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SPECIFIC IMPACT OF THE COVID-19 PANDEMIC ON THE PROFITABILITY OF LOGISTICS COMPANIES BASED IN THE WESTERN BALKAN COUNTRIES

Specifičnost uticaja pandemije kovida 19 na profitabilnost logističkih kompanija u zemljama Zapadnog Balkana

Abstract

The aim of this paper is to theoretically and empirically present the effect of the Covid-19 pandemic on profitability. In difficult economic times caused by coronavirus, companies that supplied logistical services assisted other businesses in successfully conducting their daily business operations. On the other side, the pandemic has been a contributing factor in the massive interruption in transportation flows all over the world. The research was conducted on a sample of 798 active companies that operated within the logistics industry of the Western Balkans in the period from 2015 to 2020. An empirical research was performed using panel regression analysis. Evaluation of the fixed-effect models confirmed the existence of a positive and statistically significant impact of the Covid-19 pandemic on the profitability expressed through return on total assets (ROA) and return on equity (ROE). The results confirmed the specificity of the logistics industry, indicating that it is one of the few industries that have managed to achieve higher profitability during the crisis and recession brought by the pandemic in early 2020. Given that the logistics sector has played a vital role in supplying household supplies, medicines and medical equipment, the results could help logistics companies to further improve operational performance and risk management in pandemic situations, as well as to improve the resilience of their activities to future similar crises.

Keywords: *Covid-19, pandemic, profitability, logistics, Western Balkans*

Sažetak

Cilj rada je da se teorijski i empirijski predstavi uticaj pandemije virusa kovid 19 na profitabilnost. U otežanim ekonomskim uslovima izazvanim koronavirusom, kompanije koje su pružale logističke usluge omogućavale su drugim kompanijama da uspešno obavljanju svakodnevne poslovne operacije. S druge strane, pandemija je doprinela masovnom prekidu transportnih tokova širom sveta. Istraživanje je sprovedeno na uzorku od 798 aktivnih kompanija koje su poslovale u okviru logističke industrije Zapadnog Balkana u periodu od 2015. do 2020. godine. Empirijsko istraživanje sprovedeno je korišćenjem panel regresione analize. Procena modela sa fiksnim efektom potvrdila je postojanje pozitivnog i statistički značajnog uticaja virusa kovid 19 na profitabilnost izraženu kroz prinos na ukupnu imovinu (ROA) i prinos na kapital (ROE). Rezultati su potvrdili specifičnost logističke industrije, ukazujući da je ona jedna od retkih industrija koja je uspela da ostvari veću profitabilnost tokom krize i recesije koje je donela pandemija početkom 2020. S obzirom na to da je sektor logistike odigrao vitalnu ulogu u snabdevanju kućnih potrepština, lekova i medicinske opreme, rezultati bi mogli da pomognu logističkim kompanijama da dodatno unaprede operativne performanse i upravljanje rizikom u kriznim situacijama, kao i da poboljšaju otpornost svojih aktivnosti na buduća slična stanja.

Ključne reči: *kovid 19, pandemija, profitabilnost, logistika, Zapadni Balkan*

Introduction

The pandemic caused by the Covid-19 virus has brought numerous changes and limitations to the world economy as well as to national systems that have been established and unchanged over the years. According to the World Health Organization [45], by mid-February 2022, over 409 million cases and over 5.8 million deaths had been reported due to Covid-19 infection. According to the nature of the virus, most countries around the world introduced restrictions on the movement of people, goods, and capital, as the first step in reducing the spread of the virus, which weakened consumer power and deteriorated economies and industries around the world. Regardless of the alliances and unions of the countries that had established and respected the same rules in trade until then, the pandemic induced each country to decide individually on the rules that would be applied during the pandemic. These circumstances slowed down international trade and the supply chain, both between and within countries. The beginning of the pandemic was marked by the ban on the movement of individuals as well as the closure of traffic, which hit the transportation industry the hardest and led multinational companies to shorten supply chains and nationalize them [3].

The previous experience has confirmed that the coronavirus has affected different industries differently. Some industries, due to their nature, managed to effectively adapt to the external situation and increased sales, while some industries have long-term investments that could not be easily changed and adapted to new challenging conditions, such as unforeseen health pandemics [21].

The difficulty that was generated by the Covid-19 outbreak brought to light the fragile state of all areas, especially with regard to the acquisition of fundamental resources and the distribution of manufactured products to ultimate consumers [40]. The logistics sector belongs to the group of economic sectors that played a vital role during the Covid-19 virus pandemic, primarily in the organization of the supply of products that meet basic human needs such as food and medical products. The specificity of logistics as a branch of industry is that the coronavirus has caused increased demand in certain segments. Additionally, logistics companies provide support to other companies to conduct their business activities in challenging times. On the other hand, the pandemic has contributed to the major disruption in global traffic flows. The obligation to maintain physical distance between employees has caused major delays in many phases of transportation and storage. Many multinational companies were forced to hire a large number of additional employees in order to expand storage and transport infrastructure directly to consumers, rather than to retail facilities, which were mostly closed during the quarantine regime. Throughout the pandemic, companies faced a mismatch between supply and demand, technology, and supply chain development [38]. Furthermore, companies were exposed to additional costs such as equipment for preventing the spread of infection, increased wages for overtime or night work as well as increased material costs.

The contribution of this paper is reflected in the analysis of the impact of the Covid-19 virus on the profitability of companies in the logistics sector in the Western Balkans. Due to the vital role that the logistics sector played during the ban on movement, the research was conducted on a sample of companies from that sector. The first effects of the coronavirus were felt in the disruption of supply chains and international trade and transport [2]. Manufacturers or retailers, whether global or local, strived to provide a satisfactory level of product quality and safety to end consumers, what could be done using intelligent packaging, fast logistics and modern technology [18]. These factors are even more significant in times of crisis and recession. Moreover, one of the successful measures to create the resilience of companies to unforeseen circumstances caused by the pandemic is to accelerate the supply chain [32]. Furthermore, the countries of the Western Balkans are similar in political, historical, geographical, and economic characteristics. All countries are in transition, which states the degree of market development. Due to the nature of the area, the Western Balkans region is the subject of many studies, while it is not known that there exists academic research on the impact of the Covid-19 virus on the profitability of companies in the logistics sector. The manner in which the companies' profitability is affected by the shock of a

pandemic could be used as a basis for predicting profitable operations, as well as for forming a sustainable supply chain during future, primarily health, and even economic crises of similar type. Golubeva [16] confirms the importance of several factors for the profitability of companies during Covid-19: the sector to which companies belong, size, share in exports and market demand for products, indicating the importance of country-specific factors, including economic development and corporate management. The most significant academic contribution to this topic in the field of logistics was made by Atayah et al. [7], who, however, based their research on a sample of companies from the G20 countries, which are considered the most developed countries in the world, as well as Nguyen [29], whose research was based on a sample of Nigerian logistics companies. In this regard, there is a need to analyze the impact of the pandemic in European developing countries, such as the Western Balkans.

The paper structure is as follows. Firstly, we start with theoretical background and hypothesis development. Then, we present the data and the methodology, and then we show empirical results and discussion. In the end, the conclusion summarizes limitations and future recommendations.

Theoretical background

Logistics are considered as the main factor in the success of trade, both domestic and international, given that the organization, speed and cost of transporting goods from producers to consumers are a key segment of efficient and effective sales. The major advantage of logistics for all participants in the supply chain is the most efficient usage of time and resources, considering that goods have their value only if they are in the exact place at the accurate time [31]. Traffic is a bond between all branches of the economy, synthesizing production processes from different sectors [49]. Improved performance of the logistics sector increases business opportunities as well as gross domestic product (GDP) in favor of the national economy [44]. Generally, there is a significant increase in the logistics industry, which in recent years has been one of the factors for increased productivity of other companies.

The Covid-19 pandemic has tested a globally connected economy. Global trade and social activities were interrupted due to required social distance. Great consequences are noticeable for health, economy, environment and society [47]. The biggest indicator, in economic terms, is stock market reactions that are interrelated with the severity of coronavirus outbreaks in each country. The great uncertainty of the pandemic has led to markets becoming very volatile and unpredictable [48]. Empirical results of Najaf and Chin [26] show that the value of the Chinese stock exchange, as one of the leading in the world, and the number of Covid-19 cases significantly affect the trends of other foreign stock exchanges. The results showed a significant relationship between the variability of stock markets in China and other global stock markets, which means that the volatility of global stock markets at some point is explained by yesterday's closing value at the Chinese stock market.

Companies are facing new aggravating circumstances such as a sharp drop in demand, supply chain disruptions, termination of business arrangements, primarily related to foreign markets, lack of raw materials, delays in deliveries, increased input costs and distortions in transport networks [9]. The impact of reduced economic activity has also affected industrial energy consumption, with reduced production capacity and reduced transport levels improving environmental quality in terms of reducing emissions, especially in highly industrialized countries such as the US and China [41]. Baker et al. [8] analyzed trends in the U.S. stock market since 1900, concluding that no previous epidemic of infectious diseases, including the Spanish flu, had affected the stock market as strongly as the Covid-19 pandemic, naming key reasons social distancing as well as restrictions in the provision of service activities.

There are different views when it comes to the direction of the impact of the Covid-19 pandemic on financial performance, i.e. profitability and yield. Atayah et al. [7] analyzed the logistics sector on a sample of 565 companies based in G-20 countries and concluded that, on average, logistics companies increased their financial performance by 123% and 391%, respectively, taking into account ROA and ROE as profitability indicators. Moreover, the results of the study showed that the impact of the

pandemic varies between countries, with 14 of the 20 countries significantly increasing financial performance, while in 6 countries the pandemic had a negative impact on profitability. Amnim et al. [4] analyzed the impact of the Covid-19 pandemic on the profitability and liquidity of companies in Nigeria in the consumer goods and healthcare sector, concluding that there is a statistically significant and positive impact of the pandemic on company profitability. In addition, the authors state that retail companies will feel the milder consequences of the Covid-19 pandemic if they have developed flexible models of supplying and distributing products to customers. Devi et al. [14] included 214 companies from nine sectors in the analysis. The research showed that under the influence of the pandemic, increased profitability was observed in the consumer goods sector, while in contrast, profitability fell in the sectors of trade, transport, utilities, infrastructure, real estate, finance, and investment.

Based on the financial reports of 114 companies operating in the logistics sector in Vietnam, Nguyen [29] concluded that the pandemic has a negative impact on profitability, and that the coronavirus has a global impact on supply chains. Additionally, the author states that export activity and international transport difficulty develop, with the chance of expansion only for domestic logistics companies. Kubiczek & Derej [21] analyzed revenue trends before and after the beginning of the coronavirus pandemic by industry on a sample of companies listed on the Warsaw Stock Exchange. The results showed that the tourism sectors, the oil industry as well as the transport and logistics sector achieved the largest decline in revenue in 2020, compared to 2019. Shen et al. [39], by analyzing joint-stock companies based in China, concluded that there is a negative and statistically significant impact of the pandemic on profitability, with the negative impact being more pronounced when the volume of investment or sales revenue is lower. Rababah et al. [34] confirmed such results, concluding that small and medium-sized companies are more affected by the pandemic, in terms of financial performance. Xiong et al. [46] analyzed companies based in China, considering 3,518 observations. They concluded that larger companies, companies with higher profitability, higher growth potential, higher indebtedness, and companies with a smaller share of fixed assets are subject to the less negative impact of the pandemic compared to other companies. Hope et al. [19], analyzing the results of a questionnaire obtained from the owners of private companies in Nigeria, concluded that the pandemic caused by the Covid-19 virus negatively affects financial and non-financial performance. Ding et al. [15], using panel analysis of financial data of 6,700 companies, concluded that the decline in stock returns caused by the pandemic was slighter in companies with higher profitability before 2020 as well as in companies less involved in global supply chains.

Considering the aim and problem of this paper as well as the previous conclusions of other authors, the hypotheses that will be tested within the research are the following:

H1: There is a negative and statistically significant impact of the Covid-19 virus pandemic on the profitability of companies within the logistics sector in the Western Balkan countries.

H2: The impact of the Covid-19 virus pandemic on the profitability of companies within the logistics sector differs between the countries of the Western Balkans.

Data and methodology

The aim of the research conducted in this paper is to analyze the impact of the Covid-19 pandemic on the profitability of logistics companies based in the Western Balkans, consisting of Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia. According to the Regulation on Classification of Activities [36], the sample includes companies whose activities are registered within sector H – Transporting and storage, under some of the following activity codes: 49.20 Freight rail transport, 49.41 Freight transport by road, 50.20 Sea and coastal freight water transport, 50.40 Inland freight water transport, 51.21 Freight air transport, 52.10 Warehousing and storage, 52.21 Service activities incidental to land transportation, 52.22 Service activities incidental to water transportation, 52.23 Service activities incidental to air transportation, 52.24 Cargo handling, 52.29 Other transportation support activities. The sample includes 798 active companies

operating in the period between 2015 and 2020, forming 4,788 observations. As source of data for the purposes of this research was used TP Catalyst database [11]. The dependent and independent variables used to test the models are shown in Table 1, which further shows the formulation as well as an overview of the authors who used the equal variables in their research.

Empirical results and discussions

Table 2 shows the results of descriptive statistical analysis for all variables used in the models. Due to the existence of extreme values, the use of median is preferred over the arithmetic mean when analyzing the average values. The median value of the variable ROA and ROE is 6.3% and 13.8%, which indicates a sufficient level of profitability of logistics companies from the sample. Also, the results show that the asset structure is slightly oriented towards fixed assets, which is expected given the type of activity that requires ownership of storage space, related infrastructure, and valuable fleet, especially for companies engaged in shipping by air, sea, or rail. In addition, the capital structure indicates that the analyzed companies operate according to the principle of traditional financing, maintaining a balanced level of own and borrowed resources. The median value of the liquidity variable is 1.4, which confirms that there is a low level of current liquidity, indicating a reduced ability of the companies in the sample to settle their short-term liabilities using current, liquid assets.

The first assumption regarding the direction and significance of the linear relationship between the variables will be made based on the results of Pearson's coefficient of correlation, presented in Table 3. The correlation matrix indicates the existence of a statistically significant influence between all independent variables and profitability variables ROA and ROE, except for the linear relationship between growth and ROA and gross domestic product and ROA. In addition, there is a positive linear relationship between the Covid-19 pandemic and the profitability indicators, which leads to the rejection of H1, i.e. the assumption that

Table 1: Overview of types, variable names, formulations and source literature

Variable type	Variable name	Variable formulation	Source literature
Dependent variables	Profitability	ROA	[7], [14], [15], [18], [20], [23], [25], [28], [29], [34], [39], [42], [43], [46]
	Profitability	ROE	[4], [5], [7], [28], [29], [30], [34], [41]
Independent variables	Size	Ln Total assets	[1], [7], [15], [19], [20], [22], [29], [34], [39], [42], [46]
	Asset structure	Fixed assets/Total assets	[18], [19], [20], [22], [23], [24], [25], [28], [30], [46]
	Capital structure	Total debt/Total assets	[1], [7], [14], [18], [19], [23], [25], [28], [39], [42]
	Growth	$(Sales_t - Sales_{t-1})/Sales_{t-1}$	[1], [18], [23], [24], [42]
	Liquidity	Current assets/Current liabilities	[4], [14], [18], [20], [22], [23], [24], [25], [28], [29], [30], [42]
Control variables	Covid-19 virus pandemic	Covid-19	[4], [5], [7], [14], [15], [26], [39]
	Gross domestic product	GDP	[6], [7], [15], [22]
	Inflation	CPI	[7], [10], [22], [30], [33], [35]

Source: Authors' calculations

Table 2: Results of descriptive statistics

Variable name	Number of observations	Median	Arithmetic mean	Minimum	Maximum	Standard deviation
ROA	4,788	0.063	8.547	-69.275	82.037	9.625
ROE	4,788	0.138	18.591	-253.666	837.273	25.794
Size	4,788	7.032	7.074	2.376	12.030	1.090
Asset structure	4,788	0.522	0.491	0.000	0.993	0.225
Capital structure	4,788	0.495	0.487	0.002	10.114	0.287
Growth	4,788	0.075	0.627	-1.000	1778.145	25.919
Liquidity	4,788	1.410	2.457	-0.027	84.894	4.099
Covid-19 virus pandemic	4,788	1.000	0.833	0.000	1.000	0.373
Gross domestic product	4,788	3.089	2.263	-15.307	5.078	2.263
Inflation	4,788	1.392	1.152	-1.584	3.131	1.152

Source: Authors' calculations

Table 3: Results of the Pearson's correlation coefficient

Variable name	ROA	ROE	Size	Asset structure	Capital structure	Growth	Liquidity	Covid-19	GDP
ROA	1								
ROE		1							
Size	-0.1880**	-0.1240**	1						
Asset structure	-0.2323**	-0.1767**	0.2690**	1					
Capital structure	-0.2613**	0.0939**	-0.0080	-0.0325*	1				
Growth	0.0127	0.0521**	-0.0145	-0.0049	0.0228	1			
Liquidity	0.1732**	-0.0355*	-0.0439**	-0.2007**	-0.3804**	-0.0087	1		
Covid-19	0.0774**	0.0808**	-0.0987**	0.0055	0.0031	0.0097	-0.0382**	1	
GDP	0.0254	0.0375**	-0.0381**	0.0427**	0.0211	0.0012	-0.0740**	0.8557**	1
Inflation	-0.1632**	-0.1098**	0.1010**	0.0870**	0.0387**	0.0233	-0.0381**	0.1272**	0.1525**

** - level of significance 1%; * - level of significance 5%
Source: Authors' calculations

there is a negative and statistically significant impact of the Covid-19 pandemic on the profitability of companies in the logistics sector in the Western Balkans.

To finally assess the impact of the coronavirus pandemic, as well as other microeconomic and macroeconomic variables, on the profitability of logistics companies based in the Western Balkans, which operated in the period from 2015 to 2020, panel regression analysis will be used. The impact will be measured through two models – a model in which profitability is represented by the return on total assets (ROA), and through a model in which it is presented through the determinant of return on total equity (ROE). Further, the following models will be evaluated:

$$ROAit = \beta it + \beta 1\ AS + \beta 2\ CS + \beta 3\ GR + \beta 4\ LIQ + \beta 5\ COVID + \beta 6\ GDP + \beta 7\ INF + uit \quad (1)$$

$$ROEit = \beta it + \beta 1\ AS + \beta 2\ CS + \beta 3\ GR + \beta 4\ LIQ + \beta 5\ COVID + \beta 6\ GDP + \beta 7\ INF + uit \quad (2)$$

Abbreviations are following: *i* is for each company (i = 1,2,3…, n), *t* is for each year (t = 1,2,3…, 10), *AS* is for the asset structure, *CS* is for the capital structure, GR is for growth, *LIQ* is for liquidity, *COVID* is for pandemic caused by Covid-19 virus, *GDP* is for gross domestic product and *INF* code for inflation.

Before starting the panel regression analysis, it is necessary to test the premises for the application of the chosen method. One of the few basic assumptions for the application of panel analysis is that the independent variables are not highly correlated with each other, i.e. that there is no presence of multicollinearity. Table 4 displays the test of multicollinearity of independent variables using Variance Impact Factors (VIF) and 1/VIF coefficients for both set models.

Considering that the results of VIF coefficients for all variables are less than 10 and the results of TOL coefficient (1/VIF) are higher than 0.1, it could be concluded that there is no multicollinearity in the models predetermined for the assessment of hypotheses. In further analysis, the presence of heteroskedasticity and autocorrelation was tested, as two additional basic assumptions of the panel regression analysis method (see Table 5).

Since the results of the Wooldridge test show that the value of p is lower than the level of significance threshold of 5% in both formed models, the presence of autocorrelation was confirmed. To investigate the presence

Table 4: Multicollinearity test results

Variables	VIF	1/VIF
Size	1.11	0.9050
Asset structure	1.14	0.8751
Capital structure	1.19	0.8412
Growth	1.00	0.9984
Liquidity	1.24	0.8059
Covid-19	3.81	0.2626
GDP	3.81	0.2622
Inflation	1.04	0.9603

Source: Authors' calculations

Table 5: Heteroskedasticity and autocorrelation test results

	ROA - Model 1		ROE - Model 2	
Test	Test statistic value	p - value	Test statistic value	p - value
Wooldrige test	47.796	0.000	1553.13	0.000
Breusch-Pagan/ Cook-Weisberg test	896.73	0.000	3.157	0.061

Source: Authors' calculations

of heteroskedasticity, the Breusch-Pagan/Cook-Weisberg test was used. The result of the p value for model 1 is below the level of significance threshold of 5%. In this regard, the presence of heteroskedasticity for model 1 was confirmed, while the value of p for model 2 is above the level of significance threshold of 5%, therefore, we conclude the absence of heteroskedasticity for model 2. Due to the violation of basic assumptions for the use of panel regression analysis, it is necessary to transform the model for adequate further evaluation. Finally, the transformed regression models whose evaluation led to conclusions about the acceptance or rejection of H_1 are shown in Table 6.

The results of the F test ($p < 0.01$) indicate a high statistical significance of the evaluated models. Also, considering the value of the coefficient of determination, it can be concluded that profitability expressed on the basis of ROA is explained with 13.55%, while profitability expressed through ROE is explained with 12.45% influence of selected independent variables. The obtained results of the evaluation of the transformed model using panel regression analysis indicate the positive impact of the coronavirus pandemic on the profitability of companies in both formed models. In this regard, H1 is partially accepted or rejected. In other words, it is confirmed that there is a positive and statistically significant impact of the Covid-19 virus pandemic on the profitability of companies within the logistics sector in the Western Balkans. The results are consistent with the conclusions of Atayah et al. [7] and Amnim et al. [4]. These results confirmed that the logistics sector is one of the few sectors that received a chance to grow and improve profitability during the coronavirus pandemic, despite movement restrictions. It proves necessary to emphasize the flexibility of the logistics sector, which managed to respond to the new situation in the local and international market in a very short period, caused by high demand for consumer goods, increased raw material costs, shortened delivery times and introduced epidemiological measures. Furthermore, the results of the transformed models indicate asset structure, capital structure, growth, gross domestic product, and inflation as significant determinants of profitability expressed by ROA, while statistically significant determinants of profitability expressed by ROE indicators are asset structure, growth, liquidity, gross domestic product and inflation.

Table 6: Results of the evaluation of transformed regression models 1 and 2

Variables	ROA Model 1		ROE Model 2	
	Coefficient	p	Coefficient	p
Size	0.5812	0.335	2.0365	0.274
Asset structure	-12.9011	0.000	-29.4221	0.000
Capital structure	-7.5030	0.005	-10.4785	0.000
Growth	0.0042	0.023	0.0299	0.000
Liquidity	0.0637	0.402	-0.1720	0.053
Covid-19	5.0586	0.000	14.1227	0.000
GDP	-0.4365	0.000	-1.3068	0.000
Inflation	-1.0205	0.000	-1.8301	0.000
Constant	12.2157	0.006	17.4414	0.180
Number of observations	4,788	4,788		
R^2	0.1355	0.1245		
F test	17.76	22.47		
p value (F)	0.000	0.000		

Source: Authors' calculations

The second hypothesis (H_2) states that there is a difference in the impact of the coronavirus pandemic on the profitability of companies within the logistics sector between the Western Balkans. To test the second hypothesis, the sample was divided into the countries of the Western Balkans. Considering the size of the countries and the size of their economy, the sample did not include the same number of companies from each country. Further, although Albania belongs to the Western Balkans, after setting the total assets as search criteria, the search eliminated all companies from that country. Table 7 shows the distribution of the number of active companies in the field of logistics according to the countries covered by the sample.

Table 7: Overview of the number of sampled companies by country of residence

Countries of the Western Balkans	Number of companies	Number of observations	Percentage participation
Albania	0	0	0%
Bosnia and Herzegovina	208	1,248	26.07%
Montenegro	10	60	1.25%
North Macedonia	112	672	14.03%
Serbia	468	2,808	58.65%
Total	798	4,788	100%

Source: Authors' calculations

Given that companies from different countries have different percentages of participation in the overall sample, it is necessary to individually test the impact of the coronavirus pandemic on profitability within each country. In that manner, the H_1 would be supported and H_2 will be tested. Table 8 shows the results of a panel regression analysis of the impact of Covid-19 on profitability within the Western Balkan countries.

Table 8: Impact of Covid-19 on the profitability of companies in individual countries of the Western Balkans

Countries of the Western Balkans	ROA Model 1		ROE Model 2	
	Coefficient	p	Coefficient	p
Bosnia and Herzegovina	2.0722	0.773	-13.2843	0.573
Montenegro	39.7067	0.450	-27.9497	0.829
North Macedonia	7.3328	0.037	9.7075	0.158
Serbia	5.8880	0.000	17.1246	0.000

Source: Authors' calculations

The results of the panel regression analysis by individual countries indicate the existence of a positive impact of Covid-19 on the profitability of companies operating in the logistics field, expressed by return on assets, in all Western Balkan countries, while such an impact is considered statistically significant only in North Macedonia and Serbia. Considering model 2, which assesses profitability through the return on equity, the results showed the existence of a negative impact of the Covid-19 on profitability, in the absence of statistical significance in Bosnia and Herzegovina and Montenegro. However, in the case of North Macedonia, there is a positive impact of the pandemic on the financial performance of logistics companies, also in the absence of statistical significance, while in the case of Serbia there is a positive and statistically significant impact of Covid-19 on company profitability. In this regard, we conclude that H2 is confirmed. The impact of the Covid-19 pandemic on the profitability of companies within the logistics sector differs between the countries of the Western Balkans. Finally, it could be concluded that the positive and statistically significant impact of the Covid-19 virus on the profitability of companies in the Republic of Serbia and North Macedonia is partly influenced by the measures taken by governments to mitigate the financial consequences of the pandemic. In Serbia, the total value of the package of measures aimed at the population and the economy introduced in 2020 is about 12.5% of GDP [27]. The measure of the greatest help and influence in the Republic of Serbia refers primarily to direct benefits in the form of payment of three minimum wages, which is considered to have had a high contribution to the survival of micro, small and medium enterprises, while large enterprises are subsidized in the amount of 50% of the prescribed minimum wage for staff granted paid leave due to reduced business volume or complete suspension of business [37]. In addition, the package of measures included the postponement of the tax payments and contributions on salaries for the private sector, the postponement of the corporate income tax advance payment, the moratorium on the repayment of installments of loans and leasing, as well as interest-free liquidity loans.

As for North Macedonia, the measure dedicated especially to the logistics sector refers to the subsidizing of obligatory contributions of employees in the amount of up to 50% of the average salary paid in 2019 in the tourism, the transportation, and the hospitality sector. In addition, the Government of North Macedonia has decided to completely exempt from import duties on imports of vital products, as well as medical supplies and equipment needed during the coronavirus crisis. All employees in private companies affected by the crisis caused by the spread of the coronavirus pandemic have been provided with compensation in the amount of the minimum wage of employees financed from the budget. In addition, the Development Bank of North Macedonia provided interest-free loans to small and medium-sized companies, while the government allowed a moratorium on loan payments [17].

To additionally confirm the significance of the impact of the Covid-19 crisis on the profitability of logistics companies, a placebo test was performed to analyze whether logistics companies have better financial results due to the change in the financial year. The test was conducted in a manner that the financial data of 2020 were excluded from the sample, and 2019 was set as the pandemic year. Table 9 shows the results of the placebo test for presented models, except for 2020.

Comparing the results of the evaluation of the original models and the results of the placebo test conducted in Table

Table 9: Placebo test for Model 1 and Model 2

Variables	ROA Model 1		ROE Model 2	
	Coefficient	p	Coefficient	p
Size	-0.9950	0.000	-1.4306	0.000
Asset structure	-7.9470	0.000	-16.1634	0.000
Capital structure	-10.6460	0.000	23.1501	0.000
Growth	0.0063	0.190	0.0445	0.001
Liquidity	0.0385	0.361	0.2273	0.062
Covid-19	0.6398	0.085	1.8139	0.090
GDP	-0.6207	0.000	-1.5779	0.000
Inflation	-1.0898	0.000	-2.5451	0.000
Constant	27.6610	0.000	32.3354	0.000
Number of observations	4,788	4,788		
R^2	0.1748	0.0932		
F test	105.41	51.17		
p value (F)	0.000	0.000		

Source: Authors' calculations

9, the significance of the impact of Covid-19 virus on the profitability of logistics companies could be noticed. The placebo test, excluding the pandemic year 2020, showed that the impact of the Covid-19 pandemic was positive, but not statistically significant, while in the originally tested regression models, which includes 2020, the results show a statistically positive pandemic impact on profitability. Exactly previously presented comparison confirmed that the increase in the profitability of logistics companies is not due to the change in the financial year, but due to the increase in demand for logistics services during the pandemic period. This test proves the results of the originally tested regression models 1 and 2 of this study. It could be concluded that despite difficult circumstances and disruption of movement of people and goods during the isolation period due to attempts to reduce Covid-19, companies operating in the logistics sector managed to meet customer needs and to maintain or establish a positive financial result and profitability.

Conclusion

The crisis caused by the Covid-19 pandemic pointed to the vulnerability of all industries, especially in the supply chain segment, primarily in the procurement of raw materials as well as the distribution of finished products to end customers. In this regard, the aim of the research conducted in this paper is to focus on the logistics industry, which played a vital role during the pandemic in the supply of vital goods and medicines during the strictly required distancing of people. The purpose of the paper is to show the extent to which the Covid-19 pandemic affected profitability, as a measure of company success, through two dimensions. Firstly, the impact of the pandemic on the profitability of companies operating in the logistics sector based in the Western Balkans – Albania, Bosnia and Herzegovina, Montenegro, Northern Macedonia, and Serbia. Furthermore, the differences in the effect of the pandemic on financial performance between the countries of the Western Balkans were observed. The analysis was performed using Pearson's correlation coefficient and panel regression analysis. The results indicated the existence of a positive and statistically significant impact between the coronavirus pandemic and the profitability of active companies in the logistics sector, based in the Western Balkans, which operated from 2015 to 2020. Moreover, the results of the analysis of the pandemic impact on the profitability within individual countries, confirmed that there are dissimilarities between the influences of the pandemic on profitability between the countries covered by the sample.

One of the limitations of the research presented in this paper is that at the time of conducting the analysis, the Covid-19 pandemic was still ongoing, with an unforeseen course in the future. Given that Covid-19 could have a long-term effect, the research conducted in this paper could be the basis for a more detailed investigation of the same topic, including new, alternative performance measurements in challenging and rapidly changing times. In this regard, the next research on this topic can be subsequently compared in terms of time. Despite all the limitations, this research contributes to the existing literature in terms of additional results regarding the Covid-19 virus pandemic. The results of the research are of great benefit to logistics companies in terms of understanding the impact of crises on the financial performance of the company. In this way, logistics companies will be able to focus on finding new business models that would be even more resilient to external shocks, with the possibility of faster recovery. In addition, the results presented in the paper confirmed the positive effects of digitalization and contactless business, which would most likely remain

represented after the end of the pandemic. Although it is difficult to predict the final economic impact of the epidemic caused by the Covid-19 virus, the crisis that has occurred has reminded companies of the constant presence of the risk of business interruptions. On the other hand, research is also important to public bodies in their formulation of public and corporate governance strategies regarding future preparedness and emergency responses. Furthermore, investors could use the presented results to predict fluctuations and trends in the level of return on investment in companies in the logistics sector, especially in times of crisis and recession.

Recommendations for further research are related to the consideration of other variables that may have an impact on profitability. Also, future research should focus on a more detailed analysis of the logistics sector in individual countries, considering the set of measures and constraints adopted by each country individually. In addition, it is necessary to analyze the logistics subsectors in more detail and to consider changes in the profitability of certain modes of transport, as well as the part of logistics related to warehousing. It was different types of transport that had different treatments during the ban of movement, which simultaneously caused a large increase in costs and decrease in operating revenues. In addition, each subsequent survey should be expanded with financial data from 2021 and 2022, which is a limitation of the analysis conducted in this paper, due to the unavailability of data at the time of analysis.

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