THE RELATIONSHIP BETWEEN INNOVATION, FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH IN THE SELECTED EU AND EU CANDIDATE COUNTRIES

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Abstract: *The aim of this paper is to investigate the cause and effect relationship between economic growth, innovation (R&D expenditure) and foreign direct investment (FDI) for the selected EU members (Bulgaria, Croatia, Hungary, Romania, Slovakia, and Slovenia) and EU candidates (North Macedonia, Serbia, and Turkey) for the period 2000 - 2017. Additionally, we analysed innovation by using Summary innovation index, Capacity innovation index, and Global innovation index. All three indexes show that Slovenia is best ranked by innovation. According to Summary innovation index countries such as Bulgaria, Romania and North Macedonia are "modest innovator" countries, while Slovenia, Slovakia, Hungary, Serbia, Turkey, and Croatia belong to "moderate innovator" group of countries. According to Capacity for innovation index, Serbia shows the lowest capacity for innovation, although a considerable growth of this index has been recorded since 2012. Global innovation index shows that Serbia and North Macedonia have the lowest values of this index. The results obtained by using Granger causality test reveal that a two-way relationship exists between economic growth and FDI, economic growth and innovation, and FDI and innovation.*

Keywords: *Innovation, R&D expenditure, foreign direct investment, economic growth, causality*

1. INTRODUCTION

Innovation, investing in R&D, and technology are the basis for providing competitiveness of a country as well as sustainable economic growth (Weresa, 2018). Gerguri and Ramadani (2010) define innovation as the activity of creating a new product or service, new technological process, new organisation as well as

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improving the existing product or service, existing technological process and the existing organisation. Bilbao-Osorio and Rodríguez-Pose (2004) consider traditional investing into R&D as one of the key strategies for fulfilling technological potential, and therefore innovation and economic growth. The authors state that technology and technological progress represent crucial components of innovation and economic growth. Solow (1956) shows a positive relationship between technological progress and economic growth (Omri, 2020). Cameron (1996) points out that according to the theory of economic growth, the innovation rate is the result of economic agents selected to maximise profits, which enables constant differences in the levels of productivity and growth rates. Among other authors, Bae and Yoo (2015) and Andergassen et al. (2009) claim that innovation can be regarded as a considerable potential for economic growth.

Hasan and Tucci (2010) mention that Romer (1986) and Lucas (1988) were among the first authors who emphasised the role of knowledge as an input in production. Their models show that technological development and industrial innovation generate long-term development. There is reliable empirical evidence supporting the fact that innovation contributes to economic growth (Hasan and Tucci, 2010).

Increasing innovation, encouraging investment into R&D and developing efficiency have become important factors in globalisation and they affect economic status and the prospect of economic development (Dzemyda and Melnikas, 2009). Kacprzyk and Doryń (2017) state that in the early 1990s Romer (1990), Grossman and Helpman (1991), and Aghion and Howitt (1992) developed endogenous growth models based on the general growth mechanism that operates through technological progress, which is the result of targeted activities of R&D. Gerguri and Ramadani (2010) reveal that the best way for a company to achieve competitiveness is to apply innovation. The authors view innovation as a major factor in sustainable growth and economic development, but also in creating well-being and employment. Moreover, the gap between western and eastern economies can be diminished by investing in innovation, as Petrariu et al. (2013) reveal.

The paper presents the analysis of causality between economic growth, innovation and FDI based on the panel technique. Granger non-causality test was used to examine causality. The aim of the paper is to investigate innovation interdependence (measured by R&D expenditure), FDI and econmic growth (measured by GDP) for the observed period from 2000 to 2017 for the selected EU members (Bulgaria, Croatia, Hungary, Romania, Slovakia, and Slovenia) and EU candidates (North Macedonia, Serbia, and Turkey).

The remainder of the paper comprises several sections. Section 2 is dedicated to literature survey. It is divided into three sub-sections and examines the connections between innovation and economic growth, innovation and FDI, and FDI and economic growth. Section 3 describes innovation using Summary Innovation Index, Capacity Innovation Index and Global Innovation Index for the selected EU and EU candidate countries. Section 4 presents data and methodology. Results and discussion are in Section 5. Finally, the paper is concluded in Section 6.

2. THEORETICAL BACKGROUND

2.1. Innovation and economic growth

A positive correlation between innovation and economic growth has been discovered in both empirical and theoretical research. Kacprzyk and Doryń (2017) investigated the relation between innovation and economic growth in EU countries for the period 1993 – 2011. The authors estimated whether patent activities and various R&D expenditures affect old (EU-15) and new (EU-13) members. They also investigated how various types of investment in R&D, with different funding sources, influence economic growth. Kacprzyk and Doryń (2017) did not find any significant influence of R&D on economic growth. However, patents proved to be an important indicator of growth in GDP per capita in new EU member countries. EU innovation policies as well as financial and managing instruments that implement these policies were analysed by Dzemyda and Melnikas (2009). Using the correlation analysis method these authors researched the need for EU investment in R&D and measured the influence of the investment on the economies of EU member countries. The relationship between innovation and economic growth in 19 European countries for the period 1989 – 2014 was investigated by Maradana et al. (2017). The authors used six different indicators for innovation: patents-nonresidents, patents-residents, R&D expenditure, researchers in R&D activities, high-technology exports, and scientific and technical journal articles. Maradana et al. (2017) showed that the results vary from country to country, depending on the type of indicator used in the process of empirical research. Bilbao-Osorio and Rodríguez-Pose (2004) also investigated connection between R&D, innovation and economic growth in EU countries, while Cvetanović et al. (2014) analysed innovation in the countries of Western Balkans in 2012, and Pala (2019) examined the relation between innovation and economic growth in 25 developing countries. Pala (2019) obtained different results regarding investment in R&D and economic growth in different countries. For example, this author found a negative correlation between investment in R&D and economic growth in China, Egypt, Iran, Moldova, Panama, Serbia and Uzbekistan. Futhrermore, the results of this author confirm that the number of R&D researchers has a significant negative influence on economic growth in u Iran, Mexico, Tunusia, and Uzbekistan, while the number of R&D researchers has a significant positive influence on economic growth in Ukraine, Turkey, Russia and China. Pece et al. (2015) and Petrariu et al. (2013) investigated the relationship between innovation and economic growth in CEE countries. Namely, Pece et al. (2015) applied regression analysis to observe how innovation potential of an economy has a long-term influence on economic growth in Poland, Czech Republic and Hungary. Pece et al. (2015) used various variables to quantify innovation, such as: the number of patents, the number of trademarks, and R&D spending. The authors found a positive relationship between economic growth and innovation. Petrariu et al. (2013) used different indicators to quantify innovation, such as: R&D spending, patenting, or the number of researchers, but also companies' characteristics, mergers, and acquisitions. In a similar way to Pece et al. (2015), Petrariu et al. (2013) also found that innovation significantly contributes to national competitiveness and economic growth.

Sesay et al. (2018) discussed whether national innovation system encourages economic growth in BRICS countries. The authors used quartile data for the period 2000 – 2013 and applied panel technique. Sesay et al. (2018) showed that national innovation system has an overall positive influence on economic growth in BRICS countries. Duarte and Carvalho (2020) compared national innovation system of Portugal with 92 other countries for the period 2013 – 2018. The authors came to a conclusion that the policy directed towards improving the capacities for absorbing the knowledge of domestic companies will boost innovative results of Portugal.

Ulku (2004) focused on the relationship between innovation and economic growth in 20 OECD and 10 non-OECD countries. She used the panel technique on patent and R&D data on economic growth for the period 1981 – 1997. Ulku (2004) found a positive relationship between GDP per capita and innovation (patent stock) for OECD and non-OECD countries, while only OECD countries with larger markets proved capable of improving their innovation by investing in R&D. However, Ulku (2004) concluded that innovation does not bring about constant economic growth. Cameron (1996) also concluded that innovation significantly contributes to economic growth. He took into consideration a range of different innovation measures, such as growth of R&D spending, number of patents and innovation as well as widespread effects of technological spillovers among companies, industries and countries. Cameron (1996) found considerable spillovers among countries, industries and countries and their tendencies to localise. The significance of innovation and the stock of knowledge in the process of economic growth was discussed by Uppenberg (2009). The author also investigated the mechanisms that induce companies to invest in R&D and the stock of knowledge. Uppenberg (2009) concluded that innovation generates increased productivity primarily due to enabling more efficient organisation of economy, which is often combined with relocating resources towards industries with good growth prospects. He therefore pointed out that inflexible economies could lose many potential economic benefits that come from creating new knowledge and innovation. Parežanin et al. (2014) showed that economic activity is influenced by using knowledge and technology in a sector that will lead to the rise of productivity in European economies.

Hasan and Tucci (2010) empirically researched the importance of innovation on economic growth by using panel regression. They observed a sample of 58 countries for the period 1980 – 2003. As approximation of innovation they used data on patents. These authors came out with the results that the countries with high quality of patents record larger economic growth. Furthermore, their results confirmed that the countries which increase the patenting level will witness increased economic growth. Omri (2020) studied the capacity of technological innovation to promote economic growth and improve social and ecological conditions on the sample of 75 countries with low, middle and high income. The author used the analysis of causality by applying VECM method. The results showed that technological innovation simultaneously contributes to the three pillars of sustainable development only in the case of developed countries. However, they influence both ecological and economic dimensions in middle-income countries, while no influence was recorded in the countries with low income. Omri (2020) concluded that the influence of technological innovation on sustainable development of a country depends on its phase of development or the level of its income.

2.2. Innovation and foreign direct investment

Various theories on economic growth are based on certain determinants. Different methods and different indicators of economic growth and development are used to rank countries according to the level economic growth (Jednak et al., 2018). It is considered that FDI is the precondition for achieving economic growth and development in many developing countries, particularly in Eastern European transition countries. The transfer of technology and knowledge that should improve economic growth of the host countries is conducted through various types of FDI. If this is observed on the enterprise level, companies in host countries upgrade and catch-up the development level of their industries and technologies.

Technology transfer and establishing R&D centres of multinational companies in host countries encourage innovation. The combination of local R&D and innovation activities with foreign knowledge and R&D networks helps upgrading of technology and obtaining economic growth. Nowadays, smart specialisation is one of the innovation policies closely related to R&D and based on FDI, which lead EU developing countries towards higher progress (Radosevic & Stancova, 2018). Furthermore, domestic institutions are the crucial factor in attracting innovation-intensive FDI in emerging economies (Egan, 2017). EU FDI inflows in China are determined by Chinese institutions and R&D (Cai et al., 2019). That is why R&D which is related to FDI is one of the most up-to-date research topics.

Günther et al. (2008) estimated whether there is a systemic relation between foreign investors` technological activities, their interaction with the performers of East German innovative system and the volume of technological externalities from FDI. The authors state that technological activity of foreign subsidiaries positively correlates to the importance of the chosen external network partners from Eastern German innovative system. Furthermore, Günther et al. (2008) found that the potential for spillovers rises with foreign subsidiaries` technological activity only for the suppliers from East Germany.

Erdal *&* Göçer *(*2015) used panel causality and cointgration method to explore the effects of FDI on R&D and innovation in 10 Asian economies during the period 1996 - 2013. They found that FDI inflows raise R&D and innovation activities in the host county. Doruk (2016) investigated the relationship between innovation and FDI in Turkey in the post-1980s. The results show that FDI has no contribution to innovation. However, innovation development attracts FDI. Weresa & Napiórkowski (2018) investigated how inward FDI affects innovation in the Visegrad countries. The results show no impact of inward FDI on innovation (number of patent applications), and no causal relationship between patent applications and R&D. Arun & Yıldırım (2017) confirmed that FDI is a crucial factor of the level of innovation in Azerbaijan and Georgia, but not in Turkey. The results are obtained by using panel analysis. Li et al. (2020) used a panel cointegration method, including structural breaks to explore the long-run equilibrium link between innovation and FDI in the selected OECD countries for the period 1999-2018. They revealed the equilibrium relation with structural breaks between innovation and FDI, and the positive influence of FDI on innovation and vice versa in 30 OECD countries. Omidi et al. (2020) compared theories on the drivers of innovation in 24 developing countries during 2011-2016 and found out that FDI and institutional quality have a positive influence on innovation.

Khachoo and Sharma (2016) investigated the influence of FDI spillover on innovativeness of performances in the companies that operate in Indian production sector, using panel technique on 514 companies. They found that FDI has a moderate influence on innovative performance in the enterprises of the identical industry. Khachoo et al. (2018) explored the impact of FDI spillover on innovation (R&D and patenting) and productivity in the manufacturing sector in India using DEA method.

They found that FDI affects innovation and productivity. Damijan et al. (2003) analysed 8000 companies in transition economies to explore the importance of technology transfer channels through FDI and productivity by using GMM approach. They confirmed that FDI has a direct impact on the productivity of companies due to technology transfer. Positive FDI spillover affected company innovation in China in the period 2005 - 2015 (Guo & Ning, 2020). Meyborg (2010) investigated the importance of technology transfer and modernisation by FDI in CEE countries. The results show that FDI supports innovation and networking activities in the observed countries. Furthermore, Sivalogathasan and Wu (2014) explored FDI as a channel for technology transfer in emerging economies during the period 2000 - 2011. The results show that knowledge and skilled human resources influence innovation capability. R&D expenditure is also a factor of innovation capability.

2.3. Foreign direct investment and economic growth

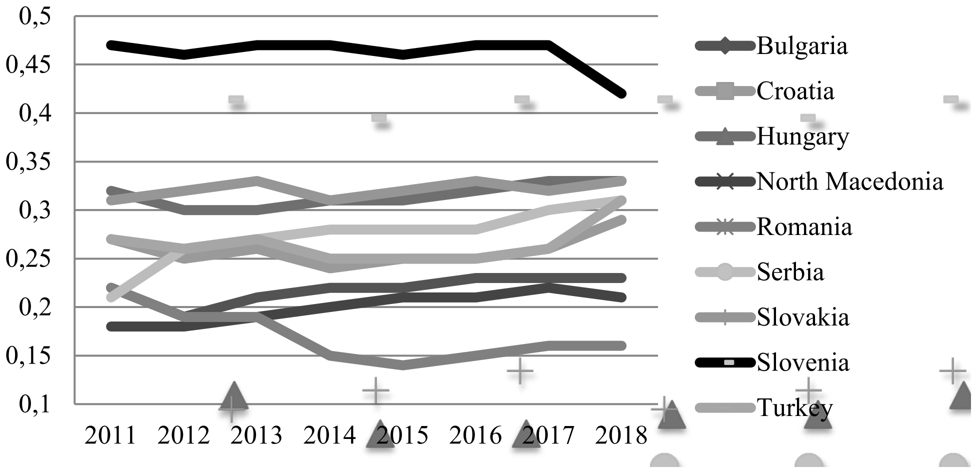
In literature, the influence of FDI on economic growth is discussed in different ways. Some resesrch papers show positive effects, and other negative. There are also research papers that show either positive or negative effects depending on the conditions found in host countries and the type of FDI. Forte and Moura (2013), Herzer et al. (2008), Alfaro et al. (2008), and Borensztein et al. (1998) think that FDI will increase economic growth only if certain economic criteria have been fulfilled in the host countries. The main idea presented by these authors is that the effects of FDI on economic growth depend on the present or subsequently developed internal conditions of the host country (economic, social, political, cultural, technological, and the degree of economic openness). Asheghian (2004) claims that the reason for different FDI effects on economic growth lies in using different variables as well as the possible lack of analyses in the FDI host countries. Wang and Wong (2009) found different influences of FDI on GDP depending on the type of FDI (greenfield investment or acquisition). Furthermore, Chowdhury and Mavrotas (2006) had mixed results regarding the relationship between FDI and GDP. For example, the authors showed that high GDP causes FDI in Chile, and not vice versa. Parežanin et al. (2016) confirm the correlation between FDI inflows and economic growth in Serbia during 2000 - 2007 and no correlation between FDI and macroeconomic indicators after economic crisis. One may conclude that causal relation between FDI and economic growth is characterised by a high level of heterogeneity (Nair-Reichert and Weinhold, 2001). Minović (2017) studied the causality by applying Granger test between total investment portfolio and GDP in Serbia. The author found a positive correlation between the two variables. In order to adequately investigate interrelation between FDI and GDP variables it is necessary to conduct several separate studies, and the causality between FDI and GDP growth is specific for each country (Chowdhury and Mavrotas, 2006).

There are many discrepancies in opinions of different authors and their empirical findings regarding the causality between FDI and economic growth. The following authors found that FDI have positive effects on economic growth: Pegkas (2015) in the Eurozone countries, Raheem and Ogebe (2014) in the countries of Sub-Saharan Africa, Wang (2009) in Asian countries, Har et al. (2008) in Malaysia, Hansen and Rand (2006) in developing countries, Mullen and Williams (2005) in the USA, Choe (2003) in 80 countries throughout the world. Negative correlation between FDI and economic growth was found by: Vissak and Roolaht (2005) in Estonian economy, Mencinger (2003), and Globerman and Shapiro (2003) in Canada. The following authors do not think that FDI has significant effects on economic growth: Belloumi (2014) in Tunisia, Carkovic and Levine (2005) in different countries around the world, Smarzynska Javorcik (2004) in Lithuania, and Haddad and Harrison (1993) in Morocco.

3. MEASURING INNOVATION

Different variables are used in literature for measuring innovation including investment in R&D, Global Innovation Index, patent numbers, etc. This section is dedicated to presenting innovation according to different indexes for each of the selected EU member and EU candidate countries for different periods of time, depending on the available data. Figure 1 presents Summary innovation index for the period 2011 – 2018 published by European Commission (2020). According to this index, the first ranked of all the selected countries by innovation is Slovenia, while the last rank belongs to Romania.

Figure 1. Summary innovation index in the period 2011-2018

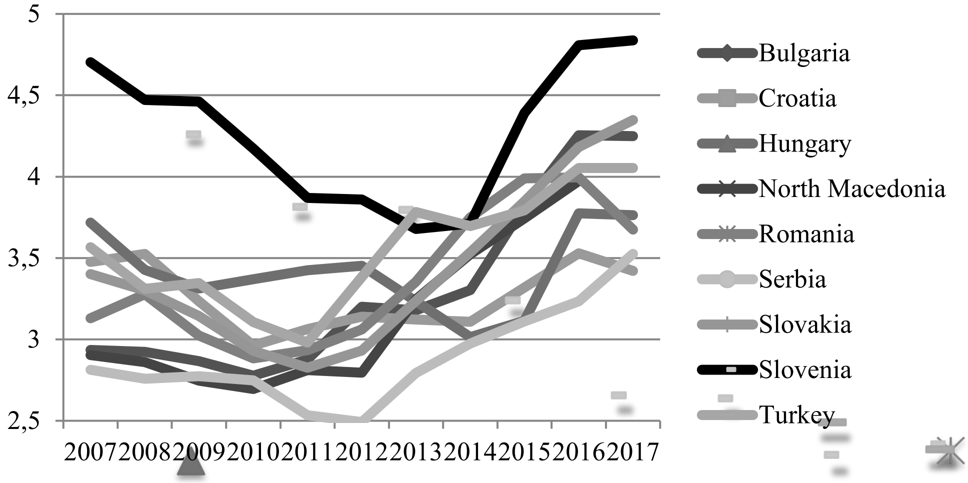


Source: Authors' presentation based on the European Commission (2020) data.

According to Summary innovation index - Bulgaria, Romania and North Macedonia belong to “modest innovator”, while Slovenia, Slovakia, Hungary, Serbia, Turkey, and Croatia belong to “moderate innovator” group.

Figure 2 presents the index of capacity for innovation in the period 2007 – 2017. Most countries have recorded a growing trend of this index since 2012 and 2013. According to this index the first ranked country is still Slovenia, which has recorded innovation capacity growth since 2014. Serbia has the smallest capacity for innovation, although this index has significantly grown since 2012.

Figure 2. Capacity for innovation in the period 2007-2017

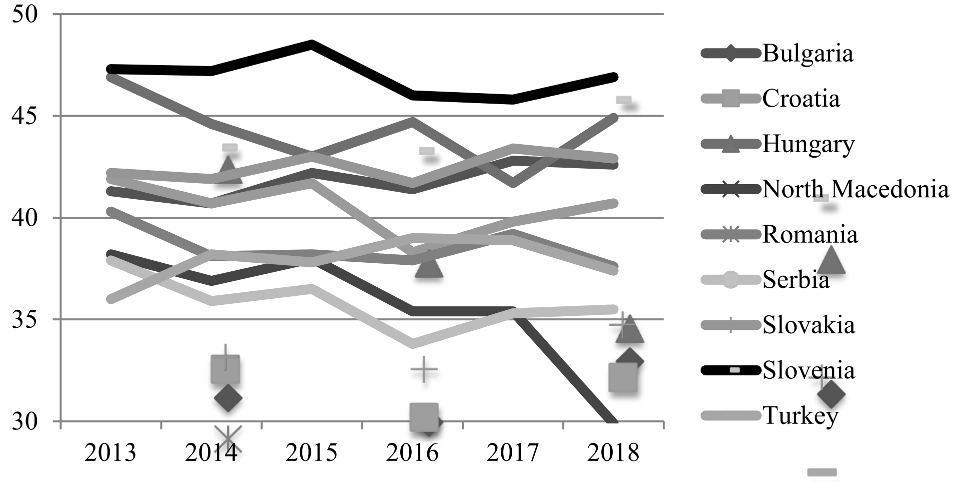


Note: Score is from 1 to 7 (the best).

Source: Authors’ presentation based on the World Bank (2020) data.

According to Global innovation index for the period 2013 – 2018, Slovenia is ahead of the rest of the countries, while Serbia and North Macedonia have the lowest values (see Figure 3).

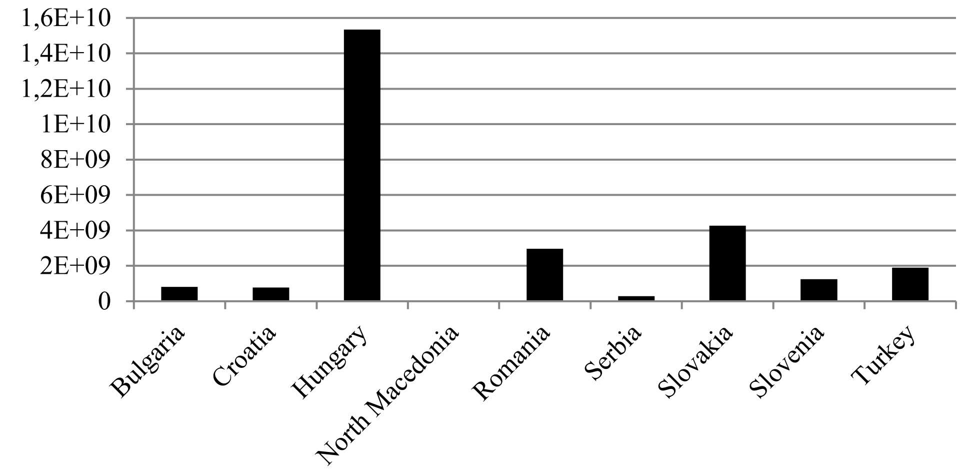
Figure 3. Global innovation index in the period 2013-2018



Source: Authors' presentation based on the WDI (2020) data.

Figure 4 shows the average value of High-technology exports (current US$) for the period 2000 – 2018. According to this indicator, Hungary is far ahead of all the selected countries. Hungary is followed by Slovakia and then Romania. The smallest values of this indicator are recorded in Serbia and North Macedonia.

Figure 4. Average High-technology exports (current US$) in the period 2000-2018



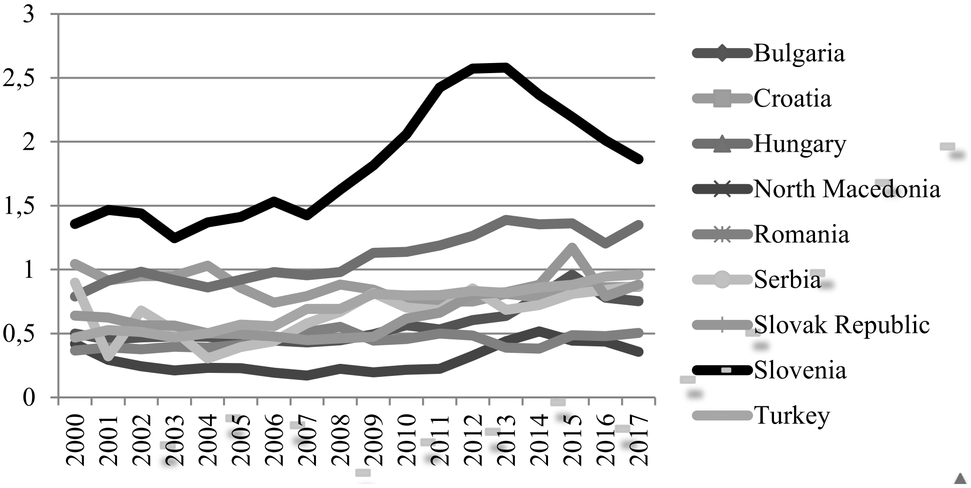
Source: Authors' presentation based on the WDI (2020) data.

4. DATA AND METHODOLOGY

Research and development expenditure (% of GDP), published by the World Bank, is used to quantify innovation. Kacprzyk & Doryń (2017) point out that R&D expenditures are often used as approximation of innovation. R&D expenditures used for the selected EU member and EU candidate countries in the period 2000 - 2017 are presented in Figure 5. The data for FDI and GDP are taken from the World Bank website and the data are World Development Indicators (WDI).

If one observes Figure 5, it is clear that Slovenia is ahead of all the other countries when investing in R&D is concerned, while North Macedonia lags behind the rest of the countries by this indicator.

Figure 5. Research and development expenditure (% of GDP) in the period 2000-2017



Source: Authors' presentation based on World Bank data.

Table 1 presents descriptive statistics of the variables employed in empirical analysis. The largest average economic growth measured by GDP is recorded in Turkey. However, its volatility is also the largest in Turkey. According to GDP level, Turkey is followed by Romania, but Romania also records a high volatility value of GDP. Of all the observed contries, Croatia has the lowest average economic growth and it is followed by Slovenia. However, the mutual characteristic of both countries is that the volatility of GDP is significantly higher than their average economic growth.

Table 1. Descriptive statistics (2000-2017)

	GDP (%)		R&D (% GDP)		FDI (% GDP)	
	Mean	**St.Dev.**	**Mean**	**St.Dev.**	**Mean**	**St.Dev.**
Bulgaria	3.704	2.925	0.570	0.154	9.004	8.080
Croatia	1.938	3.377	0.856	0.094	3.784	2.265
Hungary	2.368	2.912	1.093	0.195	11.833	20.080
North Macedonia	2.781	2.453	0.298	0.109	4.591	2.780
Romania	4.042	4.042	0.443	0.057	3.771	2.395
Serbia	3.806	3.606	0.655	0.190	5.792	3.261
Slovakia	3.870	3.468	0.660	0.196	4.551	3.066
Slovenia	2.315	3.335	1.820	0.454	2.167	1.911
Turkey	5.247	4.538	0.705	0.171	1.626	0.903

Source: Authors' calculation

Average value of investing in R&D is the highest in Slovenia, and it if followed by Hungary. The highest volatility of this indicator is also recorded in Slovenia. As has been confirmed several times, North Macedonia has the lowest average value of innovation (measured by investing in R&D). Average value of FDI (% GDP) is the highest in Hungary, but the volatility of this indicator is also significantly higher in comparison to the rest of the countries. By the level of FDI (%GDP) Hungary is followed by Bulgaria, while Turkey has the lowest level of this indicator.

The analysis of causality between economic growth, innovation and FDI is based on the panel technique. Granger non-causality test was used to examine the causality. Since input variables have to be stationary, the stationarity of the used variables was also examined (GDP, FDI, R&D) by applying different panel unit root tests (Levin, Lin & Chu; Im, Pesaran and Shin; ADF - Fisher Chi-square, and PP - Fisher Chi-square). Minović et al. (2021) used the same panel unit root tests for the Western Balkan countries, but for other variables as well.

5. RESULTS AND DISCUSSION

Panel unit root test results (Levin, Lin & Chu; Im, Pesaran and Shin; ADF - Fisher Chi-square, and PP - Fisher Chi-square) are summed up in Table 2.

Table 2. Panel unit root test results (2000-2017)

Variables	Level		First Difference	
	Intercept	**Intercept & Trend**	**Intercept**	**Intercept & Trend**
Levin, Lin & Chu t*				
GDP	-3.034 (0.001)	-2.916 (0.002)	-8.111 (0.000)	-6.196 (0.000)
FDI	-2.146 (0.016)	-2.320 (0.010)	-8.415 (0.000)	-7.319 (0.000)
R&D	0.398 (0.655)	-1.678 (0.047)	-5.493 (0.000)	-5.735 (0.000)
Im, Pesaran and Shin W-stat				
GDP	-0.545 (0.293)	0.354 (0.638)	-6.263 (0.000)	-4.022 (0.000)
FDI	-2.202 (0.014)	-1.917 (0.028)	-4.847 (0.000)	-2.908 (0.002)
R&D	1.923 (0.973)	0.299 (0.617)	-4.228 (0.000)	-4.666 (0.000)
ADF - Fisher Chi-square				
GDP	15.673 (0.615)	11.430 (0.875)	70.962 (0.000)	46.160 (0.000)
FDI	28.786 (0.051)	27.311 (0.073)	55.410 (0.000)	35.943 (0.007)
R&D	4.675 (0.999)	11.736 (0.861)	48.810 (0.000)	52.293 (0.000)
PP - Fisher Chi-square				
GDP	26.493 (0.089)	17.665 (0.478)	125.609 (0.000)	92.185 (0.000)
FDI	8.953 (0.961)	7.406 (0.986)	33.437 (0.015)	16.983 (0.024)
R&D	3.971 (0.999)	12.188 (0.837)	77.632 (0.000)	49.705 (0.000)

Source: Authors' calculation

Note: Schwarz automatic selection of the lag length is applied for the unit root tests; probabilities for Fisher tests are calculated using an asymptotic Chi-square distribution. All other tests suppose asymptotic normality; p-values are presented in the parentheses.

Table 2 indicates that stationarity results of the variables differ both from the used test and the variable. However, in order to get stationary variables, we differentiated the existing ones and the results show that variables are stationary in the first differences.

After obtaining stationary variables we started examining the causality among the variables: economic growth (GDP), innovation (Investing in R&D) and foreign direct investment (FDI). The results are presented in Table 3.

Table 3. Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.	Decision
ΔFDI does not Granger Cause ΔGDP	126	111.154	0.000	Reject
ΔGDP does not Granger Cause ΔFDI		20.112	0.000	Reject
ΔR&D does not Granger Cause ΔGDP	126	5.348	0.002	Reject
ΔGDP does not Granger Cause ΔR&D		9.946	0.000	Reject
ΔR&D does not Granger Cause ΔFDI	126	16.573	0.000	Reject
ΔFDI does not Granger Cause ΔR&D		4.801	0.003	Reject

Source: Authors' calculation

Note: Δ is the first difference operator. We used lag=3 based on different criterion (Akaike, Schwarz and Hannan-Quinn information criterion).

The results presented in Table 3 show a bidirectional relationship between FDI and GDP, R&D and GDP, and FDI and R&D. Our result, which confirms the existence of significant R&D influence on economic growth, does not correspond to the result of Kacprzyk and Doryń (2017), while it only partially corresponds to the results of Pala (2019). The results of Pala (2019) vary from country to country when investing in R&D and economic growth are concerned. Furthermore, our result showing that innovation contributes to economic growth corresponds to the result of Pece et al. (2015), Petrariu et al. (2013), Cameron (1996), Ulku (2004), and Hasan and Tucci (2010). Our result that shows the relationship between FDI and R&D is in accordance with the result of Erdal and Göçer (2015), Arun and Yıldırım (2017), Li et al. (2020), Omidi et al. (2020), and partially with Doruk (2016) who did not find the relationship between FDI and innovation, but confirmed that innovation development attracts FDI. Our result concerning the relationship between FDI and R&D do not correspond to the results of Weresa & Napiórkowski (2018), since they found no causal relationship between these variables. Finally, our result which confirms the existence of bidirectional relationship between FDI inflow and economic growth corresponds to the result of Chowdhury and Mavrotas (2006) for Malaysia and Thailand, and Parežanin et al. (2016) for Serbia during the period 2000-2007.

6. CONCLUSION

The paper provides the analysis of causal relationship between economic growth, innovation (R&D expenditure) and foreign direct investment (FDI) by using Granger causality test. Causal relationship between the selected variables is investigated for the following countries: EU members (Bulgaria, Croatia, Hungary, Romania, Slovakia, and Slovenia) and EU candidates (North Macedonia, Serbia, and Turkey) for the period 2000 – 2017.

Prior to examining causality for the selected EU and EU candidate countries, we analysed innovation by using Summary innovation index, Capacity innovation index, and Global innovation index. All three indexes show that Slovenia is best ranked by innovation. According to Summary innovation index, the last ranked of all the selected countries is Romania. This index places Bulgaria, Romania and North Macedonia among "modest innovator" countries, while Slovenia, Slovakia, Hungary, Serbia, Turkey, and Croatia belong to "moderate innovator" group of countries. According to Capacity for innovation index, Serbia shows the lowest capacity for innovation, although a considerable growth of this index has been recorded since 2012. Global innovation index shows that Serbia and North Macedonia have the lowest values of this index.

As far as the causality results for the selected EU and EU candidate countries are concerned, they reveal that a two-way relationship exists between economic growth and FDI, economic growth and innovation, and FDI and innovation. This result indicates that investing in innovation influences more FDI inflow and GDP growth and vice versa – more FDI and GDP will generate more innovation. A direct implication of this result for economic decision makers, either in EU member or EU candidate countries, is that they have to pay more attention to investing in R&D and innovation in order to create better conditions for higher FDI inflow. This will consequently lead towards higher economic growth. Future research could include a different group of countries as well as different measures of innovation, such as the number of patents or the number of researchers.

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