Economic Horizons

Faculty of Economics, University of Kragujevac, Serbia
ISSN 1450-863X eISSN 2217-9232 2022 *24* (3)

Economic Horizons

Faculty of Economics
University of Kragujevac, Serbia

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The Journal is abstracting and indexing in:

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Contact
Faculty of Economics University of Kragujevac,
Liceja Knezevine Srbije 3, 34000 Kragujevac, Serbia;
Tel. +381 34 303 502
www.horizonti.ekfak.kg.ac.rs horizonti@kg.ac.rs

THE JOURNAL IS PUBLISHED THREE TIMES A YEAR - in April, August and December

ISSN 1450-863X eISSN 2217-9232 UDC 33 COBISS.SR-ID 158022663

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Volume 24 Number 3 **September - December 2022**

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UDC: 33 ISSN: 1450-863 X

www. ekfak.kg.ac.rs

EDITORIAL

In the Issue 3 Volume 24 Year 2022 of the *Economic Horizons* scientific journal, four original scientific papers and two review papers, as well as the Review of the International Scientific Conference, the Subject-Matter Index of the Papers and the Review of the Authors and Titles of all the contributions published in the Journal in the year 2022 are published.

Based on the research in the effects of foreign direct investments and export activities in the 13 European Union new member states in the period from 2005 to 2020, the coauthors *Vlatka Bilas* and *Sanja Franc* applied a panel cointegration model, placing an emphasis on foreign direct investments, to examine their contributions to the achievement of economic growth. In spite of the cointegration determined between foreign direct investments, export activities and economic growth, the coauthors conclude that the results are heterogenous. The fact that only ambiguous conclusion can be drawn with respect to the effect of foreign direct investments and export activities on the real growth of the gross domestic product, i.e. that positive effects of foreign direct investments and export activities are neither automatic nor equal in all the countries, but they rather depend on numerous factors and conditions, are pointed to.

The analysis of the movement of the real export of goods and the services rendered by a few peripheral Eurozone member states, the author *Radovan Kovacevic* tends to provide robust evaluations of the long-term relationship between the real export of these countries and the selected explaining variables by applying panel analysis. The lower productivity and competitiveness of their economies in comparison with the Eurozone core are the common characteristic of the peripheral member countries, which causes asymmetric effects of external shocks between these two groups of countries, due to which fact the burden of adaptation falls onto the countries with a current account deficit. Based on the empirical research, how the Eurozone peripheral countries solve the problem of external imbalance in the conditions of external shocks reflecting on their competitiveness is checked. The fact the appreciation of the real effective foreign exchange rate of the peripheral member countries is all but stimulative for their exports in the conditions when all the Eurozone member countries have renounced the foreign exchange rate as an instrument of the economic policy is highlighted.

Starting from the attitude that the Nigerian economy is affected by macroeconomic shocks due to the exaggerated reliance on crude oil and the bad management of resources, the coauthors *Joshua Adeyemi Afolabi*, *Blessing Ufuoma Olanrewaju* and *Wasiu Adekunle* point to the fact that the economic sectors of this country have limited capacities of resilience to macroeconomic shocks. Using the vector autoregression model (VAR) and the vector error correction model (VEC), the coauthors indicate that the service and agricultural sectors are also sensitive to fiscal shocks and that the industrial sector is sensitive to interest rate shocks as well due to the sensitivity of the mentioned sectors to macroeconomic shocks. Based on the research, the conclusion reads that it is necessary to develop the strategies that will be supportive of sectoral productivity and that will unite into one the fiscal and monetary policies so as to mitigate the effects of macroeconomic shocks.

Based on the research done in the corporate income tax taxation system that also influences their business doing, the coauthors *Jadranka Djurovic Todorovic*, *Marina Djordjevic* and *Milica Ristic Cakic* highlight the fact that the negative effects of this system can be considerably greater at the macroeconomic level.

* *Correspondence to*: V. Lekovic, Faculty of Economics, University of Kragujevac, Liceja Kneževine Srbije 3, 34000 Kragujevac, Republic of Serbia; e-mail: lekovic@kg.ac.rs

Given the discrepancy in defining the taxpayer of the corporate income tax and a low interest in examining the economic effects of these discrepancies, the subject matter of the research conducted in the paper is the taxpayer as the subject on whom this type of tax is imposed with the aim to indicate the significance of the economic effects of this tax element and provide proposals for its reform. The research results have confirmed the initial attitude expressed by the coauthors that different forms of the organization of business entities are subjected to different burdens of company income tax payment, which on its part influences the amount of the income tax that might be collected as well.

Based on the research in the effects of inflation targeting regime monetary measures on the gross domestic product (GDP) growth rate the coauthors *Suzana Stevanovic*, *Ivan Milenkovic* and *Sladjana Paunovic* show on the example of the Republic of Serbia, Turkey, Albania and Romania that, in the cases of the Republic of Serbia, Turkey and Albania, the positive influence of inflation volatility on the GDP growth rate volatility cannot be rejected, whereas in the case of Romania, inflation volatility exerts a negative influence on the GDP growth rate volatility. Based on the foregoing, the coauthors conclude that the effects of inflation targeting regime monetary measures are different in the analyzed countries, and that it is also necessary that all the preconditions preceding its application should be met in order for the monetary regime to be successful.

Pursuant to the significance of the application of websites for commercial purposes, as well as the fact that an ever-increasing number of consumers form their organic-food-related attitudes based on the pieces of information disclosed electronically instead of going to points of sale, the coauthors *Milan Kocic*, *Srdjan Sapic* and *Katarina Sofronijevic* do research in the implications of website quality for consumers' cognitive and affective attitudes towards organic food. The research results are indicative of the fact that it is significant in the organic food sector that the website should be easy to use and visually appealing, containing quality and updated pieces of information. Pursuant to that fact, the testing of the set hypotheses led the coauthors to conclude that, with respect to the website design and the quality of the information displayed on it, website quality positively influences consumers' cognitive and affective attitudes towards the products of the organic origin.

This issue of the journal also contains a Review of the International Scientific Conference entitled Contemporary Issues in Economics, Business and Management (EBM) 2022 prepared by *Katarina Borisavljevic*. In the organization of the Faculty of Economics of the University of Kragujevac, the said Conference was held in Kragujevac City on 4th November 2022.

On behalf of the Editorial Board of the Journal and on my own behalf, I first of all express my gratitude to the authors of the contributions published in this issue of the Journal. Simultaneously, my special gratitude goes to the reviewers whose constructive and critical comments and suggestions to the authors of the submitted contributions have contributed to raising the quality level of the published papers.

Issue 3 Year 2022 contains a comprehensive Subject-Matter Index of the Scientific Papers Published in the Journal in the year 2022, as well as the Review of the Authors and Titles of all the contributions published in the Economic Horizons in 2022.

Editor-in-Chief
Vlastimir Lekovic

Vlastimir Lekovic is a full professor at the Faculty of Economics of the University of Kragujevac in retirement. He earned his Ph.D. from the Faculty of Economics of the University of Kragujevac in the scientific field of general economics and economic development. The key fields of his scientific-research interest are the economic system, the economic policy and institutional economics.

Economic Horizons, September - December 2022, Volume 24, Number 3, 217 - 229
UDC: 33 ISSN: 1450-863 X

Original scientific paper
UDC: 330.322(4)
doi:10.5937/ekonhor2203229B

THE CONTRIBUTION OF FOREIGN DIRECT INVESTMENT TO ECONOMIC GROWTH IN THE SELECTED EMERGING EUROPEAN COUNTRIES: THE EVIDENCE BASED UPON THE PANEL COINTEGRATION MODEL

Vlatka Bilas* and Sanja Franc

Faculty of Economics and Business, University of Zagreb, Croatia

This paper is aimed at examining the fact whether foreign direct investment (FDI) and exports do contribute to economic growth in the thirteen European Union (EU) new member states (namely Bulgaria, Croatia, Cyprus, Czech, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia) during the period from 2005 to 2020 or not. Various statistical tests were performed in order to examine the relationship and causality among the three observed series, including unit-root tests, the Kao and Pedroni cointegration tests, and finally the modified causality test. The obtained results are mixed. Although cointegration was established between FDI, exports and growth, the estimation of the long-term coefficients varied to such an extent that only ambiguous conclusions about the effect of FDI and exports on the growth of the real gross domestic product (GDP) could be reached. The research results imply the fact that positive effects of FDI and exports are neither automatic nor equal in all the countries, but the same rather depend on the many factors and conditions that the governments of the selected states should consider when designing policy measures for attracting FDI and promoting exports.

Keywords: foreign direct investment, gross domestic product, exports, the EU new member states, cointegration, causal relationship

JEL Classification: F21

INTRODUCTION

The global economy has been showing signs of slowing down over the last decade, this being so especially due to the latest global health crisis. In order for countries to increase their competitiveness and living standards, it is necessary for them to increase productivity and economic growth, which is the reason why policymakers need to design quality and appropriate development programs and policies irrespective of the fact that the available instruments are limited. The tense global geopolitical situation, the current health pandemic and the consequential economic crises have all increased uncertainty,

* *Correspondence to*: V. Bilas, Faculty of Economics and Business, University of Zagreb, J. F. Kennedy square 6, 10000 Zagreb, Croatia; e-mail: vbilas@efzg.hr

reduced the willingness to invest and increased the possibility of supply shocks and changes in global supply chains. With low interest rates and reduced leverage, banks have become less interested in lending to enterprises, having focused on the activities that bring them higher fees and on trading. On the other hand, despite low borrowing costs, the public sector has not embarked on greater investments, mostly due to the public debt sustainability problems, particularly in developed countries.

The fact that foreign direct investment (FDI) and exports positively contribute to economic growth (Baiashvili & Gattini, 2020; Nguyen, 2020; Mohd & Muse, 2021) is commonly accepted. Their importance has significantly grown in the past few decades, especially in developing countries after market liberalization. The influence of foreign investments largely depends on the macroeconomic and business environments and the absorption capacity of the recipient country. The impact also differs among low-income and high-income countries (Baiashvili & Gattini, 2020). Technology and knowledge transfers are perhaps one of the most important ways in which FDI contributes to the recipient country. It is known that developing countries lag behind developed countries in terms of technological progress. Even if they have the same technology, enterprises in developing countries use it less efficiently because they do not have enough knowledge and skills. Because technology is not free and accessible to everyone, there is a big technological gap between developing and developed countries. Technology is an important element of innovation and innovation is an important factor in competitiveness. In order for developing countries to achieve a higher degree of competitiveness in the global market, they need to find ways to acquire more advanced technology. FDI could be the potential source of technology transfer (Grgić, Bilas & Franc, 2012). However, there is some evidence for developing countries that the impact of FDI on the recipient country's economy is stronger in the long run than in the short run (Gochero & Boopen, 2020).

FDI can have a positive effect on domestic enterprises in many ways due to the spillover of knowledge and skills. The presence of foreign enterprises can encourage the competitiveness of domestic enterprises due to the so-called demonstration effect. Namely, domestic enterprises can observe and learn from the positive and negative experiences of foreign enterprises. In developing countries, the market is often characterized by monopolistic competition. The emergence of foreign competition can change monopolistic conditions and have a positive effect on the productivity of domestic enterprises.

However, these positive spillovers are not automatic, nor are they guaranteed either. Although many economies compete to attract FDI, it is necessary to carefully consider the promotional strategies and incentives being offered to investors. The cost of incentives is expected to be recovered by means of the positive effects of FDI on the economy. Unless properly calculated, the cost of attracting FDI might overweigh its benefits. This is why it is necessary that countries should analyze and prepare for the expected effects of FDI on the economy. It is up to the government to design the policy instruments that would help their economy grow and become an attractive location for the desired type of FDI.

The effect of FDI and exports on economic growth is the research problem dealt with in this paper. The main aim implies examining whether FDI, exports and the GDP are cointegrated and causally connected with each other by using the sample of the new EU member states in the period from 2005 to 2020. Therefore, the research hypothesis tested in this paper reads as follows: "FDI and exports positively contribute to the GDP growth in the new EU member states". The hypothesis is tested using various statistical tests including unit-root tests, Kao and Pedroni cointegration tests and the modified Granger causality test. Based on the research results, certain policy implications are discussed. The emerging EU member states have all undergone market liberalization, deregulation and privatization. While some are internationally recognized as big FDI recipients, not all countries have exerted the same effects from those activities on their respective economies. Therefore, it is interesting to do research in those effects and draw a conclusion about the policy

implication. The paper consists of the five parts. The introduction is followed by a literature review. The third part of the paper is a methodology description, and the fourth part contains the research results and the discussion. The fifth part is the conclusion.

LITERATURE REVIEW

In the last few decades, change in the volume and structure of trade and capital flows has been seen. While the relatively low levels of international capital movements were recorded in the 1990s, this volume has increased significantly in the last decades. Likewise, in the past, capital flows were mostly short-term and consisted mostly of bank loans, whereas more recent trends have been showing a strong increase in private capital flows.

A considerable number of research studies provide evidence on the positive effects of FDI on economic growth (Rahman, 2014; Nguyen, 2020; Mohd & Muse, 2021). However, there are also the studies that have not unambiguously proven the fact that FDI significantly contributes to economic growth (Simionescu, 2016; Sopta, Bilas & Franc, 2021).

More concretely, it is interesting to examine how FDI contributes to emerging economies. S. Mohd and A. N. Muse (2021) examined the correlation between FDI and growth in Ethiopia. The results showed the presence of a positive impact of FDI on the GDP, yet no causal relationship between the two variables was established as such. FDI positively contributes to economic growth and this impact is stronger in developing countries than in the developed (Baiashvili & Gattini, 2020). T. Dinh, D. Hong Vo, A. The Vo and T. C. Nguyen (2019) also used various statistical techniques to determine the effects of FDI on economic growth in developing countries. The authors came to the conclusion that FDI promoted growth in the long run, whereas the effect on economic growth was negative in the short run. S. Chaudhury, N. Nanda and B. Tyagi (2020) emphasized the role of the sectoral composition of FDI. They concluded that FDI promoted overall economic growth, whereas FDI had a negative effect on economic growth in the secondary sector specifically. N. Mamingi and K. Martin (2018) found that FDI exerted positive effects on economic growth only when there was an adequate absorptive capacity in the recipient country; otherwise, the effect was negative. FDI will positively affect growth if there is a stable government and the rule of law (Trojette, 2016). S. Hobbs, D. Paparas and M. E. AboElsoud (2021) found a unidirectional link between FDI, exports and the GDP in Albania. What was uncommon was the fact that growth had caused the inflow of FDI in the short run, not contrariwise. Using panel regression, K. Curwin and M. Mahutga (2014) found that a smaller inflow of FDI was better for the country and that sudden larger amounts of FDI could actually harm the recipient country's economy. M. Carkovic and R. Levine (2005) used a dynamic panel estimation technique and found no robust positive impact of FDI on economic growth either directly or indirectly through human capital levels. In a similar fashion, considering the EU post-transition countries, Y. Saglam (2017) found that FDI negatively contributed to economic growth in some countries included in the sample. Using panel data analysis and different cointegration and causality tests, the author concluded that there was but one-way causality from FDI to GDP *per capita*. S. Žiković, I. Žiković and M. Grdinić (2014) found that FDI positively affected economic growth in the long run in all Central European countries, expect in Croatia, where the impact was negative.

Beside FDI, openness to trade and an increase in exports are often considered to be a factor of growth, especially in emerging countries. Regarding the effects of exports on economic growth, the evidence mostly indicates to mixed results. Although exports are thought to be the engine of growth, this is not automatically achieved. For example, A. P. Ribeiro, V. Carvalho and P. Santos (2016) indicate that exports positively contribute to the economic growth of the EU countries, which is only so if it is specialized in high added value products. G. Dudzevičiūtė, A. Šimelytė and J. Antanavičienė (2017) researched the relationship between the GDP and exports on the case of the EU as well. They found that there was a unidirectional effect from the GDP to exports in 11

countries. In a smaller number of the countries, there was a unidirectional effect from exports to the GDP, or a bidirectional relationship between the variables. A. Tsitouras and C. Nikas (2016) investigated the contribution of FDI and exports in 15 post-transition EU countries. They found that the two variables positively contributed to the GDP growth only in the countries which had joined the EU in 2004. For the rest of the sample, that contribution was not confirmed. A. Aravaci and I. Ozturk (2012) analyzed the causal relationship between FDI, exports and growth in the EU transition economies. They obtained mixed results. The results of the Granger causality test revealed that there was a long-term relationship and causality between the variables in only four of the ten EU transition countries included in the sample. Interestingly, F. Carril-Caccia and E. Pavlova (2018) state in their research done for the European Central Bank that FDI and exports are no longer seen as substitutes, but rather as complements. In many cases, horizontal, vertical, export-supporting and export-platform FDI promotes trade.

METHODOLOGY

FDI and exports are considered as the important factors of growth (Sultanuzzaman, Fan, Mohamued, Hossain & Aminul, 2019). In order to determine the relationship between FDI, the exports of goods and services (EXP) and economic growth (GDP) in the EU new member states, the annual data from 2005 to 2020 were used for 13 countries. Table 1 explains the variables used in the research and the data transformations.

After the necessary data transformations, various statistical tests were done so as to examine the relationship and causality among the three series. Firstly, the unit-root test was performed in order to check the stationarity of the time series. Then, Pedroni and Kao cointegration tests were carried out and the ARDL panel cointegration model was performed in order to examine the long-term relationship among the series (Cetintas & Barisik, 2009; Tomić, Šimurina & Jovanov, 2020). Finally, the causality test was performed to determine whether there is a causal relationship among the variables or not. The use of different statistical techniques ensures the robustness of the results and the related conclusions.

RESULTS AND DISCUSSION

Unit-root tests results

All the available panel unit-root tests in EViews v. 10 were conducted. Firstly, the results of the first-generation tests are presented in Table 2. However, those tests do not consider the dependence among the variables, so additional tests were applied (Table 3 and Table 4).

First-generation tests do not consider possible cross-sectional dependences, i.e. they assume cross-sectional independence. Therefore, the second-generation panel unit-root tests were applied. The null hypothesis in the Pesaran CIPS test reads that all the panels are nonstationary and contain a unit root, whereas the alternative hypothesis reads that some panels are stationary. The Pesaran CIPS test results indicate that the null hypothesis should be rejected at the 1% significance level for all but two series (EXP1/GDP and EXP2/GDP) and for the series FDI1/GDP in the model with the trend.

Because of the strong cross-sectional dependence, the results of the Pesaran CPIS test are considered to be more reliable than those of the first-generation tests. However, since quite a short time series (15 observations only) is being dealt with, even the Pesaran CIPS test results should be taken with some doubt because of its lower power when time series are short.

Additional tests were applied in order to test the cross-sectional dependence. In this case, the null hypothesis reads that there is no cross-sectional dependence at all.

The results of all the cross-sectional dependence tests (Breusch-Pagan, Pesaran scaled, Bias-corrected

Table 1 The variables and data transformations

Variable	Description	Source of data
New EU member states	Bulgaria, Croatia, Cyprus, Czech, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia	World Bank database
GDP	Gross domestic product (constant, 2010, U.S. dollars)	World Bank database
FDI	Annual net inflow of FDI (Balance of payments, current US$)	World Bank database
rGDP	Gross domestic product growth (annual %)	World Bank database
FDI%	FDI, net inflows (% of GDP)	World Bank database
E1	Exports of goods and services (Balance of payments, current US$)	World Bank database
E2	Exports of goods and services (% of GDP)	World Bank database
GDP deflator	GDP deflator: linked series (base year varies by country)	World Bank database
rtGDP	Special LOG transformation of the GDP annual growth (rGDP) because this series contains negative values.	World Bank database
GDP def2010	Since the base year varies by country, we have converted all GDP deflator series to the base year 2010=100	World Bank database
FDI2010	= FDI/GDP_def2010	World Bank database
FDI2010 GDP2	= FDI2010/GDP2*100 (%)	World Bank database
E12010	= E1/GDP_def2010	World Bank database
E12010 GDP2	= E12010/GDP2*100 (%)	World Bank database
LtFDI%	Special LOG transformation of the FDI% series because this series contains negative values. The following notation for this series was used: FDI1/GDP	World Bank database
LtFDI2010 GDP2	Special LOG transformation of the FDI2010 GDP2 series because this series contains negative values. The following notation for this series was used: FDI2/GDP	World Bank database
LE12010 GDP2	LOG transformation of the E12010 GDP2 series. The following notation for this series was used: EXP2/GDP	World Bank database
LE2	LOG transformation of the E2 series. The following notation for this series was used: EXP1/GDP	World Bank database

Note: Special LOG transformations are performed by the EViews program due to the negative values in the GDP and FDI series.

Source: Authors

scaled, Pesaran) reject the null hypothesis for no cross-sectional independence. These results recommend the use of the second-generation panel unit-root tests. In the next phase of the research, all the series are assumed to be integrated I(1).

Panel cointegration tests results

In the following part of the analysis, two methodological approaches are used in order to assess the long-term relationship in the panels: the P. Pedroni (1999; 2004) and C. Kao (1999) tests. Table 5 contains the results of the Pedroni panel cointegration tests for the two options of FDI and exports (EXP) series. The Pedroni test was used in two variants: with a constant only and with both the constant and the trend.

With two exceptions (the first two panel tests and the first group test), all the tests reject the null hypothesis for no cointegration and indicate the existence of cointegration between the GDP, FDI and exports for the new members of the European Union panel. In other words, the results are indicative of the existence of correlation among the variables.

C. Kao (1999) advanced the cointegration analysis and presented the parametric residual-based

Table 2 The results of the first-generation unit-root tests

Variables		Null hypothesis: unit root - common root		Null hypothesis: unit root - individual root			Null hypothesis: stationarity	
		Levin, Lin & Chu *t*-statistic	Breitung *t*-statistic	Im, Pasaran & Shin *W*-statistic	ADF Fisher Chi-square	PP Fisher Chi-square	Hadri *Z*-statistic	Heteroscedastic consistent *Z*-statistic
Level	rGDP	-0.26 (.40)	2.80 (.99)	-1.29 (.10)	31.32 (.22)	23.86 (.58)	3.55 (<.01)	3.58 (<.01)
	FDI1/GDP	-6.66 (<.01)	-2.97 (<.01)	-2.74 (<.01)	56.64 (<.01)	66.08 (<.01)	8.87 (<.01)	8.52 (<.01)
	FDI2/GDP	-6.55 (<.01)	-6.97 (<.01)	-4.85 (<.01)	66.28 (<.01)	50.33 (<.01)	7.30 (<.01)	9.01 (<.01)
	EXP1/GDP	0.20 (.58)	2.35 (.99)	1.38 (.92)	17.05 (.91)	10.09 (.99)	6.15 (<.01)	5.79 (<.01)
	EXP2/GDP	-4.52 (<.01)	1.16 (.88)	-0.28 (.39)	23.50 (.60)	35.82 (.10)	8.51 (<.01)	13.79 (<.01)
The first difference	ΔrGDP	-8.73 (<.01)	-0.67 (.25)	-6.39 (<.01)	83.91 (<.01)	100.19 (<.01)	7.28 (<.01)	13.26 (<.01)
	ΔFDI1/GDP	-10.73 (<.01)	-3.72 (<.01)	-6.60 (<.01)	110.85 (<.01)	190.63 (<.01)	21.63 (<.01)	24.35 (<.01)
	ΔFDI2/GDP	-10.16 (<.01)	-6.01 (<.01)	-8.58 (<.01)	107.83 (<.01)	169.90 (<.01)	5.67 (<.01)	20.25 (<.01)
	ΔEXP1/GDP	-5.28 (<.01)	-4.07 (<.01)	-4.13 (<.01)	60.78 (<.01)	76.64 (<.01)	4.57 (<.01)	9.38 (<.01)
	ΔEXP2/GDP	-12.09 (<.01)	-5.22 (<.01)	-9.40 (<.01)	118.04 (<.01)	187.98 (<.01)	15.90 (<.01)	26.58 (<.01)

Note: Individual effects and individual linear trends are excluded. The Schwarz criterion, the Newey-West automatic bandwidth selection and the Bartlett kernel were used.

Source: Authors

panel cointegration. The results of the Kao panel cointegration test are accounted for in Table 6.

Basically, all the Kao tests reject the null hypothesis for no cointegration at the significance level of 1%. Overall, the results of the Pedroni and Kao tests are supportive of the existence of cointegration between the rGDP, FDI1/GDP and EXP1/GDP and between the rGDP, FDI2/GDP and EXP2/GDP in the new EU members.

The ARDL model estimation

The autoregressive distributed lag model (ARDL) is useful for forecasting long-term relationships among variables. In this model, the rGDP is the dependent variable and two different alternatives of the models are used (with and without the constant).

The results reveal that the rate of the adjustment back to (long-term) equilibrium is 56.89% (the model with the constant) and 58.13% (the model with the trend) significant at the less than 1% significance level (Table 7). In the short run, all the coefficients are significant at the less than 1% significance level in both models with the constant and the trend. The long-term coefficients are all negative and mostly statistically significant (the FDI2/GDP coefficient in the model with the trend is not significant). In the short run, an increase in both FDI2/GDP and EXP2/GDP would lead to an increase in the rGDP, i.e. in economic growth. However, that is not the case in the long run, at least not so in the period from 2005 to 2020, when both series had a negative impact on the economic growth series. It should be also noticed that in both the long-term and short-term the impact of exports on economic growth is greater multiple times than that of FDI.

Table 3 The Pesaran CIPS test results

Variable	Without the trend	With the trend
Level		
rGDP	-2.63***	-2.84**
FDI1/GDP	-2.68***	-2.65
FDI2/GDP	-2.80***	-2.89**
EXP1/GDP	-1.74	-1.96
EXP2/GDP	-1.73	-2.46
First difference		
ΔrGDP	-3.91***	-3.70***
ΔFDI1/GDP	-3.39***	-3.44***
ΔFDI2/GDP	-4.49***	-4.38***
ΔEXP1/GDP	-2.69***	-2.80**
ΔEXP2/GDP	-2.89***	-2.67*

Note: The Wald test of the composite linear hypothesis is used. Significance at the 10 percent (*), 5 percent (**), and 1 percent (***) confidence levels.

Source: Authors

Hence the results of the cointegration test confirm the fact that there is a long-term relationship between the rGDP, FDI2/GDP and EXP2/GDP series in the case of the new EU member countries.

Granger causality analysis

Firstly, it was tested whether any pair of series Granger-cause the remaining, i.e. third series. These test results are presented in the first six rows of Table 8. In all the six cases, the null hypothesis of no-Granger-causality was rejected at least at the 5% significance level. To make clearer these results, Granger noncausality was tested for each series separately using univariate tests. These test results are presented in the remaining rows of Table 8. The fact that the test results depend on the definition of the FDI and the exports of goods and services series can be noticed, while for the three series rGDP, FDI1/GDP and EXP1/GDP there is a unidirectional causal relationship from FDI to the GDP to the real GDP growth rate and from the real GDP growth rate to the exports of goods and services to the GDP. In the case of the other three series: rGDP, FDI2/GDP and EXP2/GDP, three bi-directional causal relationships were detected between each of these three series.

In the multivariate systems, when all the three series are included (rGDP, FDI1/GDP and EXP1/GDP or rGDP, FDI2/GDP and EXP2/GDP), the test results

Table 4 The cross-sectional dependence test statistics

Variable	Breusch-Pagan LM	Pesaran scaled LM	Bias-corrected scaled LM	Pesaran CD
Level				
rGDP	685.14	48.61	48.18	25.74
FDI1/GDP	171.90	7.52	7.05	7.73
FDI2/GDP	390.54	25.02	24.56	14.12
EXP1/GDP	747.34	53.59	53.16	26.65
EXP2/GDP	546.12	37.48	37.05	21.83
First difference				
ΔrGDP	657.79	46.42	45.99	25.03
ΔFDI1/GDP	115.95	3.04	2.57	3.93
ΔFDI2/GDP	179.52	8.13	7.66	7.06
ΔEXP1/GDP	385.51	24.62	24.19	17.23
ΔEXP2/GDP	719.82	51.39	50.95	26.41

Note: The cross-section means were removed during the computation of correlations. The degree of freedom is 378 for all the tests. *P*-values for all the test statistics are less than 1%.

Source: Authors

Table 5 The Pedroni test results

Statistic	rGDP, FDI1/GDP & EXP1/GDP		rGDP, FDI2/GDP & EXP2/GDP	
	Constant	Constant & Trend	Constant	Constant & Trend
Panel-v	-0.35	-2.30	-1.08	-3.06
Panel-ρ	-1.18	0.63	-0.22	1.28
Panel-Phillips-Perron t	-5.43***	-6.17***	-3.06***	-5.18***
Panel-Augmented Dickey-Fuller t	-5.27***	-5.46***	-4.13***	-6.92***
Group-ρ	0.14	1.93	0.81	1.70
Group- Phillips-Perron t	-6.69***	-6.84***	-4.04***	-6.63***
Group-Augmented Dickey-Fuller t	-6.06***	-5.55***	-4.25***	-7.04***

Note: The test results generated by EViews. The Pedroni panel statistics are weighted. Significance at the 10 percent (*), 5 percent (**), and 1 percent (***) confidence levels.

Source: Authors

Table 6 The Kao panel cointegration test results

Statistic	rGDP, FDI1/GDP & EXP1/GDP		rGDP, FDI2/GDP & EXP2/GDP	
	(a)	(b)	(a)	(b)
Modified Dickey-Fuller (DF) t	-1.28*	-3.53***	-1.42*	-5.57***
DF t	-3.63***	-4.72***	-3.47***	-5.85***
Augmented DF t	-4.35***	-4.63***	-4.51***	-5.71***
Unadjusted modified DF t	-6.10***	-6.26***	-7.01***	-7.68***
Unadjusted DF t	-6.01***	-5.68***	-6.14***	-6.41***

Note: The test results generated by the Stata command xtcointtest. (a) Cross-sectional means not removed, (b) Cross-sectional means removed. Significance at the 10 percent (*), 5 percent (**), and 1 percent (***) confidence levels.

Source: Authors

in rows 1 and 4 in Table 8 suggest that both the FDI and the exports of goods and services series taken together Granger-cause the real GDP growth rate. The result is consistent with the panel cointegration results, where the cointegration relationship between these three series was established. The mixed results for each individual series in Table 8 are in some way consistent with the mixed results presented in Table 7, where the direction, intensity and significance of the impact FDI and the exports of goods and services series have on the real GDP growth rate depends on the estimation method and the software algorithm used. Therefore, there is ambiguous evidence regarding the impact of FDI and the exports series on the GDP growth rate in the EU emerging countries. The reason for such a conclusion lies in the fact that the results depend on the definition of FDI and the exports of goods and services series. The short time series might also have contributed to such nonconclusive results. Similar mixed results are also revealed in Y. Salgam (2017) and partly in J. Miteski and D. Janevska Stefanova (2017), who researched the contribution of FDI to economic growth in Central European and Southeastern European countries and found that the impact of FDI depended on the sectoral composition. They found that FDI did not have any statistically significant impact on economic growth in the construction sector.

Policy implications

The above results imply that the positive effects of FDI and exports are neither automatic nor equal in all the countries. They depend upon the many factors

Table 7 The ARDL model results

Variable	Constant			Linear trend		
	Coefficient	*t*-statistic	*P*-value	Coefficient	*t*-statistic	*P*-value
	Long-run equation					
FDI2/GDP	-0.0019	-1.78	.08	0.0006	0.61	.54
EXP2/GDP	-0.9068	-1.11	.27	-1.1472	-1.48	.14
	Short-run equation					
Cointegration equation	-0.5689	-7.41	<.01	-0.5813	-6.00	<.01
ΔFDI2/GDP	0.0573	2.22	.03	0.0546	2.17	.03
ΔEXP2/GDP	3.1902	3.41	<.01	3.5759	3.61	<.01
Trend				0.0245	4.32	<.01
Constant	1.3106	6.39	<.01	0.7889	3.66	<.01

Note: The Schwarz criterion (SIC) was used. The ARDL(1,1,1) model with the constant and thee ARDL(1,1,1) model with the trend were selected.

Source: Authors

Table 8 The improved Granger panel causality test

Null hypothesis	Wald statistic	Decision
(FDI1/GDP & EXP1/GDP) does not Granger-cause rGDP	10.05***	Not accepted
(rGDP & EXP1/GDP) does not Granger-cause FDI1/GDP	29.22***	Not accepted
(rGDP & FDI1/GDP) does not Granger-cause EXP1/GDP	22.03***	Not accepted
(FDI2/GDP & EXP2/GDP) does not Granger-cause rGDP	596.26***	Not accepted
(rGDP & EXP2/GDP) does not Granger-cause FDI2/GDP	880.66***	Not accepted
(rGDP & FDI2/GDP) does not Granger-cause EXP2/GDP	24.20***	Not accepted
rGDP does not Granger-cause FDI1/GDP	0.13	Accepted
FDI1/GDP does not Granger-cause rGDP	9.42***	Not accepted
rGDP does not Granger-cause EXP1/GDP	108.07***	Not accepted
EXP1/GDP does not Granger-cause rGDP	0.47	Accepted
rGDP does not Granger-cause FDI2/GDP	31.77***	Not accepted
FDI2/GDP does not Granger-cause rGDP	99.17***	Not accepted
rGDP does not Granger-cause EXP2/GDP	15.31***	Not accepted
EXP2/GDP does not Granger-cause rGDP	8.96***	Not accepted
FDI1/GDP does not Granger-cause EXP1/GDP	0.36	Accepted
EXP1/GDP does not Granger-cause FDI1/GDP	0.55	Accepted
FDI2/GDP does not Granger-cause EXP2/GDP	26.80***	Not accepted
EXP2/GDP does not Granger-cause FDI2/GDP	119.51***	Not accepted

Note: The BIC criterion is used. Significance at the 10 percent (*), 5 percent (**), and 1 percent (***) confidence levels. The decision was based on the 5% significant level.

Source: Authors

and conditions in the country that the government should consider when designing policy measures for attracting FDI and promoting exports. The companies taking FDI into consideration most often base their decisions on the availability of certain resources, the market size or another strategic advantage.

The significance of FDI is derived from a broader perspective. Access to the capital market and financial products is key to financing growth and development. While developed countries have much easier access to capital, developing countries have only begun the process of financial integration in recent decades. The domestic enterprises that are the drivers of the economy in developed countries usually have more sources of financing available on more favorable terms, whereas enterprises in developing countries are characterized by a higher degree of risk and therefore have stricter borrowing conditions. Banks and other external sources of financing disfavor risk and risky investments and often use a broad range of higher interest rates on loans in order to protect themselves from such investments, which means that the loan applicants whose claims seem to be risky are faced with very high interest rates on loans and their access to larger amounts of funding is difficult and limited. Private capital serves as an alternative in these circumstances. Foreign investors can be the source of so much needed capital.

Strategies and instruments for attracting FDI change over years as the expected benefits from such investments change as well. As competition to attract FDI is stronger, it is not uncommon for countries to compete with each other in the scope, value or type of incentives they offer. Governments seek to attract foreign investment projects by offering greater incentives than their competitors or they are creating incentive policies in response to incentives from other countries. Traditional measures and preconditions for attracting FDI are often no longer sufficient to achieve the best possible results, such as technology transfer, higher exports, higher employment, and the like. The market-friendly strategies that used to assume liberalized regimes and reduced barriers to foreign investments, the standards of preferential treatment for foreign investors and a greater role in the resource allocation process given to market forces are the basis for attracting FDI. Some economies can be very successful in attracting foreign investors by implementing such policies, whereas the existence of a healthy and stable economic and political environment to support this is an important prerequisite (Grgić *et al*, 2012).

In the case of targeted competition when the government offers greater incentives than its competition does, those incentives can be particularly high when speaking about big and expensive projects, and investors are indifferent between alternative locations. There are the cases when targeted competition for FDI has resulted in competitive wars, in which unprecedentedly high and even economically unsustainable incentives have been offered (OECD, 2003).

FDI policy instruments should be designed based on the state and orientation of the economy. As follows, if the economy is based on the primary sector, then the government should work on improving the regulatory framework, especially the land acquisition procedure, transaction laws and property rights. If the economy is based on manufacturing, then the government should concentrate on the institutional framework and relieving the administrative burden for investors. In case the economy is based more on the tertiary sector, creating linkages, intellectual property rights and regulating services should be prioritized.

There are various criteria for determining the usefulness of incentives, some of which are based on the efficiency, i.e. on estimating whether the same benefits could be achieved at lower costs, opportunity costs, and the reaction of the competition. If incentives provoke a reaction and increased incentives from other competing countries, it can lead to overspending, the domestic economy ultimately being adversely affected. In the international context, countries should design incentives deemed to be optimal from the point of view of domestic objectives, also considering the imperative of competition with other countries.

Finally, the results of this paper indicate that FDI and exports are not necessarily the engines of economic growth. Although FDI contributes to growth

according to theory, the empirical evidence does not confirm this without a doubt. In fact, there are rather mixed empirical results, which leads to the conclusion that incentives to foreign investors should be carefully designed and that incentives alone are not enough to generate the expected benefits for the economy.

CONCLUSION

Market liberalization and globalization have spurred trade and FDI, consequently leading to the growth of their economic importance. Since developing countries are usually less open, less technologically advanced, less skilled and with less capital than the developed, FDI can be a valuable source of capital, production and growth. Countries should have an adequate strategy and FDI attracting instruments in place. However, as is shown in the paper, the benefits generated from FDI are neither guaranteed nor equally distributed among the countries. Using annual time series for the new European Union member states in the period from 2005 to 2020, the results point to the two main conclusions. Firstly, the GDP, FDI and exports are cointegrated. This conclusion implies a long-term relationship between the tested series.

The results of the long-term coefficient estimation in panel cointegrating regressions based on different estimators and algorithms, however, demonstrate great variations, which is a limitation preventing us from making a clear and definite conclusion about the size and direction of the impact that FDI and the exports of goods and services may have on the real GDP growth. Secondly, the results of the causality test indicate that, in multivariate systems, FDI and the exports of goods and services taken together Granger-caused the real GDP growth. When the pairs of the series are considered, there are certain mixed results about the causality direction. However, these results are in line with the results of the long-term coefficient estimation in the panel cointegrating regressions. In other words, based on the causality test results, it is only ambiguous conclusions about the positive impact of FDI and the exports of goods and services on the real GDP growth in the new EU member states that could be reached, and the research hypothesis cannot be confirmed. Such results imply that national strategic and policy measures for promotion and attraction of FDI and exports should carefully be calculated as the expected positive effects are not assured. The final effect that FDI will have on the recipient economy depends on numerous factors, including the recipient economy's institutional framework, macroeconomic and political stability, business climate, human capital and so forth. The short time series are the main limitation of this study. In future research, the model could be estimated using higher-frequency data (quarterly or monthly) to support nonstationary heterogeneous panel models, which would capture the particularities of specific post-transition European countries.

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Received on 13th June 2022,
after revision,
accepted for publication on 24th November 2022
Published online on 6th December 2022

Vlatka Bilas, PhD is a full professor at the Faculty of Economics and Business, Department of International Economics, University of Zagreb. She is the Head of the Department.

Sanja Franc, PhD is an associate professor at the Faculty of Economics and Business, Department of International Economics, University of Zagreb.

Economic Horizons, September - December 2022, Volume 24, Number 3, 231 - 250
UDC: 33 ISSN: 1450-863 X

Original scientific paper
UDC: 339.5:339.74
doi:10.5937/ekonhor2203243K

THE EXPORT PERFORMANCE AND COMPETITIVENESS OF THE EURO AREA'S PERIPHERY

Radovan Kovacevic*

University of Belgrade, Faculty of Economics, Belgrade, The Republic of Serbia

This paper examines the impact of the selected factors on the real exports of goods and services in the several euro area (the eurozone) peripheral economies. There are five countries in the sample (Italy, Spain, Portugal, Ireland, and Greece). The time period from 2000 to 2019 is considered. The research is aimed at providing robust estimates of the long-term relationship between the real exports of these countries and the selected explanatory variables using panel data analysis. The coefficients of the cointegration export equation were estimated using the FMOLS and DOLS estimators. Using the FMOLS estimator, the estimated coefficient of the real effective exchange rate is negative (-0.80) and of the variable foreign demand is positive (2.25). The coefficient of the real effective exchange rate confirms the fact that, from the point of view of the eurozone peripheral members, the overestimated real value of the euro has a disincentive effect on their real exports. The estimated coefficient of foreign demand suggests that the real export of goods and services (volumes) of the eurozone peripheral members increases by 2.25% when the real Gross Domestic Product (GDP) of the EU increases by 1%. The real export elasticity of the eurozone periphery countries is higher for foreign demand (income elasticity) than for relative price changes (price elasticity). Reductions in wages and prices in peripheral countries have led to redistributive effects in favor of the core.

Keywords: export, real effective exchange rate, foreign demand, net FDI inflow, cointegration, exports equation

JEL Classification: E32, F32, F41, F44

INTRODUCTION

The eurozone members are economically interconnected. According to the convention, the peripheral members of the eurozone include Italy, Spain, Portugal, Ireland and Greece (the countries that geographically belong to the periphery of the eurozone). On the other hand, there is Germany in the center of the Eurozone "core". A dynamic approach to classifying the eurozone countries into those "core" and/or those "peripheral" was developed by P. De Grauwe (2018) and F. N. Campos and C. Macchiarelli (2021). There is an economic rationale for the classification of these countries into the two blocs. The empirical research shows that there is a large gap formed between

* *Correspondence to:* R. Kovacevic, University of Belgrade, Faculty of Economics, Kamenicka 6, 11000 Belgrade, The Republic of Serbia; e-mail: radovan.kovacevic@ekof.bg.ac.rs

these two blocs with respect to competitiveness and external imbalance during the upswing phase of the economy and in terms of the degree of instability in the government bond market and the downward slope of the business cycle as well. The lower productivity and competitiveness of their economy compared to the core of the eurozone are a common characteristic of the peripheral members. Therefore, the asymmetric effects of external shocks occur between these two groups of countries, with the burden of adjustment falling on the countries with a current account deficit. The peripheral members of the eurozone are in the center of our research study. These countries generated big trade deficits in the period before the outbreak of the global financial crisis. Through empirical research, the paper aims to check how these countries solved the problem of external imbalance in the circumstances of external shocks and how that affected their competitiveness. Since all the members of the eurozone renounced the exchange rate as an instrument of the economic policy, the economically weaker members (in our case the peripheral members) are exposed to greater pressure due to external shocks. If the same research were conducted on a sample of the core countries of the eurozone, different results could be expected because these countries are stronger and more competitive economies compared to the peripheral members.

After the global financial crisis of 2008-2009, the European economies were shaken by the sovereign debt crisis. The current account imbalances in the Eurozone periphery (hereinafter referred to as the "periphery countries") are at the heart of the European sovereign debt crisis. The growing eurozone current account imbalances were subjected to the adjustment process in the post-crisis period after 2009. The increase in the exports of the deficit countries was an important channel of this adjustment. The periphery and the core of the eurozone had differed from each other by unit labor costs since the creation of the monetary union. As a result, there are also differences in price competitiveness. In the current account rebalancing process, the eurozone periphery countries had to suppress the growth of inflation and labor costs below the average of the eurozone in order to restore price competitiveness. In the literature, production structural reforms have been proposed in order to achieve this goal. P. R. Lane and G. M. Milesi-Ferretti (2012) show that the global imbalances correction after the crisis of 2008 was mainly due to a reduction in consumption. More recently, attention has been drawn to the other factors in addition to price competitiveness, which has all led to current account imbalances. One of them is the export structure due to the fact that the peripheral eurozone countries have been hit by the competition coming from low-cost countries (Chen, Milesi-Ferretti & Tressel, 2012). In the literature, there is an opinion that the growth of domestic demand in the peripheral countries is a more important cause of the current account deficit than price competitiveness (Wyplosz, 2013). In this case, certain authors see the increase in unit labor costs as an accompanying effect of domestic demand growth, not as the main factor causing the current account deficit (Gabrisch & Staehr, 2012). According to some other authors, the higher growth of unit labor costs in the periphery compared to the core countries reduced the export competitiveness of the peripheral countries and increased demand for products from the core countries, so that the deepened differences in price competitiveness led to current account imbalances (Sinn, 2014; Storm & Naastepad, 2015). In the high-tech goods exporting countries, the impact of this factor on competitiveness is less pronounced.

K. Efstathiou and G. B. Wolff (2017) show that the current account adjustment of the peripheral countries in a ten-year period from 2007 to 2016 was achieved through exports, whereas imports remained at an earlier level or but slightly increased. According to these findings, the trade balances in Spain and Portugal were adjusted to around 8.5 percentage points of the Gross Domestic Product (GDP), with the export contribution being 8 and 11 percentage points (pp) and the import contribution simultaneously being 0.5 and -2.5 (an increase in imports), respectively. Despite the strong adjustment of the current account balance, the Spanish economy is characterized by high gross external indebtedness, which amounted to 169.3% of the GDP at the end of 2019 (Delgado-Télez, Moral-Benito & Viani, 2020). The authors who came to these findings point out the fact that, due to such high external indebtedness, the country's financial stability could be disrupted if the external financing conditions deteriorated.

As the members of the eurozone, the peripheral countries were able to access a deeper financial market. At the same time, however, these countries gave up the exchange rate as a valuable corrective mechanism in the times of crisis. A higher degree of financial integration eased external borrowing, which led to deterioration in the external position of these countries. The economic growth of Greece and Ireland during the early 2000s was based on the expansion of consumer credit and borrowing abroad. Private consumption accounted for almost three-quarters of Greece's GDP growth and was financed by bank loans. A part of consumer credit was spent on imported products, which, along with moderate exports, led to a current account deficit. The real effective exchange rate appreciated in Ireland during the boom led to a reduction in export shares, so the current account shifted to a deficit in 2005 (Dooley, 2018). The global financial crisis of 2008 and the eurozone debt crisis in the period from 2010 to 2012 imposed the adjustment process which led to a reduction in the current account deficit of the peripheral members. In order to restore competitiveness and adjust the real exchange rate in the short run, these countries were forced to undertake an internal depreciation of the euro (a weaker real effective exchange rate of the euro), which was achieved by a downward adjustment in nominal wages and prices relative to major trading partners, which led to a slowdown in economic growth, a rise in unemployment, and an increase in the fear of potential recession[1]. Thanks to the structural reforms, the peripheral countries have managed to restore some of the lost macroeconomic competitiveness in recent years. However, the external shock of Covid-19 led to a large decline in the economic activity in all the members of the eurozone, so that the peripheral members are facing a reduction in export demand, which on its part can undermine the sustainability of the current account of these countries. At the same time, it will be difficult for the periphery to continue to depreciate the real exchange rate as a measure to boost exports because it could further disrupt economic growth, increasing the budget deficit and the public debt. It is, therefore, necessary to establish a redistributive industrial policy in order to support an adequate level of aggregate demand in all the euro area member states. As pointed out by C. Gräbner, Ph. Heimberger, J. Kepeller and B. Schüz (2020), strengthening the technological catch-up process in the periphery countries is a precondition to reducing the divergence between the periphery and the center of the eurozone. These are the reasons for examining the export performance of the peripheral euro area members in more detail.

The Covid-19 pandemic caused a great shock in the European economy. Some peripheral eurozone members have suffered a serious blow (Spain and Italy), so their economy is severely affected by this crisis. In the other countries, the shock caused by Covid-19 was followed by a slowdown in economic growth and trade. If the Covid-19 crisis continues to last for long, it can be expected that EU consumers will cut expenditures on manufacturing goods. It will lead to trade-to-GDP elasticity greater than the one in the eurozone periphery (the reduction in manufacturing exports of these countries will be considerably larger than the reduction in the EU's GDP). That is the reason why it is extremely important for the peripheral members of the eurozone to quickly return to the path of export growth so as to avoid the worsening of the current account. To achieve that, it is necessary that the impact of the relevant factors on the real exports of the peripheral eurozone members should be reexamined.

The subject matter of the research conducted in this paper implies the examination of the role of the exchange rate and foreign demand in shaping the export performance and competitiveness of the peripheral members of the eurozone. The paper is aimed at investigating the relative role of price competitiveness and foreign demand as the factors that affect real exports and therefore the current account of the eurozone periphery countries. Starting from the subject matter and the goal of the research study, the following research hypotheses are tested in the paper:

H1: Price competitiveness is an important export factor of the peripheral members.

H2: The export demand of the other European Union members significantly affects the export of its peripheral members.

The panel model of the real export of the five peripheral eurozone members most affected by the sovereign and banking crisis in Europe (namely Italy, Spain, Portugal, Ireland, and Greece) will be estimated. The real effective exchange rate was used as a measure of price competitiveness, while the real GDP of the EU was used as an indicator of foreign import demand, i.e. an indicator of the income elasticity of demand for the exports of the peripheral countries. The export equation in this study includes the EU28 import demand variable since the EU28 market was the most important export destination for the peripheral eurozone members in the period covered by our panel analysis.

The rest of the paper is structured as follows: Section 2 provides an overview of the literature; in Section 3, the methodology applied and the data used in the research are presented in detail; in. Section 4, the empirical results of the research study are presented, while Section 5 ultimately provides the concluding remarks.

LITERATURE REVIEW

The earlier empirical studies that analyzed the causes of the current account deficit in the eurozone peripheral members examined the effects of price competitiveness on exports (Harmsen, Turunen & Bayoumi, 2011; ECB, 2012; Tressel & Wang, 2014; Storm & Naastepad, 2015). Thus, some authors emphasize the fact that the rebalancing of the peripheral eurozone members is not only an internal process, because a significant part of these countries' exports is realized outside the eurozone (Darvas, 2012). It is pointed out that exporters from the peripheral countries are confronted with the intense competition of the countries with abundant cheap labor. The exchange rate is one of the factors influencing exports in different ways (Chen *et al*, 2012). The systematic studies of the link between eurozone exports and various cost and price competitiveness indicators do not show compliance with the "ideal indicator" for measuring international cost and price competitiveness. In an effort to answer this question from an empirical point of view, M. Ca' Zorzi and B. Schnatz (2007) evaluated the alternative export equations that included the various real effective exchange rates of the eurozone. The obtained results are quite consistent with previous findings. The authors estimated that the improvement of cost and price competitiveness by 1% was associated with an increase in the volume of exports ranging from 0.3% to 0.4% for the largest number of the indicators used to measure cost and price competitiveness. In their study on the export performance of the eurozone, R. Harmsen *et al* (2011) estimated the impact of foreign demand on exports. They found that the elasticity of exports on foreign aggregate demand was positive and statistically significant, but the price competitiveness coefficient varied considerably depending on which indicator was used as a proxy for price competitiveness. In their recent work, S. Christodoulopoulou and O. Tkačevs (2014) assessed export and import equations for some eurozone countries, and their research findings show that price competitiveness is a significant factor that affects exports.

The findings in the literature indicate the fact that the value of the exports of the peripheral members is significantly influenced by the exports structure. Countries with a greater share of high-tech products in total exports have a greater export growth, so the foreign income elasticity of export demand is greater (Wierts, van Kerkhoff & de Haan, 2014). U. Baumann and F. di Mauro (2007) analyzed how the specialization of trade in the euro area had changed due to globalization and found that the specialization of this zone had increased in those high-tech sectors in which there was a high productivity growth with strong growth in demand, e.g. pharmaceuticals.

Some authors (Matthes, 2014) found that current rebalancing in some peripheral members was mainly the consequence of the business cycle phenomenon that could be reversed in the other direction. They argued that rebalancing was not a structural phenomenon and that, due to the growth of the economic activity, imports would be greater than exports.

Our empirical strategy is also related to the literature that analyzes resource reallocation in the periphery countries. For instance, T. Tressel and Sh. Wang (2014)

analyzed the effects of the external rebalancing of the eurozone deficit countries. These authors did not provide strong evidence for resource reallocation from the non-tradable sector to the tradable sector, but they did conclude that an improved export performance still depended on external demand in the rest of the world.

Many recent papers have focused on internal demand as an important factor of the current account deterioration. One conclusion found in this literature is that rebalancing in the current account of the periphery countries is possible by redirecting exports to non-EU countries (Éltető, 2018). This author investigated the effects of trade in goods and services in the Iberian, Baltic, and Visegrád countries after the crisis. The analysis concluded that the exports of these countries had increased due to a decline in domestic demand. The results of this study show that the reorientation of trade towards non-EU countries was temporary, and the product structure of exports remained largely the same as before the crisis. G. Gaulier and V. Vicard (2012) analyzed the causes of the current account deficit in the peripheral Eurozone members and concluded that, until the outbreak of the crisis, the accumulated deficits had been mainly due to relatively dynamic domestic demand. They also noted the fact that the exports of the peripheral eurozone members had often grown despite the rising unit labor costs. These authors concluded that the financial integration in the eurozone had allowed capital inflows in the non-tradable sectors of the periphery countries, thus resulting in an increased import demand, as well as a rise in the price of non-tradable goods and services. E. Bobeica, E. P. Soares, A. Rua and K. Staehr (2014) investigated the link between domestic demand pressure and exports by using the error correction dynamic panel model for the 11 euro area countries over the two decades. The findings of that study suggest that there is a statistically significant substitution effect between domestic and foreign demand. At the same time, the link is much stronger when domestic demand decreases than when it increases, according to the authors' estimation.

Finally, some recent papers have used dynamic equilibrium models in the current account analysis of the peripheral eurozone countries. Ch. Zwick (2018) analyzed the sources of the current account deficit in Greece, Ireland, Portugal, and Spain after the introduction of the euro. The DSGE model with a diversified exports sector structure was applied in the research and estimates were given for each peripheral country individually. The model exhibited a solid performance and was used to quantitatively estimate the different explanatory variables that explain the origin of the deficit. The results indicate the fact that the interest convergence played an important role in the decline of the net-exports-to-GDP ratios in the eurozone periphery.

DATA AND METHODOLOGY

Data

Our empirical analysis of the dynamics in the exports of the peripheral eurozone countries is based on the annual time series for five countries (Ireland, Italy, Spain, Portugal, and Greece) in the period from 2000 to 2019. The source of the data for all the variables was the EUROSTAT statistical database, with the exception of the data for the net inflow of the FDI variable for the period from 2000 to 2019, and the unit value of exports for the years 2000 and 2001, which were downloaded from the World Bank database[2]. The export of goods and services is the dependent variable in the model. The explanatory variables were selected according to the conventional construction of the export equation in the literature. All the variables in the model are natural logarithms. The panel is balanced.

The variables in the export equation are as follows:

The export of goods and services (the label in the export equation is *EXPORT*). The data on the exports of goods and services are chain-linked volumes, index 2010 = 100. The export of goods and services is a dependent variable, but with a time lag of one period, it also appears as an explanatory variable. The other indicators represent the explanatory variables.

The Real Effective Exchange Rate (the label in the export equation is the *REER*). *REER* is the real effective exchange rate (the deflator: the consumer price index - 42 trading partners - industrial countries), index 2010 = 100[3]. A rise in this index means a loss of competitiveness. *REER* is calculated using tradable and non-tradable prices separately, in which way the effects of price competitiveness can be better understood according to the approach set by C. Wyplosz (2013). *REER* for internal goods is calculated by dividing *REER* (calculated using the GDP as the deflator) by *REER* (obtained using the export prices as the deflator) (the decomposition according to Ruscher & Wolff, 2009). The label for this *REER* in the export equation is *REERINTERNAL*. This variable is used to test the robustness of the model.

Foreign demand (the label in the export equation is *FD*). As an indicator of foreign demand, the data for the EU28 GDP at market prices (the chain-linked volumes, index 2010 = 100) were used. The EU's GDP was taken as the indicator of foreign demand because the predominant part of the export of the peripheral countries is realized on the EU market.

The Net FDI Inflow (the label in the export equation is *FDI*). Different *FDI* categories have a different impact on trade and competitiveness. In our panel, Ireland is an example of a country with a link between the large net *FDI* inflows and a strong export-led economic growth during 1990[4]. A significant part of the *FDI* inflow was realized in the intra-euro area in the form of mergers and acquisitions (M&A), so its impact on competitiveness and trade seems to be irrelevant. Hence, the transfer of technology associated with M&As between the euro area countries is rather limited. The largest inward *FDI* stock in terms of their GDP was recorded in Ireland (244% in 2018). Italy and Greece did not form a significant stock of *FDI*, while important investments by German companies in Spain and Portugal from the beginning of 1990 were later redirected towards new EU member states.

Export Prices (the label in the export equation is *EXPORTPRICE*). The export prices were approximated by the unit value of the exports. The unit values were calculated by dividing the trade value by the quantity. The unit values obtained in this way were divided by the average unit value of the previous year in order to obtain the basic indices of the unit value. The outliers were removed from these indices. The indices of the basic unit values were aggregated across countries and commodities. Finally, the unit value indices were chained back to the reference year (2010 = 100) and were used in this paper to approximate the import and export price movements.

The Dummy (the label in the export equation is *DUMMY*). The period from 2009 to 2019 is a crisis period because the peripheral eurozone members were forced to implement the current account adjustments. This dummy variable serves to show that the financial crisis affected the periphery countries. The dummy variable is equal to 1 from 2009 to 2019, being 0 otherwise.

Methodology

Regression model specification

Following M. Comunale and J. Hessel (2014) in our research study, the model of aggregate exports is applied, in which the panel series of the exports volumes of goods and services is a dependent variable, the independent variables being as follows: 1) the real effective exchange rate as a substitute for price competitiveness; 2) foreign demand, proxied by the EU28 growth GDP; 3) net foreign investments, as multinational enterprises represent significant exporters from the peripheral countries; 4) export prices. All the variables are natural logarithms.

The dependent variable is also a one-lag regressor and the independent variables are at the level and with one lag. The Akaike information criterion (AIC) and the Bayesian information criterion (BIC) were applied for the lag length selection. Different combinations of the variable lag lengths were used in our export equation and the differences between them were negligible. Finally, a decision was made to use all the variables with one lag length as the simplest option. The model follows the typical structure of a dynamic panel model, which includes a dependent variable

with a lag. The introduction of the variables with a lag is important for controlling the dynamics of the process. The selection of the variables in the model is similar to the analysis of the eurozone's export performance provided by R. Harmsen *et al* (2011).

The model can be expressed as:

$$LogEXPORT_{i,t} = \delta_i LogEXPORT_{1,t-1} + \alpha_{10i} LogREER_{i,t} + \alpha_{11i} LogREER_{i,t-1} + \alpha_{20i} LogFD_{i,t} + \alpha_{21i} LogFD_{i,t-1} + \alpha_{30i} LogFDI_{i,t} + \alpha_{31i} LogFDI_{i,t-1} + \alpha_{40i} LogEXPORTPRICE_{i,t} + \varepsilon_{it} \quad (1)$$

The robustness of the obtained results was checked by an extended regression equation:

$$LogEXPORT_{i,t} = \delta_i LogEXPORT_{1,t-1} + \alpha_{10i} LogREER_{i,t} + \alpha_{11i} LogREER_{i,t-1} + \alpha_{20i} LogFD_{i,t} + \alpha_{21i} LogFD_{i,t-1} + \alpha_{30i} LogFDI_{i,t} + \alpha_{31i} LogFDI_{i,t-1} + \alpha_{40i} LogEXPORTPRICE_{i,t} + \alpha_{40i} DUMMY_{i,t} + \alpha_{40i} LogREERINTERNAL_{i,t} + \varepsilon_{it} \quad (2)$$

The choice of the variables included in the export equation was motivated by the literature on external competitiveness. The estimated export equation provides an opportunity to see the impact of the selected explanatory variables on the real exports of the countries included in the panel. The panel regression in this study implies that the estimated elasticities for foreign demand and the real effective exchange rate are common across the sample of the observed countries. However, in reality, foreign trade structure differs across the periphery countries, which means that the individually calculated coefficients of elasticity will differ across countries.

The estimation strategy

The first step in the study is to check the stationarity of time series. The literature (Harmsen *et al*, 2011) suggests that aggregate trade panels are stationary (I(1)) and cointegrated. Testing for the stationarity of the time series in the panel here will be carried out using the following tests: 1. the A. Levin, Ch. F. Lin and Ch. Ch. J. Chu (2002) test (LLC), 2. the K. S. Im, M. Pesaran and Y. Shin (2003) test (IPS), 3. the J. Breitung (2000) test, 4. the Fisher -ADF and Fisher-PP tests (Maddala & Wu, 1999; Choi, 2001) and 5. the K. Hadri (2000) test. It should be pointed out that the LLC, Breitung, and Hadri tests assume that there is a common process of the unit root, whereas the the IPS and Fisher-ADF, and Fisher-PP tests are based on the assumption that there is an individual process of the unit root.

In order to investigate the possibility of cointegration in this panel, the following cointegration tests are applied: the P. Pedroni (1999; 2001; 2004) test, the C. Kao (1999) test, and the Johansen-Fisher (Johansen, 1991) Panel Cointegration Test. The Pedroni and Kao tests are based on R. F. Engle and C. F. J. Granger's (1987) two-step (residual-based) cointegration tests. The Fisher test is a combined Johansen test. The cointegration equation in this panel is estimated by the FMOLS (Fully Modified OLS) and DOLS (Dynamic OLS) estimators (Phillips & Hansen, 1990).

The pooled FMOLS estimator defined by P. C. B. Phillips and R. H. Moon (1999) is an extended version of the standard estimator established by P. C. B. Phillips and B. E. Hansen (1990). Having defined a modified dependent variable and the serial correlation correction terms, the panel pooled FMOLS estimator for the coefficient β is given as follows:

$$\hat{\beta}_{FP} = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \bar{X}_{it} X_{it}^{'} \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \left(\bar{X}_{it} Y_{it}^{+} - \hat{\lambda}_{12}^{+'} \right) \quad (3)$$

where $\bar{y}_{it}^{+} = \bar{y}_{it} - \hat{\omega}_{12} \hat{\Omega}_{22}^{-1} \hat{u}_2$ is the modified dependent variable which corrects endogenously and $\hat{\lambda}_{12}^{+} = \hat{\lambda}_{12} - \hat{\omega}_{12} \hat{\Omega}_{22}^{-1} \hat{\Lambda}_{22}$ is the modified serial correlation correction term.

Instead of directly estimating the asymptotic variance, P. Pedroni (2001) and N. C. Mark and D. Sul (2003) defined the consistent estimator by using the regressor moments:

$$\hat{V}_{FP} = \hat{w}_{1.2} \hat{M}_{FB}^{-1} \quad (4)$$

where

$$\hat{M}_{FP} = \frac{1}{N} \sum_{i=1}^{N} \left(\frac{1}{T^2} \sum_{t=1}^{T} X_{it} X_{it'} \right) \quad (5)$$

In their paper, N. C. Mark and D. Sul (2003) propose the sandwich form of this estimator, which allows for heterogeneous variances:

$$\hat{V}_{FP} = \hat{M}_{FP}^{-1}\hat{D}_{FP}\hat{M}_{FP}^{-1} \tag{6}$$

where

$$\hat{D}_{FP} = \frac{1}{N}\sum_{i=1}^{N}\left(\hat{w}_{1.2i}\frac{1}{T^2}\sum_{t=1}^{T}X_{it}X_{it'}\right) \tag{7}$$

and the long-term variance $\hat{w}_{1.2i} = \hat{w}_{11i} - \hat{w}_{12i}\hat{\Omega}_{22i}^{-1}\hat{w}_{21i}$ is calculated for each cross-section. For $\hat{w}_{1.2}$ and $\hat{w}_{1.2i}$ it is possible to correct the degree of freedom for comparability with the standard regression standard error of the regression estimators.

The dynamic OLS (DOLS) method for estimating the panel cointegration equation can be applied by augmenting the cointegrating regression with the lead and lag of the regressors. The following regression equation can be used (Pooled DOLS):

$$y_{it} = X_t^{'}\beta + D_{1t}^{'}\gamma_1 + \sum_{j=-q}^{r}\Delta X_{t+j}^{'}\delta + \vartheta_{1t} \tag{8}$$

The model allows for the short-term dynamic coefficients δ to be cross-section specific.

P. Pedroni (2001) proposed the augmentation of the J. H. Stock and M. Watson (1993) DOLS estimator on the panel structure. The panel DOLS includes an extended panel cointegration regression equation with specific cross-section lags and leads ΔX_{it} to the exclusion of asymptotic endogeneity and a serial correlation.

C. Kao and M. H. Chiang (2000) described the pooled DOLS estimator using ordinary least squares to estimate an augmented cointegrating regression equation as follows:

$$\tilde{y}_{it} = \tilde{X}_{it}^{'}\beta + \sum_{j=-q_i}^{r_i}\Delta\tilde{X}_{it} + {}^{'}{}_{j}\,\delta_i - \tilde{v}_{1it} \tag{9}$$

where $\tilde{y}_{it}$ and $\tilde{X}_{it}$ are the data without individual deterministic trends. The short-term dynamic coefficients δ_i can be cross-section specific.

Suppose that $\tilde{Z}_{it}$ represents a regressor created by the interaction of the $\Delta\tilde{X}_{it} + j$ terms with the cross-section dummy variables and denote $\tilde{W}_{it}^{'} = \left(\tilde{X}_{it}^{'}, \tilde{Z}_{it}^{'}\right)^{'}$.

Thereafter, the pooled DOLS estimator can be written as follows:

$$\begin{bmatrix}\hat{\beta}_{DP}\\ \hat{\gamma}_{\gamma DP}\end{bmatrix} = \left(\sum_{i=1}^{N}\sum_{t=1}^{T}\tilde{W}_{it}\tilde{W}_{it}{}'\right)^{-1}\left(\sum_{i=1}^{N}\sum_{t=1}^{T}\tilde{W}_{it}\tilde{y}_{it}{}'\right) \tag{10}$$

C. Kao and M. H. Chiang (2000) show that the DOLS and pooled FMOLS estimators have the same asymptotic distribution. Therefore (Kao & Chiang, 2000) the asymptotic covariance matrix of the $\hat{\beta}_{DP}$ can be estimated using the corresponding sub-matrix of:

$$\hat{V}_{DP} = \hat{w}_{1.2}\hat{M}_{DP}^{-1} \tag{11}$$

where

$$\hat{M}_{DP} = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{1}{T^2}\sum_{t=1}^{T}\tilde{W}_{it}\tilde{W}_{it}{}'\right) \tag{12}$$

and $\hat{w}_{1.2}$ is an estimator of the long-term residual variance.

In this paper, the Granger-Causality relationship will be checked among the panel time series. Granger Causality can be calculated using bivariate regressions, the bivariate regressions in a panel context taking the following form:

$$\begin{aligned} y_{i,t} =& \propto_{0,i} + \propto_{1,i} y_{i,t-1} + \ldots + \propto_{k,i} y_{i,t-k} + \\ &+\beta_{1,i}x_{i,t-1} + \ldots + \beta_{k,i}x_{i,t-k} + \varepsilon_{i,t} \end{aligned} \tag{13}$$

$$x_{i,t} = \propto_{0,i} + \propto_{1,i} x_{i,t-1} + ... + \propto_{k,i} x_{i,t-k} + \\ + \beta_{1,i} y_{i,t-1} + ... + \beta_{k,i} y_{i,t-k} + \varepsilon_{i,t} \quad (14)$$

where t represents the time dimension of the panel, and i shows the cross-sectional dimension.

Here, the panel causality test that treats panel data as one large, stacked set of data are used and the standard Granger Causality test is applied then. This method is based on the assumption that all the coefficients are the same across all the cross-sections, i.e.:

$$\propto_{0,i} = \propto_{0,j} \propto_{1,i} = \propto_{1,j}, ..., \propto_{l,i} = \propto_{l,j}, \dot{A}\forall_{i,j} \quad (15)$$

$$\beta_{1,i} = \beta_{1,j}, ..., \beta_{l,i} = \beta_{l,j} \dot{A}\forall_{i,j} \quad (16).$$

Quantile regression is also applied in order to assess the impact of the real effective exchange rate and foreign demand at the different quantiles of the conditional real export distribution in the peripheral eurozone member countries. While most regression models relate to the analysis of the conditional mean of the dependent variable, quantile regression models the quantiles of the dependent variable given a set of explanatory variables. The original version of this model was formulated by R. Koenker and Jr. G. Bassett (1978). Based on this version, using quantile regression, the relationship between the LogREER and LogGDPEU regressors and the specified quantile of the LogEXPORT dependent variable is estimated.

The Empirical Results and Discussion

The results of the empirical research are presented in this section. The descriptive statistics of the variables used in this research are given in Table 1.

Table 1 shows that all the variables have a positive value of the mean. The FDI net inflow has the highest standard deviation (1.77), which means that this variable has the highest dispersion of the time series. Based on the Jarque-Bera statistics for the EXPORT and FDI variables, the null hypothesis reading that these series are normally distributed is rejected with a significance of 1%, as well as for the REERINTERNAL variable at a significance level of 5%. The skewness values, except for the EXPORT variable, are less than zero, so their empirical distribution is asymmetric to the left. The systematic growth of the exports over time makes the empirical distribution of this variable asymmetric to the right. The asymmetry to

Table 1 The descriptive statistics of the used variables

	EXPORT	REER	GDPEU	FDI	EXPORTPRICES	REERINTERNAL
Mean	4.653465	4.577004	4.606658	0.79379	4.588338	4.574414
Median	4.62791	4.58272	4.62055	0.869926	4.59482	4.60151
Maximum	5.456602	4.695925	4.74232	4.391867	4.836537	4.758505
Minimum	4.102643	4.435567	4.467057	-6.52287	4.341205	4.349174
Std. Dev.	0.234566	0.051025	0.076002	1.771955	0.119709	0.104331
Skewness	0.789082	-0.52615	-0.07498	-1.6292	-0.26081	-0.45401
Kurtosis	4.26359	2.962443	2.27243	8.121833	2.14309	2.21485
Jarque-Bera	17.03025	4.619845	2.299356	153.5428	4.193246	6.003994
Probability	0.0002*	0.099269	0.316739	0.000000*	0.122871	0.049688**
Sum	465.3465	457.7004	460.6658	79.37897	458.8338	457.4414
Sum Sq. Dev.	5.447095	0.257754	0.571853	310.8428	1.418684	1.077606
Observations	100	100	100	100	100	100

Note:*p<1%; **p<5%. The descriptive statistics of each variable are calculated based on the logarithmic values of all the variables.

Source: Author

the left suggests that the rest of the time series exhibit a downward trend over time. The kurtosis for the EXPORT and FDI variables has a value greater than 3, which makes it possible to conclude that the tails of the empirical distribution of these variables are heavier than the tails of the normal distribution. The heavy tails are the result of the extreme disturbances in the movement of the time series, such as the global financial crisis of 2007-2009. The kurtosis for the other variables is less than 3, so the tails of the distribution of these variables are lighter than the tails of the normal distribution (the series are platykurtic).

In order to check the degree of the integration of the panel variables, the following first-generation unit root tests, namely the LLC, IPS, ADF-Fisher Chi-square, PP-Fisher Chi-square, and Hadri tests were applied. The data for all the variables cover the period from 2000 to 2019. As the time horizon in this study (20) is rather short, multiple unit-root tests were applied so as to avoid the weaknesses that arise due to the shorter time horizon of the panel time series. For all the tests, two options are included: the constant and the constant with the trend. The equation for testing was applied to the level and the first differential of each variable in the model.

The applied unit-root tests showed the presence of the unit root for the level of the variable in most panel time series at a significance level of 5%. Then, the integrity check at the first differential was carried out, and all the series were found to be stationary, that is their integrity was of the order one (Xt~I(1)). The exception were several variables whose stationarity of the first difference was not confirmed by the Hadri test. There was no surprise given the lack of the Hadri test because, in the shorter time series, it overly rejects the null hypothesis that a time series is stationary.

Since the biggest number of the unit root tests showed that the model variables were integrated of the order one, the existence of the cointegration between the exports and the explanatory variables in the model was subjected to examination. The Pedroni Cointegration Test was used, and to test the robustness of the conclusions the Kao Cointegration Test and the Johansen Fisher Panel Cointegration Test were done. The null hypothesis of the Pedroni and Kao test reads that the residuals of the estimated cointegration equations are nonstationary, i.e. they have a unit root. In case variables are co-integrated, residuals are stationary. Four of the 11 calculated test statistics of the Pedroni test (without the deterministic component in the model) indicate the existence of cointegration, whereas the other statistics of the same test do not confirm this finding.

Table 2 reports the results of the Kao Residual Panel Cointegration tests, which rejected the null hypothesis of no cointegration for the export of goods and services of the peripheral countries and the other variables at the 5% significance level, so there is cointegration.

Table 2 The Kao Residual Cointegration test results

	t-Statistic*	Prob.
ADF	-1.789289**	0.0368

Notes: The ADF is residual-based ADF statistics. The null hypothesis is no cointegration. ** It means that the estimated parameters are significant at a 5% level. The automatic lag length selection based on SIC with the max lag of 2, the Newey-West automatic bandwidth selection, and the Bartlett kernel.

Source: Author

The result of the Johansen-Fisher Panel Cointegration Test summarized in Table 3 allows us to see that there is a cointegration relationship among the five variables at the 1% significance level. Based on the results of the panel cointegration tests, it can be concluded that there is a panel long-term equilibrium relationship among the export of goods and services, foreign demand, the real effective exchange rate, foreign direct investment, and the exporting process. In contrast to the Kao and Johansen-Fisher panel cointegration test, most statistics (i.e. seven of 11, without the deterministic component in the model) do not reject the null hypothesis of no cointegration at the conventional size of 0.05 in the Pedroni test for the period from 2000 to 2019.

Since the largest number of the tests confirmed the existence of cointegration, the next step was to

estimate cointegration vector coefficients. Using the FMOLS and DOLS estimators, the long-term relationship between the variables of the starting model was estimated. The cointegration vector was estimated using country fixed-effects regressions (Table 4).

The largest number of the coefficients from the estimated equation are statistically significant at the level of 1%. The coefficient of the export volumes with a lag taken as an independent variable has a high value, which indicates a high degree of inertia in the movement of the exports of goods and services of the peripheral countries. The results obtained in this study are consistent with the findings in the economics literature (Harmsen *et al*, 2011). The diagnostic check shows that the residuals of the estimated equation do not have autocorrelation and are mostly normally distributed.

As expected, the real effective exchange rate significantly influences the exports and has the expected negative sign. The estimated coefficient of the

Table 3 The Johansen-Fisher panel cointegration test (the unrestricted cointegration rank test; the trace and the maximum eigenvalue)

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	182.8**	0.0000	126.3**	0.0000
At most 1	87.19**	0.0000	57.38**	0.0000
At most 2	39.91**	0.0000	33.31**	0.0002
At most 3	16.80	0.0766	18.86***	0.0421
At most 4	6.285	0.7908	6.285	0.7908

Notes: * The probabilities (asymptotic p-values) are computed using the asymptotic Chi-square distribution. ** The test statistics are significant at the 1% level. *** The test statistics are significant at the 5% level. The linear deterministic trend is included.

Source: Author

Table 4 The export equation of the peripheral eurozone - the FMOLS and DOLS estimates, for the period from 2000 to 2019 and the subperiod from 2009 to 2019

	2000–2019		2009–2019	
	FMOLS	DOLS	FMOLS	DOLS
Export volume - *LogEXPORT*(-1)	0.96(0.00)	0.96(0.00)	0.84(0.00)	0.84(0.00)
Real effective exchange rate (*LogREER*)	-0.80(0.00)	-0.78(0.00)	-0.85(0.00)	-0.87(0.02)
Real effective exchange rate (*LogREER*)(-1)	0.60(0.00)	0.61(0.00)	0.39(0.00)	0.40(0.24)
Foreign demand (*LogGDPEU*)	2.25(0.00)	2.26(0.00)	2.09(0.00)	2.07(0.00)
Foreign demand (*LogGDPEU*)(-1)	-2.30(0.00)	-2.33(0.00)	-1.93(0.00)	-1.92(0.00)
Net FDI inflow (*LogFDI*)	0.00(0.00)	0.01(0.02)	0.00(0.00)	0.00(0.53)
Net FDI inflow (*LogFDI*)(-1)	0.00 (0.04)	0.00(0.48)	-0.00(0.62)	-0.00(0.04)
Export prices (*LogEXPORTPRICES*)	0.11(0.00)	0.12(0.13)	0.16(0.00)	0.16(0.00)

Notes: In parentheses, there is the p value. For the period from 2000 to 2019, the sample is adjusted to 2002-2019 for the FMOLS estimation and to 2001-2019 for the DOLS. The cointegration equation estimation method: the panel FMOLS; the panel method: pooled estimation; the cointegration equation deterministic: the constant (C); the first-stage residuals use heterogeneous long-term coefficients; the coefficient covariance computed using the default method; the long-term covariance estimates (the Bartlett kernel, the Newey-West fixed bandwidth); the p-values are given in parentheses. The cointegration equation estimation method: the panel DOLS; the cointegration equation deterministic: the constant (C); the long-term variance (the Bartlett kernel, the Newey-West fixed bandwidth) are used for coefficient covariances.

Source: Author

real effective exchange rate confirmed the theoretical view that the overvalued currency will discourage export. Therefore, the estimated value of that coefficient suggests that the potential improvement of competitiveness can significantly contribute to an increase in real exports. The overestimated real value of the euro from the position of the peripheral countries shows that the cost efficiency of these countries is reduced due to wage and domestic price growth. Given the fact that the exchange rate is an exogenous variable for all eurozone members, the growth of wages and prices in the peripheral countries relative to the EU average reduces their competitiveness. This price competitiveness indicator means that the exports of the periphery countries are largely dependent on prices and less on the product quality. However, the opposite conclusion is reached based on the estimated value of the coefficient for the export prices. According to the quantitative value, this coefficient is less significant compared to the estimated value of the coefficient for the real effective exchange rate, whereas according to the FMOLS, it is statistically significant, almost the same as the coefficient for the exchange rate. Given the fact that the coefficient for export prices has a positive sign, this would mean that the growth of export prices does not adversely affect the real exports of goods and services from the peripheral countries. In other words, the export of the peripheral member states is more influenced by high-quality goods with high value added (VA) than prices themselves. This coefficient suggests that, in the process of the current account adjustment in the countries included in our panel, structural adjustment programs would imply a greater export share of higher-VA products in their total exports.

However, the data on the share of high-tech products in the total exports of the peripheral countries show that, for most of them, this share is still low (except for Ireland). As a share of the total exports for 2018, high-technology exports in Ireland were 34.7%, in Italy 7.8%, in Portugal 4.0%, in Spain 5.5%, and in Greece 4.5% According to Eurostat (SITC Rev.4), high-technology products include the following products: the aerospace, computers-office machines, electronics-telecommunications, pharmacy, scientific instruments, electrical machinery, chemistry, non-electrical machinery, and armament. The total exports for the EU do not include intra-EU trade.) The data were retrieved May 6, 2021, from https://ec.europa.eu/eurostat/web/products-datasets/-/tin00140. As the share of these products in exports increases, a smaller impact of price on exports can be expected (Wierts *et al*, 2014). At the same time, the share of domestic VA in the total exports for the periphery countries is considerably higher than the share of high-tech products in the total export[5], which means that the biggest portion of the exports of the eurozone peripheral member countries are the products of lower VA whose export demand is sensitive to both quality and prices. It means that price and income elasticities are important for a significant portion of the exports of the periphery countries[6]. However, increasing countries' involvement in global value chains (GVCs) reduces the price and income elasticity of exports[7]. The 2008-2009 global financial crisis had a strong negative effect on GVCs participation for the periphery countries (WTO, 2019), and a similar effect can be expected after the Covid-19 crisis. Namely, the crisis caused by Covid-19 led to a disruption in GVCs deliveries, so the resumption of trade flows within GVCs depends on the recovery of the world economy and the behavior of countries in terms of the principles of open trade. Shortening supply chains can reduce countries' ability to specialize according to available comparative advantages. Besides, the strengthening of trade protectionism would lead to a further reduction in trade flows within GVCs.

The estimated coefficient for the GDPEU variable, which is a proxy for foreign demand, shows that the impact of the EU demand is a very important factor for the exports of the countries included in our panel. Since the time series are expressed in logarithms, the estimated coefficient implies that the real exports of goods and services (the volumes) of the peripheral countries will increase by 2.25% when the real GDP in the EU grows by 1%. The estimated coefficient for this independent variable is statistically significant at the 1% level, both according to the FMOLS estimator and according to the DOLS estimator for the whole period from 2000 to 2019, as well as the subperiod from 2009 to 2019. This confirms the fact that the real exports of goods and services in the peripheral eurozone member countries are strongly influenced

by the EU demand, according to which findings a conclusion can be drawn that the growth of demand in the eurozone core in the post-Covid-19 period encouraged by fiscal loosening in those countries would have a positive effect on the exports of the peripheral member countries. This would alleviate the burden of the fiscal adjustment and the balance of payments adjustment in the peripheral countries.

The estimates of the coefficient for the net FDI inflow variable are negligible. Based on this coefficient, it can be concluded that the net FDI inflow had almost no impact on the export of goods and services in the peripheral members. The reason for this low impact may lie in the fact that the prevailing part of the net FDI inflow into these countries is achieved through M&A, which does not lead to an increase in exports.

Once the export equation had been estimated, the residuals were tested. The same tests were applied for the unit root test in the panel time series. Based on all the tests, it can be concluded that the obtained residuals are stationary. It is important to point out the fact that the tests where the constant could be excluded (LLC, ADF Fisher, and PP Fisher) confirmed the fact that the residuals were stationary at the significance level of 1% in the case of the omitted constant. This procedure is common in testing residuals for stationarity. The obtained results confirmed the fact that the variables in the panel were cointegrated. Therefore, the applied model confirmed the fact that the selected variables had a significant impact on the exports of goods and services in the peripheral eurozone members.

In order to check the robustness of the estimated coefficients, two new variables were introduced in the cointegration equation, namely the dummy variable (*DUMMY*) and the real effective exchange rate for domestic goods (*LogREERINTERNAL*) variable. Table 5 accounts for the estimated coefficients in the extended export equation. The estimates were obtained using the FMOLS and DOLS estimators.

The cointegration equation estimates with the FMOLS and DOLS panel cointegration estimators are accounted for in Column 1 of Table 5. The export

Table 5 The robustness checks of the model for the period from 2000 to 2019 - the coefficients estimated using the FMOLS and DOLS estimators

Variables		1	2	3
Export volume - *LogEXPORT*(-1)	FMOLS	0.96***	0.96***	0.95***
	DOLS	0.96***	0.96***	0.95***
Real effective exchange rate (*LogREER*)	FMOLS	-0.80***	-0.77***	-0.81***
	DOLS	-0.78**	-0.75**	-0.80***
Real effective exchange rate (*LogREER*)(-1)	FMOLS	0.60***	0.61***	0.58***
	DOLS	0.61**	0.60***	0.60***
Foreign demand (*LogGDPEU*)	FMOLS	2.25***	2.31***	2.35***
	DOLS	2.26***	2.30***	2.34***
Foreign demand (*LogGDPEU*)(-1)	FMOLS	-2.30***	-2.39***	-2.36***
	DOLS	-2.33***	-2.37***	-2.33***
Net FDI inflow (*LogFDI*)	FMOLS	0.01***	0.01***	0.01***
	DOLS	0.01**	0.01**	0.01**
Net FDI inflow (*LogFDI*)(-1)	FMOLS	0.00**	0.00***	-0.00***
	DOLS	0.00****	0.02****	0.00****
Export prices (*LogEXPORTPRICES*)	FMOLS	0.11***	0.11***	-0.02****
	DOLS	0.11****	0.11****	-0.01****
DUMMY	FMOLS		0.00****	-0.01****
	DOLS		0.00****	0.01****
REER for internal goods (*LogREERINTERNAL*)	FMOLS			0.12****
				0.10****

Note: *** The significance level of 1%, ** the significance level of 5%, * the significance level of 10%. **** The coefficient is not statistically significant. The panel method: pooled estimation.

Source: Author

equation then includes the additional two variables, namely the *DUMMY* and *REER* variables, for internal goods. The estimates of the export equation with the two additional variables included are given in the columns 2 and 3 of Table 5. The introduction of the two new variables should check the adequacy of the estimated model. Almost all the coefficients estimated by the FMOLS estimator are statistically significant, generally at the level of 1%. The coefficient with the *REER* for internal goods variable estimated using the FMOLS and DOLS estimators was not statistically significant. Based on the estimated export equation, after the introduction of the additional variables, the adequacy of the starting model was confirmed.

It should be noted that there is a relationship between the real effective exchange rate that relates to the internal goods and the real exports of the countries included in the panel, which is indicated by the Granger causality test (Table 6).

Table 6 shows the Granger one-way causality from *LogREERINTERNAL* to *LogEXPORT*. This result indicates a possibility of increasing exports in the peripheral countries by increasing competitiveness. In fact, with an increase in competitiveness, there is a growing possibility that a part of the products sold in the domestic market of the peripheral countries would be redirected to exports, which could positively affect the current account of these countries.

Table 6 The peripheral eurozone countries pairwise Granger causality test, sample 2000-2019

Null hypothesis	Obs.	Lags	F-Statist-	Ver. p
LogREERINTERNAL does not Granger-cause LogEXPORT	90	2	2.78117	0.0676
LogEXPORT does not Granger-cause LogREERINTERNAL	90	2	0.23230	0.7932

Source: Author

Using the panel data quantile regression approach, the impact of the real effective exchange rate and foreign demand at different points along with the conditional distribution of the real exports of goods and services as the dependent variable was estimated for the period from 2000 to 2019 (Table 7). The impact of *logREER* and *logGDPEU* on *logEXPORT* varies along with the conditional distribution of the export volumes. The estimated coefficients are statistically significant, except for the 0.10 and 0.25 quantiles for *logREER*.

In the empirical model shown in Table 7, the relationship between the exports, *LogREER*, and *LogGDPEU* were first estimated using the Panel LS. The results are reported in the first column of Table 7. Applying the least square method, the relationship between the real exports as the dependent variables and the *LogREER* and *LogGDPEU* variables as the independent is estimated. The estimate is not related to the corresponding distribution point along with the dependent variable. The obtained coefficients are statistically significant and of a high value. In order to examine the impact of the independent variables on different points along with the conditional distribution of the exports as the dependent variable, quantile regression was applied at five quantiles, that is at the 0.10, 0.25, 0.50, 0.75, and 0.90 quantiles. The results are presented in the columns 2 to 6 of Table 7.

The values of the estimated coefficients vary depending on the selected quantile. All the coefficients estimated using the Panel LS are statistically significant at the level of 1%. In the quantile regression, the statistical significance of the estimated coefficients broadly differs across the regressions for various quantiles. The estimated *LogREER* coefficients are statistically significant at the level of 1% for the very top quantiles: 0.5 and 0.90, whereas the *LogGDPEU* coefficients are statistically significant at the level of 1% for all the quantiles. The negative value of the estimated coefficients for *LogREER* increases towards the higher levels of the distribution of the exports as the dependent variables, which demonstrates the increasing impact of this variable on the exports at the higher points of the conditional distribution of the exports.

Table 7 The estimation results for the export - quantile regression (2000-2019)

Independent Variables	Panel Least Square estimates	Quantile Regression Estimates				
		0.10	0.25	0.50	0.75	0.90
	(1)	(2)	(3)	(4)	(5)	(6)
C	-3.437(0.002)	-6.955 (0.000)	-4.364 (0.006)	-3.264 (0.024)	-1.671 (0.512)	1.158 (0.601)
LogREDK	-1.021 (0.000)	-0.144 (0.5668)	-0.337 (0.2344)	-1.024 (0.010)	-1.443 (0.016)	-2.077 (0.000)
LogBDPEU	2.771 (0.000)	2.635 (0.000)	2.2784 (0.000)	2.733 (0.000)	2.819 (0.000)	2.849 (0.000)
Number of cases	100	100	100	100	100	100
R^2	0.808					
Pseudo R^2		0.5692	0.581	0.582	0.596	0.655

Notes: 1) The prob-values reported in parentheses; 2) The quantile regression includes: the Huber Sandwich Standard Errors and Covariance; the sparsity method: Kernel (Epanechnikov) using residuals; the bandwidth method: Hall-Sheather, (bw=0.074542 for tau 0,1; 0.14497 for tau 0.25; 0.20932 for the median; the estimation successfully identifies the unique optimal solution.

Source: Author

The numerical value of the estimated coefficient for *LogGDPEU* is high and varies across the quantiles of the exports. According to these estimates, the impact of foreign demand on the real exports of the countries included in our panel is constantly strong regardless of the conditional distribution of the exports. In the case of the foreign exchange rate, this effect rises from the lowest to the highest quantiles, simultaneously showing that the real overvalued euro increases the adverse effect on the exports as they increase. The appreciation of the real effective exchange rate occurs when the growth of the prices in one member of the euro area is greater than the growth of the prices in the other members (inflation differentials), In which case the export of the member with higher inflation may be more expensive than the export of the other members, which on its part leads to a loss of export competitiveness. This confirms the findings in the literature that the euro, as the common currency of the peripheral countries with weaker competitiveness and the core ones with stronger performance, has led to an overvalued exchange rate for the peripheral countries and an undervalued exchange rate for the core countries. As a result, redistributive effects arise in trade between the eurozone members (Perotti & Soons, 2019). Thus, the findings of our quantile analysis confirm the early estimates derived from the panel analysis of the export vector of the peripheral countries.

CONCLUSION

This paper examined the connection between the exports of goods and services of the eurozone periphery countries and the real effective exchange rate, foreign demand, foreign direct investment, and export prices. Based on the empirical research, the initial hypothesis that price competitiveness is an important export factor of the peripheral members of the eurozone is confirmed. The findings of this paper *de facto* confirm the thesis that the overestimated real effective exchange rate of the peripheral countries reduces their competitiveness due to the growth of wages and prices in them (these countries cannot affect the nominal value of the euro because they renounced the autonomy of the exchange rate policy

by accepting the euro as the common currency), which directly reflects on commodity exports, for the reason of which fact they had to access the adjustment process in order to reduce their trade and current account deficits and bring them to a sustainable level.

The empirical findings in the paper also confirm a strong impact of demand in the other EU member states on the real exports of goods and services from the peripheral countries. The estimated coefficient shows that the real export of the peripheral member states increases by about 2.25% when the EU GDP increases by 1%, which on its part confirms the importance of economic growth in the EU for the export of the peripheral members. The revival of the economic activity across the EU opens up possibilities for the dynamic growth of the real exports of goods and services in the peripheral member countries, which confirms the initial research hypothesis saying that the export demand of the other EU members significantly affects the export of the peripheral member countries.

The impact of export prices on the exports of the peripheral member countries is also estimated in the paper. The estimated coefficient for this variable bears the unexpected positive sign, which in fact means that a rise in the prices of such exported goods is accompanied by an increase in exports. Although this is contrary to the usual theoretical assumption, according to which an increase in export prices in a foreign currency leads to a reduction in export competitiveness and to a fall in export volumes, the obtained findings require an analysis of the export structure. Namely, these findings can be linked to the changes in the export commodity structure of the peripheral member states, which occurred in their current account adjustment process over the period following the outbreak of the financial crisis in 2008. These changes are characterized by an increase in the share of higher-VA products in the total export, although this share is still small. An increase in the export volumes of these products is more influenced by the growth of foreign demand than the prices of these products (income elasticity is higher than price elasticity). A labor market reform (a reduction in nominal wages, the redirection of labor to the export sectors), an increase in the flexibility of wages and prices, as well as structural changes in exports towards increasing the share of technologically intensive products, can all contribute to an increase in the real exports of the peripheral member states. The resource reallocation from non-tradable to tradable sectors involves a reduction in unit labor costs due to a decline in domestic demand and an increase in unemployment. In order to achieve an increase in exports, wages in tradable sectors must be reduced. These products are then cheaper compared to competitors' prices on the world market. The eurozone countries with large current account deficits have significantly reduced unit labor costs in comparison to the main trade partners in the process of the current account adjustment after the financial crisis of 2008. Due to higher profit margins, relative prices have been reduced less than unit labor costs (Kang & Shambaugh, 2014). Reducing the trade deficit in the future is a desirable channel for reducing the current account deficit.

Based on the estimated export equation, it is concluded that price competitiveness is still a significant factor of export for the peripheral member countries, but that the impact of this factor decreases with an increase in the share of high technology exports in total exports. However, the export performance of the peripheral countries is also affected by the export demand of the other EU members, and this factor is more important than price competitiveness. These results confirm the findings of P. Wierts *et al* (2014) that the export structure has a significant impact on the value of exports.

The most significant results of the empirical research carried out in this paper are as follows:

- The growth of demand at the EU level is a strong driver of the exports of the eurozone peripheral member states. The slowdown in economic growth reduces the export opportunities not only of the eurozone peripheral member countries, but also of the other exporters to the EU market. This finding also applies to the countries which the EU is the largest trade partner for, as is the case of the Republic of Serbia. Global supply chains can act as shock absorbers in the event of a drop in global demand in major trading partners.

- The appreciation of the real effective exchange rate of the peripheral member countries has a disincentive effect on their exports. The peripheral member countries have reached an overvalued exchange rate due to the increase in domestic prices and wages compared to the core members of the eurozone. This finding is consistent with the theoretical assumptions about the impact of the real effective exchange rate appreciation on exports. The obtained result is particularly significant for the Western Balkan countries, where the price elasticity of export demand is also important.
- The positive impact of the growth of the export prices on the exports of the peripheral member countries shows that the increase in the share of the products of greater value added (VA) in exports leads to a real increase in exports. Demand for these products, especially when they are represented in global supply chains, is more stable and makes it easier for a country to achieve its current account balance. This finding is also significant for economic policymakers in the Republic of Serbia, because it carries the message that it is necessary to direct FDI towards those sectors where higher VA is produced for exports. A greater integration into regional value chains opens up opportunities for smaller fluctuation in real exports.

The analysis made in this paper is limited in that it covers a short-time horizon which reduces the quality of the econometric estimates. Additionally, the analysis is focused on the behavior of aggregate exports. This approach is relevant to macroeconomic analysis (such as the response of the total exports to changes in the real effective exchange rate), but it is inconvenient for the analysis of the behavior of individual sectors in an economy. In addition to that, the consumer price index used for calculating the real effective exchange rate includes the prices of the goods that are not the subject of trade. The nominal effective exchange rate adjusted to change in the prices of export goods would allow for a more accurate analysis of the impact of the real effective exchange rate on the export of the peripheral member states. Additional research efforts should also focus on separating the impact of the export factors on higher VA exports from the impact on lower VA exports.

ENDNOTES

1 The decline in the real effective exchange rate of Ireland and Greece in the period after 2008 was greater than in the other peripheral members (according to the EUROSTAT). By reducing wages and prices, the two countries have significantly improved their respective export competitiveness and reduced the current account deficit.

2 The databases were accessed on 5th February 2021.

3 The panel of 42 countries includes the EU-28 Member States and 14 other industrial countries - Australia, Canada, the United States, Japan, Norway, New Zealand, Mexico, Switzerland, Turkey, Russia, China, Brazil, South Korea, and Hong Kong.

4 The foreign-owned firms in Ireland had a high export orientation and were mainly located in high-technology sectors. For a more detailed analysis of FDI in Ireland, see F. Barry and J. Bradley (1997).

5 The share of domestic VA in the total exports for the periphery countries in 2016 was as follows: Ireland-58%, Portugal-72%, Greece-76%, Spain-77%, and Italy-78%. Retrieved May 6, 2021, from https://data.oecd.org/trade/domestic-value-added-in-gross-exports.htm)

6 Trade elasticity (the exports to the GDP) is significantly affected by the changes in the structure of import demand and cyclical factors.

7 Ireland's participation in GVCs measured as a percent share of the domestic VA sent to GVCs and foreign VA from GVCs in the total gross exports in 2015 reached 52.4% (40.2% is the backward participation and 12.3% is the forward participation); in Italy, it was 40.8%, in Greece 40.3%, in Portugal 43.9%, and in Spain 40.3%. Retrieved May 6, 2021, from https://vvv.vto.org/english/res_e/statis_e/mivi_e/countriprofiles_e.htm

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Received on 21th July 2022,
after revision,
accepted for publication on 24th November 2022
Published online on 6th December 2022

Radovan Kovacevic is a Professor at the Faculty of Economics of the University of Belgrade, where he teaches the subjects of Serbian Foreign Economic Relations and International Finance in the undergraduate academic studies and a few subjects in the master's and doctoral studies as well. He received his PhD at the Faculty of Economics, Belgrade University. The key areas of his scientific research interest are the theory and practice of exchange rates, FDI, the balance of payments, the international capital market.

Economic Horizons, September - December 2022, Volume 24, Number 3, 251 - 267
UDC: 33 ISSN: 1450-863 X

Original scientific paper
UDC: 330.362(669.1)
doi:10.5937/ekonhor2203263A

MODELLING SECTORAL SENSITIVITY TO MACROECONOMIC SHOCKS: EVIDENCE FROM NIGERIA

Joshua Adeyemi Afolabi[1], Blessing Ufuoma Olanrewaju[1*] and Wasiu Adekunle[2]

[1]*Nigeria Institute of Social and Economic Research, Ibadan, Nigeria*
[2]*Nigeria Economic Summit Group, Lagos, Nigeria*

The Nigerian economy has been repeatedly hit by macroeconomic shocks, primarily owing to its over-reliance on crude oil and poor resource management. Given the limited resilience capacity of Nigeria's economic sectors, this study examined the sensitivity of these sectors to macroeconomic shocks using the Vector Autoregression (VAR) and the Vector Error Correction (VEC) models in whose frameworks the study was carried out for the period between 2010Q1 and 2021Q4. The findings revealed the high responsiveness of the services and agricultural sectors to fiscal shocks, as well as the high sensitivity of the industrial sector to interest rate shocks. Also, the services sector was found to be more resilient to oil price shocks than the other sectors. Therefore, this study advocates for developing strategies to boost sectoral productivity and skillfully blend the fiscal and monetary policies so as to cushion the effects of macroeconomic shocks. Overall, this study provides the evidence of the sectoral effects of macroeconomic shocks in Nigeria.

Keywords: macroeconomic shocks, vector autoregression, vector error correction, industrial sector, agricultural sector, service sector

JEL Classification: C22, E23, E52, E62

INTRODUCTION

Macroeconomic shocks are inevitable given the rising pace of globalization and economic interrelations among countries. These shocks may engender erratic fluctuations in aggregate supply or demand and thus calls for immediate policy responses (Gajic, 2012). The effects of shocks on macroeconomic stability largely depend on the nature of the shock (positive or negative), the degree of vulnerability to external shocks and the efficiency level of the economy (Bodunrin, 2016). The Nigerian economy has witnessed various macroeconomic shocks over the years. Oil price shocks, however, remain the most dominant given the over-reliance of the economy on oil revenue and the exogenously determined oil price, which is subject to the dynamics of the market forces in the global oil market (Ogunjimi, 2020a; 2020b). The effect of these shocks is evident in the macroeconomic

* *Correspondence to:* B. U. Olanrewaju, Nigeria Institute of Social and Economic Research, Ibadan, Nigeria;
e-mail: blessed.ufuoma@gmail.com

instability characterized by a rising inflation, exchange rate fluctuations, a rising unemployment rate, income inequality, dwindling government revenue and persistent poverty. Consequently, in a bid to ameliorate the adverse effects of oil price shocks on the economy, the Nigerian government has embarked on various policy responses, but the problems still linger.

According to the Central Bank of Nigeria (2021), Nigeria has had to grapple with the two episodes of economic recession in five years (namely those in 2016 and 2020). While the 2016 economic recession was partly a result of the oil price slump in the international market, the 2020 episode was due to both the Russia-Saudi Arabia oil price war and the COVID-19 pandemic (Adeoti & Gbadebo-Smith, 2020). The twin shock to the Nigerian economy was so severe that the price of crude oil, Nigeria's main source of foreign exchange, nosedived to US$30/barrel as against the benchmark of US$57/barrel proposed in the 2020 Nigerian budget. This led to a downward revision of the crude oil benchmark to US$28/barrel in order to make the budget implementation more effective, even though it limited the government's capacity to perform its fiscal responsibilities (Ozili, 2020). It seems as though Nigeria's economic fortune and fiscal policy are determined by the dynamics of the oil price in the international market as changes in oil prices lead to the execution of either a contractionary or expansionary fiscal policy (Aminu & Ogunjimi, 2019; Afolabi & Ogunjimi, 2020).

Moreover, the twin shocks of 2020 had a multifaceted impact on the Nigerian economy, affecting almost every sector of the Nigerian economy. Specifically, the agricultural, industrial, manufacturing, education, transportation, arts, entertainment and recreation sectors were badly hit, with only a few services sectors, such as the information technology sector, thriving (Afolabi & Oji, 2021; Olanrewaju & Afolabi, 2022). These adverse effects may be linked to the economy's weak resilience to shocks, weak institutions and a poor productive base coupled with poor resource management. The persistence of these problems could further weaken Nigeria's capability of effectively absorbing future shocks and addressing macroeconomic instability. However, with the right policy framework and the right implementation strategy, Nigeria can build a bulwark against future macroeconomic and health shocks.

Based on the foregoing, it is imperative to examine the sensitivity of the various sectors of the Nigerian economy to macroeconomic shocks relating to oil price fluctuations and policy shifts, with a view to suggesting measures to become resilient against future shocks. Previous studies focused on the effects of shocks on one or two sectors only (Oyelami & Olomola, 2016; Obi, Awujola & Ogwuche, 2016; Onyimadu, 2019), simultaneously ignoring the inter-linkages among the sectors. Evidence abounds that oil price shocks have far-reaching effects on more than one economic sector (Aminu & Ogunjimi, 2019). To this end, the primary objective of the study implies the investigation of the degree of the sensitivity of all the sectors of the Nigerian economy to various macroeconomic shocks so as to arm policymakers with the requisite tools required to boost the resilience of Nigeria's economic sectors against subsequent shocks.

Taking into consideration the objective of this study, the impulse response function and variance decomposition mechanisms of the Vector Autoregression (VAR) and Vector Error Correction (VEC) models are used to test the following hypotheses:

H1: The Nigerian agricultural, industrial and service sectors are unresponsive to fiscal shocks.

H2: The Nigerian agricultural, industrial and service sectors are insensitive to monetary shocks.

H3: The Nigerian agricultural, industrial and service sectors are unresponsive to external shocks.

The remaining part of this paper is sectioned as follows: Section 2 reviews the empirical literature, while Section 3 describes the sectoral and export structures of the Nigerian economy; Section 4 discusses the methodology adopted in this study and Section 5 contains the results and discussion;

Section 6 presents the conclusion and the policy recommendations based on the findings of the study.

LITERATURE REVIEW

A number of the empirical pieces of evidence of the effect of macroeconomic shocks are documented in the literature. However, there is a lack of consensus on the magnitude, direction and effect of macroeconomic shocks on the economy as the empirical evidence is mixed. G. Bäurle and E. Steiner (2015) assessed the resilience of the Swiss productive sectors to monetary and external shocks using the structural dynamic factor model. Their result showed that monetary and external shocks had partial transmission to the productive sectors and their effects varied across those sectors. On the other hand, R. M. Campos-Vazquez (2010) examined the labor market effects of macroeconomic shocks in Mexico. The result showed that the macroeconomic shocks aggravated youth unemployment, rendered unskilled labor jobless, lowered the labor force participation and reduced employment in the informal sector. The findings also revealed the fact that the formal sector was more adversely affected by the macroeconomic shocks than the informal sector.

C. L. Nguena and R. T. Nanfosso (2014) investigated the degree to which the financial sectors of the countries in the Central African Economic and Monetary Community (CEMAC) region were resilient to macroeconomic shocks. The results showed that the banking sectors in the region were less resilient to the macroeconomic shocks as bank provisions plummeted in the face of the declining GDP *per capita*, the real exchange rate and financial credits, as well as a rising interest rate. Overall, the result suggests the need to account for macroeconomic shocks in the formulation and implementation of financial policies. On the other hand, C. Higson, S. Holly, P. Kattuman and S. Platis (2004) evaluated the growth effects of shocks among firms in the United Kingdom. The results revealed the fact that firms in the mid-range of growth were more affected by the shocks than other firms. K. Bruckmeier, A. Peichl, M. Popp, J. Wiemers and T. Wollmershäuser (2020) used multiple economic models to evaluate the impact of the macroeconomic shocks occasioned by the COVID-19 pandemic and the policy responses on the German economy. The findings revealed the fact that the pandemic had lowered gross labor income but made disposable household income progressive as discretionary policies had proven helpful in stabilizing income during the period.

K. Andam, H. Edeha, V. Oboh, K. Pauw and J. Thurlow (2020) adopted the Social Accounting Matrix (SAM) model to quantify the impact of the shocks arising from the COVID-19 pandemic on the Nigerian economy. It was found that Nigeria's economy slowed down, with the services sector being mostly hit by the pandemic. Nonetheless, the output of the agricultural sector also declined despite its exclusion from the list of the sectors under the compulsory lockdown. The sector was indirectly affected due to its connection with the other economic sectors. In the same vein, P. K. Ozili (2020) assessed the effect of the COVID-19 pandemic on the Nigerian economy. The results showed that the interplay between the oil price crash and the COVID-19 outbreak had led to economic recession in Nigeria, with the COVID-19 pandemic halting economic activities globally and lowering demand for crude oil in the international market. Further results revealed the fact that the pandemic had adversely affected the labor market outcomes and sectoral performance.

With the help of the Vector Autoregression (VAR) model, B. T. Ewing, S. M. Forbes and J. E. Payne (2003) analyzed the impact of monetary, real output and market risk premium shocks on specific stock market variables. The findings accounted for the fact that the effect of a shock on the stock market variables depended on the nature (anticipated or unanticipated) of the shock itself. Specifically, a positive anticipated shock to the market risk premium and the real output has positive impacts on each stock market index, with the monetary shock exerting more influence on capital and financial goods than the other shocks. In a similar fashion, I. Babouček and M. Jančar (2005) adopted the VAR model to analyze the effects of macroeconomic shocks from various channels on the Czech economy.

According to their findings, the performance of the Czech banking sector was impressive and had a profound capacity to withstand credit risk shocks as it was less responsive to such shocks.

In a recent study, M. Murach and H. Wagner (2021) also used the VAR model to evaluate the extent to which external shocks affected the business cycle in the Chinese agricultural, industrial and services sectors between 1996 and 2014. The findings revealed the fact that, as the most dominant economic sector in China, the Chinese industrial sector sharply responded to the shocks arising from the financial, trade and confidence channels. The high vulnerability of the industrial sector to external shocks is attributed to the predominant export- and investment-driven outlook of the country. However, S. S. Abere and T. O. Akinbobola (2020) used a variant of the VAR model, namely the Structural Vector Autoregressive (SVAR) model, to assess the effects of external shocks and institutional quality on Nigeria's macroeconomic performance. The findings of that study revealed the fact that external shocks affected Nigeria's macroeconomic performance more than institutional quality, with an increased foreign aid and the terms of trade having a more positive impact on macroeconomic performance.

Adopting another variant of the VAR model, i.e. the Bayesian Vector Auto Regression (BVAR) model, N. Mupunga and P. Le Roux (2015) examined the way how macroeconomic shocks determined the volume of the public debt in Zimbabwe. It was found that the public debt was highly sensitive to shocks to the exchange rate, the trade balance, the interest rate and economic growth. However, with the help of the Computable General Equilibrium (CGE) framework, E. B. Sennoga and J. M. Matovu (2016) evaluated the growth and welfare effects of shocks to the terms of trade, foreign aid and the global oil price in Uganda between 2010 and 2017. The findings revealed that the three channels of shock had positive effects on the agricultural and services sectors but they had a negative effect on the industrial sector; the positive effect was large enough to offset the negative effect so that the real GDP growth had slightly deviated. On the other hand, the three shocks lowered the household welfare and worsened the poverty incidence in the country.

The foregoing suggests a lack of unanimous agreement on the nature of the effect of macroeconomic shocks on various sectors of an economy, which could be attributed to the methodology employed, the study scope, the economic structure and the timeframe of each study. Moreover, there is a dearth of studies on the subject for the Nigerian case and those few available studies on Nigeria did not consider the effects of macroeconomic (fiscal and monetary) policies on sectoral performance in Nigeria. This study fills this gap in the literature by evaluating the sensitivity of each economic sector (i.e. the agricultural, industrial and services sectors) in Nigeria to fiscal, monetary and external shocks using the Vector Autoregression (VAR) and Vector Error Correction (VEC) model frameworks, with a particular emphasis on their inherent impulse response function and variance decomposition mechanisms.

NIGERIA'S SECTORAL STRUCTURE

Typically, the Nigerian economy has three key sectors: agriculture, industry and services, each of them having different respective subsectors (CBN, 2021). The performance of these sectors in terms of their contribution to the GDP is shown in Figure 1. It shows that the service sector makes the highest contribution to the GDP throughout the period of observation. Specifically, the contribution the services sector makes to the total GDP averaged 52.3 percent between 2010Q1 and 2021Q4, while the average shares of the industrial and agricultural sectors stood at 23.5 percent and 24.2 percent, respectively, over the same period (Figure 1). However, it is noteworthy that the services sector played a significant role in mitigating the impact of COVID-19 on the aggregate output as its contribution rose during 2020Q1 and 2020Q2 when the lockdown orders were imposed by the government, with the trade, information and communication technology, and financial and insurance subsectors leading the impressive contribution. Despite the lockdown orders and the other containment measures introduced so

as to flatten the COVID-19 curve, the feat of these subsectors was possible because the activities in these subsectors do not necessarily require physical human interactions. The sector also played a significant role in lifting the Nigerian economy from the 2016 recession given its huge share in the total GDP.

Similarly, the contribution of the agricultural sector to the total GDP experienced a significant growth in the third quarters of 2016 to 2021, with a substantial contribution from the crop production subsector. However, these contributions were insufficient to save the economy from slipping into the episodes of recession witnessed in Nigeria in 2016 and 2020 - the two recessions that occurred in five years. On the other hand, the industrial sector was badly hit by the 2016 recession and the 2020 pandemic as its contribution to the GDP plummeted for the most part of the period after 2016, which is because the sector largely depends on the agricultural and transportation sectors for raw materials and the distribution of finished goods, which were halted during the lockdown. The falling contribution of the industrial sector vis-à-vis the positive contribution of the agricultural sector to the GDP since the 2016 recession shows that the Nigerian agricultural sector produces more food crops than cash crops, which could serve as raw materials (the input factors) for industries. Hence, a large proportion of the raw materials used in the industrial sector are sourced from abroad.

The dismal performance of the industrial sector is evidenced by the low non-oil export during the periods under consideration (Figure 2). Figure 2 shows Nigeria's export profile, revealing the dominance of oil export in Nigeria's export basket, as well as the high reliance of the country to oil export as its major source of foreign exchange. The successive government in Nigeria has made numerous efforts with respect to the balancing of this skewed trend through the formulation and adoption of various diversification policies. However, this export trend reveals the fact that the diversification efforts of the government are yet to yield the desired outcomes, which on its part suggests the possibility of having some lacunas in the existing diversification policies that need to be urgently addressed in order to ensure a successful transition to economic and export diversification.

METHODOLOGY

The Vector Autoregression (VAR) and Vector Error Correction (VEC) model frameworks are used as the analytical technique for this study given their ability to treat all variables in the system of equations as endogenous. They are used to assess the sensitivity of

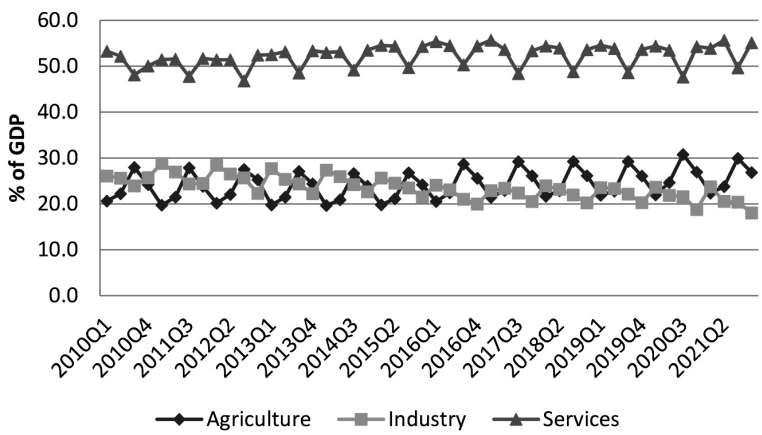

Figure 1 The Sectoral Share in Nigeria's Total GDP (%)

Source: Authors, based on CBN, 2021

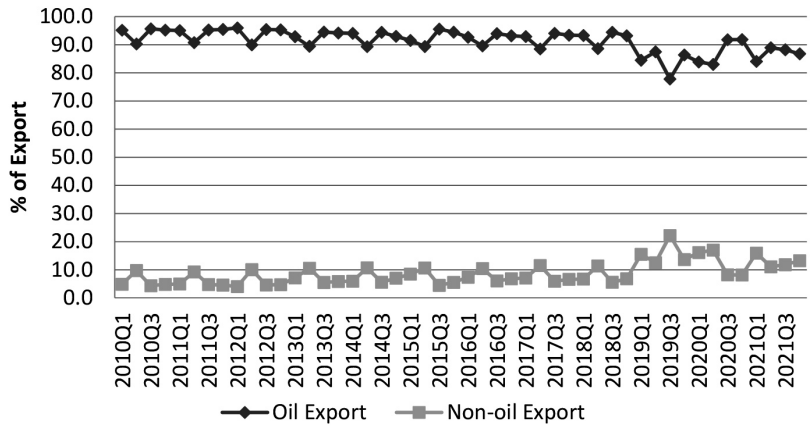

Figure 2 The Share of Oil and Non-Oil Export in Nigeria's Total Export (%)

Source: Authors, based on CBN, 2021

the productive sectors to shocks from macroeconomic indicators. The VAR and VEC models adopted in this study consist of the four variables that include the sectoral output (comprising the agricultural, industrial and services outputs), the oil price (used to proxy external shocks), the government expenditure (used to proxy the fiscal policy shocks) and the interest rate (used to proxy the monetary policy shocks). The general VAR framework is specified as follows:

$$X_t = \beta_0 + \sum_{t=1}^{k} \beta_i X_{t-1} + \varepsilon_t \tag{1}$$

where X_t is the 4x1 vector of the variables including the sectoral output (the agricultural, industrial and services outputs), the oil price, the government expenditure and the interest rate; β_i represents the identity matrix; β_i denotes the 4x4 coefficient matrices; and εt denotes the one-step ahead prediction error. For ease of the interpretation of the results, all the variables are expressed in a natural logarithm, except for the interest rate already expressed in percentage. However, the short- and long-term estimates of the VAR and VEC models, as well as the causality tests, are not presented given the fact that the study is primarily focused on the investigation of sectoral responses to macroeconomic shocks. The Variance Decomposition (VD) and Impulse Response Function (IRF) are usually the focus of empirical discussions in a study of this nature (Ewing *et al*, 2003; Bäurle & Steiner, 2015; Sennoga & Matovu, 2016; Murach & Wagner, 2021).

The matrix form of the equation (1) is written as follows:

$$\begin{pmatrix} AGR_t \\ GOV_t \\ MPR_t \\ OILP_t \end{pmatrix} = \begin{pmatrix} \alpha_{1t} \\ \alpha_{2t} \\ \alpha_{3t} \\ \alpha_{4t} \end{pmatrix} + \begin{pmatrix} \alpha_{11}(L) & \alpha_{12}(L) & \alpha_{13}(L) & \alpha_{14}(L) \\ \alpha_{21}(L) & \alpha_{22}(L) & \alpha_{23}(L) & \alpha_{24}(L) \\ \alpha_{31}(L) & \alpha_{32}(L) & \alpha_{33}(L) & \alpha_{34}(L) \\ \alpha_{41}(L) & \alpha_{42}(L) & \alpha_{43}(L) & \alpha_{44}(L) \end{pmatrix} * \begin{pmatrix} AGR_{t-1} \\ GOV_{t-1} \\ MPR_{t-1} \\ OILP_{t-1} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{pmatrix}$$

$$\begin{pmatrix} IND_t \\ GOV_t \\ MPR_t \\ OILP_t \end{pmatrix} = \begin{pmatrix} \beta_{1t} \\ \beta_{2t} \\ \beta_{3t} \\ \beta_{4t} \end{pmatrix} + \begin{pmatrix} \beta_{11}(L) & \beta_{12}(L) & \beta_{13}(L) & \beta_{14}(L) \\ \beta_{21}(L) & \beta_{22}(L) & \beta_{23}(L) & \beta_{24}(L) \\ \beta_{31}(L) & \beta_{32}(L) & \beta_{33}(L) & \beta_{34}(L) \\ \beta_{41}(L) & \beta_{42}(L) & \beta_{43}(L) & \beta_{44}(L) \end{pmatrix} * \begin{pmatrix} IND_{t-1} \\ GOV_{t-1} \\ MPR_{t-1} \\ OILP_{t-1} \end{pmatrix} + \begin{pmatrix} \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \end{pmatrix}$$

$$\begin{pmatrix} SERV_t \\ GOV_t \\ MPR_t \\ OILP_t \end{pmatrix} = \begin{pmatrix} \delta_{1t} \\ \delta_{2t} \\ \delta_{3t} \\ \delta_{4t} \end{pmatrix} + \begin{pmatrix} \delta_{11}(L) & \delta_{12}(L) & \delta_{13}(L) & \delta_{14}(L) \\ \delta_{21}(L) & \delta_{22}(L) & \delta_{23}(L) & \delta_{24}(L) \\ \delta_{31}(L) & \delta_{32}(L) & \delta_{33}(L) & \delta_{34}(L) \\ \delta_{41}(L) & \delta_{42}(L) & \delta_{43}(L) & \delta_{44}(L) \end{pmatrix} * \begin{pmatrix} SERV_{t-1} \\ GOV_{t-1} \\ MPR_{t-1} \\ OILP_{t-1} \end{pmatrix} + \begin{pmatrix} \varepsilon_{9t} \\ \varepsilon_{10t} \\ \varepsilon_{11t} \\ \varepsilon_{12t} \end{pmatrix}$$

where α_{ij}, β_{ij} and δ_{ij} are parameters in the MxN matrix forms denoting the effect of the j^{th} endogenous (dependent) variables on the i^{th} endogenous variable, whereas ε_{it} denotes the error terms of the models.

The VAR approach has the following estimation procedures:

Step I: Estimate the VAR model with all the variables specified as endogenous variables.

Step II: Generate the Variance Decomposition and the corresponding Impulse Response Function (IRF) from the estimated VAR.

Step III: Interpret the results accordingly.

Variance Decomposition (VD) and the Impulse Response Function (IRF) for the sectoral indices are presented by showing graphically and in the tabular form the sensitivity of each sector to its own shock and shocks to the other sectors under consideration. Specifically, the IRF is computed in order to show the response of the sectoral output to macroeconomic shocks, whereas the VD is used to quantify the proportion of the sectoral output that is explained by its own shock and shocks from the other macroeconomic variables. Preliminary tests, such as the unit root and correlation tests, however, were conducted so as to determine the stationarity properties of each variable and the relationship among the variables. The optimum lag length selection test was also done. The post-estimation tests were carried out, too, so as to determine the reliability of the estimates. The quarterly data on the variables of interest were sourced from the Central Bank of Nigeria's (CBN) database for the period from 2011Q1 to 2021Q4. The source and description of each variable are presented in Table 1.

RESULTS AND DISCUSSION

Descriptive statistics

The statistical properties of the variables of interest in this study are given in Table 2. It shows that the service sector dominates the other economic sectors in Nigeria as its mean value was about N8.6 trillion for the review period while the average values of the agricultural and industrial sectors are ₦4.02 trillion and N3.8 trillion, respectively, which gives further credence to the earlier assertion that the service sector contributes the highest share to the aggregate output in Nigeria. While the oil price reached the trough of US$27.5 during the period under consideration, it

Table 1 The Data description and sources

Variable	Description	Source
Agricultural Output (AGR)	Agricultural sector GDP (₦' million)	CBN (2021)
Government Expenditure (GOV)	Government expenditure (₦' million)	CBN (2021)
Industrial Output (IND)	Industrial sector GDP (₦' million)	CBN (2021)
Monetary Policy Rate (MPR)	Monetary Policy Rate (%)	CBN (2021)
Oil Price (OILP)	Bonny light spot oil price (US$ per barrel)	CBN (2021)
Service Output (SERV)	Services sector GDP (₦' million)	CBN (2021)

Source: Authors

peaked at US$121.2, raising the government revenue and facilitating domestic resource mobilization. Given the fact that crude oil export is the mainstay of the Nigerian economy, any change in the oil price directly affects the government revenue and expenditure, which reflects in huge gaps between the minimum and maximum government expenditure, as well as the range of the oil prices for the period under consideration. The monetary policy rate ranged between 6 percent and 14 percent, averaging 11.85 percent during the review period. However, the standard deviation of each variable is relatively large, with all the variables, except for the monetary policy rate, being platykurtic. In addition, all the variables, except for the industrial output and the monetary policy rate, are positively skewed.

The correlation result

Correlation analysis is important in empirical studies for two reasons: first, to determine the direction and strength of the relationship between two variables and second, to detect the possibility of encountering multicollinearity problems. With regards to the direction and strength of the relationship, the correlation results reported in Table 3 show that the government expenditure establishes a positive and moderate relationship with both the agricultural and services outputs but a weak negative association with the industrial output, which signals that the industrial sector is neglected by the government. Hence its dismal performance in relation to the other productive sectors. On the other hand, the oil price demonstrates a weak positive relationship with productivity in the industrial sector, a relatively weak negative relationship with the agricultural sector productivity and a moderate negative association with the services sector output. However, the monetary policy rate establishes a positive relationship with all the productive sectors, even though the relationship is somewhat moderate for the agricultural and industrial sectors but quite strong for the services sector. On the matter of multicollinearity, a correlation statistic of more than 80% signals the possibility of an exact linear relationship among the explanatory variables, the situation which makes the variance of the estimates extremely large, thus undermining the reliability of the estimated model. Interestingly, the correlation result reveals the absence of multicollinearity as the highest magnitude of the relationship between all the variables is 69 percent. Thus, the estimated model could be adjudged as reliable.

The unit root test result

Unit root tests are often conducted in time-series and panel studies so as to determine the appropriate estimation technique which is to be adopted in a bid to circumvent spurious results. This study conducts

Table 2 The descriptive statistics

Variables	Mean	Maximum	Minimum	Standard deviation	Skewness	Kurtosis
AGR	4026401	5550941	2594760	850596.6	0.23	1.96
GOV	1618449	3195926	743654.3	694781.7	0.65	2.10
IND	3840718	4230768	3284291	227758.2	-0.48	2.94
MPR	11.85	14.00	6.00	2.31	-1.49	4.33
OILP	76.63486	121.2267	27.49333	27.06	0.22	1.76
SERV	8621769	11203610	6704428	1060974	0.06	2.72

Note: AGR, GOV, IND, MPR, OILP and SERV imply the agricultural output, the government expenditure, the industrial output, the monetary policy rate, the oil price and the services output, respectively.

Source: Authors

Table 3 The correlation matrix

	LAGR	LIND	LSERV	LGOV	LOILP	MPR
LAGR	1					
LIND	0.15	1				
LSERV	0.65	0.26	1			
LGOV	0.63	-0.03	0.69	1		
LOILP	-0.33	0.12	-0.51	-0.48	1	
MPR	0.44	0.48	0.68	0.47	-0.35	1

Note: LAGR, LIND, LSERV, LGOV, LOILP and MPR imply the log of the agricultural output, the log of the industrial output, the log of services output, the log of the government expenditure, the log of the oil price and the monetary policy rate, respectively.

Source: Authors

unit roots tests on the variables of interest using the Augmented Dickey-Fuller (ADF) approach and the result is presented in Table 4. The null hypothesis of the ADF approach reads "The variable contains a unit root", which should be rejected if the probability value is less than 10 percent or accepted if it is otherwise. Accordingly, the result showed that the null hypothesis was accepted when the unit root test was conducted at the level for all the variables but the same was rejected when the variables were differenced in the first place, which is indicative of the fact that all the variables are stationary at the first difference (I(1)), which is a prerequisite for running the Johansen cointegration test.

Optimal lag selection

It is important to determine the optimal lag length before conducting a cointegration test as the result will be incorporated in subsequent estimations. Determining the optimal lag length helps circumvent the problem of an estimation bias and a loss of the degree of freedom that arises from under- and over-parameterized models, respectively (Afolabi, 2022). There are different criteria used in selecting the optimal lag and the lag length most selected by the various criteria will be opted for. Accordingly, the results of the optimal lag selection presented in Table 5 show that the optimal lag for all the three models (the agricultural, industrial and services output models) is 2. Thus, the optimal lag used in subsequent estimation is VAR(2).

Table 4 The augmented Dickey-Fuller unit test results

Variables	Level	First difference	Status
LAGR	-0.91b	-6.08*b	I(1)
LIND	-2.34a	-6.81*b	I(1)
LSERV	-2.07b	-2.65***a	I(1)
LGOV	0.95a	-8.89a	I(1)
LOILP	-1.61a	-6.58b	I(1)
MPR	-2.20b	-4.67*b	I(1)

Note: * and *** represent statistical significance at the 1% and 10% levels, respectively; 'a' and 'b' represent the model with the constant and the model with the constant and the trend, respectively; I(1) implies stationarity at the first difference.

Source: Authors

The cointegration test result

The unit root test results meet the requirement for conducting the cointegration test using the Johansen approach. The test is conducted on all the three models and the results are presented in Table 6. Basically, the Johansen cointegration approach tests the hypothesis reading "There is no long-term relationship among the variables." and the decision rule is that the null hypothesis will be rejected if the trace statistic exceeds the 5% critical value and will be accepted if it is otherwise. The Johansen approach has two inherent likelihood ratio test statistics (the trace and the maximum eigenvalue tests) that influence the decision to reject or to accept the null hypothesis and determines the number of the cointegrating vectors. Accordingly, the trace cointegration rank test results show the absence of the cointegrating vector among the variables in the agricultural and services output models; thus the null hypothesis is accepted, whereas it is rejected in the case of the industrial output that has three cointegrating vectors. Similarly, the maximum eigenvalue cointegration rank test results show the absence of a long-term relationship among the variables in the agricultural and services output models but the converse in the industrial output model. For the models with no cointegrating vectors, the Vector Autoregression (VAR) model is the appropriate model to run, whereas the Vector Error Correction (VEC) model is the appropriate model to run when a model has at least one cointegrating vector. Thus, while the VAR model is run for the agricultural and services output models, the VEC model is run for the industrial output model.

VAR estimation results

This study is primarily focused on the examination of the sectoral responses to fiscal, monetary and external shocks. The VAR and VEC models are estimated using the VAR(2) optimal lag length for all the three models and the corresponding results of the impulse response functions and the variance decomposition of each model are presented in Figure 3, Figure 4 and Figure 5, and in Table 7.

Table 5 The VAR lag length selection criteria

The agricultural output model						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-110.49	NA	0.002	4.98	5.14	5.04
1	7.42	210.18	2.04E-05	0.55	1.34	0.84
2	81.36	118.96*	1.67e-06*	-1.97*	-0.54*	-1.44*
The industrial output model						
Lag	LogL	LR	FPE	AIC	SC	HQ
1	52.79	NA	2.38E-06	-1.60	-0.96*	-1.36
2	75.72	37.89*	1.78e-06*	-1.90*	-0.63	-1.42*
The services output model						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-74.22	NA	0.0004	3.40	3.56	3.46
1	41.87	206.95	4.56E-06	-0.95	-0.16*	-0.65*
2	60.00	29.17*	4.22e-06*	-1.04*	0.39	-0.51

Note: * indicates the lag order selected by the criterion, LR = the sequential modified LR test statistic (each test at the 5% level), FPE = the Final Prediction Error, AIC = the Akaike Information Criterion, SC = the Schwarz Information Criterion; and HQ = the Hannan-Quinn Information Criterion.

Source: Authors

Sectoral responses to the fiscal shock

The government expenditure is an anchor fiscal tool the Nigerian government uses to ensure the fiscal stability of the country. Government expenditure shocks in Nigeria mainly arise from volatility in crude oil prices in the international market as crude oil is the main source of the Nigerian government revenue (Aminu & Ogunjimi, 2019). Thus, a shock to the government expenditure has implications for the sectoral output in the country. The IRF results show that a shock to the government expenditure has a positive contemporaneous effect on the agricultural output in Nigeria, indicating that an expansionary fiscal policy (an increase in the government expenditure in this case) spurs the agricultural output. However, the positive effect turned negative after the four quarters (one year), implying that the positive effect of the government expenditure on the agricultural output in Nigeria is a short-term phenomenon. This corroborates the finding of P. K. Ozili (2020), who argued that the government expenditure stifled the sectoral output. Similarly, the government expenditure shock has a positive contemporaneous impact on the services sector output although the impact is more lasting in the services sector than in the agricultural sector. Tacitly, an increase in the government expenditure boosts the services output more than it does the agricultural output.

Conversely, the government expenditure shock has a long-term negative contemporaneous effect on the industrial output which is such that a sudden increase in the government expenditure will stifle the industrial output in the long run, at a lower magnitude though compared to the agricultural and services sectors' outputs. This partly explains the high-flying performance of the services and agricultural sectors and somewhat dismal performance of the industrial sector in the country (Ogunjimi, 2020b). In addition, the results of the Variance Decomposition in Table 7 show that the government expenditure shocks account for a peak of 25% variation in the agricultural output in the third quarter, 1.2% of the industrial output in the tenth quarter and 2.7% variation in the services output in the fourth quarter. Overall, the services and agricultural sectors are the most responsive to

Table 6 The Johansen cointegration test result

The trace cointegration rank test result							
		Agricultural output model		Industrial output model		Services output model	
Hypothesized no. of CE(s)	5% critical value	Eigenvalue	Trace statistic	Eigenvalue	Trace statistic	Eigenvalue	Trace statistic
None	47.86	0.33	42.00	0.55*	67.55	0.37	45.98
At most 1	29.80	0.27	24.28	0.31*	33.64	0.27	24.94
At most 2	15.49	0.17	10.11	0.29*	17.61	0.17	11.03
At most 3	3.84	0.04	1.87	0.07	3.07	0.06	2.61
The maximum eigenvalue cointegration rank test result							
		Agricultural output model		Industrial output model		Services output model	
Hypothesized no. of CE(s)	5% critical value	Eigenvalue	Trace statistic	Eigenvalue	Trace statistic	Eigenvalue	Trace statistic
None	27.58	0.33	17.72	0.55*	33.91	0.37	21.04
At most 1	21.13	0.27	14.17	0.31	16.03	0.27	13.91
At most 2	14.26	0.17	8.24	0.29*	14.53	0.17	8.42
At most 3	3.84	0.04	1.87	0.07	3.07	0.06	2.61

Note: *denotes significance at the 5% level.

Source: Authors

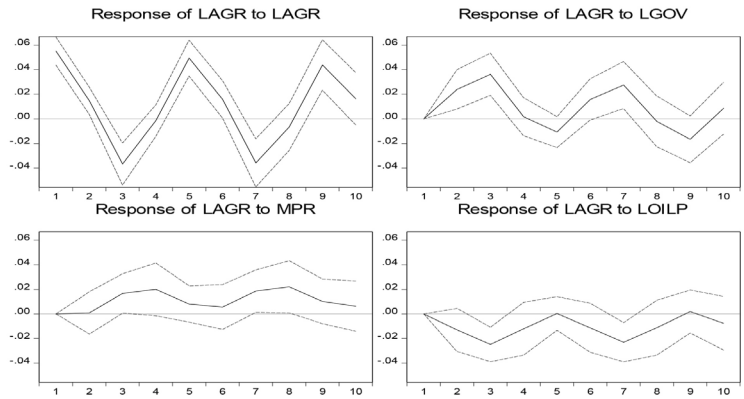

Figure 3 The impulse response function of the agricultural sector to macroeconomic shocks

Source: Authors

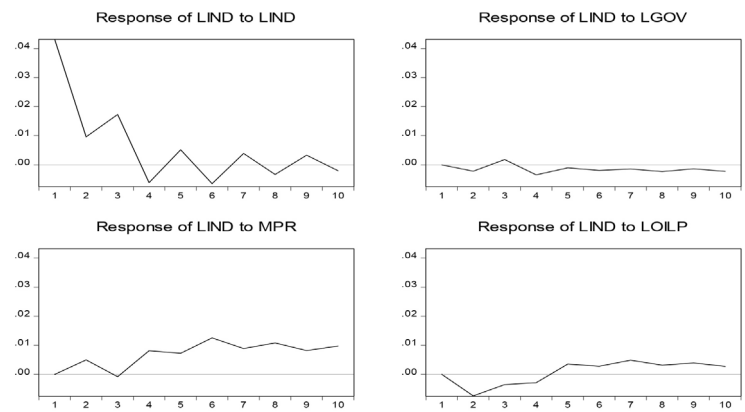

Figure 4 Th impulse response function of the industrial sector to macroeconomic shocks

Source: Authors

the government expenditure shocks relative to the industrial sector. The government expends more on the services sector than on the other two economic sectors due to the dominance of the services sector, as well as its huge contribution to the Nigerian GDP. It also explains the unimpressive contribution of the industrial and agricultural sectors to the GDP, which is primarily caused by limited financial resources. Nonetheless, the agricultural and industrial sectors have equally benefitted from the recurring government intervention directed towards the achievement of industrialization and self-sufficiency in food production such as the Anchor Borrowers' Scheme and Small and Medium Enterprises Credit Guarantee Scheme (SMECGS), among others.

Sectoral responses to the monetary shock

The monetary policy rate (MPR) (the interest rate) is determined by the Central Bank of Nigeria (CBN), the apex monetary authority in Nigeria. The CBN uses the MPR to moderate monetary policy in the country. The

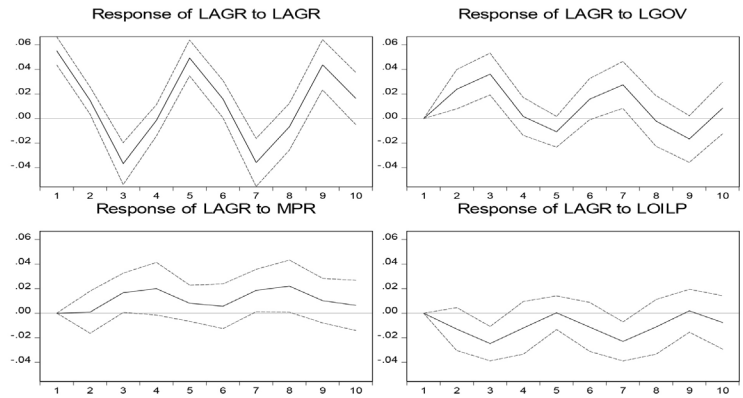

Figure 5 The impulse response function of the services sector to macroeconomic shocks

Source: Authors

IRF result shows that a shock to the monetary policy rate, the proxy for the monetary shock, has a long-term positive contemporaneous effect on the agricultural output in Nigeria, implying that a positive shock to the MPR leads to an increase in the agricultural output in the long run. In a similar fashion, the MPR shock has a positive contemporaneous effect on the industrial output in Nigeria, especially for the first two quarters, after which it turns negative in the third quarter and subsequently becomes positive with a higher magnitude. This implies that a sudden increase in the MPR will spur industrial production in the short run and that it will eventually have a higher magnitude of the impact on the industrial output in subsequent periods. On the other hand, the interest rate shock has a contemporaneous positive impact on the services sector output in the first two quarters following the shock to the MPR, but a negative impact afterwards. This shows that the interest rate shock hurts the services sector output in the long run. These findings are in line with the finding of L. O. Oyelami and P. A. Olomola (2016), as well as the postulation of traditional Keynesian economists that an increase in the real interest rate deters investment and ultimately stifles the sectoral and aggregate outputs.

Moreover, the results of the Variance Decomposition show that the interest rate (MPR) shocks explain an about 10.7% variation in the agricultural output in the eighth quarter, 20.2% in the industrial output in the tenth quarter, and a 0.5% variation in the services output in the tenth quarter. In sum, the industrial sector is the most responsive to the interest rate shock, whereas the services sector is the least responsive among the three key economic sectors in Nigeria. This suggests the resilience of the industrial and agricultural sectors relative to the services sector in the face of interest rate shocks. The agricultural and industrial sectors are not too exposed to the interest rate shocks as the services sector is, which could be explained by the CBN's restrictions with regards to interbank rates on a number of food items and other basic manufactured products (dairy products included).

Sectoral responses to the external shock

Given the fact that the oil price is denominated in a foreign currency and determined by the market forces in the international market, oil price shocks are regarded as external shocks in Nigeria. According to the IRF results, the oil price shock has a negative contemporaneous effect on the agricultural output in Nigeria, so that a positive oil price shock leads to a decline in the agricultural output, which on its part indicates that oil price shocks adversely affect the agricultural output in Nigeria in the long run. However, the negative contemporaneous effect of oil price shocks on the industrial output seems to be short-

Table 7 The variance decomposition of Nigeria's productive sectors

Period	Variance decomposition of LAGR					Variance decomposition of LIND					Variance decomposition of LSERV				
	S.E.	LAGR	LGOV	MPR	LOILP	S.E.	LIND	LGOV	MPR	LOILP	S.E.	LSERV	LGOV	MPR	LOILP
1	0.055	100.00	0.00	0.00	0.00	0.043	100.00	0.00	0.00	0.00	0.084	100.00	0.00	0.00	0.00
2	0.063	81.41	14.32	0.01	4.26	0.04	95.84	0.24	1.20	2.72	0.097	93.73	2.56	0.06	3.66
3	0.087	60.92	24.96	3.67	10.44	0.049	95.69	0.35	1.07	2.89	0.117	95.05	1.91	0.04	3.00
4	0.090	56.83	23.31	8.33	11.52	0.050	92.43	0.82	3.67	3.08	0.130	93.18	2.72	0.03	4.07
5	0.104	65.67	18.73	6.90	8.71	0.051	90.14	0.83	5.59	3.45	0.144	93.72	2.22	0.07	3.00
6	0.107	64.07	19.82	6.77	9.33	0.053	84.82	0.91	10.81	3.47	0.155	92.99	2.43	0.09	4.49
7	0.120	60.01	21.05	7.79	11.16	0.054	81.83	0.94	13.08	4.15	0.167	93.14	2.13	0.17	4.55
8	0.122	57.66	20.15	10.69	11.50	0.055	78.35	1.07	16.30	4.28	0.177	92.72	2.20	0.25	4.83
9	0.131	61.07	19.09	9.86	9.99	0.056	76.33	1.10	17.93	4.64	0.188	92.67	2.04	0.38	4.91
10	0.133	61.07	19.02	9.84	10.07	0.057	73.85	1.22	20.22	4.71	0.197	92.35	2.08	0.50	5.07

Source: Authors

lived as the effect turned positive in the fifth quarter, implying that the oil price shock can only negatively affect the industrial output for one year, after which the sector would adjust well enough to turn the negative impact to a positive one. The narrative is different for the services sector as the result shows the presence of a positive contemporaneous effect of the oil price shock on the services sector output. The result suggests that the positive effect of oil price shocks on the services sector output is a long-term phenomenon in Nigeria. These results support the findings of A. Aminu and J. A. Ogunjimi (2019); C. Onyimadu (2019) and J. A. Ogunjimi (2020a), who showed that the oil price was the key determinant of the sectoral output in Nigeria.

The Variance Decomposition results also show that, in the tenth quarter, the oil price shock accounts for 10.1% in the agricultural output, 4.7% in the industrial output and 5.1% in the services output. The peculiarity of Nigeria as an oil-dependent economy reflects in the vulnerability of almost all the sectors to oil price shocks most especially on the downside. At the aggregate level, the agricultural and industrial sectors are more exposed to negative oil price shocks compared to the services sector, which to some extent implies that a decline in receipts from crude oil sales would exert a negative impact on the performance of the key activities carried out by the agricultural and industrial sectors. With the magnifying negative impact of COVID-19 on global oil prices, the performances of the agricultural and industrial sectors remain vulnerable to the oil price volatility, indicating that they are less resilient and fragile. In brief, the services sector is more resilient to oil price shocks than the industrial and agricultural sectors are.

CONCLUSION

The quest for sustainable growth and competitiveness of the Nigerian economy has been pursued by successive governments in the country. However, Nigeria's susceptibility to various macroeconomic shocks (such as fiscal, monetary and external shocks) due to its fragility continues to dampen the possibility of achieving this quest. Given this, the study examined the sectoral responses to macroeconomic shocks in Nigeria using the VAR and VEC model frameworks. The quarterly data on the key variables of interest for the period spanning 2010Q1 and 2021Q4 were sourced from the Central Bank of Nigeria's database. The findings revealed the fact that the services and agricultural sectors were more responsive to the government expenditure shocks than the industrial sector. In addition, the industrial sector was found to be the most responsive to interest rate shocks, whereas the service sector was the least responsive to interest rate shocks. With regards to

oil price shocks, the services sector was found to be more resilient to oil price shocks than the industrial and agricultural sectors. Regarding the results of the tested hypotheses, the following conclusions are made:

- The agricultural, industrial and services sectors are responsive to fiscal shocks although with different levels of responsiveness.
- The agricultural, industrial and services sectors are sensitive to monetary shocks, albeit at different sensitivity levels.
- The agricultural, industrial and services sectors are responsive to external shocks, albeit at varying degrees.

These findings have scientific and practical implications. For the scientific implications, the varying degrees of the responsiveness of each economic sector to the policy changes suggest the need to consider both domestic and external shocks in the determination of the macroeconomic stability of the domestic economy. For the practical implications, however, the sensitivity of the agricultural sector to the government expenditure shocks indicates the need to prioritize investment in the technologies and machinery that would aid improved productivity in the agricultural sector and in the other economic sectors. Given the adverse effects of interest rate shocks on the sectoral output, the monetary authorities need to prioritize stabilizing interest rates, which will incentivize both domestic and foreign investors to invest in the various sectors of the Nigerian economy, thereby advancing the diversification quest of the country and providing the necessary support to the less resilient sectors. Finally, to maximize positive macroeconomic shocks, the Nigerian government and other stakeholders need to ensure that national accounts are opened and effectively managed in order to store surpluses during the periods of boom, which would be useful at a later period, especially during downturns.

The scope of this study is delimited to only one indicator for the fiscal, monetary and external shocks and is focused on only the Nigerian key economic sectors. Future studies could consider using different indicators of fiscal, monetary and external shocks in their evaluation of the sectoral response to shocks. In addition, future investigations should focus on the subsectors in the agricultural, industrial and services sectors so as to effectively delineate the subsector with the highest response and the lowest response to each form of the macroeconomic shock. Moreover, since this study was only based on the Nigerian economy, future studies could be conducted for other countries for the purpose of plausible comparisons and in order to check if country-specific characteristics influence the sectoral responses to macroeconomic shocks. Finally, a panel study on the subject matter is also a good direction for future research.

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Received on 10th June 2022,
after revision,
accepted for publication on 24th November 2022
Published online on 6th December 2022

Joshua Adeyemi Afolabi is a Research Fellow at the Innovation and Technology Policy Department, Nigerian Institute of Social and Economic Research. His research interests include development and macroeconomic issues.

Blessing Ufuoma Olanrewaju is a Research Fellow at the Economic and Business Policy Department, Nigerian Institute of Social and Economic Research. Her research interests include long-run economic growth, energy economics, public policy and development economics.

Wasiu Adekunle is a Research Associate at the Nigerian Economic Summit Group, Lagos, Nigeria. He is highly skilled in economic and econometric research.

Economic Horizons, September - December 2022, Volume 24, Number 3, 269 - 283
UDC: 33 ISSN: 1450-863 X

Original scientific paper
UDC: 336.221.4
doi:10.5937/ekonhor2203281D

THE TAXPAYER AS AN ELEMENT OF CORPORATE INCOME TAX: THE ECONOMIC EFFECTS OF AND OPTIONS FOR FUNDAMENTAL REFORM

Jadranka Djurovic Todorovic[1]*, Marina Djordjevic[1] and Milica Ristic Cakic[2]

[1]*University of Nis, Faculty of Economics, Nis, The Republic of Serbia*
[2]*Innovation Center of the University of Nis, Nis, The Republic of Serbia*

Although a complex taxation system can affect a company's operations, its negative effects can be significantly greater at the macroeconomic level. Given the fact that it can make it more difficult to attract investments and collect revenue, the corporate income tax system has been the subject matter of numerous research studies for many years now. Modern business conditions initiated their frequent reforms, as well as the numerous dilemmas related to them. The paper deals with the taxpayer as an element of corporate income tax. Although numerous papers investigate the (dis)unity of tax systems in defining corporate income taxpayers, few authors examine the economic effects of these discrepancies. Also, most research studies are focused on examining the other elements of this tax form, such as the tax rate or tax incentives. In this paper, an effort is made to find a connection between the form of the organization of a business entity and the tax burden in the domain of corporate income tax. The research study aims to indicate the importance of the economic effects of this tax element and to propose its reform. The research has confirmed the initial assumption, respectively; it has shown that different forms of the organization of business entities bear different burdens of paying corporate income tax, which affects the amount of the tax revenue that could be collected. The results have shown that the sampled companies paid less tax due to corrections and adjustments in tax balances and tax returns.

Keywords: corporate income tax, taxpayer, tax burden, tax revenues, Republic of Serbia

JEL Classification: E62, H20, O23

INTRODUCTION

The theoretical considerations of corporate income tax are increasingly generating polarized views regarding the importance and necessity of this form of taxation. Those in favor of corporate income tax emphasize its function as a guardian of the progressivity of the entire tax system. Its stabilization and development components were also emphasized, through which it is possible to influence the mitigation of the cyclical fluctuations of the economy. On the other hand, the opponents of corporate income tax who raise the issue

* *Correspondence to:* J. Dj. Todorovic, University of Nis, Faculty of Economics, Trg kralja Aleksandra Ujedinitelja 11, 18000 Nis, The Republic of Serbia;
e-mail: jadranka.djurovic@eknfak.ni.ac.rs

of the justification for the existence of this tax form indicate that a consensus has not yet been reached in the literature, as well as the generally accepted model of corporate income tax applied in all countries (Zee, Stotsky & Ley, 2002).

Although lacking a high collection capacity, corporate income tax can have strong economic effects (Koester & Kormendi, 1989; Plosser, 1992; Slemrod, 1995; Padovano & Galli, 2001; Widmalm, 2001; Arnold, 2008; Hoang, Tan, My & Nguyen, 2021). Therefore, it can be pointed out that it is an important element of the tax system due to the impact it can have on the economic cycle and the economic decisions made by companies (Delgado, Fernandez-Rodriguez & Martinez-Arias, 2014). Tax on profit can affect relative prices, the tax administration costs paid by taxpayers, investment in research and development, investment in innovation and capital flow (Arsić and Ranđelović, 2017). However, corporate income tax is accompanied by numerous problems and specificities. The harmonization of the elements of this tax form, tax competition, tax evasion and others are listed as the main problems. Dilemmas and paradoxes are present in all its elements. Accordingly, a large number of authors deal with the problems caused by the continuous reduction of the legal and effective tax rate and the introduction of generous tax incentives. The largest number of research studies are based upon examining the economic effects of the elements, such as the tax rate or tax incentives, whereas a very small number of researchers deal with the taxpayer as the key element of corporate income tax.

Disagreements in approaches to defining corporate income taxpayers within modern tax systems are generated by the various circumstances influenced by a large number of factors. One of the most important is the business investors do on the international market. Considering the mobility of capital, companies do not limit their operations within the borders of one country, but they rather start doing business outside them instead. For this reason, several specifics in the taxation of profits which have been faced by almost all the countries of the world have appeared. In addition to the specifics that were initiated by the expansion of business beyond the borders of one country within the framework of modern tax systems, there has also been a disagreement regarding the definition of the key tax elements between countries. The seriousness of the problem can be seen in the example of the European Union, where the degree of the harmonization of the corporate income tax elements is particularly questioned. Such circumstances have threatened the trend of fiscal harmonization and called into question the convergence of the key elements of corporate income tax at the global level, as well as the decision on the unique design of this tax form.

The development of national tax legislation has led to the emergence of different treatments of taxpayers. The discrepancies are precisely based on looking at its definition and scope. Bearing in mind the various possibilities of doing business outside the borders of one country, the nonresident of a certain country has become the subject matter of consideration in the domain of countries' laws and regulations. Therefore, the analysis of the definition of the corporate income taxpayer must include a clear demarcation of the terms "resident" and "nonresident". As the development of tax legislation has led to major disagreements between countries, the problems of the modern world that have arisen are not easy to manage, such as double taxation, tax consolidation, group taxation, and tax evasion. (Shaviro, 2004a; Van der Horst, Bettendorf & Rojas-Romagosa, 2007; Ranđelović, 2011; Tax Foundation, 2018).

In this paper, there are efforts to find a connection between the form of the organization of a business entity and the tax burden in the domain of corporate income tax.

The paper examines whether defining the taxpayer in the domain of corporate income tax can affect the amount of the tax burden. The research aims to indicate the importance of the economic effects of this tax element and to provide a proposal for its reform.

Bearing the foregoing in mind, the following hypotheses are tested in the paper:

H1: The form of the organization of the business entity affects the level of the tax burden.

H2: By changing the form of the organization of a business entity, it is possible to reduce tax revenue.

In this sense, the paper is organized so that, firstly, the cause and consequences of different definitions of the taxpayer are theoretically considered, and then the connection between the form of the organization of the business entity and the tax burden is established. The methodological instrumentation used in the research study is determined by the subject matter of the research itself. The theoretical analysis of the taxpayer represents the starting point in finding the connection between the form of the organization of the business entity and the tax burden. After the theoretical consideration of the taxpayer, the influence of the form of the organization of the business entity on the level of the tax burden and consequently tax revenue is examined in the fourth part of the research study using the relevant empirical method. In the discussion of the results of the research, a proposal is made to reform this tax element, which can increase tax collection, reduce tax evasion and encourage investments. In the last part of the paper, the author's conclusions and recommendations for further research are given.

DISAGREEMENTS IN APPROACHES TO DEFINING THE TAXPAYER: CAUSES AND CONSEQUENCES

Corporate income tax belongs to the category of "real" taxes, i.e. it taxes a profit accordingly. In addition, this form of tax is the basic form of the direct taxation of the legal entities whose goal, in addition to providing tax revenues, is also to achieve its economic function (Romer & Romer, 2010; Stoilova & Patonov, 2012). Although corporate income tax is incorporated in the tax systems of the largest number of countries throughout the world, there are still debates about the justification of its existence. Perhaps the most common argument cited in the literature is that income taxes cannot burden business (Myles, 1995; Rosen, 2012; Atkinson & Stiglitz, 2015).

Every tax liability within a country's tax system is based on the economic power of the taxpayer (the "ability to pay" principle). In accordance with that, the obligation to pay corporate income tax is defined. In relation to this element of corporate income tax, however, a number of dilemmas have emerged that have singled out different approaches to defining it. The determination of the taxpayer, therefore, differs depending on the approach adopted by a particular country.

In addition to the fact that discrepancies are appearing from one country to another, the discrepancies in defining this key tax element are also clearly visible when their development inside individual countries is perceived. In other words, the tax systems of developed countries have been accompanied by frequent reforms in the definition of taxpayers. This can best be seen in the historical presentation of the development of the corporate income tax, in which, in accordance with changes in the law, this tax form has also changed approaches to defining the taxpayer. The discrepancies in the definition of a taxpayer are therefore driven by numerous factors, where, in addition to historical elements, the development of a country, its stability and global orientation have had a great influence.

The disunity of tax laws in the modern world has created dilemmas regarding the definition of this element, with those dilemmas that affect economic activities coming to the fore. Such conflicts have initiated a series of negative reflections in the global market and created a number of the economic difficulties which affected less developed countries more (Murphy, 2004). Explicitly, problems arise at the time of the entry of economic entities to the international market, where the disunity of tax systems comes to the fore. If the basis for the occurrence of the corporate income tax liability is different, certain tax systems may be avoided (Addison, 2009; Brown, Cloke & Christensen, 2011; Palan, Murphy & Chavagneux, 2013), which is so because, paradoxically, the economic entities operating within one country would be in a more favorable position compared to the economic entities involved in the international market in such conditions. Therefore, the unity of tax systems in the

domain of defining the taxpayer should be the starting point for the reform of this tax form (Sokolovska & Belozyorov, 2019).

When studying the conditions under which modern tax systems operate and the circumstances under which they develop, it can be observed that the degree of their fairness or efficiency is seriously endangered (Shaviro, 2004b). Being actual in modern taxation, these problems have limited the fiscal harmonization process and enabled taxpayers to abuse differences in national tax systems (Paientko & Proskyra, 2016). Although measures are being taken to bring the harmonization or compatibility of legislation to a certain level in order to increase the mobility of capita, the laws that regulate corporate income tax still differ throughout the world. The fiscal harmonization process has slowed down, which is confirmed by the European Union's policy (Blechová, 2005; Šimović and Šimović, 2006; Paientko & Proskyra, 2016). A similar situation is present in the OECD member countries, where two forms of income taxation can be found: corporate income tax and personal income tax. Corporate income tax is paid by all the legal entities that make a profit. However, there is no clear list of the companies exempt from paying corporate income tax (Devereux, Griffith & Klemm, 2002; Clausing, 2007; Brill & Hassett, 2007; Loretz, 2008; Dackehag & Hansson, 2012; OECD, 2020).

The tax legislation conflict is largely initiated by a lack of internationally recognized principles in the tax field. Each country independently regulates its national tax system by legal means without taking into account the regulations of other countries and without looking exclusively at its own interests. Thus, more developed countries are interested in a broader coverage of the taxpayer, whereas the countries with fewer capital exports are limited in the application of this approach due to their weaker administrative capacity. If, on the other hand, there were no big differences between the tax elements, the benefits of this form of taxation would be great even in developing countries.

Bearing in mind the fact that countries with higher national income deviate to a greater extent from the harmonization of tax systems, which is conditioned by tax competition, the position of the countries with lower and lower average national income is further threatened. In addition to the less revenue collected from corporate income tax, the interest of foreign and domestic investors in investing in them has also significantly decreased (Orviska & Hudson, 2003; Lang, 2013).

In addition to the fact that it is very difficult to harmonize the elements of corporate income tax, it now seems impossible in perspective. In this way, it is impossible to act upon the international disturbances that are a characteristic of the modern market. The problems with the public debt and the big energy crisis that the Republic of Serbia is currently facing are making this process even more difficult.

Given the fact that a small number of authors provide an overview of all tax elements and mainly focus on the tax rate and tax incentives, it is necessary to carry out a detailed analysis of the other tax elements of corporate income tax. Therefore, the effects of defining the form of the business entity are investigated in the continuation of the paper, in which way the analysis of the other factors that can affect income from corporate income tax and economic development is made.

DECISIVE DETERMINANTS OF THE DEFINITION OF THE TAXPAYER

In the past, the taxation of legal entities was the subject matter of controversy among public finance theorists (Antić, 2019). The basic dilemma regarding the taxation of legal entities relates to their ability to pay. On the one hand, there were the claims that legal entities did not have the economic capacity, while some authors considered that legal entities had their own income that should be subjected to taxation.

The conformity of the definition of the taxpayer in different countries is determined by the elements that affect it. It is considered that there are several decisive determinants in modern tax systems on the basis of which the corporate income taxpayer is defined, namely:

- the organizational form of the company,
- the spreading of the tax liability, and
- the "source principle".

Accordingly, each of these elements is discussed in more detail along with the dilemmas that tax policymakers may have about it.

The organizational form of the company as a decisive fact in determining the taxpayer

The dilemmas that appear in this section relate to the groups on the basis of which it is possible to classify economic entities. Bearing in mind the fact that corporate taxpayers can be different forms of company organization, two dominant approaches in modern tax systems have emerged.

The basis for distinguishing between these approaches lies on the definition of a company which includes other differences depending on the breadth and scope of legal entities. According to the first approach, corporate income taxpayers are only capital companies, and this approach is one of the most common approaches. Bearing in mind the fact that only a capital company is considered to be a taxpayer, corporate income tax is also known as corporate income tax. Under this approach, companies are not considered corporate taxpayers, which undoubtedly exempts companies from paying income tax and a decisive distinction is made between them and capital companies.

The second approach implies that corporate income tax is levied on both corporate and capital companies, in which way a larger number of taxpayers, i.e. a larger number of the legal entities obliged to pay corporate income tax, are included. With the company of persons, there is an unlimited responsibility for the obligations on the company's part, which respects the personal element (Đurović Todorović, Đorđević and Ristić, 2019).

The similarities present in the field of defining taxpayers in tax legislation are related to the perception of the company, where it does not matter whether it is a company of the state or private ownership structure or a company of different activities and sizes. If it is determined that the taxpayer who carries out the business activity should pay tax based on a certain criterion in a certain country, his performance is not taken into account.

(Non)residency as the basis for introducing the obligation to pay taxes

Defining taxpayers related to the spread of tax liability puts the act of residency in an important place among the definition criteria. Namely, the determination of residency and the sources of income serve as important elements in defining the liability in the field of corporate income tax.

When residency is concerned, the corporate income tax payer is a resident who conducts the business activity in one country, as well as a nonresident who makes a profit in the country where he has the status of a nonresident. Therefore, his tax liability is unlimited, in which way the residents of one country have to pay taxes according to the national legislation on the profit they have made on the international market.

The taxpayer is defined in this way mostly in developed countries. Therefore, the application of this criterion is observed in some OECD member countries. In these cases, it is necessary that the tax system should be supported by the well-equipped administration and efficient work of tax authorities. There are three systems based on which it is possible to determine residency, namely:

- the place of incorporation,
- the place of the management of the company, and
- the combined method.

It is very often the case in practice that the place of incorporation is taken as the basis for determining residency. Namely, this system is applied in Italy, Switzerland, Brazil, and Japan. If another system is taken as the basis for determining residency, then the place from which the company is managed is

considered, which can be seen in Great Britain, Argentina, and Belgium. The combined method is used in Germany, France, the Netherlands, and Serbia. In other words, the resident is the legal entity either established or managed by that legal entity in that country.

When countries tend to tax the residents' profits made outside the national borders, there is no conflict of law. However, a conflict arises if the country in which the profit is made tends to be cautious. The problems that may arise if different criteria for determining the taxpayer are applied in countries are as follows:

- If the unlimited tax liability, i.e. residency, is used in one country as a criterion for determining the taxpayer, while the territorial approach, i.e. the source, is used in another as a criterion, a conflict of tax legislation arises. In other words, the person who has made a profit on the international market will be a taxpayer both in the country which he is a resident in and in the country where he has made a positive business result.
- If the unlimited tax liability, i.e. residency, is used in one country as a criterion for determining the taxpayer, while residency is also used as a criterion in another, a conflict of tax laws arises again. Conflicts of legislation are thought to arise due to the different treatment of residency in different countries.
- When the source, i.e. the limited tax liability, is used as the basis for determining the taxpayer in both countries where the same business entity operates, there is also a conflict of legislation. Such an example can be seen from the perspective of a bank and a company which is a resident of one country but took a loan from the bank for its business unit located in another country. In that case, the key question is how to approach the taxation of interest.

Therefore, the countries that tend to tax the profits of residents that have been made outside the national borders must be aware of the problems that may arise. If it happens that the country has a tendency to tax the realized profit, dilemmas arise regarding double taxation.

The source of income as a potential determinant for defining taxpayers

The taxation of income within economically originated country defined as the "source principle" (Gökçay, 2017). The source is a part of the taxation concept linked to the spread of the tax liability. The difference between residency and the source of income is only in the fact that the source is based on the territorial principle of spreading the obligation and is a limited tax liability accordingly. On the other hand, with the residency criterion, the obligation is unlimited. In other words, every resident will be taxed, whether he makes a profit within the borders of one country or outside them (worldwide income), in which the tax system operates outside the borders of one country.

The source of income is the territory in which a profit is made and is defined by the taxpayer. This fact is very rarely used to determine the taxpayer and its use in Latin American countries is well known. In addition, a large number of criticisms have been leveled at this criterion in determining corporate income taxpayers, bearing in mind the fact that it is not objective to look only at the profits made in the country where the taxpayer is a resident. In this way, there will be a great incentive for investors to do business outside the borders of their country. Also, due to the difficulties in determining the place where income originates from, double taxation can occur (Green, 1993; Akkaya, 2011; Oktar, 2017).

Therefore, most countries opt for combining the previous two elements, namely residency and the source, in which way the profit of residents realized outside the borders of the country is included, on the one hand, whereas the profit of nonresidents realized in the national field is taxed, too, on the other.

THE IMPLICATIONS OF THE ORGANIZATIONAL FORM OF A BUSINESS ENTITY FOR THE TAX BURDEN

In order to analyze the reflections a taxpayer, as an element of corporate income tax, can have on the tax burden, one of its determinants was analyzed. As certain elements influence the definition of the taxpayer, this paper investigates the influence of the organizational form of a business entity on the level of the tax burden. Figure 1 shows the methodological approach in researching the impact of the organizational form of a business entity on the level of the tax burden, and consequently on the level of tax revenue.

The tax burden is figured based on the actual paid corporate income tax calculated using the effective tax rate. Due to the transparency of the data, the market of the Republic of Serbia and the companies operating inside the country were analyzed. By building a tax system striving for greater transparency and comparability with the tax systems of other countries in the world, a whole range of possibilities was given to taxpayers in the Republic of Serbia under which they could organize their business. To investigate whether the form of the organization of a business entity can have implications for the tax burden, and thus for revenues generated from corporate income tax, a group of companies operating in the Republic of Serbia were analyzed. As many as 100 companies from the list of the most successful companies according to the net profit in 2018 were analyzed, all according to the Report on the Top 100 Companies in 2018 (Agencija za privredne registre, 2019). The sample based on the publication of the Business Registers Agency of the Republic of Serbia, while detailed data on the tax liability were obtained based on the request sent to the Tax Administration of the Republic of Serbia requesting access to the sampled data. The analyzed period includes the period from 2016 to 2018.

The sampled companies include the companies that operate as capital companies, that is:

- a stock company,
- a joint-stock insurance company,
- a limited liability company,
- public companies, and
- a permanent business unit of a nonresident legal entity.

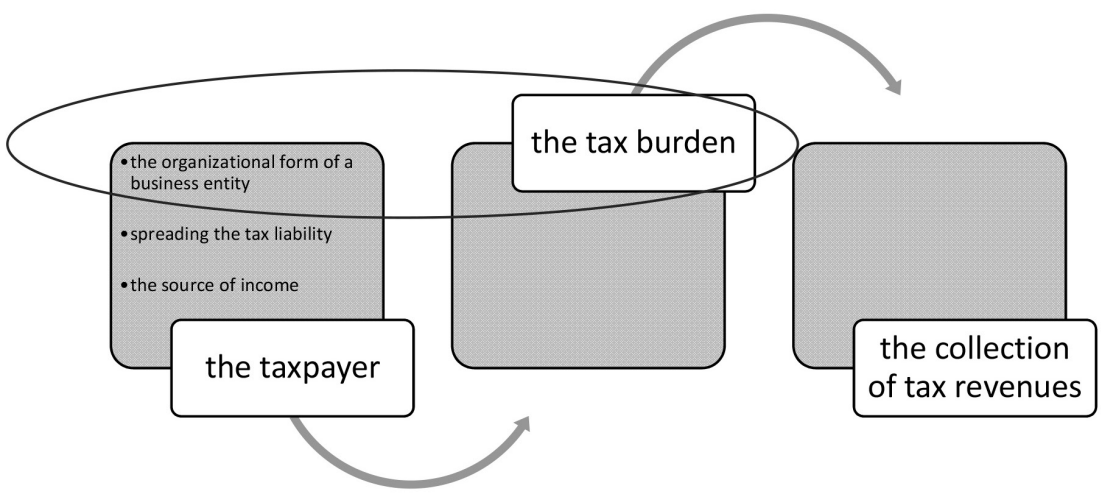

Figure 1 The taxpayer as an element of corporate income tax in the role of determining the amount of the tax burden and the collection of tax revenues

Source: Authors

The two-way between-groups analysis of variance (ANOVA) was used for the analysis in order to analyze the differences in the average values of the different groups that could be a result of the influence of the two independent factors (the two independent variables). The two-factor analysis of variance is used when it is necessary to examine the differences in the average values of one dependent variable between the groups defined by division by two criteria, i.e. between the groups defined by the different levels of the two independent factors (the two independent variables). Compared to the application of the t-test that also tests the independent samples, a great advantage of this method is emphasized in the literature (Gravetter & Wallnau, 2007). Unlike the t-test method used to compare two averages and the one-way analysis of variance, the two-factor ANOVA is used to compare more than two averages, where the difference is by default considered as significant if the significance of the test is $p < 0.05$. The main advantage of the method is that it is based on the possibility of examining the influence of each independent variable.

Two-factor analysis allows two null hypotheses to be tested simultaneously. It is possible to examine the influence of the interaction of independent variables on the dependent variable using this method. Therefore, the examination of the basic influence of the independent variable, i.e. the form of the organization of a business entity, as well as a possible influence of the interaction of all the components of the independent variable (a joint-stock company, a joint-stock insurance company, a limited liability company, public companies, a permanent business unit of a nonresident legal entity) on the dependent variable.

The effective rate of the company is determined based on the data retrieved from tax balances and tax returns for the advance - final determination of corporate income tax and is a very significant indicator of the efficiency of the tax system, indicating how much each of the companies in the sample paid corporate income tax. Also, this rate is a more relevant indicator than the legal corporate income tax rate because it gives a more realistic picture of the tax paid. The effective tax rate can be calculated applying the following formula:

$$\tau = \frac{cit}{NI}$$

where τ is the effective tax rate, *cit* represents the current corporate income tax, and *NI* is the taxable profit.

The calculation procedure starts from the profit of the business year, which is transferred from the Income Statement of the sampled companies to their tax balance sheets (Form PB 1). Given the fact that in accordance with the corrections allowable by the current Law in the Republic of Serbia there are certain adjustments to this result, no realistic picture of the paid corporate income tax can be obtained just by simply applying the legal rate prescribed in our country. For this reason, an insight into the tax balances and tax returns of the sampled companies is needed in order to determine the amount of the tax actually paid that is visible there.

The amount of the tax that the taxpayer should submit is obtained by applying the standard rate of corporate income tax (15%) to the tax base, which is stated under the serial number 69 in the position Tax Base - Taxable Profit in the Tax Balance. The "Tax Base - Taxable Profit is reported under the serial number 69 of Form PB 1 and is determined by calculation as the sum of the remaining profit and the remaining capital gain" (Agencija za privredne registre, 2020). In other words, if the taxpayer has not made a profit or is operating at a loss, it does not necessarily mean that he will not have a profit for taxation. In that case, capital gains can be the tax base for paying corporate income tax. Also, a reduction in the calculated tax is made within the framework of the tax return in which this tax base is additionally corrected.

In order to determine the effective rate, the next step in the calculation is to determine the tax paid from the tax return and compare it with the taxable profit. By comparing this position with the received amount of tax, the effective tax rate of corporate income tax is obtained.

In addition to the evaluation of the effect of each independent variable individually, the two-factor ANOVA allows for the evaluation of the other differences that may arise in the relationship between the independent variables. These differences are expressed by interaction, the impact of which is present "when the influence of one independent variable on the dependent variable changes depending on the value of the other independent variable".

Before applying the two-factor ANOVA in order to see the key descriptive values, the descriptive measures of the analyzed companies are given in Table 1. The descriptive statistics are presented for the paid corporate income tax advances. The advance payments of corporate income tax are calculated by applying the effective tax rate to the tax liability of the business entity and represent the tax burden it has submitted in a certain year.

The descriptive statistics provide the basic indicators that determine which forms of organization are similar/different according to the level of the tax burden. The tax burden is observed in the period from 2016 to 2018. The lowest tax burden was that by the joint-stock companies, the limited liability companies, and the public companies. The public companies (2016) and the joint-stock companies (2017 and 2018) had the biggest tax burden. In the last year of the observed period, the total average value of the tax burden submitted in the Republic of Serbia by the analyzed groups of companies was 380,508,354 dinars.

Given the fact that it has been determined that there are differences in the tax burden between the forms of the organization of the business entities, the further analysis of their differences follows. In order to evaluate the interaction, it is necessary to first identify the mean differences, which are not explained by

Table 1 The descriptive statistics of the tax burden according to the form of the organization of the business entity

The form of organization		N	Mean	Standard deviation	Minimum	Maximum
Stock company	2016	36	280.798.578	443297672.954	0	1.951.174.639
	2017	36	391.335.291	694186136.191	0	3.785.946.633
	2018	36	684.787.620	1674033339.776	0	9.433.469.275
	Σ	108	452.307.163	1080698531.487	0	9.433.469.275
Joint-stock insurance company	2016	1	43.329.862		43329862	43.329.862
	2017	1	75.826.029		75826029	75.826.029
	2018	1	98.236.809		9823609	98.236.809
	Σ	3	72.464.233	27607416.753	43329862	98.236.809
Limited liability company	2016	55	123.423.861	266412169.555	0	1.698.559.638
	2017	55	144.383.483	286878956.114	0	1.885.721.328
	2018	55	139.045.187	166953833.657	0	727.638.212
	Σ	165	135.617.511	244389140.824	0	1.885.721.328
Public company	2016	7	1.504.088.653	2665850841.618	0	7.459.799.187
	2017	7	815.221.989	991690227.776	0	2.869.549.533
	2018	7	729.934.542	1027395001.603	0	2.981.730.104
	Σ	21	1.016.415.061	1694065098.277	0	7.459.799.187
Permanent business unit of a non-resident legal entity	2016	1	267.820.877		267820877	267.820.877
	2017	1	336.485.385		336485385	336.485.385
	2018	1	543.217.147		543217147	543.217.147
	Σ	3	382.507.803	143350352.638	267820877	543.217.147
Total	2016	100	277.368.325	811805660.782	0	7.459.799.187
	2017	100	281.480.274	557038190.954	0	3.785.946.633
	2018	100	380.508.354	1070366037.304	0	9.433.469.275
	Σ	300	313.118.984	838192401.609	0	9.433.469.275

Source: Authors

the main effects, by means of the two-factor ANOVA analysis. After that, additional mean differences are estimated via the following equation:

$$\text{Additional mean differences} = \frac{\textit{variance (mean difference) that is not explained by the main effects}}{\textit{variance (mean difference)expected if there are no effects}}$$

Based on the above equation, one of the following results can be obtained:

- there is no interaction between the analyzed variables. All mean differences in the tax burden are explained by the main factor.
- There is an interaction between the analyzed variables. The mean differences between the forms of the organization of the tax subject are not something that can be predicted. In other words, the influence of one independent variable on the dependent variable changes depending on the value of the other independent variable (Gravetter & Wallnau, 2014, 414).

A part of the results obtained by applying the two-factor ANOVA analysis is shown in Table 2.

Table 2 shows the result of the interaction effect, as well as the results of the separate effects of the independent variables. The influence of the interaction, i.e. the change in the influence of the form of the organization of the economic entity during different years on the tax burden is not significant given the fact that the significance of the influence of the interaction is greater than 0.05 (Form of organization*Year: Sig. = 0.466). It is concluded that there is no significant interaction between the form of organization and the year.

Apart from the influence of the interaction, separate influences can also be easily interpreted, i.e. the influence of each independent variable. The results also indicate that there is a significant difference in the tax burdens for different forms of organization (Form of organization: Sig. = 0.000). Between different years, there are no significant differences in the tax burden (Year: sig. = 0.955). Therefore, there is a separate significant influence of the form of organization, but not the year, on the tax burden. This means that there are no differences in the tax burden of the analyzed companies in the observed years, but that there is a difference in the tax burden when different forms of business organization are perceived.

In order to determine which forms of the organization of the business entities are concretely different, additional tests were conducted. The basis for conducting the additional tests yielded a separate effect that was statistically significant. The post-hoc tests compare the means separately across all pairs of groups. The results indicate whether there are differences in these means. Therefore, the results of the Tukey test (Tukey HSD) are accounted for in Table 3. This test represents the "Honestly Significant Difference" (HSD)" test, which is most often used in research practice.

Table 2 The ANOVA test results: the effects of the interaction between the variables

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected model	23583038094105640000.000	14	1684502721007550000.000	2.574	.002
Intercept	581240754709215000.000	1	581240754709215000.000	8.883	.003
Year	60201808475601200.000	2	30100904237800600.000	.046	.955
Form of organization	17866260641932900000.000	4	4466565160483240000.000	6.826	.000
Year*Form of organization	503473297612192000.000	8	62934162201524000.000	.962	.466
Error	186484346038465000000.000	285	654331038731458000.000		
Total	239480433700176000000.000	300	1684502721007550000.000		
Corrected total	210067384132571000000.000	299			

Note: * R Squared = .112 (Adjusted R Squared = .069); Dependent variable: Tax burden

Source: Authors

Table 3 The Tukey test results

Test: Tukey HSD

The form of organization		Mean Difference (I-J)	Std.Error	Sig.
Joint-stock company	Joint-stock insurance company	379842930.31	473464852.944	0.930
	Limited liability company	**316689652.60**	**100121243.440**	**0.015**
	Public company	**-564107898.08**	**192917706.862**	**0.030**
	Permanent business unit of a non-resident legal entity	69799360.64	473464852.944	1.000
Joint-stock insurance company	Joint-stock company	-379842930.31	473464852.944	0.930
	Limited liability company	-63153277.71	471249391.408	1.0000
	Public company	-943950828.38	499268431.944	0.325
	Permanent business unit of a non-resident legal entity	-310043569.67	660470054.194	0.990
Limited liability company	Joint-stock company	**-316689652.60**	**100121243.440**	**0.015**
	Joint-stock insurance company	63153277.71	471249391.408	1.000
	Public company	**-880797550.67**	**187414683.392**	**0.000**
	Permanent business unit of a non-resident legal entity	-246890291.96	471249391.408	0.985
Public company	Joint-stock company	**564107898.08**	**192917706.862**	**0.030**
	Limited liability company	943950828.38	499268431.944	0.325
	Joint-stock insurance company	**880797550.67**	**187414683.392**	**0.000**
	Permanent business unit of a non-resident legal entity	633907258.71	499268431.944	0.710
Permanent business unit of a nonresident legal entity	Joint-stock company	-69799360.64	473464852.944	1.000
	Limited liability company	310043569.67	660470054.194	0.990
	Joint-stock insurance company	246890291.96	471249391.408	0.985
	Public company	-633907258.71	499268431.944	0.710

Note: *at a significance level of 0,05; Square (Error) = 654331038731457920.000; Dependent variable: Tax burden

Source: Authors

The results of the Tukey test show that the tax liability of the joint-stock company differs from the tax burden of the limited liability company (Sig. = 0.015) and the public companies (Sig. = 0.030). Also, the results of the analysis have shown that the tax burden of the joint-stock insurance company does not differ from the tax burden of the other analyzed organizational forms. The tax burden of the limited liability company differs from the tax burden of the joint-stock company (Sig. = 0.015) and the public company (Sig. = 0.000). The tax burden of the public company differs from the tax burden of the joint-stock company (Sig. = 0.030) and the limited liability company (Sig. = 0.000). The tax burden of the organizational form of the permanent establishment of the nonresident legal entities does not differ from the other analyzed forms of the organization of the company.

Bearing in mind the fact that the form of the organization of a business entity can affect the amount of the tax liability, it can be concluded that the companies can manage the amount of the tax burden by choosing the form of organization. In this way, the first research hypothesis was confirmed. Taking into account the fact that the level of the tax burden affects the level of the collected revenues from corporate income tax, it can be concluded that tax revenue can be reduced by changing the form of the organization of a business entity. In this way, the second research hypothesis was confirmed.

The potential economic effects of this tax form on the tax burden and tax revenue are of great importance and it is necessary to approach an appropriate reform. Microeconomic effects represent the effects that a taxpayer can have on the tax burden, whereas macroeconomic effects are reflected on tax revenue, which explicitly affects tax evasion, the stimulation of economic activities and economic development. Therefore, with this key element of corporate income tax, it is necessary to take a closer look at all the organizational forms enabled by the current Law in

order to achieve greater efficiency in the collection of this tax form.

The reform of the corporate income tax and its elements, as well as the prescription of special rules when defining the taxpayer, is not only significant at the national level. By harmonizing with international practice, the Republic of Serbia would be on the way to solve the other dilemmas related to corporate income tax, such as double taxation, tax consolidation, and group taxation. At the international level, the importance of the corporate income tax reform intended to achieve unity in defining the taxpayer would enable attracting investments. Also, numerous problems and specifics in profit taxation would be solved and the problem of tax competition would be significantly reduced. The reform would explicitly increase economic activities, as well as the cooperation of the tax authorities at the international level, in which way it would also act in the field of illegal tax evasion.

In the author's opinion, the reform should be implemented in such a way that, along with appropriate tax principles, taxpayers and the method of their inclusion are precisely defined. The reengineering of the elements that affect the definition of the taxpayer is also proposed. Based on the link established between the organizational form of the business entity and the tax burden, it can be concluded that there is a degree of the management of the tax burden by the taxpayer, which can significantly reduce the collection of tax revenues. It is also suggested that the work done by the tax authorities should be considered in order to reduce the management of the tax burden. It is necessary to precisely analyze the existing legal regulations related to keeping the register of taxpayers. It is necessary to improve the way of keeping the register and start an initiative to change the laws governing the registration of business entities. By acting in this direction, the tax policy creators could influence an increase in tax revenues, approach international practice through the harmonization process, attract investments and reduce tax evasion as well.

CONCLUSION

The research results show that the definition of the taxpayer is determined by the elements that definition is influenced by. The theoretical analysis found that the differences in these elements between countries allow taxpayers to abuse respective national tax systems, in which way certain tax systems are avoided and the fiscal harmonization process is slowed down.

The established research hypotheses examining the influence of the organizational form of the business entity on the tax burden and tax income are confirmed. The research results show that there is a connection between the taxpayer and the tax burden in the area of corporate income tax. The results indicate that there is a significant difference in tax burdens for different forms of organization (Sig. = 0.000). Therefore, a conclusion can be drawn that taxpayers can manage the level of the tax burden depending on the form of organization. By changing the form of the organization of the business entity, tax revenue can be reduced, which leads to the economic effects that adversely affect the economic development of the country.

Due to the limited transparency of the data, the paper analyzed the tax burden and the form of the organization of the first 100 companies on the list of the most successful by the net profit in the Republic of Serbia in 2018. Accordingly, the authors give recommendations for the further studies of the analyzed determinants on the examples of the other countries. The questions of the influence of the other elements of the definition of the taxpayer on the tax burden and tax income are open.

The analysis presented in the paper indicates the need for harmonization with international practice as an important basis for a positive business environment in the Republic of Serbia. Also, the analysis emphasizes the importance of implementing the taxpayer reform as an element of corporate income tax. The potential reform proposal should be aimed at defining the taxpayer and amending the laws regulating the registration of taxpayers. A relatively small number of papers in the professional literature

dealing with the corporate income tax element such as the taxpayer is a kind of limitation in conducting the research. The limitation of the conducted research is the insufficient transparency of the balance sheets of a sufficient number of companies, which on their part are necessary for the implementation of an appropriate empirical analysis. Also, a lack of data from the tax balances makes it impossible to examine the relationship between the income from corporate income tax and the other determinants of the taxpayer, which would provide a clearer picture of the relationship between these variables and their impact on income. Therefore, the results of the empirical research can be considered statistically significant, and the analysis is the basis for further research in this area. Finally, the authors believe that a more complete empirical investigation could provide a clearer picture of this element, which would certainly contribute to promoting the importance of this tax form.

ACKNOWLEDGEMENT

This work is the result of research that was financially supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Contract No. 451-03-68/2022-14/200371 and Contract No. 451-03-68/2022-14)

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Received on 16th May 2022,
after revision,
accepted for publication on 24th November 2022
Published online on 6th December 2022

Jadranka Djurovic Todorovic is a full professor at the Faculty of Economics, University of Niš, where she received her doctorate. He teaches the subjects Public Finance and Monetary Economy at the undergraduate level, Public Finance II and Monetary Economy II at the Master's level, and Financial Theory and Policy at the doctoral level. Her areas of scientific interest are public finance, monetary policy and economic development.

Marina Djordjevic is a full professor at the Faculty of Economics at the University of Niš, where she received her doctorate. He teaches the subjects Public Finances and Monetary Economics at undergraduate studies, Public Finances II and Monetary Economics II at Master's studies, and Theory and Politics at doctoral studies. Her areas of scientific interest are public finance, monetary policy and economic development.

Milica Ristic Cakic is a PhD student at the Faculty of Economics of the University of Niš. She is engaged, as a researcher, in the Innovation Center of the University of Niš and as an unemployed associate at the Faculty of Economics in Niš. Her areas of interest are public finance, fiscal policy and financial reporting.

Economic Horizons, September - December 2022, Volume 24, Number 3, 285 - 298
UDC: 33 ISSN: 1450-863 X

Review paper
UDC: 338.23:336.74
doi:10.5937/ekonhor2203297S

EFFECTS OF THE IMPLEMENTATION OF THE INFLATION TARGETING REGIME ON ECONOMIC GROWTH

Suzana Stevanovic[1], Ivan Milenkovic[2*] and Sladjana Paunovic[3]

[1]*University of East Sarajevo, Faculty of Business Economics in Bijeljina, Bosnia and Herzegovina*
[2]*University of Novi Sad, Faculty of Economics in Subotica, The Republic of Serbia*
[3]*University of East Sarajevo, Faculty of Economics in Pale, Bosnia and Herzegovina*

This research study is focused on the examination of the influence of the introduction and implementation of the monetary Inflation Targeting (IT) regime: the level of the inflation rate and the Gross Domestic Product (GDP) growth rate, as well as inflation and the GDP volatility. Conditional variance is calculated by fitting an empirical Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model to an annualized quarterly date for the period from 1993Q1 to 2020Q3, all in order to assess volatility. The results of the regression model showed that there was a positive statistical significance between the instability of inflation and the instability of the growth rate of the GDP in the three analyzed countries (namely in Albania, Turkey and the Republic of Serbia). The result of introducing the IT regime when the GDP growth rate volatility is concerned is statistically significant in Serbia and Turkey and led to reduction in the GDP volatility and stabilization. However, the applied regression model indicated that, in the case of Albania and Romania, the introduction of the IT regime did not have a statistically significant impact on the GDP growth rate volatility.

Keywords: inflation targeting, economic growth, GARCH, regression model

JEL Classification: C32, E47, O11, O42

INTRODUCTION

During the 1990s, major changes took place in the way the monetary policy was being conducted. In developed economies, numerous innovative ideas emerged. One of these ideas is the concept of the Inflation Targeting (IT) which was first established as the monetary policy regime in New Zealand in 1990. This concept then spread to Canada, the United Kingdom, Australia, and many other countries (Bernanke & Mishkin, 1997; Svensson, 1999). At first, the concept began to be applied only by developed countries, then later by developing and transition countries as well. S. Stevanović and I. Milenković (2020) highlight the positive effects of the IT as a monetary strategy on economic growth and financial

* *Correspondence to:* I. Milenkovic, Faculty of Economics in Subotica, University of Novi Sad, Segedinski put 9-11, 24000 Subotica, The Republic of Serbia;
e-mail: ivan.milenkovic@ef.uns.ac.rs

stability in Canada and New Zealand. During the analyzed period (2008-2017), the target (1-3%) was not achieved only in the period marked by the financial crisis of 2008-2011. The ultimate goal of the IT as a monetary strategy is to ensure price stability. This monetary policy regime implies that inflation rates are adjusted to a predefined target, which solves the problem of time inconsistencies in the monetary policy. The set monetary target is determined either in the target interval form or in the target value form. The target is most often presented as the Consumer Price Index (CPI) or certain variants of the same, with the exclusion of certain variables.

The implementation of the IT as a monetary strategy is complex and requires commitment from monetary policymakers in creating certain preconditions for its implementation. Therefore, the question of examining its effectiveness arises.

This article is aimed at assessing the effects of the application of the IT monetary regime in the Republic of Serbia, Turkey, Albania and Romania in the period from 1993 to 2020.

The National Bank of Serbia (NBS) adopted the IT regime at the beginning of 2009. The practice of the implementation of the aforementioned monetary policy strategy began in August 2006, based on the Memorandum on the New Monetary Policy Framework. The target inflation rate was determined based on annual changes in the CPI. The aim pursued by the NBS was not to undermine the stability of the financial system and the achievement of the target rate of inflation (NBS, 2008).

The Central Bank of Turkey (Türkiye Cumhuriyet Merkez Bankasi, TCMB) successfully implemented the disinflation process in the period from 2002 to 2005, so all the preconditions were created for the introduction of a new monetary regime, the so-called IT regime, in 2006. Intended to eliminate the consequences caused by the global crisis (2008), the TCMB revised its IT regime by introducing an asymmetric and broader range of multi-instrument corridors to the existing regime, as well as a flexible framework based on the active liquidity policy. Through this revision, the TCMB introduced an asymmetric and broader range of multi-instrument corridors to the current regime, as well as a flexible framework based on the active liquidity policy. The TCMB has been applying explicit full-fledged IT since 2021. The defined medium-term inflation target of 5% was retained (TCMB, 2022).

Following the period of the previous financial crisis, the Bank of Albania (BA) introduced a new monetary regime in order to target the inflation in 2009, after having targeted monetary aggregates. That year, it also submitted a request to join the European Union. In order to meet the inflation-related Maastricht criterion, the BA set the inflation rate at 3% with a ± 1% deviation. The inflation achieved in this range is considered to be supportive of price stability and economic growth. The preservation of price stability became the main goal of the monetary policy of the BA. Through low and stable inflation rates, it is possible to achieve long-term effects in the field of resource allocation in the economy and imitate financial stability (IMF, 2011).

A. Niculina and M. Catalina (2009) state that the Central Bank of Romania (NBR) has abandoned the monetary regime of the exchange rate targeting and has introduced direct IT. Analyzing broadly the monetary policy, takes into consideration the case of Romania, noticing that there are essentially two types of comments:

- The one in which the monetary policy was criticized for a too slow (too meagre and/or too late) increase in reference rates as compared to inflation, which largely was the case prior to the outbreak of the 2008 global financial crisis.
- The second type of comments referred to criticizing the overly slow reduction in the monetary policy rate, not taking into account the fact that several episodes of the abrupt fall in inflation were due to favorable supply-side shocks, which largely was the case after the global crisis had hit Romania, starting in the second part of 2008.

The impact of the introduction of the IT regime on the level of inflation rates, the level of the GDP growth rates, the inflation rate and GDP growth rate

volatility are examined in this paper. The main goal of the research study is to examine the impact of the introduction of IT on the economic growth of the selected countries.

The subject matter of the research is the examination of the effectiveness of IT and its impact on economic growth.

The research is aimed at examining the impact of IT as a monetary strategy on economic growth and a comparison of the results achieved between the selected developing countries.

The research is based on the following hypotheses:

H1: There is a positive impact of the inflation rate from the previous period on the current inflation rate movement.

H2: The IT regime had a positive impact on the GDP growth rate movement.

H3: Inflation volatility increases the uncertainty of the GDP growth rate.

H4: The IT regime decreases the GDP growth rate volatility.

Using the GARCH model, inflation volatility and the GDP volatility series were created. The analysis of the impact of the introduction of IT and inflation volatility on the GDP growth rate was carried out using a regression model. Quarterly data were used due to a larger number of observations. The analysis pertains to the period from 1993Q1 to 2020Q3 for Serbia, Turkey, Albania and Romania, which all introduced IT as a monetary strategy during 2009, 2006, 2009 and 2005, respectively.

The paper is interesting from the aspect of comparing the effects of the application of the monetary regime of IT in selected developing countries.

The paper is organized into four parts. First, a literature review is given. Second, the description of the variables and methodological research framework is presented. In the third part of the paper, the results of the econometric analysis are presented, and in the fourth part the concluding considerations are given.

LITERATURE REVIEW

Ever since the concept of IT and its impact on inflation volatility came to life as a monetary policy regime more than thirty years ago, it has been the subject matter of analysis made by numerous scientists.

In this part of the paper, a literature review prepared by the authors who were engaged in researching the impact of IT as a monetary strategy on inflation volatility and the GDP volatility is presented using one of the versions of the GARCH model.

A. Kontonikas (2004) used the GARCH-M model to examine the relationship between the previous inflation rate and inflation uncertainty in the United Kingdom using quarterly data for the period from 1972 to 2002. The results indicate that there is a positive statistical relationship between the previous inflation rate and the current inflation uncertainty. Adopting explicit IT eliminates inflation persistence and reduces long-term uncertainty.

The research study conducted by the authors N. Ç. Yavuz and B. Güriş (2004) was based on the GARCH model. They examined the impact of shocks on the GDP volatility in the long run and in the short run. They used quarterly data on a data sample from Turkey, and the period covered by the analysis was from 1987 to 2003. The results show that, although there were shocks in the analyzed period (economic and political events and the earthquake shock), they have no effect on the real GDP growth rate uncertainty in the long run, but they caused breaks in the short run instead.

J. E. Payne (2009) studied the influence of IT on inflation uncertainty in Thailand from 1965 to 2007 using the ARIMA-GARCH model and yearly data. The conclusions indicate that IT has an effect on reducing inflation volatility in the analyzed period from 2000 to 2007 and also that an increase in the inflation rate affects an increase in inflation uncertainty as well.

B. K. O. Tas (2012) analyzed the impact of IT on inflation uncertainty for the period from 1957 to 2008 by using the monthly data of six developed and 13 developing countries with the help of the PARCH

and GARCH models. The results show that a country applying IT as a monetary regime has significantly lower inflation variability after the introduction of this regime. The developing countries that have experienced hyperinflation periods benefit more from the introduction of IT. Also, the level of inflation and its volatility demonstrate the presence of a strong positive statistical relationship.

W. L. Kumo (2015) investigates the impact of IT as a monetary policy measure on economic growth in South Africa using the GARCH model. Its results show that the period preceding the introduction of this monetary policy measure (1960Q1-1998Q4) was characterized by high and more volatile inflation, which had a statistically relevant negative effect on the economy. The results of the analysis indicate that, during the period when the IT regime was being applied (2000Q1-2013Q3), inflation volatility did not have a statistically significant impact on economic growth in South Africa. The results of this research indicate that a low and stable growth of the general price level has been achieved in South Africa since 2000 with the adoption of the IT monetary regime, which on its part has created a stimulating environment for economic growth. W. L. Kumo (2015) proposes urgent structural reforms in order to ensure greater flexibility in the disinflation regime for achieving greater economic growth.

In their research study, the authors H. G. A. Valera, M. J. Holmes and G. M. Hassan (2017) analyzed the impact of the introduction of IT on the movement of the inflation level and its volatility. For the purpose of their analysis, they applied the Novel Panel GARCH model for the period from 1987 to 2013 on a sample of eight Asian countries. The results of this analysis indicate that the introduction of IT as a monetary strategy led to a reduction in the inflation level and its volatility in the case of the Philippines and South Korea.

S. Kyaw, T. Kyaw and C. Nimanussornkul (2016) used the ARIMA GARCH model to study the correlation between inflation volatility and economic growth in the Alliance of the Republic of Myanmar using the annual data from 1980 to 2014. The results indicate that there is a positive statistical relationship between inflation and inflation volatility. The findings show that higher and lower inflation has a negative impact on economic growth as measured by the GDP growth. There is also a long-term cause-and-effect relationship between inflation variables, dummy inflation, inflation volatility and economic growth.

Using the GARCH model and the Panel Vector Autoregressive (PVAR) technique, the authors S. T. Nene, D. I. Kehinde and S. Mashapa (2022) examined the volatility of inflation in order to determine the impact of IT on economic growth in the selected African and European countries. Their research confirms the advantages of the introduction of IT policy in the European countries in relation to the African countries, and as a potential explanation they conclude that the European countries have better economic conditions compared to the African countries. The authors S. T. Nene, D. I. Kehinde and S. Mashapa (2022) state that the effect of the IT monetary regime on inflation uncertainty and economic growth is different for the observed countries. Therefore, the monetary authorities should examine the state of the economy in more detail before introducing any regime or any new policy.

THE DESCRIPTION OF THE VARIABLES AND THE METHODOLOGICAL FRAMEWORK OF THE RESEARCH

This analysis examines:

- The impact of the inflation rate of the prior period on the current inflation rate movement.
- The impact of inflation volatility on the volatility (instability) of the GDP growth rate as the main indicator of economic growth.
- The impact of the introduction of IT on the GDP growth rate.

In order to generate a greater number of observations, this research study is based on quarterly data. The analysis period is the period from 1993Q1 to 2020Q3, for Serbia, Turkey, Albania and Romania, which all

introduced IT as a monetary strategy during the years 2009, 2006, 2009 and 2005, respectively.

The data used in the analysis were retrieved from the website of the International Monetary Fund's International Financial Statistics (IFS). The variables used in the research are shown in Table 1.

As the data on inflation and the GDP used in the paper are quarterly due to a larger number of observations, seasonal adjustment was performed using the Census X-11 method (McKenzie, 1984; Den Butter, Coenen & Van de Gevel, 1985) based on the principle of moving averages.

It is shown in the Table 2 that the descriptive measures for the inflation rate and the real GDP growth rate (the mean and the standard deviation) for Serbia, Turkey, Albania and Romania for the period from 1993Q1 to 2020Q3. In the analyzed countries, a cross-section of the period was made, indicating the period before and the period after the implementation of IT as a monetary strategy.

After the implementation of the monetary IT regime, it is clear that the analyzed countries faced lower average inflation rates and lower inflation volatility measured by the standard deviation, which is especially noticeable in Serbia, Romania and Turkey, the countries facing high inflation rates (periods of hyperinflation).

The volatility of the GDP growth rate decreased in all four analyzed countries after the introduction of inflation targeting, in particular this difference in the volatility of the GDP growth rate being applied in Albania and Serbia. In Serbia, the GDP growth rate fell after the introduction of the monetary strategy of IT in relation to the period before it. Also, in Turkey, a slight decline in the GDP growth rate is noticeable after the introduction of IT. Only in Albania is there a slight increase in the GDP growth rate from 2.820% before and 3.075% after the introduction of the mentioned monetary regime. Figure 1 shows the movement of the inflation rate and the real GDP growth rate in the period from 1993Q1 to 2020Q3 Serbia, Albania, Turkey and Romania.

High oscillations of inflation were observed in the first 30 observed quarters in Serbia, whereas the mentioned oscillations decreased after that. It can also be noticed that the trend of the real GDP rate had more oscillations in the first 30 observed quarters (until around the second quarter of 1997). The GDP rates expressed on a quarterly basis were negative, with the lowest negative GDP rate recorded in the

Table 1 The overview of the research variables

Variable	Abbreviation	Source
The quarterly growth rate of the gross domestic product	GDP	International Financial Statistics
The consumer price index	CPI	International Financial Statistics
Inflation	INF	Calculated from CPI - the quarterly growth rate
GDP volatility	GDP_VOL	Modeled by the GARCH model
Inflation volatility	INF_VOL	Modeled by the GARCH model
High inflation*	DHIGH	The dummy variable
Inflation targeting **	IT	The dummy variable

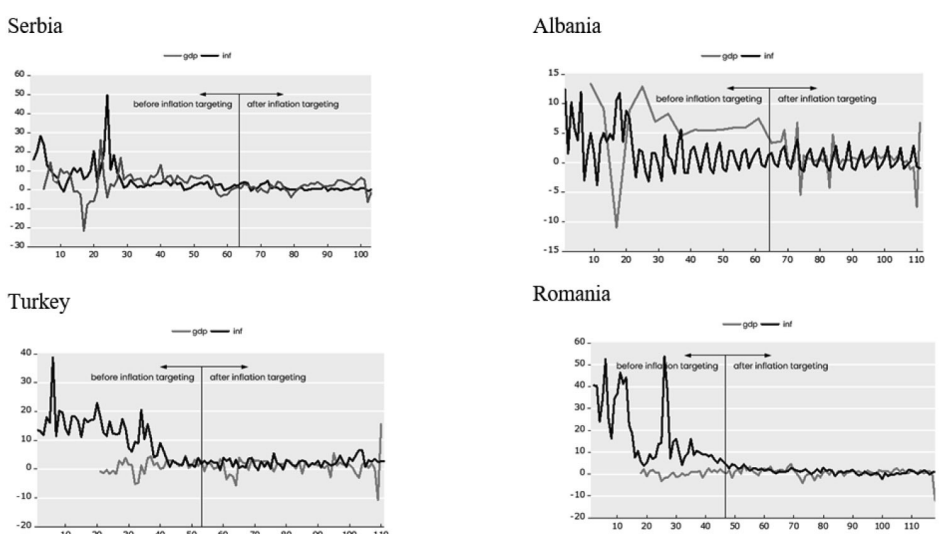
Note: * The dummy variable denoting high inflation (DHIGH) takes the value 1 when the inflation rate is over 10% and if it is lower than 10%, it takes the value 0. ** The dummy variable denoting the period of the implementation of the monetary regime of inflation targeting (IT) occupies the value 1, denoting the period after the introduction, and the value of 0 before the introduction of the said regime.

Source: Authors

Table 2 The descriptive statistics of the inflation rate and the GDP rate for the target countries

The total period of analysis				
Countries	The GDP growth rate		The inflation rate	
	Mean	Std.Dev	Mean	Std.Dev
Serbia	3.06	4.71	4.57	0.72
Turkey	4.61	4.59	5.85	0.59
Albania	2.92	7.94	1.1	0.26
Romania	1.95	5.61	4.16	0.71
The period before the introduction of the IT regime				
	The GDP growth rate		The inflation rate	
	Mean	Std.Dev	Mean	Std.Dev
Serbia	4.03	6.07	7.54	1.17
Turkey	4.61	5.06	10.03	0.96
Albania	2.82	10.28	1.68	0.46
Romania	20.23	6.55	9.39	1.53
The period after the introduction of the IT regime				
	The GDP growth rate		The inflation rate	
	Mean	Std.Dev	Mean	Std.Dev
Serbia	1.90	1.97	1.04	0.19
Turkey	4.59	4.12	2.34	0.21
Albania	3.08	1.71	0.52	0.21
Romania	3.67	4.01	0.97	0.12

Source: Authors



Notes: The X coordinate: the period in quarters; the Y coordinate: the percentage (%).

Figure 1 The movement of the inflation rate and the real GDP growth rate for the period from 1993Q1 to 2020Q3 in the selected countries

Source: Authors

first quarter of 1999 at -21.5%. The highest inflation rate in the analyzed period was recorded in the fourth quarter of 1993, amounting to 372.6%.

In Turkey in the analyzed period (1993Q1-2020Q3), there were high fluctuations in the inflation rate and low growth rates of the real GDP in the first 40 quarters. The maximum inflation rate in the second quarter of 1994 was over 38%. The stabilization of inflation is observed after the 40 quarters, the quarterly rate being in the range of about 1-3%. Mild fluctuations in the real GDP growth rate were recorded between the 60^{th} and 70^{th} quarters (the periods before and after the financial crisis) and larger oscillations were perceived at the end of the observed period (the period after the second financial crisis).

Albania passed through a large transition process which resulted in the high oscillations of inflation rates and especially the GDP rates. The mentioned categories of significant oscillations were especially present in the first 20 quarters of the analysis. After this period, there were still uniform oscillations of the inflation rate and uneven GDP rates. After the period of the first financial crisis, the Central Bank of Albania introduced a new monetary regime of inflation in 2009, having targeted monetary aggregates. The stabilization of the inflation rate has clearly been noticed since 2009, while the growth rate of the GDP is still characterized by unstable movement. Especially large GDP fluctuations are noticed at the end of the analyzed period (Q1, Q2, Q3, 2020).

The movement of the quarterly inflation rate and the real GDP rate was shown in the previous graph. There was a high oscillation of the inflation rate in the first 40 quarters, i.e. in the first 10 observed years. The real GDP growth rates of this period were also low. The growth rate of the GDP had mild oscillations during the observed period. The end of the analyzed period has a tendency to decline. Expressed in the CPI, inflation was confirmed in the first years of the analysis. In the first quarter of 1993, it was 34.51%, so in the first quarter of 1994 this rate increased to 44.29%. Until the second quarter of 1997, inflation was around 10% on average, so this rate rose to 53.86%. The stabilization of inflation has been evident since 1998, and quarterly inflation rates have fluctuated around 2% since 2005.

In order to investigate whether the introduction of the monetary strategy of IT leads to a reduction in inflation and GDP volatility, a regression model was used in this research. The regression model is applied for this purpose. The series of inflation and GDP volatility was determined on the basis of the GARCH model (Fang & Miller, 2009; Syed, Bushra, Christian & Nawazish, 2014). Prior to the evaluation of the GARCH model (Bollerslev, 1986; Engle, 2001), the stationarity of the series had been tested and the ARCH-LM test (Engle, 1982) had been conducted so as to assess the adequacy of the application of the GARCH model in modeling inflation volatility. Checking the stationarity of the inflation rate and the GDP series was performed using the following three tests: the Augmented Dickey-Fuller - ADF test, the Philips - Peron test and the KPSS test.

The results of the econometric analysis

The results of the GARCH (1,1) analysis

In order to model the inflation rate and the GDP rate series using the GARCH model, it is necessary to check whether the mentioned series are stationary or not. The verification of the stationarity of the analyzed series in the selected countries was performed using the following three tests: the Augmented Dickey-Fuller - ADF test, the Philips - Peron test and the KPSS test (Liew, Lau & Ling, 2005). The test results are accounted for in Table 3.

In the case where only the constant was used as a deterministic component, all the tests showed the series stationarity, except in the case of the Kwiatkowski-Philips-Schimdt-Shin test on the GDP series in Romania. When the trend is included in the deterministic component, only the Kwiatkowski-Philips-Schimdt-Shin test indicated the presence of the unit root in the case of the inflation rate series for Serbia and Romania, so that the final conclusion can be made that the series are stationary and they will be used as such in further analysis.

Table 3 The stationarity of the inflation rate and the GDP rate in the selected countries

Country	Variable	ADF test		Philips-Perron test		Kwiatkowski-Philips-Schimdt-Shin test	
		Constant, no trend	Constant, trend	Constant, no trend	Constant, trend	Constant, no trend	Constant, trend
Serbia	INF	-3.598*	-6.006*	-4.706*	-6.074*	0.906*	0.116
	GDP	-3.539*	-3.545**	-6.643*	-6.669*	0.481**	0.161**
Turkey	INF	-2.953**	-4.146***	-3.644*	-6.845*	0.915*	0.285*
	GDP	-11.332*	-11.320*	-11.549*	-11.547*	0.219**	0.129**
Albania	INF	-4.584*	-4.669*	-8.732*	-9.453*	0.722**	0.168**
	GDP	-3.157**	-3.654*	-3.975**	-4.396*	0.783*	0.256**
Romania	INF	-3.818*	-4.942*	-3.553*	-4.843*	1.102*	0.252
	GDP	-4.773*	-4.644*	-4.685*	-4.546*	0.115	0.156**

Notes: * statistical significance at 1%, ** statistical significance at 5%, and *** statistical significance at 10%

Source: Authors

Prior to evaluating the GARCH model, it is necessary to conduct the ARCH-LM test in order to assess the adequacy of the application of the GARCH model. The results of the ARCH-LM test are shown in Table 4.

Table 4 The ARCH-LM test results

	Serbia	Turkey	Albania	Romania
Inflation rate series				
F-test	20.531	27.560	8.389	19.346
P-value	0.000	0.000	0.005	0.000
GDP series				
F-test	49.842	57.596	29.319	33.459
P-value	0.000	0.000	0.000	0.000

Source: Authors

The ARCH-LM test confirmed the justification for modeling the inflation and GDP series in the selected countries using the GARCH model at a significance level of 1%.

The results of the GARCH (1,1) analysis for a series of inflation rates in the analyzed countries

In Table 5, the results of the GARCH (1,1) estimation of the model for the inflation rate series using the EViews econometric software are shown. The assessment was performed using the maximum likelihood method.

The obtained mean equation shows that the lagged value of the inflation rate is statistically significant at the level of 1% in the case of Serbia, Turkey and Romania. A conclusion can be drawn that there is a statistically significant positive impact of the inflation rate from the previous period on the movement of the current inflation rate, except in the case of Albania. So, in the case of Albania, the previous movement in the inflation rate did not have an impact on future movements. The results of the evaluation of the GARCH (1,1) model for the inflation in the observed period indicate the presence of GARCH effects in the time series.

Based on the GARCH model, the inflation volatility series were created. These series of inflation volatility in the selected countries are shown in Figure 2.

Table 5 The GARCH (1,1) model for the inflation rate series

Variables	Serbia	Turkey	Albania	Romania
Mean equation				
C	0.574*	0.951*	0.517*	0.448*
INF(-1)	0.571*	0.666*	0.051	0.622*
Equation of variance				
C	8.775*	-0.072***	0.051	0.159
RESID(-1)^2	0.950*	-0.055*	-0.108***	1.006*
GARCH(-1)	-0.113**	1.029*	1.087*	0.416*

Notes: * statistical significance at 1%, ** statistical significance at 5%, *** statistical significance at 10%

Source: Authors

Table 6 The GARCH model for the real GDP growth rate series

Variables	Serbia	Turkey	Albania	Romania
Mean equation				
C	0.924**	0.959*	0.037	0.317*
GDP(-1)	0.613*	0.232*	0.005*	0.324*
Equation of variance				
C	-1.071**	5.778*	-0.001	1.688**
RESID(-1)^2	0.519**	0.555*	2.937*	-0.200*
GARCH(-1)	1.053*	-0.402*	0.195*	0.588*
IT	-1.036**	-2.545**	0.0001	0.404*

Source: Authors

The results of the GARCH (1,1) analysis for the gross domestic product growth rate series in the analyzed countries

In the GARCH model, an additional regressor (the IT dummy variable) is included in order to determine the impact of IT on the movement of the GDP growth rate. Table 6 shows the GARCH model for the series of the real GDP growth rates in Serbia, Turkey, Albania and Romania.

In Serbia, Turkey and Romania, the presented model indicates the statistical significance of all parameters, so there is a statistically significant impact of both the ARCH and GARCH parameters, as well as the IT-regime-related dummy variables. In Albania, there are statistically significant parameters at the risk level of 1% with the ARCH and GARCH components, except for the parameter with the IT dummy variable, which is not statistically significant. It can be concluded that the introduction of inflation targeting had a negative impact on the GDP growth in the observed period in the cases of Serbia and Turkey. In the case of Romania, that impact was positive and statistically significant, whereas in case of Albania the model showed no statistically significant positive impact. Based on the GARCH model, the GDP volatility series was determined (Figure 3).

The influence of IT and inflation volatility on the GDP volatility - the results of the analysis

Table 7 below shows the stationarity of the inflation volatility and GDP volatility series, which is necessary in order to successfully analyze the impact of the introduction of IT as a monetary strategy and the impact of inflation volatility on the GDP volatility.

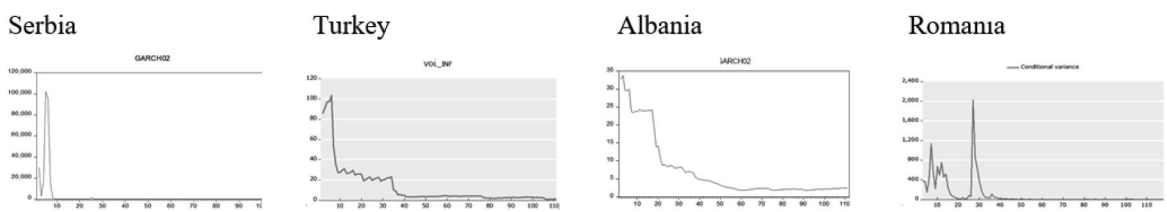


Figure 2 Inflation volatility in the selected countries in the period from 1993 to 2020

Source: Authors

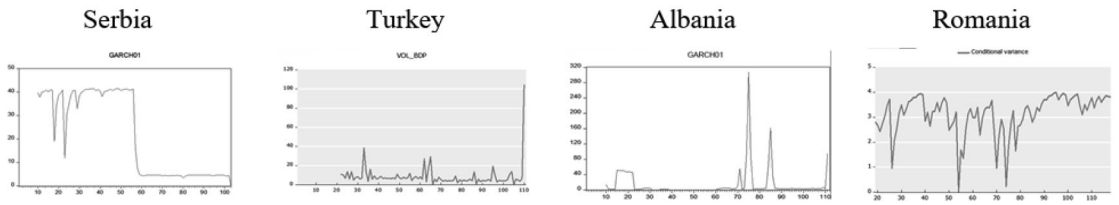


Figure 3 The GDP volatility in the selected countries in the period from 1993 to 2020

Source: Authors

According to the results of the stationarity tests, both series (INF_VOL, GDP_VOL) are stationary at the level in the selected countries.

Since it could be concluded after the stationarity tests that both series were stationary at the level, a further analysis of the impact of inflation volatility and the selected dummy variables (IT, DHIGH) on the GDP volatility could be performed using a regression model. The created regression model is shown in Table 8.

The diagnostic test shows that the residuals are not serially correlated. The residuals are homeoskedastic and normally distributed.

It can be concluded that, in Turkey and Serbia, all the parameters are statistically significant at the risk level of 1% and have an impact on the movement of the real GDP volatility, except for the DHIGH dummy variable that refers to high inflation in Turkey. Based on the presented regression model for Albania, a conclusion can be made that inflation volatility and the DHIGH

Table 7 The stationarity of the inflation volatility and GDP volatility series

Variable	Inflation volatility					
	At the level					
	ADF test		Philips-Perron test		Kwiatkowski-Philips-Schimdt-Shin test	
Inf. Vol.	Constant, no trend	Constant, trend	Constant, no trend	Constant, trend	Constant, no trend	Constant, Trend
Serbia	-5.153*	-5.367*	-5.214*	-5.387*	0.354***	0.139***
Turkey	-3.627*	-3.700**	-5.978*	-5.115*	0.470**	0.160**
Albania	-3.690*	-4.939*	-2.997**	-4.279*	0.833*	0.269*
Romania	-5.568*	-6.462*	-5.584*	-6.513*	0.785*	0.168**
Variable	GDP volatility					
	ADF test		Philips-Perron test		Kwiatkowski-Philips-Schimdt-Shin test	
GDP Vol.	Constant, no trend	Constant, trend	Constant, no trend	Constant, trend	Constant, no trend	Constant, Trend
	At level					
Serbia	-3,517*	-4,011*	-3,598*	-4,146*	0,576***	0,156**
Turkey	-4.961*	-5.110*	-5.099*	-4.949*	0.392***	0.153**
Albania	-6.085*	-6.059*	-5.778*	-5.754*	0.147**	0.166**
Romania	-5.109*	-5.413*	-4.957*	-5.305*	0.361***	0.152**

Notes: * statistical significance at 1%, ** statistical significance at 5%, *** statistical significance at 10%

Source: Authors

Table 8 The regression model - the influence of IT and inflation volatility on the GDP volatility

Variables	Coefficient (Standard error)			
	Serbia	Turkey	Albania	Romania
C	20.113* (4.775)	7.921* (2.852)	5.258 (9.591)	5.183* (0.185)
INF_VOL	0.139* (0.024)	0.766* (0.241)	0.781* (0.247)	-0.001 (0.000)
IT	-14.135** (6.466)	-5.929* (1.943)	-4.163 (12.996)	0.019 (0.290)
DHIGH	60.965* (9.574)	-4.495 (5.637)	100.444* (33.023)	0.569 (0.569)
R^2	0.610	0.355	0.203	0.017
F-test	51.243	9.958	8.987	0.554
P-value	0.000	0.000	0.000	0.646

Diagnostic test	Serbia	Turkey	Albania	Romania
Breusche-Goldfrey serial correlation LM test (p value)	0.859874 (0.256641)	0.256447 (0.7744)	3.54678 (0.165548)	0.957456 (0.21897)
Breusch-Pagan-Godfrey Heteroskedasticity Test	0.425655 (0.745632)	0.310435 (0.8178)	0.715399 (0.5451)	0.296901 (0.8278)
Jarque-Bera Normality test	3.987882 (0.137526)	3.145567 (0.15455)	0.491071 (0.782288)	1.596474 (0.45678)

Notes: * Statistical significance at 1% ** Statistical significance at 5%

Source: Authors

dummy variable have a statistically significant impact on the movement of the real GDP volatility. In the case of Romania, the model did not prove to be statistically significant, and the observed variables do not have a statistically significant impact on the GDP volatility.

CONCLUSION

The GARCH model was used in the paper in order to find the effect of the previous inflation rate on the current inflation rate. It can be concluded that H1 reading that there is a positive impact of the inflation rate from the previous period on the movement of the current inflation rate in Serbia, Turkey and Romania cannot be rejected. On the other hand, this hypothesis is rejected in the case of Albania. The descriptive statistics of the inflation rate and the GDP rate before and after the introduction of IT show that the analyzed countries faced lower average inflation rates and lower inflation volatility. J. E. Payne (2009) has also come to similar results using the ARIMA-GARCH model in Thailand for the period from 1965 to 2007 and B. K. O. Tas (2012) for the period from 1957 to 2008, using the PARCH and GARCH models on the monthly data of six developed and 13 developing countries.

In order to examine the hypothesis that the introduction of the monetary strategy of IT had a

positive effect on the movement of the GDP growth rate, the IT dummy variable (indicating the period of the application of IT) was added to the GARCH model as an additional regressor.

Our findings reveal that, in the case of Serbia and Turkey, the implementation of IT had a negative and statistically significant impact on the GDP growth during the period under observation, a positive statistically significant result in the case of Romania, whereas in the case of Albania, the model showed a positive, but not statistically significant influence. It follows that, in the case of Albania, Serbia and Turkey, the hypothesis H2 reading that the introduction of the IT regime has a positive impact on the movement of the GDP growth rate is rejected, whereas in the case of Romania the given hypothesis cannot be rejected.

Based on the results obtained using the regression model, it can be concluded that the hypothesis H3 reading that inflation volatility had a positive impact on the GDP growth rate volatility cannot be rejected in the case of Serbia, Turkey and Albania. In the case of Romania, however, inflation volatility had a negative impact on the growth rate volatility. Yet, this impact is not statistically significant. On a sample in South Africa, W. L. Kumo (2015) also came to the conclusion that inflation volatility did not have a statistically significant impact on real economic growth. The authors differently interpret how inflation volatility affects economic growth. In this context, M. Friedman (1977) states that inflation volatility has the potential to lead to a reduction in economic growth. Thus, inflation volatility can have a negative impact on economic growth.

In order to test the H4 hypothesis reading that the introduction of the IT regime affects a reduction in the GDP growth rate volatility in Serbia, Turkey, Albania and Romania for the period from 1993 to 2020, the regression model was applied by each country individually. The results of the analysis in Serbia indicate that the introduction of the monetary regime of IT (2009) has a negative impact on the GDP volatility. It is clear that the DHIGH dummy variable has a positive impact on the growth rate of the real GDP and its volatility, and the IT dummy variable has a negative impact. The results of the analysis in Turkey indicate that inflation volatility and the IT dummy variable have an impact on the movement of the real GDP growth rate volatility. In Albania, the results of the analysis indicate that inflation volatility and the DHIGH dummy variable are statistically significant for the movement of the real GDP volatility. The IT dummy variable IT has a negative but not statistically significant influence on the GDP volatility movement and its stabilization, whereas the variable indicating high inflation is statistically significant for the movement of the GDP volatility. Also, in the case of Romania, the observed variables have no statistically significant impact on the movement of the GDP volatility.

Since its inception, the IT regime has shown a statistically significant negative influence on the movement of the GDP growth rate in the case in Serbia and Turkey, so the hypothesis H4 cannot be rejected in the case of these two countries. The statistics show that, in Albania, where the IT regime was introduced in that period, the GDP still has unstable movement, whereas in Romania, it had the tendency to grow during the analyzed period. Certainly, as one of the reasons for different influences, the strategy for Serbia, Romania, Turkey and Albania can indicate various economic conditions, which is also pointed to in the research studies by S. T. Nene, D. I. Kehinde and S. Mashapa (2022). The results of this study show that there are different influences of the IT regime in terms of its influence on the GDP growth rate that are in line with the results obtained by S. T. Nene, D. I. Kehinde and S. Mashapa (2022) in their research done in the selected European and African countries.

This research study confirms the fact that the introduction of the IT monetary regime contributes to the reduction of inflation volatility and the volatility of the GDP growth rates, which ultimately leads to higher economic growth. However, the effects of IT as a monetary regime are different in the selected developing countries. One of the reasons for that lies in the fact that the positive effects of the mentioned monetary strategy are more obvious when the same is applied for a longer period of time. In order for the IT monetary regime to be successful, it is necessary that

all the preconditions for its implementation should be met. One of the limitations of this research study reflects in the fact that the period of the application of the mentioned regime in the analyzed countries is quite short.

The directions for further research are aimed at comparing the achieved economic performance of the countries that apply the monetary regime of IT (targetars) and the countries that apply other alternative monetary regimes (non-targetars). Also, future research will be directed towards comparing this regime in developing countries with that in developed countries, which will further examine the effectiveness of applying IT as a monetary strategy as opposed to the central bank's other monetary policy strategies.

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Received on 27th May 2022,
after revision,
accepted for publication on 24th November 2022
Published online on 6th December 2022

Suzana Stevanovic her scientific field is Business Finance. She currently is a Ph.D. student at the Faculty of Economics in Subotica, University of Novi Sad, final year. Works at the Faculty of Business Economics in Bijeljina, University of East Sarajevo, as a Senior Teaching Assistant.

Ivan Milenkovic is a Full Professor at the University of Novi Sad, Faculty of Economics in Subotica. His fields of interests are International Finance, Monetary Economics, Public Finance and Financial Markets.

Sladjana Paunovic is an Assistant Professor at the Department of Quantitative Economics at the Faculty of Economics in Pale, University of East Sarajevo. She teaches the courses Quantitative Economic Models and Methods and Econometrics. Fields of interest are Operations Research and Econometrics.

Economic Horizons, September - December 2022, Volume 24, Number 3, 299 - 312
UDC: 33 ISSN: 1450-863 X

Review paper
UDC: 004.738.5:631.147:339.13
doi:10.5937/ekonhor2203313K

THE INFLUENCE OF WEBSITE QUALITY ON COGNITIVE AND AFFECTIVE ATTITUDES TOWARDS ORGANIC FOOD

Milan Kocic, Srdjan Sapic and Katarina Sofronijevic*

University of Kragujevac, Faculty of Economics, Kragujevac, The Republic of Serbia

Using websites for commercial purposes has been noticeable in numerous areas in recent years, including the organic food market, among others. The era of digitalization has implied that an increasing number of consumers form their views on organic food based on information that is marketed via websites, instead of going to traditional stores. In accordance with that, the aim of the paper is to examine whether the quality of a website, measured by its usability, design and the quality of information, affects consumers' cognitive and affective attitudes towards organic products. In this paper, exploratory factor analysis is carried out along with multiple regression analysis. The research results indicate that, in the organic food sector, it is very important to have a website which is both usable and visually appealing, simultaneously containing quality and updated information, which all can greatly influence the formation of users' attitudes towards organic food, their attitudes being made of the rational emotional dimensions as well. The contribution of this research study is particularly significant bearing in mind the fact that attitudes towards organic food are mostly examined in a traditional environment, not so much in an online environment.

Keywords: website, organic food, cognitive attitudes, affective attitudes

JEL Classification: M31

INTRODUCTION

Bearing in mind the fact that modern consumers are spending more and more time on the internet (Lee, Hong & Lee, 2017), manufacturers and entrepreneurs are striving to find out how the presentation of their content using this communication method can create new business opportunities. In that sense, using websites for commercial purposes is listed as one of the fields of extreme importance. The interaction between consumers and business entities is quite often performed via websites, which are increasingly being assigned the attribute of being the key means of communication (Kim & Stoel, 2004). Since the nature of an online environment is specific in that products can neither be physically touched nor seen (Lee *et al*, 2017), websites increase consumers' impressions on the current offer.

There are almost no areas of business in which at least one part of the business strategy is not based

* *Correspondence to:* K. Sofronijevic, University of Kragujevac, Faculty of Economics, Liceja Knezevine Srbije 3, 34000 Kragujevac, The Republic of Serbia;
e-mail: kradakovic@kg.ac.rs

on a high-quality website (Aladwani & Palvia, 2002), the production and sale of organic food being one of them. When searching for the products that are healthier but also better for the environment (Chen, 2009), consumers are increasingly beginning to give precedence to organic products in their choice of food. Because it is seen as one of the sources of health, as well as a way to decrease the activities that are harmful to the environment, the organic food market is increasingly experiencing a tendency to grow. Moreover, the current pandemic situation and the development of online trade as well additionally contribute to the fact that organic food is increasingly being purchased through online channels (Ćirić, Ilić, Ignjatijević & Brkanlić, 2020).

Considering the limited nature of the offer and a lack of time, the purchase of organic products is often done using the websites of specialized stores (Hasanov & Khalid, 2015). In this field, the consumer has numerous alternatives to choose from (Sapic, Filipovic & Dlacic, 2019). Considering the fact that organic food consumers need more thorough pieces of information compared to the consumers of traditional products when shopping online (Lee & Yun, 2015), it is the responsibility of the website creators to solve all doubts and enable a comfortable purchase by using this communication form.

Unlike the previous research that mostly puts an emphasis on the motives for buying organic products regardless of whether they are bought in an online environment or in an offline one, what makes this research specific is that it follows modern demands for website-based shopping. The subject matter of the research study is to examine the interdependence between the quality of the website and the attitudes towards organic food, the attitudes being made up of cognitive and affective components. In accordance with that, the goal of the research is to examine whether website quality, measured by its usability, design and the quality of the information presented on the website, affects consumers' attitudes or not.

In accordance with the determined research study subject matter and objectives, appropriate qualitative and quantitative methodologies were used. Within the framework of the qualitative methodology, systemic thinking was applied in order to examine the relationship between the quality dimensions of the website and users' attitudes towards organic food. Afterwards, in order to reach relevant conclusions regarding the observed variables, the analysis of the content of numerous theoretical and empirical publications was carried out. In addition to this, the comparative method was used as well so as to identify the similarities and differences in the influence that the website quality dimension has on cognitive and affective attitudes towards organic food. The quantitative methodology implies the implementation of the statistical method. Thus, a questionnaire was used as the data collection instrument. As for statistical analyses, exploratory factor analysis and multiple regression analysis were made.

Even though the research stresses the role of websites in the creation of consumers' attitudes (Bilgihan & Bujisic, 2015), breaking down the attitude dimensions into the cognitive and affective components is the way to observe this problem in the field of organic food that has not been analyzed sufficiently. Bearing in mind the fact that psychological concepts are increasingly being applied in the context of marketing research, it is not surprising that consumer behavior with the inclusion of the affective component has been transferred from predominantly applied psychological studies (Alcántara-Pilar, Blanco-Encomienda, Armenski & Barrio- García, 2018a) to the field of consumer behavior. By studiously examining the relevant literature, several papers whose research subject focuses on the affective component of consumer behavior have been identified (Alcántara-Pilar *et al*, 2018a). Still, the researchers' intention is to encompass both the cognitive and the affective dimensions by applying an integrative approach and examine their relationship with website characteristics.

In the first place, the paper gives an overview of the theoretical concepts in accordance with the current literature. Then, the conceptual bases of organic food, the quality of the website and its constituent dimensions are highlighted. Following the research model, the defined hypotheses are defined. Finally,

after elaborating the results, the key contributions of the research study are summarized, and certain limitations and future directions of the research framework are presented in the conclusion.

LITERATURE REVIEW

Organic food

As relatively new products in the market (Chen, Lobo & Rajendran, 2014) and as one of the fastest-growing segments in the food field (Thøgersen, Pedersen, Paternoga, Schwendel & Aschemann-Witzel, 2017), organic products are increasingly becoming the consumer's choice. The organic food market is rapidly increasing (Çabuk, Tanrikulu & Gelibolu, 2014; Thøgersen *et al*, 2017; Rodríguez-Bermúdez, Miranda, Orjales, Ginzo-Villamayor, Al-Soufi & López-Alonso, 2020). The pronounced awareness of the negative impact and use of chemicals in food production leads to a more intensive search for a healthier lifestyle. Organic food contains fewer additives and chemicals (Chen, 2009), is based on renewable energy resources and excludes the use of synthetic fibers and pesticides (Ashraf, Joarder & Ratan, 2019). This is the reason why organic food is often labeled bearing the words such as "healthy", "fresh" or "clean" (Chan, 2001). The most common motives for choosing organic food are primarily caring for one's health (Chen, 2009; Hamzaoui Essoussi & Zahaf, 2009; Çabuk *et al*, 2014; Chen *et al*, 2014; Basha, Mason, Shamsudin, Hussain & Salem, 2015; Thøgersen, Dutra de Barcellos, Gattermann Perin & Zhou, 2015) and the environment (Çabuk *et al*, 2014; Chen *et al*, 2014). Using organic food is still in the initial stage on the Republic of Serbia's market, mostly because of the high prices of organic products (Grubor, Djokic, Djokic & Kovac-Znidersic, 2015; Ćirić *et al*, 2020). However, demand for these products has increased in the past few years.

Many studies point to the differentiation of the factors that affect consumers' attitudes towards organic food (Chen, 2009; Basha *et al*, 2015; Rodríguez-Bermúdez *et al*, 2020). In the largest number of those studies, the dominant factors which determine attitudes towards organic food are health and taking care of the environment (Chen, 2009). When the intention to buy organic food is concerned, it is determined by numerous factors. M. B. Basha and D. Lal (2019) claim that these factors are taking care of the environment, health, product quality, support for local producers, safety and trust, and subjective norms. However, with the recent intensive development of the Internet and the Internet-based technologies, there are other factors which can be pointed out specific to the online environment which can influence attitudes towards and a choice of organic food (Hasanov & Khalid, 2015; Ćirić, Ignjatijević, Ilić, Puvača & Brkanlić, 2021). Thus, for example, M. Ćirić *et al* (2021) take into consideration the characteristics of the website when examining the online purchase of organic food.

It is also important to emphasize the fact that the development of online trade enables new sales opportunities for numerous products, including those of the organic origin (Yue, Liu & Wei, 2017; Tariq, Wang, Tanveer, Akram & Akram, 2019; Ćirić *et al*, 2020). The current pandemic situation has additionally influenced the fact that organic food consumers avoid shopping in the stores themselves, relying on online shopping instead (Ćirić *et al*, 2020; Lin, Li & Guo, 2021; Ćirić *et al*, 2021), which additionally justifies the choice of the research concept model used in this paper. One of the studies conducted in the territory of the Republic of Serbia showed that the pandemic had resulted in an increase in the percentage of the consumers who buy organic food online (Ćirić *et al*, 2020).

In the last few years, the development of the Internet and online sales channels has contributed to the fact that, in numerous areas, the website is used as one of the dominant means for informing consumers and carrying out transactions (Tariq *et al*, 2019). When marketing information about organic food, the website plays a crucial role (Tariq *et al*, 2019). The authors indicated that the quality of the website in the field of organic food is particularly significant (Hasanov & Khalid, 2015; Fernández-Uclés, Bernal-Jurado, Mozas-Moral & Medina-Viruel, 2019). This statement is confirmed by the fact that websites are particularly

attractive in the sectors such as organic food where frequently there are commercial obstacles implying a lack of sales points, which further promotes online shopping (Fernández-Uclés *et al*, 2019). In their study explaining the choice of food during the growth and development of online trade, O. Wang, S. Somogyi and S. Charlebois (2020) mention that the quality of the website was not explained as an important factor in the study of consumer attitudes, which was one of the potential limitations of the study. A. Tariq *et al* (2019) confirmed that the quality of the website has a moderating influence when observing the relationship between consumers' attitudes towards and their buying behavior when purchasing organic food. Website quality has both a direct and positive influence on the intention to purchase organic food (Hasanov & Khalid, 2015). However, there is a gap in the literature with respect to a lack of papers, which indicates the direct influence of website quality when forming organic food consumers' attitudes in the territory of the Republic of Serbia.

Website quality

As an effective marketing resource (Hwang, Yoon & Park, 2011), the website and its quality are exposed to constant evaluation (Ahn, Ryu & Han, 2007; Chen, Huang & Davison, 2017). As a multidimensional construct (Kim & Stoel, 2004), website quality is defined as "a user's evaluation of a website which meets the user's needs and shows the overall characteristics of the website" (Aladwani & Palvia, 2002). As "a portal through which transactions are realized" (Ahn *et al*, 2007), the website is applicable in numerous fields, the organic food field being increasingly present there. In accordance with the results of the previous research studies that confirm the claim that website quality is an exceptionally important factor in defining consumers' attitudes (Tariq *et al*, 2019) and, consequently, their current behavior (Alcántara-Pilar *et al*, 2018a), the intention is to identify whether the given relationships can be confirmed in the organic food field as well or not.

The study of the basic components of the website characteristics in various research approaches encompasses numerous dimensions. For example, when studying satisfaction and the purchase intention as the two main determinants of website quality, B. Bai, R. Law and I. Wen (2008) list its functionality and usability. There are authors who analyze website quality through the following variables: website usability, design, information quality, trust, perceived risk and empathy (Mohd Sam & Hayati Tahir, 2009). As the key two variables that show website quality, E. Huizingh (2000) also lists content and website design.

When studying the role of websites in the context of analyzing the organic food market, D. Fernández-Uclés *et al* (2019) state that the website is precisely the key means of establishing a relationship with consumers, considering the fact that it combines the informative, relational and transactional functions. In a similar manner, the website is listed as an attractive sales channel in the organic food sector (Fernández-Uclés *et al*, 2019). Even though website quality is included in many research models, there is no standardized model possible to apply (Martinez-Sala, Monserrat-Gauchi & Alemany-Martinez, 2020), especially so in the organic food examination context. The choice of the variables that will be used is based on a review of previous research and a comprehensive approach to examining the factors deemed to be important in the given field accordingly.

Website usability

Many authors agree that one of the key aspects of website quality is its usability (Belanche, Casaló & Guinalíu, 2012; Martinez-Sala *et al*, 2020). This term normally implies the ease of use of a website, which significantly facilitates the end consumer's searching and decision-making process. In the modern business environment, consumers represent the "essential input" in the marketing strategy formulation and implementation process (Maričić, 2011, 47), which is the reason why meeting their desires and needs is listed as a priority for almost all business activities. Recognizing their affinities and needs is precisely what enables an increase in the perceived usability in an online environment and the website, as one of the mediators between companies and consumers,

enables a better user experience (Alcántara-Pilar *et al*, 2018a). In the website context, such perceived usability primarily reflects in the ease of use of the website (Alcántara-Pilar *et al*, 2018a). D. Belanche *et al* (2012) state that the greater the usability of a website, the more positive consumers' attitudes. In their empirical study, N. Chung, H. Lee, J. S. Lee and C. Koo (2015) confirmed that website usability was an important antecedent of consumer attitudes and, consequently, of their concrete actual behavior. In their study, J. M. Alcántara-Pilar, F. J. Blanco-Encomienda, M. E. Rodruguez Lopez and S. Del Barrio-García (2018b) pointed out the fact that website usability had a statistically significant and positive impact on the user's attitudes, which is why the paper generates the following hypothesis:

H1: Website usability has a positive and statistically significant influence on organic food consumers' a) cognitive and b) affective attitudes.

Website design

When examining website characteristics, design is listed as one of the key variables which determine what the consumer's decision will be (Zhou, Lu & Wang, 2009; Bufquin, Park, Back, Nutta & Zhang, 2020). Since consumer behavior is a very complex research area, marketing experts strive to identify the key variables that define the decision-making process. The aspects of website design contribute to users' experience (Bufquin *et al*, 2020) and they are mostly associated with aesthetic characteristics such as images, colors, graphic elements, a font, videos, and other similar things (Luna-Nevarez & Hyman, 2012). In accordance with the results obtained in previous research studies, website design may be connected to consumer behavior (Jones & Kim, 2010). M. Ćirić *et al* (2021) examined the online purchase of organic food and stated that design and aesthetic components were one of the website characteristics that can be brought into connection with consumer behavior. Website design can have numerous cognitive and motivational effects on consumer behavior in online shopping, and its connection with consumers' attitudes towards organic food has been confirmed as such (Tariq *et al*, 2019). This is the reason why the paper generates the following hypothesis:

H2: Website design has a positive and statistically significant influence on organic food consumers' a) cognitive and b) affective attitudes.

Information quality

The specific nature of the organic products not bought in a traditional way requires that the online seller should adequately present all the characteristics of his products, together with visual support and a detailed description. When elaborating on the characteristics of websites, many authors list information quality as an integral variable (Cao, Zhang & Seydel, 2005; Chen *et al*, 2017). In the relevant sources that explain website quality and its connection with consumers, promoting the significance of information quality is described as "content is king" (Huizingh, 2000). Information quality on a website is "extremely significant" (Cao *et al*, 2005), which is the reason why this variable represents an integral component of the research framework examining organic food consumers' attitudes. When speaking about information quality in the website context, authors mostly point out authenticity and relevance (Cao *et al*, 2005), i.e. it is of vital importance for potential organic food consumers that the information should be clear, up-to-date and reliable (Chen *et al*, 2014). In accordance with the previous results, the paper generates the following hypothesis:

H3: Information quality on a website has a positive and statistically significant influence on organic food consumers' a) cognitive and b) affective attitudes.

Attitudes towards organic food

The study of the attitudes towards organic food has been the focus of an increasing number of authors (Chen, 2009; Chen *et al*, 2014; Basha & Lal, 2019; Tariq *et al*, 2019; Rodríguez-Bermúdez *et al*, 2020). In order to examine the organic-food-related specifics, attitudes are one of the essential variables (Thøgersen *et al*, 2015). One of the earliest definitions reads "attitudes

imply positive or negative feelings that a person might have about a target behaviour" (Fishbein & Ajzen, 1975, 216). In this paper, attitudes are understood as being made of cognitive and affective components. While the cognitive component deals with costs, i.e. benefits (Chen, Phelan & Chang, 2016), the affective dimension of attitudes refers to the positive or negative feelings that a consumer might form in relation to a specific stimulant (Hwang *et al*, 2011). Cognitive attitudes relate to the extent to which individuals like or dislike an object usually based on its usability or functionality (Moon, Khalid, Awan, Attiq, Rasool & Kiran, 2017). Affective attitudes, on the other hand, are growingly associated with psychological research (Dai, Arnulf, Iao, Wan & Dai, 2019) and related to the emotional experience arising from using an object (Moon *et al*, 2017). When observed in the organic food context, cognitive attitudes can, for example, refer to what benefits the use of organic products provides, whereas the affective dimension concerns the fact that the use of organic food affects the sensory senses and provides satisfaction for consumers (Lee & Yun, 2015).

Research ambitions go one step further, so they move from the classical environment to the online one (Park, Stoel & Lennon, 2008) in order to determine how consumers' attitudes towards a website are formed (Lee *et al*, 2017). In the same way that marketing stimulants can affect consumers by cognitive and affective processes in the traditional environment (Hwang *et al*, 2011), the same logic can be applied when the online environment is concerned. Previous research has confirmed the fact that online shopping attitudes contain an explicit cognitive component and an implicit affective component (Dai *et al*, 2019). After examining the attributes of websites which can influence online shopping attitudes, M. A. Moon *et al* (2017) also emphasize the importance of the specific examination of the cognitive and affective components of an attitude. Bearing in mind the fact that consideration between the alternatives is characterized by the cognitive thought process (Chen, Phelan & Chang, 2016), all the information that might facilitate that process when choosing organic food should be clearly defined via the website. Also, it has been determined that the evaluation, purchase and consumption processes are characterized by certain emotions as well (Chen *et al*, 2016), so affective attitudes are studied in that context (Park *et al*, 2008).

H. J. Lee and Z. S. Yun (2015) state, most papers analyze attitudes as a one-dimensional concept, whereas the breaking down of attitudes into the cognitive and affective components in the organic food field is noticed in significantly fewer papers (Dean, Raats & Shepherd, 2008). A two-dimensional approach to examining organic food consumers' attitudes towards website quality is a novelty, especially in the territory of the Republic of Serbia.

RESEARCH METHODOLOGY

In order to collect data, the survey method was applied as one of the methods most commonly used in similar types of research. Bearing in mind the fact that organic food sale is still in the development phase in the territory of the Republic of Serbia, the survey included only those respondents who had previously stated that they had purchased organic products via a website as it was the case in similar studies (Tariq *et al*, 2019). There are only a few organic online stores in Serbia. So, after connecting with those stores, the data collection process was easier to perform. In order to test the previously defined hypotheses, the data were obtained by distributing the questionnaire in person and via the Internet. The research was conducted in the territories of Belgrade and Kragujevac in the period from September to December 2021. A total of 140 questionnaires were ultimately collected through the survey. A seven-point Likert scale was applied as one of the most frequently used in the papers dealing with this issue (Sapic, 2017; Tariq *et al*, 2019). The variables used for the research model were measured by the findings having been taken from the relevant studies for the purposes of the research study. Website quality was measured based on the three variables: website usability, website design and information quality. Thus, the findings on website usability were taken from the studies by D. Belanche *et al* (2012) and Alcántara-Pilar *et al* (2018b). Website design was measured based on the findings retrieved from a study conducted by V. H. Le, H. T. T. Nguyen, N. Nguyen and S. Pervan (2020). Information

quality was measured based on the three statements taken from the studies by X. Chen *et al* (2017) for the purposes of the research. When consumer attitudes towards organic food are concerned, the cognitive and affective components were measured through the findings taken from the research studies conducted by H. J. Lee and Z. S. Yun (2015) and M. A. Moon *et al* (2017).

In order to test the hypotheses for the purpose of the research study, statistical processing and data analysis were performed by using the SPSS (The Statistical Package for the Social Sciences-SPSS, version 21) software package. As for the statistical analyses, descriptive statistics were used at the beginning of the research, only to be followed by exploratory factor analysis and multiple regression analysis. The defined variables and the stated relationships between them are presented by a conceptual research model (Figure 1).

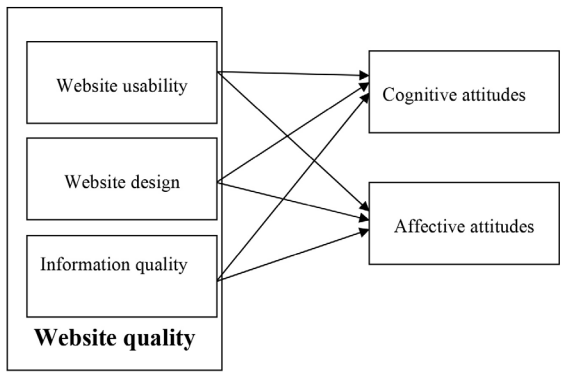

Figure 1 The conceptual research model

Source: Authors

RESEARCH RESULTS

In order to group the statements from the questionnaire into factors, exploratory factor analysis was applied in this paper, which allowed for the extraction of the three factors (website usability, design and information quality), and principal components analysis was used as the factor extraction method. In accordance with the relevant literature, the Bartlett sphericity test and the Kaiser-Meyer Olkinov-KMO sample adequacy index were taken into account (Table 1). The value of the KMO indicator is 0.803, which is significantly above the recommended limit value

Table 1 The results of exploratory factor analysis

Website usability	Factor loadings	Cronbach alpha	AM	SD
Website usability		0.815		
Organic food websites are easy to understand.	0.602		6.11	0.707
Organic food websites are easy to use, even when they are used for the first time.	0.749		6.19	0.719
It is easy to find the necessary information on organic food websites.	0.899		6.18	0.649
The structure of the website organic-food-related content is easy to understand.	0.814		6.12	0.640
Website design		0.771		
Organic food websites are visually appealing.	0.752		5.09	0.645
Organic food websites efficiently use colors.	0.757		4.85	0.656
Organic food websites have the right font.	0.792		4.82	0.692
Organic food websites contain impressive images and materials.	0.758		4.94	0.648
Information quality		0.757		
Organic food websites contain relevant information.	0.759		6.06	0.648
Organic food websites contain a sufficient amount of information.	0.920		6.14	0.626
Organic food websites contain true information.	0.601		6.11	0.675
Bartlett sphericity test		0.000		
KMO		0.803		

Source: Authors

0.5 (Janković-Milić & Jovanović, 2019). The Bartlett sphericity test has a statistically significant value (Sig = 0.000), which shows that there is a statistically significant correlation between the original variables and that the application of factor analysis is justified.

In the initial research phase, the values of the descriptive statistics for the original variables are presented (Table 1). The value of the Cronbach alpha coefficient is shown in order to examine whether the factors that reflect website quality have an appropriate level of internal consistency or not, i.e. whether the items that make up the factors represent reliable scales or not. Its value above the acceptable value 0.7 (Nunnally, 1978) indicates that the variables are reliable, i.e. the statements used to measure them are internally consistent. Table 1 shows the obtained factors, the values of the factor loadings in each factor, as well as the value of the Cronbach alpha coefficient.

Factor isolation was performed by using the oblimin rotation, thus achieving a simple factor structure. Only those statements where the absolute factor weight value was above 0.5 were kept, whereas the others were deleted, as in similar studies (Chen *et al*, 2014). The first factor refers to website usability, the second factor involves website design, while the third factor relates to information quality on the website. Also, it is important to point out the fact that those factors whose characteristic value was greater than 1 were also retained (Kim & Stoel, 2004). The total percentage of the variability explained by these three factors is 65.19%, which is above the recommended value 60% (Janković-Milić & Jovanović, 2019) and in line with similar research (Kim & Stoel, 2004; Chen *et al*, 2014).

In order to examine the influence of the three observed factors on the respondents' cognitive attitudes, multiple regression analysis was performed. Taking into consideration the initial assumptions for the application of this type of analysis, the regression model indicators are presented in Table 2. The observed model is representative (Sig = 0.000), the value of the determination coefficient is 0.337, which shows that 33.7% of the variability of the *cognitive attitudes* dependent variable is explained by the foregoing factors. The results of the regression analysis indicate that the website usability-related factor individually contributes the most to the cognitive attitudes in relation to organic food (ß = 0.299, p = 0.000). Also, website design (ß = 0.219, p = 0.004) and information quality (ß = 0.269, p = 0.000) both have a positive and statistically significant impact on cognitive attitudes when organic food is concerned. This result implies that the hypotheses H1a, H2a and H3a can be confirmed. Also, it is concluded that multicollinearity is not a problem in the observed relationships, bearing in mind the fact that the variance inflation factor (VIF) has a value lower than 5 in all the observed cases.

Table 2 The results of multiple regression analysis (the cognitive attitudes are dependent variables)

Variable	ß	T	Sig.	VIF
Website usability	0.299	3.815	0.000**	1.259
Website design	0.219	2.936	0.004**	1.141
Information quality	0.269	3.579	0.000**	1.164

Note: ****** the value is significant at the 0.05 level

Source: Authors

In a fashion similar to the previous research logic, multiple regression analysis was conducted again, with the affective attitudes observed as the dependent variable this time. The applied multiple regression analysis model indicators are shown in Table 3. In the given representative statistical model (Sig = 0.000), the value of the determination coefficient is 0.438, which implies that 43.8% of the variability of the *affective attitudes* dependent variable is explained by these three factors. By observing the other indicators, it is concluded that all the factors have a positive and statistically significant impact on affective attitudes towards organic food.

Table 3 The results of multiple regression analysis (the affective attitudes are the dependent variables)

Variable	ß	T	Sig.	VIF
Website usability	0.417	5.775	0.000**	1.259
Website design	0.117	1.710	0.090*	1.141
Information quality	0.322	4.639	0.000**	1.164

Note: * the value is significant at the 0.1 level; ** the value is significant at the 0.05 level

Source: Authors

It can be concluded that the strength of the influence of the given factors measured by the coefficient ß is more emphasized when website usability in relation to organic food (ß = 0.417, p = 0.000) is concerned when compared to information quality (ß = 0.322, p = 0.000) and website design (ß = 0.117, p = 0.090). Hence, the hypotheses H1b, H2b and H3b are confirmed.

DISCUSSION

The conducted empirical research study represents the starting point for examining future consumer behavior in the online environment when choosing organic food is in question. By observing the value of the descriptive statistics, it can be concluded that organic food consumers gave the highest average ratings to the website usability-related statements. More precisely, the respondents included in the sample believe that websites are easy to use even when they are used for the first time. As for website design, the respondents' most favorable attitudes are those towards the fact that such websites are visually attractive, whereas the lowest value of the standard deviation relates to the same statement, that is to say to the highest homogeneity of the organic food users' attitudes. Finally, when looking at the descriptive statistics on information quality, the research results show that the most favorable and the most homogenous attitudes appear to be those towards the organic food websites containing a sufficient amount of information.

When speaking about the results of the testing of the hypotheses given in the paper, this empirical research study indicates that, observed through the three dimensions, website quality has a positive and statistically significant impact on both cognitive and affective attitudes towards organic food, thus all the hypotheses defined in the paper being confirmed. The connection between website quality and the attitudes was already confirmed in previous studies (Tariq *et al*, 2019). More specifically, the authors confirmed the relationship between website usability and the attitudes (Chung *et al*, 2015; Alcántara-Pilar *et al*, 2018a), website design and the attitudes (Tariq *et al*, 2019) and information quality on the website and the attitudes (Cao *et al*, 2005). Although all the three dimensions have a positive and statistically significant influence on the attitudes towards organic food, the results of this paper indicate that it is interesting that the role of design is emphasized the least, contrary to the author's expectations. This result could be explained by the fact that previous studies pointed out the fact that consumers' perceptions of and attitudes towards organic food can differ depending on the region and countries where the studies are conducted (Rodríguez-Bermúdez *et al*, 2020). Also, the findings relating to design predominantly focused on the aesthetic characteristics of a website, whereas there are authors who examined design through other findings, such as navigation or technical characteristics, for example (Zhou *et al*, 2019).

Moreover, the research results correspond to the previous scientific studies in which attitudes are observed as a two-dimensional concept (Lee & Yun, 2015; Moon *et al*, 2017; Dai *et al*, 2019). An easy-to-use and well-designed website containing a sufficient amount of information has a positive effect on the cognitive dimension of users' attitudes. Nevertheless, the results of previous studies confirmed the fact that, in the online environment, it is important that the emotional aspects of consumer behavior should be analyzed (Moon *et al*, 2017), which was done in this paper by observing the relationship between website quality and the affective attitudes. The results indicate that all the three dimensions of website quality, namely its usability, design and information quality can be predictors of affective attitudes towards organic food.

CONCLUSION

Online business is increasingly gaining in superiority over the traditional forms of doing business. The turbulent development in this area is an incentive for marketing the professionals who seek to identify the key factors in consumer behavior in the online environment. Consumer behavior trends in the organic food field indicate that future papers will increasingly be based on the study of the factors which determine the online purchase of organic products (Ćirić *et al*, 2020).

One way to spread information and make purchases online is through a website. As a platform for promoting products and services (Martinez-Sala *et al*, 2020), the website significantly facilitates informing consumers and also helps to achieve the company's business goals. Via the website, the company communicates with both the existing and potential consumers. So, in order to achieve a win-win situation both for companies and for users, it is essential to examine which characteristics of the website are particularly important for consumers. A clear, useful, and visually appealing website provides numerous benefits to increasingly demanding users and enables companies to maintain a competitive position (Ahn *et al*, 2007). The information presented through the website significantly facilitates the selection process for consumers and reflects the content of the website (Chen *et al*, 2017).

During the process of integrating internet technologies into consumers' everyday life, the website is becoming an essential shopping process tool when the food market is concerned (Fernández-Uclés *et al*, 2019). In the paper, it was essential to establish which characteristics of website quality dominantly influenced consumer behavior, or more precisely the formation of their attitudes. In this sense, this paper aimed to identify whether website quality measured through the usability, design and information quality components affected organic food consumers' cognitive and affective attitudes. The research results confirmed the initially defined hypotheses that all the three factors had a statistically significant and positive impact on cognitive and affective attitudes.

This paper has both scientific and practical implications. The theoretical contribution of the research primarily reflects in the fact that, through the research integrative framework, the website is brought into connection with the users' cognitive and affective attitudes towards organic food. Also, one of the key theoretical contributions of the research study is that it emphasizes the research in the factors inherent in online organic food purchase, i.e. it points out the fact that even in this area attitudes can be formed under the influence of some other factors, such as the website. Prior research was mainly focused on the formation of organic food users' attitudes as a result of the concern for their health or for the environment.

The research study also has a significant applied contribution. As can be seen from the previous theoretical assumptions and the empirical research, organic product retailers should make more significant efforts in order to enrich the website with the elements that allow for a better market orientation (Fernández-Uclés *et al*, 2019). This research study makes a contribution by pointing out the importance of using modern technologies in the organic food market and by opening new opportunities for the creators of marketing strategies. Furthermore, the guidelines resulting from the conducted research study could improve business indicators and provide numerous benefits for the users who base their decisions on the choice of organic food on the website, i.e. after using the website.

Bearing in mind the fact that favorable attitudes towards organic food are key to maintaining long-term relationships with consumers, producers and distributors in this area should identify the key factors that influence their choice. Given the fact that an increasing number of transactions are performed through the website whose role is elaborated in detail in this paper, the websites that sell products of the organic origin should be designed to meet consumers' requirements in the best possible way. This paper contributes to the existing literature by analyzing the characteristics of the website in relation to attitudes as a two-dimensional concept. By breaking down the attitudes into the cognitive and affective components, website content creators in the field of organic food

can identify the importance of both rational and emotional motives that guide consumers in the selection process, in which way the retailers who sell organic food online can attract a larger number of potential consumers and create loyal consumers as a source of long-term profitability as well.

The research has certain limitations, one of which relating to the sample representativeness. So, expanding the number of respondents would ensure the better applicability and generalization of the results. The disadvantage is, among other things, that the research study was only carried out inside the territories of two cities. The research study does not include some other variables that might be connected with website quality, such as website navigation. Whether attitudes towards the website have an impact on current behavior or not could also be investigated. It would be interesting to relate confidence in website quality (Duffy, 2017) and value for organic food users (Babin, Darden & Griffin, 1994) to attitudes and the purchase intention. During the next research phases, it would be worthwhile to include cultural specifics in order to examine whether there are statistically significant differences when analyzing the impact of the website on creating consumers' attitudes or not. As the web environment also carries a certain degree of risk for users (Mohd Sam & Hayati Tahir, 2009; Belanche *et al*, 2012), this variable should also be included in future analyses through mediation. In accordance with the results of the previous research that perceives website quality as a predictor of consumer loyalty (Bilgihan & Bujisic, 2015; Chen *et al*, 2017), whether the given relationships can be confirmed in the field of organic food sales or not could be done research in.

ACKNOWLEDGMENT

This paper is a part of the interdisciplinary research project number 41010 funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

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Received on 31th August 2022,
after revision,
accepted for publication on 24th November 2022
Published online on 6th December 2022

Milan Kocic is a full professor at the Faculty of Economics of the University of Kragujevac. He is engaged in teaching the subjects of Marketing, Market Communication and Direct Marketing. The main areas of his interest are marketing, branding and marketing communications.

Srdjan Sapic is a full professor at the Faculty of Economics of the University of Kragujevac, Kragujevac. He teaches the courses in International Marketing, International Business and Management, and Marketing Services. The main areas of his scientific research are international marketing and international business, within the framework of which he intensively explores the cultural environment and the forms of internationalization.

Katarina Sofronijevic is an assistant professor at the Faculty of Economics of the University of Kragujevac. She is giving practical lectures in the subjects of Marketing, Market Communication and Direct marketing. Marketing and consumer behavior are the most important areas of her research.

Economic Horizons, September - December 2022, Volume 24, Number 3, 313 - 315
UDC: 33 ISSN: 1450-863 X

Conference review

CONTEMPORARY ISSUES IN ECONOMICS, BUSINESS AND MANAGEMENT - EBM 2022

November 4 2022, Faculty of Economics, University of Kragujevac, Kragujevac, The Republic of Serbia

Katarina Borisavljevic*
University of Kragujevac, Faculty of Economics

There are numerous challenges and problems in the field of economics and management which require different theoretical and methodological responses and reactions, which further implies the development of new concepts, methodologies, methods, models and techniques. The complexity of contemporary problems in the field of economics and management can best be observed in the variety of topics taken into consideration in the papers submitted for the International Scientific Conference entitled *Contemporary Issues in Economics, Business and Management* (EBM 2022), which was held at the Faculty of Economics, University of Kragujevac, on 4th November 2022.

The 7th Biennial International Scientific Conference entitled *Contemporary Issues in Economics, Business and Management* (EBM 2022) has gathered the largest number of participants so far, as many as 104 authors - 81 authors of higher education institutions in Serbia and 23 authors coming from abroad (Poland, Italy, Slovenia, Ukraine, Croatia). The introductory speakers at the conference were Zlatko Nedelko (Faculty of Economics and Business, University of Maribor, Slovenia) and Stanislaw Mazur (Krakow University of Economics, Poland). After the plenary talk, the Conference was organized into five parallel sessions.

Simultaneously, within a separate session, a symposium was held as a result of cooperation between the faculties of economics from Italy (Messina), Poland (Krakow), Ukraine (Kiev) and Serbia (Kragujevac). The conference included topics from the fields of management, marketing, globalization, regionalization, accounting, business finance, information systems and quantitative methods and models in economics and management.

Initially highlighting the necessity that approval for contemporary challenges in business economics and management should be sought and that the corporate social responsibility concept should be relied on,

* *Correspondence to: K. Borisavljevic, Faculty of Economics, University of Kragujevac, Kragujevac, Liceja Kneževine Srbije 3, 34000 Kragujevac, The Republic of Serbia; e-mail: katarinab@kg.ac.rs*

the first introductory speaker Zlatko Nedelko dealt with the issue of socially responsible behavior of management in the crisis conditions of lacking energy sources in his presentation entitled Socially Responsible Behavior of Management in Conditions of Energy Scarcity. Stanislaw Mazur introductory presentation entitled The Globotics Transformation and Its Socio-Economic Consequences focused on the application of the modern concept of the so-called *globotics* and the analysis of the socio-economic consequences of the implementation of this concept.

In total, 45 papers were accepted for presentation at the Conference, 35 of which were presented at the Conference. The papers that were presented belong to different thematic areas, including:

- Key challenges in management and marketing,
- Globalization and regionalization,
- Accounting and business finance, and
- Applied informatics and quantitative methods in economics and management.

During the first session called *Key Challenges of Management and Marketing*, the participants presented the papers dealing with the aspects of strategic management, corporate management and sustainability, corporate social responsibility, management and marketing aspects, the WOM concept, customer satisfaction, the application of innovations in business, the characteristics of doing business in the field of tourism (with a special reference to the image of the destination and the consumer's and guest's experience in hotel business) and so on.

During the second parallel session called *Key Challenges of Management and Marketing*, the participants presented the papers dedicated to the problems of human resource management, leadership, internal satisfaction and loyalty, lifelong learning and business in the digital era, as well as the recruitment process and vertical communication in companies, along with the analysis of the tourist offer in crisis conditions, entrepreneurship (start-up companies) and the acquisition of companies.

The session called *Globalization and Regionalization* was dedicated to the consideration of the current key economic challenges in the Republic of Serbia and the region, such as economic development, macroeconomic stability, the financial system stability, the state and perspectives of the financial market development, the effectiveness of the economic policy, as well as the sustainable tourism concept. Bearing in mind the fact that regional countries are still experiencing the consequences of the global economic crisis, overcoming them remains one of the key challenges of economic growth and development. Thus, in the presented scientific papers, special attention was paid to the review of valid macroeconomic paradigms, as well as the issue of the effectiveness of the monetary and fiscal policies in the conditions of a high public deficit and budget deficits in pandemic conditions.

When the papers included in the session called *Applied Informatics and Quantitative Methods in Economics and Management* are concerned, the participants discussed the application of various methods, models and approaches, the business and artificial intelligence concepts, the impact of digitalization on business operations, the application of CRM software solutions and cloud-based digital platforms in business. The main advantages, problems and challenges related to CRM systems were taken into consideration, the focus being on understanding the CRM system strategy and implementation framework.

During the session called *Accounting and Business Finance*, the participants discussed the areas of measuring business performance and the profitability of the companies operating in Serbia, primarily those doing business in the banking and pharmaceutical sectors, as well as higher education institutions.

As for the scientific symposium entitled *Contemporary Challenges in Economy, Business and Management*, the following topics were discussed: international economy, business internationalization, economic support to Ukraine in the post-war period, the analysis of the CEE countries' export opportunities and economies. There was also a special review of the value-based management concept and the analysis of start-up companies in the services field.

The conclusions reached by the researchers which were presented during the analyzed sessions are a good basis for providing adequate answers to various challenges in the business economics and management fields.

The authors and participants had the opportunity to exchange experiences through discussions and conversations, and also to discover the topics and areas of joint research, in which way the main goal of the Conference was achieved: to expand the scientific community and create an initiative for joint research and collaboration.

The conference was a good opportunity for researchers to exchange their ideas and present their research results, and to strengthen international cooperation and develop various forms of academic cooperation as well.

Katarina Borisavljevic is an associate professor at the Faculty of Economics, University of Kragujevac. She received her PhD degree from the Faculty of Economics of the University of Belgrade in the field of business economics and management. She teaches the following courses: Management in Tourism and Hospitality and Marketing Channels in the bachelor academic studies; Hotel Companies Management, Distribution Channels Management and Ecotourism in the master's academic studies, and Strategic Management in Tourism in the doctoral academic studies at the Faculty of Economics, University of Kragujevac. The key areas of her scientific and professional interests are marketing and management in tourism, marketing channels and trade.

Economic Horizons, September - December 2022, Volume 24, Number 3, 317 - 318
UDC: 33 ISSN: 1450-863 X

THE SUBJECT INDEX

(This Index includes all papers published in the Volume 24 of the Journal.)

Economic Horizons, September - December 2022, Volume 24, Number 3, 319 - 320
UDC: 33 ISSN: 1450-863 X

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THE LIST OF AUTHORS AND TITLES

(This List contains the authors and titles of all contributions published in the Volume 24 of the Journal.)

Lekovic, V. (2022). Acknowledgements to reviewers. *Economic Horizons*, *24*(2), 213-214. Published online 26 Jul 2022.

Lekovic, V. (2022). Editorial. *Economic Horizons*, *24*(3), 215-216. Published online 6 December 2022.

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Lo, H-C., Yang, M. J., Huang, C-T., & Chien, C-Y. (2022). Does income influence rational decisions? *Economic Horizons*, *24*(2), 185-198. Published online 26 Jul 2022. doi:10.5937/ekonhor2202195L

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Народна библиотека Србије, Београд

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EKONOMSKI horizonti / glavni i odgovorni urednik Vlastimir Leković. - God. 1, br. 1/2 (1999)- . - Kragujevac: Ekonomski fakultet Univerziteta u Kragujevcu, 1999 - (Kragujevac: InterPrint). - 26 cm

Tri puta godišnje. - Tekst na srp. i engl. jeziku. - Drugo izdanje na drugom medijumu : Ekonomski horizonti (Online) = ISSN 2217-9232
ISSN 1450-863X = Ekonomski horizonti (Štampano izd.)
COBISS.SR-ID 158022663

NOTES FOR CONTRIBUTORS

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