Volume 28 • Number 2 • October 2021

Journal Transition Studies Review

Papers

JTSR (2021) 28(2): 3-18
DOI 10.14665/1614-4007-28-2-001

PAPER

Is the Rule of Law Essential for Economic Growth? Evidence from European Countries

Sinisa Zaric* • **Vojislav Babic****

Abstract This paper aims to measure the influence of human capital, the rule of law, and the protection of property rights on GDP. The works of Acemoglu have inspired the research. This study has used a self-structured sample containing eight countries: Germany, Czech Republic, Hungary, Serbia, Italy, the UK, Spain, and Sweden. The selection of countries in the sample was intentional. While choosing it, the countries' business culture, path dependence, and geopolitical situation have been taken into account. The analysis showed a high correlation of all three observed indices with GDP/cap. In order to determine the relative share of overall indices in economic growth, a graphic representation was used. The regression analysis showed that the change in the IPRI value by one percentage point leads to a more significant positive impact on GDP growth in the group of less developed countries than in the leading developed economies. Although GDP jumps percent are higher in countries with lower IPRI, they are roughly equal to those recorded in developed countries if observed in real terms. This can be explained by the fact that countries with high IPRI have accumulated a higher mass of GDP over time.

Keywords*:* Economic growth, property rights, rule of law, human capital.

Jel Classification: P14, O43, O57.

1. Introduction

From its inception (Veblen, 1994) to the present day, the institutional economics has gone through several evolutionary waves. A special stamp in the development of this economic discipline was given by theorists such as Coase, Becker, North, Ostrom, and Williamson. These scientists have been awarded the Nobel Prize in Economic Sciences for their innovative achievements. The mentioned authors found shortcomings in the concept of an economy that relies on the full information of individuals and put in the

Sinisa Zaric*(✉), Vojislav Babic**
* Faculty of Economics, University of Belgrade, Serbia
E-mail: sinisha.zaric@gmail.com,
**University of Belgrade, Institute for Sociological Research, Serbia
E-mail: babic.voja@gmail.com

foreground the importance of institutions in shaping economic development. In this sense, North (1990, 1995) presented a specific analysis of the impact of institutions on the economic performance of states. David Baron (2010) pointed out the importance of strengthening the nonmarket environment. Problems such as the cause of prolonged stagnation or absolute decline of well-being in some societies, causes of different paths of historical changes are problems that economic science is interested in. Besides, there are always the interests of the ruling elite directed towards institutional changes and the basis of economic policy. In this regard, informal rules, customs, and culture (Pejovich, 2003) can slow down or provoke an inadequate response to changes in formal rules. According to Acemoglu, which inspired our research, elites have great power to change rules and shape institutions (Acemoglu et al., 2014).

Three groups of variables have an important impact on economic output. These are the rule of law, the protection of property rights, and human capital. This research included eight European countries with various path dependence. Since 2000, numerous scholarly articles have been published on the impact of the rule of law and human capital on GDP. However, earlier studies and reports do not measure the relative contribution to economic growth that human capital, the rule of law, and the degree of protection of property rights have. The rule of law and property rights protection are not statistically associated in a model. The specificity of this study lies in measuring the relative share of the human capital index, the rule of law, and the protection of property rights in GDP growth per country. In order to determine the relative share of overall indices in GDP growth per country, a graphic representation and regression model were used.

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2. Literature Review

Economists such as Acemoglu, Robinson, Gallego, Woodberry have improved the analysis of the institutional impact on the economy (Gallego & Woodberry, 2010). The authors offered:

1. new aspects,
2. more diverse argumentation,
3. more sophisticated analysis, compared to previous institutionalists.

1. This group of authors has demonstrated the importance of the influence of political

elite decisions on institutional change. As Becker (1983) argued, there will be the possibility of a significant change in the situation, where elites have certain interests. The direction in which elites operate usually changes when they are forced to, and the interest of organizations occurs in a situation where it is more profitable to invest in politics in order to change these rules than to invest in the context of existing policies and regulatory constraints. In distinguishing political institutions, that govern the allocation of *de jure* power in society (Acemoglu & Robinson, 2006) and economics (affecting strengthening and protection of property rights), there is a need to analyze the success of institutional management changes. The way the changes can be will depend on factors on the side of the elite but also on the side of citizens. Elites are characterized by different degrees of commitment, not only to proposing new institutional changes but also to their implementation and strengthening of the rule of law. Citizens are distinguished by a smaller or greater degree of trust in institutions, which is one of the social capital variables. The problem of institutional trust is particularly pronounced in a number of transitional societies, for instance in Serbia, which is characterized by low stocks of social capital. Social capital is a kind of political elixir and the value of networks that assimilate institutional changes with reduced transaction costs (Acemoglu & Robinson, 2012). According to Knowles (2005), the issues of social capital represent a very important factor in the mentioned issue.

2. Detailed data and rich argumentation of the influence of institutions on economic growth in the works of Acemoglu et al. (2012), date back to the distant colonial era, and through the application of quantitative analysis bring a whole range of cause-and-effect results.

3. Sophisticated analysis on the relationships among institutions, human capital, and economic development (Acemoglu et al., Robinson 2014) is based on the long-term data series, using OLS regression, semi-structured models, and other techniques, whereby the authors showed a significant degree of scientific creativity.

The link between the rule of law and growth was in focus in the recent research papers on China - a country that has implemented modernization following a model atypical of Western countries. According to Zhon Zhang (2018), the recent decline in China's growth rate may be explained by an underdeveloped rule of law system. According to Andrei Lisitsyn-Svetlanov, Aleksandar Vasilevich -Malko,and Sergei Fedorovich Afanas'ev (2018), the correlation between economic and judicial institutions becomes more significant because efficient market relations exist only in a legal framework. The legal framework provides all interested agents with high institutional and procedural standards in the field of justice. As for developing countries, Pavle Petrović, Danko Brčerević, and Mirjana Gligorić (2019) highlight the key importance of the rule of law to economic growth. According to the authors, growth in Serbia is 1 percentage point behind due to an underdeveloped rule of law, primarily because of the weakness of institutions. Thi Thuy Huong Luong, Tho Minh Nguyen, and Thi Anh Nhu Nguyen (2020) investigated the connections between the rule of law, economic growth, and the shadow economy in

18 transition countries. According to the authors, the size of the shadow economy could be controlled by improving the effectiveness of the rule of law and the growth of the economy. Analyzing the impact of the rule of law on economic growth in a sample of 41 countries, the authors came to interesting results (Shevchuk et al., 2020). According to these authors, the rule of law benefits are a factor in the CEE's economic growth and the former Soviet Union countries. However, no such dependence has been identified for Asia and Latin America. On the other hand, according to the authors, further exploration of functional linkage between the rule of law and economic growth requires additional research using WJP sub-indices and expanding the number of independent variables in regression models (*ibid.*).

3. Sample Design and Analysis

This chapter measures and analyzes the impact of human capital, the rule of law, and the degree of protection of property rights on GDP/capita PPP. As the instrument for measuring human capital, it was used the human capital index (World Economic Forum, 2017). Human capital represents the economic value of a set of skills an employee has. For economic policymakers, human capital refers to the capacity of the population that strives for economic growth. Traditionally, human capital can be linked to education and experience. Lately, human capital has included the health aspect of the nation as well (physical, cognitive, and mental health). According to the newest WEF report (2017), the human capital index ranks 130 countries. Countries are ranked based on the extent of the development and implementation of human capital potential. Covering 21 indicators, the human capital index measures on a scale from 0 (worst) to 100 (best) how well countries are developing their human capital across four thematic dimensions such as capacity, deployment, development, and know-how. The human capital index considers five distinct age groups to capture the full demographic profile of a country (WEF, 2017). For the purpose of the research, the overall human capital index is used.

A synthetic index is used to measure the rule of law (World Justice Project, 2018). This index measures how the rule of law affects the daily lives of 113 countries. The measurement is carried out on a sample of more than 110,000 citizens and based on the evaluation of 3000 legal experts collected worldwide. The rule of law is evaluated on the basis of 44 indicators organized in 8 composite factors (indices): Constraints on government powers, absence of corruption, the openness of the government, fundamental rights, order and security, regulatory enforcement, civil justice, criminal justice. The values of each of the indices range from 0.00 (minimum value) to 1.00 (maximum value). The total value of the rule of law index is calculated on the basis of the average value of 8 indices (WJP 2018). The analysis uses the overall index of the rule of law, the regulatory enforcement index, and the absence of corruption index.

The international property rights index (Levy-Carciente2019) is used when studying the problem of property rights and their impact on economic development. This

synthetic index aims to offer politicians, researchers, businessmen, and government officials the instrument for understanding the significance of the impact of private ownership on economic development. In societies where private property and the rule of law are respected, citizens enjoy economic freedom from a strong property rights system (Dedigama & De Soto, 2008). The index concept is based on the assumption that there is a significant correlation between property rights and the nation's economic growth. The international index of property rights consists of three sub-indices: 1. The legislative and political environment, 2. Physical property rights, and 3. Intellectual property rights. The overall grading scale of the IPRI ranges from 0 to 10, where 10 is the highest value for a property rights system and 0 is the lowest value (most negative) for a property rights system within a country (Levy-Carciente, 2019).

In this study, it was used a self-structured sample. Eight countries were selected for the sample: Germany, Czech Republic, Hungary, Serbia, Italy, the United Kingdom, Spain, and Sweden. The selection of countries in the sample was intentional. While choosing it, the countries' business culture, path dependence, and geopolitical situation have been taken into account. The criteria for the sample were to compare the impact of institutional factors on the economic results of different groups of countries. The first group includes mature market economies with long-standing and stable institutions (Sweden, Germany, and UK). Italy and Spain represent the second group of mature market economies with continuous institutional design and unstable governments problems. The Czech Republic (the most developed country among post-socialist countries) and Hungary (having moderate reforms in the last period of the socialist government) are examples of the successful transition process.As the major part of current Serbia had a long development period based on the oriental traditions, the transaction costs of introducing new formal institutions and the rule of law are different and higher, compared to the Czech Republic and Hungary, still having a memory of the rule of law in Austro-Hungarian Empire (Pejovich, 2003).According to the latest reports, Serbia is classified by the IMF as part of the Emerging and Developing Europe group and by the World Bank as an upper-middle-income country (Levy-Carciente, 2019). Serbia is still living the period of transition recession, with the permanent problem of the weak rule of law. The pace of accession to the EU of Serbia and Western Balkan countries is strongly related to the performance of the rule of law and protection of property rights (Zaric, 2015). In this context, Serbia is identified as a separate group. Table 1 shows values of the overall human capital index measured in eight countries.

Table 1. The Human Capital Index

	Overall index
Germany	74.30
Czech Republic	71.41

Hungary	66.40
Serbia	62.50
Italy	67.23
UK	71.31
Spain	65.60
Sweden	73.95

Source: World Economic Forum 2017

Table 2 shows the values of the rule of law indices. The highest values of all three indices were recorded in the cases of Germany and Sweden. This can be explained by institutional consistency and continuity in these countries (North, 1990).

Table 2. The Rule of Law Indices

	Overall index	**Regulatory enforcement**	**Absence of corruption**
Germany	0.84	0.85	0.82
Czech Republic	0.73	0.71	0.65
Hungary	0.53	0.47	0.51
Serbia	0.50	0.48	0.44
Italy	0.66	0.61	0.63
UK	0.79	0.81	0.82
Spain	0.73	0.70	0.73
Sweden	0.86	0.84	0.91

Source: WJP 2018

Table 3 shows the values of property rights indices. This research, whose results are specially monitored by global companies and potential investors, shows that Serbia was ranked 110th, Hungary 48th, Italy 49th, Spain 35th, the Czech Republic 30th, Germany according to the overall property rights index 16^{th,} and UK 13th. Sweden is ranked the best among countries observed and occupies third place in the global ranking (Levy-Carciente, 2019).

Table 3. International Property Rights Indices, country comparison

	Overall index	**Physical Property Rights**	**Intellectual property rights**
Germany	7.85	7.60	8.29
Czech Republic	7.03	7.04	7.40

Hungary	6.22	6.53	6.73
Serbia	4.76	6.02	3.89
Italy	6.13	6.14	6.77
UK	8.04	7.87	8.47
Spain	6.45	6.61	6.72
Sweden	8.28	8.17	8.37

Source: Levy-Carciente 2019

The research started with the hypothesis H1: *Human Capital and GDP/capita PPP are positively correlated.* Table 4 shows the values of GDP/capita for eight countries (World Bank, 2018).

Table 4.GDP/cap/PPP (current int. $)

Germany	53074.5
Czech Republic	39743.6
Hungary	31102.5
Serbia	17434.9
Italy	41830.4
UK	45973.6
Spain	39715.4
Sweden	53208.9

Source: World Bank Group 2018.

In order to test the hypotheses, the correlation between the human capital index and GDP was measured (Table 5).

Table 5. Correlation between the Human Capital Index and GDP/cap PPP

		Human Capital Index	**GDP cap/ppp int $**
Human Capital Index	Pearson Correlation	1	,896**
	Sig. (2-tailed)		,003
	N	8	8
GDP cap/PPP int $	Pearson Correlation	,896**	1
	Sig. (2-tailed)	,003	
	N	8	8

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Authors' calculation

A significant correlation between the human capital index and GDP is achieved, and it is concluded that hypothesis H1 is confirmed.

The following research was based on hypothesis H2: *The rule of law and the GDP/capita PPP are positively correlated*. The correlation of the rule of law indices and GDP/capita PPP is measured to test the hypothesis. In Table 6, the values of Pearson's correlation coefficient between the rule of law indices and GDP are given.

Table 6. Correlations between Rule of Law Indices and GDP/cap PPP

		Rule of Law overall index	**Rule of Law Regulatory enforcement**	**Rule of Law Abscence of corruption**	**GDP cap/ ppp int $**
Rule of Law overall index	Pearson Correlation	1	,990**	,976**	,942**
	Sig. (2-tailed)		,000	,000	,000
	N	8	8	8	8
Rule of Law Regulatory Enforcement	Pearson Correlation	,990**	1	,962**	,905**
	Sig. (2-tailed)	,000		,000	,002
	N	8	8	8	8
Rule of Law Abscence of Corruption	Pearson Correlation	,976**	,962**	1	,936**
	Sig. (2-tailed)	,000	,000		,001
	N	8	8	8	8
GDP cap/PPP int. $	Pearson Correlation	,942**	,905**	,936**	1
	Sig. (2-tailed)	,000	,002	,001	
	N	8	8	8	8

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Authors' calculation

In all three variants of the index, very high values of Pearson's coefficient were obtained. Notably, the sub-index of "absence of corruption" has a slightly more significant impact on GDP than the "regulatory enforcement." Therefore, it is concluded that hypothesis H2 is confirmed.

In addition, hypothesis H3 has been tested*: Property Rights Index and GDP/capita PPP are positively correlated*. In Table 7, correlations between 3 property rights indices (overall index, physical property rights index, and intellectual property rights index) and GDP were measured. The results are the following values of the Pearson's coefficient: 0.922, 0.801, and 0.937, respectively. It can be noted that the sub-index "intellectual property rights" has a more significant impact on the growth of GDP than the sub-index related to the protection of physical property.

Table 7. Correlations between IPRI and GDP/cap PPP

		IPRI overall	**Physical Property Rights**	**Intellectual property Rights**	**GDP cap/ ppp int $**
IPRI overall	Pearson Correlation	1	,956**	,963**	,922**
	Sig. (2-tailed)		,000	,000	,001
	N	8	8	8	8
Physical Property Rights	Pearson Correlation	,956**	1	,846**	,801*
	Sig. (2-tailed)	,000		,008	,017
	N	8	8	8	8
Intellectual property Rights	Pearson Correlation	,963**	,846**	1	,937**
	Sig. (2-tailed)	,000	,008		,001
	N	8	8	8	8
GDP cap/ppp int $	Pearson Correlation	,922**	,801*	,937**	1
	Sig. (2-tailed)	,001	,017	,001	
	N	8	8	8	8

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Authors' calculation

It is concluded that hypothesis H3 is confirmed. The analysis showed a high degree of correlation of all three observed indices with GDP/capita. Considering the very high value of Pearson's coefficient in all cases (Table 8), it is not possible to conclude, from

the analysis that included the used reports, what is the relative share in economic growth that human capital, the rule of law, and the degree of protection of property rights have.

Table 8. Correlation Matric: Overall Indeces and GDP/cap PPP

		Human Capital Index	Rule of Law overall index	IPRI overall	GDP cap/ ppp int $
Human Capital Index	Pearson Correlation	1	,881**	,939**	,896**
	Sig. (2-tailed)		,004	,001	,003
	N	8	8	8	8
Rule of Law overall index	Pearson Correlation	,881**	1	,917**	,942**
	Sig. (2-tailed)	,004		,001	,000
	N	8	8	8	8
IPRI overall	Pearson Correlation	,939**	,917**	1	,922**
	Sig. (2-tailed)	,001	,001		,001
	N	8	8	8	8
GDP cap/ppp int $	Pearson Correlation	,896**	,942**	,922**	1
	Sig. (2-tailed)	,003	,000	,001	
	N	8	8	8	8

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Authors' calculation

In order to determine the relative share of overall indices in GDP growth per country, a graphic representation was used. To achieve a precise and comparable graphic representation of the country distance to overall index averages, it was necessary to align the overall rule of law index values and IPRI overall with the human capital index. To achieve this, it was used weighting. The rule of overall law index is multiplied by 100 while IPRI overall is multiplied by 10. Figure 1 shows the countries distance to index averages.

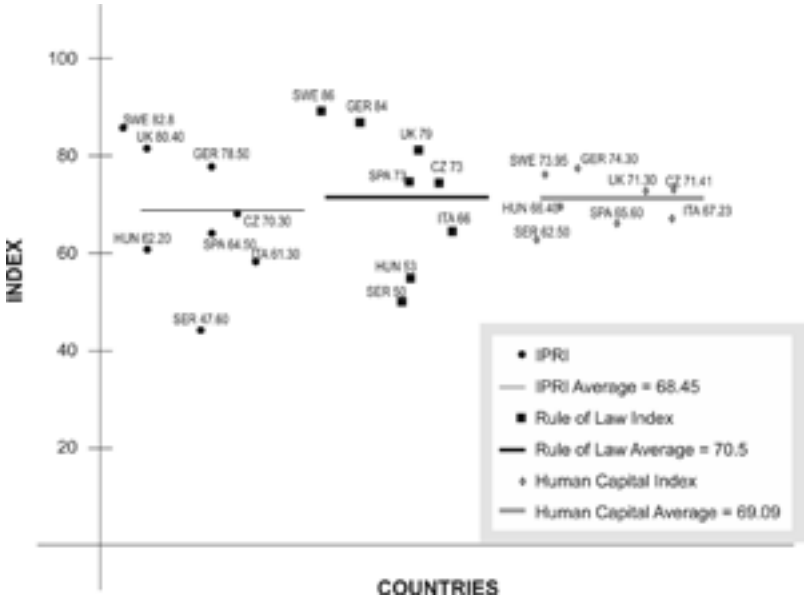

Figure 1. Country distance to overall index averages
Source: Authors' calculation

As can be seen, in the Serbian case it was measured the largest distance below the IPRI average. The intention was to calculate how much GDP is growing in the case of an IPRI increase by one percentage point. The following regression model was set:

$$Y_i = \beta_0 + \beta_1 x_{i+} \varepsilon_i \quad (1)$$

Where, for $i=n$ **observations:**

Y_i= dependent variable (GDP/cap/PPP int. $)
β_0 = y intercept (constant)
β_1 = slope
x_i= the independent variable or predictor: IPRI (International property rights index)
ε_i = random error

Based on the results (Table 9), it can be concluded that 84.9% of the variability of the dependent variable GDP can be explained by the influence of the IPRI predictor, with the statistical significance p = 0.001 (Table 10).

Table 9. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,922[a]	,849	,824	4938,9413

[a.] Predictors: (Constant), IPRI weighted

[b.] Dependent Variable: GDP cap/ppp int $

Source: Authors' calculation

Table 10. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	826046206,852	1	826046206,852	33,864	,001b
	Residual	146358848,303	6	24393141,384		
	Total	972405055,155	7			

[a.] Dependent Variable: GDP cap/ppp int $

[b.] Predictors: (Constant), IPRI weighted

Source: Authors' calculation

Table 11 shows the contributions by coefficients.

Table 11. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-22149,890	10866,005		-2,038	,088
	IPRI weighted	911,766	156,681	,922	5,819	,001

[a.] Dependent Variable: GDP cap/ppp int $

Source: Authors' calculation

In order to carry out the interpolation of the model, there were considered two conditions in the Serbian economy. In the first case, the GDP /cap PPP for Serbia was used, which, according to World Bank 2017, amounts to 17434.9 int. $. From model 1 it follows:

$GDP1 = -22149.89+911.77*47.60–3815.26 \approx 17435\$$

where $\beta_0 cons.$ = -22149.890, β_1 = 911.77 and ε = -3815.26 for *IPRI* = 47.60

In order to measure the GDP change in case of an increase in IPRI, it is considered that the new *IPRI2* value is 41.40($\Delta IPRI$ =1percentage point). In this case, GDP increased by 911.77, so the new value was 18346.9$

$GDP2=-22149.89 + 911.77 * 48.60 – 3815.26=18346.9\$$

where $\beta_0 cons.$ =-22149.890, β_1 = 911.77 and ε = -3815.26 for *IPRI* = 48.60

$$\Delta GDP\ (\%) = \frac{GDP2 - GDP1}{GDP1} * 100 = 5.23\% \quad (2)$$

We can note that the jump of IPRI by 1 percentage point in the Serbian case leads to an increase of GDP/cap PPP of 5.23%. According to model 1 and equation 2, when the IPRI increases by 1 percentage point, the Hungarian GDP increases by 2.93%. Sweden, UK, and Germany have the highest scores for IPRI. According to model 1 and equation 2, for each increase in IPRI by 1 percentage point, there is an increase in GDP in the case of Sweden1.71%, the UK of 1.98%, and Germany1.72%. It can be concluded that countries with lower IPRI scores have higher GDP jumps in a percentage than those with the highest IPRI values. Although GDP jumps percent are higher in countries with lower IPRI, they are roughly equal to those recorded in developed countries if observed in real terms. This can be explained by the fact that countries with high IPRI have accumulated a higher mass of GDP over time.

4. Conclusion

Based on this analysis, it can be concluded that the impact of property rights protection (as a separate and important segment of the rule of law problem) is of the greatest importance for economic development. It means the research is not based on the non-causal association of the rule of law and property rights protection. The rule of law and the level of human capital have a positive impact on economic development. It is also confirmed the result of Acemouglu's research with Gallego and Robinson that the impact of institutional factors is more important than the impact of education and the formation of human capital (Acemoglu et al., 2014).Investments in the human capital of one country affect the GDP growth in others, primarily in neighboring countries (Malešević-Perović et al., 2018).The institutional changes, on the contrary, are not characterized by such a type of spillover. Acemoglu and Autor (2012) published a review of Goldin's and Katz's work (2010) on the race between education and technology. But, paraphrasing the title of this study, there are significant researches on the "race between" education and institutions. The conclusions are of great importance to the creators of economic policies. It should be kept in mind that different political institutions create different, divergent influences in protecting their rights (Justesen, 2015).

The regression analysis done for Serbia and Hungary, i.e., Germany, Sweden, and the United Kingdom, showed that a change in the IPRI value by one percentage point leads to a more significant positive impact on GDP growth in a group of less developed countries than in the leading developed economies. This can be explained by the degree of protection of property rights already achieved in developed market economies, representing a historical development and one of the foundations of the rise of Sweden, Germany, and the United Kingdom.Whether the institutional infrastructure, starting from a constitutional solution, supports economic activity is a question discussed in the literature, and Daron Acemoglu, Georgy Egorov, and Konstantin Sonin (2012) paid attention to it, too. In post-communist countries, where the very concept of transition must be understood, first of all, as a process of redesigning institutional infrastructure (and not primarily as property transformations, macroeconomic stabilization, and liberalization), the efforts to define property rights and create instruments for their protection are crucial, as argued by the data on the connection of these changes (based on international indices) with changes in the field of economic development.

Conflicts of interest/Competing interests

The authors declare no conflict of interest.

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DOI 10.14665/1614-4007-28-2-002

PAPER

International Migration as a Factor of Economic Development of Central, Eastern and Southern Europe

Giorgio Dominese[*] • Sergey Yakubovskiy[**] • Tetiana Rodionova[***] • Maryna Kachanovska[****]

Abstract This paper provides the analysis and assessment of the impact of international migration on the economies of Central, Eastern and Southern Europe, which are EU Member States, as well as Ukraine due to the geographical proximity and historical similarity with the CEE countries. To achieve this goal, modeling using panel data was chosen, which well approximates the presented data and can be used for further forecasting. The research has found that the GDP per capita of Poland, Slovakia, the Czech Republic, Austria, Slovenia, Spain, Italy, Greece, and Portugal depends on the inward and outward migrant remittance flows, the level of average annual wages and labor productivity. Foreign-born employment rate in these countries on average is not very high, and therefore is not a determinant of the economic situation of the studied countries. Ukraine's integration into international migration processes has increased significantly in recent decade, so a separate linear regression model has been created for Ukraine using the OLS method, based on which Ukraine's GDP per capita depends on migrant remittances inflows and outflows along with unemployment. The study also analyzes the impact of the COVID-19 pandemic on the selected economies and existing risks in the context of international migration. Spain, where the unemployment rate among foreigners rose to 15.3%, suffered the most from the coronavirus crisis. In addition, the countries of Central and Southern Europe depend on migrant workers, who are involved in such important sectors as health and services.

Giorgio Dominese[*], Sergey Yakubovskiy[**](✉), Tetiana Rodionova[***], Maryna Kachanovska[****]

[*] Professor, Chair of Transition Studies Research Network, Venice, Italy.
E-mail: g.dominese@transitionstudiesnetwork.org

[**] Doctor of Economics, Professor, Chair of the Department of World Economy and International Economic Relations, Odessa I. I. Mechnikov National University, Odessa, Ukraine.
E-mail: syakubovskiy@onu.edu.ua

[***] Ph.D. (Economics), Associate Professor of the Department of World Economy and International Economic Relations, Odessa I. I. Mechnikov National University, Odessa, Ukraine.
E-mail: t.rodionova@onu.edu.ua

[****] Competitor at the Department of World Economy and International Economic Relations, Odessa I. I. Mechnikov National University, Odessa, Ukraine.
E-mail: marina.kachanovska22@gmail.com

Keywords: international migration, migrant remittances, GDP per capita, COVID-19 pandemic, European Union, Ukraine.

JEL Classification: E24, F16, F22, F24, J61, O15, O52.

1. Introduction

At the present stage of the development of international economic relations, much attention is paid to the analysis of international migration processes, because they increasingly affect the economies of both countries of origin and destination of migrants. International migration has a positive effect on migrant donor countries through large remittances, and destination countries receive cheaper labor, which is one of the drivers of changes in the labor market in developed economies. The main factors of migration are primarily economic indicators, namely: GDP per capita, income level, unemployment and employment, tax burden. However, the socio-political situation is also important in making decisions about going abroad.

The Member States of the European Union are the most attractive to foreigners because of their stability in all spheres of life and high level of living standards. The fifth phase of EU enlargement, in which 10 countries joined the Union, facilitated active migration from the new EU members to the old ones by simplifying border crossings, making international migration a major economic issue. The European Union has always had a positive balance of migration, as the number of immigrants exceeded the number of emigrants. In 2019, 4.7% of the total EU population were not its citizens (Eurostat 2021). As of 2020, Germany and Spain were the leaders in this indicator - 543.8 thousand and 498 thousand people respectively, at that time the smallest balance of migration was registered in Poland and Romania. However, the European migration crisis (2015) has led to a significant increase in illegal migration, which is currently one of the most important problems in this area.

The global COVID-19 pandemic has affected both host and migrant supply countries. According to data published by the Organization for Economic Cooperation and Development (OECD, 2021), in the first half of 2020, the issuance of new visas and entry permits to member countries of this organization fell by almost 60% compared to the same period in 2019. In addition, 2020 was marked by an increase in reverse migration. In the short term, mobility will not return to previous levels due to weak labor demand, persistently tight travel restrictions, and the widespread use of telework among highly skilled workers and distance learning. As of March 2021, emigrants from the 20 countries with the highest number of COVID-19 cases accounted for 31% of the total number of international migrants. Moreover, their remittances sent to countries of origin was set at about 37% of the total remittances worldwide (Migration Data Portal, 2021).

Ukraine ranks first in terms of territory size among European countries, but the penultimate place in terms of GDP, which according to statistics in 2020 is USD

142.25 billion, ahead of only Moldova. Ukraine is deeply involved in global migration processes, and from 2002 to 2004 the country recorded a negative balance of interstate migration, in the following years and to this day Ukraine has more immigrants than emigrants. However, according to unofficial data, Ukraine is a "donor" of migrants and an exporter of labor. In general, the Ukrainian diaspora numbers 5.9 million people worldwide and ranks 8th in this indicator. An important step in regulating international migration in the framework of Ukraine's European integration policy was the signing of the Association Agreement in 2014 between Ukraine, on the one hand, and the European Union, on the other hand. In accordance with Section III of this Agreement, both parties will contribute to solving the problems that cause migration, combating illegal migration and human trafficking, cooperation in the field of asylum, effective integration of foreigners, addressing discrimination against migrants, including in the process of employment, etc. (Official web portal of the Parliament of Ukraine, 2021). Within the framework of the above-mentioned topic, the Association Agreement provides for the development of a dialogue on international migration issues between Ukraine and EU Member States.

The signing of a visa-free regime between Ukraine and the European Union on May 17, 2017 has also contributed to the mobility of human resources and the growth of interstate migration between Ukraine and member states. It stipulates that Ukrainians can stay in the Schengen area for up to three months for 180 days, which has led to the fact that some migrants are illegally employed and go to work every six months. As a result, according to the State Statistics Service of Ukraine, as of December 1, 2017, the number of registered unemployed decreased by 9% compared to the same period last year. In addition, the level of average monthly wages increased by 37%.

The approval of the Strategy of the State Migration Policy of Ukraine on July 12, 2017 is an important event for achieving successful European integration of the country, as well as a necessary step in the field of migration under the Association Agreement. It consists of two stages. Currently, Ukraine is in the first stage (2018-2021), which aims to improve regulations in migration policy. As stated in the Strategy, the improvement of Ukrainian migration policy will help improve Ukraine's relations with EU member states and increase immigration flows (Official web portal of the Parliament of Ukraine, 2021).

In 2013-2016, the migration balance in Ukraine tended to decrease due to a significant reduction in the number of arrivals because of the military conflict in the country (see Figure 1). Since 2017, the number of immigrants and emigrants has been steadily increasing, which is one of the consequences of the introduction of a visa-free regime for citizens of Ukraine. The main drivers of emigration from Ukraine have always been economic factors, namely higher incomes and better education, and since 2014 - the socio-political situation in the country. According to IOM, 76.4% of all migrant workers have found a job.

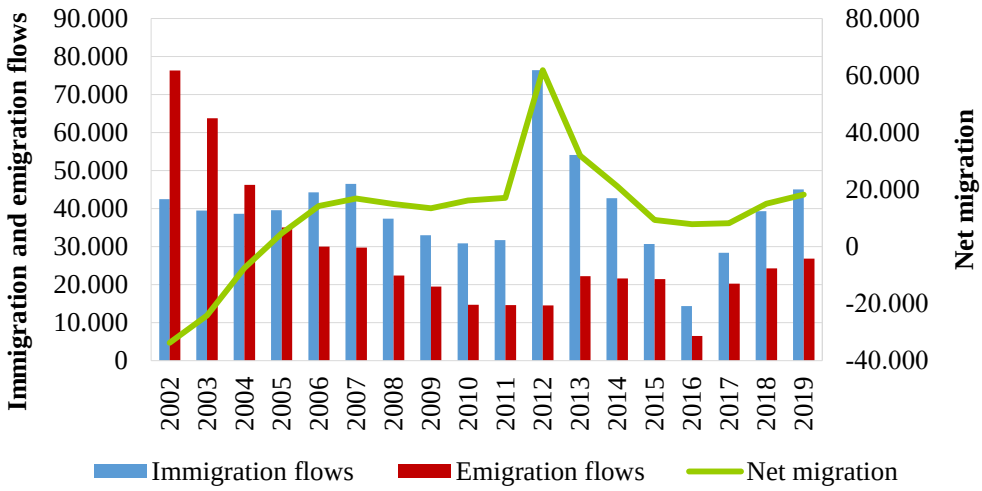

Figure 1. Immigration and emigration flows (on the left axis), net migration (on the right axis) in Ukraine in 2002-2019.

Source: calculated and compiled by the authors based on (Eurostat 2021).

The growing flows of labor migration from Ukraine are influenced by the following factors. First, the devaluation of the national currency from 15.7 to 24.8 hryvnias per US dollar in 2014, and at the peak of the collapse the exchange rate reached even 30 hryvnias per US dollar. Secondly, the mass closure of enterprises due to the military-political situation in the country, as a result of which the unemployment rate increased by 9.3%. For comparison, in 2013 it was 7.2%. Third, too rapid price growth, which did not meet the minimum wage in the country. If in 2013 there was a slight deflation in Ukraine (-0.2%), in 2015 inflation reached 48.7%. Low wages have always been the main driver of labor migration from Ukraine to other countries, especially European ones. According to data published by the State Statistics Service, in Ukraine the average employee receives a salary of USD 258, and abroad – USD 722.

However, the problem of outflow of Ukrainian students abroad is more urgent, as their number has increased more than sevenfold over the last 10 years. As a result, Ukraine is losing its intellectual and innovative potential, as most educational migrants aim for further employment in the destination country. Poland is a priority for Ukrainian students - their share is almost 48% of the total (Sedikova I., Nikolyuk O., 2020). Russia, despite being an aggressor country, still attracts Ukrainian youth and is a second destination for study abroad; it is followed by Germany. According to the results of the Osvita.ua study, if Ukrainian students currently studying abroad remained in Ukraine, it would bring more than UAH 1 billion to the higher education system. On the other hand, Ukrainian students are an important resource for Poland,

as they make up 55% of all foreign students in the country and most of them work on their own to pay for it, which has a positive impact on both the Polish higher education system and the economy of Poland as a whole (Onischenko O., 2018).

This study also examines the countries of Central, Eastern and Southern Europe because of their historical similarities, relatively equal levels of socio-economic development, except for Austria, Italy and Spain, which are leaders in the region, Moreover, CEE countries are in the same geographical region with Ukraine, they are a priority for Ukrainian migrant workers, play an important role in the transformation of its economy and serve as a vector of development and an example of successful improvement and stabilization of the macroeconomic situation.

Table 1. Net Migration in selected EU countries in 2010-2019, number

Country	**2010**	**2012**	**2014**	**2016**	**2018**	**2019**
Bulgaria	-	-2512	-2112	-9329	-3666	-2012
Czech Republic	-12752	-11769	1429	25219	39168	28090
Greece	-1579	-66494	-47791	10332	16440	34439
Spain	-42672	-142553	-94976	87421	334158	454232
Croatia	-4171	-3918	-10220	-22451	-13486	-2422
Italy	380085	244556	141303	143758	175364	153273
Cyprus	15913	-629	-14826	2499	8102	8797
Hungary	12154	10822	12368	13729	34759	38786
Malta	74	4251	9346	8748	17102	20343
Austria	19327	39745	62771	65081	38421	40887
Poland	-62995	-58057	-46024	-28139	24289	44506
Portugal	3815	-37352	-30056	-8348	11570	46055
Romania	-48100	-2920	-36836	-70123	-59083	-31314
Slovenia	-521	644	-490	1051	14928	16213
Slovakia	3383	3416	1713	3885	3955	3632

Source: calculated by authors based on (Eurostat, 2021).

The data presented in Table 1 indicate that most CEE and Southern European countries have been net recipients of migrants over the last 10 years. The exceptions are Bulgaria, Croatia and Romania, whose migration balance is consistently negative, as

they are the poorest countries in the EU and therefore indigenous people emigrate from the country in search of better living conditions.

Italy and Spain are leaders in the balance of migration, especially Spain, which until 2014 was a donor country for migrants. Italy is one of the first European countries to which immigrants arrive due to its central position in the Mediterranean. However, from 2018, the number of immigrants arriving by sea is significantly reduced (from 117 th people in 2017 to 34 th people in 2020). The largest numbers of migrants come from Romania (23% of all migrants), Albania (8.4%) and Morocco (8%). According to Caritas-Migrantes, Italy ranks second (following Germany) in the number of foreigners in the EU (almost 9% of the country's total population). However, most immigrants are unskilled, which is not very conducive to Italy's economic development. The primary reasons for leaving the country are the opportunity to earn higher incomes. For comparison, the average wage in Italy in 2019 was 31.6 thousand euros, and in Germany - 42.4 thousand euros (Country Economy, 2021). In addition, more than a third of Italian emigrants are people with higher education. In general, for Italy there is a problem of loss of qualified personnel, because every year emigration flows from the country increase.

After the global financial crisis of 2008-2009, the number of immigrants to Spain decreased significantly due to the slow recovery of the economy, as well as too high unemployment. Nevertheless, since 2014, annual immigration flows in Spain have increased by 48%, with the largest number of foreigners coming from Colombia and Morocco. One of the reasons for immigration to Spain for residents of non-European countries is employment, and for residents of European countries - favorable climatic conditions. The emigration movement from Spain in 2019 was mostly directed to such host countries as the United Kingdom and France. One of the highest unemployment rates in the EU, which is 16.3%, has a positive effect on the decision to emigrate from the country. In 2013, when the minimum migration balance was recorded in Spain, the unemployment rate among the 25-54 age group was almost 27%.

Poland and the Czech Republic, with historically negative migration balances, are now net recipients of migrants, unlike Croatia. If in the Czech Republic the number of emigrants exceeded the number of immigrants only in 2010-2012, in Poland - during the entire period, except 2017-2019.

In recent years, the largest number of Polish emigrants is concentrated in Ukraine, Germany, Great Britain and the Netherlands. Many Polish students choose to study in other EU countries because of their higher level of education and greater career opportunities. In turn, Ukrainian students immigrate to Poland for the same reasons. Also, a large number of Polish nurses, caregivers and workers leave the country in search of work due to low wages. For example, the average basic salary of a nurse in Poland is ≈19.6 thousand euros / year, while in Germany and the Netherlands ≈60.6 thousand euros / year (SalaryExpert, powered by ERI, 2021).

According to Inter Nations, in 2019, the Czech Republic was included in the ranking of the top 10 best countries among 64 destinations for immigrants. Foreigners living in the Czech Republic are satisfied with the country's transport infrastructure, travel opportunities and the general state of the economy. The largest share of immigrants in the Czech Republic are citizens of Ukraine (16.3%), Great Britain (2.5%), Germany (2.2%), Belarus (1.3%) and Russia (0.7%).

Due to the fact that Poland receives the largest number of labor migrants among OECD countries, and the number of emigrants from the country is declining, unemployment in Poland may increase and problems may arise in low-paid sectors in other countries. The main reason for entering the country is employment. As of 2017, 42% of all immigrants were from other EU countries. Labor migration has a positive effect on the Czech labor market, as domestic labor is unable to meet demand due to the mismatch between the needs of the labor market and the professions of graduates and trainees in the Czech Republic, mass undeclared work and strict rules hindering flexible employment.

Since 2010, Croatia has been a migrant donor country, as the number of emigrants from the country surpasses the number of immigrants, and as a result, it has a negative balance of migration. Most people of working age emigrate, and as of 2015, about 50% were aged 20-44. As in Poland, a significant number of doctors are leaving the country, which worries the authorities. Croatia is currently one of the three EU states from which the largest number of health workers emigrate. Immigrants in Croatia are citizens of Bosnia and Herzegovina (12,000), Serbia (4,000) and Kosovo (3,500). Thus, migration flows in the country are closely linked to the former states of the Kingdom of Yugoslavia.

2. Literature review

Over the past two decades, the number of migrants has almost doubled, leading to imbalances in many national economies. In 2020, the total number of migrants amounted to 280.6 million people, or 3.6% of the world's population (Migration data portal, 2021). That is why international migration is the focus of many scientists from different industries and regions of the world, because it restructures not only the demographic and social component of countries, but also economic one. Many scientific studies are devoted to identifying and assessing the influence of international migration on the social-economic development of various countries.

Among the latest relevant studies - the paper of G. Domineze et al. (2020) that provides an analysis of the migrant flows to the EU during the recent years. Econometric analysis reveals that the main drivers of the immigration process in the EU countries are GDP per capita and income levels in EU member states. The authors also consider Ukraine's participation in this process and find that remittances have a significant impact on its balance of payments and final consumption of households in 2019.

I. Herceg et al. (2020) have also made a significant contribution to the study of migration processes in the EU. An econometric evaluation of the model based

on previously presented data from the panel revealed that with each year of EU membership, net emigration from new EU countries to other EU member states increases by 0.0092 percentage points. Immigrants from the new members also tend to move to Western Europe. In addition to the higher level of GDP per capita, the authors of this study identify the inability of young people to find attractive employment in their country of origin after graduation as one of the most important factors of emigration, leading to "brain drain".

J. Soava et al. (2020) consider that the migrant remittance inflows have a positive effect for economic growth, especially in developing countries, and labor employment contributes to their social-economic development. Due to the effective integration of migrants from less developed EU countries into national labor markets of other EU countries, states such as Sweden, the United Kingdom, the Netherlands, Ireland and Portugal have high overall employment levels, in contrast to Italy and Croatia. The authors also warn that in addition to the negative impact of the COVID-19 pandemic on migrant remittances to developing countries, the UK's exit from the EU will also have a negative impact, leading to a deterioration in the balance of payments of recipient remittance countries.

F. Fasani, J. Mazza (2020) devoted their research to international migration during the COVID-19 and assessing risks for immigrants in the EU. It was determined that foreign populations in Germany, Spain, Italy and Portugal are at the highest risk of losing their jobs than in Belgium and the United Kingdom. On the other hand, on average, migrants are less at risk of employment than indigenous Europeans. The authors propose to revise the migration policy for migrants, dividing, based on which sectors they are involved: important or "less" important.

Pál Bite et al. (2019) describe international migration in the CEE countries.. In addition to economic factors of migration, the authors also highlight such social factors as history and culture of the country, corruption and nepotism, religion and linguistic features, confirming their importance in previous studies: linguistic, religious and cultural differences negatively affect migration flows by 0.76, 0.29 and 0.34 percent, respectively. From an economic point of view, it was confirmed that labor emigration from CEE countries has a positive effect on the countries of origin of migrants, as their remittances raise standards and quality of life, as well as the purchasing power of recipients. The authors emphasize that remittances should be directed to investment, not consumption.

O. Pikulyk (2019) notes that Ukraine is dominated by the phenomenon of labor emigration, which chooses as destinations Poland, Russia, the Czech Republic and Germany. Ukrainian emigrants are mainly employed in construction, agriculture and households, as well as trade and services. On the one hand, the outflow of human resources from Ukraine reduces tensions in the national labor market and the level of poverty in the country, but, on the other hand, it risks losing the labor and intellectual

share of individuals, which hinders the development of the country in the economic context. The author of the study sees the solution to the above problem in creating favorable conditions for the functioning and development of small and medium-sized businesses in Ukraine, legalization of shadow employment and raising wages, as well as macroeconomic stability. One of the recent researches, published by Mihaela Simionescu (2018), prove the positive impact of emigrants from the new EU countries on the economic growth of the old ones. According to the panel data model, the economic integration of the CEE states is a driver of emigration from the countries of this region to the EU-15.

O. Malynovska's paper "Labor Migration of Ukrainian Citizens Abroad: Challenges and Ways to Respond" (2018) reveals the negative consequences of Ukrainian emigration for their Motherland. Among the main negative effects on the national economy, the author singles out: the loss of part of the labor and intellectual potential, democratic transformations in the state caused by the outflow of educated youth, and the general shortage of workers. According to this study, to solve the migration problem, first of all, it is necessary to improve migration policy and legislation, as well as to raise awareness of the Ukrainian population on migration issues.

The following papers - Dominese et al. (2020, 2021), Lomachynska et al. (2020), and Yakubovskiy et al. (2020) reveal the influence of primary income, which includes remittances of migrants, on the current accounts of the EU countries.

3. Hypothesis, methodology and data

To identify and assess the impact of international migration on the economies of countries of origin and supply of migrants, researchers use a variety of statistical and econometric methods, the most popular of which are the Granger causality test, gravity models, intermediate capability models, linear regressions and panel data models.

Given the topic and features of this study, to model the impact of international migration processes on the economies of Central, Eastern and Southern Europe, the last of these methods of econometric analysis was chosen. First, panel data models allow individual heterogeneity to be taken into account. Second, they contain a large number of observations and thus provide more information, they are characterized by greater variation and less collinearity explain the variables, they give more degrees of freedom and provide greater efficiency of estimates. Third, panel data provide an opportunity to study the dynamics of changes in individual characteristics of population units.

It should be noted that panel data require certain methods of analysis and interpretation. When analyzing panel data, it is necessary to choose which of the panel data models (pooled OLS model, model with fixed effects or model with random effects) is most suitable for a particular situation. The first one assumes that the population units do not have individual differences. The model with fixed effects assumes that each unit of the population has its own specific individual characteristics, which for each

particular object are constant over time. If the population units differ in their individual characteristics, but these differences are random, then in this case it is better to consider a model with random effects.
In general, the model is presented in the following form:

$$Y_{it} = \alpha + \beta_1 x_{1t} + \beta_2 x_{2t} + \ldots + \beta_n x_{it} + v_{it},$$

where

Y_{it} – endogenous, dependent variable;

α – constant;

x_{1t}, x_{2t},..., x_{it} – exogenous variables of the model; β*1*, β*1* , … , β*n* – regression coefficients;

v_{it} – residuals;

i – number of observations (countries);

t – time variable.

Thus, the hypothesis to be investigated is the hypothesis of the impact of international migration on the economies of Central, Eastern and Southern Europe. The selected group mainly includes countries that are net recipients of migrants, with the exception of Bulgaria, Croatia and Romania. That is why it is advisable to identify the impact of migration on their economies, expressed in terms of GDP per capita. To obtain more accurate models, Romania, Croatia, Bulgaria, Malta and Cyprus were excluded due to the lack of separate data. The following model is proposed to determine the impact of international migration:

$$GDP\ per\ cap = \alpha + \beta_1 FER + \beta_2 LP + \beta_3 AW + \beta_4 RI + \beta_5 RO \quad (1)$$

where

α – Constant

GDP per cap – Gross domestic product per capita

FER – Foreign-born employment rate

LP – Labor productivity

AW – Average wages

RI – Inward remittance flows

RO – Outward remittance flows

Thus, in order to achieve this goal, the data of 10 countries for 20 years (2000-2019) were systematized for the formed group of the Central-Eastern and Southern regions of the EU. A panel structure of data with a total number of 200 observations (1:1-

10:20) was generated. Based on the above assumptions concerning the impact of international migration processes on the economies of countries, a regression model of the dependence of GDP per capita on chosen indicators was analyzed. The main source of data: Eurostat statistical databases (Eurostat, 2021) and OECD Data (OECD, 2021). An OLS regression model is created to identify and evaluate the impact of international migration on Ukraine's economic development. GDP per capita in Ukraine is assumed to be affected by migrant remittance inflows and outflows, but for a more reliable model, control variables such as annual flows of immigrants and emigrants and the unemployment rate in the country are chosen because most immigrants in Ukraine are low-skilled workers and therefore occupy indigenous jobs. The following model is proposed, which determines the impact of international migration on the economy of Ukraine:

$$GDP\ per\ cap = \alpha + \beta_1 RI + \beta_2 RO + \beta_3 UR + \beta_4 Im + \beta_5 Em \quad (2)$$

where

α – Constant

GDP per cap – Gross domestic product per capita

RI – Inward remittance flows

RO – Outward remittance flows

Im –Immigration flows

Em – Emigration flows

The time period is 20 years. The main source of data: State Service of Statistics of Ukraine (SSSU, 2021).

4. Results and discussion

EU countries (Poland, Slovakia, Czech Republic, Austria, Slovenia, Spain, Italy, Greece, Portugal) have been selected for the analysis. After creating a regression model with the Pooled method and models with Fixed and Random Effects, a panel diagnostics was conducted to test which model is best suited to reflect the impact of international migration on the economies of these countries.

Three separate tests are used to select an appropriate model. Wald test is used to choose the best one between the Pooled model and the model with Fixed Effects. The Breusch-Pagan test determines the most applicable model between a Pooled model and a model with Random Effects. Hausman test compares models with Fixed and Random Effects. The results of the panel diagnostics of model 1 are presented in table 2.

Table 2. Panel diagnostics of the model 1.

Test	P-value	Interpretation of p-value
Wald test	6,77046e-020	Low p-values indicate a weak null hypothesis about the adequacy of the Pooled panel data model, preferring the model with Fixed Effects
Breusch-Pagan test	3,52012e-009	Low p-values indicate a weak null hypothesis about the adequacy of the Pooled panel data model, preferring a model with Random Effects
Hausman test	8,86589e-012	Low p-values indicate a weak null hypothesis about the adequacy of the model with Random Effects, preferring the model with Fixed Effects

Source: prepared by authors.

Based on the results of panel diagnostics of model 1, according to the Wald Test, the hypothesis about the adequacy of the Pooled model is rejected, preferring the model with Fixed Effects. The Breusch-Pagan test indicates a weak null hypothesis about the adequacy of the Pooled panel data model, preferring a model with Random Effects. The results of Hausman test point that the hypothesis of choosing a model with Fixed Effects is applied, the adequacy of the model with Random Effects is rejected. Therefore, a panel data model with Fixed Effects will be analyzed for selected EU countries.

The results of the empirical verification of the impact of international migration on GDP per capita are presented in table 3:

Table 3. Coefficients and their statistical estimate for the model 1.

Variables	Pooled method	Fixed effects method	Random effects method
	Coefficients (t-statistic)		
const	−15.4088*** (−5.680)	−29.0127*** (−7.657)	−14.4405*** (−4.606)
FER	0.152999*** (3.708)	−0.0568016 (−1.233)	0.0481356 (1.062)
LP	0.143239*** (4.403)	0.515337*** (5.414)	0.159673*** (2.639)
AW	0.589494*** (7.814)	0.683859*** (3.648)	0.670659*** (4.662)
RI	0.0745566 (0.6412)	0.771544*** (4.195)	0.662844*** (3.819)

RO	−0.478651*** (−3.341)	−0.618386*** (−3.733)	−0.540628*** (−3.188)
R^2	0.8341	0.9083	–
$F_{stat.}$	195.095	130.9097	–

*** – statistical significance at 1% level, ** – statistical significance at 5% level, * – statistical significance at 10% level.

Source: prepared by authors.

First, the coefficient of determination R^2 of model 1 with Fixed effects is 0.9083, which means that the variability of the dependent variable GDP per capita by 90.83% is due to selected factors.

Second, the high p-values of the independent variables LP, AW, RI, and RO indicate the "adequacy" of the hypothesis. These variables are statistically significant at 1% (***), pointing that there is only a 1% probability that the independent data coefficients will be zero, and 99% that they will be statistically different from 0. The FER variable is not statistically significant.

Third, the modulus of the Student's coefficients (t-statistics) of the variables LP, AW, RI and RO exceeds the critical value of the coefficient, which also indicates the importance of these factors.

Fourth, Fisher criterion of the model 1 is 130.9097, which is greater than its critical value. Thus, the obtained regression model well approximates the presented data and is "adequate".

After interpreting all the results, we obtain the following empirical model 1:

$$GDP\ per\ cap = -29.01 + 0.52LP + 0.68W + 0.77RI - 0.62\ RO \quad (3)$$

Thus, from the obtained model 1 we can conclude that the greatest impact on the dependent variable in Central, Eastern and Southern Europe have the migrant remittance inflows, because the β coefficient of this variable is the highest. Based on the signs of the coefficients, an increase in this indicator contributes to the growth in GDP per capita in this group of countries; an increase in remittance outflows leads to a decrease in GDP per capita.

The employment rate of foreigners is not statistically significant due to the fact that in the selected group of EU countries it is not very high, and therefore does not have a significant impact on their economies. β coefficients of labor productivity and the level of average annual wages are 0.52 and 0.68, respectively. As a result, the presented model is reliable and adequate, so it can be used for further forecasting.

Most remittances from and to selected CEE and Southern European countries are made through informal channels, so their actual volumes are difficult to track. For example, in Spain, despite one of the largest numbers of immigrants in the EU - 13.1% of the total population, the outflow of migrant remittances amounted to only 0.7% of

GDP in 2020 (World Bank, 2021). In Poland, inflows of remittances surpassed outflows during 2000-2017, and since 2018 the country has a negative balance on this indicator. In 2020, remittances to the country amounted to 0.9% of GDP. According to the latest data (2017), most remittances from Poland were sent to France, Germany, Ukraine, Lithuania and Belgium. In general, the largest share belongs to European countries. Due to a much larger reduction in migrant remittance outflows than inflows in the COVID-19 pandemic in Spain and Poland, by 24.6% and 13.2%, respectively, the current account balances in both countries improved (Bank of Spain, National Bank of Poland, 2021). In Croatia, outflows of migrant remittances also decreased by 16.3% along with significant decrease in investment income payments by USD 1.1 billion that helped to improve the balance of primary services by USD 1.2 billion. (National Bank of Croatia, 2021). In the Czech Republic, on the contrary, payments of compensation of employees increased by 1%.

According to the results of the panel data model, the level of employment of foreign population in the studied countries does not affect changes in GDP per capita, due to the low values of this indicator in some countries. The employment rate of migrants in Central, Eastern and Southern Europe is presented in Table 4.

Table 4. Foreign-born rate of employment in selected EU countries in 2010-2019, %.

Country	2010	2012	2014	2016	2017	2018	2019
Czech Republic	78.5	69.2	69.9	80.0	82.7	79.4	86.1
Greece	61.8	43.3	31.1	35.4	42.9	43.0	29.5
Spain	59.9	47.4	53.4	63.5	62.0	67.2	62.7
Croatia	-	-	-	-	-	79.0	79.5
Italy	62.4	58.4	54.4	55.3	53.2	58.9	62.4
Cyprus	78.5	73.1	71.4	65.3	70.0	69.8	73.5
Hungary	68.6	55.1	67.2	69.4	61.9	56.1	58.4
Malta	-	-	93.8	66.5	71.5	80.2	91.0
Austria	64.5	67.1	70.2	72.9	73.9	73.5	70.3
Poland	-	-	87.4	63.3	78.9	83.7	75.9
Portugal	53.2	-	-	78.5	67.7	70.7	74.6
Slovenia	-	71.1	48.8	65.6	65.3	84.5	84.2

Source: calculated by authors based on (OECD, 2021).

The analysis of Table 4 shows that Greece has the lowest level of foreign employment. both among the selected group of countries and throughout the EU. The employment rate of migrants in Italy has been increasing since 2017 and the share of employed migrants is 62.4%. This country has always had a low level of employment also among

the native people in 2019 only 58.1% of people were employed. Moreover, according to ANPAL. the number of foreigners looking for work in Italy has increased to 39.2% for EU citizens and up to 40% for immigrants from non-EU countries.

Spain tended to decrease the share of employed migrants by 2013 (50.7% in 2013 - the lowest value). However, currently the share of employed migrants is 62.7%. During the global financial crisis Spain had one of the highest unemployment rates for both migrants and natives. Unfortunately, the country still has a large percentage of low-skilled labor. but there are also positive changes in the Spanish labor market. According to the Employment Observatory of the National State Employment Service the number of unemployed registered with the state employment services in September 2019 decreased significantly to three million. The presence of foreign workers is an important factor in these indicators. given that they account for 12% of the unemployed and 11% of social security contributions. The largest number of workers from EU Member States who pay social security contributions come from Romania, Italy, the United Kingdom, Bulgaria., Portugal and France.

Due to the COVID-19 pandemic the unemployment rate reached 15.1% among Spanish people and 15.3% among immigrants (Eurostat. 2021). In Spain 2.5 million immigrants work in manufacturing. Most of them are from other European countries, but there also a lot of migrants from South and Central America. So quarantine restrictions negatively affect migrant mobility, which can lead to the economic downturn in Spain.

Poland had a significant decrease in the share of employed migrants in 2004 - to 27.2% when it joined the EU, but since 2005 the figure began to grow rapidly and now it is 75.9%. As Poland has traditionally been a “donor” of migrants, immigrants have a significant impact on its economy, as they occupy the jobs of Polish emigrants who go to other EU countries. A large number of migrant workers in Poland are Ukrainians, who mostly work in low-skilled occupations. Therefore, on the other hand, foreign migrants do not eliminate the phenomenon of “brain drain” from Poland. The country had a low unemployment rate of 3% throughout the period, and it is one of the few states where this figure has hardly changed during COVID-19, but in the second quarter of 2020 it has fallen slightly compared to similar period in the previous year.

International migration processes play an important role for the development of Ukraine’s economy, that is confirmed by the results of the regression model, coefficients of which are presented in Table 5.

Table 5. Coefficients and their statistical estimate for the model 2.

Variables	coefficients	Standard error	T-statistic	P-value	Significance
Const	3997.721	714.776	5.593	0.000	***
RI	0.104	0.025	4.149	0.001	***
RO	-0.802	0.227	-3.529	0.003	***

Variables	coefficients	Standard error	T-statistic	P-value	Significance
UR	-3.482	88.463	3.934	0.001	***
Im	0.009	0.008	1.045	0.314	
Em	0.000	0.008	-0.051	0.960	
R^2			0.917		
$F_{stat.}$			42.930		

*** – statistical significance at 1% level. ** – statistical significance at 5% level. * – statistical significance at 10% level.

Source: prepared by authors.

The adjusted coefficient of determination R^2 of model 2 is 0.917, which means that the variability of the dependent variable GDP per capita by 91.7% is explained by this set of independent variables.

According to the results of model 2, the p-values of the variables RI, RO and UR showed that they are statistically significant at the level of 1% (***). Const is also statistically significant at 1%, so it should be included in the regression equation. The independent variables of annual immigration and emigration flows (Im and Em) were statistically insignificant.

The critical value of Student's t-test in this case at a significance level of 1% is equal to 2.98. The modulus of the Student's coefficients of all selected variables exceed the critical value, which also means that they are significant.

The value of the Fisher criterion indicates the adequacy of the model as a whole. $F_{stat.}$ of model 2 is 42.930, which is greater than the critical value, which is 2.96. Thus, we can claim that the hypothesis of insignificance of this regression model is rejected. After interpreting all the results, we obtain the following empirical model 2:

$$GDP\ per\ cap = 3997.21 + 0.10RI - 0.80RO - 3.48UR \quad (4)$$

The results of model 2 show the remittances of migrants have a positive impact on GDP per capita in Ukraine. Outflows of migrants' remittances and the unemployment rate, on the contrary, have a negative effect on the dependent variable, with a change in the unemployment rate by 1 standard deviation leading to a change in GDP per capita of Ukraine by 3.48 standard deviations.

In general, migrant remittances are of great importance to the Ukrainian economy, as their volumes are so large that they can be compared to foreign exchange inflows under other balance of payments items (see Figure 2). Money transfers are one of the main channels for foreign currency to enter the country and contribute to the relative stability of the dollar. The balance of primary incomes in Ukraine has always been positive. Although, both in terms of investment income and in terms of wages income

far outweighs payments, the latter has a much larger share. Most of these cash inflows are in dollars (76.6%). as well as in euros (22.6%) and Russian rubles (0.2%) (National bank of Ukraine, 2021). The impact of remittances on Ukraine's economic growth is particularly noticeable in 2015-2016, when their amount doubled, and the GDP growth rate changed from 9.8% to 2.2%. Also in 2019, the Ukraine repaid the debt to the IMF in the amount of USD 1.6 billion, while the hryvnia revalued. Clearly, the increase in migrant remittance inflows have had a short-term positive impact on the Ukrainian economy, as most of them are saved and spent on consumption, and only 1% are invested. Nevertheless, migrant remittances increase effective demand in the country, which contributes to GDP growth.

Ukraine is the leader in Europe and Central Asia in the amount of remittances received from migrants in monetary terms, but in percentage terms to GDP it ranked 9th in 2019. Inward remittances to Ukraine have almost doubled in the last five years as a result of many Ukrainians leaving their homeland due to Russia's occupation policy on Ukrainian territory. In 2020, remittances to Ukraine amounted to 8.2% of GDP, while outward remittances – to only 0.4% of GDP. In 2015, remittance flows from Russia accounted for more than 25% of the total, and in 2021 - less than 10%. Currently, the largest share is occupied by remittances from Poland (28.3%), the United States (10.8%), the United Kingdom (8.5%) and the Czech Republic (6.4%) (Ministry of Finance of Ukraine, 2021). Therefore, migrant remittances are of great importance for the Ukrainian economy as their volumes significantly exceed other channels of foreign currency inflow to Ukraine (see Figure 2).

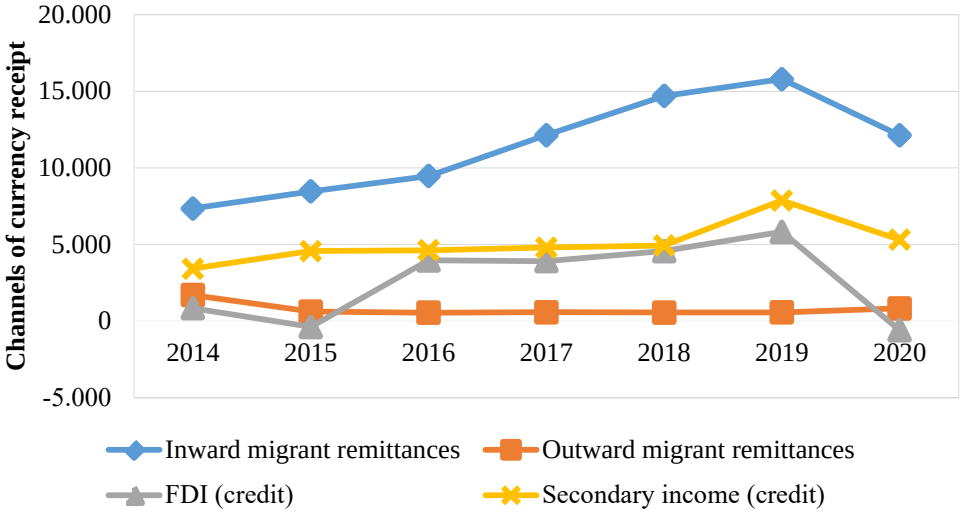

Figure 2. Volumes of migrant remittances. as well as foreign exchange earnings through other channels to Ukraine in 2014-2020, USD million.

Source: calculated and compiled by the authors.

Graphical analysis shows that the volume of inward migrant remittances in 2019 amounted to USD 15.8 billion, and the receipt of current transfers (secondary income), which include humanitarian assistance, monetary donations, etc. - USD 7.9 billion. In other words, remittances exceed the inflow of current transfers almost twice and almost three times the inflow of FDI.

As a result of the quarantine on March 11, 2020 due to the COVID-19 pandemic, many Ukrainian labor migrants returned to their homeland, which ultimately led to a decrease in remittances. 10% of migrant workers managed to arrive in Ukraine, and 10%, who planned to go to work abroad, decided to stay in Ukraine. At the end of March 2020, about 20% of Ukrainian workers employed in the construction industry in Poland returned to Ukraine. However, in the IV quarter of 2020, income under the item "compensation of employees" even slightly exceeded the figure for the same period in 2019. This is due to significant reductions in many EU countries for migrants (seasonal workers) in late summer - early autumn.

Due to the COVID-19 pandemic, many migrants have returned to Ukraine and cannot find work that has led to the rise in unemployment rate, which is a socio-economic risk. If in 2019 this indicator was recorded at 8.8%, then in the second quarter of 2020 it was 9.6%, which is the peak value for the whole year. On average, in 2020 the unemployment rate was 9.5%. Such an unplanned return of Ukrainian migrants has increased the pressure on the Ukrainian labor market, as the labor force looking for work has increased in number. According to Ukrinform, 17% of the workforce were hidden unemployed, ie their employment was reduced or they were on unplanned leave. If in November 2019 3 unemployed people applied for 1 job, in the same period of 2020 – 6 people, and the number of vacancies decreased by 34%.

Moreover, the solvency of those households that are dependent on remittances from their relatives who previously worked abroad has decreased. This can reduce consumer spending and investment. Thus, in addition to the fact that because of the introduction of quarantine in Ukraine many people lost their jobs (≈ 8%), they were joined by migrant workers who returned from abroad and also became unemployed. However, as of June 2020, some countries have eased the conditions for migrants. For example, Italy temporarily legalized migrants working in the agricultural sector, and Finland planned to bring 9.000 Ukrainian migrants to harvest.

In a crisis in neighboring countries due to a pandemic, there may be an influx of immigrants to Ukraine from these countries. At the same time, the flow of migrants may increase not only from countries - traditional suppliers of migrants to Ukraine, but also from EU countries. For instance, Hungary, which is the last European country to impose quarantine restrictions, may suffer much more from overdue actions, which in turn will be one of the drivers of Hungarian emigration to Ukraine. In 2020, Hungary's GDP decreased by 5%, and the unemployment rate rose from 3.4% to 4.3%. Nonetheless, according to the European Commission, in 2021 the Hungarian economy

will recover from the crisis, showing GDP growth of 5%, but unemployment in the country will still remain at the same level. Slovakia's GDP in 2020 decreased by 4.8%, and the unemployment rate increased by 6.7%. In addition, it is expected that in 2021 it will be 7.4%. Hence, it is quite possible that in the short term, due to the constant reduction of jobs, Ukraine will become a host country for migrants from Hungary and Slovakia (Yakubovskiy S., Kachanovska M., 2020).

Along with the existence of many risks for Ukraine, the positive consequences of the pandemic can also be identified. Restrictions in Europe have contributed to the outflow of Ukrainian applicants is decreasing. Thus, the introduction of restrictions on entry into the EU has significantly influenced the decision of entrants to study at European universities. The favorable fact is that in this case Ukraine does not lose its "intelligence", so it is likely that these students will stay in their country and in the future will improve the economic situation of their homeland, working here and not abroad.

5. Conclusion

The study found that Bulgaria, Croatia, and Romania have traditionally been donor countries to migrants, but the trend in Poland, the Czech Republic, and Spain has changed, and they are now net recipients of migrants. In this context, the key factors of immigration to selected countries of Central and Eastern Europe have been identified: climatic conditions and employment, but for the most part these factors attract migrants from non-European countries.

In order to model the impact of international migration processes on the economic development of selected EU countries, a panel data model was constructed. The economic significance of the obtained model for the countries of Central, Eastern and Southern Europe, which are members of the EU, is as follows: labor productivity, the level of average annual wages and remittances has a positive impact on GDP per capita, and outward remittances negatively affect the dependent variable. The employment rate of migrants is not statistically significant, and therefore does not influence GDP per capita. In addition, the inward remittances have a much greater effect on the economies of these countries, due to the fact that in some countries their volumes are much larger than the volume of outflows.

The analysis of the impact of COVID-19 on international migration allows us to conclude that the pandemic has increased unemployment among indigenous and foreign populations. For example, in Spain among migrants the figure reached a record 15.3% in 2020, and in Poland, on the contrary, it even decreased slightly.

Given that Ukraine is increasingly integrating into the international economic relations, interstate migration has become an important component of the economy that can influence its further development. Although according to official data, Ukraine is a net recipient of migrants, in reality the number of departures exceeds the number of arrivals. The main reasons for emigration from Ukraine are higher incomes and the socio-political

situation in the country. Moreover, due to the intensification of educational migration, there are risks of losing potentially highly skilled labor and innovation potential of Ukraine. At the same time, it should be emphasized that labor migration has much more positive consequences, because of the large volumes of remittances of migrants coming to Ukraine increase effective demand and stabilize the exchange rate. In order to practically confirm the importance of external migration for Ukraine, a regression model was created and the impact of incomes and outflows of migrant remittances, as well as the unemployment rate on GDP per capita was established.

Thus, based on the results of regression analysis of the obtained models, it could be concluded that international migration processes are an important and integral factor in the development of countries 'economies, having a mostly positive effect on them.
The COVID-19 pandemic has led to the repatriation of a large number of Ukrainian labor migrants, which has created additional tensions in the labor market and increased unemployment. Furthermore, the balance of «compensation of employees» of the balance of payments deteriorated as a result of a reduction in migrant remittances, although the overall current account balance improved. Therefore, it is necessary to state the importance of external migration at the present stage of development of Ukraine's economy.

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JTSR (2021) 28(2): 41-56
DOI 10.14665/1614-4007-28-2-003

PAPER

Revisiting Nonlinear Inflation – Growth Relationship: a Multidimensional Nonlinear Robust Approach

Noman Arshed[*] • Muhammad Shahid Hassan[**]

Abstract The changes in aggregate demand or aggregate supply vibrate economic activities in the goods market, further affecting the market's general price level. Therefore, one of the prioritized objectives of the policymakers in any economy is to manage the price level. Steady rising prices assist producers in expansion for higher profits, while high inflation discourages consumers. Based on this argument, the inflation growth dilemma using the quantile on quantile (QQ Model) approach for the 73 selected economies of the world will be investigated in this study. The study has found that general prices have a nonlinear and significant impact on GDP per capita in the 73 selected countries. This nonlinearity depends on the level of general prices and depends on the level of GDP per capita and development. The contour plots provide the optimal strategy to minimize the negative effects of inflation on GDP.

Keywords: Quantile-on-Quantile Approach, Nonlinear effects.

JEL Classification: E31.

1. Introduction

One monetary policy objective is to ensure a low and stable inflation rate to achieve financial stability and long-run stable economic growth (Bernanke, 2011). The low and stable inflation allows the smooth functioning of the markets, facilitating the efficient allocation of resources. It also helps the economic agents build up their confidence to decide to consume and invest respectively freely. Therefore, the monetary authorities desire low and stable inflation in order to enjoy sustainable economic growth. Inflation influences economic growth differently. The most prominent path which inflation takes

Noman Arshed[*](✉), Muhammad Shahid Hassan[**]
[*] Assistant Professor, Department of Economics and Statistics, University of Management and Technology, Lahore Pakistan.
E-mail: noman.arshed@umt.edu.pk
[**]Assistant Professor, Department of Economics and Statistics, University of Management and Technology, Lahore Pakistan.
E-mail: shahid.hassan@umt.edu.pk.

is through production decisions. For a representative firm, initiating output production requires prices to increase at a certain rate to achieve average profit. As predicted by firm theory, new firms will enter the production process and increase economic output if prices increase beyond it. After this macroeconomic phenomenon of misperception theory, sticky-price and sticky-wage theory play their role in increasing output up to the limit where these misperceptions are cleared, prices and wages are no more sticky, and the cost of production jumps with the rise in inflation and hinder economic growth. Consequently, there are two instances in the evolution of general prices where production-related decision changes direction.

Moreover, the empirical studies (Lucas, 1973; Akerlof & Yellen, 1985) concluded that changes in inflation appreciate production decisions, and therefore, production increases in response to an increase in inflation. The studies like Ghosh and Phillips (1998), Khan and Senhadji (2001), Sepehri and Moshiri (2004), Sweidan (2004), Lee and Wong (2005), Drukker et al. (2005), Pollin and Zhu (2006), Li (2006), Schiavo and Vaona (2007), Kan and Omay (2010), Espinoza et al. (2010), Ibarra and Trupkin (2011), Mignon and Villavicencio (2011), and Seleteng et al. (2013) have empirically found nonlinear inverted U-shaped impact of inflation on economic growth. There are some research studies in the literature as Barro (1996), Barro (2001), Singh and Kalirajan (2003), Hodge (2005), Hayat and Kalirajan (2009), and Jha and Dang (2011) and these studies have disclosed the negative impact of inflation on economic growth. Therefore, the inflation-growth trade-off has been inconclusive and has been found to be fragile because it is subject to model specification (Levine & Renelt, 1992; Hineline, 2007).

This article was designed to test the specification of inflation growth dilemma for 73 – selected countries from the world, and the study covers the sample period from 1960 – 2018, which is varying country-wise. Since the variables used are not normal, this study checked the quantile-wise correlations between GDP per capita and CPI. Rather than using the quadratic function or the threshold approach, this study used the quantile on quantile approach to explore for every quantile of CPI on every quantile on GDP per capita and further exploring to different development groups. This evaluation will help map CPI management and, consequently, lead to GDP per capital target management. The rest of the study has been organized as in the second section. We will briefly review the past studies and in the light of these studies. We will also discuss how this study is different from past studies. After reviewing the literature, data sources, methodological framework, and estimation procedure will be discussed in section three. Besides section three, we would like to estimate empirical results, and then we will discuss the results and their rationale in the light of past studies in section four. Lastly, in section five, we will summarize our findings, and based on such findings, we will possibly suggest some policy implications.

2. Literature Review

Different researchers have tested the association between inflation and economic growth, and these studies are examined below.

This study will start this section with the researchers' contribution to the nonlinear impact of inflation on economic growth. They found evidence of an inverted U-shaped or U-shaped relationship between both macroeconomic indicators. The study conducted by Ghosh and Phillips (1998) investigated the nonlinear effects of inflation on economic growth for considering 145 countries. They applied multiple regression analysis for the period from 1960 – 1990. The empirical findings of their study showed that inflation has a nonlinear relationship with economic growth in these countries.

Moreover, this nonlinear relationship was found to be inverted U-shaped. Further, Khan and Senhadji (2001) using Non-Linear Least Square with Fixed Effects and Log-Likelihood Ratio methods on the data series from 1960 – 1998 for 140 countries. They found that inflation has an inverted U-shaped impact on economic growth in these countries. Moreover, they also found that the threshold level of inflation ranged from 1% to 3% for developed and 11% to 12% percent for developing countries, respectively. Sepehri and Moshiri (2004) explored the nonlinear association between inflation and economic growth into four groups: Upper Middle-Income Countries, Middle-Income Countries, Lower Income Countries, and OECD Countries. The study found evidence of a nonlinear relationship between inflation and economic growth in the first three groups, respectively. However, in the last group, the study did not find any evidence of a nonlinear relationship between inflation and economic growth. Moreover, the threshold levels of inflation were 5%, 15%, and 11% for Upper Middle-Income Countries, Middle-Income Countries, and Lower-Income Countries, respectively. The study concluded that inflation became harmful for economic growth beyond the cut-off inflation into these groups.

Afterward, in the same year, Sweidan (2004), applying the ARCH Model on the monthly data covering the period from 1970 – 2000 of Jordan's economy, found an inverted U–shaped relationship between inflation and economic growth. The study further found that economic growth will tend to decline after a 2% cut-off inflation in Jordan. The study made by Burdekin et al. (2004) using Panel Generalized Least Square with Panel Fixed Effect Model for Developed (contains 21 countries) and Developing (contains 51 countries) countries on the sample period for developed countries ranges from 1965 to 1992 and for developing countries ranges from 1967 to 1992. They found the nonlinear impact of inflation on economic growth in these countries. However, they found multiple threshold points for both sets of countries. For instance, they found two threshold points in developed countries: 8% and 25%. The findings revealed that below the 8% threshold level of inflation, the impact of inflation on economic growth was negative and insignificant; however, above 8%, but below 25% threshold level of inflation, the impact of inflation on economic growth is

negative and significant. Moreover, the study found three threshold levels of inflation in developing countries: 3%, 50%, and 102%, respectively. The effect of inflation on economic growth remains negative but significant if a threshold level of inflation varies from 3% to 50%. The same result has found that if inflation becomes larger than 102%, and for a threshold level of inflation below 3 percent, then the effect of inflation on economic growth was negative and insignificant in developing economies.

After applying the Johansen Multivariate Cointegration approach, Ahmed and Mortaza (2005) found that inflation has a negative and significant impact on economic growth in the long run. Moreover, the study also found that economic growth responds inversely beyond the 6% threshold level of inflation. The nonlinear relationship between economic growth and inflation for Taiwan and Japan was tested by Lee and Wong (2005). They considered a sample period for Taiwan from 1962 to 2002 and for Japan from 1970 to 2001, and they found that inflation has a nonlinear impact on economic growth, and cut-off inflation for Japan was found to be 9.66% and 7.25% for Taiwan, respectively. If inflation increases after each country's respective threshold level, it will deteriorate these countries' economic growth.

The study by Drukker et al. (2005) took a sample of 138 economies for the sample, ranging from 1950 to 2000. They found a nonlinear impact of inflation on economic growth in these countries, and the global threshold level of inflation was 19.16%. In the year 2006, Pollin and Zhu (2006) for 80 OECD, middle and low-income countries of the world investigated the nonlinear association between inflation and economic growth, and they considered the period from 1961 to 2000. They found a nonlinear relationship between inflation and economic growth in these selected countries; whereas, the threshold level of inflation was found to be from 15% to 18%. The study concluded that below this cut-off point, economic growth was expanding, and beyond this cut-off point, economic growth was detrimental in these countries, respectively.

Li (2006) attempted to test whether inflation and economic growth are linearly related or nonlinearly related. The study took a sample period from 1961 to 2004 for the 117 countries globally. Out of 117 countries, 27 were developing countries, and 90 were developed. The study results confirmed the nonlinear relationship for developed countries, and the threshold level of inflation was found to be 24% for developed countries of the world. That shows that above this threshold level of inflation, economic growth starts diminishing significantly. Moreover, the study found no evidence for a nonlinear relationship between inflation and economic growth for developing economies as the inflation coefficient was insignificant.

Schiavo and Vaona (2007) applied a Semi-Parametric instrumental variable (IV) and nonparametric techniques on the sample of 167 developed and developing countries of the world from 1960 to 1999. They concluded that the nonlinear impact of inflation on economic growth existed in developed countries, not in developing countries. Moreover, the study reported a 12% threshold level of inflation for

developed countries beyond which economic growth started falling. Kan and Omay (2010) worked on the association between inflation and economic growth. They took the sample of six industrialized countries: the US, Japan, UK, France, Canada, and Italy, for the sample period, which ranges from 1972 to 2005. The empirical findings confirmed the existence of nonlinearity between economic growth and inflation in these industrialized countries. The threshold level of inflation was found to be 2.52%, beyond which economic growth started decreasing. During the same year, the global episode of 2007 – 2008 and the consequences of the monetary policies during the global financial crisis motivated Espinoza et al. (2010) to re-examine the nexus between growth and inflation. They applied Panel OLS and Conditional Bootstrap techniques for the data series from 1960 – 2007 for 165 countries worldwide. The empirical findings showed that inflation in the early stages positively affects economic growth; however, it turns out to be dangerous for an economy beyond a threshold point. Moreover, the study found that the threshold point was 10% for emerging market economies, whereas the threshold point was found to be 10% even for oil-exporting countries.

In the same way, the nonlinear impact of inflation on economic growth was examined by Ibarra and Trupkin (2011). They applied the Panel Smooth Transition Regression technique and Panel Fixed Effects Model on the sample period from 1950 to 2007 for more than 120 countries. The empirical results reported that inflation had a nonlinear impact on economic growth in both developed and developing economies. Whereas the threshold level of inflation for developed economies was found to be 4.1%, and the threshold level of inflation was 19.1% for developing economies. Furthermore, the threshold point was found to be 7.9% when the sample size for developing economies was reduced.

Another study conducted by Mignon and Villavicencio (2011) used the Panel Smooth Transition Regression technique for the 44 economies of the world, considering the sample period from 1961 to 2007. They found that inflation has a nonlinear impact on economic growth in these countries. Moreover, they also found a 19.6% cut-off point beyond which inflation became harmful to economic growth. Similarly, Seleteng et al. (2013) applied Panel Smooth Transition Regression (a robust technique that resolved endogeneity and heterogeneity problems) on the data series from 1980 – 2008 for the Southern African Development Community region. This study found that inflation has a nonlinear impact on economic growth in the Southern African Development Community region. They also found an 18.9% cut-off point, after which inflation turned to be harmful to economic growth in the SADC region.

After reviewing the above studies, we have concluded that all confirmed that inflation has a nonlinear and inverted U-shaped impact on economic growth for the set of developing and developed countries, respectively. Besides reviewing these studies, some studies in the literature state that inflation has a negative and significant impact on economic growth, and now we would like to review these studies.

This study has been initiated from the study conducted by Barro (1996), who taking a sample of around 100 countries and covering sample period from 1960 – 1990, investigated the impact of inflation on economic growth, and he found that inflation had a negative and significant impact on the economic growth of these countries. Moreover, he concluded that a 1% increase in inflation would reduce economic growth by 0.02% to 0.03% each year. In another study, Barro (2001) found that inflation has a negative and significant impact on economic growth after applying pooled data series. The inflation coefficient was found to be -0.03, which shows that as inflation increases by 1%, it will reduce economic growth by 0.03%. Moreover, the study highlighted inflation variability as an indicator of macroeconomic stability. It further found that more inflated countries tend to experience high inflation variability, which deteriorates economic growth into such countries.

Singh and Kalirajan (2003) found that economic growth responds inversely and significantly to the changes in inflation in India. Afterward, we see the contribution of Hodge (2005), who investigated the impact of inflation on economic growth for South Africa for the quarterly data from 1970 to 2003, and he found a negative and significant impact of inflation on economic growth. The inflation coefficient was approximately 0.25, meaning that as inflation increases by 1%, it will curtail the South African economy's growth rate by 0.25%. Furthermore, Hayat and Kalirajan's (2009) study also examined the effects of inflation on economic growth in Bangladesh, and the study found that inflation has a negative and robust impact on economic growth in Bangladesh. The study also proposes that any economy could achieve considerable gains if price stability becomes a priority while conducting monetary policy. Jha and Dang (2011) examined the impact of inflation variability on economic growth for 31 developed and 182 developing countries, whereas the study covers data series from 1961 to 2009. The study's empirical findings concluded that beyond the 10 percent inflation rate, economic growth is inversely hit by inflation variability in these countries.

The relationship between inflation and economic growth has opened up so many questions for us, as we could see from the mixed types of association between the two that have been witnessed in the literature. Some studies have found a linear but positive impact of inflation on economic growth, indicating a positive aggregate supply curve like Lucas (1973). Some studies went beyond finding a linear relationship between inflation and economic growth. These researchers believed a nonlinear relationship between inflation and economic growth prevails. They have found evidence of the inverted U-shaped impact of inflation on economic growth, meaning that inflation up to a certain level is acceptable for accelerating economic growth, but beyond this level, inflation becomes harmful for the economy. These studies are Ghosh and Phillips (1998), Khan and Senhadji (2001), Sepehri and Moshiri (2004), Sweidan (2004), Lee and Wong (2005), Drukker et al. (2005), Pollin and Zhu (2006), Li (2006), Schiavo and Vaona (2007), Kan and Omay (2010), Espinoza et al. (2010), Ibarra and Trupkin

(2011), Mignon and Villavicencio (2011) and Seleteng et al. (2013). Moreover, the literature has also provided evidence on the negative impact of inflation on economic growth. This may be because producers' misperception is cleared when prices are too high, and at that point, an increase in prices is considered an increase in the cost of production (Lucas, 1973). These studies are Barro (1996), Barro (2001), Singh and Kalirajan (2003), Hodge (2005), Hayat and Kalirajan (2009), and Jha and Dang (2011). This study will adopt the following notions from previous models as the effect of inflation depends on the level of development, and the time series models of different countries have found different thresholds. This study is going to be different from all these studies. The first dimension is that previous studies applied transformations or ignored the non-normality of the variables. Second, this study will consider the size of GDP per capita and CPI while assessing the role of CPI on GDP per capita; thus, the effect of CPI will be multidimensional.

3. Economic Theory and Econometric Approach

Prices of goods and services are important decision indicators for all the economic agents; hence changing prices set many other phenomena into motion. This paper will develop from Cobb Douglas Labor and Capital production function (Cobb & Douglas, 1928) and incorporates prices. In the next section, we will examine all the variables included in our study.

3.1 Variables and Description

3.1.1. General Prices (CPI)

Prices and, consequently, inflation are the main focus of this study, bridging the gaps illustrated above. Empirically several studies have proposed mixed results for this Prices-GDP relationship in terms of its specification, i.e., linear, quadratic, or cubic. Hence, with the adoption of production function as a control model, this study will expect to provide the source to the direction of the relationship. From the literature, it can be seen that the effect of inflation is not linear. Considering this assumption, many studies have used the dummy variable threshold method to find one discrete cut-off value beyond which the effect of inflation is the opposite.[1] However, considering the economy comprises industries whose responsiveness to changing prices is heterogeneous, the continuous threshold method suggests general prices are more appropriate, suggesting that the direction shifting is gradual rather than spontaneous. This study has used the Consumer Price Index as an indicator for general prices, while the first difference after the natural logarithm will represent inflation.

3.1.2 Output (GDP per capita)

Maximizing the national output is the foremost objective of any economy, and Bernanke

[1] Hence prices are expected to have positive impact before the threshold and negative after threshold.

(2011) talk about stabilized prices which assist in healthy growth. This study has used Real GDP per capita from World development indicators as an indicator for output.

3.2 Quantile on Quantile Estimation Approach

Previous studies have used mean as a central tendency approach which requires the data to be normally distributed. However, theoretically, variables like GDP per capita, whose ideal value is not in the center, cannot be normal. Previous studies have used the quadratic transformation or the threshold method to find the nonlinear impact of CPI on GDPpc. Since the variables were not normal in most cases, the estimates are not appropriate for inference. Lastly, this study has used the actual data of GDP per capita constant US$ and CPI (2005 = 100) from the World Development Indicators for 73 countries between 1960 and 2018. Mixed panel data is adapted to ensure maximum possible observations for the analysis.

This study has assessed the advanced version of quantile regression which assesses the effects of different quantiles of the independent variable on the dependent variable (Koenker & Bassett, 1978). A study by Dufrenot, Mignon and Tsangarides (2020) assessed the role of inflation on GDP per capita for developing countries using a quantile regression approach. A study by Gezdim and Zortuk (2018) used panel quantile regression to estimate the U-shaped effect of Inflation on economic growth for transition economies.

This study has availed Quantile on Quantile approach proposed by Sim and Zhou (2015). Studies like (Sharif et al., 2019a, 2019b; Shahbaz et al., 2018; Mishra et al., 2019; Hassan et al., 2021) have used this model in the univariate set up to assess the quantile wise effect of the independent variable on different quantiles of the dependent variable. Atsalakis, Bouri, and Pasiouras (2020) assessed the role of natural disasters on economic growth using a quantile on quantile approach. They excluded the effect of inflation using quantile estimates before estimating QQ regression.

4. Results and Discussion

Following table 1 shows detailed descriptive stats. We can observe that the mean and the median value of the variable are not similar for CPI and GDP per capita. The skewness and kurtosis values are not near 0 and 3, and lastly, the Shapiro Wilk test's significance confirmed that the data is not normal. Hence it is not advisable to use the least square methodology, which uses the arithmetic mean as a center (Gujarati, 2009).

Table 1. Descriptive Statistics

Variable	Obs.	Mean	Median	Std. dev	IQR	Skewness	Kurtosis	SW test	Prob.
CPI	3559	51.97	48.06	42.18	74.07	0.60	0.45	0.924	0.00
GDP	3559	14534	6049	17374	23115.6	1.68	3.46	0.784	0.00

Figure 1 provides the correlation between GDP per capita and CPI for each quintile of GDP per capita. Here we can see a higher association between GDP per capita and CPI for the median level of GDP per capita. Hence, middle-income countries tend to show higher commonalities between GDP per capita and CPI. This high communality might indicate high sensitivity of GDP per capita with changes in CPI.

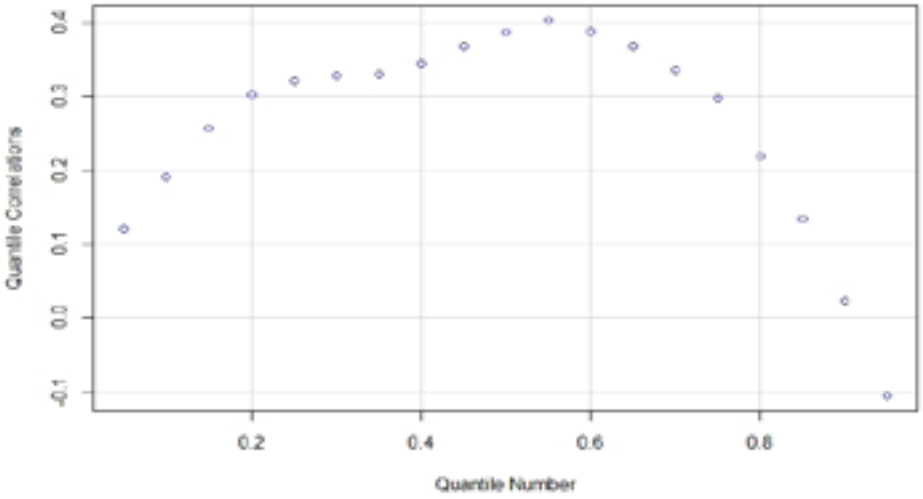

Figure 1. Quantile wise correlation coefficient

Before moving to the quantile plots, we will present GDP per capita and CPI values at different quantile levels. These reference points will help in quantifying the graphical presentations provided via quantile estimates.

Table 2. Quantile-wise incidence of GDPpc and CPI for different samples.

	GDPpc	**CPI**	**GDPpc**	**CPI**	**GDPpc**	**CPI**	**GDPpc**	**CPI**	**GDPpc**	**CPI**
Percen-tiles	**Overall**		**Low HDI**		**Medium HDI**		**High HDI**		**Very High HDI**	
0%	304.7	0.00	304.7	0.00	330.989	0.00	585.9	0.00	944.2	0.00
25%	1616.5	11.1	582.1	5.08	1431.8	0.00	3809.1	6.85	20301.6	26.4
50%	6049.3	48.0	1032.5	39.1	2122.4	28.4	5719.1	44.8	29406.2	64.6
75%	24732.1	85.6	1506.8	80.9	3558.7	78.1	8596.7	83.4	40434.5	89.7
100%	111968.3	373.1	14936.4	214.2	19491.8	231.1	32080.3	337.1	111968.3	127.7

Figure 2 presents the 3-dimensional plot of quantile on quantile estimates of CPI on

GDP per capita. The colours show a 19*19 effect matrix for each quintile of CPI on each quintile of GDP per capita. Here we can see that generally, there is a U-shaped association between CPI and GDP per capita for the overall data set. There is a slight positive effect of CPI on GDP per capita at lower quintiles. This effect reduces to a negative value at the median level of CPI, but after that, a further increase in CPI tends to show an increase in the positive effect. Figure 3 provides the contour plot corresponding to figure 2, providing similar outcomes. This indicates that the countries whose CPI value is below the median tend to experience increasing negative effects on economic growth for our sample.

Moreover, these effects are severe for the countries whose GDP is higher than the median. At the same time, countries whose CPI values are above the median are enjoying increasing positive growth effects. Moreover, these positive effects are higher for the median GDP countries.

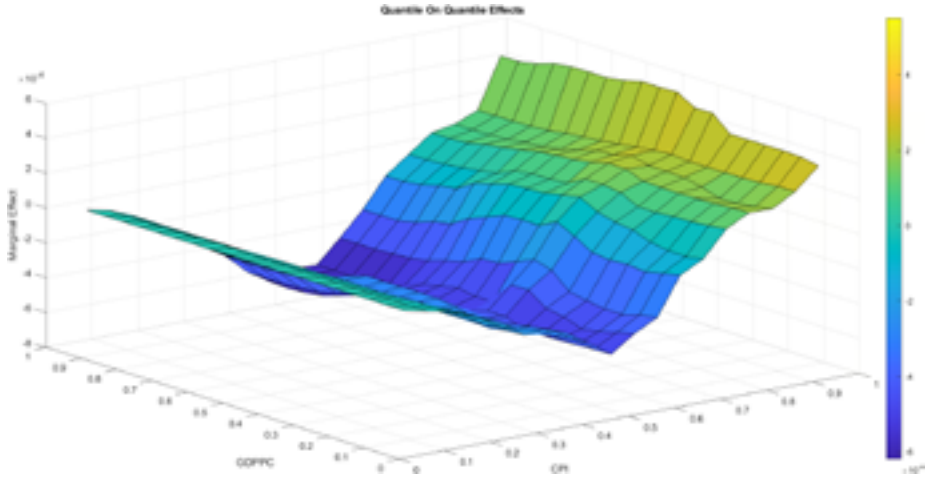

Figure 2. 3d Quantile on Quantile Effects plot

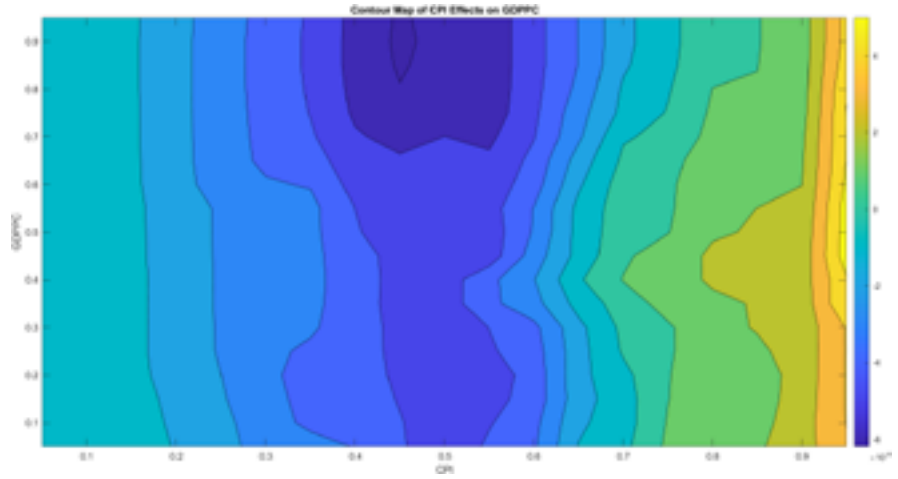

Figure 3. Contour plot of effects of CPI on GDP per capita for the whole sample

Figure 4 provides the QQ estimates for the case of Low Human Developed Countries. Here, it is evident that an increase in CPI has an inverted U-shaped pattern of effect at low to median levels of GDP per capita. For these countries, low levels of CPI are beneficial for growth. Nevertheless, for these countries, generally, CPI has a positive effect throughout its range. Moreover, at high levels of GDP per capita, there is an inverted U-shaped of effect. This means that at the median level of CPI, there is the highest possible growth deterrent effect.

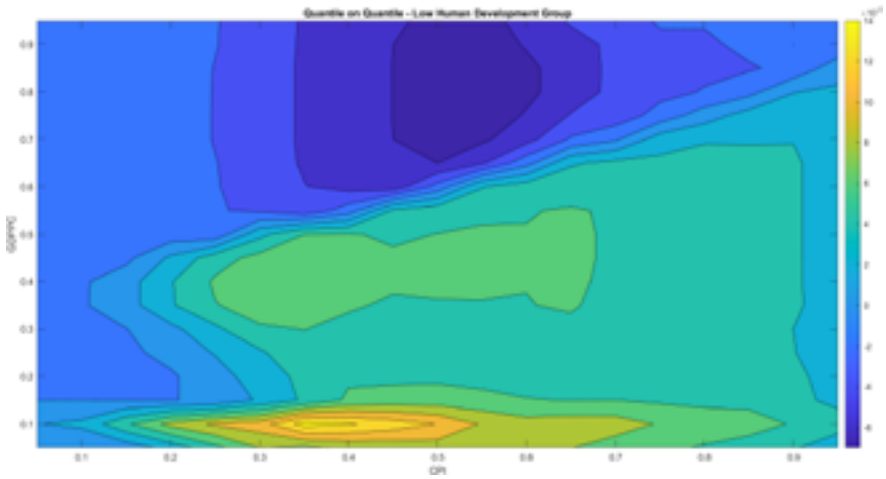

Figure 4. Contour plot of effects of CPI on GDP per capita for low HDI countries

Figure 5 provides the QQ estimates for the case of Medium Human Developed Countries. Here at low levels of GDP per capita, the negative effect of CPI will increase with CPI. For the case of high levels of GDP per capita, there is a positive trend of effect to CPI. Countries in this group with this specific range of GDP per capita tend to enjoy the supply-promoting effects of an increase in CPI. So opting for price stability may be the right option for these countries.

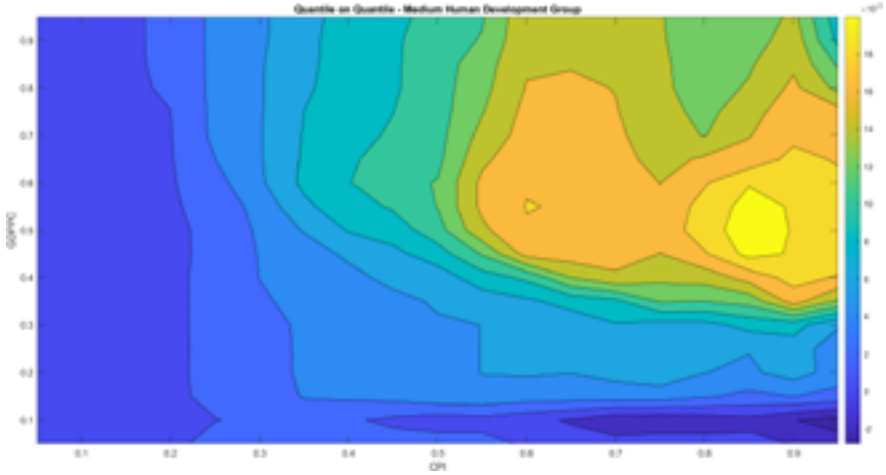

Figure 5. Contour plot of effects of CPI on GDP per capita for medium HDI countries

Figure 6 provides the QQ estimates of High Human Development Countries. There is a decrease in positive effects with an increase in CPI for low levels of GDP per capita. For CPI above the 65 percentile, the negative effects tend to appear. However, at high levels of GDP per capita, there is an increase in positive effect with an increase in CPI. Hence staying above 10 percentile will ensure positive effects, but between the 60 and 80 percentile ensures the highest possible positive effects.

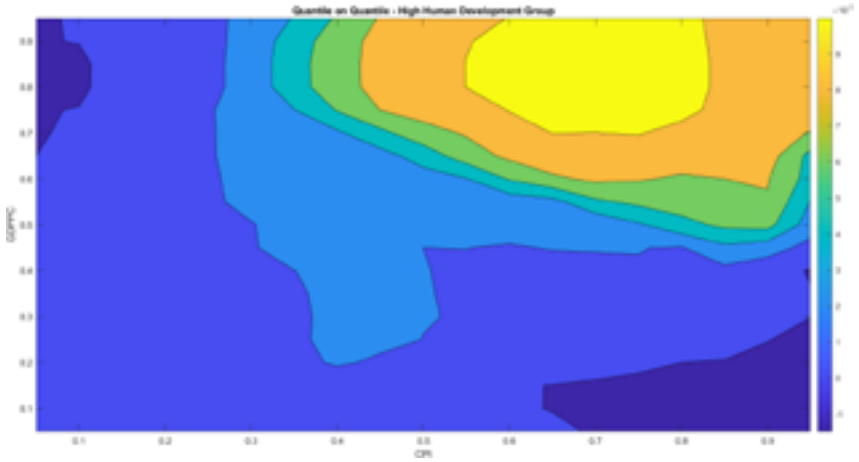

Figure 6. Contour plot of effects of CPI on GDP per capita for high HDI countries

Figure 7 provides the QQ estimates of Very High Human Development Countries. There is a decrease in the positive effect of an increase in CPI for low levels of GDP per capita. However, for all the ranges of CPI, there is no negative effect on GDP per capita. While at high levels of GDP per capita, there is an inverted U-shaped pattern of effects of an increase in CPI. Below 35 percentile increase in CPI shows an increasingly positive effect on GDP per capita while beyond 45% percentile of CPI, there is a slight decreasing trend of the positive effects. Here the median GDP per capita countries tend to enjoy stable/consistent effects of change in CPI.

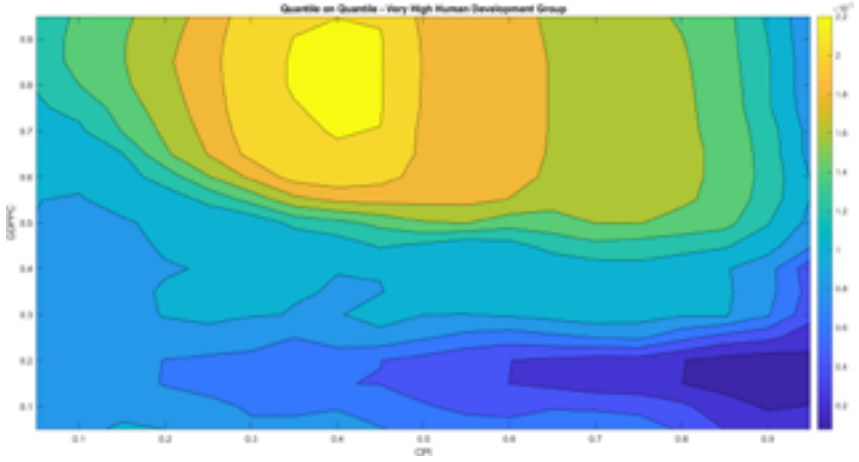

Figure 7. Contour plot of effects of CPI on GDP per capita for very high HDI countries

5. Conclusion and Policy Implications

Many scholars have attempted to explore the nonlinear effect of inflation on economic growth. The general outcome they have consensus is that it is inverted – a U-shaped relationship between inflation and economic growth. Moreover, this relationship is different for different income groups. As suggested by the positive slopped aggregate supply curve theories, this inverted U-shaped relationship signifies that production is motivated at low inflation levels. Beyond a certain threshold, the relationship becomes flexible, so the increase in inflation increases costs only, reducing aggregate demand.

This study has used the quantile-on-quantile estimation approach to cater to the non-normality of the variables and create a map of effects of each quantile of CPI on each quantile of GDP per capita. Figure 2 to 7 provides the graphical representation of 361 effects generated from the vector of 19 quintiles of CPI against 19 quintiles of GDP per capita.
The results show that the nature of the non-linear relationship between CPI and GDP per capita is not only determined by the value of CPI and the category of the country (developed or underdeveloped); this relationship is also sensitive to the level of GDP per capita itself.

This study provides insights to policymakers to ascertain the robustness of GDP per capita against the negative effects of CPI. Very high HDI, high HDI, and medium countries should aim for the higher percentiles of GDP per capita. At the same time, it is complicated for the low HDI countries to aim for median levels of GDP per capita if they cannot climb the HDI category. Policymakers can also identify the favorable growth-promoting targets of CPI. For the case of very high HDI and low HDI, below-median CPI is fruitful. For high HDI and medium HDI, above median CPI is fruitful.

Compliance with Ethical Standards

There is no conflict of interest between the authors and the publishing journal. No funding has been used. There is no need for consent from the data source as the data is publically available. No humans and animals are used in the experiments.

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Appendix

Table A1. Countries included in sample

Australia	Austria	Azerbaijan	Belgium
Bangladesh	Bulgaria	Bahamas	Belarus
Bolivia	Brazil	Botswana	Canada
China	Cameroon	Costa Rica	Cyprus
Czech Republic	Germany	Denmark	Dominican Republic
Egypt	Spain	Finland	France
Gabon	United Kingdom	Gambia	Switzerland
Greece	Guatemala	Hong Kong	Honduras
Indonesia	India	Ireland	Iran
Israel	Italy	Kazakhstan	Kenya
Korea Rep	Sri Lanka	Luxembourg	Morocco
Mexico	Mauritius	Malaysia	Nigeria
Netherland	New Zealand	Pakistan	Panama
Philippines	Paraguay	Romania	Russia
Senegal	Singapore	Slovenia	Sweden
Swaziland	Togo	Thailand	Turkey
South Africa	Uganda	Uruguay	USA
Vietnam	Tanzania	Yemen	Zimbabwe
Iceland			

JTSR (2021) 28(2): 57-80
DOI 10.14665/1614-4007-28-2-004

PAPER

Determinants of Economic Complexity in Transitional Economies

Birol Erkan* • **Fatih Ceylan***

Abstract Which country is more developed? Which country's foreign trade policies are more rational? In a globalized world, which country has higher added value and competitiveness in its exports? Questions like this are not easy to answer. Because there are many criteria for measuring the development of the economy and foreign trade of countries. In this context, an important index called The Economic Complexity Index (ECI) was created by Hidalgo and Hausmann to measure and compare the development of the country's economies and foreign trade. For this purpose, we test whether economic growth, foreign direct investment, Human Development Index, Economic Freedom Index cause economic complexity, vice versa in this study.

We analyze annual data for 1996-2017 for 22 countries called Transitional Economies using the panel causality method. Considering all of Transitional Economies, according to the Bootstrap Granger causality test results, we were not able to determine a Granger causality relationship between economic growth, foreign direct investment, Human Development Index, Economic Freedom Index, and Economic Complexity Index. However, when we consider country-specific variables defined as Transitional Economies, we identify both one-way and two-way Granger causal relationships in some countries between economic growth, foreign direct investment, Human Development Index and Economic Freedom Index, and Economic Complexity Index. Therefore, some Transitional Economies need to increase their level of economic complexity to get a larger share from global added value and increase their competitiveness. In this context, economic complexity needs to be taken more seriously by scientists, policymakers, and decision-makers.

Keywords: Economic Complexity, Human Development Index, Economic Freedom Index, Bootsrapt Panel Granger Causality, Transitional Economies.

JEL Classification: O10, O150, O43, C58, P20.

Birol Erkan*(✉), Fatih Ceylan**

* Department of Economics, Iskenderun Technical University, Hatay, Turkey
E-mail: birol.erkan@iste.edu.tr

** Department of Economics, Usak University, Usak, Turkey.
E-mail:fatih.ceylan@usak.edu.tr

1. Introduction

The economic complex is an area of research involving export competitiveness, intensification, and diversification. The ECI has filled a significant gap both in terms of a more precise understanding of the economic development levels of countries and in terms of a more obvious definition of foreign trade structures. Also, the legs of the concepts of foreign trade competitiveness and foreign trade concentration have stepped more firmly on the ground thanks to the ECI. However, human development and economic growth of per-capita income countries and macro socio-economic variable started to be more clearly and accurately estimated using this index.

Countries' income level is significantly connected to the mix of products that they export, as measured by their ECI. Countries with an income that is lower than what would be expected from their ECI tend to grow faster than those with an income that exceeds what would be expected from their current level of economic complexity. So, what countries export, as proxied by the ECI, is a solid leading indicator of economic growth (Bustos et al., 2012).

Hidalgo and Hausmann investigated the relationship between diversity and ubiquity in exports (Hidalgo and Hausmann, 2009). Studies show that if countries increase product sophistication, product diversity also increases. In other words, the simultaneous availability of manufacturing products, especially high added value, is becoming easier in many parts of the world. However, the production of these sophisticated products by limited countries around the world will also increase the country's competitiveness.

The competitiveness, development, and sustainability of countries' economies cannot be explained only by GDP, GDP per capita, total export amount, natural resources, and mineral wealth such as oil, natural gas, and gold. However, this index shows the level of specialization in technological products, whether the country is one of the few countries that export high-value-added products. In this context, it is clear to what extent the country diversifies its exports by looking at the ECI.

In this study, we aim to investigate the effects of the Human Development and Economic Freedom Index, economic growth, and foreign direct investment levels in determining the levels of economic complexity of Transitional Economies. In the first part of the study, we give information about the formation and structure of the ECI. In the second part, we present examples of literature on Economic Complexity. In the third part, we test whether economic growth, foreign direct investment, Human Development, and Economic Freedom Index cause economic complexity, vice versa with the panel causality analysis.

1.1 Economic Complexity Index

The main production and export source of most underdeveloped countries in the world is mining industries. As a result, the country's source of income and economic

growth is also limited by the amount of reserves of the mentioned mines. Therefore, in order for these countries to increase their economic growth and development levels, they need to increase the productivity of the factors of production and make them sustainable. In addition, these countries need to diversify the products they produce and export. These countries will only be able to increase their level of development if they diversify in production and produce more innovative (high value added) products. The basic condition for producing more innovative products is the productive knowledge and skill level of the society. For example, products such as medical imaging devices, space shuttles are more innovative and require a higher level of knowledge. However, the production of products such as wheat, sesame requires much less knowledge. In this context, countries need to raise the level of productive knowledge in order to produce and export more innovative and sophisticated products (Yildirim, 2014).

The ECI shows the characteristics of production through exports. Higher index value means a more diversified export agenda and complex economy (Ferraz et al., 2017). The complexity of an economy is related to the multiplicity of useful knowledge embedded in it. Economic complexity is expressed in the composition of a country's productive output and reflects the structures that emerge to hold and combine the knowledge. Complex economies can weave vast quantities of relevant knowledge and increased economic complexity is necessary for a society to be able to hold and use a larger amount of productive knowledge. On the contrary, simpler economies have a narrow base of productive knowledge and produce fewer and simpler products (Hausmann et al., 2011). The more productive knowledge countries have, the more opportunities they have to recombine that knowledge in new ways to develop new products and products that are more complex (Yildirim, 2014).

Governance is important to allow individuals and organizations to cooperate, share knowledge and make more complex products, it should be reflected in the kind of industries that a country can support. Therefore, the ECI indirectly captures information about the quality of governance in the country (Hausmann et al., 2011). The economic complexity and its index (ECI) are important. Because, they don't only carry information about the productive structure of countries but also income, income distribution, human development, and future economic growth rate (Yildirim, 2014). At the same time, the economic complexity has been used successfully and extensively both for academic purposes and for policy and strategic management by policymakers and firms (Pietronero, Gabrielli, Kupers, & Tachella, 2017). For an economy to remain complex, individuals from diverse areas such as finance, marketing, technology, human resources, operations, law, etc. must interact and combine their knowledge (Ferraz et al., 2017).

Understanding economic complexity and creating quantitative measures that capture it can help to illuminate the path of economic development. Measurement of economic complexity and product sophistication provide us with objective metrics for country's level of industrial development, economic growth, income and can inform

strategic decision making, as the sophistication of the products that a country currently exports, together with their location in the product space, are relevant for the future development of that country's economy (Hidalgo, 2009).

The positive effect of the level of economic complexity on economic growth in a country depends on the level of education and knowledge, institutional structure, know-how and technology level in the country. The level of economic complexity can be measured in different ways. These measurements can give results in different ways according to the information density in the economies. These metrics help to define the information density of economic activities internally from the data, and these internal definitions are simply linear techniques. For example, the original version of the ECI expresses economic complexity as the average complexity of countries exporting a particular product. This circular argument can be traced mathematically through linear algebra. It also has a solution as the eigenvector, which constitutes an intrinsic definition of economic complexity and information density (Albeaik, 2017).

According to Albeaik et al., this technical innovation helped separate these measures of economic complexity from other measures relying on exogenous definitions of knowledge intense activities. This innovation also helped these measures become adopted in other domains; for instance, they have been used to estimate the innovative capacity of cities using patent data (Albeaik, 2017).

Measurement of the ECI has some limitations. The most important point is that the index requires defining which countries export which products. However, it is not easy to do in a world where the markets for products and the size of economies vary by multiple orders of magnitude. The convention has been to consider as exports only the products that a country has a revealed comparative advantage in. Yet, this definition introduces a hard threshold that introduces noise around the boundary. The metric of the new economic complexity called ECI+ presented by Albeaik et al. avoids this limitation by using a continuous definition. ECI+ defines the complexity of an economy as the total exports of a country corrected by how difficult it is to export each product and by the size of that country's export economy. In addition, ECI+ provides consistent estimators for a wide variety of econometric specifications (OLS, Random Effects and Fixed Effects models).

Economic complexity is a measure of the knowledge in a society that gets translated into the products it makes. The most complex products are sophisticated chemicals and machinery. However, the least complex products are raw materials and unprocessed agricultural products. The economic complexity of a country depends on the complexity of the products it exports. A country is considered complex if it exports not only highly complex products but also a large number of different products. To measure the economic complexity of a country, it is calculated the average ubiquity of the exported products. Then, the average diversity of the products exported by a country is calculated (Hidalgo and Hartmann, 2016).

Diversification is related to the number of capabilities available in a country, albeit imperfectly. This is because countries producing the same number of products could be making goods that require different numbers of capabilities. In such cases, the diversification of countries would not be the most accurate estimator of the number of capabilities available in those countries, and it will be needed a measure of the number of capabilities required by a product to correct for this (Hartmann et al., 2016). Ubiquity is related to the number of countries that a product is connected to. This is equal to the number of links that this product has in the network (Hausmann et al., 2011).

According to Hidalgo (2009) and Hausmann et al. (2011) the ECI is calculated as follows:

$$M_{cp} = 1 \text{ if } RCA_{cp} \geq 1$$

$$M_{cp} = 0 \text{ if } RCA_{cp} < 1$$

The RCA (Balassa Index) is used to define a discrete matrix M_{cp} which is equal to 1 if country c has the RCA in product p and 0 otherwise. The matrix M_{cp} allows to define the diversity of a country and the ubiquity of a product, respectively, as the number of products that are exported by a country with revealed comparative advantage, and the number of countries that export a product with revealed comparative advantage.

$$Diversity = k_{c,0} = \sum_{p} M_{cp}$$

$$Ubiquity = k_{p,0} = \sum_{p} M_{cp}$$

Diversity and ubiquity are inversely related. A conspicuous fact of the structure of the network connecting countries to the products that they make or export is that poorly diversified countries export products that are, on average, exported by many other countries, whereas highly diversified countries make products which are made, on average, by fewer other countries (Hausmann and Hidalgo, 2011). Higher diversity means that a country has an export basket with many different products. In this condition, the country has a high amount of know-how. On the other hand, higher ubiquity means that a product is included in many countries' export baskets, and thus it needs fewer capabilities to be produced. However, both diversity and ubiquity are simple graph characteristics of the bipartite network represented by the adjacency matrix M which carry limited information about the productive structure of a country or complexity of a product as they do not take into account who else export the same products. As a result, a careful assessment is required if any of these simple measures are to be used for the explanation of economic phenomena (Stojkoski et al., 2016)

To generate a more accurate measure of the number of capabilities available in a country, or required by a product, it is needed to correct the information that diversity and ubiquity carry by using each one to correct the other. For countries, this requires us to calculate the average ubiquity of the products that it exports, the average diversity of the countries that make those products and so forth. For products, this requires us to calculate the average diversity of the countries that make them and the average

ubiquity of the other products that these countries make. This can be expressed by the recursion (Hausmann et al., 2011):

$$k_{c,N} = \frac{1}{k_{c,0}} \sum_{p} M_{cp} k_{p,N-1} \tag{1}$$

$$k_{c,N} = \frac{1}{k_{c,0}} \sum_{p} M_{cp} k_{p,N-1} \tag{2}$$

$$k_{c,N} = \frac{1}{k_{c,0}} \sum_{p} M_{cp} \cdot \frac{1}{k_{p,0}} \sum_{c'} M_{c'p} \cdot k_{c',N-2} \tag{3}$$

$$k_{c,N} = \sum_{c} k_{c',N-2} \sum_{c'} \frac{M_{cp} M_{c'p}}{k_{c,0} k_{p,0}} \tag{4}$$

$$k_{c,N} = \sum_{c'} \tilde{M}_{cc'} k_{c',N-2} \tag{5}$$

Next, a matrix can be defined that connects countries exporting similar products, weighted by the inverse of the ubiquity of a product (to discount common products), and normalized by the diversity of a country:

$$\tilde{M}_{cc'} = \frac{1}{k_{c,0}} \sum_{p} \frac{M_{cp} M_{c'p}}{k_{p,0}} \tag{6}$$

Finally, the ECI is defined as:

$$ECI_c = \frac{\vec{K} - \langle \vec{K} \rangle}{stdev(\vec{K})} \tag{7}$$

where $\vec{K}_c$ is the eigenvector $\tilde{M}_{cc'}$ associated with the second argest eigenvalue (the vector associated with the largest eigenvalue is a vector of ones).

2. Literature Review

When the literature is examined, it is seen that scientific studies analyze the relationship between the ECI and the economic growth rates of countries and their national incomes per capita (Hausmann et al., 2011; Ferrarini and Scaramozzino, 2013; Albeaik et al., 2017; Mkrtchyan, 2016; Çeştepe and Çağlar, 2017).

Hausmann et al. analyze the economies of Ghana and Thailand between 1970 and 2010. They conclude that both competitiveness and economic complexity are important determinants of GDP and economic growth per capita in these countries (Hausmann et al., 2011). In addition, Ferrarini and Scaramozzino study 89 countries with different levels of development from different continents. Their study, which covers the period 1990-2009, examines the link between economic complexity and per capita income and economic growth (Ferrarini and Scaramozzino, 2013). Albeaik et al. analyze the period 1962-2014 in their studies on 250 countries (Albeaik et al., 2017). In the studies

mentioned above, the authors reveal that economic complexity positively affects the variables of economic growth and GDP per capita. In addition, Gnutzmann-Mkrtchyan also conducts a similar study on Transitional Economies. They emphasize that the per capita income of countries that diversify their products in their exports also increases and that politicians should take economic complexity more seriously (Mkrtchyan, 2016). Çeştepe and Çağlar also analyze the relationship between the ECI values of 86 countries between 1982 and 2012 and the growth of per capita income using panel data method. The results show that there is a positive relationship between the two variables. However, rises in the ECI value increased the growth rate to a greater extent, especially in countries with a per capita income of less than $ 20,395 (Çeştepe and Çağlar, 2017).

Herrera et al. (2020) compare the economic complexity index in the states of Brazil. Their studies for the period 1997-2017 emphasize that the index decreases or is stable in the south and southeastern states (Herrera et al., 2020). Sahdev (2016) determines a positive correlation between economic complexity and the increase in technology and productivity level in the economy. From the literature, we know that knowledge grows through re-combinatory processes where new knowledge builds on previous knowledge. Therefore, if economic complexity or the total amount of productive knowledge in the economy grows over time, there has to be a mechanism to foster complexity growth (Sahdev, 2016).

When we examine the literature, we see that there are studies that measure the relationship between the economic complexity index and the human development and income inequality of countries (Savenkov, 2015; Hartman et al., 2016; Çoban, 2020; Morais et al., 2021). For example, Hartmann et al. compare the income inequality and productivity structure of Latin American and Caribbean countries (LAC) with China and High-Performing Asian economies (HPAE) using the ECI in their study for 1962-2012. The results show that HPAE countries can increase the level of Economic Complexity and reduce income inequality through product diversification. Despite their recent successful policies, the LAC countries have not been able to increase their level of Economic Complexity, have not been successful in preventing income inequality, and have not created an efficient production structure and social structure (Hartmann et al., 2016). In addition, Savenkov analyzes the relationship between the ECI and government data openness of 94 countries by correlation analysis. The results show a moderate to strong correlation between the economic complexity index and government data openness (Savenkov, 2015). Çoban (2020) examines the relationship between economic complexity and human development. He examines the period 1993-2017 in his study on E7 countries. He does not find a cointegration relationship between the two variables in his study, in which he examines the long-term relationship between two variables using the Westerlund Panel Cointegration test. Dumitrescu-Hurlin panel causality analysis results show a one-way causality relationship between

human development and economic complexity (Çoban, 2020). Morais et al. (2021) examine the relationship between economic complexity and income inequality in the states of Brazil. In their study, where they analyze the period of 2002-2014 with the panel regression method, they conclude that the mentioned relationship is at different levels in different states and that economic complexity is affected by regional development levels.

3. Empirical Analysis

3.1 Data

In this study, we analyze the causality relationship between ECI and Economic Growth Rate (GR), Economic Freedom Index (EFI), Human Development Index (HDI), and Foreign Direct Investment (FDI) for 22 countries[1] called Transitional Economies. We analyze annual data for the 1996-2017 period using the panel causality method. We obtained the ECI data we used in the study from the Atlas Media database (https://atlas.cid.harvard.edu/rankings, 2021) and the other variables from the World Bank database (https://data.worldbank.org/, 2021). We consider the net inflows of foreign direct investment as the share of GDP.

The model we use in the analysis is as follows:

$$ECI = f(GR, EFI, HDI, FDI)$$

Table 1 contains descriptive statistics for the variables we use in the model. We analyzed the 22 Transitional Economies discussed in the study over 21 years, and 462 observations are revealed. The average ECI for these economies is about 0.5. In the whole sample, the lowest ECI score is in Azerbaijan in 2012, while the highest score is in the Czech Republic's economy in the same year. During this period, the average economic growth rate of Transitional Economies is 4%. Bosnia and Herzegovina reached the highest economic growth rate after the civil war in 1996. The Transitional Economy most affected by the 2009 global crisis was Lithuania. Azerbaijan's economic freedom index doubled in 2017 from its lowest level in 1996. It is seen that the economic freedom index increased in 21 years in all Transitional Economies and reached the highest value in Estonia in 2017.

Similarly, the human development index shows an upward trend in all countries. However, the lowest level was calculated in Moldava in 1996 and the highest in Slovenia in 2017. The share of foreign direct investments in GDP is 5.5% on average for Transitional Economies.

[1] Albania, Azerbijan, Bosnia, Belarus, Bulgaria, Crotia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Ukraine

Table 1. Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
ECI	462	0.479	0.606	-1.51	1.69
GR	462	4.106	6.382	-14.8	88.96
EFI	462	59.34	9.148	30	79.1
HDI	462	0.761	0.065	0.602	0.899
FDI	462	5.532	6.825	-15.7	55.08

We calculate the correlation matrix to evaluate a priori whether there are multiple linear regression problems among the variables used in this study. Table 2 contains the correlation matrix of the variables. According to the correlation matrix, it is seen that there is no multiple linear regression problem between variables. Accordingly, the highest correlation between the variables emerged between the economic freedom index and the human development index variables. The variable with the highest correlation with ECI is the human development index.

Table 2. Correlation Matrix of Variables

Variables	ECI	GR	EFI	HDI	FDI
ECI	1				
GR	-0.15	1			
EFI	0.148	-0.12	1		
HDI	0.562	-0.19	0.65	1	
FDI	-0.19	0.169	0.05	-0.13	1

3.2 Methodology

3.2.1 Testing for Cross-Sectional Dependence

Cross-section dependency has an important role in determining the causality relationship between economic variables in panel data models. Especially in Transitional Economies, a high degree of economic integration can increase the probability of spreading shocks occurring in a country. If the spillover effects of shocks between countries are not considered, the estimation results can be misleading. In a panel data study, Pesaran (2006) emphasizes that when an inter-country dependency is ignored, estimation results may be biased and thus the importance of testing inter-country dependency (Pesaran, 2006).

Cross-section dependency is necessary in determining the unit root test in panel data models and selecting the appropriate test model for panel causality analysis. For

this reason, we first test whether there is cross-section dependency between countries. For cross-section dependency, we first apply the Lagrange Multiplier (LM) test developed by Breusch and Pagan (1980), which is frequently used in empirical studies.

The LM test primarily requires estimation of the panel data model:

$$y_{it} = \alpha_i + \beta_i x_{it} + \varepsilon_{it} \quad i = 1,2,\ldots N; t = 1,2,\ldots T \tag{8}$$

In this Equation (8), '*i*' represents the cross-sectional size, '*t*' represents the time dimension, '' represents the vector of explanatory variables.

- H_0= There is no cross-sectional dependency
- H_a = There is a cross-sectional dependency

To test the null hypothesis from the LM test;

$$LM = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N} \acute{p}_{ij}^2 \tag{9}$$

$\acute{p}_{ij}^2$ is the sample estimate of binary correlations of error terms obtained from the least-squares estimator for each country. The LM test is valid in samples for relatively small N and sufficiently large T. When time (T) and country (N) dimensions are both large, it is possible to investigate whether there is a cross-sectional dependency with the CD_{LM} test developed by Pesaran (2004). CD_{LM} is as follows:

$$CD_{LM} = \left(\frac{N}{N-1}\right)^{1/2} \sum_{i=1}^{N-1}\sum_{j=i+1}^{N} (Tp'^2_{ij} - 1) \sim N(0,1) \tag{10}$$

In cases where N large T is small, the CD_{LM} test may be subject to size distortions. Pesaran (2004) developed more general CD test statistics. The CD test is as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1}\sum_{j=i+1}^{N} p'^2_{ij} \backsim N(0,1) \tag{11}$$

Pesaran (2004) states that the mean of the CD test for fixed T and N is zero. At the same time, this test is resistant to heterogeneous dynamic models with multiple breaks in slope coefficients and/or error variances. However, the CD test may be weak in some cases where the binary correlations of the sample mean are zero.

In large panels *($T \to \infty$ ve $N \to \infty$)*, Pesaran et al. (2008) converted the LM test using the mean and variance of the LM statistics *(LM_{adj})*. In Equation (12), Pesaran et al. (2008) obtain the mean μ'^2_{Tij} and variance v'^2_{Tij} with respect to $(T-k)p'^2_{ij}$.

$$LM_{adj} = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1}\sum_{j=i+1}^{N} p'^2_{ij} \frac{(T-k)p'^2_{ij} - \mu'^2_{Tij}}{\sqrt{v^2_{Tij}}} \sim N(0,1) \tag{12}$$

3.2.2 Testing for Slope Homogeneity

Another important issue in panel data analysis is to decide whether the slope

coefficients are homogeneous. In other words, it is necessary to take into account country-specific heterogeneity before making panel data estimates (Pesaran and Yamagata, 2008). In addition, the assumption of homogeneity for parameters cannot capture heterogeneity due to country-specific characteristics (Breitung, 2005).

It is possible to test the slope uniformity with the standard F test. Accordingly, the null hypothesis is tested as $H_0=\beta_i=\beta$ and the alternative hypothesis is tested as $H_a=\beta_i\neq\beta_j$ for all countries. However, the F test is valid for $T>N$ panel data, and the exogenous and error terms of the explanatory variables have fixed variances. Swamy (1970) developed a new slope homogeneity test by stretching the condition of constant variance of error terms. However, both the F test and Swamy's test require panel data models where N is smaller than T. Pesaran and Yamagata (2008) developed the delta test $(\tilde{\Delta})$ as a standardized version of the Swamy (1970) test for large panels.

The delta test is valid without any restrictions in cases of relative expansion of country (N) and time (T) dimension. In the delta test approach, the following modified version of the Swamy test is first calculated:

$$\tilde{S}=\sum_{i=1}^{N}(\hat{\beta}_i-\hat{\beta}_{WFE})'\frac{x_{i'}M_{\tau}x_i}{\tilde{\sigma}^2}(\hat{\beta}_i-\hat{\beta}_{WFE}) \tag{13}$$

The standardized version of the Swamy (1970) test (Equation (13)) by Pesaran and Yamagata (2008) is as follows:

$$\tilde{\Delta}=\sqrt{N}\frac{N^{-1}\tilde{S}-k}{\sqrt{2k}} \tag{14}$$

Errors are asymptotically distributed normally due to the large sample characteristics of the delta test . However, an adapted Delta test version of the statistic can be used under the normal assumption of errors in small samples. The adapted Delta test version accordingly is calculated as follows:

$$\tilde{\Delta}_{adj}=\sqrt{N}\left(\frac{N^{-1}\tilde{S}-E(\tilde{z}_{it})}{\sqrt{Var(\tilde{z}_{it})}}\right) \tag{15}$$

Hypotheses of the delta test:

- $H_0=\beta_i=\beta$ (Slope coefficients are homogeneous.)
- $H_a=\beta_i\neq\beta_j$ (Slope coefficients are heterogeneous.)

3.2.3. Unit Root Tests

We applied two different unit root tests to variables to investigate the integrated degrees of all countries in this study. Im et al. (2003) developed a unit root test based on the mean of independent unit root statistics for dynamic heterogeneous panels. Specifically, they propose a standardized t-bar test statistic based on Dickey-Fuller statistics augmented across countries.

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \sum_{j=1}^{p_i} \Delta y_{i,t-j} + \varepsilon_{it}, \quad i = 1,\ldots,N, t = 1,\ldots,T \tag{16}$$

In the unit root test, the null hypothesis is for all countries, and the alternative hypothesis is for all countries.

There are two steps to creating the T-bar test statistic. First, the average of the ADF t statistics for each country in the sample; secondly, the standardized t-bar[2] statistics are calculated. However, a potential problem with t-bar testing is that the test is no longer applicable when there is cross-section dependence. For this reason, the CIPS (Cross-sectionally augmented IPS) test, which was developed by Pesaran (2007) and took into account the cross-sectional dependency, was applied as the second unit root test to determine the degree of integration for variables with cross-section dependence.

In the test developed by Pesaran (2007), CADF test statistics values are calculated for all units that make up the panel. Then, the statistical values of the CIPS (Cross Sectionally Augmented IPS) test for the panel are calculated by taking the arithmetic mean of these tests. In addition, the CADF test results make the stationarity analysis for each country that makes up the panel, while the CIPS test results make the stationary analysis for the panel in general. It has also shown that it gives good results in small samples and in data sets where T and N are close to each other. Moreover, it is a powerful test in the presence of low cross-sectional dependency and even in small samples (Pesaran, 2007). The CIPS statistic can be derived as follows:

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + y_i \bar{y}_{t-1} + \sum_{j=0}^{\phi_i} \delta_{ij} \Delta \bar{y}_{i,t-j} + \sum_{j=1}^{\phi_i} \theta_{ij} \Delta y_{i,t-j} + \varepsilon_{it}, \tag{17}$$

$$CIPS = \left(\frac{1}{N}\right) \sum_{i=1}^{N} CADF_i \tag{18}$$

The CIPS test takes into account both cross-sectional dependency and residual series correlation. Pesaran (2007) reports critical values based on N, T using Equation (18) for various deterministic terms used in the equation.

3.2.4. Causali*ty* Analysis

The analysis suggested by Emirmahmutoglu and Kose (2011) was used in determining the causality test due to cross-sectional dependence and country-specific heterogeneity in the a priori tests. In this context, bootstrap panel causality analysis is used, which considers both cross-sectional dependency and slope heterogeneity. Here, it does not require a preliminary test for cointegration, except for determining the delayed structure. Variables can be used with level states.

Emirmahmutoglu and Kose (2011) causality test includes a Granger causality test procedure combined with Toda and Yamamoto's (1995) LA-VAR approach for

[2] For detailed information: "Im, K. S., Pesaran, M. H., and Shin, Y. (2003). Testing for unit roots in heterogeneous panels. Journal of econometrics, 115(1), 53-74.

heterogeneous panels. Fisher test statistics were used to test the Granger causality hypothesis in heterogeneous panels. The Fisher test statistic (λ) is defined as follows:

$$\lambda = -2\sum_{i=1}^{N} \ln(\rho_i) \quad i = 1,\ldots,N \tag{19}$$

According to Equation (19), ρ_i gives the probability values (p-value) of the Wald statistics values of each country.

This test statistic has a chi-square distribution with 2 N degrees of freedom. However, the limit distribution of Fisher's test statistic is no longer valid in the presence of cross-sectional dependency between countries. For this reason, Bootstrap Granger causality methodology is proposed for panel data models with cross-section dependency. In heterogeneous and variable panel data models with different degrees of integration, the delay level VAR model is as follows:

$$x_{i,t} = \mu_x^i + \sum_{j=1}^{k_i+d\max_i} A_{11,ij} x_{i,t-j} + \sum_{j=1}^{k_i+d\max_i} A_{12,ij} y_{i,t-j} + u_{i,t}^x \tag{20}$$

$$y_{i,t} = \mu_y^i + \sum_{j=1}^{k_i+d\max_i} A_{21,ij} x_{i,t-j} + \sum_{j=1}^{k_i+d\max_i} A_{22,ij} y_{i,t-j} + u_{i,t}^y \tag{21}$$

$dmax_i$ is the maximum degree of integration suspected in the system for each i (country). Equations (20) and (21) are estimated without applying any parameter constraints, and then the null hypothesis in the causality relationship for each country is calculated by the Wald statistics for each country separately. The Fisher test statistic is then calculated by Equation (19). In Equation (20), causality from x to y is tested, whereas, in Equation (21), causality from y to x is tested. Equations (20) and (21) are tested with bootstrap methodology in case of cross-sectional dependency.

4. Empirical Results

We make preliminary tests to choose the appropriate estimation method in the study. First of all, we test the slope homogeneity specific to the variables used in the study. Accordingly, the null hypothesis that "slope coefficients are homogeneous" in both and slope homogeneity tests are rejected in all variables for both tests. Thus, there is country-specific heterogeneity in all variables used in the study.

Another important issue in panel data is the cross-section dependency test for variables. In the LM (Breusch-Pagan 1980) and CD_{LM} (Pesaran 2004) cross-sectional dependency tests, the null hypothesis that "there is no cross-sectional dependency" is rejected for all variables. According to the test results of CD (Pesaran 2004), the null hypothesis of "no cross-sectional dependency" for Gr, RFI, and HDI variables is rejected. According to the LMadj (PUY, 2008) test results, only the GR variable is rejected at the 10% significance level. When the test results are evaluated, the null hypothesis that "there is no cross-sectional dependency in all variables except the GR variable" cannot be strongly rejected. Test results are shown in Table 3.

Table 3. Cross-section dependence and homogeneity tests.

CD/Delta Tests	ECI	GR	EFI	HDI	FDI
LM (Breusch, Pagan 1980)	472.363*** (0.000)	354.175*** (0.000)	351.962*** (0.000)	296.605*** (0.000)	280.611*** (0.001)
CD_{LM} (Pesaran 2004)	12.802*** (0.000)	7.035*** (0.000)	6.927*** (0.000)	4.226*** (0.000)	3.445*** (0.000)
CD (Pesaran 2004)	0.271 (0.393)	-1.888** (0.030)	-2.590*** (0.005)	-2.341*** (0.010)	0.336 (0.368)
LM_{adj} (PUY, 2008)	-0.239 (0.594)	1.395* (0.081)	-1.517 (0.935)	-2.194 (0.986)	-0.193 (0.577)
$\tilde{\Delta}$	3.727*** (0.000)	1.350* (0.094)	1.865** (0.030)	1.827** (0.033)	3.695*** (0.000)
$\tilde{\Delta}_{adj}$	4.011*** (0.000)	1.437* (0.081)	2.007** (0.021)	1.966** (0.025)	3.976*** (0.000)

Notes: The numbers in parentheses are p-values. * Indicate significance at the 10% level., ** Indicate significance at the 5% level., *** Indicate at the 10% level.

Panel unit root tests can be differentiated according to the characteristics of the cross-section units that make up the panel. If there is no dependency between the horizontal sections that make up the panel, first-generation unit root tests are preferred. If there is dependence between horizontal sections, second-generation unit root tests are preferred. We do not prefer homogeneous panel unit root tests due to the detection of country-specific heterogeneity in all variables used in the study. Accordingly, we conduct two different panel unit root tests because the time dimension is short, and the cross-sectional dependency specific to the variables cannot be strongly rejected. We try to determine both panel data and country-specific integrated levels using IPS (Im et al., 2003) for traditional unit root tests and CIPS (Pesaran, 2007) for second-generation panel unit root tests. We show the panel unit root test results in Table 4:

Table 4. Panel unit root tests

Variables	IPS		CIPS	
	Constant	Constant and Trend	Constant	Constant and Trend
ECI	-1.281* (0.09)	-0.942 (0.17)	-2.001	-1.787
GR	-6.52***(0.00)	-5.08***(0.00)	-2.905***	-3.387***
EFI	-1.81***(0.03)	-2.06***(0.01)	-2.557***	-2.364
HDI	-0.42 (0.33)	-0.35 (0.36)	-2.098	-2.758*
FDI	-6.61***(0.00)	-5.48***(0.00)	-2.587***	-2.971***

Notes: CIPS test statistics crticial values are -2.40, -2.21 ve -2.10, respectively, at the significance level of %1, %5 and %10 for constant. For constant and trend , the critical values are -2.92, -2.73 ve -2.60, respectively at 1, 5 and 10 percent significance levels. The maximum lag lengths are selected using Schwarz information criterion.

The panel unit root test results show that the null hypothesis that "the series contains unit root" for both tests is not rejected for ECI and HDI variables. When the first difference is taken, the null hypothesis that "the series contains unit root" is rejected. Accordingly, the integrated level of ECI and HDI variables in the panel data was determined as I (1). The integrated level of GR, EFI, FDI variables was determined as I (0). In addition, since it occurs in a country-specific process, the highest level of suspected integration was determined by IPS (Im et al., 2003) and CADF (Pesaran, 2007) unit root tests. The highest level of integration (*dmax*) results of the countries in the VAR system is shown in appendix 1.

Slope homogeneity and cross-section dependency should be considered in determining the appropriate causality test method in panel causality analyses. For this reason, in the study, to analyze the causality relationship, we first analyze whether there is cross-sectional dependency and heterogeneity among Transitional Economies in models.

Table 5. Results of Granger causality test.

	GR→ECI			ECI→GR			EFI→ECI			ECI→EFI		
Country	**Lag (ki)**	**Wald**	**p-val**	**Lag (ki)**	**Wald**	**p-val**	**Lag (ki)**	**Wald**	**p-val**	**Lag (ki)**	**Wald**	**p-val**
Albania	3	4.946	0.176	3	7.196	0.066*	1	0.937	0.333	1	1.145	0.285
Azerbaijan	1	0.232	0.63	1	0.099	0.753	1	1.159	0.282	1	0.758	0.384
Bosnia	1	1.423	0.233	1	1.602	0.206	1	1.69	0.194	1	0.779	0.378
Belarus	2	7.795	0.02**	2	1.077	0.584	2	27.67	0.00***	2	2.031	0.362
Bulgaria	1	0.842	0.359	1	7.702	0.00***	1	2.805	0.094*	1	1.966	0.161
Croatia	1	2.87	0.09*	1	5.003	0.025**	3	0.998	0.802	3	12.995	0.00***
Czech Republic	1	0.6	0.438	1	5.221	0.022**	1	1.114	0.291	1	3.568	0.059*
Estonia	3	10.311	0.016**	3	7.172	0.067*	1	1.439	0.23	1	0.616	0.432
Georgia	1	9.162	0.00***	1	1.363	0.243	1	1.018	0.313	1	2.186	0.139
Hungary	1	0.1	0.751	1	1.057	0.304	2	1.604	0.448	2	18.737	0.00***
Kazakhstan	1	1.971	0.16	1	1.639	0.2	1	0.987	0.32	1	3.321	0.068*
Latvia	1	0.859	0.354	1	0.144	0.704	1	12.92	0.00***	1	2.014	0.156
Lithuania	1	0.977	0.323	1	0.402	0.526	2	1.159	0.56	2	5.09	0.078*
Macedonia	1	2.908	0.088*	1	0.052	0.819	1	0.638	0.424	1	0.515	0.473
Moldova	1	5.575	0.018**	1	0.575	0.448	2	2.42	0.298	2	0.636	0.727
Poland	1	1.622	0.203	1	1.586	0.208	1	0.172	0.678	1	0.334	0.563
Romania	1	0.321	0.571	1	3.811	0.051*	3	8.676	0.034**	3	11.903	0.00***
Russia	1	0.136	0.712	1	1.161	0.281	4	1.202	0.878	4	9.296	0.054*
Slovakia	1	1.333	0.248	1	5.129	0.024**	4	5.701	0.223	4	6.57	0.16
Slovenia	1	1.519	0.218	1	1.169	0.28	1	2.692	0.101	1	0.184	0.668
Ukraine	1	0.037	0.848	1	2.235	0.135	1	1.838	0.175	1	1.572	0.21

Panel Fisher	76.447	67.939	68.315	67.14
Asymptotic p-value	0.005***	0.007***	0.006***	0.007***
Bootstrap p-value	0.939	0.771	0.895	0.549
LM (Breusch and Pagan 1980)	558.22***	639.27***	558.22***	389.57***
	0.00	0.00	0.00	0.00
CDlm (Pesaran 2004)	16.992***	20.946***	16.992***	8.762***
	0.00	0.00	0.00	0.00
CD (Pesaran 2004)	2.056***	17.741***	2.056***	3.044***
	0.00	0.00	0.00	0.00
LMadj	16.125***	21.255***	16.125***	10.837***
	0.00	0.00	0.00	0.00
Delta_tilde	9.483***	3.664***	9.483***	9.580***
	0.00	0.00	0.00	0.00
Delta_tilde_adj	10.787***	4.169***	10.787***	10.898***
	0.00	0.00	0.00	0.00

Notes: The numbers in parentheses are p-values. * Indicate significance at the 10% level., ** Indicate significance at the 5% level., *** Indicate at the 10% level. Lag orders k_i are selected by minimizing the Schwarz Bayesian criteria. Critical values are based on 2000 bootstrap replications.

The slope homogeneity and cross-section dependency test results of the models are included in Table 3. Accordingly, the null hypothesis that "there is no cross-sectional dependency" is rejected in all models established. This shows that a shock that occurs in one of the Transitional Economies can spread to all Transitional Economies. According to the test results for the determination of slope homogeneity, the empty hypothesis that "slope coefficients are homogeneous in all models" is rejected. Thus, country-specific heterogeneity has been identified.

Table 6. Results of Granger causality test.

	HDI→ECI			ECI→HDI			FDI→ECI			ECI→FDI		
Country	**Lag (ki)**	**Wald**	**p-val**	**Lag (ki)**	**Wald**	**p-val**	**Lag (ki)**	**Wald**	**p-val**	**Lag (ki)**	**Wald**	**p-val**
Albania	2	1.667	0.434	2	17.103	0.00***	2	12.372	0.00***	2	0.522	0.77
Azerbaijan	1	0.094	0.76	1	1.936	0.164	2	0.306	0.858	2	0.483	0.785
Bosnia	1	0.326	0.568	1	0.522	0.47	1	0.212	0.645	1	0.147	0.701
Belarus	2	3.14	0.208	2	8.343	0.015**	1	0.929	0.335	1	0.355	0.551
Bulgaria	1	1.488	0.223	1	8.566	0.00***	1	0.67	0.413	1	1.373	0.241
Crotia	4	12.20	0.016**	4	4.012	0.404	1	0.599	0.439	1	2.544	0.111
Czech Republic	4	1.806	0.771	4	52.131	0.00***	1	4.707	0.03**	1	0.944	0.331
Estonia	1	1.228	0.268	1	0.206	0.65	1	0.283	0.595	1	0.749	0.387
Georgia	2	22.02	0.00***	2	0.972	0.615	1	1.199	0.273	1	2.842	0.092*
Hungary	1	1.725	0.189	1	1.449	0.229	1	2.967	0.085*	1	5.507	0.02**
Kazakhstan	4	1.163	0.884	4	18.806	0.00***	1	0.688	0.407	1	6.56	0.01**
Latvia	1	1.373	0.241	1	5.782	0.016**	1	0.012	0.911	1	1.434	0.231
Lithuania	1	3.253	0.071*	1	1.436	0.231	1	6.278	0.012**	1	1.106	0.293
Macedonia	1	1.553	0.213	1	2.064	0.151	1	3.38	0.066*	1	0.001	0.978
Moldova	1	3.145	0.076*	1	0.26	0.61	1	0.716	0.397	1	0.119	0.73
Poland	1	3.035	0.081*	1	2.285	0.131	1	5.611	0.018**	1	1.234	0.267
Romania	2	8.134	0.017**	2	12.975	0.00***	1	4.688	0.03**	1	1.271	0.26
Russia	1	0.357	0.55	1	0.288	0.591	1	5.965	0.015**	1	9.286	0.00***
Slovakia	2	1.713	0.425	2	2.852	0.24	4	6.436	0.169	4	9.515	0.04**
Slovenia	1	0.182	0.67	1	2.694	0.101	1	5.2	0.023**	1	1.359	0.244
Ukraine	1	0.099	0.753	1	0.336	0.562	1	0.161	0.688	1	7.521	0.00***

Panel Fisher	44.74	114.93	58.812	68.319
Asymptotic p-value	0.358	0.000***	0.044**	0.006***
Bootstrap p-value	0.815	0.152	0.882	0.749
LM (Breusch and Pagan 1980)	558.22*** (0.00)	467.75*** (0.00)	558.22*** (0.00)	408.71*** (0.00)
CDlm (Pesaran 2004)	16.992*** (0.00)	12..577*** (0.00)	16.992*** (0.00)	9.670*** (0.00)
CD (Pesaran 2004)	2.056*** (0.00)	12.268*** (0.00)	2.056*** (0.00)	10.696*** (0.00)
LMadj	16.125*** (0.00)	9.252*** (0.00)	16.125*** (0.00)	9.001*** (0.00)
Delta_tilde	9.483*** (0.00)	3.779*** (0.00)	9.483*** (0.00)	4.574*** (0.00)
Delta_tilde_adj	10.787*** (0.00)	4.299*** (0.00)	10.787*** (0.00)	5.204*** (0.00)

Notes: The numbers in parentheses are p-values. * Indicate significance at the 10% level., ** Indicate significance at the 5% level., *** Indicate at the 10% level. Lag orders k_i is selected by minimizing the Schwarz Bayesian criteria. Critical values are based on 2000 bootstrap replications

Considering the preliminary test results and sampling structure, we use Toda-Yomamato's (1995) LA-VAR approach and Granger causality test in heterogeneous panels using the meta-analysis developed by Emirmahmuoğlu and Köse (2011) in this study. This test does not require a pre-test for cointegration, except for determining the delayed structure. Variables can be used with their level states without being noticed. Also, according to Monte Carlo simulation results, it shows that the LA-VAR approach is strong even if *N* and *T* are small, both under cross-sectional dependency and under cross-sectional independence. (Emirmahmuoğlu and Köse, 2011:875). In the panel data, when there is no cross-country dependency, the Asymptotic p-value is taken into consideration for Panel Fisher test statistics, and the Bootstrap p-value is taken into consideration in cases where there is inter-country dependency. The bootstrap p-value is used in panel data due to cross-country dependency. Accordingly, the causality analysis test results between ECI and the variables of GR, EFI, HDI, FDI are shown in Table 5 and Table 6.

According to the Granger causality analysis test results applied using the LA-VAR approach; both the null hypothesis "GR is not the Granger cause of ECI" and the null hypothesis "ECI is not the Granger cause of GR" cannot be rejected according to Bootstrap probability values between ECI and GR variables in Transitional Economies. Therefore, we cannot identify a causality relationship between ECI and GR between

1995 and 2017 when we take into account all Transitional Economies. When country-specific causality relationships are analyzed, the null hypothesis that "GR is not the cause of ECI" is rejected for Georgia at the 1% significance level, for Moldova, Estonia, and Belarus at the 5% significance level, and Croatia and Macedonia countries at the 10% significance level. On the other hand, the null hypothesis that "ECI is not the Granger cause of GR" is rejected at a 1% significance level in Bulgaria, at 5% significance level in Croatia, Czech Republic, and Slovakia, at 10% significance level in Romania, Estonia and Albania countries.

Considering all Transitional Economies between ECI and EFI variables, both the null hypothesis that "EFI is not the Granger cause of ECI" and the null hypothesis that "ECI is not the Granger cause of EFI" cannot be rejected according to Bootstrap probability values. When country-specific causality relationships are analyzed, the null hypothesis that "EFI is not the cause of ECI" is rejected for Latvia and Belarus at 1% significance level, Romania at 5% significance level, and Bulgaria at 10% significance level. The null hypothesis that "ECI is not the Granger cause of EFI" is rejected for Croatia, Hungary, and Romania at the 1% significance level and the Czech Republic, Kazakhstan, Lithuania, and Russia at the 10% significance level. We detect a bidirectional causality relationship between ECI and EFI variables in Romania according to the test results.

Considering all Transitional Economies; between ECI and HDI variables, both the null hypothesis that "HDI is not the Granger cause of ECI" and the null hypothesis that "ECI is not the Granger cause of HDI" cannot be rejected according to Bootstrap probability values. Therefore, we cannot identify a causality relationship between ECI and HDI between 1995 and 2017 when considering all Transitional Economies. When country-specific causality relationships are analyzed, the null hypothesis that "HDI is not the cause of ECI" is rejected for Georgia at 1% significance level, Romania at 5% significance level, Lithuania, Moldova, and Poland at 10% significance level. On the other hand, the null hypothesis that "ECI is not the Granger cause of HDI" is rejected at the 1% significance level in Albania, Bulgaria, Czech Republic, Kazakhstan and Romania, at the 5% significance level in Belarus and Latvia. Accordingly, we cannot detect a bidirectional causality relationship between ECI and HDI variables in Romania.

Finally, we examine the causality relationship between ECI and FDI variables in Transitional Economies, including all panel data. Both the null hypothesis that "FDI is not the Granger cause of ECI" and the null hypothesis that "ECI is not the Granger cause of FDI" between ECI and FDI variables cannot be rejected according to Bootstrap probability values. When considering all Transitional Economies, we cannot identify a causality relationship between ECI and HDI variables. When country-specific causality relationships are analyzed; the null hypothesis that "FDI is not the cause of ECI" is rejected for Albania at the 1% significance level, Czech Republic, Lithuania, Poland, Romania, Russia, and Slovenia at the 5% significance level, and

Hungary and Macedonia countries at the 10% significance level. On the other hand, the null hypothesis that "ECI is not the Granger cause of FDI" is rejected in Russia and Ukraine at the 1% significance level, Hungary, Kazakhstan, and Slovakia at the 5% significance level, and Georgia at the 10% significance level. In this case, we cannot detect a bidirectional causality relationship between ECI and FDI variables in Russia and Hungary.

5. Discussion and Results

In today's world, where global competition is increasing, developed countries constantly impose sanctions on other countries, and trade wars are raging, foreign trade competitiveness is perhaps the most important concept. The increase in the exports of the countries does not indicate that their competitiveness has increased. Because the content of the exported products in terms of added value, the diversity on the product and market basis is also important. In this context, the concepts of "economic complexity" and "economic complexity index", which encompass both product and global market diversity, and the rankings of countries are critical.

For this purpose, we analyze the determinants of the economic complexity levels of countries within the scope of Transitional Economies in this study. In this context, we investigate the causality relationship between the economic complexity index and economic growth, foreign direct investments, human development index, and economic freedom index of these countries. According to Bootstrap Granger causality test results, we cannot identify a Granger causality relationship between the variables in question and economic complexity when considering all Transitional Economies. However, we identify both one-way and two-way Granger causality relationships between economic growth, foreign direct investment, human development, and economic freedom index and economic complexity in some countries when we consider the variables specific to these countries.

Countries' global competitiveness, export diversification, in short, economic complexity index scores are determined not only by product type but by human capital. There is a need for a more educated workforce stock with a higher level of competence to produce more complex products. In this context, countries should build their economic policies, development, and foreign trade strategies based on qualified labor and products to improve their economic complexity and development levels.

The per capita income and economic growth rates of countries that succeed in product and market diversification in their exports are increasing. In other words, countries need to increase their level of economic complexity to get a larger share from global added value and increase their competitiveness. In this context, economic complexity needs to be taken more seriously by scientists, policymakers, and decision-makers.

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APPENDIX 1.

Table 1. Maximal Order of Integration

	ECI	GR	EFI	HDI	FDI
	dmax	dmax	dmax	dmax	dmax
Albania	1	1	1	2	1
Azerbaijan	1	1	0	1	1
Bosnia	1	0	1	1	1
Belarus	0	0	1	2	0
Bulgaria	0	0	1	1	0
Crotia	1	1	1	2	1
Czech Republic	0	1	1	1	0
Estonia	1	0	0	1	1
Georgia	1	0	1	1	1
Hungary	0	1	1	1	0
Kazakhstan	2	1	1	1	1
Latvia	1	0	1	2	1
Lithuania	2	0	0	1	1
Macedonia	1	0	1	1	1
Moldova	2	0	1	1	1
Poland	1	0	1	1	1
Romania	1	0	1	1	1
Russia	1	0	1	1	1
Slovakia	0	0	1	1	0
Slovenia	1	0	0	1	1
Ukraine	1	0	1	1	1

JTSR (2021) 28(2): 81-92
DOI 10.14665/1614-4007-28-2-005

PAPER

The Impact of Corruption and Good Governance on the Economic Growth of the Balkan Countries

Antonella Biscione* • **Klodian Muço****

Abstract The aim of this paper is to investigate the effect of good governance on economic growth in Balkan countries. In particular, we investigate the impact of corruption on the growth of GDP per capita. The results show that in some of the countries of the Balkan area such as Albania, Bosnia, Croatia, Greece, the Republic of North Macedonia, Romania, Serbia, and Turkey, corruption is negatively correlated with GDP per capita growth. This paper also shows that corruption, in some Balkan countries, tends to decrease before joining the European Union and continues to decrease even after joining. This is due to the fact that, with EU membership, governance tends to improve and adapt more easily to EU rules. The main policy implication is that improved governance is more effective in terms of both reducing corruption and improving the growth potential of an economy and also EU integration.

Keywords: Corruption, economic growth, good governance, integration, Balkan countries.

JEL Classification: O11, P43, P52.

1. Introduction

Grand corruption is one of the biggest threats to sustainable development. It is difficult to see any other crime resulting in more victims globally (Benestad, 2020). Corruption exists in all countries and can affect a given region or a specific level of development (Abed and Gupta, 2002). It occurs when the public and private sectors interact; in this situation, bureaucrats may abuse their public position to gain private gains by accepting bribes or even actively extorting bribes. According to the existing

Antonella Biscione**(✉), Klodian Muço**

* Ph.D., Assistant Professor, Catholic University "Our Lady of Good Council, Department of Bioeconomic Strategies, Tirana, Albania.
E-mail: a.biscione@unizkm.al

** Associate Professor, Catholic University "Our Lady of Good Council", Research Centre on Economics of Transition Countries, Tirana, Albania.
E-mail: k.muco@unizkm.al

literature, this behavior is defined as an act of bureaucratic corruption that can promote growth (Asian paradox) by helping firms bypass the burden of the public sector or can postpone it by increasing that burden and reducing the efficiency of public spending that contributes to productivity (Dzhumashev, 2014). The prevailing literature (Mauro, 1997; Friedman et al., 2000; Dreher and Schneider, 2010; Leff, 1964; Huntington, 1968; Rock and Bonnett, 2004) highlights that the positive or negative effect of corruption on growth depends mainly on: (i) the quality of governance and (ii) the level of institutional development, which results in strong and independent instigations that exist in a given country. This means that corruption is driven by the institutional environment. Corruption depends on the extent to which bureaucrats coordinate their rent-seeking behavior. Some countries with organized corruption networks are likely to display lower levels of bribes, higher levels of research activity, and higher rates of growth than countries with disorganized corruption arrangements (Blackburn and Forgues-Puccio, 2009).

Another strand of literature states that corruption modifies the effects of institutions on the economy, such as the burden imposed or the productivity input provided by the public sector, thereby impacting economic growth (Acemoglu and Verdier, 2000; Aidt, 2009).

Based on these facts, this paper tries to investigate: (i) the impact of corruption on the growth of GDP per capita in Balkan countries region through the correlation between GDP growth per capita and good governance indicator measured by CPI. We focus on the Balkan countries for the following reasons. First, with few exceptions, corruption in Balkan countries is systemic (Muço and Balliu, 2018). This allows us to study the correlation between systemic corruption and GDP growth per capita. Balkan countries are generally characterized by weak institutions; for this reason, in this article, we will try to study how the performance of good governance indicator affects GDP per capita growth.

Secondly, some of the Balkan countries have joined the EU; the others try to join it. Taking these countries into consideration allows us to understand what happens with corruption and with the governability of a country after joining the EU.

The rest of the paper will proceed as follows. Sections 2 and 3 discuss the overview of the Balkan area and its theoretical background. In Section 4, we show the statistical analysis, and the last section concludes and summarizes.

2. Overview of the Balkan area

The area under examination represents a strategic point as it constitutes a bridge between Europe and the East. The years following the Balkan conflicts have been characterized by the intervention of both the European Union and the international political community that have tried to promote economic growth and regional stability.

The Balkan area has been perceived by the international community as a problematic area made up of small states constantly fighting each other. The Balkan region was called

the Powder Keg of Europe because it was characterized by unstable political situations and constant disorder. In this analysis, we consider states that belong to the European Union (Greece, Slovenia, Bulgaria, Romania, and Croatia) and states that are candidates (the Republic of North Macedonia, Turkey, Albania, and Serbia)[1].

In the Balkan intra-regional context, efforts were made to implement reforms by the intervention of cooperative and political means. The variables that are a problem for this area (in political and economic terms) cannot be overlooked, and environmental conditions must be taken into account, as well as the shift from a difficult conflict phase to solve and the formation of new political entities, which have tried to legitimize themselves by leveraging ethnic-political elements (Gligorov et al., 1999).

The reasons for the integration policy in the Balkan area consist in trying to link their development to that of the European Union, achieving social cohesion (eliminating discrimination, poverty and exclusion), raising social and human capital (affirmation of human rights) and empowering citizens with the democratization of political structures.

3. Literature review

Over the years, there has been an attempt to understand how corruption can influence the defining contexts for a country's economic growth. This has led several scholars in two opposite directions: the first group of scholars argue that corruption facilitates trade and promotes efficiency by allowing private sector agents to bypass cumbersome regulations (Leff, 1964; Huntington, 1968; Rock and Bonnett, 2004). Several studies (Egger and Winner, 2005; Levy, 2007) support this hypothesis, demonstrating that in highly restrictive regulatory environments, corruption can foster economic growth by stimulating entrepreneurship and efficiency. Corruption acts as a way to fight the bureaucracy of public sector tenders. Countries with high levels of public bureaucracy have the tendency to restrict and discourage production activities. Entrepreneurs, through corruption, enhance the benefit of necessary authorizations in order to continue their planned activities that stimulate employment and economic development (Acemoglu e Verdier, 1998; Huntington, 2002; Rock e Bonnett, 2004).

The second line of thought argues that corruption hinders economic growth (Mauro, 1997) and reduces investment in most developing countries and especially in small open economies. Moreover, corruption reduces foreign direct investments (FDI) and productivity (Lambsdorff, 2003).

Fisman and Svensson (2007) estimate that a one percent increase in corruption leads to a three percent reduction in business growth.

According to Sylos Labini (1989), scientific, technical progress and education

[1] Greece joined the EU in 1981; Slovenia in 2004; Bulgaria and Romania in 2007; Croatia in 2013; Turkey has been a candidate since 1999; the Republic of North Macedonia has been a candidate since 2005; and finally, Albania and Serbia have been candidates since 2012.

stimulate economic development; however, if there is corruption, this tends to negatively affect these factors, also affecting the increase in the social well-being of citizens.

Mauro (1995), in his empirical model comes to the conclusion that corruption is like an income tax and worsens economic growth.

Tanzi and Davoodi (2002a) state that corruption can reduce spending on health and education. The authors also affirm that corruption can lead to a reduction in the level of quality of public infrastructure. Akai et al. (2005) arrive at a similar result; according to them, corruption tends to increase government spending on infrastructure, diverting funds from other sectors such as education and health. Another problem is that corruption causes an increase in cost, a decrease in the quality of investments but also an increase in informal economic growth and distortion of the tax burden as the ability of the government to collect tariffs and taxes is compromised (Friedman et al., 2000; Del Monte and Pagnani, 2007; Dreher and Schneider, 2010).

Several other studies link corruption to the economic conditions of a particular country; in fact, a country with poor economic conditions will tend to have high levels of corruption, which will further worsen development (Shleifer and Vishny, 1993; Ali and Isse, 2003). These studies also state that a country with satisfactory macroeconomic performance is more sensitive to reduce bureaucracy and corruption, consequently having a robust development.

Acemoglu et al. (2008) create a connection between corruption and the level of democracy in a country, which means that the more democratic the country is, the less corrupted and most economically advanced it will be. Corruption and democracy, according to the authors mentioned above, have a negative correlation. According to Brunetti et al. (1998) there exists a negative connection between the credibility of laws and economic growth. As claimed by the authors, corruption worsens the distribution of wealth within a country.

According to North (1991), the growth that occurs in a country is not only hindered by the presence of corruption by public officials but also depends on the efficiency of the judicial system. The corruption phenomenon is very often also connected to informal activities, and it is also characterized by a reduction in tax revenues and consequently by increased tax evasion (Friedman et al., 2000).

Corruption and decreasing tax revenues are related to the government's lesser ability to provide public services and goods (Mauro, 1997).

According to Kaufmann (2010), policymakers seek to encourage large investments that are placed in public works, thereby also increasing public spending.

4. Statistical analysis

In this analysis, we investigate how Corruption Perception Index (CPI) affects GDP growth per capita in a group of Balkan countries[2]; Kosovo and Montenegro are

[2] The countries considered in this analysis are: Albania; Bosnia; Bulgaria; Croatia; Greece; the Republic of

disregarded due to the lack of data that does not allow us to perform statistical and empirical checks.

To analyze graphically the effect of corruption on economic growth we use the following relationship:

$$GDP_{pt} = \alpha + \beta_1 CPI + \varepsilon_t$$

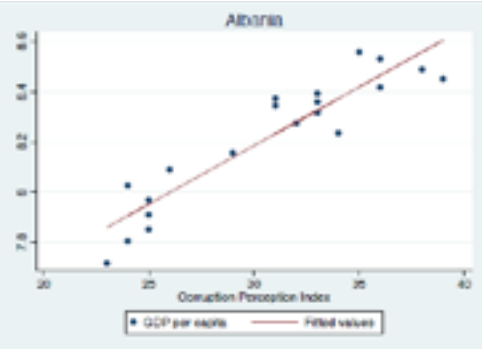
where GDP_t is the annual GDP per capita and our dependent variable. Instead, CPI represents the perceived level of corruption. CPI is the most widely used measurement tool at global level and is issued annually by Transparency International. It estimates levels of corruption in the public sector using a set of surveys and interviews of businesspeople, professionals, and experts.

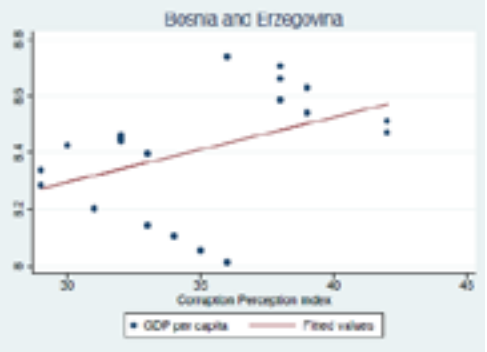
The CPI is calculated using 13 different data sources. Data collected by the CPI cover the following topics: bribery; diversion of public funds; diversion of public funds; use of public office for private gains; nepotism in the civil service, and finally, state capture.

The index ranks 180 countries and territories according to the perceived levels of corruption in their public sector. It ranges from 0 to 100, with 0 indicating highly corrupt and 100 indicating very clean. Graphs below show the correlation between GDP per capita, released periodically by the World Bank, and the CPI.

The data show that the trend in GDP per capita tends to increase in all countries, except for some fluctuations during 2008-2009, only in Greece the trend tends to decrease for the period 2009-2016. On the contrary, the trend of the corruption perception index tends to fluctuate for all countries during the period 1996-2018.

By carefully observing the data, one can clearly see a gradual reduction in corruption (the increase in the value of the index in question) before the EU membership for some countries of the Balkan area (Bulgaria, Romania, and Croatia) and Greece after the start of the 2008-2009 crisis.





North Macedonia, Romania; Slovenia; Serbia and Turkey.

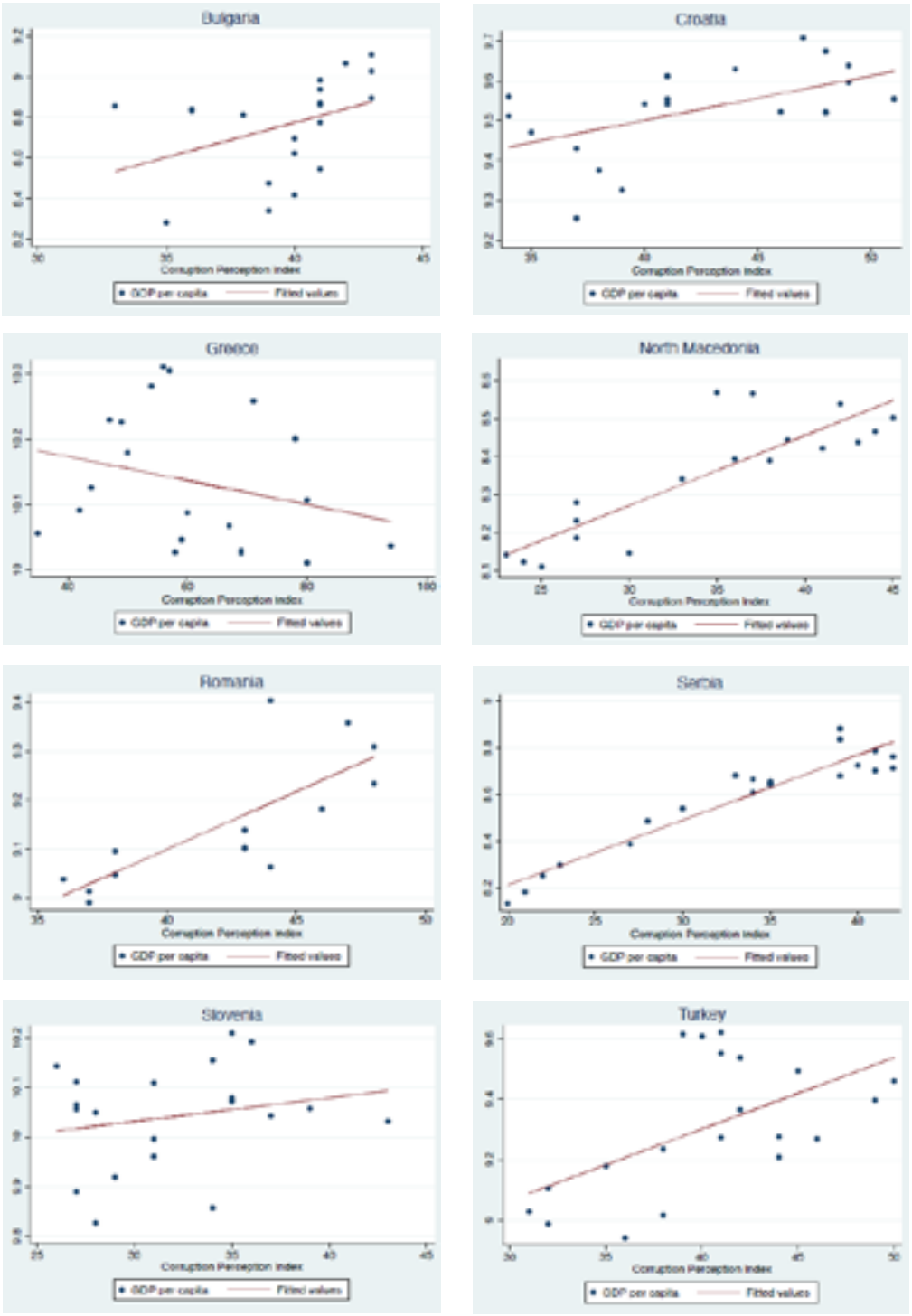


Figure 1. Correlation between the Corruption Perception Index and GDP per capita

Figure 1 shows that in Albania, Bosnia, Croatia, the Republic of North Macedonia, Romania, Serbia, and Turkey, even if the trends differ in the period considered, corruption tends to increase, i.e., the CPI has a decreasing trend[3]. In the long run, this correlates positively with GDP per capita, which could be due to the slowdown in GDP growth. In other words, corruption is negatively correlated with the growth of GDP per capita. In countries like Bulgaria, Slovenia and Greece, there does not seem to be a correlation between the CPI and GDP per capita.

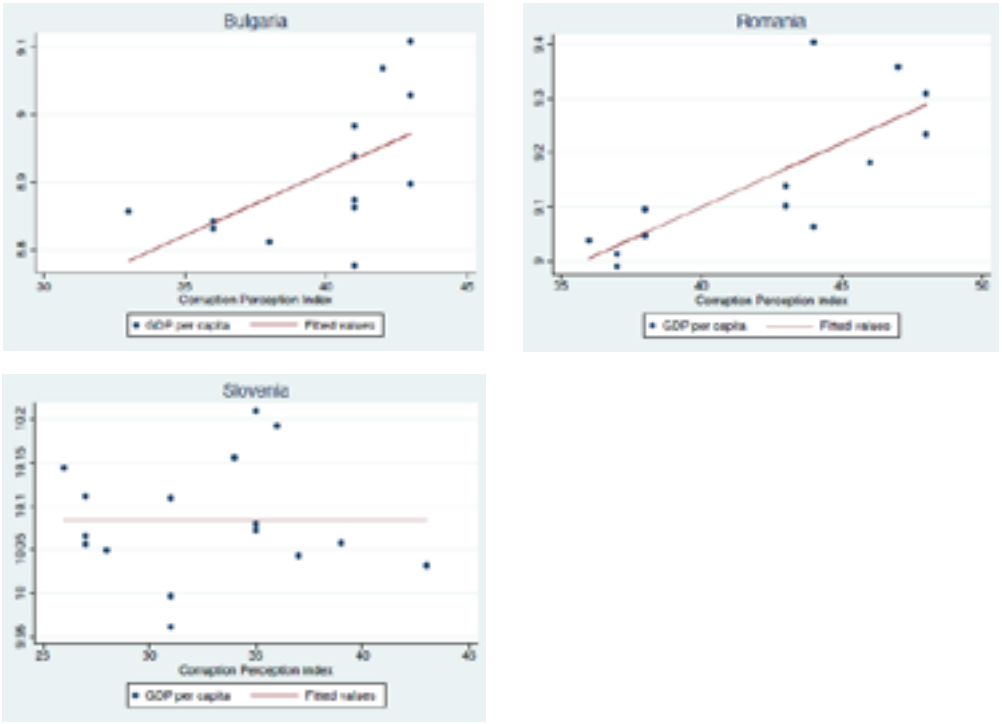


Figure 2. Correlation between the Corruption Perception Index and GDP per capita of countries after joining the European Union

Figure 2 contains the correlation between GDP per capita and CPI of some countries that belong to the EU, namely Bulgaria, Romania, and Slovenia. We focus on these countries to understand whether the EU membership of these countries has any impact on corruption trends.

For this purpose, the baseline year of our analysis is the year of the EU membership, that is to say, 2004 for Slovenia and 2007 for Bulgaria and Romania. We exclude Greece as it became a member of the EU in 1981 and Croatia, which joined the EU in 2013. As can also be seen in Figure 2, Bulgaria for the period in which it was

[3] CPI ranges from 0 to 100, where 0 is highly corrupt and 100 is very clean.

already a member of the EU (2007-2019), has a significant and negative correlation between corruption and the growth of GDP per capita. This means that the decrease in corruption leads to faster growth in GDP per capita.

On the contrary, Slovenia, even after joining the EU, shows a non-significant correlation. This result probably depends on the fact that Slovenia differs from other Balkan countries; in fact, it is characterized by a different government culture, a higher level of development, and the influence of neighboring countries such as Austria and Italy, which have a low corruption rate.

5. Conclusions

The results obtained in this paper can be summarized as follows. First, corruption has always been present to an important degree in the countries of the Balkan area, thus suggesting that corruption in these countries often becomes a cultural factor that is difficult to prevent and fight.

Second, in most of the Balkan countries (Albania, Bosnia, Croatia, the Republic of North Macedonia, Romania, Serbia, and Turkey), there is an inverse correlation between corruption and growth of GDP per capita. That is to say, the reduction in corruption tends to positively influence the growth of GDP per capita.

In some countries of the Balkan area, such as Bulgaria, Slovenia and Greece, there seems to be neither a negative nor a positive correlation between corruption and GDP per capita.

Third, the corruption of the various countries of the Balkan area is also correlated with the process of integration into the European Union. That is to say, corruption in some countries tends to decline in the early years before joining the EU and continues to decline even after joining.

Bulgaria, in the period in which it was already a member of the EU (2007-2019), has a significant correlation between corruption and the growth of GDP per capita, the decrease in corruption in the GDP per capita tends to grow faster.

In Slovenia, the correlation is not significant even in the period in which it is a member of the EU. This is probably because Slovenia, unlike the other Balkan countries, has another type of governing and developing the country. This is most likely because it is influenced by neighboring countries such as Austria and Italy, which are considered as low corruption countries.

In conclusion, we can say that the integration of the Balkan countries into the EU tends to improve governance, and this leads to a reduction in corruption both in short and in the long term. This leads us to the conclusion that improving governability is more effective in terms of both reducing corruption and improving the growth potential of an economy and also have a positive impact on integrating into the EU.

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Appendix

Table A1 Correlation between the Corruption Perception Index and GDP per capita

Albania	
Variable	**GDP per captita**
Corruption	0.047***
Constant	6.788***
R-squared	0.859
Number of Observations	20
Bosnia and Erxegovina	
Variable	**GDP per captita**
Corruption	0.023***
Constant	7.609***
R-squared	0.182
Number of Observations	20
Bulgaria	
Variable	**GDP per captita**
Corruption	0.034
Constant	7.406***
R-squared	0.156
Number of Observations	20

Croatia	
Variable	**GDP per captita**
Corruption	0.011***
Constant	9.056***
R-squared	0.301
Number of Observations	20
Greece	
Variable	**GDP per captita**
Corruption	-0.002
Constant	10.247***
R-squared	0.07
Number of Observations	20
North of Macedonia	
Variable	**GDP per captita**
Corruption	0.018***
Constant	7.719***
R-squared	0.736
Number of Observations	18
Romania	
Variable	**GDP per captita**
Corruption	0.032***
Constant	7.793***
R-squared	0.851
Number of Observations	20
Serbia	
Variable	**GDP per captita**
Corruption	0.028***
Constant	7.654***
R-squared	0.900
Number of Observations	20

Slovenia	
Variable	**GDP per captita**
Corruption	0.005
Constant	9.889***
R-squared	0.045
Number of Observations	20
Turkey	
Variable	**GDP per captita**
Corruption	0.024***
Constant	8.356***
R-squared	0.322
Number of Observations	20

JTSR (2021) 28(2): 93-104
DOI 10.14665/1614-4007-28-2-006

PAPER

Impact of Public Investment Through Public Debt on Economic Growth: Empirical Analysis in European Countries in Transition

Kestrim Avdimetaj[*] • Bekim Marmullaku[**] • Artan Haziri[***]

Abstract The main aim of this study is to investigate the link between public investment and public debt in transition countries. This analysis includes European countries in transition, and the source of data will be the World Bank, the International Monetary Fund, and Eurostat. This study has particular scientific importance; firstly, this study will reflect the relationship between public investment and public debt. Secondly, this study will give empirical data that shows the impact of public debt through public investment on economic growth in European countries in transition. To conduct this research, we have used various econometric models, such as OLS, Fixed and Random Effects, Hausman-Taylor, and GMM. The results obtained through this study are in full accordance with the theoretical hypotheses presented at the beginning of this research which emphasize that public debt is likely to affect economic growth through public investment positively. Empirical results show that public debt positively affects economic growth through public investment in transition countries in Europe, and it can be argued that these countries can increase the level of debt to finance public capital investment which then affects economic growth. The findings of this study are beneficial for the governments of European countries in transition, as it provides them with helpful information on the link between investment and public debt.

Keywords: Economic Growth, Public Investment, Public Debt, Panel Date, European Transition Country.

JEL classification: E20,E6, C10,C30.

Kestrim Avdimetaj[*], Bekim Marmullaku[**](✉), Artan Haziri[***]

[*] Assistant Professor, Faculty of Management and Business and Economics, University for Business and Technology, Prishtine, The Republic of Kosovo.
E-mail: kestrimavdimetaj@gmail.com

[**] Assistant Professor, Faculty of Management and Business and Economics, University for Business and Technology, Prishtine, The Republic of Kosovo.
E-mail: bekimi05@yahoo.de

[***] Assistant Professor, Faculty of Management and Business and Economics, University of Pjeter Budi, Prishtine, The Republic of Kosovo.
E-mail: artanhaziri@live.com.

1. Introduction

The main purpose of this scientific research is to reflect the link between public investment and public debt. The paper will empirically analyze European countries in transition. This scientific study will try to present the impact of public debt through public investment on economic growth in European countries in transition. Some scientific papers deal with the threshold of the utilization of public debt, where it is observed that European countries in transition have different levels of utilization of public debt; if we refer to the current period, we see that most countries have exceeded the optimal threshold of the utilization of public debt, and this can then affect economic stability (Mencinger et al., 2015; Reinhart and Rogoff, 2010; Bexheti et al., 2020; Fetai et al.,2020; Blanchard et al., 2018). However, through this analysis, we will explore how the growth of public debt can be affected if it is used for public investment, which can then affect economic growth. We will see how the eventual increase of public debt affects public investment in the context of economic growth in European countries in transition.

From the theoretical literature, we notice some approaches which do not support the high growth of public debt to finance public investments, which are not reasonable because unbalanced growth of public debt can negatively affect economic growth. On the other hand, some scientific studies pay special attention to the use of public debt if it is gathered to finance productive public investments, which later stimulate economic activity in European countries in transition (Checherita and Rother, 2010). To examine the relationship between public investment and public debt, we have addressed some research hypotheses which can help us solve this problem, such as:

H1: There is a positive link between public investment and public debt.
H2: Public debt is likely to positively impact economic growth through public investment in European countries in transition.

To confirm the reliability of the hypotheses, we will use various econometric methods in order for the results to have a high scientific significance, such as the following: OSL, Fixed Effects, Random Effects, Taylor-Hausman, GMM.

To summarize, the main findings of this study show that there is a possible link between public debt and public investment, where more specifically, the results show that public debt positively affects public investment by 0.011%. While public debt placed in the square negatively affects public investment by 0.403%, this result has statistical reliability.

The structure of this paper is as follows: the first part begins with the introduction and motivation of the thesis, then continues with the literature review, methodology, and in the last part will be set the results and conclusions of the study.

2. Literature Review

When reviewing the empirical literature on the relationship between public investment and public debt in the context of economic growth in European countries in transition, we note that few scientific studies address this relationship between these variables and their impact on economic growth (Checherita and Rother, 2010**;** Valila and Mehrotra, 2005; Heinemann,2006; Picarelli et al.,2019). However, we see that many scientific studies have addressed the impact of public debt on economic growth in countries in transition. We should emphasize that some of these studies have determined the optimal threshold of the utilization of public debt to what extent public debt can be used and still positively affect economic growth, and conversely exceeding the use of public debt above the optimal threshold will negatively affect economic growth (Mencinger et al.,2015; Fetai et al.,2020; Reinhart and Rogoff, 2010; Checherita and Rother, 2010; Andres et al.,2016; Fetai and Avdimetaj, 2020). Some studies point out that an increase in public debt, in the long run, can drive out capital as well as reduce output, but in the short run, it can boost aggregate demand and aggregate output Barro,1979; Elmendorf and Mankiw, 1999; Salotti and Trecroci, 2016). On the other hand, Rubin and Sinai (2004) have pointed out the negative consequences of persistent budget deficits resulting from increased public debt. This can be argued because the persistent deficit is a burden for many generations, and government spending becomes unmanageable, and as a result, economic and social problems are caused, which can hardly be repaired. While Elmeskov and Sutherland (2012) claim that high long-term rates increase the cost of capital, focusing more on public investment, and most importantly, reducing private investment, which in the long run can negatively affect growth economically.

Checherita and Rother (2010) analyze the relationship between public debt and public investment, in their empirical research they analyzed the impact of public debt on economic growth in a sample of twelve Eurozone countries through several channels such as private investment, public investment, the overall level of productivity, as well as real and nominal interest rates. According to the analyzed results, we see that the return point of public debt in the 12 euro area countries is from 90% to 100%, and the reliability of this threshold is about 70% of GDP. The authors have argued these empirical findings on how public debt can be affected through public investment, which means that increasing budget deficits from earlier periods could positively affect the economic growth of these countries if used to finance productive public investment.

Almada and Juarez (2016) analyzed the impact of public debt and public investment on Mexico's economic growth through simple OLS regression. The findings of this study showed that public debt is positively related to public investment, which positively affects economic growth in Mexico. The study recommended that the legal framework for public debt needs to be reformed to improve economic growth. The scientific study conducted by Bacchiocchi et al. (2011) has analyzed the relationship between public investment and public debt. The empirical results of this

study show that the high level of public debt affects the reduction of public investment in all OECD countries, without specific differences between countries. Also, Valila and Mehrotra (2005), using the data of the joint panel, have analyzed the evolution of public investments and shares of public capital during the period 1972-2003 for 14 EU countries. Their findings show that public investments are mainly defined by national income and fiscal sustainability. Heinemann (2006) tries to explain the decrease in public investment for the 16 OECD countries, most of which are European, and the results of this study show that the increase in public debt since 1970 has severely limited the ability to finance new public investment.

Picarelli et al. (2019) have analyzed 26 EU countries through panels data from 1995-2017. Their findings show that if public debt increases by 1% will affect the reduction of public investment by 0.03%.

These findings refer to countries with a high level of public debt, while the negative impact of public debt on public investment is smaller in EU countries compared to other European countries. To summarize, it is clear that a considerable number of studies have analyzed the relationship between public debt and public investment in developed and developing countries.

However, a few empirical studies address the impact of public debt through public investment on economic growth in transition countries, especially in European transition countries. This paper will try to contribute to this issue by investigating how increasing public debt for public investment will positively impact economic growth in European countries in transition.

3. Research methodology

Empirical data which have been used to test variables in European transition countries cover the period from 1995 to 2017 (approximately 22 years) testing the impact of public debt through public investment has been done in transition countries in Europe, while the source of data for the realization of this scientific research has been the World Bank and the International Monetary Fund. To confirm the reliability of the hypotheses, we will use econometric methods in order for the results to have a high scientific significance, such as the following: OLS, Fixed Effects, Random Effects, Hausman-Taylor, and GMM. The dynamic panel model (GMM) is used to test the relationship between public debt and public investment and other independent variables in transition countries in Europe. We will use the GMM estimator from Arellano and Bond (1991), Blundell and Bond (1998), Blundell, Bond and Windmeijer (2000) as it is the proper estimator. To address the problem of endogeneity, we use the instrumental variable (IV) or the two steps of the GMM instrumental estimator (IV). This instrument has the advantage of not having a direct causal effect on the growth rate if it is assumed that there are no effects between debt levels in transition countries of Europe. The problem of endogeneity is also avoided through our specifications because the independent

variables have all remained 1 or 2 years compared to the dependent variable. For the purpose of comparison, we also apply OLS, Fixed Effects, and Random Effects.

The essential difference between Fixed Effects and Random Effects lies in whether the unobserved individual effect counts elements related (correlated) to other regressors in the model and whether these effects are not stochastic. The "Fixed Effects" model is not correlated with the "Random Effects" model. It follows that in the "Fixed Effects" model, it is assumed that there are *"n"* unknown parameters to be treated in econometric estimates, while in the case of the "Random Effects" model, it is treated as a diagram with an average distribution of "μ," as well as a variance independent of the explanatory variables in the model. To see which of those two methods will provide the most appropriate and argumentative results, we will also use the Hausman-Taylor test and evaluator, which offers an alternative to these approaches as mentioned above. The reliability of the GMM assessor depends on the validity of its groups. To address this issue, we consider two tests suggested by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1997). The first is the Sargan test that tests the invalid hypothesis of limitations on identifying the set of exogenous instruments that apply.

The dynamic panel model (GMM) specification is as follows:

$$FINAL\_GOVERNMENT_{it} = \mu + FINAL\_GOVERNMENT_{(It-1)} + B_1 DEBT_{it} + B_2 DEBT\_SQUARE_{it} + B_3 FINAL\_CONSUM_{it} + B_4 EXPORT_{it} + B_5 GDP_{it} + B_6 BRUTO\_SAV_{it} + B_7 CURRENT_{it} + \delta_i + \gamma_i + \varepsilon$$

The dependent variable is the growth rate of the public investment expressed through government spending for each country *i* and *t* represents the years, μ is the term of the constant, while the explanatory variables include $FINAL\_GOVERMENT_{(It-1)}$ is the first group of the dependent variable, $DEBT_t$ is debt and $DEBT\_SQUARE_{it}$ represents debt assuming a non-linear relationship between government debt and economic growth. Based on the theoretical assumptions that the relationship between public debt and public investment is non-linear, we expect public debt to impact economic growth through public investment positively. We also include control variables in order to improve model performance and ensure robust results. Control variables are selected based on key determinants of economic growth (see Sala-i-Martin, 2004; Kumar and Woo, 2010; Checherita and Rother, 2010). The control variables are final consumption, exports, gross savings, current account, and gross domestic product.

The term δ_i is the fixed effect of the country that enables us to control unacceptable time factors that may affect economic growth, which might otherwise lead to bias coefficients. The term γ_i is the usual time effect covering the business cycle's effect, which might otherwise lead to inducible regression between the dependent and explanatory variables. While the term ε_{it} represents the standard error.

4. Results

This part of the section will present the empirical results gained through several econometric approaches such as OLS, Fixed Effects, Random Effects, Hausman-Taylor, and GMM. The variety of use of these econometric models is because the results obtained should reflect high statistical reliability. The results presented below through Tables 4.1 and 4.2 show that all the methods calculated in the dynamic panels are well modeled, as their coefficients are statistically reliable. Furthermore, the Sargan-Test identifies the constraints in the presence of heteroskedasticity with the associated t-value, which examines the validity of the instrumental variables accepted as sound instruments for all evaluated equations. Therefore, the results from the GMM estimator confirm the finding that the instrumental variables are not related to the waste group. As a result, the Arellano-Bond tests AR (1) and AR (2) with associated t-values are rejected in the first order, while they are accepted in the second-order, which confirms that there is no auto-correlation in the second-order between the term of errors.

4.1. The data from empirical research

Table 4.1. Statistical description of exogenous and endogenous variables in European countries in transition

Variables	OBS	Std.Dev	Min	Max
Final_Goverment_Expenditure	146	1.547	15.76	25.88
Debt	146	19.560	3.7	85.7
Debt_Square	146	1637.4	13.69	7344.49 |
Final_Consum	146	5.552	65.48	89.31
Exsport	146	16.557	22.09	86.54
Gdp	146	4.371	-14.56	12.92
Bruto_Saving	146	4.204	10.46	30.46
Current_Account	161	5.001	-21.07	7.9

Source: Calculated by Author

Empirical data used to investigate the link between public debt and public investment in transition countries in Europe cover the period from 1995 to 2017. Meanwhile, the data source will be the World Bank and the International Monetary Fund. To test the impact of public debt on economic growth through public investment, we have

built econometric models that include several econometric approaches, ranging from OLS, Fixed Effects, Random Effects, Hausman-Taylor, and the GMM (General Methodology) Moments), which are in line with other empirical studies that try to explain the impact of public debt on economic growth through certain channels, including public investment (Checherita and Rother (2010).

According to the data presented in Table 4.2, we can see the results from all the econometric approaches used in this empirical research, representing the relationship between public debt and public investment. Where the dependent variable is set final_ goverment_expenditure (which otherwise represents public investment expenditure), debt (public debt), debt square (debt placed in square), export (export), final_consum (consumption expenditure), gross_saving (gross savings), current account, and GDP are set as independent variables. All variables in this empirical research are expressed as a percentage of GDP.

The empirical results in this study will be interpreted through the GMM estimator, or instead according to the latest model in Table 4.2. This is because the data obtained from this estimator are seen to be more reliable.

4.2. Empirical results

Table 4.2. Results from regression analysis in transition countries of Europe

Variable	OLS Model (1)	Fixed Effects Model (2)	Random Effects Model (3)	Hausman-Taylor Model (4)	GMM Model (5)
Final_gov_ex_ Lag1 T-Statistics				0.6650*** (13.19)	0.3865*** (4.47)
Gdp T-Statistics	-0.095*** (-3.11)	-0.0098 (-0.43)	-0.0951*** (-3.11)	-0.099*** (-6.01)	-0.0733*** (-4.14)
Debt T-Statistics	-0.031*** (-2.05)	-0.0213** (-1.51)	0.0318 (-2.05)	-0.0050 (0.52)	0.0116 (0.61)
Debt_Square T-Statistics	0.046 (0.22)	0.3102* (-1.04)	0.0465 (0.22)	-0.0911 (-0.47)	-0.4039*** (-1.26)
Export T-Statistics	-0.035*** (3.22)	-0.055*** (-3.68)	-0.035*** (-3.22)	-0.0147* (1.37)	-0.0118 (-0.76)
Final_Consum T-Statistics	-0.108** (-2.00)	0.0516 (0.63)	-0.1080** (-2.00)	-0.0087 (0.17)	0.0992** (1.54)
Bruto_Saving T-Statistics	-0.212*** (3.08)	-0.345*** (4.87)	-0.212*** (-3.08)	0.111*** (2.16)	-0.135*** (-2.17)

Variable	OLS Model (1)	Fixed Effects Model (2)	Random Effects Model (3)	Hausman-Taylor Model (4)	GMM Model (5)
Current_Account T-Statistics	0.1097*** (2.63)	0.1460*** (4.13)	0.1097*** (2.63)	0.0205 (0.78)	0.0518** (1.70)
Constant T-Statistics	35.43*** (5.78)	24.88*** (2.97)	35.43 (5.78)	11.38** (1.99)	-- --
Observation	146	146	146	145	139
Arellano - Bond test for AR (1)	--	(-1.55)	--		(-1.55)
Arellano - Bond test for AR (2)	--	(-0.98)	--		(-0.98)
Sargan Test	--	-	-		(142.90)

$X^{2(56)prob.}$

Note: Final government expenditure means government expenditure and presents (public investment) wherein this table it is placed as a dependent variable. Interpretation of results will be made through the GMM approach.

Source: Calculated by Author

Reliability and significance will be based on the t-statistics coefficient, where parameters 1 to 1.5 results are significant on *, parameters 1.5 to 2 are **, and over 2 on ***. Whereas if we are based on the results given by the regression analysis in table 4.2 for the transition countries of Europe, as well as by their interpretation through the GMM estimator, we notice the possible connection between public debt and public investment. Where specifically, in Table 4.2, we notice that public debt positively affects public investment. More specifically, if public debt increases by 1% in European countries in transition will affect by 0.011% public investment. While referring to the results according to econometric methods show that the public debt placed in the square negatively affects public investment, which means that the increase in debt in the square by 1% negatively affects public investment by 0.403%, and this result has high statistical reliability. Square debt otherwise refers to doubling the level of debt, and this means that if its level increases indefinitely, its effect will be negative on economic growth, even if used to finance public investment.

This result is in line with the study conducted by Mencinger et al. (2015), who have determined the public debt threshold in developing and developed countries based

on public debt in relation to GDP and debt located in the square. From the results, we see that the increase in exports negatively affects public investment by -0.011%, while final consumption expenditures positively affect public investment by 0.099%, a result that has statistical reliability. An increase in gross savings by 1% negatively affects public investment expenditures by -0.135%. While increasing the current account ratio positively impacts public investment by 0.051%, this ratio is also statistically reliable.
According to these results and empirical findings, we see that public debt can positively affect economic growth through public investment in European transition countries. This can be reflected through the effect of public investment, where countries in transition can increase the level of public debt to finance public investment increasing production boosting economic growth. Increasing public debt to finance public investment can positively impact economic growth if investments are made in certain areas, such as education, infrastructure, or tourism. At the same time, the opposite of this approach is whether the increase in public debt is used to finance social schemes or wage increases in the public sector (e.g., the case of Greece), which will negatively affect economic growth. Therefore, based on the results given by the assessor "GMM" in Table 4.2, we fully support hypotheses 1 and 2 raised at the beginning of this study. The results mentioned above can also be compared with the study done by (Checherita and Rother, 2010), where in their empirical research, they have analyzed the impact of public debt on economic growth in a sample of twelve Eurozone countries through the following channels such as public investment, private investment, the overall level of productivity, as well as real rates and nominal ones of interest. This scientific study shows that the turning point of public debt through these channels in euro area countries is from 90% to 100%, results with a very high statistical reliability. The authors have given a reasonably clear explanation of how public debt can be affected through public investment, meaning that the increase in accumulated deficits from the past can positively affect economic growth if those deficits are used to finance productive public investment. However, if the increase in public debt exceeds the threshold of 45% - 68% in relation to GDP, then it can negatively affect public investment.

5. Conclusion

We have investigated public debt impact through public investment on economic growth in some European transition countries (Estonia, Lithuania, Latvia, Slovenia, Czech Republic, Poland, Croatia) using advanced econometric methods. What is very important to emphasize is that we have tried to investigate the relationship between public debt and public investment in relation to economic growth through this study. For testing the empirical data, we have used some of the econometric models such as: OLS, Fixed Effects, Random Effects, Hausman-Taylor, and GMM. The reason for the variety of uses of these econometric models is because the results obtained should reflect high statistical reliability and have scientific significance in practice.

For the construction of econometric models, we have used data from the World Bank, the International Monetary Fund, and the European Statistics Agency, including the period from 1995 to 2017. The main findings of this study show that there is a link between public debt and public investment in European countries in transition, and this can be seen in the results in Table 4.2, where we see if public debt eventually increases by 1% for public investment in European countries in transition will positively affect economic growth by 0.011%. These empirical results can also be argued in practical terms because European countries in transition can increase the level of public debt to finance public investment aimed at economic growth. While the debt placed in the square negatively affects public investment, which means that the increase in debt in the square by 1% negatively affects public investment by 0.403% and does not affect economic growth, this result has high statistical reliability. In addition, from the empirical findings, we see that there is no possible link between exports and public investment; more specifically, the results show that export growth negatively affects public investment by -0.011% in European countries in transition. Also, according to the results, we see that gross savings negatively affect public investment by -0.135% and do not show any relationship with each other.

While the increase in expenditures for final consumption positively affects public investment by 0.099%, reflecting high statistical reliability. Also, the current account has a positive impact on public investment by 0.051%. Furthermore, this ratio is statistically very reliable. The results show that some control variables used for testing this study show a positive relationship with public investment while others show a negative relationship with public investment. Most result coefficients possess statistical reliability.

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Appendix

Table A1. List of the Transition European countries

Nr	Countries of the Central Europe
1	Estonia
2	Lithuania
3	Letonia
4	Slovenia
5	Czech Republic
6	Poland
7	Croatia

Table A2: Description of variables in Transition European countries

Nr	Variables	Code
1	Government Expenditure (% of GDP)	final_goverment_ex_lag1
2	GDP (Gdp Per Capita -Annual %)	gdp
3	Public Debt (% of GDP)	debt
4	Debt Square (% of GDP)	debt_square
5	Export (% of GDP)	eksport
6	Final Consum (% of GDP)	final_consup
7	Bruto Saving (% of GDP)	bruto_saving
8	Current_Account (% of GDP)	current_account

JTSR (2021) 28(2): 105-129
DOI 10.14665/1614-4007-28-2-007

PAPER

Does Financial Integration Increase Bank Efficiency? New Evidence From the Euro area

Ehsan Rajabi*

Abstract This paper aims to estimate the relationship between a bank's cost and profit efficiency and financial integration, which we defined as five groups of competition, bank market ownership, financial liberalization, free capital flow, and the euro area control variables. A two-step quantitative research design was employed to accomplish the purpose of the current paper for an unbalanced pooled time series dataset of 126 banks of the euro area banking system between 1999 and 2012: Data Envelopment Analysis (DEA) and panel regression analysis (GMM regression model).

The results suggest that concentration ratio, foreign ownership, domestic credit, and market integration are negatively related to banks' cost and profit efficiency. In contrast, the coefficients of real credit growth and capital flow positively relates to cost and profit efficiency scores. Furthermore, empirical findings of bank market power, government budget deficit targeting, and public debt targeting are consistent in both cost and profit efficiency models. Therefore, the government budget deficit positively impacts cost efficiency without assurance of sound public finance policy, which is essential to ensure sustainable economic development within the euro area. Criteria relating to government deficit needs to adjustment for the euro area adopted by the Member States because, by increasing the difference of actual from the targeted value of government budget deficit, bank cost efficiency will be increased.

Keywords: Banking, Euro Area, concentration ratio, foreign ownership, market integration.

Jel Classifications: E5, C33, F36, L25, G32.

1. Introduction

During the past two decades, the deregulation of financial services in the European Union (EU) and the establishment of the Monetary Union and the introduction of the

Ehsan Rajabi**(✉)

* Assistant Professor, Department of Agricultural and Food Policy, Agricultural Planning, Economic and Rural Development Research Institute (APERDRI), Ministry of Jihad-e Agriculture, Tehran, IRAN.
Email: e.rajabi@agri-peri.ac.ir

Euro have targeted promoting integration through the formation of a level-playing-field in the provision of banking services across the EU-17. Without a doubt, in the calculation for gains from financial integration, it is suspected that banks in different countries would become equally efficient with removing cross-border constraints. In addition, EU regulators believe that a well-integrated financial system is essential to improve the efficiency of the euro area economy by reducing the cost of capital and enhancing the allocation of financial resources. Although it is mostly agreed that deepening financial integration is beneficial in general speaking, it may also have negative effects. By way of example, integration in a particular market segment might lead to a high degree of consolidation, which might hinder competition. Furthermore, financial integration has significant implications for financial regulation, and the issue of financial stability has suspected an extremely international dimension. As a result, it is essential to monitor and realize the procedure of financial integration and its effect on bank performance.

In light of the ongoing process of financial integration, it is of specific interest to investigate its impact on efficiency scores for all the euro area Member States over the convergence period. Moreover, an advantage of looking at all Member States banking systems in terms of efficiency level is that it permits us to single out differences across countries that, then, may help discover optimal pathways towards the next rounds of financial integration, which potentially could lead towards successful adoption of banking supervision (banking union). Therefore, this paper is designed to contribute to the current debate by investigating the influence of financial integration factors on the efficiency of the Eurozone banking system. This permits us to examine the dynamic linkage between the efficiency of 126 selected banks and financial integration (which closely relates to competition, foreign ownership, financial liberalization, and capital flow).

For enhancing efficiency, developing a highly effective and dependable financial system constitutes a substantial purpose of the reform procedure and transfers from an intensive economy to a market economy within the European Monetary Union (EMU). A series of factors could considerably influence bank performance in the euro area, such as financial liberalization, development in the circulation of capital, goods and services, financial integration, economic interaction among union members, and a new common monetary environment.

Therefore, monetary and financial integration are crucial elements of economic integration in the European Union (EU), which we evaluate its potential benefits on bank efficiency. In principle, establishing a common currency area, the Member States in the sample will powerfully reinforce the mobility of financial flows and cross-border banking activities. Even so, the existing dissimilarity of average costs and the wide difference of profitability among various banking systems continue to raise questions concerning the future upcoming of the progressive integration of banks within an effectively integrated euro area banking system. Therefore, the study of the differences through out bank

efficiency among the Member States of the euro area, which apply financial integration, will also clarify each country's competitive position in the banking sector and may shed light on the capacity to respond to the new changing environment.

The assessing efficiency of the banking system and its influence factors can help smooth operating of their national economic system and banking industry. Because of improved efficiency of the banking sector, it can cause better banking performance, decrease costs, improve in quality of services, and betterment the allocation of resources and increase the productivity of the entire economy. Efficiency improvement also contributes to amelioration in the soundness and stability of the banking system that achieves profits channel toward increase equity and provision for better absorption of risks.The remainder of this study is structured as follows: Section 2 briefly reviewed the literature. The research method is represented in section 3, followed by results and discussion in section 4. Finally, conclusions depict in section 5.

2. Literatures Review

Through the years, various researchers have worked on financial integration in European countries. Many of these studies have focused on the Euro and the financial services integrated with it. Banks' coverage has usually been tested through the micro-level and aggregating factors. For instance, in recent studies, it has been shown that price convergence is an indicating factor of financial coverage (e.g., Gaganis & Pasiouras, 2013). In 1999, the Euro was introduced for the first time in the euro area. Since then, using the single currency as well as the additional legislative initiative has led to major developments along with the integration of the European market (Jiang, Yao & Feng, 2013; Goddard, Molyneux, Wilson, & Tavakoli, 2007). Studies show some evidence of money, bond, and equity integration (Tabak, Fazio & Cajuerio, 2013; Cappiello, Vives, & Gérard, 2006; Emiris, 2011; Hartmann, Straetmans, & De Vries, 2005; Manna, 2004), as well as integration in the wholesale banking. However, it has been noted that despite all the efforts, there are still some barriers left (Chortareas, Giradone & Ventouri, 2013; Berger, 2003; Berger, Dai, Ongena, & Smith, 2003).

Moreover, numerous studies focus on the banking efficiency and cost structure and how these can lead to efficiency (Goddard et al., 2007; Hughes & Mester, 2008). In the majority of these studies, efficiency is measured by parameters such as Stochastic Frontier Analysis. However, some studies use non-parametric methods such as Data Envelopment Analysis. Before the introduction of the Euro, many of the European banks were facing deregulation due to high levels of capacity or non-optimal scale (see Berger & Humphrey, 1997).

However, in reality, many inefficient banks survive due to a lack of competition or by the support of the government or domestic authorities. Post-Euro, the competition among banks increased, and during the 1990s, in particular, many of the banks showed higher efficiency levels by cutting costs (see, among others, Ferreira, 2013; Amel,

Barnes, Panetta, & Salleo, 2004; Casu et al., 2004). However, in recent years, the European bank's efficiency level has dropped (Casu & Girardone, 2006).

In addition, many studies have compared banks' performances in different European countries. Some of these studies have used nation-specific frontiers for their comparison, while others have employed common efficient frontiers. Nevertheless, only a few have focused on the direct impact of financial integration on bank efficiency. For example, Ausina (2002) assessed the Spanish banks' performance before and after EU integration. He showed that deregulation leads to lower efficiency of the banks in question. In another study, Murinde et al. (2004) tested the banking system in Europe following the introduction of the European common market in 1993. They showed no significant correlation between the convergences of banks in question, except for some products. Another study done by Weill (2009) showed that there is financial integration in the convergence of efficiency. Another study done by Mamatzakis et al. (2008) provided evidence of efficiency cost convergence based on the cross-country comparison. In their study, authors examined ten new members of the European Union from 1998 until 2003. They found slight convergence among few of the new members. Now, we look at the development of the euro area banking market and how it affected banks in Europe. In the 1990s, numerous mergers and acquisitions took place in the European market (Thomson Financial Database, 2002). By 2000, more than 80% of the mergers and acquisitions were done domestically. Such mergers and acquisitions lead to lower competition in the banking sector as the number of national players are reduced. The assessment of some bank branches and banks between 1994 and 2005 proves this observation (ECB, 2007). This shift of domestic focus on the number of bank branches could result in negative impacts. When economic scales are the source of merger and acquisition motivation, the number of branches would surely decrease as a result. However, it did not result in the reduction of branches as was expected.

Several studies show the results of an absence of competition. It was shown that during the 1990s and from 2000 until 2005, the competition among EU banks was extremely low (Ayadi, Arbak, Naceur & De Groen, 2015; De Guevara, Maudos, & Perez, 2005). By calculating the Lerner index for five of the biggest countries in the EU, the authors showed the lack of significant increase in the competition among banks. In a more recent study, Guevara et al. (2007) expanded their investigation to 15 countries in the EU. In that study, it was shown that ten of the countries showed improvement in competition.

In a similar study, Goddard et al. (2004) examined six of the major countries in the EU in terms of profitability. In their study, they looked at the banks' profitability in those six countries and noticed the existence of an abnormal profit between 1992 and 1998. This abnormal profit was linked to the absence of competition among banks in the EU in the period in question. The reduction of banks' margin in the 1990s might; however, some studies have shown the reduction of banks' margin in the 1990s, which

might be surprising considering the lack of increasing competition in the EU banking section during that period. Maudos and Guevara (2004) explained the reduction of margins through the relaxation of competition in that period and increased market power. Authors also showed that banks benefited from lower interest rate risks, lower risk of credits, and lower operating costs in that period, which led to lower margins while retaining the market power.

In another study, Casu (2009) examined the impact of the Lerner index (competition) and efficiency among five EU countries' banks. He showed that there is a positive relationship between market power and efficiency. Another study conducted by Weill (2004) examined the relationship between competition and efficiency. In that study, the author used the regression method to link the independent variables (GDP and demand density) through intermediating ratio of loans over deposits to the dependent variable (efficiency scores estimated by SFA). The employed model corresponded with the geographical location. It was concluded that there is positive causation between market competition and cost efficiency among the EU banks, although the causality running from the latter to the former is low.

Finally, it can be said that the financial integration in the EU happened due to the changes in the legal aspects. Despite the positive outcomes of such integration, a negative aspect remains unchanged: the low number of mergers and acquisitions among banks in the EU. This negative impact has been severed to extend where some stated that the complete integration is an illusion (Dermine, 2003). While the integration has made mergers and acquisitions easier, in practice, it has happened mostly among branches rather than cross-national banks.

Therefore, it can be said that there is still a long way until reaching the single banking market in the euro area. These obstacles are political barriers, as some countries do not seek such major collaboration and changes (Boot, 1999). Another significant barrier can be the cost drops that can make the change irrational, and the ever-channeling cost is another barrier.

In addition, the existing literature focuses on the variation of cost or profit efficiency in European economies by bank ownership. A study done in 1998 by Kraft and Tirtiroglu (1998) showed that the cost-efficiency of private and government banks varies. Their study also showed that new private banks had lower cost efficiency levels than the old ones in Croatia. In none of the studies above, a significant difference was found between the local and foreign-owned banks. Another study in Hungary showed that foreign-owned banks were dramatically more significant than the local ones (Hasan & Marton, 2003). Based on other studies such as Jemric and Vujcic (2002), Nikiel and Opiela (2008), domestically owned banks were less efficient than foreign private banks. It was also noticed that when the number of foreign banks increased, the other banks' cost efficiency was also improved. Therefore, it can be said that studies performed in a specific country did not provide clear evidence regarding the benefit

of new foreign banks, how they might improve the country's economy, and the role of policies that encourage such entries (Fries &Taci, 2005).

In recent years, there have been a number of cross-national studies on EU banking. Grigorian and Manole (2006) have conducted a study on 17 countries between 1995 and 1998. In another study performed by Yildirim and Philippatos (2007), 12 countries were investigated from 1993 to 2000. Bonin et al. (2005) carried out another research where 11 countries were covered between the years 1996 to 2000. Despite the cross-national perspective, none of the mentioned studies examined bank ownership, whether the banks in question are new private, old private, state-owned, or domestic or foreign. Efficiency can be measured through various methods. For instance, one study used date envelopment analysis while the other used the stochastic frontier method (Semih Yildirim & Philippatos, 2007).

One of the recent studies regarding the period after financial liberalization showed that financial liberalization was a result of the reduced efficiency of banks. In the study done in turkey, a sample of Turkish banks was investigated from 1970 to 1994 (Denizer, Dinc, & Tarimicilar, 2000). Another study in India showed that the liberalization process lead to reduced profitability and concentration in the Indian banks in the '90s (Brooks, 2003).

Some studies have worked on the impact of financial liberalization on a bank's performance as a whole. For instance, a study done by Williams and Nguyen (2005) showed that among 231 commercial banks in the South East Asia region, the most beneficial method was the privatization of the commercial banks. In fact, in that study which investigated the time between 1990 and 2003, it was shown that financial liberalization was the most critical factor in determining efficiency compared to other types of reform. Another study done in Malaysia showed that financial liberalization had a positive impact on the efficiency of the Malaysian banks (Njie, 2006). The descriptive statistics reveal a decrease in bank spread post the financial liberalization process in the former study.

Another study focused on the correlation between financial liberalization and a bank's efficiency (Hermes & Nhung, 2010). This study was carried out in 10 countries where commercial banking was emerging in the 1990s. Here, the data from banks were used in the DEA to estimate the bank efficiency and the financial liberalization index. The final findings showed a positive relationship between efficiency and financial liberalization.

Some studies indicate that financial liberalization leads to the financial crisis. In an attempt to justify this theory, Angkinand et al. (2010) selected banks in 48 countries for analysis. The study focused on data of these banks from 1973 to 2005. The findings suggested that financial liberalization could lead to a crisis based on countries type, insurance deposit, and reforms.

The impact of financial liberalization on a bank's performance is another subject in recent studies. Gupta et al. (2011) showed the role of government ownership in

financial liberalization and how it limits the gains. In addition, financial liberalization has been examined in the context of the Indian banking system.

By comparing the banking system in five European countries, Andries et al. (2012) showed the positive impact of the financial liberalization index on the performance index. In their study, the authors used operational performance, return on assets, and cost of intermediation as the performance indices.

3. Research Method

The purpose of the current descriptive and quantitative correlational study was to examine the relationship between environmental variables, European financial integration, and level of bank cost and profit efficiency in the euro area. A two-step quantitative research design was employed to accomplish the purpose of the current study: Data Envelopment Analysis (DEA) and panel regression analysis. In the first stage, we estimated the cost and profit efficiency level of the entire 126 listed bank[1] dataset for 17 euro area Member States by using the nonparametric DEA approach to investigate whether the cost and profit efficiency[2] of the euro area banking system improved between 1999 and 2012, and to compare the efficiency scores of the financial sectors of the euro area Member States. In the second stage, we regressed the efficiency level obtained from the first stage on factors that could influence the efficiency of banks (financial integration variables) by using a GMM regression model for the period of study.

This paper employs competition, ownership, financial liberalization, and free capital flow variables that have a proxy for financial integration. The following model presents the relationship between bank efficiency and financial integration.

$$\begin{aligned} &\textit{Bank efficiency} \\ &\quad = f(\textit{Lag of Bank efficiency} + \textit{Concentration ratio} \\ &\quad + \textit{Bank market power} + \textit{Foreign ownership} + \textit{Domesticcredit} \\ &\quad + \textit{Real credit growth} + \textit{Market integration} + \textit{Capital flow} \\ &\quad + \textit{Government budget deficit targeting} + \textit{Public debt targeting}) \end{aligned} \tag{1}$$

[1] Data for banks was gathered from the "Bankscope" database of BVD-IBCA. We use unconsolidated accounting data for 126 banks from 17 euro area Member States (6 from Austria, 6 from Belgium, 3 from Cyprus, 3 from Estonia, 3 from Finland, 11 from France, 25 from Germany, 4 from Greece, 5 form Ireland, 15 from Italy, 6 from Luxembourg, 3 from Malta, 6 from the Netherlands, 4 from Portugal, 3 form Slovakia, 4 from Slovenia, 18 from Spain).

[2] For estimating cost and profit efficiency (two different optimization concepts-cost minimization and profit maximization), based on the intermediation approach, we selected labor, deposit and fixed asset as inputs and loan and profit as outputs for estimating cost and profit efficiency under assumption of variable return to scale and input oriented which more usual in literature.

The baseline regression model is formulated as below:

$$EF_{ijt}=\alpha+\lambda EF_{(ijt-1)}+\beta_1 CR5_{ijt}+\beta_2 LERNR_{ijt} \quad (2)$$
$$+\beta_3 FORE_{ijt}+\beta_4 DCREDT_{ijt}+\beta_5 RCREDT_{ijt}+\beta_6 CPITLF_{ijt}$$
$$+\beta_7 ln(OUFDI)_{ijt}+\beta_8 BDEFIC_{ijt}+\beta_9 PDEBT_{ijt}+\eta_j+\mu_{ijt}$$
$$i=1,\ldots,126, t=1,\ldots,14 j=1,\ldots 17$$

Where symbolizes the bank, denotes the tested time period represent countries of the Eurozone unobserved specific effect of the country is the disturbance term. is cost and profit efficiency of bank at time for country that are estimated by DEA, separately. We estimate this model two (2) times with cost and profit efficiency. is the concentration ratio that is measured by asset share of five biggest banks in the entire banking system assets in each Member States. For the most prominent firms, the concentration ratio (CR) reflects the market structure. This literature is basically assuming that concentration makes competition weak through promoting collusive behavior between firms. Raised market concentration leads to higher prices and greater profits (Bain, 1951). From a certain point of view, increased concentration is anticipated to intensify market power and hence prevent both efficiency and competition. From the other point of view, it is assumed that when economies of scale cause the acquisitions and mergers of a bank, then efficiency may be improved through increased concentration.

Based Casu (2009), Weill (2004) on Competitiveness of a bank is measured by using the Lerner index . The results show that banks with a higher Lerner index will have higher profit and cost-efficiency.

Foreign ownership was measured by the percentage of the total banking assets that foreign banks hold. A foreign bank is a bank where foreigners own 50 percent or more of its shares. Financial liberalization is measured by the ratio of domestic credit to the private sector to GDP (for each of the euro area Member States. The real credit growth that has progressed the growth rate of real domestic credit can be described as the next variable that is able to proxy the progress of financial liberalization. Theoretically, financial liberalization enhances the efficiency and productivity of banks by creating a competitive and flexible environment (like set interest rates on their assets and liabilities) in which banks have more control over their operations.

Free capital flow is measured by market integration and capital flow for accounting capital movements within the Eurozone Member States. By intra-EU outflows of capital for countries which can be considered as the total stream of funds that a country invests abroad throughout a certain period (commonly a year). Although, market integration is measured by the average value of inward and outward foreign direct investment flows divided by GDP.

To control the Eurozone fiscal policy, government budget deficit targeting and public debt targeting are introduced to the model. The public finance discipline is an important criterion of the euro area convergence. Government budget deficit targeting

is measured by the difference between the actual government deficit to GDP and reference value (3% of GDP) at the end of the preceding fiscal year and public debt targeting is measured by the difference between the actual level of public debt and reference value (60% of GDP) at the end of the preceding fiscal year. Table 1 presents measurements of financial integration and source and expected signs for all 126 selected banks from all 17 euro area Member States.

Table 1. Measurements of financial integration

Variable	Symbol	Name	Description	Source	Expected Sign
Competition	CR5	Concentration ratio	Asset share of five largest banks in total banking system assets (%)	ECB	-
	LERNR	Bank market power	Lerner index: which market power allows firms to fix a price above marginal cost	Author	+
Ownership	FORE	Foreign ownership	Foreign bank assets among total bank assets (%)	IMF	+
Financial liberalization	DCREDT	Domestic credit	Domestic credit provided by banking sector (% of GDP)	WDI	+/-
	RCREDT	Real credit growth	Growth rate of real domestic credit provided by banking sector (%)	WDI	+/-
Free capital flow	CPITLF	Market integration	Average value of inward and outward EU foreign direct investment flows divided by GDP (%)	Eurostat	+
	OUFDI	Capital flow	Intra-EU outflow direct investment reported by EU Member State (million USD)	Eurostat	+
Euro-area control variables	BDEFIC	Government budget deficit targeting	Difference between the actual government deficit to GDP and reference value (defined in the Maastricht Protocol on the excessive deficit procedure as 3% of GDP)	Eurostat	-

	PDEBT	Public debt targeting	Difference between the actual level of public debt and reference value (defined in the Maastricht Protocol on the deficit procedure as 60 % of GDP)	Eurostat	-

Note: Government budget deficit targeting and public debt targeting variables are introduced by the author. ECB: European Central Bank, Statistical Data Warehouse, IMF: International Monetary Fund, Global Financial Stability Report, WDI: World Development Indicators, Eurostat: statistical office of the European Union.

Equation 2 is estimated by applying GMM, which is an abbreviation for Generalized Method of Moments which was proposed by Arellano and Bond (1991) and Arellano and Bover (1995) as well as Blundell and Bond (1998) generalized. The GMM estimation proposed by Arellano and Bond is based on Equation 3 first difference transformation by following removal of banks specific impact:

$$y_{it}\text{-}y_{(it-1)} = \alpha(y_{it-1}\text{-}\, y_{it-2}) + \beta(L)(X_{it}\text{-}\, X_{it-1}) + (\varepsilon_{it}\text{-}\, \varepsilon_{it-1}) \quad (3)$$

$$\Delta y_{it} = \alpha\Delta y_{it-1} + \beta(L)\Delta X_{it} + \Delta\varepsilon_{it} \quad (4)$$

Where Δ can be described as the first difference operation symbol. In Eq. 4, a bias is imposed in the model's estimation through Δy_{it-1} (lagged depended variable) is mutually related with, $\Delta\varepsilon_{it}$ (the error term). However, Δy_{it-2}, which is anticipated to be mutually related with Δy_{it-1} and not related with $\Delta\varepsilon_{it}$ for $t= 3,...,T$, can be utilized as an instrument in Equation 4's estimation, on the assumption that ε_{it} are not correlated sequentially.

4. Results and Discussions

Table 2 shows the correlation matrix for the euro area. The observed correlations between the models' variables were all below 0.95, with the highest observed correlation being 0.570. When variables display a correlation above 0.95, all but one is usually removed, representing a duplication of information (Berger and Humphrey, 1997). The low correlation coefficients explain that, in general, the correlation between the financial integration variables is not strong; thus, suggesting that multicollinearity problems are not severe or non-existent. To investigate whether financial integration factors can explain the efficiency levels, we explore the determinants of efficiency with specific competition, ownership, financial liberalization, and free capital flow factors by a generalized method of moment regression analyses. For this purpose, we provide a descriptive analysis by examining the cross-sectional determinants of bank-specific efficiency scores from the DEA by regressing these measures against a number of financial integration variables.

Table 2. Correlation matrix for the financial integration variables

Variable	CR5	LER-NER	FORE	DCRE-DT	RCRE-DT	CPITLF	OUDF-DI	BDE-FIC	PDEBT
CR5	1.000								
LERNER	0.165***	1.000							
FORE	0.336***	0.132***	1.000						
DCREDT	-0.070***	-0.008***	-0.226***	1.000					
RCREDT	0.117***	0.038	0.166***	-0.190***	1.000				
CPITLF	-0.188***	0.157***	0.520**	0.066**	0.050*	1.000			
OUDFDI	-0.570***	-0.095***	-0.300***	0.175***	-0.082***	0.271***	1.000		
BDEFIC	-0.128***	0.039	0.165***	-0.324***	0.451***	0.267***	0.191***	1.000	
PDEBT	-0.129***	-0.128***	-0.566***	0.137***	-0.371***	-0.428***	0.122***	-0.431***	1.000

Note: The independent variables, concentration ratio (CR5) calculated as asset share of five largest bank in total banking system assets (%); bank market power (LERNR) calculated as Lerner index; foreign ownership (FORE) calculated as foreign bank assets among total bank assets (%); domestic credit (DCREDT) calculated as domestic credit provided by banking sector (% of GDP); real credit growth (RCREDT) calculated as growth rate of real domestic credit provided by banking sector (%); market integration (CPITLF) calculated as average value of inward and outward EU foreign direct investment flows divided by GDP (%); capital flow (OUFDI) calculated as the natural log of the intra-EU outflow direct investment reported by EU Member States; government budget deficit targeting (BDEFIC) calculated as difference between the actual government deficit to GDP and reference value (defined in the Maastricht Protocol on the excessive deficit procedure as 3% of GDP); public debt targeting (PDEBT) calculated as difference between the actual level of public debt and reference value (defined in the Maastricht Protocol on the deficit procedure as 60 % of GDP).

The table presents the results from spearman ρ correlation coefficients.

***,**,* indicates significance at 1%,5% and 10% levels respectively.

Source: Author's calculations

The current descriptive and quantitative correlational study aimed to examine the relationship between European financial integration and level of bank cost and profit efficiency in the euro area. A two-step quantitative research design was employed to accomplish the purpose of the current study: Data Envelopment Analysis (DEA) and panel regression analysis. In the first stage, we estimated the cost and profit efficiency level of the entire 126 listed bank dataset for 17 euro area Member States by using the nonparametric

DEA approach to investigate whether the cost and profit efficiency of the euro area banking system improved between 1999 and 2012. In the second stage, we regressed the efficiency level obtained from the first stage on factors that could influence the efficiency of banks (financial integration variables) by using a GMM regression model for the period of study.

The baseline regression results focusing on the relationship between cost and profit efficiency and financial integration among the Eurozone banking systems are presented in Tables 3 and 4. Several diagnostic tests are performed to show that results are warranted. The first two columns of Table 3 report the results for GMM-DIF, and the next two columns report GMM-SYS, respectively. Using the first-differenced GMM estimator in this panel, the coefficient on the lagged dependent variable is only 0.3387, suggesting implausibly low returns to scale. Using the system GMM estimator, which exploits the moment conditions, the coefficient on the lagged dependent variable is 0.5062. It could be argued that the efficiency of the previous year may represent a certain level of accumulated knowledge and technological endowment that may help banks to generate higher outputs with their inputs by adapting relatively quickly to the changes brought about by the environmental conditions. The coefficients of all financial integration variables are significant at least at 1% level system panel GMM in the two-step version. Hence, competition, ownership, financial liberalization, and free capital flow factors play an essential role in determining cost efficiency.

Table 3. Baseline analysis for effect of financial integration on cost efficiency (controlling endogeneity)

Regressors	**GMM-DIF One-step**	**GMM-DIF Two-step**	**GMM-SYS One-step**	**GMM-SYS Two-step**	**GMM-SYS♣ One-step**	**GMM-SYS♣ Two-step**
Initial of cost efficiency (L1)	0.3390*** (0.000)	0.3387*** (0.000)	0.5059*** (0.000)	0.5062*** (0.000)	0.4868*** (0.000)	0.4875*** (0.000)
Concentration ratio	-0.0021 (0.247)	-0.0020*** (0.000)	-0.0006 (0.507)	-0.0006*** (0.000)	-0.011 (0.226)	-0.0012*** (0.000)
Bank market power	-0.0059 (0.656)	-0.0060*** (0.000)	-0.0081 (0.563)	-0.0081*** (0.000)	-0.0073 (0.594)	-0.0074*** (0.000)
Foreign ownership	-0.0006 (0.680)	-0.0005*** (0.000)	-0.0006 (0.335)	-0.0006*** (0.000)	-0.0009 (0.139)	-0.0009*** (0.000)
Domestic credit	-0.0009*** (0.007)	-0.0009*** (0.000)	-0.0008*** (0.003)	-0.0008*** (0.000)	-0.0009*** (0.000)	-0.0009*** (0.000)
Real credit growth	0.0004 (0.527)	0.0004*** (0.000)	0.0006 (0.301)	0.0006*** (0.000)	0.0006 (0.288)	0.0006*** (0.000)

Regressors	GMM-DIF One-step	GMM-DIF Two-step	GMM-SYS One-step	GMM-SYS Two-step	GMM-SYS♣ One-step	GMM-SYS♣ Two-step
Market integration	-0.0002 (0.132)	-0.0002*** (0.000)	-0.0003*** (0.002)	-0.0003*** (0.000)	-0.0004*** (0.000)	-0.0004*** (0.000)
Capital flow[1]	0.0055 (0.430)	0.0055*** (0.000)	0.0375*** (0.000)	0.0374*** (0.000)	0.0324*** (0.000)	0.0325*** (0.000)
Government budget deficit targeting	-0.0014 (0.507)	-0.0014*** (0.000)	0.0018 (0.409)	0.0017*** (0.000)	0.0024 (0.258)	0.0024*** (0.000)
Public debt targeting	-0.0019** (0.013)	-0.0018*** (0.000)	-0.0003 (0.610)	-0.0004*** (0.000)	-0.0012 (0.072)	-0.0012*** (0.000)
Sargan test (*p*-value)[2]	0.0005	0.2741	0.0001	0.6894	0.0001	0.7977
Serial correlation test: AR(1) (*p*-value)[3] AR(2) (*p*-value)	0.0001 0.6869	0.0071 0.5958	- -	0.0039 0.1861	- -	0.0054 0.3036
Wald test for joint significance (*p*-value)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
No. of instruments	98	98	122	122	124	124
Cross-sectional observations	123	123	126	126	126	126

Note: The independent variables, concentration ratio (CR5) calculated as asset share of five largest bank in total banking system assets (%); bank market power (LERNR) calculated as Lerner index; foreign ownership (FORE) calculated as foreign bank assets among total bank assets (%); domestic credit (DCREDT) calculated as domestic credit provided by banking sector (% of GDP); real credit growth (RCREDT) calculated as growth rate of real domestic credit provided by banking sector (%); market integration (CPITLF) calculated as average value of inward and outward EU foreign direct investment flows divided by GDP (%); capital flow (OUFDI) calculated as the natural log of the intra-EU outflow direct investment reported by EU Member State; government budget deficit targeting (BDEFIC) calculated as difference between the actual government deficit to GDP and reference value (defined in the Maastricht Protocol on the excessive deficit procedure as 3% of GDP); public debt targeting (PDEBT) calculated as difference between the actual level of public debt and reference value (defined in the Maastricht Protocol on the deficit procedure as 60 % of GDP).

♣ The regressions also include time trend variables for the different time periods that are not reported. [1]In the regression, this variable is included as log(variable). [2]The null hypothesis is that model and overidentifying conditions are correct specified.[3]The null hypothesis is that there is no serial correlation in the first-differenced disturbances. Values in parenthesis are p-value. ***,**,* indicates significance at 1%,5% and 10% levels respectively. Source: Author's calculations

In the first set of variables, to capture the competition situation for retail banking services and its correlation with bank cost efficiency, the *concentration ratio* variable has a negative sign, indicates a higher asset share of the five biggest banks in the entire banking system assets contribute to higher banking costs. One reason can be because the concentration make competition weak through promoting collusive behavior between firms. On the other hand, heightened competition should encourage banks to reduce their costs so that their cost efficiency, meaning their ability to produce with minimal costs, would improve (Weill, 2004). The sign of *bank market power* variable is also negative, shows that higher Lerner index level is, higher operating and financial costs are. Therefore, bank with higher market power (an inverse measure of the competition) in the banking system has lower cost efficiency then efficiency may not be improved through increased concentration. Therefore, raised concentration is anticipated to increase market power and hence prevent both profit efficiency and competition.

The sign of the foreign ownership variable coefficient is also negative, suggesting that a higher level of foreign bank share in the banking sector contributes to higher banking costs (*i.e.,* decrease in cost efficiency). A more significant presence of foreign banks in the financial sector has a negative spillover effect on other bank cost efficiency, which finds that relatively more efficient foreign banks create an environment that forces the entire banking system to become more efficient. Furthermore, the underlying belief is that foreign banks will transfer knowledge and technology and contribute to the competition. Foreign ownership is also expected to improve corporate governance practices, an area where much is needed to be done in the Eurozone context. In contrast, the empirical findings find weak evidence that the foreign controlling ownership environment is associated with somewhat lower efficiency levels.

A third set of variables was used to capture the financial liberalization in a specific Member State. The sign of the coefficient of *domestic credit* variable is also negative, suggesting that a higher level of domestic credit provided by the banking sector over GDP contributes to higher banking costs (*i.e.,* decrease in cost efficiency). Therefore, on average, a larger volume of financial credit through the banking sector can be associated with somewhat lower efficiency levels. Although, the influence of *RCREDT* is positive and significant at the 1 per cent level. This result supports the hypothesis that financial liberalization leads to improvements in banks' cost efficiency in our dataset. The empirical finding of two different demissions of financial liberalization provides mixed results on the relationship between bank efficiency and financial liberalization. In theory, the extent to which financial markets are liberalized may be linked to the impact of liberalizations on bank efficiency. In particular, the more the government retreats from influencing the allocation of scarce financial resources, the more the price mechanism will be restored and the more the conditions for the market competition will be improved, which is expected to result in more efficient banking activities. In constant, the result of the domestic credit variable is opposite to what we expected

based on the theory that financial liberalization has been associated with a substantial improvement in the efficiency of credit allocation in these countries, resulting in higher bank efficiency. The reason can be related to two issues; first, financial liberalization has different dimensions which this study focus on just two dimensions of financial liberalization; second, quality of loans perhaps is another reason which the elimination of government control refers to screening and monitoring of loan quality lead to low-quality loans. Therefore, domestic credit provided by the banking sector variable should lead to high-quality loans, which are a strong measure of financial liberalization.

The empirical finding of the next group of variables that are proxy of free capital flow shows a negative relationship between *CPITLF* and *CE* would be indicated that market integration carried out in Eurozone economies during 1999-2012 and has a negative impact on bank efficiency while the intra-EU outflow direct investment flow (*OUFDI*) has a positive coefficient that is significant at the 1 per cent level, supporting the idea that high flow capital within the Eurozone encourages banks to encourage banks' managers to utilize their resources more efficiently. The findings imply that banks operate in member with higher intra-EU outflow direct investment tend to have higher cost-efficiency scores. Likewise, negative coefficients of market integration variable in the cost efficiency regression model suggest that the high integrated market country; the less efficient of the bank will be purely because of the intra-EU inflow direct investment effect.

To investigate the relationship between Maastricht Protocol targeted policy and the Eurozone bank efficiency, government budget deficit targeting (*BDEFIC*) and public debt targeting variables (*PDEBT*) are introduced as explanatory variables in cost efficiency model regressions. The sign of the government budget deficit targeting variable is positive, while the public debt targeting variable has a negative coefficient (-0.0004). The results have indicated that, on average, an increase of difference between the actual government budget deficit to GDP and reference value (3% of GDP) was associated with increased bank efficiency at the domestic country-level. In contrast, the difference between the actual level of public debt and reference value (60% of GDP) could have a negative impact. Those two variables are related to sound public finance for sustainable convergence of Member States. The *BDEFIC* refers to countries' fiscal policy, and the positive value of variables across all Member States indicated budget deficit over time because of expansionary fiscal policies. Therefore, the government budget deficit positively impacts bank efficiency without assurance of sound public finance policy, which is essential to ensure sustainable economic development within the euro area. It must also be remembered that the criteria relating to government deficit need to be adjusted for the euro area adopted by the Member States. By increasing the actual difference from the targeted value of the government budget deficit, bank cost efficiency will increase. The negative sign of the public debt targeting coefficient suggests that higher deference of the ratio of government debt to GDP from 60% of

GDP contributes to higher banking costs (*i.e.,* decrease in cost efficiency). One reason can be the crowding-out effect of the increasing share of government debt from GDP over the long term (by continuous fiscal budget deficit). A higher share of government debt would increase the share of government in the economy. When governments find a deficit with the issuing of government bonds, interest rates can be increased across the market because government borrowing creates a higher demand for credit in the financial markets. Therefore, the bank will increase the cost of borrowing deposits, so; banking costs will be heightened. As a second reason, fiscal deficit financed by debt crowds out private sector investment and lowers the level of economic growth and development (environmental condition of the banking industry).

The paper also detected differences in the profit efficiency of banks between the countries. The application of the Battese and Coelli (1995) specification furthermore allows us to explain the association of profit efficiency with efficiency correlates, namely competition levels, foreign ownership, financial liberalization, free capital flow, and the euro area control variables.

The first two columns of Table 4 report the results for first-difference panel GMM and next two columns report system panel GMM, respectively. Using the system GMM estimator, which exploits the moment conditions, the coefficient on the lagged dependent variable is higher than first-differenced GMM (0.5062) and statistically significant. These results suggest that the profit efficiency of the previous year (L1) is significantly and positively related to the efficiency of the current year in both models. The importance of the lagged value of profit efficiency is because of including the efficiency of the previous year (L1) as an independent variable for attempting to capture the dynamic nature of the efficiency of banks. The result of L1 in all estimated profit models stated that the first lags of profit efficiency are usually significantly different from zero, thus indicating that profit efficiency at time t is positively influenced by previous years' efficiency.

Further, the GMM-SYS results satisfy the three additional conditions: a significant AR(1) serial correlation, lack of AR(2) serial correlation, and a high Sargantest. The first is a Sargan test of over-identifying restrictions, which tests the instruments' overall validity by analyzing the sample analog of the moment conditions used in the estimation process. The second test examines the hypothesis that the error term is not serially correlated. We test whether the differenced error term is second-order serially correlated (by construction, the differenced error term is probably first-order serially correlated even if the original error term is not). Failure to reject the null hypotheses of both tests gives support to our model. Therefore, The results of both specification tests, AR(2) for testing the serial correlation and Sargent test for testing the validity of the instrument adopted, are valid.

The coefficients of all financial integration variables are significant at least at 1% level and in line with our expectations with system panel GMM in the two-step

version. Hence, competition, ownership, financial liberalization, and free capital flow factors play an essential role in determining profit efficiency.

In the first set of variables, to capture the competition situation for retail banking services and its correlation with bank profit efficiency, the *concentration ratio* variable (an inverse measure of the competition) has a negative sign, indicating higher asset share of the five biggest banks in entire banking system assets contribute to lower banking profits. It means that, on average, higher market concentration can be associated with the deteriorating profit efficiency of banks. The sign of the *bank market power* coefficient is positive, which shows the higher Lerner index (degree of market power) is significantly and positively connected with profit efficiency level. Therefore, banks with higher market power in the banking system have higher profit efficiency. For interpreting this result, several explanations may justify such a result based on theoretical literature. First, the "efficient-structure" hypothesis can explain this result. Namely, the most efficient banks may have increased their market share following the acquisition or the bankruptcy of the least efficient banks. It can notably be argued that the wave of domestic mergers in EU countries during the nineties led to an improvement in profit efficiency as some evidence suggests that the acquirers were more efficient than the acquired banks (Huizinga, Nelissen, & Vennet, 2001). Second, the specificities of banking competition may also explain this result. Namely, a decrease in competition may have favored profit efficiency for banks, as they can benefit more from scale economies in monitoring and from a higher length in the customer relationship, providing the best information on the borrowers (Weill, 2004). Finally, the results of these two variables show that empirical findings on banks in the euro area countries provide mixed results for the relationship between competition and the efficiency of banks, which is more dependent on the selected proxy for competition. The sign of the foreign ownership variable coefficient is positively and statistically significant in influencing the banks' profit efficiency, suggesting that a higher level of foreign bank share in the banking sector contributes to higher banking profits. Besides making the banking industry more competitive, an increase in foreign banks' presence can positively influence the efficiency of banks through two channels (see Lensink & Hermes, 2004). First, foreign banks may introduce modern and more efficient banking techniques that may be copied by domestic banks (transferring knowledge and technology). Second, foreign banks may contribute to the quality of human capital in the domestic banking industry by importing high-skilled bank managers to work in their foreign branches and investing in the training of local employees. This, in turn, could enhance the ability of banks to transform their inputs into outputs.

A third set of variables is used to capture the financial liberalization in specific countries. Contrary to expectations, the coefficient of the *domestic credit* variable has a negative sign, suggesting that a higher level of domestic credit provided by the banking sector over GDP contributes to lower banking profit (*i.e.,* decrease in profit efficiency).

Therefore, on average, a larger volume of financial credit through the banking sector can be associated with somewhat lower efficiency levels. This empirical finding is opposite to what we expected based on the theory that financial liberalization has been associated with a substantial improvement in the efficiency of credit allocation in these countries, resulting in higher bank efficiency. Loan quality may be one reason why eliminating government control refers to screening and monitoring of loan quality leads to low-quality loans. Therefore, domestic credit is provided by the banking sector variable should lead to high-quality loans that are a strong measure of financial liberalization.

Real credit growth is positively linked with bank profit efficiency. This result supports the hypothesis that financial liberalization leads to improvements in banks' profit efficiency in the countries in our dataset. In theory, the more government retreats from influencing the allocation of scarce financial resources, the more the price mechanism will be restored and the more the conditions for market competition will be improved, which is expected to result in more efficient banking activities (Hermes, Nhung, 2010). In general, the empirical finding of two different demissions of financial liberalization provides mixed results on the relationship between bank efficiency and financial liberalization.

The empirical finding of the next group of variables that is proxy of free capital flow shows a negative relationship between CPITLF and CE, indicating market integration carried out in the Eurozone economies has a negative impact on bank profit efficiency during 1999-2012. The intra-EU outflow direct investment flow (*OUFDI*) has a positive coefficient that is significant at the 1 per cent level, supporting the idea that high flow capital within the Eurozone encourages banks to encourage banks' managers to utilize their resources more efficiently. The empirical findings imply that banks operate in a country with higher intra-EU outflow direct investment tend to have higher profit efficiency scores. Likewise, negative coefficients of market integration variable in the profit efficiency regression model suggest the high integrated market country; the less efficient the bank will be purely because of the intra-EU inflow direct investment effect. Theoretically, FDI flow enables restructuring and the reallocation of resources to create a more efficient pan-European banking market structure and further dynamic benefits (like increasing output potential and the spillover productivity effects).

Regarding the relationship between Maastricht Protocol targeted policy and the Eurozone bank efficiency, government budget deficit targeting (*BDEFIC*) and public debt targeting variables (*PDEBT*) are introduced as explanatory variables in profit efficiency model regressions. The sign of the government budget deficit targeting variable is negative (-0.0001), while the public debt targeting variable has a positive coefficient (0.0018). The results have indicated that, on average, a larger volume of difference between the actual government budget deficit to GDP and reference value (3% of GDP) is associated with decreasing bank profit efficiency at the domestic country-level whereas an increasing difference between the actual level of public debt and reference value (60% of GDP) could have a positive impact.

Table 4. Baseline analysis for the effect of financial integration on profit efficiency (controlling endogeneity)

Regressors	**GMM-DIF One-step**	**GMM-DIF Two-step**	**GMM-SYS One-step**	**GMM-SYS Two-step**	**GMM-SYS♣ One-step**	**GMM-SYS♣ Two-step**
Initial of profit efficiency (L1)	0.4258*** (0.000)	0.4243*** (0.000)	0.5034*** (0.000)	0.5016*** (0.000)	0.4985*** (0.000)	0.4988*** (0.000)
Concentration ratio	-0.0024 (0.332)	-0.022*** (0.000)	-0.0007 (0.587)	-0.0008*** (0.000)	-0.0009 (0.546)	-0.0009*** (0.000)
Bank market power	0.1225*** (0.000)	0.1221*** (0.000)	0.1250*** (0.000)	0.1246*** (0.000)	0.1251*** (0.000)	0.1251*** (0.000)
Foreign ownership	0.0004 (0.850)	0.0004*** (0.000)	0.0024*** (0.003)	0.0024*** (0.000)	0.0022*** (0.006)	0.0022*** (0.000)
Domestic credit	-0.0015*** (0.001)	-0.0015*** (0.000)	-0.0014*** (0.000)	-0.0014*** (0.000)	-0.0015*** (0.000)	-0.0015*** (0.000)
Real credit growth	-0.0004 (0.580)	-0.0005*** (0.000)	0.0002 (0.839)	0.0002*** (0.000)	0.0002 (0.823)	0.0002*** (0.000)
Market integration	-0.0004* (0.051)	-0.0004*** (0.000)	-0.0004*** (0.001)	-0.0004*** (0.000)	-0.0004*** (0.000)	-0.0004*** (0.000)
Capital flow[1]	0.0012 (0.898)	0.0011*** (0.000)	0.0347*** (0.000)	0.0348*** (0.000)	0.0328*** (0.000)	0.0328*** (0.000)
Government budget deficit targeting	0.0003 (0.917)	0.0005*** (0.000)	-0.0002 (0.940)	-0.0001*** (0.000)	0.0002 (0.952)	0.0002*** (0.000)
Public debt targeting	0.0009 (0.399)	0.0007*** (0.000)	0.0017* (0.081)	0.0018*** (0.000)	0.0014 (0.155)	0.0014*** (0.000)
Sargan test (*p*-value)[2]	0.0176	0.5535	0.0001	0.4807	0.0001	0.4522
Serial correlation test: AR(1) (*p*-value)[3] AR(2) (*p*-value)	0.0001 0.8930	0.0005 0.9240	- -	0.0006 0.8148	- -	0.0006 0.8792

Regressors	GMM-DIF One-step	GMM-DIF Two-step	GMM-SYS One-step	GMM-SYS Two-step	GMM-SYS♣ One-step	GMM-SYS♣ Two-step
Wald test for joint significance (*p*-value)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
No. of instruments	98	98	122	122	123	123
Cross-sectional observations	123	123	126	126	126	126

Note: The independent variables, concentration ratio (CR5) calculated as asset share of five largest bank in total banking system assets (%); bank market power (LERNR) calculated as Lerner index; foreign ownership (FORE) calculated as foreign bank assets among total bank assets (%); domestic credit (DCREDT) calculated as domestic credit provided by banking sector (% of GDP); real credit growth (RCREDT) calculated as growth rate of real domestic credit provided by banking sector (%); market integration (CPITLF) calculated as average value of inward and outward EU foreign direct investment flows divided by GDP (%); capital flow (OUFDI) calculated as the natural log of the intra-EU outflow direct investment reported by EU Member State; government budget deficit targeting (BDEFIC) calculated as difference between the actual government deficit to GDP and reference value (defined in the Maastricht Protocol on the excessive deficit procedure as 3% of GDP); public debt targeting (PDEBT) calculated as difference between the actual level of public debt and reference value (defined in the Maastricht Protocol on the deficit procedure as 60 % of GDP). ♣The regressions also include time trend variable for the different time periods that are not reported. [1]In the regression, this variable is included as log(variable). [2]The null hypothesis is that model and overidentifying conditions are correct specified.[3]The null hypothesis is that there is no serial correlation in the first-differenced disturbances. Values in parenthesis are *p*-value. ***,**,* indicates significance at 1%,5% and 10% levels respectively. Source: Author's calculations

At least three reasons could be forwarded for this negative relationship. First, the bank was mandated to invest low-return government securities in financing government fiscal deficits (Fry, 1995). It could negatively influence bank-earning assets, resulting in lower profit efficiency. Second, the high cash reserve requirement is imposed on banks by the presence of high fiscal deficits. This persistently high cash reserve requirement may act as a cost imposed on banks because it restricts their capacity to produce maximum earning assets with their mobilized funds. Finally, in a high fiscal deficits economy, banks may find deposits more expensive to acquire scarce investible funds by launching government-sponsored saving schemes because it acts as a substitute to bank deposits. All of these factors, in turn, could hamper banks' ability to produce the quantity of earning assets and, hence, income and profit efficiency.

On the contrary, high *PDEBT* is positively related to banking profit efficiency, suggesting that higher deference of the government debt ratio to GDP from 60% of

GDP contributes to higher banking profit (*i.e.,* increase in profit efficiency). Finally, empirical findings of the euro area control variables cannot suggest a specific outcome in terms of Maastricht Protocol targeted policy and bank efficiency related to sound public finance because each variable is a line of public finance discipline but has a different impact on bank efficiency. Furthermore, these two variables have adverse impacts on cost and profit efficiency by comparing Tables 3 and 4.

The first-difference panel GMM estimator in the two-step version states that financial integration variables have a significant effect (at 1% level) on bank efficiency like system panel GMM. However, all coefficient signs are not consistent with GMM-SYS (like signs of real credit growth, government budget deficit, and public debt targeting variables. Moreover, columns 5 and 6 report system panel GMM regression, including time trend, which indicates that the results are consistent with the two-step system GMM regarding the significance level and sign of coefficients except government budget deficit targeting variable). Although, lagged dependent variable coefficient is 0.4988 and significant at 1% level but less amount than two-step system GMM.

5. Conclusions

The debate on differences in measuring and analyzing the efficiency of the Eurozone banking industry is still open and has been the subject of many applied works. This paper is designed to contribute to the current debate by investigating the influence of financial integration on the efficiency of the Eurozone banking system. This research tries to clarify the portions of the banking system based on financial integration in the euro area. Second, we estimated the relationship between cost, profit efficiency scores, and financial integration, which we defined as five groups of competition, banking market ownership, financial liberalization, free capital flow, and the euro area control variables. The results of the *t*-test suggested that concentration ratio was negatively related to bank efficiency while that the coefficient of bank market power had a negative relation to the cost efficiency score and positive relation to the profit efficiency for all years and for regression of panel data. The foreign ownership variable was negative, suggesting that a higher level of foreign bank share in the banking sector contributes to higher banking costs (*i.e.,* decrease in cost efficiency). On the other side, the profit efficiency model founds empirical evidence that the foreign controlling ownership environment was associated with somewhat higher profit efficiency levels.

Concerning the third set of variables, financial liberalization, the result showed a strong relationship between *domestic credit* and low cost and profit efficiency scores. In contrast, on average, a larger volume of real credit growth through the banking sector can be associated with somewhat higher efficiency levels. Overall, we deemed financial liberalization leads to improvements in banks' cost and profit efficiency in the countries in our dataset. The empirical finding of the next group, free capital flow, showed a negative relationship between market integration and cost and profit

efficiency. In contrast, the intra-EU outflow direct investment flow had a positive coefficient that was significant at the 1 per cent level, supporting the idea that high flow capital within the Eurozone encourages banks to encourage banks' managers to utilize their resources more efficiently. Likewise, negative coefficients of market integration variable in the cost and profit efficiency regression model suggested that the high integrated market country; the less efficient the bank will be, purely because of the intra-EU inflow direct investment effect.

The main finding of the current paper was that banks' efficiency scores could be significantly explained by Maastricht Protocol targeting policies. The current study results indicated that the public debt targeting variable had a strong negative influence on the cost-efficiency but a positive effect on profit efficiency. Conversely, the government budget deficit targeting variable positively affected cost efficiency, but it negatively impacted profit efficiency.

A clear message that emerges from the empirical analyses in this volume is that designing appropriate policies and institutions is essential for financial integration influence on bank efficiency. Whereas, the cost and profit efficiency model suggests that the level of financial integration (especially, concentration ratio, foreign ownership, domestic credit, and market integration) needs to design new regulations or developments to control its negative impacts on bank efficiency for contributing positively to bank performance.

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JTSR (2021) 28(2): 131-148
DOI 10.14665/1614-4007-28-2-008

PAPER

Investigation of Factors Influencing Risk-Averse Investor's Perception: Fixed Deposit Vs. Mutual Funds (Debt-based)

Barun Srivastava* • **Kamal Pant****

Abstract In the present scenario, investing has become a complex activity because various financial products have a gamut of facets or traits. The present study analyzes risk, liquidity, time, and tax benefit based on demographic variables of investors preferring to invest their savings in mutual funds (Debt-based) and fixed deposits. The study unveils that the safety of principals concerning the marital status and brand image and family member opinion concerning education and monthly income have significant variance. Thus, the research study helps to understand contrasting potential factors of an investor who is prominently risk-averse or risk cautious and invests their maximum savings in mutual funds (debt-based) and fixed deposits. The study will help the marketers formulate strategies for risk-averse customers and spend every penny of their savings with caution. Similarly, it will also support various government agencies to develop multiple policies targeted at increasing investor awareness.

Keywords: Risk-averse, Fixed deposits, Mutual funds, Demographic variables.

JEL Classification: G11, G41, M38.

1. Introduction

The Progression and advancement of the Indian economy have given rise to an increase in the per capita income and the purchasing power of the individuals, progress, and expansion of the financial markets over the years. The advancement of the financial market and information technology led to increased financial literacy and the desire for a wide variety of financial products in the market. As a result, investors' significant attention in the financial markets earns extra income and maximizes earnings. Among all the investment tools, equity investment has gained much popularity but carries a higher risk. Even the brand image of the companies is the most important factor to

Barun Srivastava*, Kamal Pant**(✉)
* Assistant Professor, School of Commerce, Graphic Era Hill University, Dehradun, Uttarakhand, India.
Email: bsrivastava@gehu.ac.in
** Head & Associate Professor, School of Vocational Studies, Graphic Era Hill University, Dehradun, Uttarakhand, India.
Email: kpant@gehu.ac.in

attract an equity investor (*Pant, K. and Oberoi, K., 2020).* Historically fixed deposits are considered to be the most attractive form of investment option in our country. In times of emergency conditions like the economic crisis and the Covid-19 pandemic, people use the fixed deposit as a safety resort and move towards a safer asset from a riskier class of assets. The ongoing pandemic has forced many retail investors to move towards a fixed deposit to save their capital. Thus, with the growth in the financial market, making an investment decision has become a difficult task for an investor, as different investors perceive risk differently, associated with an instrument based on various factors. Therefore, it is crucial to recognize the aspects that affect an investor's investment attitude and behavior towards financial instruments having different features such as risk, tax benefit, liquidity, period, return, and so on. The study explores and analyzes the potential determinants of investor perception about investment in fixed deposit and mutual funds and analyzes the relationship between the demographic profile and explored factors. Most of the research work done earlier focuses on the investment behavior of investors towards high-risk securities or low-risk securities. The present study focuses on two instruments, i.e., mutual fund and fixed deposit, to identify different aspects that affect investors' perception of investment in fixed deposits and mutual funds. As the Financial markets are suffering from turmoil and in the present context of the Covid-19 pandemic, it is challenging to predict the investor's sentiments. In the current scenario, investors are trying to park their savings in those instruments that are less risky and gives a regular return. The present study will help the marketers to understand the investor's perspective towards investment in mutual funds and fixed deposits and the different variables influencing the investment perspective of the investor.

1.1 Related work

Lucy F. Ackert (2006) showed how a firm image plays an essential role in individual investment behavior. The study was based on experiments to identify whether personal investment decisions influenced by critical information disclosed to make a positive or negative image. They include 24 students from a medium-sized university, which mainly includes final year students of the university. It was seen that participants heavily invested in firms having a positive image rather than a negative image.

Aduda, Oduor & Onwonga (2012) investigated the investment and saving preferences of salaried individuals. The research work delivers a thorough examination of the attitude of the salaried person towards investments. Savings channelized in the form of an asset is a significant factor in the monetary progress of any country. Salaried people are driven mainly by the need for the security and guarantee of their investment out of their earned salary. Many persons who have just started their careers and started earning tend to make incorrect choices regarding their investments due to a lack of investment knowledge. The government should take measures to promote saving and investment habits among salaried persons. Obamuyi (2013) studied and explored the

critical aspects influencing the investment decision of investors and their relationship with elements amid socio-economic features in the Nigerian stock market. Based on an ANOVA, t-test of independence, and post hoc analysis, the five most and least influencing factors are identifying as per the investor choice. The past company's stock performance, followed by an anticipated split of stock/capital appreciation/ bonus, dividend policy, anticipated earnings of corporate were the most influential factors. In contrast, aspects such as religions, rumors, loyalty towards the products of the company/services, and views of family members were insignificant among investors.

Marwaha & Arora (2014) examined the perception of retail investors concerning investment in stocks and fixed deposits in Punjab city. Two hundred and forty-one respondents have analyzed the least and most persuading factors affecting individual investment decisions concerning stock and mutual funds. Data analysis was done with a paired sample t-test. The study concluded that high returns proved to be the most influencing factor in investing in stocks whereas, for fixed deposits, income stability proved to be most influential.

Kaur & Kaushik (2016) examined determinants that affect individual investment behavior toward mutual funds investment. The investigation was about the consequence of attitude, consciousness, and conditions related to socio-economic aspects related to 450 individual investors' behavior concerning mutual funds with the help of the logit model. The study revealed that cognizance about various facets of mutual funds demonstrates to have a very optimistic outcome. At the same time, attitude plays no effect on investment behavior. Social and economic factors were identified corresponding to gender, occupation, and age, impacting investment behavior.

Kumar & Kumar (2019) explored the perception of female investors concerning the Indian share market and the demographic factors that can influence women investors' perceptions. Sample collected at random from 400 women investors from the state of Haryana, and analysis was done using ANOVA to identify the difference between demographic factors on women investor perception. The study concluded that the qualification, occupation, experience, and income of women investors have a significant relationship with the perception of women investors. Thus, it can be supposed that most of the studies conducted taking into consideration high-risk securities like equity or other instruments like insurance or specifically mutual funds. Therefore, this study fills the gap by exploring and analyzing potential determinants of investors' perception of fixed deposit and mutual funds investment. The various objectives of this study are:

1. To explore and analyze the potential determinants of investor perception about investment in fixed deposits and mutual funds.
2. To analyze the relationship of demographic profile with explored factors.
3. To analyze the impact of demographic variables on investment in fixed deposits and mutual funds.

2. Materials and methods

Direct information was gathered using convenience and judgmental sampling. Sixteen statements were used to discover the factors that affect investment choice between the two most common investment avenues, i.e., fixed deposits and mutual funds. The Likert five-point psychometric response scale was used, having a scale from firmly consent to unequivocally oppose this idea to know the level of agreement of the investor towards their investment decisions.

These statements are:

1. my investment decision is primarily based on emotion;
2. I always talk about money matters with my family;
3. Parents provide me guidance about what to do with my savings;
4. I always consider an investment with my family member;
5. I would prefer small gains to large unsure ones;
6. I prefer a safe investment and grow slowly;
7. give the negative news of my company I would redeem my investment;
8. stability of my account balance is more important to anything else;
9. the Company's image plays very a vital role in selecting my investment instruments;
10. I consider the brand ambassador/ celebrity associated with the company while making investing decisions;
11. I keep an eye on the company parameter before investing/ trading;
12. I always consider the rating/ ranking of the company while investing my saving;
13. I always talk about money management related matters with my friends;
14. I often blindly imitate decisions of others in my investment;
15. I constantly compare the inflows and outflows of cash with my friends;
16. I appreciate my friends when they give me advice about what to do with my money.

The statements mentioned above have developed with the help of a review of past studies. Out of the total responses, only a portion was selected for the study related to maximum investment in fixed deposits and mutual funds.

2.1 The Instrument

The first section of the questionnaire consists of the demographic profile of an investor like age, gender, marital status, monthly income, the percentage of saving towards investment, occupation. The next section of the questionnaire consists of 16 statements for extracting factors affecting investment decisions in fixed deposits and mutual funds. The 5-point Likert scale was used to collect responses.

3. Results & discussion

The demographic features of the respondents are stated in Table 1. Out of 530 respondents, 347(65.47%) were males, whereas 183 (34.53%) were females. The result

further showed that 25.5% of investors aged between 20-30; 25.7% lie 30-40; the majority of the investors, 38.1%, lie between 40-50, & 10.8% of the investors were 50 years above. Again, 25.3% of investors are under-graduate, 44% are graduates, and 30.8% have a postgraduate degree. Most of the respondents, i.e., 57.9%, belong to the salaried class, whereas business, self-employed, and retired respondents constitute only 16%, 20.4%, and 5.7%, respectively. 85.8% of the total respondents are married, and 14.2% are unmarried. The percentage of saving towards the investment of the respondents revealed that majority 52.1% of respondents invest only 10%- 20%, 35.8% invest only 20%- 30%, above this only 10% and 2.1% of respondents invest their 30%- 40% and above 40% of monthly income respectively. Out of total respondents, 73.2% prefer to invest in fixed deposits, whereas 26.8 percent prefer to invest in mutual funds.

Table 1. Demographic Characteristics of the Investors

Gender	**Frequency**	**Percent**	**Marital Status**	**Frequency**	**Percent**
Male	347	65.5	Married	455	85.8
Female	183	34.5	Unmarried	75	14.2
Total	530	100	Total	530	100

Monthly Income	**Frequency**	**Percent**	**Age**	**Frequency**	**Percent**
up to 30,000	251	47.4	20 – 30	135	25.5
30,000-60,000	182	34.3	30 – 40	136	25.7
60,000-90,000	79	14.9	40 – 50	202	38.1
90,000 & Above	18	3.4	50 &Above	57	10.8
Total	530	100	Total	530	100

Education Qualifications	**Frequency**	**Percent**	**Percentage of Investment in Savings**	**Frequency**	**Percent**
Under- Graduate	134	25.3	10% -20%	276	52.1
Graduate	233	44	20%-30%	190	35.8
Post Graduate	163	30.8	30%-40%	53	10
Total	530	100	40% & Above	11	2.1
			Total	530	100

Maximum Investment of Savings are in	Frequency	Percent
Fixed deposits	388	73.2
Mutual funds	142	26.8
Total	530	100

3.1 Exploratory factor analysis (EFA)

Primary data was collected to explore the factors. The researcher has also checked the consistency of the data collected through the investors. The Cronbach's α was determined as 0.779, which indicates that the data is reliable. KMO test (Kaiser, 1974) recommends a value between 0.7 and 0.8 are good (Hutcheson & Sofrenion, 1999; Andy, Field, 2009). Bartlett's Test of Sphericity showed a significance level. Both tests confirmed that the sample was appropriate for factor analysis (*Table 2*).

Table 2. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.779
Bartlett's Test of Sphericity	Approx. Chi-Square	1892.000
	Df	55
	Sig.	0.000

3.2 The Output of Factor Analysis

For recognizing the factors influencing the investment decisions of respondents, principal component factor analysis with varimax rotation was done on 16 statements related to investment. Here, the factor loadings of the items are more significant than 0.6, which ensures the practical significance of data (Haier et al.1998, p. 111). Out of the total, five statements/items were reduced due to low factor loadings. The remaining items were summarised to four aspects with eigenvalues bigger than 1.0 were taken for subsequent analysis. Factor analysis identified four factors that explained 71.275% of the variation in data and confirmed the factorial validity (Table 4).

Table 3. Rotated Component Matrix

	Components			
	1	**2**	**3**	**4**
Items 11	.873			
Items 12	.871			
Items 9	.776			
Items 15		.824		
Items 14		.799		
Items 13		.796		
Items 4			.824	
Items 2			.815	
Items 3			.696	
Items 5				.882
Items 6				.714

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
[a.] Rotation converged in 5 iterations.

Table 4. Eigen Values

Total Variance Explained									
Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	3.615	32.861	32.861	3.615	32.861	32.861	2.299	20.904	20.904
2	1.954	17.764	50.624	1.954	17.764	50.624	2.102	19.107	40.011
3	1.214	11.033	61.657	1.214	11.033	61.657	2.059	18.719	58.730
4	1.058	9.618	71.275	1.058	9.618	71.275	1.380	12.545	71.275
5	.648	5.894	77.169						
6	.519	4.721	81.891						
7	.506	4.599	86.490						
8	.454	4.123	90.613						
9	.417	3.789	94.402						
10	.352	3.196	97.598						
11	.264	2.402	100.000						

Extraction Method: Principal Component Analysis.

After reaching the acceptable factor solution, next is to name each of the factors. Hence, the study extracted four aspects that affect the investment choice of an individual investor in fixed deposits and mutual funds.

Brand Image **-** Factor 1 comprises three variables, ITEMS 11, ITEMS 12, ITEMS 9, related to the investor perception concerning a firm and brand image. Therefore, the factor was named as the brand image. A Positive brand image attracts investors to invest with confidence. *(Wang & Tsai, 2014)*

The Peer Effect **-** Factor 2 is associated with friends' and peers' advice and suggestions while making a particular investment. The statements ITEMS 15, ITEMS 14, ITEMS 13 deal with the role of a peer while making an investment decision. The part and choices of peers while investing positively affect the individual decision of investment *(Ouimet & Tate, 2020)*

Family Member Opinion **-** Factor number 3 is related to the advice and opinions of the family members affecting an individual investor while making an investment choice. The statements ITEMS 4, ITEMS 2, ITEMS 3 deals with family member opinion in helping an individual make an investment decision. *(Pant, K. & Srivastava, B., 2021)*
The Safety of Principal - Factor 4 is related to the safety of the investment. ITEMS 5 and 6 deal with the investor's perception of the safety of his investment made. *(Saini et al., 2012)*

3.3 Reliability test

For checking consistency, the resulting Cronbach's alpha values were high and sufficient in *Table 5*. Hence, the reliability coefficients for all four factors indicate an acceptable dependency of each factor. The calculated value of all the 16 statements is taken together for each explored factor for investment in the EFA.

Table 5. Reliability Test

S.No	Factors	Cronbach's Alpha
1	Factor 1 (Brand Image)	0.829
2	Factor 2(Peer Effect)	0.765
3	Factor 3(Family Member Opinion)	0.748
4	Factor 4 (Safety of Principal)	0.577
Overall Cronbach's Alpha = 0.844		

3.4 Demographic analysis with extracted factors

All the identified demographic characteristics of an investor, like marital status, education, and monthly income, are examined to determine their effect on investor perception.

Hypothesis Testing

H1 *There is no effect of marital status on investor perception.*

Marital status Vs. Extracted Factors

The result of the marital status was listed in Table 6. Levine's Test for Equality of Variances was used to experience the supposition of homogeneity of data. As contained in Table 6, Levine's statistics for factor affecting investor decision, namely, Brand Image ($F = 0.113$, $p = 0.737$), Peer Effect ($F = 1.073$, $p = 0.301$), Family Member Opinion ($F = 0.032$, $p = 0.857$), Safety Of Principal ($F = 0.348$, $p = 0.556$), indicated that supposition for the similarity of variance was not despoiled as the p-value for superior than 0.05 and therefore alike variances were supposed. The Significant difference between married and unmarried investor and his perception, related to Safety Of Principal ($t = -2.008$), $p = 0.045$) was indicated by the t-test and, no significant difference was obtained between married and unmarried investors perception related to Brand Image ($t = -1.724$, $p = 0.085$), Peer Effect ($t = 0.310$, $p = 0.756$), and Family Member Opinion ($t = -1.353$, $p = 0.177$).Specifically, the study further showed that unmarried ($M = 4.22$) investors significantly ($p = 0.045$) rated perception towards investment avenues better than their married ($M = 3.84$) counterparts in the case of Safety Of Principal. Although unmarried investors ($M = 5.81$) rated Brand Image better than married ($M = 5.2945$), yet it was not statistically significant. Similarly, in the case of Family Member Opinion, unmarried ($M = 6.8933$) have rated better than married ($M = 6.4593$), but it was also not statistically significant. Also, in Peer Effect, married ($M = 7.9516$) have rated better than unmarried, but it was not statistically significant.

Table 6. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
SUM_ B. I	Equal variances assumed	.113	.737	-1.724	528	.085	-.51883	.30089	-1.10992	.07227
	Equal variances not assumed			-1.755	101.354	.082	-.51883	.29561	-1.10521	.06755
SUM_ P. E	Equal variances assumed	1.073	.301	.310	528	.756	.11165	.35964	-.59485	.81814
	Equal variances not assumed			.296	96.492	.768	.11165	.37767	-.63797	.86127
SUM_ F.M. O	Equal variances assumed	.032	.857	-1.353	528	.177	-.43399	.32087	-1.06433	.19634
	Equal variances not assumed			-1.375	101.279	.172	-.43399	.31552	-1.05988	.19190
SUM_ S.O. P	Equal variances assumed	.348	.556	-2.008	528	.045	-.38491	.19173	-.76156	-.00826
	Equal variances not assumed			-1.944	97.615	.055	-.38491	.19803	-.77791	.00809

H2 *There is no effect of education on investor's perception.*

Education Vs. Extracted factors

The next demographic characteristic that could influence investor decisions toward investment in fixed deposits and mutual funds is the education level of investors (Table 8). Table 7 shows that Levine's Test for Homogeneity of Variance was practiced for equivalence of variances on the educational qualifications of respondents. In Table 7, Levine's indicator on investor's perception is shown towards Brand Image (F = 2.770, p = 0.064), Peers Effect (F = 2.168, p = 0.115), Family Member Opinion (F = 0.423, p = 0.655), Safety Of Principal (F = 0.950, p = 0.388), exhibited that the postulation for homogeneousness of variance has not been despoiled as the p-values were superior to 0.05 and, the equality of the variances was therefore assumed. One-way ANOVA stood accomplished to understand the effect of educational qualification of investors toward their perception (Table 8). Findings listed in table 8 display that there was a noteworthy statistical difference on two factors, namely Brand Image (F = 4.834, p = 0.008) and Family Member Opinion (F = 3.387, p = 0.035).In contrast, the other two factors were not significant. However, the real difference in mean among groups remained reasonably small for the brand image and family member opinion. Turkey post hoc examination was experienced to determine where the difference in educational levels influenced brand image and family members of the investor's opinion (Table 9). Table 9 revealed that the mean scores of undergraduate and graduate have no statistical differences and, the mean scores of postgraduate (M = 4.9325) are statistically different.

Table 7. Test of Homogeneity of Variances

	Levine's Statistic	df1	df2	Sig.
SUM_B. I	2.770	2	527	.064
SUM_P. E	2.168	2	527	.115
SUM_F.M. O	.423	2	527	.655
SUM_S.O. P	.950	2	527	.388

Table 8. ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
SUM_B. I	Between Groups	55.766	2	27.883	4.834	.008
	Within Groups	3039.488	527	5.768		
	Total	3095.255	529			

SUM_P. E	Between Groups	30.335	2	15.168	1.830	.161
	Within Groups	4367.484	527	8.287		
	Total	4397.819	529			
SUM_F.M. O	Between Groups	44.572	2	22.286	3.387	.035
	Within Groups	3467.699	527	6.580		
	Total	3512.272	529			
SUM_S.O. P	Between Groups	5.044	2	2.522	1.060	.347
	Within Groups	1254.248	527	2.380		
	Total	1259.292	529			

Table 9. Multiple Comparisons

Tukey HSD							
Dependent Variable			**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
SUM_B. I	under graduate	Graduate	.36186	.26037	.347	-.2501	.9738
		Post Graduate	.85853*	.28004	.006	.2003	1.5167
	Graduate	Under Graduate	-.36186	.26037	.347	-.9738	.2501
		Post Graduate	.49667	.24523	.107	-.0797	1.0730
	post graduate	Under Graduate	-.85853*	.28004	.006	-1.5167	-.2003
		Graduate	-.49667	.24523	.107	-1.0730	.0797
SUM_P. E	under graduate	Graduate	.59445	.31211	.138	-.1391	1.3280
		Post Graduate	.42652	.33569	.412	-.3625	1.2155
	Graduate	Under Graduate	-.59445	.31211	.138	-1.3280	.1391
		Post Graduate	-.16793	.29396	.835	-.8588	.5230
	post graduate	Under Graduate	-.42652	.33569	.412	-1.2155	.3625
		Graduate	.16793	.29396	.835	-.5230	.8588

SUM_F.M.O	under graduate	Graduate	.62437	.27811	.065	-.0293	1.2780
		Post Graduate	.71431*	.29912	.045	.0113	1.4174
	Graduate	Under Graduate	-.62437	.27811	.065	-1.2780	.0293
		Post Graduate	.08994	.26193	.937	-.5257	.7056
	post graduate	Under Graduate	-.71431*	.29912	.045	-1.4174	-.0113
		Graduate	-.08994	.26193	.937	-.7056	.5257
SUM_S.O.P	under graduate	Graduate	.09218	.16726	.846	-.3009	.4853
		Post Graduate	.25419	.17989	.335	-.1686	.6770
	Graduate	Under Graduate	-.09218	.16726	.846	-.4853	.3009
		Post Graduate	.16201	.15753	.559	-.2082	.5323
	post graduate	Under Graduate	-.25419	.17989	.335	-.6770	.1686
		Graduate	-.16201	.15753	.559	-.5323	.2082

* The mean variance is important at 0.05 level.

H3 *There is no effect of monthly income on the investor's perception.*

Monthly income Vs. Extracted Factors

The next demographic characteristic of fixed deposits and mutual funds investors examined is the investor's monthly income and, the outcome was listed in Table 11. For testing the postulation for homogeneity of variance, Levine's test for equality of variance was conducted on the monthly income of respondents. Levine's statistic on investor perception, namely Brand Image ($F = 2.066$, $p = 0.104$), Peers Effect ($F = 1.229$, $p = 0.299$), Safety of Principal ($F = 0.208$, $p = 0.891$) showed the assumption for homogeneity of variances has not been despoiled as p-values were superior to 0.05 (Table 10). Only in the case of family member opinion Levine's test assumption was not satisfied and was not considered for analysis with monthly income. A one-way ANOVA was then used to understand and identify the monthly income effect on their perception (Table 11). The Findings shown in Table 11 show that only in the case of Brand Image ($F = 3.459$, $p = 0.16$) was the result statistically significant where all other factors were not statistically significant. However, further analysis was performed using Turkey post hoc because the mean score difference among groups was for the brand image and to analyze at what income level brand image has a statistically significant impact (Table 12). The

results obtained revealed that the mean score of income group 60000 to 90000 (M = 4.722) what statistically different from other income groups.

Table 10. Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
SUM_B. I	2.066	3	526	.104
SUM_P. E	1.229	3	526	.299
SUM_F.M. O	5.685	3	526	.001
SUM_S.O. P	.208	3	526	.891

Table 11. ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
SUM_B. I	Between Groups	59.876	3	19.959	3.459	.016
	Within Groups	3035.379	526	5.771		
	Total	3095.255	529			
SUM_P. E	Between Groups	22.314	3	7.438	.894	.444
	Within Groups	4375.505	526	8.318		
	Total	4397.819	529			
SUM_F.M. O	Between Groups	13.214	3	4.405	.662	.576
	Within Groups	3499.058	526	6.652		
	Total	3512.272	529			
SUM_S.O. P	Between Groups	18.090	3	6.030	2.555	.055
	Within Groups	1241.203	526	2.360		
	Total	1259.292	529			

Table 12. Multiple Comparisons

Tukey HSD							
Dependent Variable (in Rs.)			**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
SUM_B. I	Upto 30,000	30,000-60,000	.15709	.23388	.908	-.4457	.7598
		60,000-90,000	.81351*	.30990	.044	.0148	1.6122
		above 90,000	1.25232	.58616	.143	-.2584	2.7630
	30,000-60,000	Upto 30,000	-.15709	.23388	.908	-.7598	.4457
		60,000-90,000	.65642	.32366	.179	-.1777	1.4906
		above 90,000	1.09524	.59355	.253	-.4345	2.6250
	60,000-90,000	Upto 30,000	-.81351*	.30990	.044	-1.6122	-.0148
		30,000-60,000	-.65642	.32366	.179	-1.4906	.1777
		above 90,000	.43882	.62741	.897	-1.1782	2.0558
	above 90,000	Upto 30,000	-1.25232	.58616	.143	-2.7630	.2584
		30,000-60,000	-1.09524	.59355	.253	-2.6250	.4345
		60,000-90,000	-.43882	.62741	.897	-2.0558	1.1782
SUM_P. E	Upto 30,000	30,000-60,000	-.13147	.28080	.966	-.8552	.5922
		60,000-90,000	.09637	.37207	.994	-.8626	1.0553
		above 90,000	-1.07592	.70376	.421	-2.8897	.7379
	30,000-60,000	Upto 30,000	.13147	.28080	.966	-.5922	.8552
		60,000-90,000	.22785	.38859	.936	-.7737	1.2293
		above 90,000	-.94444	.71263	.547	-2.7811	.8922
	60,000-90,000	Upto 30,000	-.09637	.37207	.994	-1.0553	.8626
		30,000-60,000	-.22785	.38859	.936	-1.2293	.7737
		above 90,000	-1.17229	.75328	.405	-3.1137	.7691
	above 90,000	Upto 30,000	1.07592	.70376	.421	-.7379	2.8897
		30,000-60,000	.94444	.71263	.547	-.8922	2.7811
		60,000-90,000	1.17229	.75328	.405	-.7691	3.1137

Tukey HSD							
Dependent Variable (in Rs.)			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
SUM_F.M.O	Upto 30,000	30,000-60,000	.01408	.25110	1.000	-.6331	.6612
		60,000-90,000	-.18811	.33273	.942	-1.0456	.6694
		above 90,000	-.80766	.62934	.574	-2.4296	.8143
	30,000-60,000	Upto 30,000	-.01408	.25110	1.000	-.6612	.6331
		60,000-90,000	-.20218	.34750	.938	-1.0978	.6934
		above 90,000	-.82173	.63727	.570	-2.4642	.8207
	60,000-90,000	Upto 30,000	.18811	.33273	.942	-.6694	1.0456
		30,000-60,000	.20218	.34750	.938	-.6934	1.0978
		above 90,000	-.61955	.67363	.794	-2.3557	1.1166
	above 90,000	Upto 30,000	.80766	.62934	.574	-.8143	2.4296
		30,000-60,000	.82173	.63727	.570	-.8207	2.4642
		60,000-90,000	.61955	.67363	.794	-1.1166	2.3557
SUM_S.O.P	Upto 30,000	30,000-60,000	.36540	.14955	.070	-.0200	.7508
		60,000-90,000	.38348	.19817	.215	-.1273	.8942
		above 90,000	.02413	.37483	1.000	-.9419	.9902
	30,000-60,000	Upto 30,000	-.36540	.14955	.070	-.7508	.0200
		60,000-90,000	.01808	.20697	1.000	-.5153	.5515
		above 90,000	-.34127	.37955	.805	-1.3195	.6369
	60,000-90,000	Upto 30,000	-.38348	.19817	.215	-.8942	.1273
		30,000-60,000	-.01808	.20697	1.000	-.5515	.5153
		above 90,000	-.35935	.40120	.807	-1.3934	.6747
	above 90,000	Upto 30,000	-.02413	.37483	1.000	-.9902	.9419
		30,000-60,000	.34127	.37955	.805	-.6369	1.3195
		60,000-90,000	.35935	.40120	.807	-.6747	1.3934

*. The mean difference is significant at the 0.05 level.

4. Conclusion

The investigation recognized various perspectives that influence the observation of the investor towards investment in fixed deposits and mutual funds. Using Principal Component Analysis, four factors, namely Brand Image, Family Member Opinion, Peer Effect & Safety of Principal were identified. Later on, the effect of marital status, education, and monthly income has been seen in context to four identified factors. The results show that marital status has a significant difference in terms of the safety of the principal. Unmarried persons prefer to invest more in mutual funds, whereas married prefer to invest in fixed deposits. Education qualification differs significantly in Brand Image & Family Member Opinion, and only postgraduates have mean scores different from undergraduates and graduates. In the case of monthly income, only the brand image statistical difference was obtained, and the income group of "Rs,60,000-90,000" has a statistically different mean. The significance of the study shows that married investors prefer to invest in more safe investments, i.e., fixed deposits rather than mutual funds that are prone to market risks. It also revealed that investors with a higher level of education are keener towards a positive brand image of the investment avenue. Their investment decisions are in line with the recommendations made by family members. High-income group investors are more inclined towards the brand image of the investment options. Thus, the study helps the marketers formulate strategies for risk-averse customers and want to spend every penny of their savings with caution. Similarly, it will also help the various government agencies like SEBI, RBI, AMFI to understand the perception of such investors and plan and formulate the different policies targeted on increasing investor awareness.

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