
ROAD FREIGHT TRANSPORT SECTOR IN SLOVENIA AND ITS CONTRIBUTION TO THE MACROECONOMIC INDICATORS AS COMPARED TO EU AVERAGES

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Abstract: *Transport has a linking function between all economic activities, enabling their existence and development. At the same time, it is an economic sector that generates a significant part of the national income and directly or indirectly employs a large part of the labor force. Road transport is crucial for the development of the European economy and society, and despite the recommendations of the European transport policy, the volume of road transport is increasing, both in terms of passenger and freight traffic. The authors focus on the extent to which road freight transport sector in Slovenia contributes to GDP and employability, comparing Slovenia's results with the European average. Finally, they attempt to estimate the loss in selected macroeconomic indicators in Slovenia due to the involvement of foreign carriers in the provision of transport services related to the Slovenian economy.*

Keywords: *road freight transport, macroeconomic indicators, Slovenia, EU, shift-share analysis*

1. INTRODUCTION

Transport, whether passenger or freight, is a critical factor in the development and existence of modern economies and societies. Transport has a linking function between all economic activities, enabling their existence and development. At the same time, it is an economic sector that generates a significant part of the national income and directly or indirectly employs a large part of the labor force.

The volume of traffic flows, including the volume of freight flows has increased in recent decades, and the rough forecast for the EU is that there will be about 60% more freight flows in 2050 than in 2010 (Krause, et al., 2020), despite the long-standing tendency in the EU to decouple transport flows from economic development. Most of this growth will be by road, and the question is which carriers will benefit most from it as in recent years, we have seen carriers operating throughout the EU, regardless of whether freight flows are in any way linked to the economies of the countries from which they originate.

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In the article, the authors focus on the extent to which the road freight sector in Slovenia contributes to GDP and employability, comparing Slovenia's results with European averages. In the second phase, they attempt to estimate the loss of selected macroeconomic indicators in Slovenia due to the involvement of foreign carriers in the provision of transport services related to the Slovenian economy.

The paper is divided into five sections. The introduction in section one is followed by a brief theoretical background on freight flows prediction and an overview of road freight transport in the EU. Section three describes the data and methodology used to conduct the study, while section four is the core of the paper and includes the analysis of the Slovenian and the EU road freight sector and its macroeconomic impact. Section five is devoted to the conclusions.

2. BACKGROUND

The studies show that freight flows respond quickly to economic and political changes, with road transport being the most responsive mode. The relationship between the volume of freight flows and the volume of economic activity has long been a method for predicting future flows of goods. As early as 1962, Tinbergen established a gravity model that predicted the flow of goods between two countries based on their GDP and the distance between them. In the following decades, a number of studies have demonstrated a strong correlation between GDP growth and the volume of freight flows, measured in ton kilometers (Brunel, 2005; van de Riet, de Jong, & Walker, 2007). However, some authors point out that forecasting freight flows is challenging and should not be based on GDP data alone (McKinnon in Woodburn, 1996). Instead, the volume of freight flows is related to demographic change, economic structure, transportation costs, globalization of the economy, environmental awareness, logistics concepts used, and characteristics of potential modes (Koorey et al. al, 2000; Holguin-Veras et al., 2011; Meersman & Van de Voorde, 2013).

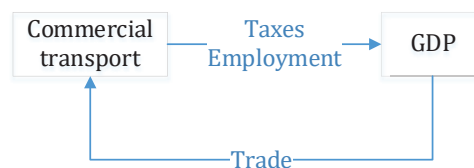


Figure 1: Relation between commercial transport services and GDP

In, 2019, European road freight operators transported about 13.5 billion tons of cargo, covering nearly 160 billion kilometers. The majority of this was provided by German, French, Spanish and Polish carriers (Eurostat, 2022a). These ratios are changing as the international road freight transport in the European Union (EU) is fully open to competition, while domestic transport remains fairly well protected. As a result, cabotage accounts for only a small part of domestic transport in EU Member States; most cabotage takes place in Germany, and almost half of total cabotage in EU is carried out by carriers from Poland. The overall average in Member States is that cabotage accounted for 4.9% of national road haulage for hire or reward in 2020 (Eurostat, 2021).

3. DATA AND METHODS

The key research question of this study was: “Does road freight transport sector in Slovenia contribute to macroeconomic indicators in line with EU averages?”.

To answer this question, we used different data from Statistical Office of the Republic of Slovenia, and Structural Business Statistics data from Eurostat.

First, we provided a general overview of road freight sector in EU-27, to determine the competitive position of Slovenian carriers. For this purpose, we first calculated the Herfindahl-Hirschman Index (HHI), then provided the shift share analysis and calculated the market instability index.

HHI is used to determine to determine market concentration, while shift-share analysis was originally a technique for analyzing a region's economic growth patterns, but, we have used it to examine changes in the road freight transport sector in European countries, using number of employed people* as the economic variable studied.

$$HHI = 10,000 \times \sum_{i=1}^n s_i^2 \quad (1)$$

where s is the percent market share (of each country i in our case).

HHI ranges from close to 0 to 10,000. A market with the HHI of less than 1,500 is considered a competitive, with the HHI from 1,500 to 2,500 moderately concentrated, and with HHI 2,500 or greater is considered highly concentrated market.

Shift-share analysis helps understand changes in market by decomposing them into two parts, where *share* reflects the expected growth (in our case of employment in road freight sector) to maintain the market share, and *shift* reflects the number of employees that a country got or lost in relation to expected growth. Shift-share analysis does not explain causes for economic changes.

$$share_{i,t} = AGR_t \times Q_{i,t-1} = (Q_t - Q_{t-1}) \times s_{i,t-1} \quad (2)$$

where AGR is annual growth rate (of total) observed variable, Q denotes sum of the quantity observed, i denotes the single observation (country), while t and $t-1$ denote the time of observation.

$$shift_{i,t} = (s_{i,t} - s_{i,t-1}) \times Q_t = Q_{i,t} - Q_{i,t-1} - share_{i,t} \quad (3)$$

The same data can be used to calculate absolute market share instability (AMSI), which is the measure of market mobility.

$$AMSI = \sum_{i=1}^n |s_{i,t} - s_{i,t-1}| = \frac{\sum_{i=1}^n |shift_i|}{Q_t} \quad (4)$$

At the end we created a linear regression model to predict production value of Slovenian road freight transport sector.

* Number of persons employed refers to the total number of persons who work in the observation unit (employees receiving remuneration, working proprietors and unpaid family workers) as well as outside working persons who belong to the unit and are paid by it. It includes all persons who are on the payroll of the enterprise, whether they are temporarily absent (excluding long-term absences), part-time, seasonal or home workers, apprentices, etc. (OECD, 2003)

4. THE MACROECONOMIC IMPACTS OF ROAD FREIGHT TRANSPORT SECTOR IN SLOVENIA

4.1. EU road freight transport sector

The transport and storage industry directly employs around 11 million people in EU-27 and accounts for about 5% of GDP (EC, 2017). In 2019, there were 1.25 million companies operating in the transport and storage sector in the EU-27, most of them, more than 540 thousand, in road freight transport. Road freight sector alone employs around 3.3 million workers, which is around 1.7% of total employment of people aged from 15 to 64 in EU-27 (Eurostat, 2022b; Eurostat, 2022c).

The five largest European countries employ just over 60% of all workers in the road freight sector in EU-27; however, the Herfindahl-Hirschman Index (HHI), which is the index of market concentration, has the value of about 950 and shows that the market is rather competitive.

In the Table 1 we present the results of the shift-share analysis.

Table 1: Shift share analysis of road freight sector in Europe for the period from 2016 to 2016

State	Share	Shift	Total	State	Share	Shift	Total	State	Share	Shift	Total
Belgium	6,949	-3,049	3,900	France	41,691	-11,091	30,600	Netherlands	14,049	-3,378	10,671
Bulgaria	8,283	-3,245	5,038	Croatia	2,658	1,235	3,893	Austria	7,343	-6,100	1,243
Czechia	15,093	-9,397	5,696	Italy	38,558	-10,382	28,176	Poland	42,941	80,418	123,359
Denmark	3,457	-2,182	1,275	Cyprus	224	98	322	Portugal	8,051	703	8,754
Germany	50,009	-26,369	23,640	Latvia	3,044	-2,192	852	Romania	17,615	-1,429	16,186
Estonia	1,919	-1,401	518	Lithuania	7,639	22,774	30,413	Slovenia	2,870	2,656	5,526
Ireland	2,546	657	3,203	Luxembourg	876	-476	400	Slovakia	5,478	1,349	6,827
Greece	4,283	-2,856	1,427	Hungary	9,196	-1,798	7,398	Finland	5,293	-5,997	-704
Spain	38,274	-9,987	28,287	Malta	129	36	165	Sweden	9,459	-8,596	863

Source: Authors, based on (Eurostat, 2022b)

As said, shift-share analysis does not directly explain causes for economic changes, nevertheless, many of countries showing strong competitive effect (shift) on the employment in road freight sector, also have (relatively) low salaries in road freight sector (in comparison to EU-27 average) or (relatively) low share of personnel costs in total purchases of goods and services, and vice versa.

4.2. The road freight sector in Slovenia

As we could see in Table 1, road freight transport sector in Slovenia is competitive, but compared to others, the Slovenian transport sector is relatively small, so it does not have as big an impact on the European transport market as the fast-growing road transport sectors of Lithuania and Poland.

According to Slovenian Statistical Office (SURS, 2022) and Eurostat (2022b) there are about 5,700 trucking companies in Slovenia, which together employ around 29,300 people or around 3.0% of all employed people in Slovenia. Although the share of people employed in road freight sector in Slovenia is higher than the average in EU is, Slovenian transport companies are still relatively small, employing on average 5.1 people (only 3.6 until 2010), while the current average on European level is 5.9. On the other hand, the production value of road freight transport in Slovenia as compared to Slovenian GDP was around 6.4% in 2019, while the EU-27 average stopped at 2.3%; interestingly two most

prominent countries in European road freight transport sector had similar numbers to Slovenia, in particular Poland with 6.4% in 2019 and 5.5% in 2016, while Lithuania is registering record numbers with 13.3% in 2019, a significant growth from 9.5% in 2016. Also, the gross operating rate, which is the measure of profitability that provides the ratio between gross operating surplus* and turnover† is relatively high in Slovenia (12.7%), higher than EU-27 average (10.6%), which indicates that the Slovenian trucking companies are efficient in their operation and are good at turning sales into profits.

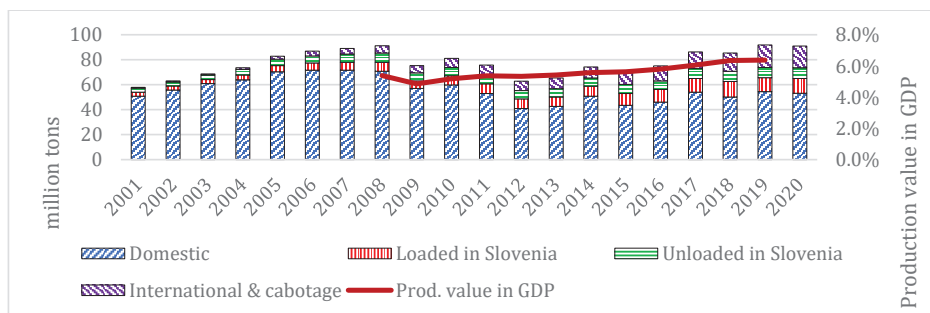
Slovenia has an open economy; in 2020, Slovenia exported 17.6 and imported 20.8 million tons of goods. As shown in Table 2, Slovenia conducts most of its trade with neighboring countries. The five most important trading partners account for almost 75% of exports (around 13.2 million tons) and 58% of imports (12.1 million tons).

Table 2: Slovenia's main trading partners

Export (tons)		Import (tons)	
Country	Volume	Country	Volume
Italy	6,268,386	Austria	3,599,182
Austria	2,324,830	Italy	3,038,646
Croatia	2,201,896	Croatia	2,866,629
Germany	1,607,177	Germany	1,401,812
Hungary	751,478	Hungary	1,101,110
All partners	17.560.899	All partners	20.821.848

Source: Authors, based on (SiStat, 2022)

Slovenian road freight carriers have achieved record figures from 2007 and 2008 in recent years, but in the following figure (Figure 2) we can see that the work structure of Slovenian road freight carriers has changed; there is less domestic transport and more integration with foreign markets. If we look at Table 2, we can assume that most trade flows with Austria, Italy and Germany are handled by Slovenian carriers, because they are more competitive than carriers from these countries. Some of the exports to Croatia and Hungary are also handled by Slovenian carriers (perhaps about 1 million tons), while the import flows are probably handled mainly by carriers from Hungary and Croatia.



Source: Authors, based on STAT.SI

Figure 1: The structure of services provided by Slovenian road freight

The corona pandemic crippled also the Slovenian economy (but only in 2020), but we can assume that the needs of the domestic market were not lower than until 2008, at least in

* Gross operating surplus is defined as value added at factor costs minus personnel costs (OECD, 2003).

† Turnover is defined as total value of market sales of goods and services to third parties, excluded VAT (OECD, 2003).

normal circumstances. Slovenian carriers transported a similar amount of goods in 2008 and 2019, more than 91 million tons, but the difference in domestic market was almost 16.5 million tons (we don't have data on cabotage in Slovenia;- however 16.5 million are much more than 5% overall average for cabotage in EU-27). The question is who is carrying out these transports instead of Slovenian carriers and how much the Slovenian GDP is losing as a result.

We created a linear regression in which the output variable was the production value (PV) of road freight sector in Slovenia. The input variables were the amount of goods transported domestically (Q_{domestic}), the amount of goods loaded in Slovenia (Q_{loaded}), the amount of goods unloaded in Slovenia (Q_{unloaded}), and the amount of goods transported by Slovenian carriers in international transport or cabotage ($Q_{\text{international}}$); all given in thousand tons. The following model had a very high coefficient of determination (0.983), but all variables except one, the amount of goods carried in international traffic and cabotage, were found to be statistically insignificant.

$$PV_{\text{mio€}} = 14.2501 + 0.0056Q_{\text{domestic}} + 0.0443Q_{\text{loaded}} + 0.1092Q_{\text{unloaded}} + 0.0757Q_{\text{international}}$$

So, every million tons of goods carried for the Slovenian economy in domestic transport by carriers from other countries would mean a loss of 5.6 million and a production value or about 90 million euros in 2019, which is about 3% of the total production value of the Slovenian road transport sector in that particular year. But if there was no shift to other markets (same market structure as in 2008), the loss would be much greater, around 1 billion EUR or almost a third of the achieved production value in 2019, as according to our model, goods unloaded in Slovenia contribute to production value of Slovenian road freight transport sector almost 20 times more than domestic traffic, and goods transported in international transport about 13.5 times more than domestic traffic.

5. CONCLUSIONS

Road freight transport is very important as it is the only mode that allows door-to-door service, so it often has no competition with other land transport modes, but competition between carriers from different European countries is very present. This is made possible by EU legislation, and carriers from the new member states, i.e. carriers from Eastern European countries, are generally more competitive due to lower personnel costs.

Slovenian carriers have recognized their competitiveness on the European market and are directing their capacities to more profitable markets. We estimate that foreign carriers in Slovenia carried about 16 million tons of cargo in 2019. If these were transported by Slovenian carriers, this would mean an additional production value of about 90 million euros (or 3% more production value). Since the capacities of Slovenian carriers are exhausted, focusing on foreign markets is a good solution, as it affects the growth of production value and directly increases the GDP; however, in doing so Slovenian carriers do not directly support Slovenian production.

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