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EMIGRATION AND ECONOMIC GROWTH IN EUROPEAN TRANSITION ECONOMIES: EVIDENCE FROM A BOOTSTRAP PANEL CAUSALITY TEST IN ROLLING WINDOWS

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ABSTRACT

The relationship between migration and economic growth has long been the subject of theoretical and empirical debate. Previous studies estimated the link between variables with an unchanging parameter. Nevertheless, prevailing economic and political circumstances, effective contracts and agreements, implemented policies and ongoing crises or shocks can cause the relationship between variables to change direction. This study analyses the relationship between emigration and economic growth in transition economies in Europe for the period between 1995-2019 using a time-varying causality test. Findings obtained from the bootstrap panel causality test suggest that there is a bidirectional causality relationship between emigration and economic growth only in Estonia. However, the results of the bootstrap panel rolling window causality analysis reveal that hidden causal relationships exist for the sub-periods in Hungary, Lithuania, Poland, Slovakia and Slovenia.

***Keywords**: Migration, Economic Growth, Panel Rolling Window Causality, Transition Economies.*

***Jel Codes**: O11, O15, O40.*

1. INTRODUCTION

The collapse of the Soviet political and economic system at the end of 1980s pushed the dramatic economic slowdown prevailing Eastern Bloc countries to the peak. As a result, transition process from centralized planning to market economies turned out to be quite a challenge in the 1990s and economic performance of Eastern bloc countries remained far below the expectations(Svejnar, 2002). During the early years of transition period, economic growth followed a negative course; hence these countries experienced mass migration to abroad (Melegh, 2012).

In the "Annual Report on Intra-EU Labour Mobility in 2020" published by the European Commission, it has been stated that almost all of the countries which are above the average of EU-28 in terms of migration rate are transition economies (Fries-Tersch et al., 2021). One of the main reasons for continued migration from transition economies to other states is the easy migration of workers to other European countries as a result of free movement rights after the great enlargement. The disappearance

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of the barriers against migration flows has created a new market between East and West Europe (Kahanec and Pytlikova, 2017).

This reality triggers different economic effects both for receiving and sending countries alike. Following their EU membership, many of transition economies converged with Western European countries having economic growth and high income per capita, there were great improvements measured in labor markets too. On the other hand, as young and educated population migrated to Western Europe after EU membership, a shortage of labor force emerged in some transition economies. Researchers investigated whether various economic developments after EU membership are directly linked to migration. Schreiner (2008) has argued that economic growth cannot be attributed to labor migration from transition economies and further argues that migration flow can be brought under control after major enlargement. On the other hand, Brücker (2007) argued that the migration flow from the East to the West is in line with expectations and that in the long run, these migrations will bring profits to the economy. Evaluating the discussions on this subject within the framework of the views of different economic schools such as neoclassical theory and endogenous growth theory will make the process more understandable.

Studies on the relationship between migration and economic growth have mostly focused on immigration. (see, Walz 1993; Dolado et al. 1994; Lundborg and Segerstrom 2000; Bretschger 2001;Kemnitz 2001; Lundborg and Segerstrom 2002; Morley 2006; Feridun 2007; Torben 2007; Dritsakis 2008; Felbermayr et al. 2010; Gómez and Giráldez 2011;Islam et al. 2012; Chletsos and Roupakias 2012; Huber and Tondl 2012; Bellini et al. 2013; Boubtane et al. 2013a, b; Alesina et al. 2016; Boubtane et al. 2016; Bove and Elia 2017; Gómez and Giráldez 2017; Manole et al. 2017; Akbari and Haider 2018; Kang and Kim 2018; Borjas 2019; d'Albis et al. 2019; Bayraktar and Özyılmaz, 2019; Furlanetto and Robstad 2019; AboElsoud et al. 2020; Şerban et al. 2020; Özyılmaz et al. 2020; Tipayalai 2020; Bayraktar and Özyılmaz, 2021). Different theoretical analyses and econometric methods are used in the studies and then country-specific policies are suggested.

The effects of migrations on demographics, labor markets, inequalities, public finances, well-being or long-term growth prospects are important for the country of origin as well as for the host countries (Walerych, 2020). The number of studies analyzing economic effects of migration in terms of origin countries is more limited. Hence, in this study, the relationship between emigration and economic growth in European transition economies mostly performing as the sending country has been inspected. In addition, as we know, there is no study that discusses the causal relationship between variables in transition economies for the entire period and sub-periods. In the analysis of the relationship between emigration and economic growth, the factors such as human capital, skilled -unskilled labor force, remittances, trade and foreign direct investment which can impact the relationship directly or indirectly are taken into account. However, the focus point of this study has been uncovering the hidden relationships between emigration and economic growth, which it is difficult in traditional analyses.

This study investagated emigration–economic growth nexus for European transition economies from 1995 to 2019 using bootstrap panel rolling window causality test. The main reason behind employing the method developed by Yilanci and Ozgur (2019) is to unveil hidden causal relationships that are unnoticed in classical causality tests. On a global scale existing economic and political terms, implemented policies, inter-country contracts and agreements are likely to change continuously. In particular, EU is an economic and political foundation having adopted an expansion policy and these expansion policies change the economic structure in new member countries. Thus, instead of an unchanging parameter, it is vital to obtain country-specific results in sub-sample periods. Indeed in this research bootstrap panel causality test developed by Kónya (2006) is implemented and causality findings have been attained for all periods. That alone is a vital finding for empirical literature and even beyond that, this study can offer an important contribution to the current literature by exposing hidden causal relationships between emigration and economic growth for sub-sample periods.

This paper has been organized as follows: Section 2 presents the theoretical framework between emigration and economic growth. Section 3 consists of literature review. Section 4 provides extensive information on data and methodology. Section 5 contains empirical findings and discussion. Section 6 is the conclusion part of the research and presents suggested policies.

2. THEORETICAL FRAMEWORK

Throughout the historical process various theoretical approaches based on different disciplines have been developed to explain the causes and effects of migration (see, Sjaastad 1962; Mabogunje 1970; Piore 1979; Stark and Bloom 1985; Sassen 1988; Borjas 1989; Castells 1989; Morawska 1990). Yet even in the earliest theories striving to systematically explain migration flows it was emphasized that in essence, migration is triggered by economic concerns (see, Ravenstein 1885; Stouffer 1940; Lee 1966). Although these theories failed short in explaining complex structure, they succeeded in establishing the theoretical infrastructure of migration. As migrations became more complex over time, migration theories developed more, especially with the emergence of economic reasons, migration researchers such as Lewis (1954), Todaro (1969) and Harris and Todaro (1970) began to focus on economic factors.

According to Neoclassical models, migration increases only per capita income of origin country; hence convergence between developed and less-developed countries would accelerate with migration (Atoyan et al., 2016). But in the first stage, only highly- skilled workers can migrate, and this causes "brain grain" and in the long term, economic growth in origin countries decrease (Chen, 2006). Endogenous growth theorist Lucas (1988) emphasizes that in countries having less human capital, profits from production would be lower. Accordingly, emigration of skilled laborforce can decrease welfare and also productivity of people left behind in origin country.

On the other hand, despite negative effect of emigration on the host economies, emigration effect positively host countries with indirect channels (Scott, 1960). Skilled emigrants can indirectly contribute after gaining remittances, foreign direct investment, trade, knowledge transfer and additional skills; hence they can support origin economy via reverse migration (Ghosh and Weinstein, 2021). Remittances are an important source of capital, mostly in low-income developing countries. In this context, business remittances positively affect many macroeconomic indicators, especially economic growth and financial development, and as a result, it can make a significant contribution to minimizing financial volatility (Özyılmaz et al., 2019, 2021, Barajas et al., 2009). However, if remittances are only used for household consumption, the savings rate will not change. In that case stimulant effect of remittances on investments and economic growth cannot emerge (Depken et al., 2021). In a different scenario, migration is not successful at all times. Emigrants moving to developed countries but attaining a failed experience or going through integration problems when returning back sometimes can not contribute to the economy of origin country (Coniglio and Brzozowski, 2018).

Moreover, emigrants' effects on economic growth should not be examined only with respect to labor market or remittances. In host countries, emigrants are long-term tourists who consumer, and investor (Gómez and Giráldez, 2017). In the same vein among sending countries too, the opposite change witnessed in consumption and investment can impact economic growth.

Discussion about the relationship economic growth and emigration differs, acoording to traditional theories and newly-developed theories. Economic development in origin country can cause a negative impact on migration with respect to traditional theories such as neoclassical models. However, new theoretical approaches have been suggested to emphasize that economic development level, in general, tends to elevate migration. This discussion goes back to Zelinsky's (1971) study. Zelinsky (1971) developed a theoretical approach which manifests that relationship between emigration and development is not linear but rather inverted-U shape. Thus this approach disassociates from traditional neoclassical theories such as the gravity model which demonstrates that there exists a negative relationship between development and migration (Bencek and Schneiderheinze, 2020).

After Zelinsky's (1971) study, some theoretical approaches were developed and these studies revealed that an inverted-U shape relationship between emigration and development. For instance, Bazzi (2017) suggests that income rise not only escalated opportunity cost of migration but also eased liquidity restrictions. According to this approach, unlike neoclassical economic theories, positive income shocks in relatively low-income regions cause labor migration because in parallel with the rise in development level human capital accumulation, increases global networks, demand increase and climb up and credit limits are raising.

3. LITERATURE REVIEW

In the discussions on the relationship between migration and economic growth, the focus is mostly on the countries hosting immigrants. On the contrary, the literature on the impact of migration on origin countries is quite limited. Among the studies examining emigration's effects on economic growth Ha et al. (2016), Dessilani (2016), Tabassum et al. (2017) concluded that emigration negatively affected economic growth whereas Cantore and Cali (2015) claimed that emigration positively affected economic growth and Baas et al. (2010) suggested that the positive effect of emigration became neutral in the long term.

On the other hand, there are a number of studies looking into the effects of economic growth on emigration. Theoretical researchers Banik and Bhaumik (2006) and De Haas (2007) suggest that rising income increases emigration and similarly Rotte et al. (1997) and Angelucci (2015) show that there is a positive link between income and emigration. Vogler and Rotte (2000), De Haas (2010), Clemens (2014), Djajic et al. (2016), Bazzi (2017), Dao et al. (2018), Berthiaume et al. (2021) detected that between income and emigration the relationship is positive and inverted-U shaped. However, Ortega and Peri (2013), Bertoli and Moraga (2013), Murat (2019), Bencek and Schneiderheinze (2020) and Langella and Manning (2021) report that income triggers a negative effect on emigration. Mayda (2010) argued that the effect of economic growth on emigration in origin country is statistically insignificant.

Empirical studies in the literature are based on econometric methods which mainly explain variables' effects on one another through unchanging coefficient values. This study differs from literature with respect to three dimensions as listed below:

(i) Causal links between variables have been exhibited for the entire research period.

(ii) Hidden relationships have been exhibited by revealing causal links between variables for the sub-periods.

(iii) Effects of the variables on each other have been examined for the sub-periods.

4. DATA AND METHODOLOGY

4.1. Data

In this study, the causality relationship between emigration and economic growth in European transition economies has been analyzed for the period between 1995-2019. Emigration data have been obtained from the Eurostat database. Emigration data of European transition economies such as Bulgaria, Czech Republic and Romania are limited and there is no data in Croatia for some years due to specific reasons. Therefore, a panel data set was formed consisting of Estonia, Latvia, Lithuania, Hungary Poland, Slovakia and Slovenia. For the economic growth data, per capita GDP (constant 2015

US$) was used, and obtained from the World Bank database. On the other hand, for the analysis of the study, the natural logarithms of the variables were taken.

4.2. Methodology

4.2.1. Cross-section dependency and Homogeneity Tests

In the panel data methods that have become widely popular recently, results of a test geared at cross-section dependence gain further value. Results to be obtained from the cross-section dependence test provide preliminary information for the tests to be conducted in panel data analysis. Additionally, the presence of dependency among countries used in the panel demonstrates that any shock impacting a country could also influence neighboring states due to the effects of globalization and liberalization. Therefore if dependency is detected among sections used in the panel, it is important to employ the kind of tests that take cross-section dependence into account in the analyses. In that sense, a set of tests have been designated to test cross-section dependence. The reliability of tests could vary depending on the time (T) and cross-section unit (N) dimensions in particular used in the research. Simple panel data models to be employed in this research to check cross-section dependence are such;

$$GDP_{it} = \alpha_0 + \alpha_1 EMG_{it} + u_{it} \quad (1)$$

$$EMG_{it} = \beta_0 + \beta_1 GDP_{it} + \gamma_{it} \quad (2)$$

GDP and EMG used in the models stand for a logarithmic mode of the economic growth and emigration respectively and countries used in the analysis are symbolized as "i" (i=1,….N), the period is shown as "t" (t=1,….T). α_0 and β_0 and constant terms used in the models whilst u_{it} and γ_{it} stand for error terms.

To investigate cross-section dependence in models, at first LM test developed by Breusch and Pagan (1980) was employed. If T>N this test presents more reliable results and computed according to equation (3).

$$LM = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^2 \sim X^2_{\frac{N(N-1)}{2}} \quad (3)$$

In here, $\hat{\rho}_{ij}$ when simple correlation coefficients among all residues attained from OLS estimations in every equation, when N is constant T→∞ in Breusch and Pagan (1980) LM test for $\chi 2$ distribution null hypothesis is "There is no Correlation between residues" (Pesaran, 2004).

CD_{LM} test developed by Pesaran (2004) can also employ T>N condition. CD_{LM} test statistics at first shows asymptotically standard distribution for T→∞, then for N→∞:

$$CD_{LM} = \sqrt{\frac{1}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\left(T\hat{\rho}_{ij}^2 - 1\right) \sim N(0,1) \quad (4)$$

Pesaran (2004) also designed a CD test which can be used in N>T conditions. Pesaran CD test showing asymptotically standard distribution and with "There is no Correlation between residues" null hypothesis is as shown here:

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right) \sim N(0,1) \quad (5)$$

Breusch and Pagan (1980) LM and Pesaran (2004) CD tests are biased when the group mean is zero and the individual mean is different from zero. To overcome this problem Pesaran et al. (2008) suggest to administer a bias-adjusted LM test. Adjusted LM test of which null hypothesis lacks cross-section dependence, asymptotically standard normal distribution feature under T→∞ and N→∞ condition is exhibited:

$$LM_{adj} = \sqrt{\left(\frac{2T}{N(N-1)}\right)}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\ \frac{(T-k)\hat{\rho}_{ij}^{2}-\mu_{Tij}}{\sqrt{\upsilon_{Tij}^{2}}} \sim N(0,1) \quad (6)$$

In order to test whether or not slope coefficients of the models formed in panel data analyses are homogenous, delta ($\tilde{\Delta}$) tests developed by Pesaran and Yamagata (2008) can be utilized. In two delta ($\tilde{\Delta}$) tests developed by Pesaran and Yamagata (2008) when T and N → ∞ and when √N/T →∞ "Slope coefficients are homogenous" null hypothesis is tested against the alternative hypothesis "Slope coefficients are heterogeneous". Among these tests, it is suggested to employ adjusted delta ($\tilde{\Delta}_{adj}$) test in small sampling:

$$\tilde{\Delta} = \sqrt{N}\left(\frac{N^{-1}\tilde{S}-k}{\sqrt{2k}}\right) \sim \chi_{k}^{2} \quad (7)$$

$$\tilde{\Delta}_{adj} = \sqrt{N}\left(\frac{N^{-1}\tilde{S}-E(\tilde{z}_{it})}{\sqrt{var(\tilde{z}_{it})}}\right) \sim N(0,1) \quad (8)$$

4.2.2. Bootstrap Panel Causality Test

In this study, at first, Kónya's (2006) bootstrap panel causality test was used to analyze the relationship between emigration and economic growth. Panel causality test of Kónya (2006) is based on estimation of seemingly-unrelated regression (SUR) model developed by Zellner (1962). While the homogeneity assumption is valid in the traditional Granger causality test, the heterogeneity assumption is valid in this test. It is thus viable to attain results specific to countries and also this test can be used in cross-section dependence condition. On the other hand, there is no need for pretests such as unit root and cointegration in this approach (Kónya, 2006).

In the causality test of Kónya (2006), firstly, below-shown equation is estimated via SUR system.

$$GDP_{1,t} = \alpha_{1,1} + \sum_{l=1}^{lGDP_1}\beta_{1,1,l}\,GDP_{1,t-l} + \sum_{l=1}^{lEMG_1}\gamma_{1,1,l}EMG_{1,t-l} + \varepsilon_{1,1,t}$$

$$GDP_{2,t} = \alpha_{1,2} + \sum_{l=1}^{lGDP_1} \beta_{1,2,l}\, GDP_{2,t-l} + \sum_{l=1}^{lEMG_1} \gamma_{1,2,l} EMG_{2,t-l} + \varepsilon_{1,2,t}$$

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$$GDP_{N,t} = \alpha_{1,N} + \sum_{l=1}^{lGDP_1} \beta_{1,N,l}\, GDP_{N,t-l} + \sum_{l=1}^{lEMG_1} \gamma_{1,N,l} EMG_{N,t-l} + \varepsilon_{1,N,t} \quad (9)$$

and

$$EMG_{1,t} = \alpha_{2,1} + \sum_{l=1}^{lGDP_1} \beta_{2,1,l}\, GDP_{1,t-l} + \sum_{l=1}^{lEMG_1} \gamma_{2,1,l} EMG_{1,t-l} + \varepsilon_{2,1,t}$$

$$EMG_{2,t} = \alpha_{2,2} + \sum_{l=1}^{lGDP_1} \beta_{2,2,l}\, GDP_{2,t-l} + \sum_{l=1}^{lEMG_1} \gamma_{2,2,l} EMG_{2,t-l} + \varepsilon_{2,2,t}.$$

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$$EMG_{N,t} = \alpha_{2,N} + \sum_{l=1}^{lGDP_1} \beta_{2,N,l}\, GDP_{N,t-l} + \sum_{l=1}^{lEMG_1} \gamma_{2,N,l} EMG_{N,t-l} + \varepsilon_{2,N,t} \quad (10)$$

GDP and EMG shown in (9) and (10) equations stand for variables used in the analysis and N represents panel cross-section number shown as (i=1,2,..N), t on the other hand represents time period (t=1,2,…T). Optimal lag length set according to Akaike information criterion is symbolized with l. In order to identify the presence of a causal link between GDP and EMG initially Wald statistics based on SUR estimation are retrieved. Critical values specific to units attained by the bootstrap method are compared via Wald test so that causal links between variables can be detected.

Because of its methodical advantages causality test of Kónya (2006) has become quite popular in recent times but in this test, a general result specific to countries can be attained for a definite period of time. This condition could, in sub-sampling periods, lead to ignoring varying causality relationships between variables. Tang (2008) argues that the results of causality relationship would not remain stable within a certain period of time due to constantly shifting global economic and political conditions and therefore would transform after a while. Since the bootstrap panel causality test developed by Kónya (2006) shows the results obtained for all samplings, Yilanci and Ozgur (2019) improved bootstrap causality test in which causality findings of sub-sampling periods are obtained. Yilanci and Ozgur (2019) employed a bootstrap panel causality test in order to determine the dimension of subsamples administered for t = τ-1+l, τ−1, τ=l, l+1, ..., T and they also tested the stability of causality emerging at the end of analyzing the entire sampling. Also in this method, critical values required to control small-sample bias and probability values are gained via bootstrap simulations. Yilanci and Kilci (2021) suggest that in order to detect the size of sub-sampling, formula introduced by Phillips et al. (2015) should be harnessed.

5. EMPIRICAL RESULTS AND DISCUSSION

In this research examining the relationship between EMG and GDP in European transition economies, at first, cross-section dependence and homogeneity tests for the model have been administered and attained results can be seen in Table 1.

Table 1. Results of Cross-Sectional Dependence and Homogeneity Tests

Test	Direction of causality	
	EMG → GDP	GDP → EMG
Breusch-Pagan LM	162.752*	77.740*
Pesaran CD_{LM}	21.873*	8.755*
Pesaran CD	10.346*	3.720*
Pesaran et al. LM_{adj}	16.294*	16.312*
$\tilde{\Delta}$	4.488*	18.306*
$\tilde{\Delta}_{adj}$	4.772*	19.463*

* indicate the rejection of null hypothesis at 1% significance level

The findings of Table 1 show that 'There is no cross-section dependence' null hypothesis is rejected at the 1% significance level; in another saying in the models used in this study there exists cross-section dependence. On the other hand, findings of delta tests show that 'Slope coefficients are homogenous' null hypothesis is rejected at the 1% significance level and these findings manifest that employed models in this study maintain a heterogeneous structure.

Table 2 displays the results of the bootstrap causality relationship between EMG and GDP and results attained from Table 2 reveal that for Estonia, there is a bidirectional causality relationship between EMG and GDP but in countries except for Estonia, there is no causality relationship detected. The causality analyses of the entire period could make it impossible to detect time-varying causal links; hence stability must be tested via sub-sampling period analyses.

Table 2. Bootstrap panel causality test results

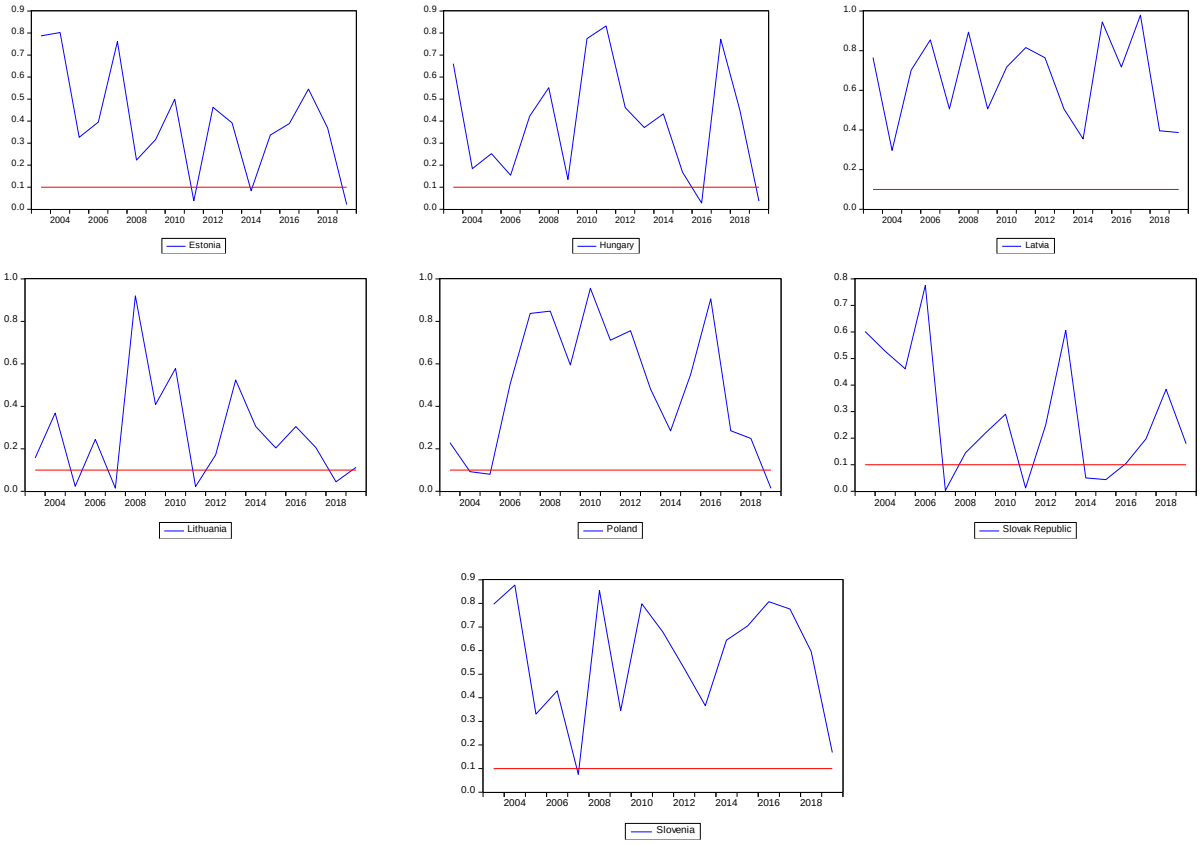
	H_0: Emigration does not cause Economic Growth				H_0: Economic Growth does not cause Emigration.			
		Bootstrap Critical Values				Bootstrap Critical Values		
Countries	Wald Stat.	%1	%5	%10	Wald Stat.	%1	%5	%10
Estonia	4.428***	9.233	5.098	3.548	12.271*	9.702	7.828	6.855
Hungary	3.881	10.442	7.234	5.842	1.991	7.792	5.937	5.123
Latvia	1.26	20.072	11.935	8.591	3.352	11.687	6.918	4.969
Lithuania	2.484	10.771	5.183	3.489	2.617	15.417	9.967	7.682
Poland	0.004	6.203	3.423	2.420	5.529	25.436	17.985	15.033
Slovak Republic	5.318	15.937	10.062	7.790	2.913	21.207	15.120	12.546
Slovenia	0.292	18.058	8.554	5.512	16.018	40.879	29.987	24.930

*, and *** indicate the rejection of the null hypothesis at 1% and 10% significance levels, respectively. Critical values are based on 10,000 bootstrap replications.

In this study employing Yilanci and Ozgur's (2019) method, the time-varying causality relationship between EMG and GDP has been tested by considering sub-sampling periods. Also, optimal lag length was detected according to the Akaike information criterion and sub-sampling size was computed as 9 years by using the method developed by Phillips et al. (2015).

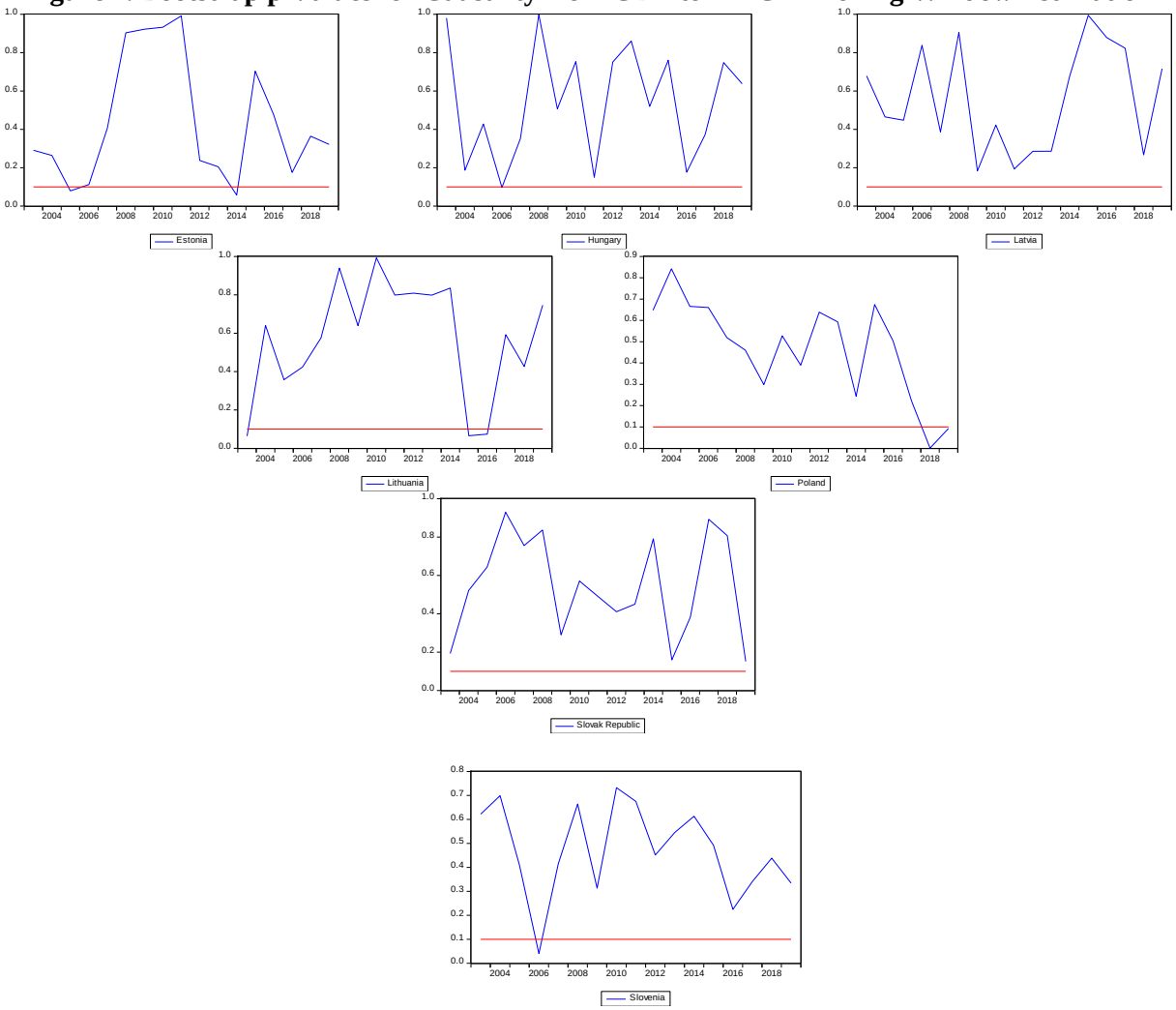
Figure 1 shows the bootstrap p values for the test of causality from EMG to GDP along with the 10% critical level in the rolling windows. The results for bootstrap rolling window causality from EMG to GDP in Figure 1 show no causal link running from EMG to GDP in Latvia. In addition, Figure 1 exhibits that EMG was the cause of GDP in Estonia in 2011 and 2019; in Hungary in 2016 and 2019; in Lithuania in 2005,2007,2011 and 2018; in Poland in 2004,2005 and 2019; in Slovakia in 2007, 2011, 2014 and 2015; in Slovenia in 2007. For Estonia and Lithuania results obtained from Figure 1 comply with the results retrieved from the bootstrap panel causality test in Table 2 but for the remaining countries, hidden causality relationship that went unnoticed in the bootstrap causality test could be detected after employing time-varying causality test.

Figure 1. Bootstrap P Values for Causality from EMG to GDP in Rolling Window Estimation



The results for bootstrap rolling window causality from GDP to EMG in Figure 2 show no causal link running from GDP to EMG in Latvia and Slovakia. On the other hand, it can be seen in Figure 2 that there was a one-way causality relationship from GDP to EMG in Estonia in 2005 and 2014; in Hungary in 2006; in Lithuania in 2003,2015 and 2016; in Poland in 2018 and 2019; in Slovenia in 2006 and also according to results taken from Figure 1 and Figure 2, bidirectional causality relationship between EMG and GDP could be detected in the year 2019 in Poland. Results obtained from Figure 2 align with the results attained in Table 2 from the bootstrap panel causality test with respect to Estonia, Latvia and Slovakia but for the remaining countries, hidden causality relationship that went unnoticed in the bootstrap causality test could be detected after employing time-varying causality test.

Figure 2. Bootstrap p Values for Causality from GDP to EMG in Rolling Window Estimation

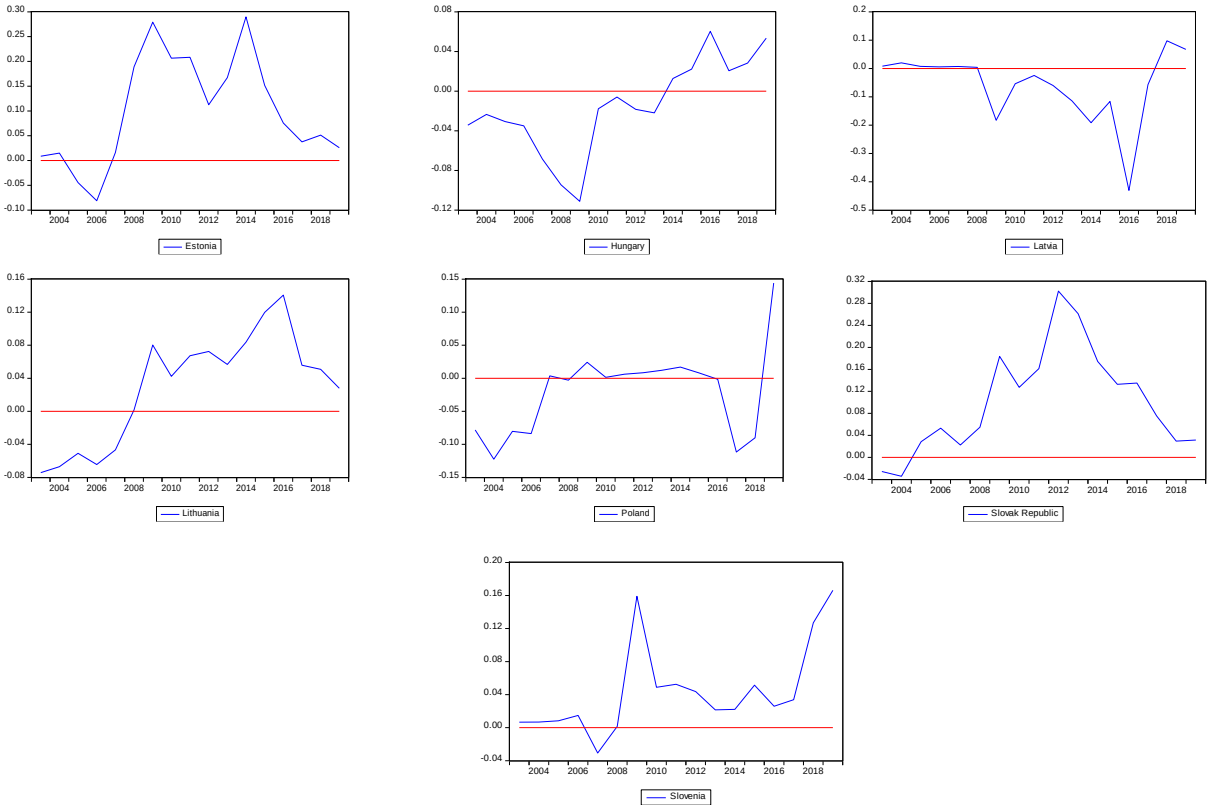


In this research, aside from time-varying causality test, reciprocal effects of EMG and GDP on each other for the sub-sampling periods on the basis of Ozcan et al. (2018) and Aslan et al. (2018)'s analysis and EMG's impact on GDP is as shown in Figure 3.

As EMG's impact on GDP is analyzed for all countries it is detected that in general the trend is fluctuating but particularly after the post-2004 period when full EU membership was granted EMG's negative impact on GDP turned into positive in Estonia, Lithuania, Slovakia and Slovenia. On the other hand, in Hungary, Latvia and Poland the process of having a positive impact from EMG to GDP happened in quite a later period but in these countries, following full-EU membership, EMG's negative impact became further dominant. These results related to EMG's negative impact are similar to the findings detected by Ha et al. (2016), Dessilani (2016) and Tabassum et al. (2017). Also, the hypothesis of endogenous growth model is verified in these countries since skilled labor force emigrate to countries where they can earn the highest income. Ghosh and Weinstein (2021) argue that the power of the connection between emigrants and their homeland could impact economic growth of source country through indirect channels. It can thus be argued that in Hungary, Latvia and Poland the bond between emigrants and their origin country was not strong enough. However, in many of the transition

economies, emigrants leaving their homeland could positively influence the economic growth in their origin country and this is a finding that is identical to the research findings on developing countries attained by Cantore and Cali (2015). On the other hand, this is a finding in line with the convergence hypothesis presented in the neoclassical model.

Figure 3. Rolling window estimation results for the impact of EMG on GDP



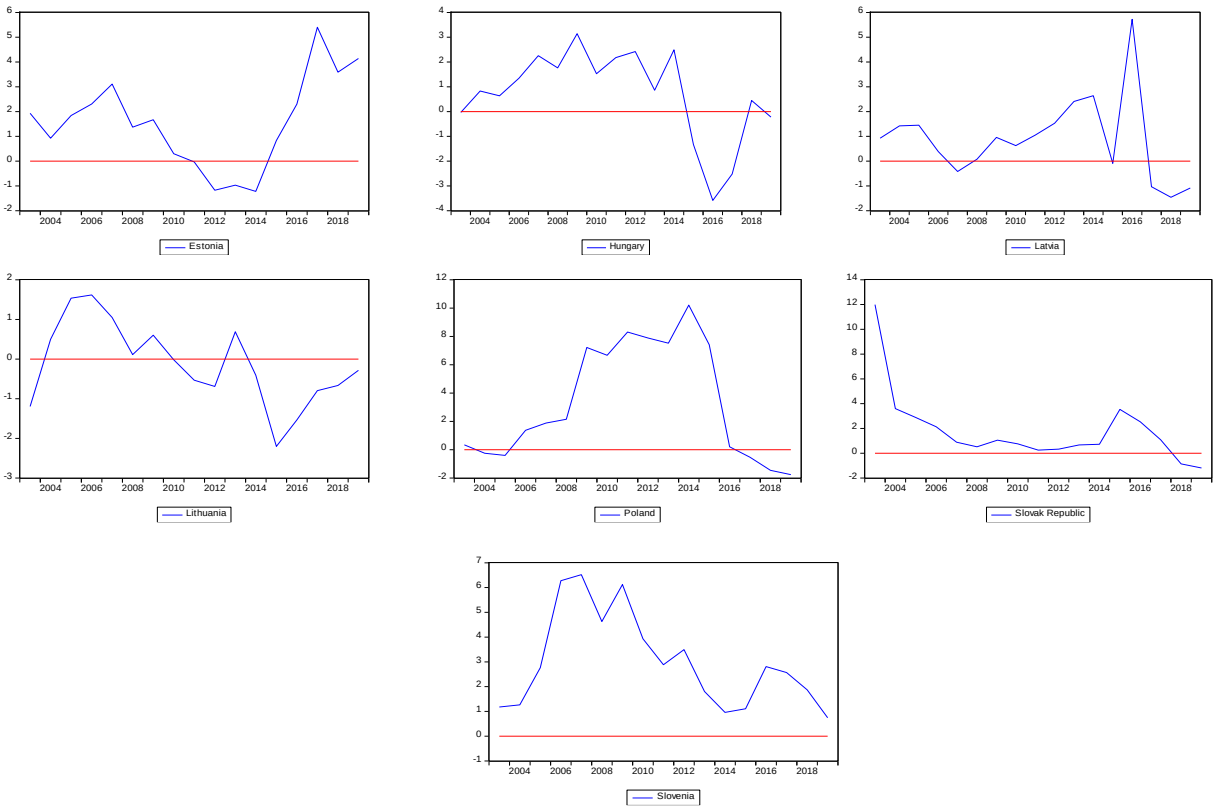
In European transition economies, GDP's impact on EMG with respect to sub-sampling can be detected in Figure 4. Findings shown in Figure 4 exhibit that particularly in Poland, GDP's impact on EMG is an inverted-U shape which is suggested by Zelinsky (1971). In the year 2004 that marked Poland's full EU membership, there was a negative effect of GDP on EMG whereas in the next period a rise in income level escalated emigration because as income level increased there was human capital accumulation and connections with global networks also climbed. In that case unlike traditional theories emigration was heightened in the first stage and the next stage as a certain income level was attained, there was a fall in emigrating population. For Poland Zelinsky's (1971) hypothesis is validated and an inverted-U shaped relationship between GDP and EMG is verified. This finding attributed to Poland is in parallel with findings attained from the researches of Vogler and Rotte (2000), De Haas (2010), Clemens (2014), Djajic et al. (2016), Bazzi (2017), Dao et al. (2018) and Berthiaume et al. (2021).

In other countries except Poland, it is infeasible to verify an inverted-U shaped relationship. As for Estonia, Hungary, Latvia, Lithuania and Slovakia throughout sub-sampling period GDP's impact on EMG followed a fluctuating trend. However, in Slovenia GDP's impact on EMG changes no signal.

The coefficient signal is positive throughout the period and this is a finding that aligns with theoretical studies from Banik and Bhaumik (2006) and De Haas (2007) as well as empirical studies from Rotte et al. (1997) and Angelucci (2015).

In some of the European transition economies positive impact of income on emigration comes to the surface whereas in some countries, as claimed by Zelinsky (1971), there is a clear inverted-U shaped relationship between income and emigration. Nevertheless, no clear findings similar to the findings of Ortega and Peri (2013), Bertoli and Moraga (2013), Murat (2019), Bencek and Schneiderheinze (2020) and Langella and Manning (2021) could be detected in our research.

Figure 4. Rolling Window Estimation Results for the Impact of GDP on EMG



6. CONCLUSION AND POLICY IMPLICATIONS

This study analyzed the causality relationship between emigration and economic growth in European transition economies for the period between 1995-2019. In line with this objective at first Konya's (2006) panel causality test which covers the entire period was administered. Next, for the sub-periods, the time-varying causality test developed by Yilanci and Ozgur (2019) was employed. Lastly, based on the studies of Ozcan et al. (2018) and Aslan et al. (2018), the effects of the variables on each other were determined.

Findings obtained from Konya's (2006) bootstrap panel causality test which was administered for the entire period reveal that a bidirectional causality relationship between EMG and GDP prevailed for

Estonia but for the other countries, there exists not any causality relationship. Yet by employing a time-varying causality test, this study manages to unveil hidden causality relationships which went unnoticed in a causality test that was administered for the entire period.

Apart from this, different results were obtained in this study regarding the effects of variables on each other. Related to EMG's effects on GDP, findings in favor of endogenous growth theory were observed in Hungary, Latvia and Poland and this finding demonstrates that in these countries loss of skilled laborforce affected the economic growth of source country negatively. Thus in order to reverse negative effects of emigration on economic growth in these countries, it is essential to operate indirect channels such as remittances, foreign direct investment, trade and technology transfer. On the other hand in Estonia, Lithuania, Slovakia and Slovenia findings in favor of the neoclassical hypothesis were attained. This finding validates that emigration to abroad affected source country's economic growth indirectly via returns such as remittances, foreign direct investment, trade, knowledge and technology transfer.

In terms of GDP's effect on EMG, an inverted-U shaped relationship was attained in Poland hence Zelinsky's (1971) hypothesis was verified. In Slovenia, it was detected that GDP has a positive effect on EMG whilst in Estonia, Hungary, Latvia, Lithuania and Slovakia time-varying results could be attained. When GDP's effect on EMG is evaluated in general, it can be argued that unlike the claims of traditional theories, hypothesizing that any rise in income results in a decrease in migration is no longer valid. Therefore, in such countries, it is not feasible to reduce emigration to abroad by only rising income level. As claimed by Atoyan et al. (2016) it is essential to improve failing corporate structure, ensure economic and political stability, create novel job opportunities and modernize the educational system in these countries. Thus in parallel with income rise, migration from European transition economies to Western European countries could be manageable.

In the relevant literature, there is a scarcity of studies analyzing the relationship between emigration and economic growth. By focusing on this topic, in particular, relevant literature has been enriched. In addition, this study contributes to existing literature from three aspects. (i) There was not a study detected which analyzed for the entire period the causality relationship between emigration and economic growth in European transition economies. By employing bootstrap causality analysis for a specified period, this research managed to fill the void in the literature. (ii) In literature, by examining the causality relationship between emigration and economic growth for the first time by taking sub-periods into account, it was feasible to unveil hidden causal relationships. (iii) In this study, variables' effect on each other was once again displayed on the basis of sub-periods. In addition to this study's contributions to literature there exist certain failures related to the variables given in the model. In future studies, while unveiling hidden causal relationships, it is suggested to reach more specific results by modeling other economic factors directly and indirectly affecting migration and offer more comprehensive policy suggestions.

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