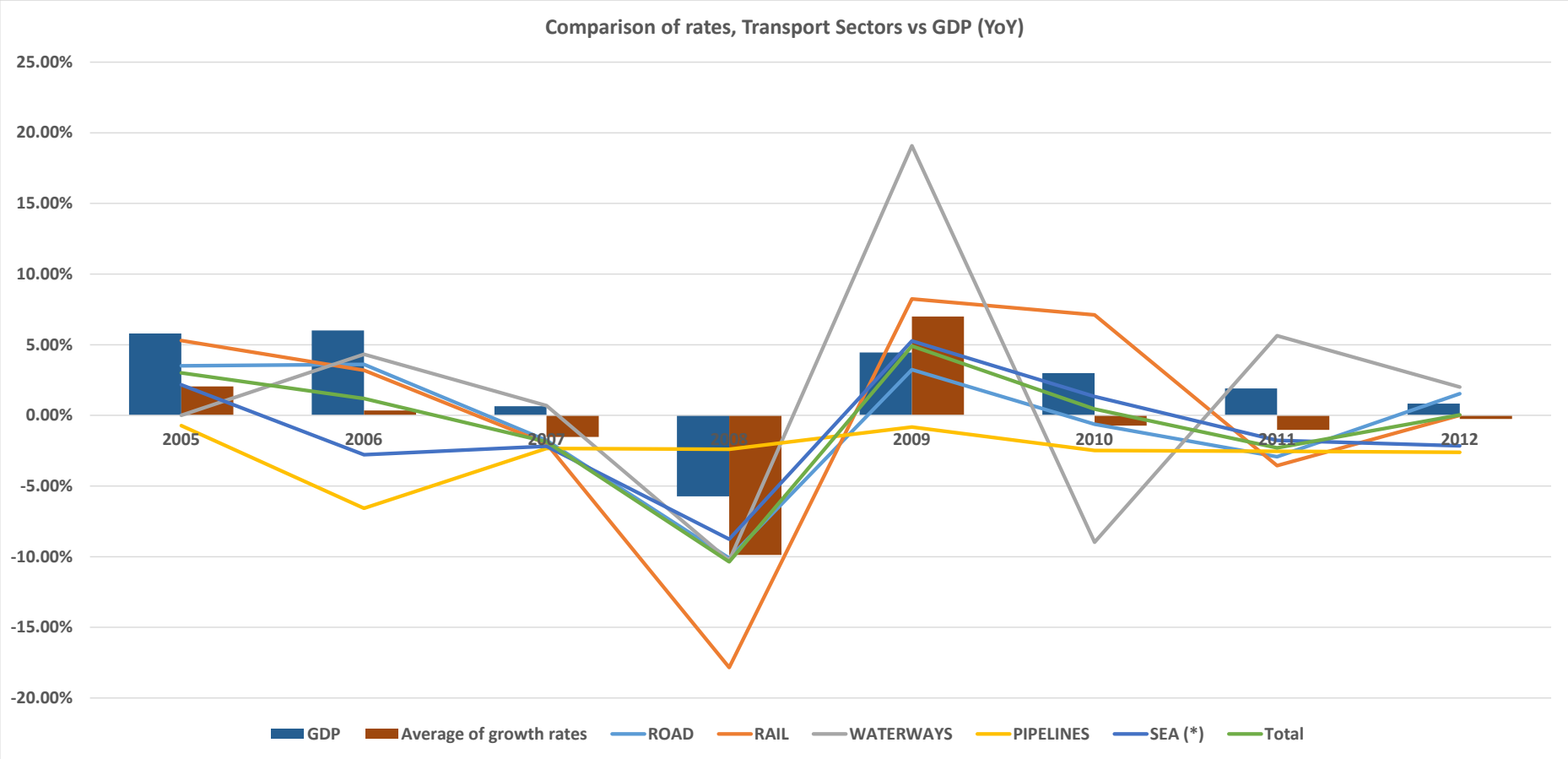
As a conclusion, it can be inferred that, with the exception of the road sector, the rest of transport sectors, did not experience as much growth as compared to the road sector, in spite of the deregulation efforts from EU, since their growth was in most of the cases at best close to the GDP growth. This can also be observed in the modal split between the different modes / across all sectors. Based on EU’s latest figures (European Union, 2015), the road sector improved its standing whereas the rest of the sectors remained about the same. For example the road sector started with a 45.1% share to reach 49.4% in 2013, the waterways started with 4.3% share and remained almost the same in 2013 at 4.4% and the sea sector started at 32.7% to decrease to 31.3%. Similarly, as Figure 3 shows, the YoY growth rates in the transport industry follow the GDP growth rates at best indicating (at first sight) that deregulation efforts across the transport modes did not boost the transport industry’s growth higher than the EU economic growth. Nevertheless, it is understood that this review is limited, since it observes generic patterns without delving into causal relationships. For example, Haralambides and Thanopoulou (2014) acknowledge (based on causal analysis) that the economic crisis had affected the shipping industry’s economic cycle. The same effect is also recognized by Sambrakos and Maniati (2014) for the passenger coastal shipping sector. Both accept that the economic crisis had a

significant effect not only on the transport industry growth rates but also on the growth patterns and potential outlook.

3.3 OECD Deregulation Intensity

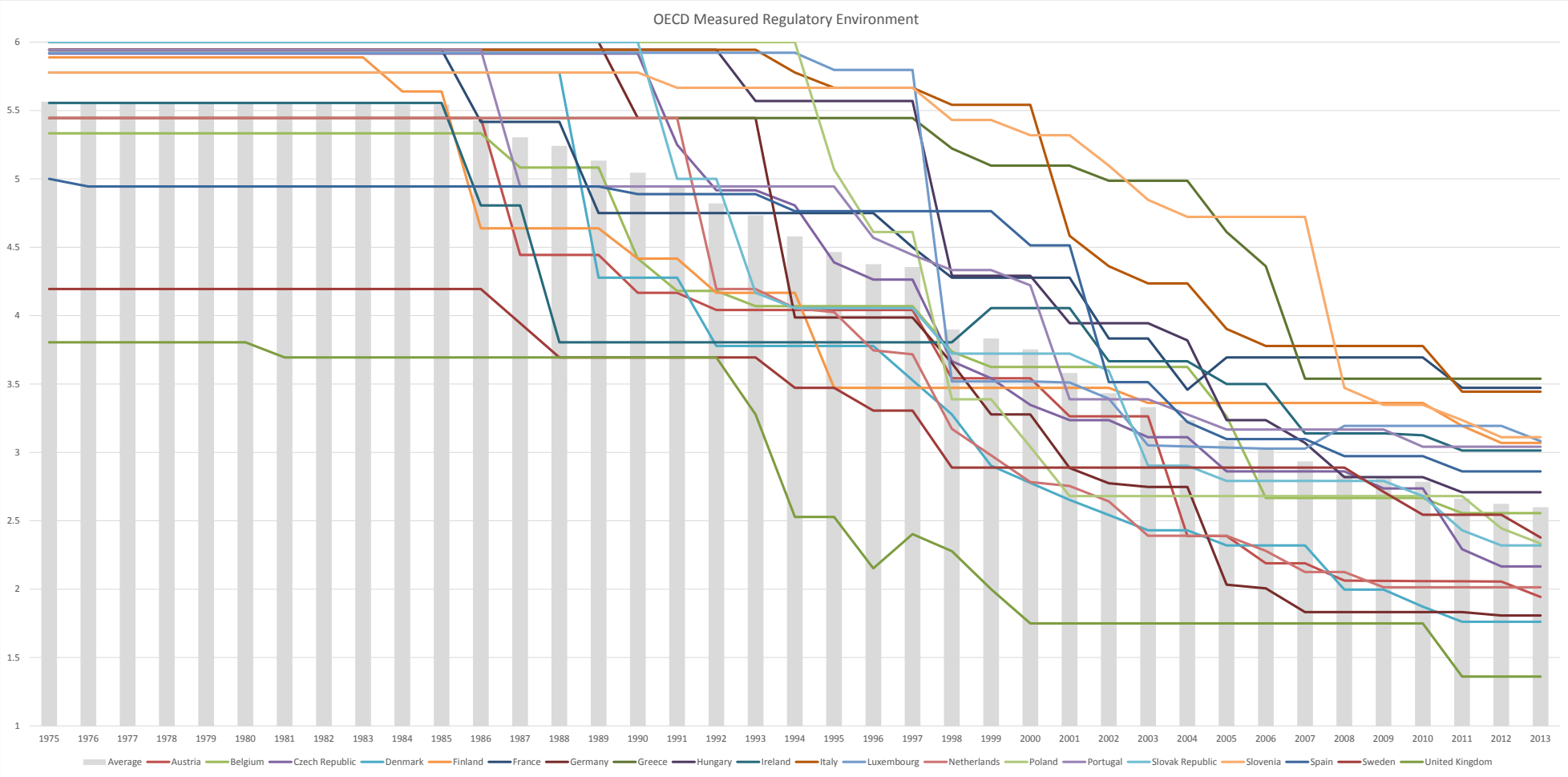
One important element this paper introduces is the analysis of the impact of regulatory intensity in the transport industry as a whole. One of the most relevant and most contemporary indices is developed by OECD (OECD, 2015) and measures the intensity of regulation across different countries. The index as well as some preliminary analysis are depicted in Figure 4. For the requirements of this analysis, the ratio calculates the regulatory intensity in the road, rail and postal sectors. Based on this index, it is observed that since 1975, the start date of measuring this index, all EU-28 countries are implementing deregulatory initiatives. Many of the countries had totally regulated transport industries, however during the past 30 years, these industries were deregulated to a rather open business environment. It has to be noted though that there are a lot of differences observed in this sample. For example, the UK has (2013) the most deregulated transport industry in this sample, whereas Greece, France and Italy have the most regulated sectors (2013). On the other hand, Germany and Denmark have implemented the most intense deregulatory initiatives and have created an almost free market based on this index. Last but not least, it should be noted that Figure 4 also shows quite exceptionally the deregulatory trend after 1985. In all of the countries in this analysis, deregulation started in a rather slow pace, but took up especially after 1992.

Figure 3 - Comparison of growth rates across transport sectors vs GDP growth (YoY), Freight Sectors excluding Air



Source: (European Union, 2015), analysis by author.

Figure 4 - OECD Index on Regulation (0= no regulation | 6=completely regulated)



Source: (OECD, 2015), the G20 average doesn't contain certain countries (BR, CN, USA, IN) due to missing data, calculations by author.

4. Measuring the impact of deregulation on the transport industry production

4.1 Literature Review

Significant research has been carried out on the impact assessment domain of deregulation. Most of the literature focuses on the theoretical side or attempts to explain the optimal operational frontier in terms of efficiency and/or effectiveness on the various inputs including labor, asset utilization and knowledge capital. More precisely, Kugler and Pica (Kugler & Pica, 2005) have studied the impact of introducing dismissal costs, accessions regulations and other relevant regulatory interventions. Their results from an Italian Social Security employer-employee panel has indicated that although this reform reduced firms' entry rates, it increased very much the exit rate, thus flattening employment policies over the economic cycle, reducing accession to the market and ultimately discouraging potential entrants. Considering that most companies in the transportation sector are Micro and Small companies, this affects new business development and constraints employment opportunities, oftentimes leading to sole proprietorship companies and hidden employment. Furthermore, Paul Teske et al. (1994) estimate that the regulation of prices and barriers to entry for new players in road freight transport market result in industry profits only for the incumbents, limiting the spread of these profits to the entities wishing to transport their goods and the economy as a whole.

With regards to the productivity growth, Nicoletti and Scarpetta (Scarpetta & Nicoletti, 2003) look at differences in the scope and depth of pro-competitive, pro-business regulatory reforms. Their research indicates that despite extensive deregulation and privatization in the OECD area, the cross-country variation of regulatory interventions has increased equivalently with the increasing dispersion in growth. They developed a multifactor productivity model and tested it against empirical data investigating the regulation-growth link. The authors found that reforms promoting private governance and competition (where these were deemed sustainable) tended to boost productivity. Additionally, within the manufacturing sector, the expected benefits from lowering the entry barriers are greater the further a given country is from the technology leader. Thus, by limiting entry barriers, regulation may boost the adoption of new technologies, increase completion and technology spillovers, or affect the entry of new high-technology firms. The benefits from deregulation and from privatization were found to be positive in terms of productivity in all panel sectors.

With regards to investing in capital stock, Alesina et al (Alesina, Ardagna, Nicoletti, & Schiantarelli, 2005) have studied regulation on several sectors from OECD countries and have found that regulatory reform of product markets, especially in terms of reducing economic regulation, is associated with an increase in investment. More precisely, entry liberalization and privatization both were found to have a substantial effect on investment.

Furthermore, Growitsch and Wetzel (Growitsch & Wetzel, 2009) conducted a pan-European efficiency analysis and investigated the performance of European railways in terms of vertical integration effectiveness. They analyzed whether integrated railways

realize economies of scope producing more efficiently railway services. Like most of their peers, the analysis has a theoretical background, using the theory of Data Envelopment Analysis, developing a super-efficiency bootstrapping model which relates the efficiency for integrated production to a reference set consisting of separated firms which use a different production technology. This analysis follows a previous work from Wetzel (Wetzel, 2008) which used econometric models and more precisely stochastic frontier analysis to prove that regulatory reforms have both positive and negative results considering each time different environmental factors such as network density, substantially changes parameter estimates, thus leading to biased estimation results when extrapolated in national or international level. Similarly, Cantos et al (Cantos, Manuel Pastor, & Serrano, 2012) use different theoretical approaches to estimate efficiency levels, using a sample of 23 European national rail systems and for the years from 2001 to 2008. Based on this panel, they analyzed the reforms on inefficiency levels and found that the rankings obtained were similar indicating that the best way to achieve increased efficiency is to combine vertical and horizontal reforms in the rail industry.

4.2 Hypothesis

Based on the above discussion, it is evident that most of the current analysis is limited on the technical issues of deregulation and doesn't explain the causality between the actual production of the transport industry and the deregulatory initiatives. One of the main issues that still remains unanswered is whether the deregulation has any effect on the production in the transport sector as measured by basic metrics like total tonne-kilometers or total vehicle kilometers. This causality between the two is yet to be confirmed based on empirical data. Thus, in order to prove this concept, the following hypothesis will be tested:

Hypothesis 0: Deregulation level as measured by the OECD indicators of regulation in energy, transport and communications (ETCR) is positively associated with increased volume of freight transport.

The following sections describe the model used and the results from the analysis.

4.3 Model construction

In order to test Hypothesis 0, the following model was developed and used:

$$\begin{aligned} &\boldsymbol{Volume\ of\ freight\ transport\ relative\ to\ GDP_{it}} \\ &\quad = \boldsymbol{a_0} + \boldsymbol{a_1} * \boldsymbol{OECD\ Regulation\ Index_{it}} + \boldsymbol{a_2} * \boldsymbol{GDP\ Growth_{it}} \\ &\quad + \sum_{n} \boldsymbol{\mu_{in} Country_n} + \sum_{t} \boldsymbol{v_t Year_t} + \boldsymbol{\varepsilon_{it}} \end{aligned}$$

Where

- Volume of freight transport relative to GDP of country *i* in year t, is the ratio of inland freight transport volume (road, rail and inland waterways) relative to GDP (chain-linked volumes, at 2000 exchange rates), and indexing on a single reference year (2000);

- OECD Index is a variable that ranges from 0 to 6, 0 being a free market and 6 being a completely regulated market. More information can be found in (World Bank, 2015). In order to construct the index, the road, post and rail subsegments were selected and their average was calculated and used as a proxy for the entire inland freight deregulation;
- GDP Growth corresponds to the real GDP Growth for Country i in year t;
- Country and Year are dummy variables; and
- $\boldsymbol{\varepsilon_{it}}$ is an error term.

The index "Volume of freight transport relative to GDP of country" was selected simply because the index by definition levels out the effects of country specific transport volume variations.

4.4 Results

The following table demonstrates the regression results and describes the relationship between Volume of freight transport relative to GDP, the OECD index on deregulation and the remaining explanatory variables described above. The results illustrated in the table are the unstandardized coefficients and standard errors respectively. Appendix contains further details of the regression results.

Table 2 - Hypothesis 0 Regression Results

	Coefficients
OECD Regulation Index	-13,489*** (2,894)
GDP Growth	0,002 (0,384)
(Constant)	174,264*** (14,577)
Year Dummies	Yes
Country Dummies	Yes
Adjusted R^2	0,595
Observations	335

*** denotes significance at 1%
** denotes significance at 5%
* denotes significance at 10%
Figures in the parentheses denote the standard error.

The results from the statistical analysis appear on the following table.

Table 3 – ANOVA Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	84908,011	38	2234,421	13,927	,000
	Residual	47648,611	297	160,433		
	Total	132556,622	335			

a. Dependent Variable: Volume of freight transport relative to GDP

Table 4 – Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Volume of freight transport relative to GDP	336	50,3	168,3	97,720	19,8920
OECD Indicator	336	1,361	5,541	3,028	0,747
GDP Growth	336	-14,098	10,648	1,919	3,211
Valid N (listwise)	336				

The OECD Regulation Index beta coefficient is statistically significant and is negative. This suggests that market deregulation (i.e. the reduction of the OECD index from 6 to 0) leads to higher volume of cargoes transported, reconfirming Hypothesis 0. This is a very interesting observation, confirming that industry wide deregulation (which is captured by the OECD Index that measures deregulation across many different sectors and industries) affects positively the volume of cargoes.

4.5 Discussion of results

The significance of this analysis lies into understanding the causality, based on empirical data, of the industry wide deregulation on the volume of cargoes that is transported. Based on the results, the transport industry deregulation in the road, rail and post sectors as measured by the OECD ETCR index has a positive impact on the volume of transported cargo as measured by tonne-kilometres. This analysis confirms the impact of the deregulatory initiatives on the volume of cargoes, signifying the importance at the systemic level. Thus, it may be argued that one of the main objectives of deregulation, which is the increasing of the transport sector production volume, is met at the EU level.

Nevertheless, this analysis has certain limitations and doesn't focus on the sustainability principles. More precisely, the analysis showed that the entire inland freight transport industry in EU has grown and this is attributed to the deregulatory initiatives across EU. However, the modal split is not the focus of this model and although the intention of the deregulatory efforts might be the transferring to more sustainable modes, this may not have been achieved, primarily due to mode specific market failures. Additionally, this analysis doesn't study the country mix. As such, certain dynamics in the industry at the country level, which may distort certain aspects of the economy like labour or foreign

direct investment, may also be negatively affected by the deregulation, again due to country or mode specific market failures.

5. Conclusions

As closing remarks of this analysis, an overview of the most important deregulation initiatives in EU were reviewed, in order to not only understand the efforts put forward by EU, but more importantly to understand whether (de)regulation has an impact on the volume of goods transport in EU. This review has indicated that the most used deregulatory tools by EU (including abolishing market entry restrictions, development of regulatory authorities and creating a level playing field in terms of certain qualitative aspects of the business) have a positive effect on a systemic level across all inland modes of transport in terms of volumes transported. The main observations of the high level review include:

i. The fiscal crisis of 2008-2009 had a significant effect across all modes of transport for freight,
ii. The degree of deregulation is different for each country, based obviously on the individual (at the state level) operational and political differences,
iii. The impact of deregulation in the transport industry during the period 1995-2013 resulted in a growth rate similar to the GDP growth rate.
iv. Since 1985, there is a strong intention in the EU to deregulate the transport industry, which follows similar initiatives in other industrialized countries,
v. The level of impact deregulation had on individual transport sectors is different and is based on a combination of political and economic reasons in addition to endogenous systemic effects. This is even more apparent when analyzing the effects of deregulation that one sector had over another sector.

Based on these observations and on the regression analysis, the empirical data confirmed with strong confidence that the deregulation initiatives adopted by EU (on the EU and on the national level) have a positive impact on the volume of cargoes transported. The analysis confirmed that the more level the playing field is in the transport industry, the greater the volume of products transported will be. However, based on this analysis, further research has to be undertaken in order to understand the implications of deregulation asymmetry across the different modes. This is the case of directly competing modes (on specific routes, markets or areas) where the cross-modal impact has to be further analyzed and understood. Additionally, the exact impact of each deregulatory tool both on the sector but also on the system (industry) level have to be further analyzed.

In summary, this analysis has studied the causality between volume of cargoes and deregulation at the system level. Having confirmed the direct and positive impact, additional deregulatory initiatives may be adopted in order to further improve the transport industry production. To this extent, the level of market failures and/or unsuccessful initiatives has to be carefully monitored so as not to produce adverse effects between the transport modes.

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APPENDIX

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	174,264	14,577		11,955	,000
	OECD Indicator	-13,489	2,894	-,507	-4,661	,000
	GDP Growth	,002	,384	,000	,006	,995
	Austria	-37,234	6,995	-,375	-5,323	,000
	Belgium	-40,087	5,927	-,403	-6,763	,000
	Czech Republic	-33,229	6,400	-,334	-5,192	,000
	Denmark	-52,336	7,519	-,527	-6,961	,000
	Estonia	-45,027	6,115	-,453	-7,364	,000
	Finland	-35,257	5,477	-,355	-6,437	,000
	France	-27,586	5,002	-,278	-5,515	,000
	Germany	-30,421	7,503	-,306	-4,055	,000
	Hungary	-2,584	5,544	-,026	-,466	,641
	Iceland	-17,846	6,123	-,180	-2,915	,004
	Ireland	-26,492	5,456	-,267	-4,856	,000
	Italy	-18,089	4,821	-,182	-3,752	,000
	Luxembourg	-27,246	5,773	-,274	-4,719	,000
	Netherlands	-39,122	7,386	-,394	-5,297	,000
	Norway	-18,285	6,216	-,184	-2,941	,004
	Poland	-8,733	6,819	-,088	-1,281	,201
	Portugal	7,924	5,507	,080	1,439	,151
	Slovakia	-34,417	6,409	-,346	-5,370	,000
	Slovenia	27,689	4,823	,279	5,741	,000
	Spain	-2,113	5,531	-,021	-,382	,703
	Sweden	-34,029	6,473	-,342	-5,257	,000
	Switzerland	-30,940	6,441	-,311	-4,803	,000
	United Kingdom	-54,398	8,862	-,547	-6,138	,000
	2001	-3,474	3,755	-,045	-,925	,356
	2002	-4,966	3,830	-,064	-1,297	,196
	2003	-7,361	3,888	-,095	-1,893	,059
	2004	-1,612	3,927	-,021	-,410	,682
	2005	-6,862	4,120	-,089	-1,665	,097
	2006	-7,064	4,221	-,092	-1,674	,095
	2007	-9,427	4,332	-,122	-2,176	,030
	2008	-13,306	4,555	-,173	-2,922	,004
	2009	-19,875	5,468	-,258	-3,635	,000
	2010	-17,551	4,577	-,228	-3,834	,000
	2011	-21,692	4,736	-,281	-4,581	,000
	2012	-24,574	4,934	-,319	-4,980	,000
	2013	-23,670	4,928	-,307	-4,803	,000

a. Dependent Variable: Volume of freight transport relative to GDP