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DETERMINANTS OF THE BILATERAL TRADE FLOWS OF NORTH MACEDONIA – A GRAVITY MODEL APPROACH

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Abstract

The paper makes an in detail overview of the structure of the trade exchange of goods of Macedonia and explores the determinants of its bilateral trade flows using the gravity model. The analysis includes data on 40 trade partners of Macedonia in the period from 2005-2019. The used variables in the model are: GDP per capita difference, population, distance and relative endowments of factors of production (capital, land and labour). In most of the analyzed regressions the coefficients on determinants such as GDP per capita difference and population are positive and their impact upon the bilateral trade (as dependent variable) is statistically significant. Intensity of Macedonian trade decreases in regard of the distance from a trade partner and increases in partner's size – the country tends to trade more with larger countries. In our analysis we included three dummy variables such as: membership in the EU and in CEFTA-2006 and common language. The impact of the possible membership in the EU is clearly positive and statistically significant. Being a candidate country for full EU membership, Macedonia trades more with EU trade partners rather than with the neighbouring countries, members of CEFTA-2006.

Keywords: *bilateral trade, gravity model, trade partners, Republic of North Macedonia, European Union, CEFTA-2006*

1. INTRODUCTION

Gravity models have long been used as a workhorse for analyzing bilateral trade flows. In this paper we apply gravity model to analyze the determinants of bilateral trade flows of Macedonia. The purpose of the paper is through analyzing the determinants of Macedonia's trade and by comparing them with the actual international trade position of the country to determine the flows and possible areas where different actors and institutions could lead conclusions for future possible policy recommendations.

Macedonia is a small landlocked import dependent country with unfavorable economic structure. The unfavorable economic structure of the country was inherited from the two former Yugoslav states within which the Macedonia economy was integrated. This inherited economic structure of goods did not record many improvements even 30 years after its independence (see Table 1).

Table 1 Export/import economic structure of foreign trade exchange of goods of Macedonia (%)

	Exports		Imports		
	% of total exports		% of total imports		
	1997	2019	1997	2019	
Intermediate goods	52.3	65.2	Intermediate goods	61.4	71.0
Capital goods	2.9	16.0	Capital goods	10.5	9.0
Consumption goods	44.6	18.5	Consumption goods	27.5	16.8
Omitted goods	0.2	0.3	Omitted goods	0.6	3.2
Total:	100	100.0	Total:	100	100.0

Source: Kikerkova, I. (2008): Foreign Trade, text book, Ss. Cyril and Methodius University, Faculty of Economics –Skopje, Skopje, p. 405 and Statistical Office of the RN of Macedonia (2020): Annual Report, Skopje, p. 580

The amount of exchanged intermediate goods both at the export and at the import side has worsened. At the same time, the percentage of import of capital goods has never exceeded more than 10.5% of total imports. For a country which is technologically backward and dependent on imports of new technology, the amount of imported capital goods is not only insufficient, but also has an inconvenient structure, as a significant portion of it consists of imported transportation means, basically automobiles.

Since 2011 there was a shift in the structure of the leading exported and imported items from Macedonia, due to the effects from the newly established plants within the so called Technological Development Industrial Zones. These zones were established in 2008 and function as free economic zones that provide customs, fiscal and other incentives for foreign investors. Thus, some of the most exported items from Macedonia since 2011 happen to be components for the automotive industry. The developments in the exporting sector are reflected on the import side, as raw materials for the production in the TIDZ register significant increase. (Statistical Office of RN of Macedonia, 2020).

The balance of payments of Macedonia records a continuous trade deficit which reached 2.255 million American dollars at the end of 2019, while the coverage of imports with exports reached 77.9% (National Bank of the RN of Macedonia, 2020).

About 2/3 of the foreign trade exchange of goods of Macedonia is effectuated with trade partners from the European Union. The trade exchange of goods with the EU started to intensify since the signification of the Stabilization and Association Agreement (SAA) back in 2001, which created a classic effect of trade creation in the foreign trade exchange of goods of the country. Just after the signification of the SAA the trade exchange of goods between Macedonia and EU reached 43% of the total trade exchange of goods and in ten years it reached 60%. At present Macedonia realizes 70% of its total exports and 80% of its total imports with trade partners from the EU (National Bank of the Republic of Macedonia, 2020).

Another 10-11% of the total trade exchange of goods is realized with trade partners from CEFTA-2006, which is the only RTA of which Macedonia is a full member (National Bank of the RN of Macedonia, 2020).

In the last 20 years the most important trading partners for Macedonia are Germany, Great Britain, Greece, Serbia and Italy. From the top five trading partner countries, the absolute dominant position belongs to Germany, which is the economy that absorbs almost half of the total Macedonian export, and covers about 10% of the total Macedonian import (Statistical Office of RN of Macedonia, 2020).

The second chapter of the paper provides with literature review for the application of gravity models, in the third part we explain the econometric model and the data. In the fourth chapter we will give explanation of the results and in the fifth chapter we give conclusion.

2. LITERATURE REVIEW

Multiple research papers estimate the gravity equation on the sample of Western Balkans economies and specifically on Macedonian economy, offering several insights relevant to Macedonian exports and trade performance.

The first stream of research offers some early insights in the potential trade among Western Balkan countries and explores the economic benefits following signing of FTAs and joining the CEFTA 2006. Begović (2011) estimates a gravity model on a panel of CEFTA member countries and their major trading partners and concludes that trade agreements and liberalization did not improve trade in the region, when controlling for the other trade determinants. On the other hand, the gravity model by Pllaha (2012) shows that FTAs have positively contributed to the regional trade integration, even though the trade between nine SEE countries was below their potential. Similarly, Kucharčuková et al (2010) find that international trade of the SEE countries with the world economy is still below its potential, which is mainly explained by low institutional quality and the reasons are sought in light of the past regional conflicts.

The second group of studies, closely examining the determinants of Macedonian bilateral trade, finds that Macedonia's trade performance can partly be explained by the existence of non-tariff barriers. Mojsoska-Blazevski and Petreski (2010) estimate the gravity model for the foreign trade between Macedonia and 39 trading partners. They show that Macedonian and foreign GDP per capita play significant role in explaining bilateral trade, as well as the standard gravity variables, such as geographical proximity, economic similarity and common language and border. On the other hand, authors find no additional gains from FTAs and from CEFTA2006, which could be explained by the still existent non-tariff barriers across the SEE countries. The paper by Toševska-Trpčevska and Tevdovski (2014) sheds light on this particular topic. The authors employ gravity model in order to estimate the impact of customs and administrative procedures on trade in Macedonia and other SEE countries. Their results show that the number of days at the border and costs paid in both importer and exporter country pose significant impediments to trade, whereas number of documents needed to import or export do not obstruct trade. In addition, statistically significant effects on trade show common borders and common history. Therefore, authors recommend that more attention should be placed on measures towards simplification and harmonization of procedures and documents in trade, in order to facilitate and stimulate trade.

Considerable body of research analyzing Macedonian trade in the context of Western Balkans group of countries emphasize the role of non-economic factors, such as common history, in their joint trade. This is evident in the study by Apostolov and Josheski (2018), which confirms that Western Balkan countries have positive propensities to import from Macedonia. The strength of regional integration is validated by the analysis of trade linkages within Western Balkan countries by Murgasova et al. (2015). In particular, their estimation shows that for both exports and imports, membership in the Western Balkan group is a strong explanatory factor of the size of trade

flows, which is a reflection of the improvement of intra-regional relations since 2000, on the back of historically similar institutional frameworks and languages. Similarly, the results of the gravity model by Trivić and Klimczak (2015) show that non-economic factors in the Western Balkans, such as language, culture and common history, play the most important role in determining bilateral trade. Another contribution to this topic is by Pere and Ninka (2017), who conduct a comprehensive analysis for each country in Western Balkans and the overall region. The gravity model for Macedonian exports points to a positive relationship with the exports to the countries of the former Yugoslavia, in addition to domestic GDP per capita, GDP per capita of partner countries and the weight of manufacturing to the total production of partner countries. The gravity model by Kaloyanchev, Kusen and Mouzakitis (2018) confirms the main insights from the referenced body of research – the intra-regional trade in Western Balkans would follow from increased economic activity and would benefit from reducing non-tariff barriers.

3. EXPLANATION OF THE ECONOMETRIC MODEL AND DATA

The panel gravity model presented further in the texts aims to explore the determinants of Macedonian trade by considering the bilateral trade flows with 40 trading partners ranging from the most important trading partners (such as Germany, Serbia, Italy...) to countries that Macedonia has insignificant trade flows (Cyprus, Japan, Bolivia...). This model is widely used to examine country-specific trade characteristics (Anderson & Wincoop, 2003). The panel gravity model is OLS without effects. For the construction of the model we used data for the period from 2005 to 2019.

The framework of the model is based on the analogy with the Newtonian theory of gravity reflecting the relationship between the intensity of trade between two partners, the size of their economies and the distance between them (Tinbergen 1962, Bergstrand 1985). The traditional gravity model successfully reproduces the volume of trade between trading partners using macroeconomic properties, such as GDP, geographic distance, and other related factors. Although there are different modifications of the model in terms of empirical specification (Melitz and Rubinstein, 2008; Almog, A., Bird, R., & Garlaschelli, D., 2019) we use the basic model by constructing the following equation:

$$\ln \text{TRADE}_{ijt} = \alpha_1 \ln \text{GDP}_{capitaijt} + \alpha_2 \ln \text{REMOTNESS}_{ijt} + \alpha_3 \ln \text{POP}_{ijt} + \alpha_4 \ln \text{LABOUR}_{ijt} + \alpha_5 \ln \text{CAPITAL}_{ijt} + \alpha_6 \ln \text{LAND}_{ijt} + \beta_1 \text{EU}_{jt} + \beta_2 \text{CEFTA}_{jt} + \beta_3 \text{LANGUAGE}_{jt} \gamma_j + \lambda t + u_{it} \quad (1)$$

The dependent variable (TRADE_{ijt}) is constructed as a sum of export and import from Macedonia to the trading partners in absolute values.

In order to define the independent variables, we consulted the available academic literature, and decided to include the most commonly used variables in the model.

Helpman and Krugman (1985) pointed out that countries with similar level of development trade more intensively than countries that are at different levels of economic development. *GDP per capita* is the most common indicator of the level of development. In our model it is calculated as a difference between maximum and minimum value of GDP per capita of Macedonia and of the trading partner at constant prices ($\text{GDP}_{capitaijt}$). We expect this coefficient to be statistically significant and positive. An increase in the gap should increase the intensity of bilateral trade, thus positively affect bilateral trade. Increase of the GDP per capital means increased demand for goods.

The model also comprises the standard variable - geographical distance, expressed in kilometers (REMOTNESS_{ijt}). However, since this variable is constant throughout time, we included a dynamic component by multiplying the distance in kilometers with the GDP ratio of Macedonia and the trade partner. If the distance between the two countries is higher it implies higher transport costs, hence, it is likely to cause a negative impact on the bilateral flows of trade.

Regarding the population, we calculated a sum of the population in Macedonia and of the trading partner (POP_{ijt}). The bigger the population in one country, the bigger the market and the

potential for trade. However, bigger population can decrease the income per capita, and therefore the consumption capacity might shrink. Lower income per capita tends to decrease the demand for imports (Nuroglu, E. 2009).

Factor endowment is commonly understood to be the *amount of capital, land or labor that a country possesses* (*CAPITALijt*, *LABOURijt* *LANDijt*) and may exploit for the production process. In this model we included the variables: capital, labour and land endowment. The Heckscher-Ohlin international trade theory states that comparative advantage is derived from differences in relative factor endowments across countries and relative intensities with which factors are used across sectors. A country will have an advantage vis a vis other country in producing goods in those sectors which are endowed with factors disposable in relative abundance. The best approach to influencing trade outcomes is to invest in resource market enhancement, such as education and training of the engaged working force and transparency and availability of capital (Stone, S., R. Cavazos Cepeda and A. Jankowska, 2011).

Apart from standard independent variables we use three dummy variables: membership in regional trade agreements: EU and CEFTA-2006; and common language. Macedonia is a member of only one RTA - CEFTA-2006. At the same time, Macedonian exports enjoy a preferential treatment on the Internal Market of the EU, due to the signed Stabilization and Association Agreement with the EU. The impact of the full membership in the CEFTA-2006 and the expected one in the EU, is supposed to be positive and statistically significant. Most of the CEFTA-2006 member-states have similar languages, so it is also expected that trade among these countries should be easier and more intensive.

The general fit of the model is high, explaining around 70% of the variation in trade. The results are robust to potential modifications in all five equations. Data set was compiled from World Bank data development indicators. Data for the trade flows from and to Macedonia was derived from the National Bank of the Republic of North Macedonia.

4. EXPLANATION OF THE RESULTS

In order to explore the determinants of bilateral trade flows of Macedonia we constructed gravity model. In the specification R^2 and the adjusted R^2 are high – around 70% , meaning that the independent variables taken into account explain satisfactory the dependent variable trade.

We start the explanation of the results with analyzing the influence of the variable *GDP per capita difference* over bilateral trade flows. We acknowledge high statistical significance of this variable over trade flow and estimate positive sign of the variable. This means that the bigger the GDP per capita gap between Macedonia and its trading partners the higher the statistical significance of country's bilateral trade flows increment. Thus we confirm that Macedonia's greatest trading partners are countries with significantly higher GDP per capita than the Macedonian one, which is absolutely correct as Macedonia's number one trading partners are countries from the EU like: Germany, Great Britain, and Italy (Table 4). The coefficient of this variable is also high and we can say that 1% increase of the GDP per capita difference between Macedonia and its trading partners may lead to 0.32% growth of bilateral trade.

Distance is the other independent variable that is the main proponent of the gravity model indicating that greater distance between trading partners implies higher transportation costs and thus negatively impacts trade. This assumption is confirmed in the gravity model of Macedonia. The statistical significance is high, the sign is expectedly negative and the coefficient in the last regression indicates that 1% of increase of the distance (remoteness) of Macedonia may lead to a decrease of bilateral trade of 1.15%.

The influence of the variable *population* is statistically significant and positive as expected. The increase of the population in both of Macedonia and its trading partners leads to bigger

market and bigger potential to trade. The coefficient is high and indicates that 1% growth of population may lead to 2.51% increase of trade flows.

The results of the influence of *factor endowments (capital, land and labour)* on trade indicate that they are all highly statistically significant. However, difference in land abundance and labour productivity has negative impact upon trade exchange of goods between Macedonia and its trading partners, and difference in capital endowment has positive effect. The explanation of these results can be found in the economic structure of foreign trade exchange of Macedonia presented in Table 1. Macedonia is a small landlocked and import dependent country that hasn't undergone satisfactory economic restructuring. The country is still dependent on import of raw materials and components and preserves the same structure in exporting intermediate goods with lower level of finalization. The positive coefficient of capital endowment indicates that when the difference between capital endowments between Macedonia and its trading partners is bigger than it should lead to increase of Macedonian trade. In our model 1% increase in the difference of capital endowments, should increase Macedonian trade by 1.57% on average. The coefficient for labor endowment indicates that the bigger the difference in labor productivity among Macedonia and its trading partner, the lower is the trade between Macedonia and its trading partners. The negative coefficients on land endowment suggests that the increase of the difference of land possession between Macedonia and its trading partners leads to decreasing mutual trade.

Table 2 Results from the gravity panel data model

N. of observations	529
LnGDP per capita	0.3239 *** (0.0719)
LnREMOTNESS	1.1452 *** (0.0687)
LnPOP	2.5059*** (0.0985)
LnCAPITAL	1.5741 *** (0.1114)
LnLAND	-0.1529 *** (0.0370)
LnLABOUR	-0.34026*** (0.0775)
EU	0.8217 *** (0.1441)
CEFTA	0.6240 *** (0.2524)
LANGUAGE	1.5586*** (0.1890)
R2	0.7050
Adjusted R2	0.6999

Note: Numbers given in parenthesis are corresponding standard deviations. *** : $p < 0.01$; ** : $p < 0.05$; * : $p < 0.1$

Source: Authors' calculations

Additionally in the model we present the results from the analysis of three dummy variables: *trade with EU member countries, Macedonia's membership in CEFTA-2006 (free trade area) and common language with the trading partners*. The results show that there is statistically significant positive impact of free trade agreements upon Macedonian trade exchange of goods. The results indicate that EU member-states have strong significant impact upon Macedonian trade flows, i.e. Macedonian bilateral trade flows are highly influenced by EU members. Even more, the results confirm positive influence of Macedonia's membership in CEFTA-2006. These results can be considered as correct as in reality Macedonia's biggest trade partners are EU member-states and EU

is by far the most important trading partner of the country. CEFTA-2006 member-countries are the second most important trading partner of Macedonia.

The influence of the dummy variable *common language* appears to be significant and positive. It can be explained with the fact that some of the most significant trading partners of Macedonia are countries from the neighbourhood which have similar languages. Trading with a foreign partner that shares the similar language decreases communication costs and that can promote trade.

5. CONCLUSIONS

The aim of this paper is to give an insight into the determination of bilateral trade flows of Macedonia by applying the standard workhorse for international trade: the gravity model. We have analyzed Macedonia's trade with 40 trading partners throughout a period of fifteen years and the results from the model have only confirmed the picture of a small import dependent and landlocked country.

The results have confirmed the weak economic restructuring of the country, the low level of technological development of the production processes in the country, and its lagging behind in development in comparison with other countries. Macedonia's greatest trading partners are highly developed EU member-states, which basically derives from the preferential market access obtained with the SAA signed with EU. Yet, the structure of the exported goods from Macedonia to the EU market is rather inconvenient and dependant on exports of intermediate products mostly with low level of finalization. Macedonia's greatest trading partners are countries with significantly higher GDP per capita than Macedonia's GDP which is absolutely correct as Macedonia's number one trading partners are countries from the EU like: Germany, Great Britain and Italy. Second most important trading partner of Macedonia are member-countries from CEFTA-2006.

Macedonia is trading more with partners with whom there are bigger difference in capital endowments which confirms the fact that the country is lagging behind in technological advancement and is mostly exporting raw materials and semi-processed products and importing products with higher capital abundance. The influence of land endowment and labor productivity with its trading partners indicates negative significance. Bigger difference of land abundance and higher labor productivity between Macedonia and its trading partners should lead to less mutual trade. These results should be taken into account by all actors and institutions of the country for making analysis and in the process of creating future trade policy recommendations.

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Appendix

Table 3

Variable	Explanation	Source	Expected sign
Trade	export + import from Macedonia to the trading partner in absolute values	World Bank national accounts data and National Bank of the Republic of North Macedonia	
GDPcapita	max-min value of GDP per capita constant prices 2020 US dollars of Macedonia and the trading partner	World Bank national accounts data	+
Remotness	distance in km * GDP constant2010 US dollars trade partner/world GDP constant 2010 US dollars	Google maps and World Bank nationals accounts data	-
Pop	sum of population of Macedonia and the trade partner	United Nations Population Division. World Population Prospects: 2019 Revision.	+/-
Capitla	max gross fixed capital formation divided by labor force/min gross fixed capital formation 2010 US dollars divided by labor force of Macedonia and trade partner	World Bank national accounts data, and OECD National Accounts data and International Labour Organization, ILOSTAT database	+
Land	ratio of max land area (sq. km) divided by labor force/min land area (sq. km) divided by labor force of Macedonia and trade partner	Food and Agriculture Organization and International Labour Organization, ILOSTAT database	+
Labor productivity	Max-min value of GDP per person employed (constant 2017 PPP \$)	World Bank national accounts data, and OECD National Accounts data files.	+
EU	Membership in EU	Dummy variable	+
CEFTA	Membership in CEFTA-2006	Dummy variable	+
Language	Countries that have common language	Dummy variable	+

Table 4 Ten most important trading partners of Macedonia, in Euros and as a % of the total export/import

		Export from Macedonia				
		2005		2019		
		Euros	%	Euros	%	
1	Serbia and Montenegro	371.98546	22.62	Germany	3128.7973	48.72
2	Germany	292.07764	17.76	Bulgaria	313.88021	4.89
3	Greece	252.03953	15.33	Kosovo	297.61639	4.63
4	Italy	136.57593	8.31	Serbia	248.39787	3.87
5	Croatia	65.132751	3.96	Belgium	213.06464	3.32
6	Bulgaria	61.713663	3.75	Italy	173.82822	2.71
7	Bosnia and Herzegovina	40.927711	2.49	Greece	172.83374	2.69
8	Turkey	36.90597	2.24	Hungary	162.92773	2.54
9	USA	35.886359	2.18	Romania	153.69361	2.39
10	Netherland	35.759626	2.17	China	149.05154	2.32
	Total 10	1329.0046	80.82	Total 10	5014.0912	78.08
	Total export	1644.361	100%	Total export	6421.566	100%

		Import to Macedonia				
		2005		2019		
		Euros	%	Euros	%	
01	Russia	344.1929	13.21	G.Britain	969.09883	11.49
02	Germany	271.13093	10.41	Germany	960.91383	11.39
03	Greece	239.93562	9.21	Greece	683.71332	8.10
04	Serbia and Montenegro	212.51629	8.16	Serbia	606.30549	7.19
05	Bulgaria	188.33541	7.23	China	486.90205	5.77
06	Italy	156.72122	6.02	Italy	471.13234	5.58
07	Slovenia	103.00678	3.95	Turkey	404.79662	4.80
08	China	92.822666	3.56	Bulgaria	324.49158	3.85
09	Turkey	91.692347	3.52	USA	276.77539	3.28
10	Poland	76.119533	2.92	Poland	237.17429	2.81
	Total 10	1776.47	68.20	Total 10	5421.30	64.26
	Total import	2604.9007	100.00	Total import	8436.3241	100%