



DETERMINANTS OF FREIGHT VOLUME AND EFFICIENCY IN TRANSPORTATION AND STORAGE SECTOR

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ABSTRACT. Background: It is observed, in the studies on the factors affecting productivity and performance of the firms, that foreign firms are more successful than domestic firms thanks to their advantages of technological know-how, easy access to capital and modern management practices. Based on these findings, this study aims to measure the efficiency and performance of the companies in transportation and storage sector, which has an increasing share in the GDP of countries, with other industry-specific variables such as nationality and freight volume which are not in the literature.

Methods: To reveal the determinants of the freight volume and efficiency of the transportation and storage sector, the study employs Fixed Effect Model for analyzing the aggregate data of the companies in 30 European countries obtained from Eurostat from 2008 to 2018.

Results: The main findings in this study indicate that foreign controlled enterprises make a significant difference in terms of both efficiency and freight volume in the sector compared to domestic firms. The empirical results also suggest that investment in tangible goods and apparent productivity of labor serve as factors that are effective on both international and national freight volume. However, we have not found out any evidence for an impact of national enterprises on international and national freight volume.

Conclusions: The study shows the importance of nationality of the companies, loaded national and international transportation and apparent labor productivity as the determinants of freight volume and efficiency of the transportation and storage sector. The future researches can extend this study by conducting a firm level analysis.

Key words: transportation and storage sector, foreign companies, efficiency, freight volume, fixed effect model.

INTRODUCTION

The globalization which has evolved rapidly with the competition between Anglosphere and Sinosphere in the last 40 years has changed the firms into a multinational structure and has caused blurring the concept of nation state. Foreign capital and multinationalism have been an important area of discussion both in national economic and political discourses and in the literature. Although cultural, economic and political problems emerging with the globalization have harmed the internal dynamics of the countries and relations with each other, the presence of foreign capital and

foreign direct investments in countries have led domestic and foreign firms to interact and compete with each other implicitly or explicitly.

There is vast literature especially on macro base studying the effects of both foreign direct investments (FDI). Studies show that foreign firms can greatly contribute to economic development by increasing domestic competition and consequently lead to further productivity, lower prices and more efficient resource distribution thanks to the advantages of technological know-how, easy access to capital and modern management practices. FDI also has a significant effect on the employment conditions in the domestic markets.

Multinational corporations employ high skilled workers, pay higher prices and offer better working conditions. Indeed, OECD [2008] confirms that foreign-owned firms in host countries seem to be improving in terms of wages and employment conditions such as working hours.

Addressing the factors and their impact levels that affect productivity and performance at the firm level in the context of nationality of the firms provides a valuable instrument to business managers and policy makers. However, these studies are not very common in the literature. Based on the competition and interaction among domestic and foreign companies, the existing literature shows that foreign firms perform better than domestic firms in one or more of the various fields such as efficiency, trade volume, investment amount, access to international markets, etc.

Furthermore, there are only a few studies on ownership comparison for transportation and storage sector which is a critically important sector for the flow of goods in an economy. In order to overcome a deficiency in the literature and the main purpose of this study is to analyze the factors that affect the national or international freight volume and efficiency of the transportation and storage sector in the countries on the basis of nationality of the companies. The reason for the inclusion of freight volume in the transportation and storage sector in the study is that we assume that this factor will be a good variable in representing the power to reach international markets. Efficiency is chosen because it is one of the main factors in comparing the performance of companies.

To this end, we conduct the study in two stages. Firstly, in order to reveal the determinants of the freight volume, the effect of number of foreign controlled and national enterprises, amount of investment and sector productivity on the national or international freight volume is analyzed. Secondly, the impacts of selected variables such as number of foreign controlled and national enterprises, amount of investment and average personnel cost is examined to determine the factors affecting efficiency in transportation and storage sector.

It is thought that the study will contribute to the literature in two ways and offers originality: First one is to contribute to close the study gap on the effect of foreign companies and efficiency factors in the transportation and storage sector which has been developing rapidly in the national economies and globally, and its share in the gross product of the countries has increased rapidly. Second one is that this study analyzes this sector by using freight volume and efficiency variables that are not found in the literature.

ON THE PERFORMANCE AND EFFECT OF FOREIGN COMPANIES IN THE HOST COUNTRY

Existing literature shows that FDI have positive effects on both competition and domestic firms in the host country in the long run. Because, domestic firms can increase their performance by observing and benchmarking foreign ones in the country. Also, increasing competition in the domestic market with the appearance of foreigners pushes domestic firms to search for new technology, which increases research and development (R&D) investments and as a result, increases productivity and competitive power of the companies. For instance, Liu and Wang [2003], Harris and Catherine [2003], Görg and Strobl [2005] observe the positive effects of FDI on productivity respectively in Ireland, China and United Kingdom. Newman et al. [2015]'s study on the Vietnamese manufacturing industry clearly shows that domestic firms cooperating with foreigners have positive results in terms of productivity. Foreign companies affect the domestic firms not only in terms of productivity but also in different fields. For instance, in the studies of Wang and Wong [2016], they have observed that foreign firms increase technical efficiency in their industry including domestic firms. Elmawazini et al. [2018] have emphasized that FDI can have an impact not only in terms of productivity and technical efficiency, but also in macro labor productivity. Innovation performance affecting productivity is another factor that can be addressed. In their studies, Joe et al. [2019], have stated that the innovation activities of the foreign companies

in Korea encourage the Korean domestic companies. Both the above-mentioned studies and recent studies prove that foreign companies affect productivity and innovation and encourage domestic companies to improve themselves. In Karentina [2019]'s study, it is seen that FDI also affects productivity in capital-intensive domestic enterprises. Even if the effects don't occur in the short term, it has been determined that they cause positive effects on productivity in the long term. The effects of productivity differ according to the structure of the workforce and the size of the firm. Apostolov and Scagnelli [2019]'s study in Macedonia and Bentivogli and Mirenda [2017]'s study in Italy show that well performed foreign firms force domestic firms to compete, however, there is an increase in the employment and export-oriented initiatives in domestic firms. As it is seen, the performance of foreign companies forces many domestic companies to encourage competition and to develop in terms of innovation, workforce, size and capital.

However, foreign firms to gain superiority in many areas in the short time and gain more efficiency after entering the market. Literature indicates that the performance and efficiency of foreign or multinational firms are better than domestic firms in many sectors.

Beaumont, Schroder and Sohal [2002] observe that foreign firms operating in the manufacturing sector in Australia and Canada perform better than domestic firms, and also these firms are faster for using and managing the advanced manufacturing technology than others. The reason is that foreign-owned firms can draw from a wider knowledge base, have economies of scale, have more skilled and experienced managers and/or have a more highly skilled labor force [Chamarbagwala et al., 2000]. Unlike other studies, Ito [2011] deals with the performance comparison of domestic and foreign companies in the service industry. In the study, it is stated that foreign firms operating in the service industry in Japan perform better than domestic firms in terms of efficiency. Bournakis et al. [2019] state that multinational companies in the field of R&D in the UK perform better than domestic companies.

Researchers also have been interested in developing countries on the subject. Dimelis and Louri [2002] state that foreign firms have a more efficient structure than many domestic firms, especially in the workforce, through the example of Greece. The study of Takı [2004] also supports the above studies and expresses that that foreign-owned plants are more productive than locally owned plants. At the same time, differences in productivity are related to the degree of foreign ownership in Indonesian manufacturing is the another result. Douma, George and Kabir [2006] have investigated the performance of firms in emerging markets. They claim that foreign firms perform better than firms with other ownership structures and their productivity is noticeably higher due to financial strength and strength of partnerships. Kosova [2010] who presents a different perspective, states that the entry of foreign firms into the market has an important effect on the growth and efficiency of the market. Although domestic firms are negatively affected by this situation. The study of Greenaway, Guariglia and Yu [2014] show that foreign firms are better than domestic firms in terms of productivity in China, but also the joint venture of foreign and domestic firms can lead to better results in terms of performance. Peluffo [2015] expresses that variables such as labor productivity, total factor productivity, wages are more prominent in foreign companies in Uruguay. In addition, it is observed that foreign firms pay more wages to their workers in line with their abilities. Consequently, productivity also increases. Vu [2016] states that foreign firms have 60% more technical efficiency than domestic firms in Vietnam. Konara and Wei [2017] conclude that multinational companies have good performance than others in Sri Lanka. Marinescu et al. [2019] reveal that foreign firms in Romania perform better than domestic firms in terms of profitability and investments.

Although different countries, years and sectors have been addressed about productivity and foreign capital in the literature, it has almost been obtained as a result of foreign firms being more efficient and performing better than domestic firms. In fact, this can be explained by several factors which are discussed in measuring efficiency. The amount

of capital, the structure of the workforce, the size of the company, and the structure of income sources and the management culture of the company [The Manufacturer's Organization, 2018] are all considered as important indicators of companies' efficiency and performance.

As we mentioned in the previous parts, FDI creates a revival in many sectors in the country. Nevertheless, this recovery is thought to be more effective in some sectors. The impact of FDI is more important on competition in the market for services such as telecommunications, retail trade where exports are not a general option, because service needs to be started at the delivery point [OECD, 2002]. As stated in the report, FDI generally concentrate on the telecommunication and retail sectors, but they also have reflections in the logistics sector. According to the EY European Investment Monitor Report [2019], supply chain reorganization strategies that started two years ago across Europe maintained a high level of FDI in logistics projects (+5%) last year. In addition, the market share of logistics among all FDIs is 9%. After sales-marketing, production and R&D in Europe, the area where the most investments are made is logistics. But there is very limited amount of literature on the FDI on logistics sector. Yang and Luqian [2010] analyses the impact of investments on the workforce in the logistics sector. This study shows that foreign firms are more competitive than domestic firms in providing investment and employment. Maggi and Mariotti [2010] state in their studies that FDI in the logistics sector have increased by 26% in Italy, and these investments are made especially by the logistics and cargo companies originating from China, Japan and Singapore. In addition, the power of the market and the benefit of the economies of scale are the elements that encourage investment. In another study, Maggi and Mariotti [2012] claim that the internationalization of production has expanded the logistics sector and the growth has caused foreign companies to be willing to operate in that country.

DATA, MODELS AND ESTIMATION TECHNIQUE

This study aims to analyze the factors that affect the national and international freight volume and efficiency of the transportation and storage sector in the countries on the basis of nationality of the companies. To this end, we use “Loaded National and International Transportation” as a proxy for “national and international freight volume” and “Apparent Labor Productivity” as a proxy for efficiency of transportation and storage sector.

We conduct the study in two stages. Firstly, in order to reveal the determinants of the freight volume, it is analyzed the effect of number of foreign controlled and national enterprises, amount of investment and sector productivity on the national or international freight volume. Secondly, the impacts of selected variables such as number of foreign controlled and national enterprises, amount of investment and average personnel cost is examined to determine the factors affecting efficiency in transportation and storage sector.

The data used in the analysis covers the years 2009-2018 for the first research question and the period 2008-2016 for the second research question. Due to existing data constraints, the data set is limited to 30 countries (EU 27- except Malta because of lack of data problem- Norway, Switzerland, Liechtenstein). Following Table 1 presents definitions of variables. LNT and LINT data are taken from Eurostat [2019] - Transport database and other variables are from Eurostat [2019] - Structural Business Statistics.

In the line with our research purpose, we create four different regression models. In first regression model which is built in accordance with the first research question of the study; LINT in transportation and storage sector is dependent variable; FCNE, NE, GITG and ALP are used as independent variables. In order to compare this model, an alternative model has been developed in which the same independent variables are included and only the dependent variable changes to the LNT.

Table 1. Definitions of Variables

Variables	Definitions
LNT	Logarithm of Loaded National Transport (1000 tonnes)
LINT	Logarithm of Loaded International Transport (1000 tonnes)
FCNE	Logarithm of Foreign Controlled Enterprises (number)
NE	Logarithm of National Enterprises (number)
GITG	Logarithm of Gross Investment in Tangible Goods (million Euro)
ALP	Logarithm of Apparent Labour Productivity (Gross value added per person employed - thousand Euro)
APC	Logarithm of Average Personnel Costs (personnel costs per employee - thousand Euro)
SWALP	Logarithm of Simple Wage Adjusted Labour Productivity (Gross value added by personnel costs – percentage)
FCSWALP	Logarithm of Simple Wage Adjusted Labour Productivity for Foreign Controlled Enterprises (Gross value added by personnel costs – percentage)
TE	Turnover per Enterprise - thousand euro
TFCE	Turnover per Foreign controlled enterprise - thousand euro

Note: The values of all variables in the study are limited to the transport and storage sector

In second regression model which is built in accordance with the second research question of the study; ALP in transportation and storage

sector is dependent variable; FCNE, NE, GITG and APC are used as independent variables. In addition, the dependent variable in this model has been changed to SWALP and the regression has been re-run in order to strengthen estimated results.

In this study, based on the claims of the studies in the literature and the descriptive statistics in our data set, it is accepted that foreign firms have superior features from national firms. Table 2 shows the selected descriptive statistics about our data set. In this table, it can be seen that the Wage Adjusted Labor Productivity for Foreign Controlled Enterprises is higher than the sector productivity average. In addition, when the average turnover per enterprise and average gross investments in tangible goods amounts per enterprise are compared, there are values above the sector average for foreign controlled enterprises. Another striking point in the table is that national transportation in the sector in the relevant years and countries is more than international transportation.

Table 2. Selected Descriptive Statistics about the Data Set

Variables	Obs	Mean	Std. Dev.	Min	Max
Loaded National Transportation (1000 tonnes)	298	873798.9	2311744	14384	1.43E+07
Loaded International Transportation (1000 tonnes)	289	61733.73	162098.6	17	1197205
Number of National Enterprises	290	65025.14	169160.4	553	1246259
Number of Foreign Controlled Enterprises	249	792.5783	2045.517	26	14537
Gross Investment in Tangible Goods per Enterprise (Million Euro)	289	0.1881425	0.3159924	0.006308	2.472875
Gross Investment in Tangible Goods per Foreign Controlled Enterprise (Million Euro)	240	1.090801	1.490115	0.021027	10.09811
Simple Wage Adjusted Labour Productivity for All Enterprises (%)	279	150.2703	25.65276	90.7	222.3
Simple Wage Adjusted Labour Productivity for Foreign Controlled Enterprises (%)	242	196.7694	87.76861	122.9	1213.6
Turnover per Foreign Controlled enterprise	241	20850.42	21402.42	272.8	124372
Turnover per Enterprise	289	1721.417	2196.636	179.9	13015.3

Panel data consists of units that are put together for certain periods. It gives the opportunity to use both time series and cross sectional data together. Some of the advantages of using panel data are that the unit change can be added to the model, creating fewer multi-collinearity problems, reducing the estimate deviation. In addition, it enables more comprehensive models to be established in cases where time series is short or cross-sectional observation is insufficient [Tatoğlu,

2016]. Panel data analysis also clarifies the country-wide heterogeneity and the complex consequences invisible in cross-sections [Greene, 2012].

The two most obvious methods used in panel data analysis are Fixed Effect Model (FEM) and Random Effect Model (REM) [Gujarati, 2003]. In FEM, it is assumed that the cross-sectional units in the model have their

own characteristics, these properties may differ between the units and these differences may affect the result variables. Therefore, FEM is appropriate for models with correlation between error term and explanatory variables in the model [Gujarati, 2003]. Fixed effects (FE) should be used when analyzing the effect of variables that change over time. FE removes the effects of properties that do not change over time, thus enabling predictors to evaluate the net effect on the outcome variable [T. Reyna, 2007]. In REM, unlike the fixed effects model, the changes between units are assumed to be random and unrelated to the explanatory variables in the model [T. Reyna, 2007]. "The crucial distinction between fixed and random effects is whether the unobserved individual effect embodies elements that are correlated with the regressors in the model, not whether these effects are stochastic or not" [Green, 2008].

Formally, the choice between FEM and REM is made as applying Hausman test. It basically tests whether the error terms are correlated with the explanatory variables. The null hypothesis is that the preferred model is random effects whereas the alternate hypothesis is that the more appropriate model is fixed effects. Considering Hausman test statistics and the structure of dataset, we decide to use FEM.

The functional representation of FEM is written as

$$Y_{it} = \beta_1 X_{it} + v_i + u_{it}$$

where "i" represents the countries, "t" denotes years. (Equation 1)

In equation 1, "y" is the dependent variable, "x" refers to the independent variable, "u_{it}" is the error term, "v_i" is the effect of country-specific variables that do not change over time (the unit effect that is constant over time). In this model country effects (v_i) are assumed to be handled as fixed, not random. It is also assumed that "u_{it}" and "x_{it}" are uncorrelated.

Since panel data includes cross-section and time dimensions, the problems of cross-section data (e.g. heteroscedasticity, cross-sectional

dependency) and time series data (e.g. non-stationarity) need to be addressed [Gujarati, 2003]. To this end, we use FEM with "robust" option. The option "robust" is used in order to create heteroscedasticity-robust standard errors [T. Reyna, 2007] By this way, it is prevented heteroscedasticity problem that is sourced by cross-sectional dependency. Also, due to the shortness of the time dimension of the data set, unit root tests that control the assumption that all series are stationary, which is the basic assumption of time series analysis, cannot be applied.

RESULTS AND INTERPRETATIONS

As mentioned before, the aim of this study is to analyze the factors that affect the national and international freight volume and efficiency of the transportation and storage sector. In the first step of estimations, we analyze the impact of selected determinants of freight volume (FCNE, NE, APL and GITG) on international and national freight volume (LNT and LINT). To this end, we conduct following two regression models.

$$LINT_{i,t} = \alpha + \beta_1 FCNE_{i,t} + \beta_2 NE_{i,t} + \beta_3 ALP_{i,t} + \beta_4 GITG_{i,t} + \varepsilon_{it} \quad (\text{Equation 2})$$

$$LNT_{i,t} = \alpha + \beta_1 FCNE_{i,t} + \beta_2 NE_{i,t} + \beta_3 ALP_{i,t} + \beta_4 GITG_{i,t} + \varepsilon_{it} \quad (\text{Equation 3})$$

The estimated results of these models are presented in Table 3. In this table, first three columns show the results where dependent variable is LINT, whereas last three columns indicate the results where dependent variable is LNT. As seen from the table, FCNE, GITG and ALP have positive and statistically significant effect on LINT. However, NE doesn't have any significant impact on LINT. Moreover, both ALP and GITG have positively significant impact on LNT, while NE is still insignificant. Surprisingly, unlike LINT, there is no statistically significant impact of FCNE on LNT. The results show that foreign controlled enterprises contributes more to the international freight volume of the countries compared to domestic ones; because of their advanced technologies, knowledge and skills in transportation and storage sector. We

also find out that investments in Transportation and Storage Sector and labor productivity seem determinants of both international and national freight volume of the countries. Finally, the

model shows that there is no evidence for an impact of national enterprises on international and national freight volume.

Table 3. The Impact of Selected Determinants of Freight Volume on Freight Volume

Variables	(1) LINT	(2) LINT	(3) LINT	(4) LNT	(5) LNT	(6) LNT
FCNE	0.225* (0.113)		0.234** (0.111)	-0.0327 (0.0718)		-0.0335 (0.0710)
GITG	0.152** (0.0654)	0.165** (0.0704)	0.150** (0.0623)	0.123** (0.0514)	0.103* (0.0536)	0.123** (0.0508)
ALP	0.461** (0.197)	0.740** (0.284)	0.376* (0.215)	-0.211* (0.118)	-0.186 (0.131)	-0.204 (0.138)
NE		0.0928 (0.103)	0.0797 (0.0670)		0.0128 (0.0509)	-0.00684 (0.0445)
Constant	5.714*** (1.234)	5.003*** (1.580)	5.184*** (1.327)	12.37*** (0.464)	12.10*** (0.673)	12.41*** (0.607)
Observations	213	236	213	222	246	222
Number of id	29	30	29	29	30	29

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the second step of analysis the impacts of selected variables such as number of foreign controlled enterprises (FCNE) and national enterprises (NE), amount of investment (GITG) and average personnel cost (APC) is examined to determine the factors affecting efficiency in transportation and storage sector (ALP). To do so, firstly, we run following regression model is given in Equation 4. The findings from this estimation are presented in first three Columns of Table 4.

$$ALP_{i,t} = \alpha + \beta_1 FCNE_{i,t} + \beta_2 NE_{i,t} + \beta_3 APC_{i,t} + \beta_4 GITG_{i,t} + \varepsilon_{it} \quad (\text{Equation 4})$$

In Table 4, the first column shows only the results that only the effect of FCNE is controlled on the ALP, whereas column (2) indicates the results that the impact of NE is controlled, solely. Column (3) gives results in which both the effect of FCNE and NE are measured in the same model. When these three columns are evaluated together, it is seen that both FCNE and NE have a statistically significant and positive effect on ALP. Since the coefficient of FCNE is higher than NE in the third column, we can deduce that the contribution of foreign controlled enterprises to the transportation and storage sector is higher compared to national enterprises. In addition, APC has a statistically positive significant effect on ALP in all three columns.

However, GITG has no significant effect on ALP. These results show that the increase in average personnel costs may increase the productivity of the sector, while investments in tangible goods may not have a direct effect on the productivity of the transportation and storage sector.

Based on the result of "average personnel costs have a significant impact on productivity", we take the analysis one step further. Considering that the difference in productivity resulting from wage differences between enterprises can change the effect of other variables, we re-estimate our model using a simple wage adjusted efficiency variable (SWALP). In this model, which is expressed in the Equation 5, we take the simple wage adjusted apparent labor productivity as a dependent variable. In this model, we don't include APC as an explanatory variable, since the effect of the wage, which we consider covers most of the personnel costs, is excluded by the dependent variable.

$$SWALP_{i,t} = \alpha + \beta_1 FCNE_{i,t} + \beta_2 NE_{i,t} + \beta_3 GITG_{i,t} + \varepsilon_{it} \quad (\text{Equation 5})$$

In Table 4, columns (4), (5) and (6) show the estimated results that the dependent variable is SWALP. In this table, columns (4)

and (5) show the results in which FCNE and NE have been added to the model separately, while column (6) shows the results where FCNE and NE have joined the model together. According to these results, both FCNE and NE have a statistically significant and positive effect on SWALP. However, GITG has no any significant effect on SWALP as in ALP. Also, the fact that FCNE's coefficient is higher than

NE in column (6) indicates that FCNE is a more effective variable than NE in terms of magnitude on SWALP. In summary, these results indicate that, even when the determinative impact of the wage differences on productivity is controlled, foreign controlled enterprises may make a higher contribution to sector productivity than national enterprises.

Table 4. The Factors Affecting Efficiency in Transportation and Storage Sector

Variables	(1) ALP	(2) ALP	(3) ALP	(4) SWALP	(5) SWALP	(6) SWALP
FCNE	0.155*** (0.0317)		0.156*** (0.0347)	0.135*** (0.0382)		0.130*** (0.0405)
GITG	0.0219 (0.0306)	0.0258 (0.0338)	0.0187 (0.0294)	0.00672 (0.0213)	0.00247 (0.0222)	0.00441 (0.0212)
APC	0.756*** (0.137)	0.780*** (0.120)	0.634*** (0.110)			
NE		0.0777*** (0.0173)	0.0789*** (0.0175)		0.0416*** (0.0142)	0.0383** (0.0142)
Constant	0.116 (0.417)	0.139 (0.372)	-0.272 (0.396)	4.154*** (0.265)	4.563*** (0.186)	3.813*** (0.291)
Observations	221	244	221	220	243	220
R-squared	0.396	0.372	0.432	0.141	0.020	0.159
Number of id	29	29	29	29	29	29

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

CONCLUSIONS

The transportation and storage sector, which is an important key factor for countries to gain superiority in international trade, is rapidly changing in terms of size and competition all over the world. This paper aims to explore the factors that affect the national or international freight volume and efficiency of the transportation and storage sector on the basis of nationality of the companies by conducting panel data including 30 European countries.

The empirical results suggest that investment in tangible goods and apparent productivity of labor serve as factors that are effective on both international and national freight volume. Besides, foreign controlled enterprises contribute only to international freight volume, unlike national freight volume. However, there is no evidence for an impact of national enterprises on international and national freight volume.

Moreover, the main findings in this study indicate that factors such as foreign controlled enterprises, national enterprises and average personnel cost can increase efficiency in transportation and storage sector. Indeed, the results suggest that foreign controlled enterprises seem to be a more influential than national enterprises in terms of contributing to the level of efficiency of transportation and storage sector. These results do not change even when the effect of wage differences on productivity is eliminated.

Based on the results, it can be inferred that foreign controlled enterprises make a significant difference in terms of both efficiency and freight volume in the sector compared to other firms.

On the one hand, this study provides important information for the players of the transportation and storage sector, on the other hand, it provides valuable information for the academicians working in this field. First of all, it will be useful to emphasize the fact that the

foreign controlled enterprises in the sector, which are mentioned in the literature and supported by the analysis results, are more efficient than the others. Accordingly, national enterprises which would like to gain competitive advantages in international arenas should more invest in tangible assets that provide technical progress and knowledge intensity. Secondly, companies that would like to increase their freight volumes should take more strategic investment decisions and take initiatives to increase their efficiency, since investment in tangible assets in the sector and apparent labor productivity affects both national and international freight volumes. Moreover, the fact that the average personnel costs incurred by companies in this sector contributes to the efficiency, indicates that firms should pay attention to satisfactory personnel requirements such as education, wage, social security, rather than their investments in tangible assets. Finally, the study is also guiding in academic sense. As far as we know, this study is the first study to examine the freight volume and efficiency of the transportation and storage sector, it adds a new dimension to relevant literature.

In this paper, results shouldn't be generalized in terms of the impact of determinants of transportation and storage sector because of the limitation of determinants. Therefore, the future research, can extend this study with using other potential determinants of this sector. Besides, a firm level analysis can provide stronger results for the link between factors that effect on freight volume and efficiency of transportation and storage sector.

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WYZNACZNIKI WIELKOŚCI PRZEWOZÓW I SPRAWNOŚCI W TRANSPORCIE I MAGAZYNOWANIU

STRESZCZENIE. Wstęp: Na podstawie analizy publikowanych prac dotyczących czynników mających wpływ na ich produktywność można stwierdzić, że firmy o kapitale zagranicznym osiągają większe sukcesy aniżeli firmy krajowe, dzięki posiadanemu technologicznemu know-how, łatwiejszemu dostępowi do kapitału oraz nowoczesnych sposobów zarządzania. Celem pracy jest, w oparciu o te badania, zmierzenie efektywności i sprawności przedsiębiorstw w sektorze transportowym oraz magazynowym, mający coraz większy udział w GDP w porównaniu do innych specyficznych dla przemysłu zmiennych takich jak narodowość czy wielkość przewozów, niewystępujących jednak w literaturze naukowej.

Metody: W celu wytypowania determinantów wielkości przewozów i efektywności dla sektora transportowego i magazynowania, do badania użyto modelu Fixed Effect Model. Za jego pomocą poddano analizie zagregowane dane z przedsiębiorstw w 30 krajach europejskich, uzyskanych na podstawie Eurostatu z okresu 2008-2018.

Wyniki: Uzyskane w pracy wyniki wskazują, że przedsiębiorstwa zagraniczne wykazują istotną różnicę w stosunku do przedsiębiorstw krajowych w obszarze zarówno efektywności jak i wielkości przewozów w badanych obszarach. Dane empiryczne sugerują, że inwestycje w dobra materialne jak również wzrost produktywności pracy to czynniki mające wpływ na wielkość transportu zarówno krajowego, jaki międzynarodowego. Nie stwierdzono jednak wpływu czynnika narodowościowego na wielkość transportu zarówno krajowego, jaki międzynarodowego.

Wnioski: Praca wykazuje istotność czynnika narodowościowego dla przedsiębiorstw, udziału krajowego jak i międzynarodowego w transporcie, produktywności pracy, jako determinantów wielkości przewozów oraz efektywności branży transportowej i magazynowej. Badania te powinny być kontynuowane przy uwzględnieniu w analizie poziomu przedsiębiorstwa.

Słowa kluczowe: sektor transportowy i magazynowania, przedsiębiorstwa zagraniczne, sprawność, wielkość przewozów, stały model efektywności

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