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Original article

INTERNATIONAL TRADE FLOWS OF THE BALKAN STATES

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Abstract: International economic relations are immensely important for small economies, such as the countries of the Western Balkans (WBC). The importance of economic relations is a key link in the overall economic growth and development, especially in international trade in goods. This paper analyses international trade flows of the WBC and the EU using the gravity panel data model in the period from 2006 to 2020. The research aims to assess the international trade flows between the Balkan countries and the EU, bearing in mind that they conduct the largest volume of trade with the EU member states. Simultaneously, this approach will enable a clearer view of the economic relations of candidate countries during the EU negotiation process for potential membership. The results indicate that the highest volume of trade is achieved with wealthy economies, measured by the development of the economy and the size of the market measured by the number of inhabitants, while the lowest volume of trade is achieved with distant economies. The use of the gravity model in its basic form provides satisfactory model estimates, while the extended model provides additional information on mutual commodity flows with additional variables and dummy variables in the model.

Keywords: international trade, gravity panel data model, Western Balkans, EU

INTRODUCTION

Regional integrations, such as the European Union, as a rule, present a significant economic undertaking for small, underdeveloped economies. The concept of regional integration is based on Mundell's theoretical concept of the optimal currency area (1961), according to which economies become part of the integration in order to realise the benefits of the single market and currency (Ristanović, 2017). The

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theoretical concept of economic cooperation starts from the assumption that two economies find the absolute and relative advantages of each economy separately, which can provide the potential for mutual trade growth. The rule is that economies achieve the largest volume of trade in goods and services with neighbouring economies. At the same time, the effects on trade are greater when the neighbouring economy is more developed and has a larger market. However, the advantages of such economies sometimes become less relevant compared to developed regional integrations. Therefore, it is not surprising that economies tend to join various regional integrations, such as the European Union. The direction of the Balkan states towards such integration is a natural, economically rational, and geographically justified procedure because it helps to overcome the limitations in the flow of capital, goods, services, people, and ideas. In the process of achieving the socio-political values of European countries, economic relations present an important idea. Developing commodity trade is only a support to the overall process of joining the European Union, and it is not surprising that these countries in the largest trade capacity realise trade in the integrated market of goods, production factors, and services.

Trade between the Balkan states (Serbia, Montenegro, Bosnia and Herzegovina, North Macedonia, and Albania) and the EU is very high. This has been going on for decades. All this unequivocally points to the fact that the EU member states are the most important foreign trade partners for these countries. The total share of the foreign trade of the Western Balkans with the EU exceeds 60%. Moreover, the share of total foreign trade is high (exceeding 100% of GDP in certain years), which clearly shows that foreign trade plays an important role in the economies of small Balkan economies.

The period in which the analysis was conducted, from 2006 to 2020, was a period of crisis and instability, especially for the EU member states. During the analysed period, the European market was struck by the financial crisis of 2008, followed by the crisis of the real sector in 2012, and by the pandemic in 2019. At the same time, it is a period of intense activity in the process of the Balkan states' joining the European Union. Therefore, according to the author, the period for the analysis is relevant, and the economic environment was the same for all economies on the continent. In such circumstances, it was justified to measure and evaluate the trade flows.

Due to these instabilities in trade, the idea is to analyse the estimates through the analysis of trade flows of the Balkan countries with their partners from the European Union in order to stabilise and, possibly, increase them. The research aims to determine the impact of the basic determinants of the economy on trade flows between the Balkan countries and the EU. The subject of research is the econometric assessment of these impacts and the modelling of bilateral trade through the econometric model. For that purpose, the gravity model has been chosen, whose application in international trade gives an assessment of the trade flows of two

countries. The obtained results can be compared with the achieved ones, and valid conclusions can be drawn about future activities in economic policy.

We found the justification for choosing the gravity model for the analysis of trade flows between the Balkan states and the EU in its simplicity and practical application. The model provides a possibility to present the directions of trade in goods with foreign trade partners, as well as the potential growth of trade, which is the goal of this research. At the same time, the gravity model fails to explain certain features of economies in foreign trade, such as fragmented exports, low trade volume, insufficient export range, high import dependence, etc. These features of foreign trade, typical for the Western Balkans, are not part of this analysis.

To evaluate the gravity model, it is necessary to provide relatively available comparable data by country. In order to analyse the gravity panel data model, it is necessary to take into account the effects of space and time. The evaluation of the panel in relation to the cross-sectional data (N) and the time-series data (T) offers greater variability and a greater degree of freedom, which reduces collinearity among the explanatory variables in the model. The advantage of this combination (NT board data) is that it enables and helps analyse the structure of trade and changes in trade over time.

The basic hypothesis of the research is that the economic determinants that can affect the trade flow between two countries arise from the size of their economies and the distance between them. In addition to the null hypothesis, there are two secondary hypotheses in the research. The first is that the more developed the economies are, the greater the impact on trade flows. The second one is that the more distant the economies that trade with each other, the smaller the impact on trade flows.

The paper consists of six parts. After the introduction, the flow of foreign trade of the Western Balkans is presented. The third part presents the literature review of the gravity model and its application in similar research. The gravity model is presented in the fourth part (methodology), after which the results of the obtained model estimates for all economies are presented separately. Finally, at the end of the paper is the conclusion.

TRADE IN THE WBC

Regional integration can expand markets and input sources, allocate resources across the region in a better way, and improve risk sharing, which leads to accelerating economic growth. Obviously, there are also negative risks, such as spreading the potential profit more easily, which can lead to growing income inequality and the polarisation of a single market (ADB 2013, 41). Small economies in the Balkans, although they may have different preferences when it comes to regional integration,

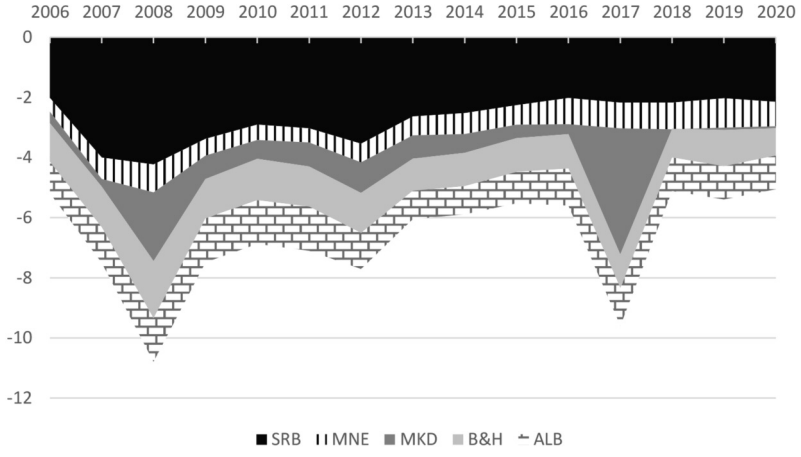
strive to expand international economic relations through the EU's integrated market. It is often difficult to assess the impact of regional integration on trade flows, as indicated by the following results of the assessed econometric model of the analysed Balkan states: Serbia, Montenegro, Bosnia and Herzegovina, North Macedonia, and Albania. Moreover, the availability and benefits of regional integration also attract developed economies. According to the official data of the Australian Government (2022), Australia currently has 15 free trade agreements with 26 countries. Australia is currently negotiating new bilateral and regional free trade agreements.

In recent years, the Balkan countries' regional structure of foreign trade has significantly improved: the share of developed countries has increased, and there has been an increase in the share of trade with the EU members with whom there was no trading to such an extent, if at all. The question is whether, given the existing level of development and economic structure of the Western Balkan countries, trade with the EU member states can be expanded further.

The trade exchange at the CEFTA level has recorded a decline in recent years, partly due to the growing trend in trade with the EU members, but also due to the well-known fact of intolerance and the ongoing political situation. Before the trade flows are econometrically assessed in the following part of the paper, the subject of this part of the paper will be the trade opportunities of the Balkan economies and the role and structure of trade within their economies. The emphasis will certainly be on trade with the EU in order to assess the state and potential flows and the possibilities for future growth of trade with the EU based on the following analysis.

The volume of trade between the countries of the Western Balkans and the EU recorded a growing trend until 2008 when the financial crisis of global proportions occurred. The crisis in the EU member states, caused first by the financial turmoil in 2008 and then by the recession in the real sector in 2012, was accompanied by a lower level of trade with the Balkan economies. The recovery in the trade followed in the coming years (after 2016), but was soon slowed down again due to the consequences of the COVID-19 pandemic. According to official data from the Trade statistics for international business development database, the countries of the Western Balkans have a continuous deficit in trade with the EU (Figure 1).

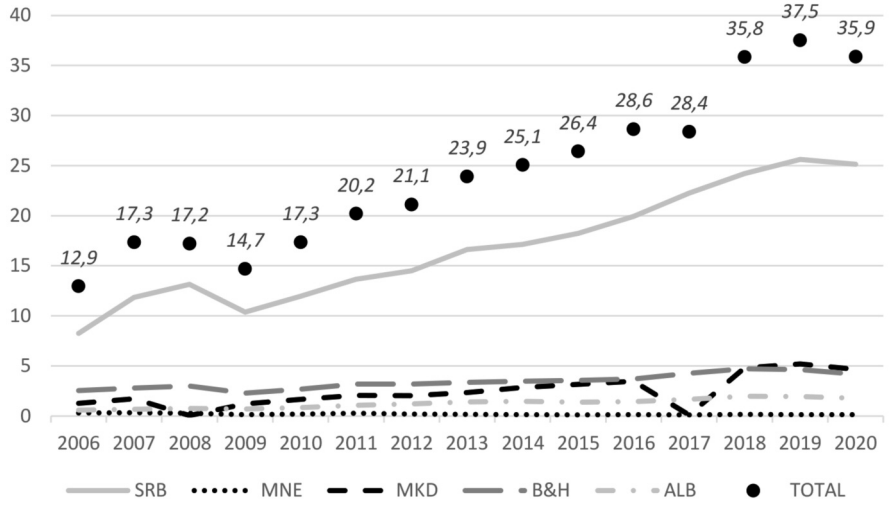
Figure 1: WBC's trade deficit with EU members, 2006-2020, in bil. EUR



Source: The author's calculation based on Trade statistics for international business development.

The volume of total trade (exports + imports) of the Balkan countries with the EU is continually growing (Figure 2). In the analysed period, individually observed by countries, the largest part of the total trade with EU members was realised by Serbia. Serbia's share of total trade with the WBC and the EU ranged from 64% in 2006 to 78% in 2017.

Figure 2: WBC's total trade with EU members, 2006-2020, in bil. EUR



Source: The author's calculation based on Trade statistics for international business development.

The positive trend in total trade is accompanied by a better structure of trade. Namely, in the structure of trade, according to Eurostat data for the period 2009–2019 (Table 1), products of the manufacturing industry dominate (over 70%) compared to primary products. In recent years, the ratio of products of the processing industry to primary products has increased, which has certainly been reflected in a lower trade deficit. In fact, the products of the processing industry have higher prices in the markets compared to the prices of primary products.

Table 1: EU-27 exports to the Western Balkans by main groups, 2009-2019, percentage

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Primary goods											
Food and drink	10.7	10.2	10.0	10.5	10.8	10.8	10.7	10.4	10.0	10.0	10.7
Raw materials	2.6	3.2	3.4	3.2	3.0	2.7	2.6	2.3	2.6	2.3	2.5
Energy	9.0	11.8	14.9	16.2	12.8	12.8	10.6	8.8	10.7	9.8	10.3
Manufactured goods											
Chemicals	14.9	15.1	14.4	14.8	14.9	14.4	14.7	14.7	14.3	15.5	14.3
Machinery and vehicles	28.4	25.6	25.8	24.9	27.2	27.6	28.9	30.2	29.4	29.6	29.9
Other manufactured goods	32.6	32.8	30.8	29.5	30.5	31.0	31.5	32.9	32.3	32.1	31.6
Other goods											
Other goods	1.7	1.3	0.8	0.8	0.8	0.7	1.0	0.7	0.7	0.7	0.8
Total	100	100	100	100	100	100	100	100	100	100	100
Primary	22.3	25.3	28.2	29.9	26.6	26.3	23.9	21.5	23.3	22.1	23.5
Manufactured	76.0	73.5	71.0	69.3	72.6	73.0	75.1	77.9	76.0	77.2	75.7
Manufact./primary	3.4	2.9	2.5	2.3	2.7	2.8	3.1	3.6	3.3	3.5	3.2

Source: EUROSTAT

According to EU trading partners, based on Eurostat data for 2019, the Western Balkan countries have the largest trade surplus with Lithuania, Croatia, Hungary, and Slovenia, and the largest trade deficit with Germany, which is also the largest individual partner from the EU.

Considering the trade flows in the last fifteen years, the change in the volume and structure of trade in goods, the gravity towards the EU market, and the choice of the Balkan countries to opt for accession to regional integration, such as the EU, is quite justified. The potential assortment of goods in mutual exchange is increasing. The free exchange of goods, services, capital, people, and ideas is becoming more intense, which will bring benefits for both parties.

Although there is a CEFTA agreement between the countries of the Western Balkans, with numerous trade facilitations and the advantages of regional integration cooperation, these economies are more open to the EU members. Although, according to the Statistical Office of the Republic of Serbia, the volume of foreign trade within the CEFTA countries exceeds 3.5 billion euros. The volume of Serbia's foreign trade within the CEFTA agreement is around 2.5 billion euros, of which Bosnia and Herzegovina alone accounts for 0.9 billion euros, which is more than one-third of the total trade. A similar structure has been recorded in other Western Balkan countries.

For a deeper analysis of international trade, the flows of trade between the WBC and the EU will be estimated using the gravity model.

LITERARY REVIEW

The gravity model has been applied in numerous research areas for decades. In its basic form, it has significant application in the process of explaining bilateral trade and international trade. A large number of scientific papers and research in the literature show the relations between different economic determinants. The application of the gravity model is widespread from the point of view of the application of various methods and techniques in the evaluation of model variables, as well as the possibility of including numerous determinants of the economy, either as explanatory variables or as dummy variables. In this literature review, the emphasis will be mainly on trade flows and the basic economic determinants.

The application of the gravity model in economics dates back to the 1960s. Tinbergen (1962) and Linnemann (1966) were the first to apply the gravity model in empirical analyses of international trade. After more than a decade, Anderson (1979) made a clearer connection by analysing the consumption in the trade of two economies. Bergstrand (1985, 1989), Deardorff (1995), Anderson and van Wincoop (2003), as well as Evenett and Keller (1998), also contributed to the development of the gravity model in the field of trade. In particular, with the opening of the Eastern Bloc in the 1990s, the use of the gravity model in economic analysis became more common (Hamilton and Winters, 1992; Bussière et al., 2005; Dragutinović Mitrović 2005). In research, the gravity model has been used as a standard to assess the potential of bilateral trade between countries. However, it has been successfully

applied in other areas as well, for the identification of trade potential, the assessment of the impact of membership in organisations (GATT, WTO), currency indicators, migration flows, etc. What makes this model unique is that it places a strong emphasis on empirical confirmation (Feestra et al. 2001).

Bilas (2007) showed that trade between countries is positively affected by their size and negatively by the distance between them. Ranilović (2017) concluded the same for Croatia. He used the gravity model to estimate trade flows in Croatia and showed that Croatia had a higher volume of trade with wealthy and, at the same time, closer economies. Smarzynska (2001) examined the impacts of trade flows in art between the GCC countries and developed countries and showed that GDP per capita had a positive and significant impact, while distance had a negative impact on trade. This research undoubtedly showed that countries with the higher purchasing power of their population (GDP per capita) had a greater influence on the art trade. Bialinicka-Birula (2015) used the gravity model in the analysis of the trade flows in the countries of the European Community and found that there was a negative and significant impact of distance on the volume of trade. Magrini et al. (2017) analysed the EU trade preferences imposed on the southern Mediterranean countries in the fishery and agricultural products from 2004 to 2014 and showed that there was a significant and effective impact on trade in these product groups. The restrictions on trade flows, in the example of Asian economies in the period from 2007 to 2014, were assessed by Ramaswami et al. (2016) using the gravity model. Waheed and Abbas (2015) assessed the trade relations between the GCC countries and their trading partners using the conventional gravity model and showed that GDP had a positive effect on overall trade while bilateral distance between countries had a negative effect. Antonucci and Manzocchi (2005) assessed the trade relations between Turkey and European Union countries for the period 1965-2011 and showed that the gravity panel data model of international trade fit well into Turkey's trade flows. Marku (2014) showed that the size of the economy had a positive effect on foreign direct investment in the EU. On the other hand, he justified the indeterminate influence of distance (the statistical significance of distance was not meaningful) with the phenomenon of globalisation, which by its nature diminished the role of distance over time.

Pradhan (2009) confirmed the assumptions of the gravity model by assessing trade relations between the GCC countries and India, pointing to the potential growth of exports in total trade. In an analysis of South Korean trade flows, Chan-Hyun (2001) showed that the volume of trade in bilateral trade increased with the trading partners who had higher GDP and less distance from the other partners. In the analysis of the trade flows between the MERCOSUR and the EU blocs, Martinez-Zarzoso and Nowak-Lehmann (2003) and Martinez-Zarzoso et al. (2006) indicated that the size of a country had a direct impact on the trade flows and that larger and more populous economies had a greater capacity to absorb the goods

due to their market size. In analysing the exports of Malaysia and the OIC member states, Abidin and Sahlan (2013) used the gravity model to assess the impact of several variables on Malaysian exports. Actually, the estimated parameter of the country's GDP variable was significant with a positive sign, starting from the assumption that the GDP estimate was based on the size of the economy.

Several studies examined trade potential using the integration of the gravity model, i.e., the gravity panel data model (Cinar et al., 2016; Sultan and Munir 2015). For example, Irshad et al. (2018) applied the gravity panel data model to assess South Korea's trade with the OPEC members in the period 2001–2016 and showed that income (GDP per capita), GDP, and trade openness significantly affected bilateral trade, while the impact of distance was negative. Sultan and Munir (2015) used a gravity panel model to individually analyse, in the period from 2001 to 2013, export, import, and the bilateral trade flows in different regions and showed that trade is determined by determinants such as population, GDP, distance, and customs. Similarly, Martínez-Zarzoso et al. (2006) used a dynamic panel model instead of the traditional static specification of the gravity model and showed that regionalism fostered international trade within and/or outside blocs, observing heterogeneity over time and between countries.

The above examples and aspects of using the gravity model to estimate international trade flows will be the basis for finding an answer to the question of whether there is a possibility of modifying the traditional gravity model of international trade between the Western Balkans and the EU to give the best estimates of model parameters. The methodology and specification of the model, which will be presented in the next chapter, have already been presented in similar papers (Ristanović et al. 2017; Ristanović et al. 2019, Ristanović et al. 2020).

The process of estimating using the gravitational model was started by the basic form of the regression equation, which consisted of GDP and distance. Estimates of the parameters of the model were efficient and statistically significant, so the inclusion of an additional variable in the model (as the independent variables) was justified. In the new regression equation, in addition to GDP and distance, the population was added, in order to check the real impact of the population on total trade. Numerous researchers are always in a dilemma about whether to include the population in the model or not because it is difficult to determine *a priori* the effects of the population on international trade (Ristanović et al., 2019). It is obvious that trade grows with population growth, indicating that large and rich countries tend to trade with each other based on GDP per capita (Fitzsimons et al. 1999). However, Oguledo and MacPhee (1994) and Eita and Jordaan (2007) show that the effects of the population on total trade are ambiguous. The importance of distance is seen through the fact that geographical distance may also include transaction costs (Guiso et al. 2005; Krugman 1979; Linnemann 1966; Portes and Rey 2005). In the model, the distance is taken as the physical distance between the capitals, measured in

kilometres. All other forms of distance, cited by Bialynicka-Birula (2015) in their research, like temporal distance (travel time), economic distance (transport cost, trade policy, customs tariffs), and political distance (membership in one of the groups, participation in agreements of an international character), are not taken into account. By introducing dummy variables into the gravity model, it is possible to consider various factors that affect trade flows, but they are not numerically determined, and the problem is quantifying them. In that case, dummy variables are useful because they control different effects on trade flows, such as trade agreements, common language or borders, common history, etc. (Sekur 2013; Baldwin and Taglioni 2006).

RESEARCH DATA AND METHODOLOGY

The gravity model provides a relatively intuitive description of trade between economies based on the concept of Newton's law of gravity. Basically, the model simply looks at trade between two economies and combines their basic economic elements — GDP, population, and distance. The assumption is that trade between two countries develops depending on the degree of development of their economies, the size of their markets, and the distance that exists between them. Actually, trade flows between two countries grow if the level of GDP is higher, but the market in which products are placed and the distance are smaller. Generally speaking, trade flows between different countries should be higher if they are relatively closer and have common borders, similar cultures and languages, and close economic and social relations.

The gravity model is often the subject of criticism (Dragutinović Mitrović 2005) because it is justified to claim that it simplifies the actual trade flows between two economies and that it can lead to wrong conclusions. Frequently, other factors associated with real and everyday trade flows, such as social, institutional, local, and other economic and non-economic factors, are not in the model. However, this can be remedied by making a more expended model. The latter implies that by expanding the model with new determinants, the application of panels in the gravity model (along with time series and comparative data), and the use of technological innovations and advanced statistics, these shortcomings can be eliminated. The gravity panel models structured in that way can also be used to predict commodity flows, forecast future agglomerations and locations, make projections of demand and supply of goods, etc. It is important to emphasise that there are a number of limitations to this complex model, which are reflected in the unavailability of updated information for all countries or for the desired period, insufficiently long time series, and, therefore, an insufficient number of observations for the analysis, different sources for the same data, inability to measure consumer preferences or the elasticity of foreign demand and domestic supply, etc.

Despite the existing shortcomings, the application of the gravity model is widespread in the analysis of international trade. This is primarily due to the fact that the basic determinants of the economy are easily accessible to any economy over a long period of time and allow a useful comparative analysis of bilateral trade (Paas 2000; Sekur 2003). Thus, Evenett and Keller (2002) point out that the equation of the gravity model in economics is one of the most important results in trade flows. Bilas (2007) rightly states that the gravity model is an ex-post econometric technique for examining the determinants of bilateral trade flows. As such, it is also considered a successful technique for analysing trade flows, the relationships that exist between trading partners, and changes in global trade. At the same time, realistic assumptions that trade between countries is directly proportional to the volume of GDP and inversely proportional to distance make this model attractive and well-known. This is also indicated by Salvatore (2014), "In its simplest form, the gravity model is based on the assumption (with other circumstances unchanged) that bilateral trade between two countries is proportional, or at least positively related to GDP produced in two countries, and it is lower when the distance between those two countries is greater (Newton's law of gravity in physics)".

Therefore, in this analysis, the gravity panel model was used to estimate trade flows based on basic determinants of the economy in order to simultaneously observe comparative data for five variable models (one independent variable: total trade; three explanatory variables: GDP, population, and distance; and two dummy variables: common border and common language) from five countries in the Western Balkans (Serbia, Montenegro, Bosnia and Herzegovina, North Macedonia, and Albania) and a time series for a period of 15 years, 2006–2020. The model was tested through the STATA software package, which provides an analyst with the opportunity to obtain valid estimates of quantitative and qualitative determinants within the same model, in space and time, giving a more accurate picture of trade flows. The analysis of the basic determinants of the economy within the model, which evaluates trade flows, is the basis for further expansion of the model in future research, which will include collecting more data for more variables in the model and thus far more observations, which is a prerequisite for better estimates of the model and more detailed results and conclusions.

All the data for economic determinants used in the model as parameters come from official sources. The names of the variables, their definitions, data sources, and levels are presented in Table 2. The analysis of trade between the Western Balkans and 28 EU member states covers the period from 2006 to 2020.

Table 2: List of variables included in the Gravity model

Variables	Content	Data Source	Level
TT	Total trade	Eurostat and Trade statistics for international business development	Bilateral
GDP	Exporting countries' real gross domestic product in constant US dollars	Eurostat and Trade statistics for international business development	Unilateral
GDP*	Importing countries' real gross domestic product in constant US dollars	Eurostat and Trade statistics for international business development	Unilateral
POP	Exporting countries' population (millions)	World Bank Annual Statistics	Unilateral
POP*	Importing countries' population (millions)	World Bank Annual Statistics	Unilateral
Distance	The distance in kilometres (expressed in the distance between each country's capital)	CEPII – *le Centre d'études prospectives et d'informations internationales*	Bilateral
Border	*1* if countries *i* and *j* share the border, *0* otherwise	A dummy	Bilateral
Language	*1* if countries *i* and *j* share the common official language, *0* otherwise	A dummy	Bilateral

Source: Author

As in the previous analyses of trade and export flows (Ristanović et al. 2017; Ristanović et al. 2019, Ristanović et al. 2020), the gravity panel model was used to assess the trade flows between the Western Balkans and EU member states, within which the influence of specific determinants of the economy on total trade was examined by the regression equations with the help of panel series. Panel series data are suitable for this type of estimation of the regression equations as they allow for the simultaneous analysis of comparative data (N) and time-series data (T). Thanks to the features of the panel series, the sample size (NT) increases and the amount of information from a limited number of observations (samples) increases as well. In this way, the efficiency of model evaluation increases and we get better results. The larger the sample, the greater the efficiency of the model estimates. At the same time, the greater the degree of variability, the greater the degree of freedom, and the lower the correlation of explanatory variables. Another advantage of using the

gravity panel model is that it allows us to simultaneously analyse both trade structure and changes in trade over time. The evaluated results of the model should show the relationship between the size of an economy, the purchasing power of the population, and distance, on the one hand, and the total trade, on the other hand.

Within the dynamic gravity panel model, the determinant of GDP reflects the size of the economy, the population in the model determines the size of the market, and the distance indicates the distance between countries and is a substitute for all trade barriers (transport costs in international trade, export/import tariffs, dumping prices, etc.). The model is designed so that the equations contain at least three regional variables, which allows an analyst to simultaneously test the effects of grouping within the union, outside the union, and total trade. Such models involve the use of panel data to verify potentially inconspicuous country-specific factors that will have an impact on trade between them (Trotignon 2010). Finally, in order to examine the individual characteristics of the countries participating in the analysis of trade flows through which we want to analyse mutual trade relations, dummy variables are included in the model. The influence of specific factors in the gravity model is examined by the regression equations with the help of panel series (Ristanović et al. 2017; Ristanović et al. 2019, Ristanović et al. 2020).

As a rule, in the regression equation, the dependent variable (Y) is explained by the independent variables of the model (X_i), which is expressed in terms of the level of the coefficient of determination (R^2). The higher the level of the coefficient of determination, the higher the percentage of the dependent variable explained by the selected independent variables. Thus, the results obtained in the previous step indicate the choice of a model with random effects. The next step in the evaluation process is to check for the existence of heteroskedasticity (using the Breusch and Pagan Lagrange test). The obtained values clearly confirm the use of the random effect model. This means that we reject the hypothesis – there are no individual effects. This additionally confirms the previous statement on the acceptance of the random effects panel regression model. At the same time, as in every process of regression analysis, diagnostic tests were conducted that facilitated the assumptions of the random effects model.

In fact, the estimated model parameters are estimates of the partial elasticity coefficients. This means that the estimated parameters in the model (b_1, b_2 …b_n) represent the elasticity of the dependent variable related to the change of the independent variable. In other words, changing the independent variable by 1 percentage point causes the dependent variable to change by 1 percentage point.

These economic determinants are included in the model as explanatory variables. Apart from them, dummy variables (common border and common language) are included in the model as well. An expanded gravity panel model of this type has been tested and evaluated for its impact on total trade, both in terms of the common

border and common language. The evaluation process was conducted through two models: the random effect model (RE) and the fixed effect model (FE). The differences between the two models should be outlined. In the random effect model, the regression parameters with explanatory variables are invariant, while the random error in the model reflects variations in both observation units and over time. In the fixed effect model, the random error u_{ij} has a normal distribution with a zero mean value and constant variance, while the explanatory variables are non-stochastic and the error term is independent. Which model will be chosen depends on the value of the Hausman test, which will unequivocally show which of the two models will give the best results when testing and evaluating the coefficients with the model variables. Descriptive statistics show that the model used to estimate the variables contains 280 observations [N = 28; T = 10]. All the steps in estimating the model parameters are conducted through the statistical software STATA, S/E, version 13.0.

Gravity model specification

The original form of the gravity model was an analogy to Newton's law of gravity in physics. The model has been transformed to represent relationships between economies and is presented in logarithmic form. The following regression equation (equation 1) contains variables whose values vary by country and time, as well as variables whose values vary from country to country but are constant over time.

$$X_{ijt} = \beta_0 + \beta_1 Y_{it} + \beta_2 Y_{jt} + \beta_3 POP_{it} + \beta_4 POP_{jt} + \beta_5 DIST_{ij} + \varepsilon_{it} \quad (1)$$

, where X_{ijt} represents the total trade of an economy *i* and an economy *j* in a year *t* (TT_{ijt}); Y_i (Y_j) reflects the GDP of the economy *i* and the economy *j* in a year *t*; $DIST_{ij}$ is a measure of the distance between the capitals of these countries; POP_i (POP_j) is the size of the market of the economy *i* and the economy *j* in a year *t*. ε shows the random component of the model.

In the next step (equation 2), two dummy variables are included in the model.

$$X_{ijt} = \beta_0 + \beta_1 BDP_{it} + \beta_2 BDP_{jt} + \beta_3 POP_{it} + \beta_4 POP_{jt} + \beta_5 DIST_{ij} + \beta_6 bord_{ij} + \beta_5 lang_{ij} + \varepsilon_{it} \quad (2)$$

, where the dummy $bord_{ij}$ presents the common border between country *i* and country *j*, and the dummy $lang_{ij}$ presents the common language between country *i* and country *j*.

Estimation of bilateral trade between 28 EU countries and 5 Western Balkan countries for the period 2006-2020 begins by estimating the gravitational model using the ordinary least squares method (OLS) to calculate the total trade equation.

The bias in the estimation obtained by the OLS model is eliminated in the following steps by using a panel model with random and fixed effects.

Before starting the evaluation of the model parameters, it is necessary to consider the theoretical expectations of the signs (+/-) of the estimated coefficients of the variables. Economic growth (the size of the economy, i.e., an increase in production levels and aggregate demand) affects the growth of trade between economies, which indicates that the coefficients in front of the variables GDP, β_1 and β_2, should have a positive sign, with a slightly greater impact of GDP from the EU countries. The influence of the population is ambiguous, so its coefficients (β_3 and β_4) have both positive and negative signs. It depends on the effect of absorption and economies of scale. A negative sign is expected for the distance coefficient (β_5) because the greater distance between the two economies increases the price of total trade and it decreases. Conversely, a smaller distance between the two economies makes overall trade cheaper and it increases. A positive sign is expected for both coefficients with dummy variables. As a rule, it is easier and more traded if the partner countries share a common border ($bord_{ij}$) and/or speak the same language ($lang_{ij}$). (Statistical data are available on request: descriptive statistics, model estimates, and tests of estimated parameters).

To evaluate the regression model, the existence of individual effects is first examined. If these effects are absent, it is recommended to use a regression estimation model. However, if there are individual effects within the model, then either a fixed effects model or a random effects model is recommended. It depends on the degree of correlation between individual effects and model variables. The Hausman test is used, which shows which of the two models gives the more effective estimates. According to Gujarati (2007) and Dragutinović-Mitrović (2005), unlike the fixed effects model, the random effects model is used when there is no correlation in the model between individual effects and explanatory variables; individual effects are random and new explanatory variables are obtained through residuals. In this way, the random effect model provides more efficient parameter estimates.

RESULTS AND DISCUSSION

The Ordinary Least Squares method (OLS), the Fixed Effect model and the Random Effect model, the Breusch-Pagan/Cook-Weisberg heteroscedasticity test, and the Hausman test were used to evaluate the model.

In accordance with the theory, it is expected that the estimated parameters will be statistically significant and that the signs of the gravity model parameters will be defined in advance. Thus, the value of the sign of parameter b_1 will be positive because the volume of trade is expected to increase in line with the increase in the GDP of the partner country. On the other hand, the value of the sign of parameter

b_2 is also positive because it is expected that the size of the market, measured by the number of inhabitants, will have a positive effect on trade from the aspect of higher demand. Finally, with the last explanatory variable, the theoretically expected value of the coefficient b_3 is negative, given that the volume of trade between the Balkan states and the EU decreases with the increasing geographical distance between them. However, this statement must be accepted with reservations due to the specific relationship between distance and trade; trade is certainly limited by distance. Transaction and other costs usually increase with increasing the distance, so in that case, the distance is a limiting variable. However, if the distance proves not to be statistically significant, it does not necessarily mean that it is insignificant, but that it has a different effect on trade (positive or negative). For the coefficients with dummy variables, it is expected to be a positive sign for both the evaluated parameters b_4 and b_5.

In this example, total trade should be positively correlated with the degree of development (GDP) of a foreign country, positively correlated with the size of a market (population), and negatively correlated with the distance of a foreign market from the domestic one (distance). This is confirmed by the obtained results, i.e., they show that the variables included in the gravity equation are statistically significant and emphasise already expected effects. The estimated coefficients represent, in most cases, expected signs and magnitudes.

Table 3: Estimated result of a gravity model for the WBC, random effect

Dependant variable: TT					
Variable	**SRB**	**MNE**	**MKD**	**B&H**	**ALB**
GDP	.5497298***	1.501445***	1.290911*	2.632017***	.2695439
GDP*	.7697678***	1.657788***	.6313784***	1.081607***	.8849231***
POP	-11.35147***	-1.772462	30.90436**	.4636441	-19.4305***
POP*	.2467783*	-.6217995**	.5039832**	-.1546122	-.2224467
DISTANCE	-1.795294***	-2.73689***	-1.847095***	-2.464953***	-1.352163***
BORDER	-.0087273	-1.369217	1.391817	-.7011573	2.029901*
LANGUAGE	1.21348***	1.303641**	-.2885174	2.100249**	.6152361
_cons	173.4569***	-7.041022	-472.5567***	-58.89204**	289.9064***

Variable	SRB	MNE	MKD	B&H	ALB
Obs	420	420	420	420	420
R^2	92.70	80.30	84.52	88.04	63.64

Source: ***; **; * are statistically significant at the level of 1%; 5%; 10%.

Note: SRB – Serbia, MNE – Montenegro, MKD – North Macedonia, B&H – Bosnia and Hercegovina, ALB - Albania

The results of estimated parameters from the random effects regression model for total trade, which includes three independent variables (GDP, distance, and population in the Western Balkans and the EU member states) and two dummy variables (dummy Border and dummy Languages) as dependent variables, are shown in Table 3. In this model, too, the coefficients of determination (R^2) for all five equations of the Western Balkans are high, which confirms that the explanatory variables unequivocally reflect the impact on the dependent variable. The estimates of the mentioned variables in the model more or less correspond to the expected signs and are of different levels of significance. This is explained by the nature of the ambiguous influence of the population variable. The estimated coefficients for GDP and distance reflect a high degree of significance. The estimated coefficients for the common border in all Western Balkan countries reflect a negative and weak impact on overall trade, and it is not statistically significant in all countries (except in Albania, with a significance level of 10%). The estimated common language coefficients in all Western Balkan countries reflect a positive and relatively weak impact on overall trade, although not statistically significant in North Macedonia and Albania. This insufficiently clear impact of dummy variables shows that the process of globalisation has greatly influenced the flow of trade beyond the common border (lower transport costs, advances in telecommunications, fast and short transport routes) and that language similarities in border areas are not key to trade (English has become a business language).

Based on the estimated equations using the panel gravity model, it has been unequivocally shown that economic determinants of economic size and distance are important determinants for the expansion of trade between the Western Balkans and the EU member states. In other words, the impact of the size of the economy, i.e., GDP, is an important determinant of the future trade of these economies, and further expansion of economic relations can be expected to have a reciprocal impact on GDP on trade. This would further enable the growth of the purchasing power of the population and increase mutual demand, so we could expect a more significant impact of the population on overall trade. Distance is not a constraint on trade,

which shows that it is possible to expect benefits from expanding trade with the most remote parts of the EU single market.

CONCLUSION

The main purpose of the paper was to examine trade flows between the countries of the Western Balkans and the European Union. As in previous research, the gravity model was used in the analysis, which proved to be a very effective tool for examining international trade. By creating the gravity panel model, consistent estimates were obtained that showed the extent to which trade flows were determined by economic determinants in certain Balkan countries. Most of the results had already been known intuitively, but the estimated model variables, i.e., the determinants of economies, quantitatively expressed, revealed the volume of trade flows and could be the basis for trade projections in the future.

In accordance with the gravity theory, regression analyses were performed, and the model parameters were estimated using a number of econometric tools. The results showed that trade is determined by GDP as an indicator of economic growth and population as an indicator of market size regarding demand and distance, i.e., the distance between trading countries. Quantitatively expressed, through the evaluation of parameters, cooperation with a more developed, more populous, and closer economy contributes to a larger volume of trade.

Based on the analysis of each of the Western Balkan countries individually observed, the results clearly show that in the analysed period 2006-2020, the growth of trade in goods was positively affected by economic cooperation with the size of the GDP of the partner country and negatively affected by the distance of the partner country. To put it differently, a greater volume of trade was realised with those economies that were richer and closer.

In the extended gravity panel data model, which included the population in the equation, the results showed ambiguous effects on trade — both positive and negative in relation to total trade. This is partly understandable because it does not mean that populous countries are rich and have developed economies at the same time. Hence, market size is partially acceptable as a determinant of the economy that affects trade flows.

Concrete results in some countries of the Western Balkans give a common conclusion: all Balkan economies (Serbia, Montenegro, Bosnia and Herzegovina, North Macedonia, and Albania) are determined to trade with the EU and that there is a growing trend of trade. The results of individual equations, i.e., the evaluation of the model for each economy individually, show that the volume of trade with rich and populous economies within the EU has increased over time and that

commodity trade is the lowest with the farthest EU members, regardless of the level of development.

The results, discussion, and conclusions presented above unmistakably confirm the null and both secondary hypotheses. The basic economic determinants that affect trade flows arise from the factors of the size of the economy and the distance between them, but also the purchasing power of the population (GDP per capita) and market size (population). The size of the economy shows a positive impact, and distance has a negative impact on total global trade. Although from the author's point of view, this analysis provides constructive and acceptable results and conclusions, which can make it easier for economic policymakers to achieve a clearer vision of trade in the EU single market, the author recommends future research with more data and variables.

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ПРАВЦИ МЕЂУНАРОДНЕ ТРГОВИНЕ БАЛКАНСКИХ ДРЖАВА

Апстракт: Значај међународних економских односа посебно је важан за мале економије, попут држава Западног Балкана (WБЦ). Важност економских односа је кључна карика целокупног привредног раста и развоја, нарочито њихова међународна робна размена. У овом раду су анализирани токови међународне трговине држава Западног Балкана и Европске уније, употребом гравитационог панел модела у периоду 2006-2020. година. Циљ овог истраживања је да се оцене токови међународне робне размене балканских држава са ЕУ, с обзиром на чињеницу да оне највећи обим трговине управо реализују са државама чланицама ЕУ. Истовремено, овај приступ омогућиће да се јасније сагледају економске релације држава кандидата у току процеса преговора са ЕУ, и стицања потенцијалног чланства. Резултати су показали да је највећи степен трговине остварен са богатим економијама мерено развојем економије, величином тржишта мерено бројем становника, док је најмањи остварен са удаљеним економијама. Употреба гравитационог модела у свом основном облику пружила је задовољавајуће оцене модела, при чему је проширени модел додатним варијаблама и вештачким променљивим у моделу обезбедио додатне информације о међусобним робним токовима.

Кључне речи: међународна робна размена, гравитациони панел модел, Западни Балкан, ЕУ.

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