THE REMITTANCE INFLOWS IN VISEGRAD COUNTRIES: A SOURCE OF ECONOMIC GROWTH, OR MIGRATION POLICY MISTING?[*]

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Abstract. The global economy and worldwide open market of goods and services creates a favorable environment for expanding technological cooperation among countries. However, such development is also accompanied by an intense movement of the labor force. After opening the EU single market, a large number of foreign workers from the new member countries found the better paying jobs in the highly developed EU countries. The total volume of this financial compensation that was transferred into mother countries was more than USD 70 billion in 2017. A primary question for this situation is the role that these financial sources play in the economies of the mother countries. Have the transferred money contributed to economic growth or have they been materialized in the sphere of private household consumption? Our paper answers these questions in the case of the Visegrad (V4) countries. The scientific literature does not offer a unified position in this respect. The positive, neutral, and negative impacts on concerned economies are presented. In our view, the answers should be verified in the specific conditions of the beneficiary countries, taking into account all the statistically relevant factors. The primary source of our information is statistical data of international organizations, particularly of the United Nations (UN), the World Bank, the Organization for Economic Cooperation and Development (OECD), the European Union, and the International Organization for Migration. As a tool for solution was applied the analysis of panel data.

1. Introduction

The global economy and worldwide open market create a favorable environment for expanding technological cooperation among countries. However, such development is also accompanied by an intense movement of the labor force. Consequently, the flow of financial remittances paid to the foreign labor force became an interesting topic for research and scientific studies. The cardinal question is whether the remittances received by an individual country have an impact on the country´s GDP growth.

After the opening of the EU single market, a large number of foreign workers from the new EU member countries found better paying positions in the highly developed EU countries. The total volume of such financial compensation transferred was more than USD 70 billion in 2017. According to valid data on the labor force movements, the large share of these financial means was transferred into the new EU member countries.

Faced with this situation, we raise the following question: what role did these financial sources play in the economies of the mother countries? Did these financial sources contribute to economic growth, or had they been materialized in the sphere of private household consumption?

Searching for the generally accepted answer is not an easy task, having in mind the large differences in volume of remittances transferred, the level of economic and social development in the receiving countries, the quality of transferring institutions and of the entrepreneurial environment, and the possibilities for investment of the external finances in the mother countries.

The main objective of this article is to verify the hypothesis on the impact of the remittance inflows on economic growth in the mother countries. For verification of the above hypothesis, we used econometric modelling, particularly the panel data analysis and Granger causality testing. The countries included in the study are the Visegrad Group (V4) countries: the Czech Republic, Hungary, Poland, and Slovakia.

We also use statistical data collected and processed by selected international organizations, particularly the United Nations, the World Bank, the Organization for Economic Cooperation and Development (OECD), the European Union (EU), and the International Organization for Migration (IOM).

2. Review of literature: migration and migrants

International migration, or the movement of people across the borders of countries, has historically occurred since ancient times and has happened for different reasons. While international migration has always had a major impact on the socio-economic environment or poverty alleviation in the countries of origin, it has also made an impact on the social and demographic structure of the targeted countries. Migration has influenced not only the economic but also the social and demographic environment of both host and parent countries.

The migration of humanity constitutes a special socio-demographic movement and has different forms, scopes, and durations as well as a considerably long history in virtually all parts of the world (www.historyworld.net). More recently, migration has been in the spotlight of the media and the professional public, as presented by Pooley (2019) and Hoerder. (2017)

According to Demirguc-Kunt (2019), the high degree of globalization in international and regional economies is one of the key factors that enhances interregional migration flows. Persistent differences in the income levels of the population as well as national and regional unrest and conflicts of war are also classified among the pro-migration factors.

Available statistics from the International Organization for Migration indicate that currently some 271 million people are living outside of their mother countries, which represents approximately 3.5% of the global population. More detailed statistical information on the reasons for this situation are found according to individual migration segments, including migrants, expatriates, clandestine migrants, immigrants, people who temporarily resettle, asylum seekers, and refugees, IMO (2020). However, the accuracy of statistics on migration flows, as highlighted by Alvarez (2015), is problematic to estimate.

The movements of residents from the mother country to the host country are referred to as migratory waves and are identified as immigration and emigration. The first case is represented by the "inflow" of people to the host country, and the latter case represents the "outflow" of residents from the parent country. The reasons for these movements may vary, as presented and analyzed by Castelli (2018); Consumer (2020); Filipek (2019); Hendricks (2019).

Generally, the migrants who leave the mother country tend to look for an opportunity to improve their personal and family economic and social situation. These migrants are classified as economic migrants. The main objectives of their migratory movement are mostly to seek countries with a higher level of economic development, a higher standard of living, and the possibility of an official access to the labor market as well as subsequently to achieve full incorporation into the social environment of the new country Kováč,M.(2015), Vaysilova (2019). Globally, approximately 266 million migrants are currently statistically classified as economic migrants. Most of them have the opportunity to enter the labor market and to obtain the officially reported salary as a domestic labor force. The financial compensation of these migrants, after transferring to the home countries is known as remittances World Bank (2016),

Extensive information sources confirm that migrants are an important factor in the host country's economy. According Kosten (2018), "the migrants play a crucial role in the U.S.A. labor force". The study of the University of Pennsylvania (2016) also confirms the importance of "the active participation of migrants in technical innovation and intellectual creativity in various academic and research fields across the US economy."

According to UN Secretary-General A. Guterres (2018), "the managed migration is one of the most challenging but also a promising social movement and opportunity for enhancing the international cooperation across the industrial and developing countries."

3. Migration remittances: what do they bring our countries?

Evidence of the active participation of migrants in the economic development of host countries is found in the increasing volume of remittances that are directly related to their labor activity. According the World Bank (2019), the volume of remittances transferred to the mother countries in 2018 was over USD 689 billion, whereby USD 529 billion (76%) was transferred to beneficiaries in low-income developing countries. The high volume of reported financial transfers "become over time one of the important external sources of their economic growth". Similar conclusions are presented by other sources World Bank (2016), OECD (2020).

The published outputs indicate a wide range of the assessed impact of remittances on the economies of the mother countries, ranging from a highly positive evaluation to the lack of any impact. Some articles even identified remittances as "corruption inhibitors", and therefore, they should be classified as a negative factor in the economic environment.

In this article, we specifically address the impact of migrant remittances on the economies of the Visegrad Group (V4) countries. We compare the volume and economic efficiency of the received remittances in these countries with the results of selected studies for another countries. We also present the various positions on the evaluation of the role of remittances in the economic growth of selected countries.

Meyer and Sherab (2016) have studied the impact of remittances on economic growth using the panel data approach to assess six remittance-receiving Balkan countries during the period 1999–2013. Their final analysis confirmed that remittances have a positive impact on economic growth in mother countries.

According to Nita (2016) "the remittances in Romania also have a positive impact on the economic development of this country." A similar position about Romania´s experience is presented by Comes (2018) et al.. Simonescu (2019) demonstrates a more complex evaluation of remittances that indicates both positive and negative aspects of migration flows in the context of Romanian membership to the EU. According to Cismas et al., "the hypothesis that remittances has a significant influence on the Romanian economy was not validated, and the statistical data does not show a long-run neither a short-run influence or a Granger causality."

A slightly similar conclusion is presented by Rauser et al. (2018) who posit that the remittances have a positive impact on the economic development in Lithuania, Latvia, and Estonia.

A certain level of skepticism in the evaluation of the remittances impact is also presented by Sobiech (2019) who found that "remittances can foster growth, but the effect is significant only at low levels of financial development of the individual country." In line with many other authors, he also believes that the remittances play an important role in alleviating poverty at the household level.

The role of remittances in securing the durability of economic growth in developing countries was studied by Adams Mensah Klobodu (2016). He found that remittance do not have a robust impact on the economic growth in Sub-Saharan African countries. However, as a byproduct of his study, he identified the so-called "institutional linkages" of remittances, meaning that the growth effect of remittances is enhanced by a stable and democratic government. Another conclusion is offered by Coulibaly (2015) who notes that no strong evidence exists to support the view that remittances promote financial development in Sub-Saharan African countries.

A strong position on the short-term and long-term effects of remittances is offered by Barajas et al (2010). Their study relies on the analysis of the development of remittance flows between 1970 and 2004 for 84 countries. According to these authors, the remittances have poverty-alleviating and consumption-smoothing effects on recipient households. Furthermore, Azam (2016) highlights that migration and remittances have first-order effects on poverty. This finding is based on a study representing 39 countries of high-, middle-, and low-income countries across the world.

A more cautious stance in evaluating the effectiveness of remittances is upheld by Clemens (2016). Similarly, according to Chami et al.(2018), "remittances are essential to fight poverty, but they failed to identify the remittances' impact on economic growth". The authors also identified the accompanying negative effects of

remittances, which often "contributes to weakening the entrepreneurial activity of young people, relying on external sources" which means accepting the downsides of the "Dutch disease."

Several authors from developing countries have made valuable findings on the negative phenomena identified in the analysis of the remittance flows. Specifically, these studies have mentioned the phenomenon of corruption, which has been identified as an endogenous factor at various levels of the economic implementation of remittances. Muhhamad and Khairuzzaman (2013) have examined this problem through a data base for five countries of South and Southeast Asia for the period 1985–2011. Applying the econometric model, they "found the positive and statistically significant effects of FDI and workers remittances on economic growth"; however, the empirical results simultaneously demonstrate the negative and statistically significant impact of endemic corruption on economic growth.

An exact analysis of remittances and corruption was studied on panel data from 122 countries by Majeed (2016), who identified that "among the least corrupt countries, remittances do not appear to increase corruption but, among the most corrupt countries, it significantly contributes to growth of corruption behavior." These findings are quite understandable and could help to assess situation for the majority of central European countries as well.
An in-depth study on remittances and corruption was conducted with data from 127 countries by Tyburski (2014), who adopted the political economy methodology to analyze these two phenomena. He found that democratic institutions significantly reduce the probability that remittances increase corruption and that democracies tend to control corruption better than nondemocratic regimes. According the author, "the remittances should be considered as a curse but also as a cure for corruption." Another strong position about the outcome of remittance inflows is presented by Berdiev et al.(2013), who have also identified the existence of a negative institutional impact.

The fact that the published results evidently indicate a wide range of unsolved problems related to the inflow and outflow of remittances is important to underline. In particular, many articles draw attention to the ambiguous impact on the economies of the beneficiary countries. We follow this position when presenting our results.

4. Are there real causal relations between remittances and economic growth?

Furthermore, the published scientific findings that are unsure about making direct causal links between correlated variables deserve greater attention. Aldrich (2018) presents various scenarios of the inappropriate and incorrect application of the methods of correlation and regression analysis. The findings highlight the repeated errors in the methodologies of research projects and publications by arguing that "...correlation alone cannot be used as evidence for a causal-and-effect relationship between a treatment and benefit, a risk factor and a disease, or a social or economic factor and various outcomes."

An important position is presented by Kahn (2018), who notes that "causal effects are difficult to quantify because we rarely observe occasions, where one variable is changed while others are constant." Such methodological weakness have also been studied by Bleske-Rechek (2015) who underlined that little systematic data is available to the extent that individuals conflate correlation with causation. She also found that people frequently tend to draw causal outcomes from non-causal data, regardless of the statistical findings.

An noteworthy study of the correlation and causality phenomena is offered by Panizza and Presbytero (2014). They studied if public debt has a causal effect on GDP growth in OECD countries. According their findings, a

negative correlation exists between debt and growth. However, the link between debt and growth disappears after the researchers corrected the model for endogeneity.

The highly qualified approach to the problem of identification and differentiation between correlation and causal relationships has also been developed in biological science, as presented by Berwick (2017).

In conclusion, finding answers to questions about the impact of remittance payments on the volume or the growth of GDP and GDP per capita is more complex than it appears at first glance in light of the studies previously presented. To respond to the research topic properly, extending the model instruments in such a way as to eliminate the incorrect interpretations of correlation and causal relations is necessary.

5. Objectives of the article

The dynamic of migration movements in Czechia, Hungary, Poland, and Slovakia are the subject of sharp political and expert discussions in these countries. In particular, the financial flows that represent compensation are closely monitored for migrant workers who operate abroad outside of their parent country. Given that these financial flows are mainly directed from industrialized countries to countries with a lower level of economic potential, they are analyzed not only in terms of their volume but also in terms of their potential impact on the dynamics of the economy of the parent countries whose citizens are the beneficiaries of these means. For many countries, the volume is comparable to the volume of external financial resources such as the official development assistance (e.g., Official Development Aid or ODA) and direct foreign investment (e.g., Foreign Direct Investment or FDI). Therefore, the question under investigation is whether these resources have a positive impact on the dynamics of the growth of the national economy, namely the economies of the countries to which the remittances are directed.

Based on the literature, we segmented the arguments and conclusions into the following groups:
1. Tne first group of authors presents conclusions on the **clear positive impact** of remittances on the economic growth of the beneficiary countries. These positions are based on model projections, in which the volume of remittances is identified as one of the statistically significant explanatory variables.
2. Based on similar model instruments, another group of authors offers **more cautious conclusions** on impact of remittances on GDPpc. The effect of remittances is presented as accompanying phenomenon with the other development assistance sources. Also, the statistical significance of the REMIN confirm to this conclusion.
3. Another group of authors rejects the general conclusions on the positive impact of remittance on economic growth of the beneficiary countries. These authors, based on more sophisticated modelling analyses, highlight the negative effects on the corruption environment which is detrimental to the home economies. Important warnings exist also about the insufficient verification of the causal effects of remittance on economic growth.
4. Interesting results are presented by authors who highlight the institutional aspects of the environment in which remittance inflows are materialized. The quality and efficiency of relevant government institutions and their democratically functioning structures and processes are pointed.

The main objective of our paper is to verify the remittance inflows and other relevant factors in terms of their impact on economic growth of the V4 countries. We have used model tools and information sources that have been applied in the majority of published and analyzed articles. Adopting this approach, we intend to eliminate the impact of different methodologies in quantitative analysis and to increase the comparative weight of our results.

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6. Methodological framework

The impact of remittance inflows and other selected factors on economic dynamics is estimated through the GDP per capita volume and the GDP per capita growth.

The general econometric model on basis of which we analyze the dependency in question takes the form of the following:

$$Y_i = \alpha + \sum_{j=1}^{n} \beta_i X_i + u = \alpha + \beta_1 * X_1 + \beta_2 * X_2, ..., \beta_n * X_n + u \qquad (1)$$

where **Y** is the studied dependent variable, **α, β1, …, βn** are the regression coefficients, and **u** is the expected estimation error.

Model (1) is analyzed in two alternatives, where variable **Y** presents the following:
- Alternative A—Volume of GDP per capita   labelled as **GDPpc**
- Alternative B—Annual growth of GDP per capita   labelled as **GDPpc-G**

As explanatory factors, or independent variables, according to earlier conducted theoretical studies and experimental recounts, we have defined the following:

Factors	Variable	Label
1. Volume of inflowed remittances as % GDP	- REMIN	X1
2. Volume of inflowed remittances-lagged as % GDP	- REMIN-1	X1-1
3. Volume of outflows of remittance as % GDP	- REMOUT	X2
4. Export as % GDP	- EXPORT	X3
5. Import as % GDP	- IMPORT	X4
6. Direct foreign investment as % GDP	- FDI	X5
7. Total capital formation as % GDP	- GCF	X6
8. Total volume of final consumption as % GDP	- FINCONSUM	X7
9. Volume of international trade as % GDP	- TRADE	X8
10. Population growth in % annually	- POPUL-G	X9
11. Government debt as % GDP	- DEBT	X10

To eliminate the heteroscedasticity in values of dependent variables, we have used their log transformed values as follows:

- GDPpc   - new value   - **LN(GDPpc)**

The values of all explanatory variables are applied in their relative values toward the national GDP.
The values reflecting annual growth of GDPpc-G are presented in their relative values (%) toward the previous year.

The relevant statistical information for the V4 countries for period 2000–2018 is transformed into panel data, in which the specificities of each country are represented by sectoral, time invariant variables labelled as Czechia, Hungary, Poland, and Slovakia.

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On basis of an analysis of previous economic developments, the significant impact of the economic recession on individual national economies has been identified in the countries concerned in 2009 and 2010. To quantify this impact, we expanded the list of time invariant explanatory variables labelled as Crisis09 and Crisis10.

Having in mind the above presented clarification, the econometric model for estimating the theoretical values of the statistically dependent variable LN(GDPpc) and GDPpc-G has the following form:

For dependent variable LN(GDPpc):

$$LN(GDPpc) = b_1*REMIN + b_2*REMIN-1 + b_3*REMOUT + b_4*EXPORT + b_5*IMPORT + b_6*FDI$$
$$+ b_7*GCF + b_8*FINCOMSUM + b_9*TRADE + b_{10}*POPUL + b_{11}*DEBT + u \qquad (2)$$

For dependent variable GDPpc-G:

$$GDPpc-G = b_1*REMIN + b_2*REMIN-1 + b_3*REMOUT + b_4*EXPORT + b_5*IMPORT + b_6*FDI$$
$$+ b_7*GCF + b_8*FINCOMSUM + b_9*TRADE + b_{10}*POPUL + b_{11}*DEBT + u \qquad (3)$$

Consequently, we verified the applicability of both models to estimate the impact of remittance flows on macroeconomic indicators LN(GDPpc) and GDPpc-G. This means that we should verify the validity of the following hypotheses:

H1: Variable REMIN has a statistically significant impact on LN(GDPpc)
H2: Variable REMIN has a statistically significant impact on GDPpc-G

As a methodological tool to answer the above presented hypotheses, we applied the pooled regression models with the fixed effects.

As a final test for evaluating the impact of remittance inflows on economic growth, the Granger causality test was employed. According the EViews approach, this test is based on bivariate regression of the following form:

$$LN(GDPpc)_t \quad = Y_t = \alpha_o + \alpha_1*Y_{t-1}+...+ \alpha_l*Y_{t-l} + \beta_1*X_{t-1}+...+ \beta_l*X_{t-l} + u_t \qquad (4)$$
$$REMIN_t \quad = X_t = \alpha_o + \alpha_1*X_{t-1}+...+ \alpha_l*X_{t-l} + \beta_1*Y_{t-1}+...+ \beta_l*Y_{t-l} + u_t \qquad (5)$$

where Y_t and X_t correspond to variables $LN(GDPpc)_t$ and $REMIN_t$.

In the above formulated model (4), the X_t (REMIN) does not Grenger-cause Y_t (GDPpc) only if all $\beta_j=0$. Reciprocally, in model (5), the Y_t (GDPpc) does not Grenger-cause X_t (REMIN) only if all $\beta_j=0$.
Testing procedure was performed by EViews software package.

7. Data, results, and discussion

All input data are drawn from the World Bank, the International Organization for Migration, Eurostat, and the UN OpenData sources. The time series data of the relevant indicators for the 2000–2018 period is presented in Table 1.

Table 1 Original data for Czechia, Hungary, Poland and Slovakia for 2000-2018

					Original input data							
LN(GDP)	LN(GDPpc)	GDPpc G	REM-IN	REM-OUT	Export % GDP	Import % GDP	FDI % GDP	GCForm % GDP	FCONSUMP % GDP	TRADE % GDP	POPUL % Growth	DEBT % GDP
11,89	9,56	4,56	0,48	0,36	48,19	50,04	45,50	31,41	50,57	88,32	-0,28	17,00
11,96	9,63	3,30	0,38	0,40	49,03	50,28	47,54	31,55	49,88	94,81	-0,38	22,80
11,98	9,66	1,85	0,41	0,48	45,12	46,40	48,26	30,13	49,86	95,50	-0,19	25,90
12,03	9,71	3,63	0,50	0,56	46,91	48,11	50,00	29,04	49,90	96,49	-0,03	28,30
12,10	9,78	4,87	1,03	0,68	57,34	56,53	52,30	29,35	48,86	95,44	0,03	28,50
12,16	9,83	6,39	0,98	0,60	62,18	59,83	44,51	29,12	47,85	95,67	0,14	27,90
12,21	9,88	6,56	1,03	0,69	65,19	62,45	51,35	30,04	46,97	96,04	0,27	27,70
12,31	9,98	4,99	0,97	0,85	66,41	63,96	59,40	32,07	46,06	94,96	0,58	27,50
12,34	9,99	1,83	0,48	0,89	63,23	61,06	48,01	31,06	47,37	94,15	0,57	28,30
12,30	9,95	-5,34	0,58	0,71	58,68	54,81	61,03	26,51	48,61	93,85	0,57	33,60
12,31	9,96	1,98	0,59	0,52	66,03	62,94	61,94	27,12	48,96	94,66	0,29	37,40
12,34	9,99	1,57	0,61	0,50	71,31	67,48	52,89	26,96	49,05	95,80	0,21	39,80
12,35	10,00	-0,94	0,68	0,44	76,17	71,37	65,82	26,19	49,21	96,79	0,14	44,50
12,37	10,02	-0,52	0,83	0,34	76,87	71,11	64,03	24,67	49,41	104,00	0,03	44,90
12,43	10,08	2,61	1,26	0,45	82,55	76,18	58,47	25,88	48,07	104,70	0,11	42,20
12,50	10,14	5,10	1,43	0,39	81,05	75,05	62,42	27,96	46,83	105,09	0,20	40,00
12,51	10,15	2,25	1,60	0,45	79,56	71,84	62,46	25,98	47,04	104,63	0,19	36,80
12,56	10,20	4,08	1,66	0,51	79,73	72,20	72,25	25,87	47,42	103,49	0,27	34,70
12,60	10,24	2,65	1,60	0,65	78,39	72,00	66,59	26,17	47,48	103,49	0,29	32,60
11,57	9,25	4,75	0,47	0,07	66,86	70,55	69,05	28,06	54,43	96,13	-0,26	55,00
11,67	9,35	4,31	0,45	0,07	64,88	66,17	69,59	26,24	53,97	98,45	-0,23	51,60
11,75	9,43	5,04	0,34	0,07	58,14	60,18	70,08	25,60	54,58	100,09	-0,28	54,80
11,80	9,48	4,38	0,29	0,07	56,33	60,27	70,39	24,61	56,32	102,22	-0,29	57,40
11,84	9,53	5,06	1,61	0,50	59,65	63,61	70,68	26,88	55,02	95,95	-0,22	58,30
11,89	9,58	4,45	1,69	0,53	62,64	64,95	54,06	25,32	54,82	96,26	-0,20	60,20
11,94	9,63	4,19	1,79	0,53	73,87	75,00	69,54	25,79	53,32	96,09	-0,16	64,40
11,97	9,66	0,40	1,65	0,71	77,94	77,40	68,26	24,28	54,37	96,17	-0,15	65,30
12,01	9,71	1,24	1,59	0,73	79,28	78,92	55,75	24,62	53,62	96,04	-0,18	71,20
11,97	9,66	-6,55	1,34	0,58	74,40	70,37	75,73	20,26	53,63	96,25	-0,15	77,50
12,01	9,71	0,89	1,58	0,53	81,75	76,45	69,52	20,60	52,53	97,08	-0,23	80,20
12,06	9,76	2,11	1,97	0,52	86,59	80,47	60,81	20,39	52,78	96,80	-0,28	80,50
12,06	9,77	-0,96	2,75	0,47	86,32	79,55	81,65	19,33	53,83	98,06	-0,32	78,40
12,09	9,80	2,24	3,40	0,35	85,58	78,59	80,72	20,92	52,32	104,72	-0,28	77,10
12,14	9,85	4,48	3,39	0,35	87,42	81,07	71,68	23,44	50,15	104,19	-0,27	76,60
12,19	9,90	4,09	3,72	0,26	87,98	79,99	70,08	23,30	48,90	103,03	-0,24	76,70
12,18	9,89	2,50	3,83	0,30	87,15	78,40	65,63	21,32	49,80	102,71	-0,30	76,00
12,21	9,93	4,60	3,43	0,32	87,14	79,85	66,90	22,85	49,52	103,49	-0,27	73,40
12,27	9,99	5,30	3,08	0,34	84,94	80,57	61,12	27,23	48,70	103,49	-0,20	70,80
12,79	9,14	5,66	0,87	0,08	27,23	33,56	36,94	24,63	63,63	100,10	-0,03	36,40
12,82	9,17	1,28	0,82	0,08	27,23	30,85	37,51	20,56	64,40	101,63	-0,03	37,10
12,87	9,22	2,09	0,85	0,08	28,76	32,17	38,42	18,45	66,33	103,79	-0,05	41,50
12,89	9,25	3,63	1,05	0,07	33,39	36,05	38,95	18,83	64,92	105,70	-0,07	46,30
12,97	9,33	5,20	1,85	0,13	34,26	36,95	40,64	20,23	64,17	97,55	-0,06	45,10
13,02	9,38	3,54	2,11	0,12	34,61	35,67	28,20	19,91	62,85	99,58	-0,04	46,40
13,08	9,43	6,25	2,46	0,12	37,86	39,93	33,59	21,70	61,89	98,65	-0,06	46,90
13,18	9,53	7,09	2,44	0,16	38,56	42,10	38,31	25,21	60,22	98,08	-0,05	44,20
13,22	9,58	4,24	1,96	0,21	37,86	42,90	27,80	24,66	61,78	97,15	0,01	46,30
13,23	9,58	2,75	1,86	0,16	37,18	38,04	38,06	20,57	61,58	96,24	0,07	49,40
13,33	9,67	3,90	1,60	0,16	40,06	42,05	39,14	21,31	61,57	95,94	-0,29	53,10
13,39	9,74	4,96	1,46	0,16	42,56	44,52	31,09	22,44	61,47	95,90	0,05	54,10
13,44	9,79	1,61	1,40	0,17	44,44	44,88	39,76	20,99	61,52	96,21	0,00	53,70
13,45	9,79	1,45	1,41	0,17	46,32	44,37	43,71	18,98	60,94	107,35	-0,06	55,70
13,48	9,84	3,40	1,36	0,22	47,57	46,13	38,86	20,36	60,02	106,90	-0,07	50,40
13,55	9,90	3,91	1,42	0,25	49,50	46,40	38,50	20,46	58,41	107,74	-0,07	51,30
13,55	9,90	3,11	1,42	0,35	52,19	48,16	39,56	19,59	58,48	108,60	-0,04	54,20
13,59	9,94	4,92	1,31	0,52	54,35	50,17	45,40	19,82	58,34	109,93	0,01	50,60
13,64	9,99	5,14	1,20	0,60	55,59	52,15	38,92	20,70	58,06	109,93	0,01	48,90
10,89	9,21	1,30	0,06	0,01	53,21	55,58	68,35	27,06	54,58	85,62	-0,14	49,60
10,97	9,29	3,44	0,07	0,02	57,12	64,56	67,53	30,65	55,90	86,03	-0,18	48,30
11,03	9,34	4,55	0,07	0,02	56,97	63,40	66,80	30,09	55,97	87,94	-0,04	42,90
11,08	9,39	5,57	0,91	0,02	62,33	62,81	66,18	25,58	54,18	90,09	-0,07	41,60
11,14	9,46	5,30	1,22	0,03	69,05	70,60	65,27	26,75	55,98	92,57	-0,02	40,60
11,24	9,55	6,61	1,93	0,06	72,30	75,43	60,44	29,67	54,97	93,28	0,01	34,10
11,34	9,66	8,49	1,90	0,06	81,24	83,39	67,56	28,47	54,91	92,68	0,00	31,00
11,45	9,76	10,80	1,92	0,07	83,38	82,95	62,03	28,21	54,22	92,34	0,03	30,10
11,52	9,84	5,48	2,04	0,12	80,15	81,92	52,20	28,41	55,83	91,74	0,09	28,50
11,46	9,77	-5,58	1,88	0,11	68,04	68,20	59,07	20,50	59,67	91,68	0,13	36,30
11,55	9,86	5,62	1,76	0,05	77,32	77,63	56,23	23,87	57,19	92,26	0,09	41,20
11,57	9,89	2,73	1,77	0,05	85,01	84,31	52,94	25,24	55,71	92,60	0,13	43,70
11,61	9,92	1,72	2,04	0,11	91,04	85,52	59,00	20,67	56,07	92,60	0,17	52,20
11,62	9,93	0,56	2,10	0,12	93,62	88,01	58,92	20,92	55,49	90,82	0,11	54,70
11,66	9,97	2,65	2,37	0,14	91,52	86,70	49,27	21,75	55,07	90,68	0,10	53,50
11,71	10,02	4,72	2,42	0,15	92,02	88,95	52,43	24,26	54,05	90,98	0,10	52,20
11,65	9,96	1,99	2,36	0,14	93,73	90,78	52,97	23,05	55,08	91,25	0,13	51,80
11,67	9,98	2,88	2,27	0,15	95,11	92,92	62,24	23,03	55,87	91,07	0,16	50,90
11,72	10,03	3,89	2,00	0,21	96,09	94,06	54,89	23,43	55,93	91,07	0,14	48,90

Source: UN Open data, WB, IOM, Eurostat, the authors

The original data is organized in the form of a pooled panel data to sequence of Czechia, Hungary, Poland, and Slovakia. The sectorial, time invariant variables, Crise06 and Crise10, as well as the sectorial variables representing the individual countries of Czechia, Hungary, Poland, and Slovakia were added consequently. The descriptive statistics are presented in Table 2.

Table 2. Descriptive statistics of the original variables

Descriptive statistics												
PARAMETER	LN(GDPpc)	GDPpc G	REMITIN % GDP	REMITOUT % GDP	Export % GDP	Import % GDP	FDI % GDP	GCForm % GDP	FCONSUMP % GDP	TRADE % GDP	POPUL % Growth	DEBT % GDP
Valid cases	76	76	76	76	76	76	56	76	76	76	76	76
Mean	9.732	3.300	1.644	0.305	65.415	64.221	55.424	24.594	54.596	97.492	-0.030	48.283
Std. error of mean	0.031	0.317	0.120	0.027	2.205	1.938	1.750	0.421	0.593	0.658	0.029	1.757
Variance	0.072	7.657	1.088	0.054	369.613	285.391	171.578	13.497	26.690	32.942	0.063	234.542
Std. Deviation	0.268	2.767	1.043	0.233	19.225	16.894	13.099	3.674	5.166	5.740	0.252	15.315
Variation Coefficient	0.028	0.839	0.634	0.763	0.294	0.263	0.236	0.149	0.095	0.059	-8.479	0.317
Skew	-0.463	-1.138	0.472	0.595	-0.273	-0.268	-0.290	0.191	0.305	0.298	-0.107	0.430
Kurtosis	-0.567	3.415	-0.556	-0.693	-0.991	-0.970	-0.515	-0.974	-0.702	-0.522	4.094	-0.311
Minimum	9.138	-6.555	0.061	0.013	27.229	30.845	27.801	18.445	46.061	85.617	-1.044	17.000
Maximum	10.240	10.800	3.828	0.894	96.090	94.065	81.654	32.072	66.332	109.934	0.829	80.500
Range	1.102	17.355	3.767	0.882	68.861	63.219	53.854	13.627	20.272	24.316	1.874	63.500
Sum	739.62	250.80	124.96	23.20	4,971.55	4,880.79	3,103.75	1,869.13	4,149.27	7,409.38	-2.26	3,669.50
5th percentile	9.219	-1.619	0.259	0.020	32.696	35.350	30.659	19.281	47.026	88.261	-0.307	27.260
10th percentile	9.319	0.513	0.369	0.055	37.655	39.362	38.236	20.133	47.737	90.932	-0.284	28.300
25th percentile	9.556	1.980	0.629	0.107	49.145	48.629	44.735	20.924	49.817	92.833	-0.195	36.875
Median	9.773	3.759	1.613	0.236	66.219	65.559	58.694	24.644	54.578	96.227	-0.032	47.600
75th percentile	9.946	4.981	2.084	0.509	81.623	78.546	65.232	27.107	58.268	102.951	0.107	54.775
90th percentile	10.018	5.834	3.396	0.660	88.896	84.672	70.562	30.056	61.814	105.271	0.224	76.180
95th percentile	10.140	6.685	3.719	0.717	93.632	89.222	76.478	31.114	64.207	107.872	0.336	77.635

Source: World Bank, the authors

To assess the mutual relation among the variables that were analyzed, their partial correlation coefficients have also been calculated, as presented in Table 3.
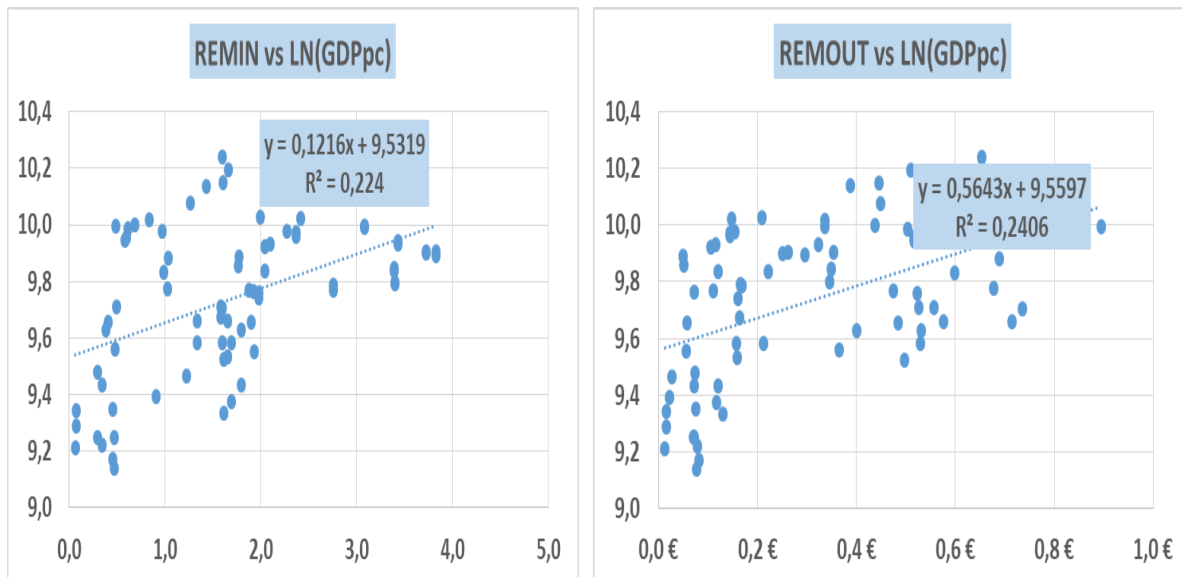
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Table 3. Coefficients of partial correlation, Pearson

| Pearson correlation coefficients												
	LN(GDPpc)	GDPpc G	REMIT IN	REMIT OUT	Export	Import	FDI	GCForm	FCONSUMP	TRADE	POPUL	DEBT % GDP
LN(GDPpc)	1											
GDPpc G	-0,157	1										
REMIT IN	0,473	0,068	1									
REMIT OUT	0,490	-0,255	-0,001	1								
Export	0,631	-0,108	0,350	0,161	1							
Import	0,529	-0,052	0,273	0,079	0,984	1						
FDI	0,325	-0,287	-0,021	0,283	0,774	0,733	1					
GCForm	0,024	0,327	-0,532	0,256	0,089	0,159	0,175	1				
FCONSUMP %	-0,590	0,071	0,080	-0,624	-0,594	-0,542	-0,662	-0,615	1			
TRADE	0,218	0,025	0,444	0,210	-0,178	-0,292	-0,054	-0,445	0,061	1		
POPUL	0,532	-0,130	-0,095	0,317	0,186	0,151	-0,159	0,224	-0,303	-0,151	1	
DEBT	0,010	-0,246	0,528	-0,013	0,342	0,309	0,315	-0,583	0,095	0,263	-0,449	1

Source: World Bank, the authors

Particular interest is focused on the values of correlation coefficients between the dependent variables LN(GDPpc) and the core studied explanatory variables of REMIN and REMOUT. Figure 1 presents the linear regressions between these variables under the pooled panel data scheme.

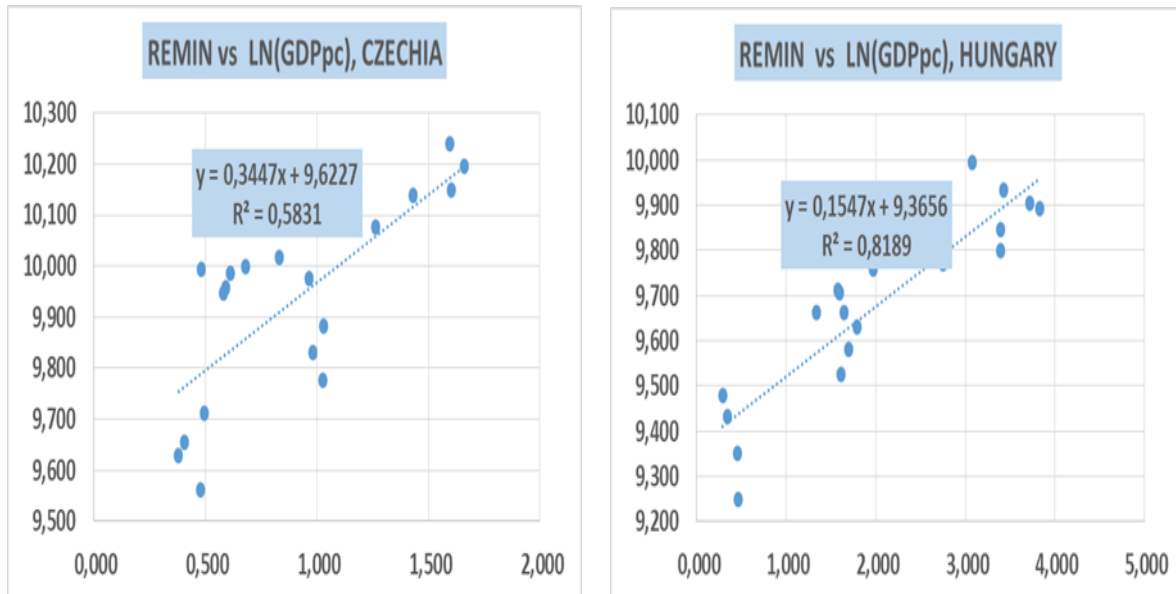**Fig. 1. Li**near regression between LN(GDPpc) and REMIN, REMOUT
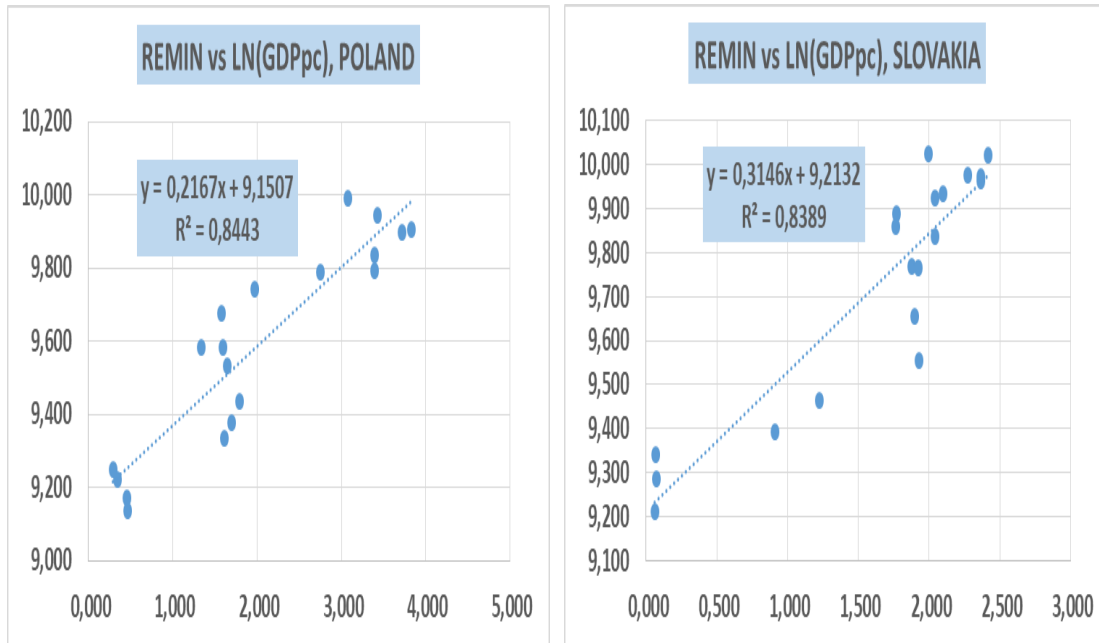*Source:* World Bank, the authors
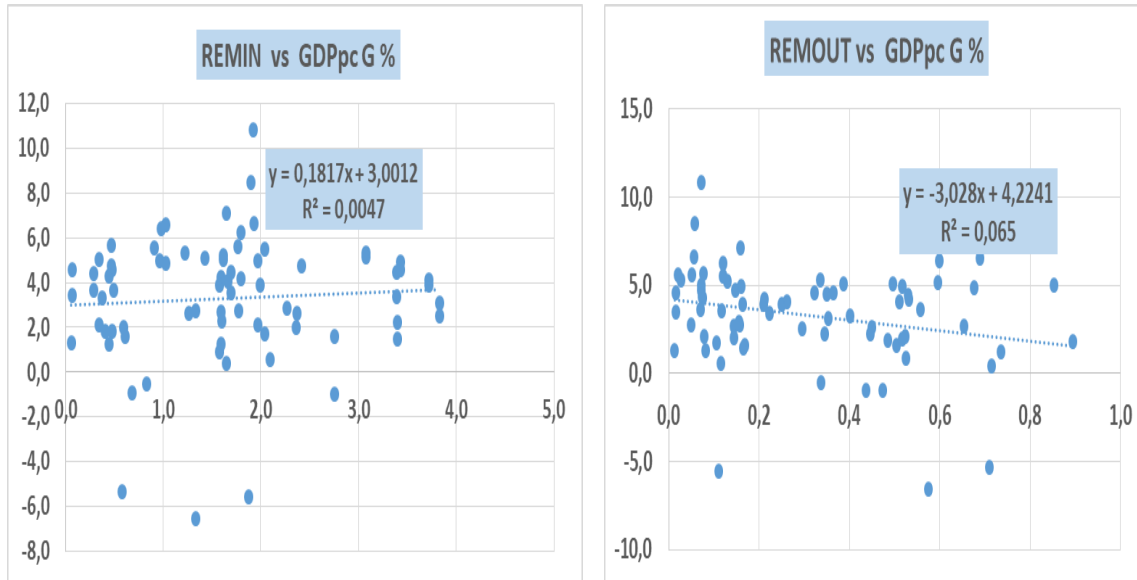
Fig. 2. Linear regression between LN(GDPpc-G) and REMIN, REMOUT
Source: World Bank, author

As expected, the analysis of data in the pooled form, without respecting the sectoral time invariant factors, demonstrates relatively low correlation ties (see Figure 2). However, a significantly different situation is presented if the data is analyzed for individual countries, as demonstrated in Figure 3.

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Figure 3. Linear regression between LN(GDPpc) and REMIN for individual countries
*Source: W*orld Bank, the authors

The last figures present the need to adopt the panel data approach, with sectoral variables reflecting the country specificities.

With reference to the published findings, specifically those of Aldrich (37), Aisbett (38), Kahn (39), Panizza (41), neither high nor statistically significant values of the correlation indicators do not confirm the causal relationship among the considered variables. They only reflect their correlation closeness and this should be respected in interpretation of the results of following statistical analysis.

8. Remittances as a factor of economic growth in the V4 countries

In line with the methodology of this paper, the main factors to further monitor the volume and growth of gross domestic product per capita are the following independent variables:
- The inflow of remittances into V4 countries
- The outflow of remittances from V4 countries

According the officially reported data presented in Table 4, more than USD 613 billion was redistributed worldwide in 2017, which confirms the significance of monitoring and analyzing the remittance flows.

The total EU transfers amounted to USD 147 billion in 2017, of which USD 77 billion were directed to non-member countries, particularly to the low-income developing countries.

Table 4. Remittance flows between EU and non-EU countries

Remittance flows between EU and Non-EU countries			
Volume of remittance flows 2017, mil USD			
	EU	**NON EU**	**Spolu**
EU	70 290	77 691	147 981
NON EU	53 989	411 494	465 483
Total	124 279	489 185	613 464
Share of remittance flows, 2017, %			
	EU	**NON EU**	**Spolu**
EU	11,46	12,66	24,12
NON EU	8,80	67,08	75,88
Total	20,26	79,74	100

Source: World Bank, the authors

To clarify the current situation related to remittance flows and their expected positive impact on economic growth in selected EU countries, we present the statistical data on remittance inflows in the V4 countries for the 2000–2018 period, Figure 4a.
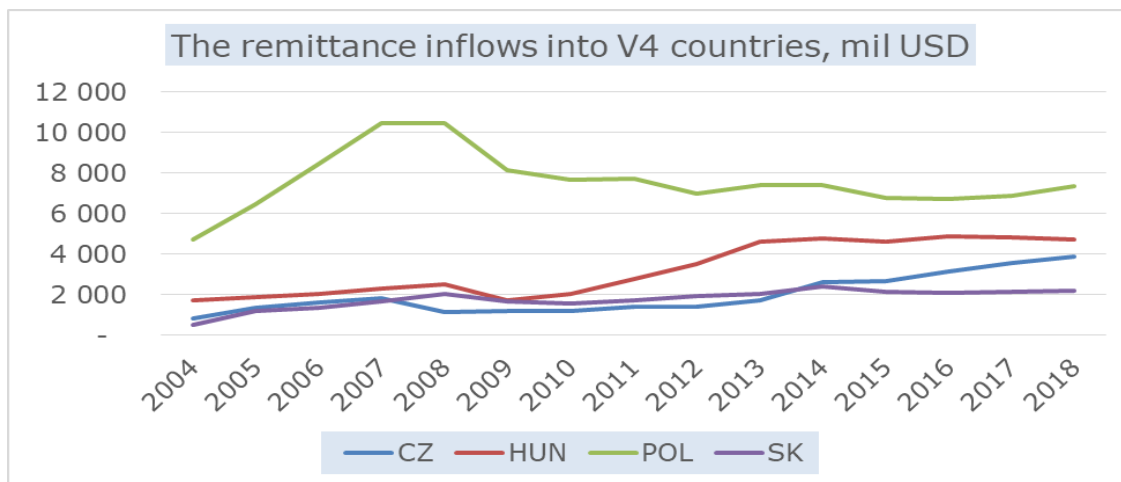
Fig. 4. Inflows of remittances into V4, mil. USD
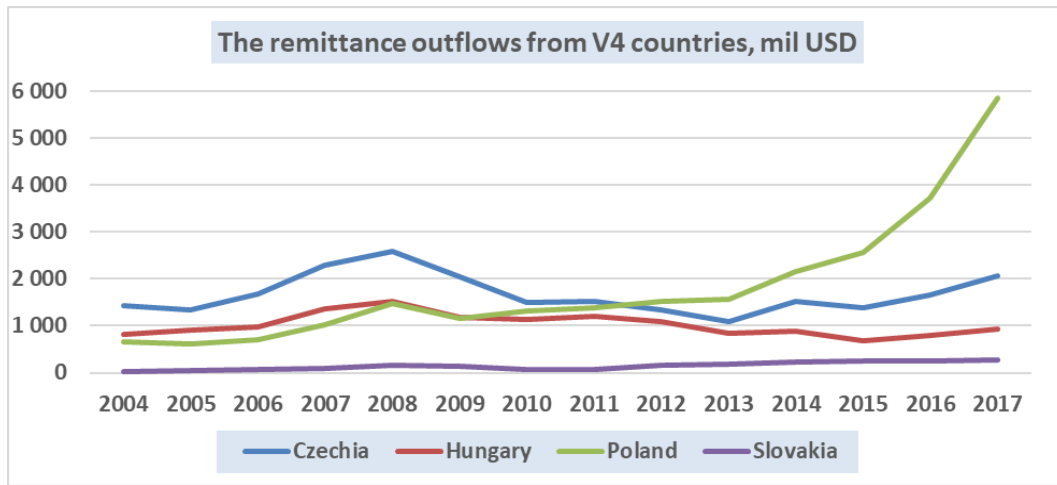*Source:* IOM, the authors

The highest share of remittances gained (as % of GDP) among the V4 countries was Hungary (3%), while the share of Slovakia´s remittances reached 2.1%. In Czechia and Poland, where labor markets have not been severely weakened over the studied period, the share of remittances was slightly lower with 1.6% and 1.3%, respectively.

Concerning the final destination of these finances, the households in Slovakia received total transfers in 2018 of more than USD 2.21 billion, and since 2004, the total was over USD 26 billion. Of this amount, more than 87% were transfers from EU countries, mainly the UK, Czechia, Germany, and Austria.

The V4 countries, as an organic part of the European Union's economic and social space, also created a wide scope for a foreign labor force that involves the subsequent financial compensation of foreign workers in the form of remittance outflows, as presented in Figure 4b.

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Fig. 4b. The remittance outflows from V4 countries, mil. USD
Source: IOM, the authors

The volume of outflow remittances was significantly lower than the volume of remittances received. In 2018, the volume of remittance paid in Czechia was USD 2.758 billion, USD 1.011 billion in Hungary, USD 7.094 billion in Poland, and USD 0.385 billion in Slovakia. In these countries, the share of the disbursement paid was 1.13% in Czechia, 0.656% in Hungary, 1.211% in Poland, and only 0.361% in Slovakia. The total volume of remittances paid in Slovakia for the entire period of 2000–2018 amounted to USD 2.3 billion.

The growth of the GDP per capita and the volume of remittance per capita is presented in Figure 5. While the development of GDPpc in the V4 countries follows a similar mode in economic growth with the leading position of Czechia and Slovakia, the inflows of remittances in these countries indicates a different pattern with leading positions for Hungary and Slovakia.
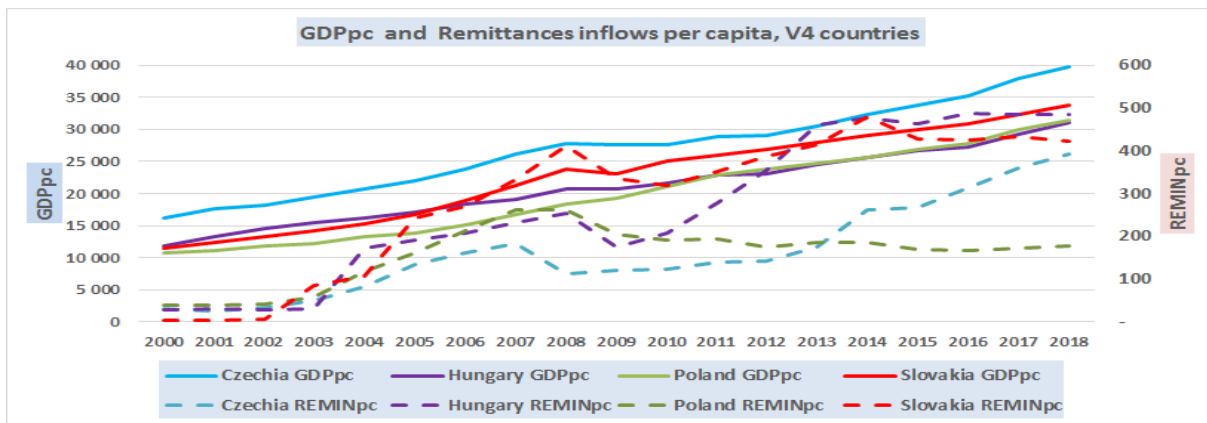
Fig. 5. Dynamics of GDPpc and the remittances received per capita
Source: IOM, the authors

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9. Solution of econometric models (2) and (3)

To confirm the initially formulated hypotheses H1 and H2, the models (2) and (3) and their solutions are presented. The dependent variables LN(GDPpc) and GDPpc-G are expressed through the set of explanatory variables defined earlier. The solutions of these models are presented under three scenarios and two forms.

The first scenario offers the pooled linear regression for estimating dependent variable LN(GDPpc). The explanatory variables are presented in Table 1.

Under the second scenario the dependent variable is estimated through expanded list of explanatory variables, where the time invariant variables representing individual countries are taken into account.

The third scenario considers also the expected external impact of economic crisis in 2009 and 2010 toward all studied countries.
All solution are presented in two form A and B. The form A contains all explanatory variables, while the form B contains only a list of statistically significant variables with $p < 0.05$ (see Table 5).

Table 5. Model (2)

Table 5	Solutions to Model 2											
	Y = LN (GDPpc)											
	Pooled regression				Expanded model - Countries				Expended model - Crisis			
	A		B		A		B		A		B	
	Coefficient	P	Coefficient	P	Coefficient	P	Coefficient	P	Coeff.	P	Coeff.	P
Constant	9,163	0,000	8,235	0,000	9,273	0,000	9,053	0,000	4,602	0,012	8,620	0,000
REMIN	0,013	0,601			0,089	0,005	0,086	0,000	0,147	0,000	0,125	0,000
REMOUT	0,021	0,827			0,023	0,825			0,097	0,278		
EXPORT	0,022	0,262	0,025	0,000	-0,024	0,272			0,021	0,295		
IMPORT	-0,016	0,437	-0,018	0,004	0,037	0,111	0,016	0,000	-0,001	0,942	0,020	0,000
FDI	-0,004	0,046	-0,004	0,011	-0,001	0,635			-0,004	0,009	-0,003	0,025
GCFORM	-0,009	0,652			-0,039	0,105	-0,011	0,006	0,021	0,383		
FCONSUM	-0,007	0,729			-0,035	0,194			0,037	0,181		
TRADE	0,011	0,015	0,013	0,000	0,001	0,792			0,001	0,751		
POPUL	0,334	0,005	0,454	0,000	0,295	0,009	0,375	0,000	0,221	0,025	0,275	0,000
DEBT	-0,003	0,119			0,000	0,899			0,000	0,943		
CZECHIA					2,481	0,000			1,539	0,000		
HUNGARY					2,102	0,000	-0,384	0,000	0,998	0,026	-0,464	0,000
POLAND					2,534	0,000			1,237	0,023		
SLOVAKIA					2,155	0,000	-0,476	0,000	0,829	0,071	-0,580	0,000
Crisis 09									0,212	0,000	0,192	0,000
Crisis 10									0,171	0,000	0,147	0,000
R^2	0,838		0,827		0,899		0,886		0,936		0,926	

Source: IOM, the authors

Concerning the impact of remittance inflows, the variable REMIN is statistically significant according several versions of model (2). The highest level of reliability in explaining variability of dependent variable LN(GDPpc) is presented by Expanded model with time invariant variables representing individual countries and crises. The respective index of determination has a value of R2=0.936. The robustness of the model is presented by empiric and estimated time series data of LN(GDPpc), according the last presented model, Figure 6.

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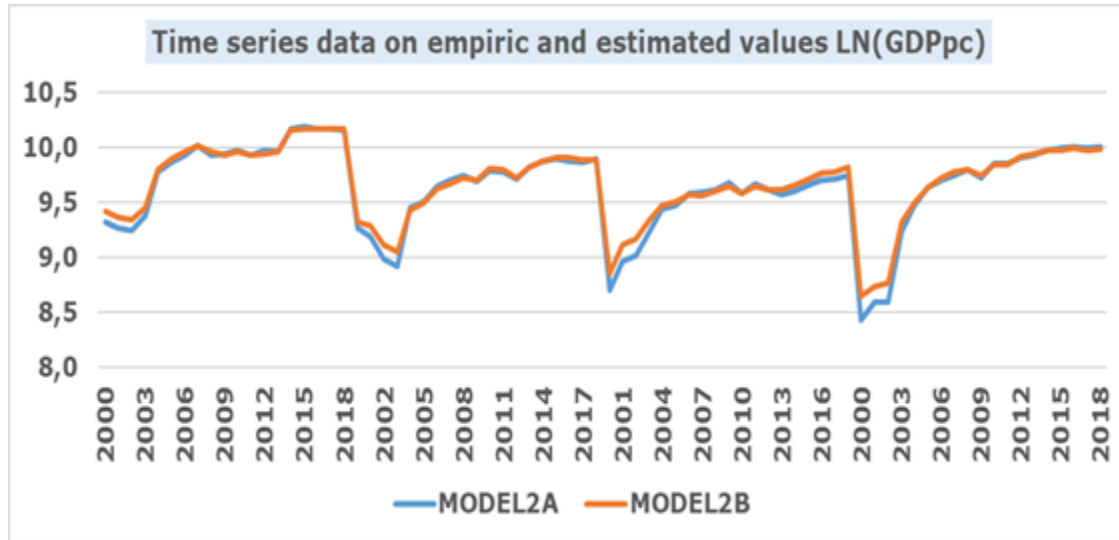

Fig. 6. The empiric and estimated values of LN(GDPpc)
Source: the authors

The time-invariant sectoral and country related variables for Hungary = -0.3711 and Slovakia = -0.4356 indicate a fairly strong effect on the nationally specific factors to transfer the remittance inflows into economic growth. To identify them, the additional variability analysis of the values LN(GDPpc) would be required by introducing the relevant "hedonic variables."

Table 6. Model (3)

Table 6	Solutions to Model 3											
	Y = GDPpc - G											
	Pooled regression				Expanded model - Countries				Expanded model - Crisis			
	A		B		A		B		A		B	
	Coefficient	P	Coefficient	P	Coefficient	P	Coefficient	P	Coeff.	P	Coeff.	P
Constant	-97,485	0,010	-42,340	0,000	30,837	0,476	-42,340	0,000	96,618	0,028	-21,905	0,001
REMIN	0,685	0,224	2,113	0,000	-0,536	0,479	2,113	0,000	-1,373	0,048		
REMOUT	0,574	0,787			-3,866	0,148			-5,938	0,009		
EXPORT	1,015	0,025			0,253	0,633			-0,296	0,542		
IMPORT	-0,982	0,034			-0,036	0,949			0,415	0,406		
FDI	-0,103	0,013			-0,083	0,051			-0,026	0,493		
GCFORM	1,824	0,000	0,967	0,000	0,485	0,415	0,967	0,000	-0,460	0,425	0,537	0,000
FCONSUM	0,997	0,022	0,331	0,000	-0,621	0,357	0,331	0,000	-1,556	0,022		
TRADE	0,037	0,707			-0,088	0,446			-0,074	0,423	0,184	0,000
POPUL	-8,789	0,001			-6,081	0,029			-1,954	0,400		
DEBT	-0,024	0,573			-0,261	0,008			-0,316	0,000	-0,083	0,000
CZECHIA					-0,414	0,965			12,094	0,184	-5,378	0,000
HUNGARY					9,807	0,367			27,426	0,012		
POLAND					18,124	0,182			35,649	0,008		
SLOVAKIA					3,320	0,750			21,449	0,054		
Crisis 09									-5,385	0,000	-5,502	0,000
Crisis 10									0,337	0,728		
R^2	0,7064		0,5309		0,7748		0,5309		0,8634		0,7267	

Source: author

All solutions to Model 3 (see Table 6) demonstrate slightly lower degrees of coherence among the empiric and estimated data. Total variability in GDPpc-G values is covered by the identified explanatory variables to maximum at 86% (respectively 77%). The empiric and estimated time series of GDPpc-G are presented on Figure 7.
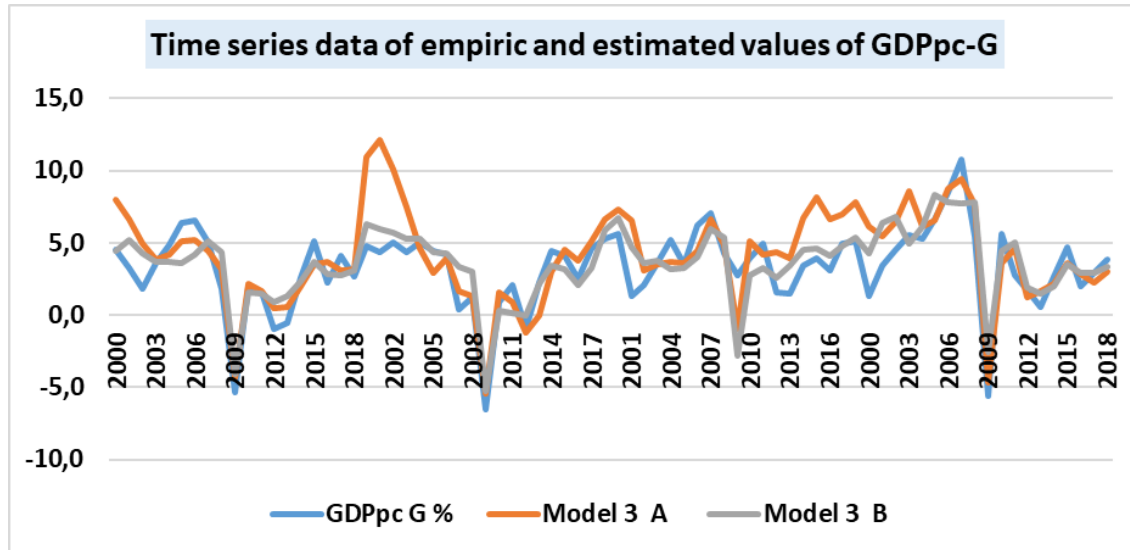

Fig. 7. Time series of empiric and estimated values for Models 2A and 2B
Source: the authors

Based on the results of all presented models, the statistically significant impact of the remittance inflows on GDPpc volume and GDPpc-G growth of hosting countries was identified by both econometric models. Results obtained by these econometric models could be accepted as a confirmation of the working hypotheses, H1 and H2. In the economic interpretation, this finding means that remittance inflows in the Visegrad group countries (V4) during the period 2000–2018 had positive impact on economic growth measured by volume of GDPpc as well as on annual growth of GDPpc.

10. Granger causuality approach

The last step in evaluating the importance and validity of the impact of remittance inflows is the Granger causality test between variables LN(GDPpc) and REMIN and LN(GDPpc-G) and REMIN. The results are presented below in Table 7:

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Table 7. Results of Granger Causality Testing for Model 2

Pairwise Granger Causality Tests Date: 06/30/20 Time: 23:15 Sample: 1 76 Lags: 2			
Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
REM-IN does not Granger Cause LN(GDPpc)	74	1.29680	0.2800
LN(GDPpc) does not Granger Cause REM-IN		4.05072	0.0217

Source: Eviews, author

According the results above, we cannot reject the hypothesis that REM-IN does not Granger cause LN(GDPpc); however, we reject the hypothesis that LN(GDPpc) does not Granger cause REM-IN. This indicates that the Granger causality runs in the direction from LN(GDPpc) to REM-IN (see Table 8).

Table 8. Results of Granger Causality Testing for Model 3

Pairwise Granger Causality Tests Date: 06/30/20 Time: 23:31 Sample: 1 76 Lags: 2			
Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
REM-IN does not Granger Cause LN(GDPpc-G)	74	1.02770	0.3632
LN(GDPpc-G) does not Granger Cause REM-IN		0.83185	0.4396

Source: the authors

In the case of Model 3, we cannot reject neither of the two hypotheses.

These findings are in line with the previous conclusions about the impact of remittance inflows obtained by econometric models (2) and (3).

All the results of the above presented econometric analysis and the Granger causality tests offer qualified information about the ties among the studied variables. However, the presented results have only partially confirmed the positive impact of remittance inflows on economic growth in the studied countries. Despite the high value of the obtained information, the final interpretation of the results, namely their transformation into terms of causality, should be considered in the context of all the relevant economic and social dimensions.

Conclusions

The worldwide globalization of economies, their technological openness, and their interconnection also amplifies the national labor markets and consequently, the migration of workers from less developed countries into labor markets that offer higher compensations. These financial means or remittances are private incomes of individual workers. However, because of their high volumes, these means are considered as a possible source of economic growth of national economies of the mother countries. For this reason, remittance flows between the hosting and the mother countries of foreign workers has been a frequently discussed topic in professional literature.

The main goal of our discussion was to answer the research questions that were formulated through the two working hypotheses. As a methodological tool, we adopted the panel data analysis supported by econometric model techniques and Granger causality testing.

On the basis of the statistical information obtained, formulating the following positions on the working hypotheses is possible:

Hypothesis 1:
A statistically significant impact of remittances received on the volume of LN(GDPpc) **has been confirmed** based on Models 2A and 2B.

Hypothesis 2:
A statistically significant impact of the remittances received on the growth of GDPpc-C has not been confirmed based on Models 3A and 3B.

We consider that all the above findings should be interpreted as results based on the correlation and regression relationships, which **do not provide sufficient arguments to confirm the generally valid positive causal relationship** between the remittance received and the dynamics of the GDP in case of the four Visegrad group countries.

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