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Article

The Analysis of Romania's External Migration and of the Causality between Remittances and Romania's Economic Growth

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THE ANALYSIS OF ROMANIA'S EXTERNAL MIGRATION AND OF THE CAUSALITY BETWEEN REMITTANCES AND ROMANIA'S ECONOMIC GROWTH

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Abstract

The Central and East European countries are affected after the fall of the communism, by the international migration for work towards the developed countries. The adherence to the European Union and the lift of restrictions on the labour market in Western Europe facilitated the short-term and definitive emigration. The temporary and definitive departure of a part of the labour force from the emigration countries led to a significant flow of remittances. Being viewed as the main gain of the loss of labour force, remittances are important at macroeconomic level to the extent in which they bring in the receiving country economic growth. The emigration of the labour force may have a positive or a negative influence on the economy of a country according to the way in which remittances received are used by emigrants. This study analyses the impact that the remittances have on the economic development of the country, on investments and exports in Romania. The characteristics of macroeconomic variables used require, for the econometric analysis, the determination of the Granger causality by means of the Toda and Yamamoto's procedure (1995). The results obtained confirm that remittances do not Granger cause either the economic development of Romania expressed in the GDP, or the investments or the exports.

Keywords: remittances, international migration, emigration of labour force, investments, gross domestic product, Granger causality, Romania.

JEL Classification: F22, F24, C30

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Introduction

Between 1945 and 1990, although Central and East Europe traditionally represents an emigration pool, the politics of the countries in this region restricted the mobility of citizens outside the borders of their countries. Immediately after the fall of communism, due to the previous desire to emigrate, to the economic and social tensions as well as to the lack of a certain economic perspective, many people left this region. The first emigrants from 1989 and 1990 belonged to the minority ethnic groups and settled permanently outside the frontiers, especially in Germany, Finland and Turkey. This migration phenomenon decreased very much in 1992 and it continued with the temporary migration determined by the agreements between the governments of developed countries and the developing ones on seasonal work. (León-Ledesma and Piracha, 2004). The reforms necessary to make the bridge to the market economy created an insecure economic and social environment and thus, the migration phenomenon for finding a job or a well-paid job became more acute. The adherence of the countries to the European Union and later on the lift of restrictions regarding the access to the labour market in the developed European countries significantly facilitated the work migration process of East European citizens simultaneously with the improvement of social and economic conditions there. The migration of an important part of the labour market outside the country's borders caused a significant flow of remittances (Blouchoutzi and Nikas, 2010; Goschin and Roman, 2012).

Adams and Page (2005) ascertain that international migration is one of the most important factors that influence the relationship between the developed and developing countries. The international remittances sent by workers that emigrated represent for the developing countries a very significant source of external funds (Giuliano and Ruiz-Arranz, 2009) after the direct foreign investments. The temporary or definitive loss of a part of the labour work from the emerging countries is compensated through remittances. According to how remittances are used, they can contribute or not to the economic development. If, for example, remittances fund investments which generate production, they can determine the country's economic growth. The use of remittances only for consumption and imports will not cause the economic growth of the receiving country.

Nikas and King (2005) believe that remittances are very important for the reduction of poverty in developing countries. Another characteristic of remittances is that they are not influenced or are influenced to a small extent by the economic conditions in comparison with direct foreign investments determining their counter-cyclic nature (Buch and Kuckulenz, 2004). Remittances are for the developing countries a source of foreign currency needed for reserves as well as for the support of credits. Even if the importance of remittances for both the countries in Central and East Europe and other developing countries has grown, there are not many studies focusing on the relationship between remittances and the gross domestic product (GDP). A potential explanation may be on one hand the lack of data regarding international migration (the statistics underestimate the number of emigrants) and, on the other hand, the lack of data about the remittances registered by each country (the real remittances, transmitted also through unofficial channels are higher than the official ones) (Adams and Page, 2005).

León-Ledesma and Piracha (2004) synthesize two main approaches when studying the relationship between remittances and economic development. One approach supports that remittances received by a country determine the dependence of that country on remittances. Remittance dependence negatively influences the country's economic growth because they

can be beneficial for very few inhabitants. Another approach sustains that remittances represent an important factor in the reduction of poverty in the receiving countries and at the same time, they are a source of economic development.

The migration of labour force can have a positive or a negative influence on a country's economy according to the way remittances received are used. Remittances, as well as other development aids, represent a gain (Bourguignon Levin and Rosenblatt, 2009). Giuliano and Ruiz-Arraz (2009) state that remittances can provide support for the elderly or temporarily, for the persons who are not employed. At macroeconomic level, remittances can have multiple benefits. Giuliano and Ruiz-Arraz (2009) mention that remittances can determine economic growth both through their use in productive investments and for expenditures related to healthcare, education, insurances. At macroeconomic level, Daianu, Voinea and Tolici (2001) specify that remittances can decrease the current account deficit of a country through its financing.

Romania, one of the Central and Eastern European countries, is affected by the migration of its inhabitants especially in developed countries from the European Union. The main destinations for the definitive emigration in 2014 and 2015 are Spain (Săseanu and Petrescu, 2011), Germany and Italy, as the data provided by the National Institute for Statistics and previous research show. The current paper aims to study the long-term impact of remittances on the GDP. To the extent in which remittances are viewed as international flows, it is important to study whether remittances sent by the Romanian emigrants have an impact at macroeconomic level on the development of the country. The results obtained in this study are very important for the decision-makers who can implement economic and social policies so that the remittance flows lead to economic growth.

The study conducted add value to the existing international literature on the topic of remittance contribution to the economic development and attempts to identify the current situation in Romania. The previous studies on this topic do not lead to common results. In the case of Romania, there are relatively few data and on short periods of time. The use of Granger causality by means of the Toda and Yamamoto's procedure (1995) allowed us to answer certain questions. Do remittances determine Romania's economic development? Are investments caused by remittances? Are Romania's exports caused by remittances? The results obtained prove that in Romania, remittances do not Granger cause either of the macroeconomic variables studied: GDP, investments and exports. The results obtained in this study are partially similar to those obtained by Akkoyunlu and Silivestovs (2014) who used the same methodology. The main difference is the fact that Akkoyunlu and Silivestovs (2014) obtained that in Turkey remittances Granger cause exports which can determine the indirect influence of the country's GDP. This paper continues with the presentation of the literature then, in the second part with the presentation of international migration of Romania. The third part tackles the data presentation and the results obtained after which the study ends with conclusions.

1. An overview of the relevant literature

The studies about the effects of remittances on the economic situation of receiving countries have not reached similar conclusions so far. We may identify on one hand an optimistic perspective (Goschin, 2014; Blouchoutzi and Nikas, 2010; Încălțărău and Maha, 2012) and a pessimistic one on the other hand (Chami, Fullenkamp and Jahjah, 2003; Gjini,

2013). Remittances for the Central and East European countries are studied by Goschin (2014). He starts from the premise that remittances are a factor of economic development and estimates two growth models for a panel composed of ten countries from this region during 1996-2011. The use of the panel analysis highlights that there are unseen features of countries that influence macroeconomic growth. The results obtained confirm that the remittances of these countries influence the GDP increase expressed in absolute form as well as the GDP increase expressed in a relative form.

Giuliano and Ruiz-Arraz (2009) analyze the effects of remittances on economic growth by taking into account the development of the financial system. The analysis is performed on a sample comprising 100 countries during the period 1975-2002. For the estimation of the regression models, they use the ordinary least square method and the generalized method of moments. The results obtained confirm that remittances determine the increase in investments for the countries with a less developed financial system and thus, remittances help in avoiding the constraints related to liquidity. At the same time, two thirds of the countries considered in the sample have pro-cyclic remittances, a result that is in contradictions with the expected conclusion of Buch and Kuckulenz (2004). Another important result obtained by this study is also the fact that the countries with a very developed financial system have a negative impact on remittances. Therefore, the developed countries do not encourage remittances even if the expenses incurred for their transmission are lower due to the developed financial system.

Another study which supports the optimistic impact of remittances for Romania is the one undertaken by Încalțărău and Maha (2012). They use the variables registered during 1990-2009 and estimate by means of the ordinary least squares method several regression models. The results confirm significant direct relationships between remittances and the increase in the households' consumption on one hand and on the other hand the direct significant relationship between remittances and investments. An important emphasis of the authors focuses on the fact that remittances used in the econometric analyses are those officially registered since in reality there are also remittances sent through informal channels. The macroeconomic implications of remittances in three countries Romania, Bulgaria and Albania are analyzed by Blouchoutzi and Nikas (2010). By using the time series analysis, they reach the conclusion that remittances finance the imports in these countries and that remittances have a significant effect on investments and consumption. The results obtained confirm the optimistic theory of remittances according to which they have an important role in the economic development of this country.

The role of remittances in Turkey's economic growth and the methodologies previously used in the studies about remittances are investigated by Akkoyunlu and Siliverstovs (2014). The study takes into consideration the statistical and econometrical properties of data and it reaches the conclusion that the determination of the Granger causality by means of the Toda and Yamamoto's methodology is the most suitable one. The macroeconomic variables considered alongside remittances are the GDP, the investments and the exports. Even if the result obtained does not confirm the Granger dependency between the GDP and remittances, its lack cannot be confirmed. One may notice in the results obtained the existence of the Granger causality between remittances and investments and thus, the GDP could be influenced, indirectly and not directly, through investments.

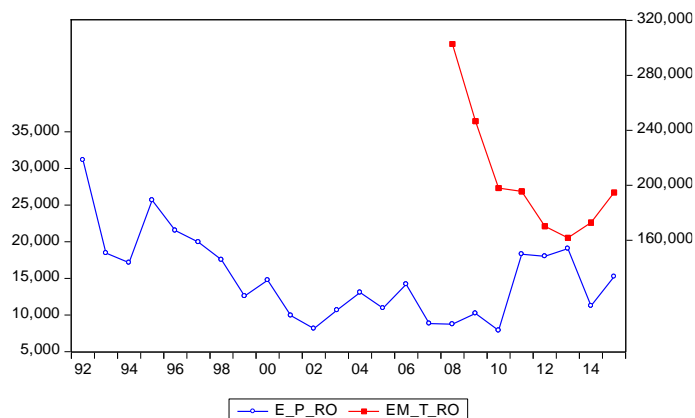
The study of Chami, Fullenkamp and Jahjah (2003) conducted for a sample of 113 countries identifies an inverse significant correlation between the gross domestic product

and remittances. The result is explained by the authors through the existence of a negative incentive of persons receiving remittances. Thus, the beneficiaries of remittances are characterised by the decrease in their interest in working. The same idea was underlined by Daianu, Voinea and Tolici (2001) who point out that remittances higher than the monthly average salary in Romania may encourage the culture of dependence.

The negative relationship between the GDP per capita and remittances is identified by Gjini (2013). The study is performed on 12 Central and East European countries structured by two groups, according to the ranking made by the World Bank in relation to the income level. A potential explanation specified by the author could be the use of remittances for the immediate consumption and not for productive investments. The econometric study of the remittance effects on the economic growth in Romania performed by Pintilescu, Jemna and Turtorean (2009) shows that remittances determine an increase in imports, especially after 2005, which leads to a negative exchange balance. The results also confirm the appreciation of the real exchange rate which, thus, determines a decrease in the export competitiveness. The study suggests the analysis of the long-term future effects of remittances on the economic growth in order to identify whether in the case of Romania, their use in the financing of education and healthcare determines economic growth.

2. The situation of external migration from Romania

The migration situation in Romania is similar to the other countries in Central and Eastern Europe. In the first years after the fall of communism the number of people who emigrated was high and occurred within ethnic minority groups, then a major permanent emigration followed until 2000 and, afterwards, the emigration was prevalently caused by economic factors (Ghetau 2007). The evolution of people who emigrated temporarily and those who emigrated permanently from Romania during 1991-2015 is shown in Figure 1. For temporary emigrants we have available data only from 2008.



**Figure no. 1: The evolution of permanent and temporary emigrants
from Romania during 1991-2015**

Notes: Results are obtained by the authors based on processing data from the National Institute for Statistics, Romania (Tempo Online). E_P_RO and EM_T_RO the number of people who emigrated permanently and temporary, respectively

Figure 1 shows there is a general downward trend of permanent emigrants, after 1996 until 2002. After this date, there are increases and decreases in the number of emigrants during the economic and financial crisis when the lowest values are registered (2007 - 2009) and after its end there are again significant increases. In 2008-2013 (available common period of the two variables), the number of temporary emigrants recorded a sharp drop and then a rising trend. We could say that in general, when temporary emigrants increase, the permanent emigrants decrease and vice versa. Figure 2 presents the evolution of permanent emigrants from Romania by regions of economic development in the period 1991-2015. Because the number of emigrants in the 8 regions differs significantly by two groups, we used two axes in the chart. On the left axis there are the regions with a smaller number of migrants and on the right axis there are the regions with a greater number of migrants.

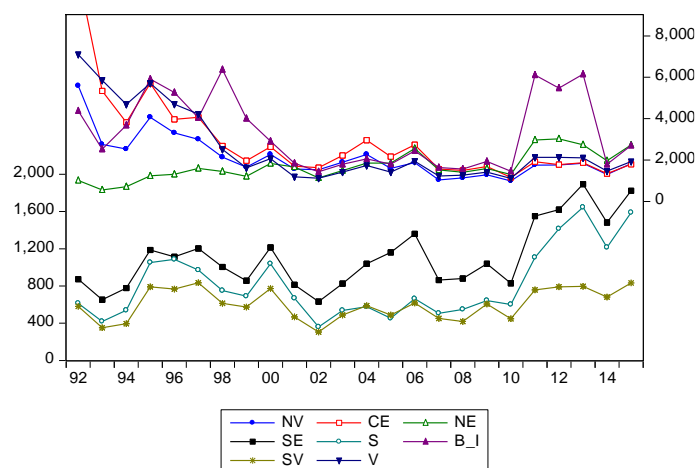


Figure no. 2: The evolution of permanent emigrants from Romania by regions of economic development, during 1991-2015

Observations: Results are obtained by the authors based on processing data from the National Institute for Statistics, Romania (Tempo Online).

Notes: NV, CE, NE, SE, S, B_I, SV and V represent the macroeconomic development regions of Romania: North-West, Centre, South-East, South, Bucharest-Ilfov, South-West and West

The group of regions with fewer emigrants includes South-East, South and South-West while the other regions are in the group with a greater number of emigrants. Although during 2002-2009 the variation of the number of permanent emigrants is relatively small for all regions, the South-East region stands with larger increases and decreases compared to its previous values. After 2010, at the end of the global financial and economic crisis, the number of emigrants of this region increases very much, being one of the regions with a high number of migrants. Large increases in permanent emigrants, after the 2007 economic and financial crisis, are observed, also, in the South region and Bucharest-Ilfov region.

As for the evolution of the number of temporary emigrants, all the regions have similar evolutions: most of the regions register slight decreases in 2013 in comparison with 2012 and afterwards, all the regions present increases until 2015. In the last year of registration, 2015, the highest number of temporary emigrants is found in the North-East region, of 31,403 persons and the smallest number of emigrants is in the West region, of 17,925 persons. If for 2015 we

register the number of temporary emigrants to the resident population, for each macroeconomic development region, the highest weight, of 1.009%, occurs in the South-West region and it is closely followed by the weight of the South-East region, of 1.005%. The smallest weight of 0.935% is identified in the Bucharest-Ilfov region.

Figure 3 shows the distribution map of Romania's counties based on the number of temporary emigrants per one thousand inhabitants in 2015 (EMITTMIOLO).

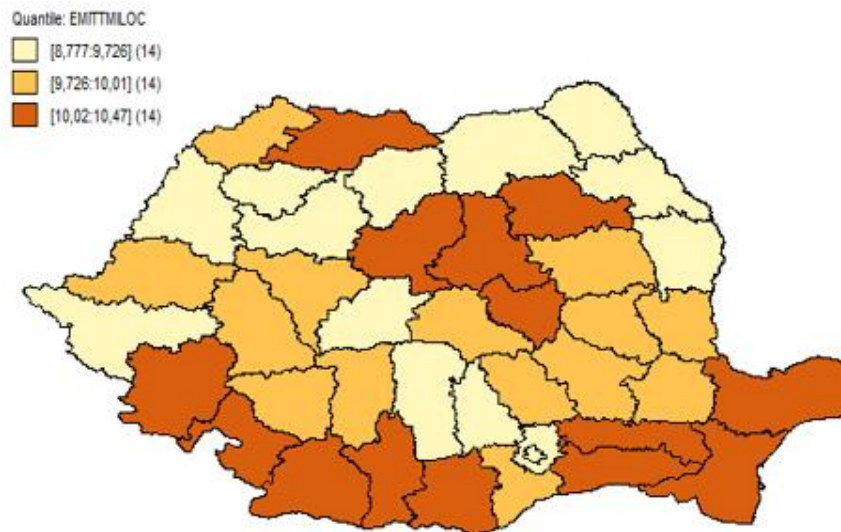


Figure no. 3: Temporary emigrants per 1000 inhabitants in Romania, by counties, in 2015

Notes. Results are obtained by the authors based on processing data from the National Institute for Statistics, Romania (Tempo Online) by means of the GEODA software.

In the south of Romania are grouped the counties with the highest level between 10.02 and 10.47 emigrants per one thousand inhabitants while the counties in the north are at a minimum, namely between 8.77 and 9.72 emigrants per one thousand inhabitants. In the above figure a positive spatial autocorrelation can be seen which means that the counties with a level close to the number of emigrants per one thousand inhabitants are grouped together.

3. Methodology and database

In order to determine the long-term relationship between economic growth and remittances we took into consideration that the needed variables for the study are the following: remittances, the gross domestic product, investments and export. Remittances and the gross domestic product are expressed in American dollars and they were taken from the database of the World Bank while the export expressed also in American dollars, was taken from the Tempo Online database of the National Institute for Statistics in Romania. The variables registered have a yearly frequency and the period analysed comprises the interval 1994-2015. The variables were transformed in real values and then they were logarithmed.

In figure 4 one can notice that the GDP, investments and exports as real values register an almost constant evolution in Romania at the start of the analysis period until 2001, and then they register a moderate increase until 2005 and then a sudden increase until 2009 when the global economic and social crisis is also felt in Romania.

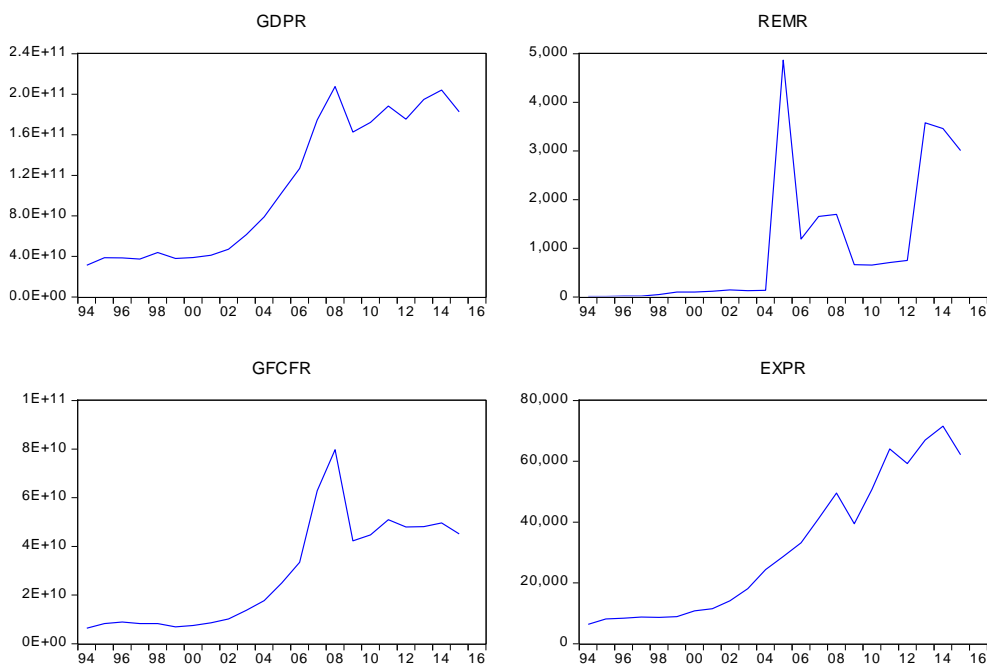


Figure no. 4: The evolution of the real GDP value, of remittances, investments and exports in Romania between the years 1996-2015

Observations. The results are obtained by the authors based on the processing of data provided by the World Bank and the National Institute for Statistics, Romania.

Note: GDPR, REMR, GFCFR, EXPR represent the real GDP values, remittances, investments and exports

The evolution after 2010 of these macroeconomic variables registers increasing fluctuations. The remittances registered have a completely different evolution. Until 2005, remittances have relatively close values. The year 2005 is marked by a high increase in remittances in comparison with the previous years and then they fluctuate recording drops during the economic and financial crisis and then again increases but much smaller than in 2005. If we take into consideration that the year 2005 is the first year when the monetary transfers of the persons from different parts of the world were performed towards Romania almost instantaneously through the services offered by the banking system, we may ascertain that the development of the financial system has significantly influenced the remittances received in Romania. Yet, this situation did not last in the years to come.

In order to identify if there is a correlation between the GDP and remittances, we used the procedure belonging to Toda and Yamamoto (1995). This procedure has the advantage of causality determination, in Granger sense, between variables with equal or different integration order that can be or cannot be co-integrated with a certain rank. The procedure proposed by

Toda and Yamamoto (1995) resides in the estimation of a model $VAR(p+d_{max})$ where d_{max} represents the maximum order of integration of the variables considered in the VAR model and p is the size of the lag within the initially estimated VAR model.

The equations of the VAR model, on which the Toda and Yamamoto's procedure (1995) is based, are the following:

$$\begin{aligned} Y_t &= \alpha_Y + \sum_{i=1}^{p+d_{max}} \beta_i Y_{t-i} + \sum_{j=1}^{p+d_{max}} \gamma_j Y_{t-j} + u_{Y_t} \\ X_t &= \alpha_X + \sum_{i=1}^{p+d_{max}} \theta_i X_{t-i} + \sum_{j=1}^{p+d_{max}} \delta_j X_{t-j} + u_{X_t} \end{aligned} \quad (1)$$

The procedure consists in testing the significance of the parameters γ_j and δ_j . The hypotheses of testing the parameters γ_j are:

$$\begin{aligned} H_0 : \gamma_j &= 0 \\ H_1 : \gamma_j &\neq 0 \end{aligned} \quad (2)$$

The null hypothesis implies that the variable X_t does not cause the variable Y_t while the alternative hypothesis supposes that the variable X_t causes Y_t . Similarly, the hypotheses of testing the parameters δ_j are:

$$\begin{aligned} H_0 : \delta_j &= 0 \\ H_1 : \delta_j &\neq 0 \end{aligned} \quad (3)$$

The null hypothesis supposes that the variable Y_t does not cause the variable X_t and the alternative hypothesis implies that the variable Y_t causes X_t . (Table 1)

Table no. 1: The selection of the lag order for the VAR models

Lag	LogL	AIC	SC	HQ
VAR (GDPR, REMR)				
1	-637.7574	67.76394*	68.06219*	67.81442*
2	-637.1264	68.11857	68.61564	68.20269
3	-632.8819	68.09283	68.78873	68.21061
VAR (REMR, GFCFR)				
1	-628.6212	66.80223	67.10048*	66.85271
2	-626.3468	66.98387	67.48094	67.06799
3	-618.8745	66.61837*	67.31427	66.73614*
VAR (REMR, EXPR)				
1	-352.7296	37.76101*	38.05925*	37.81148*
2	-352.2122	38.12760	38.62467	38.21172
3	-347.8295	38.08732	38.78322	38.20509

Notes: * indicates the lag order selected by the criterion, AIC-Akaike information criterion, SC - Schwarz information criterion, HQ -Hannan-Quinn information criterion. The results are obtained by the authors by means of the Eviews software programme. GDPR, REMR, GFCFR, EXPR represent real values for the GDP, remittances, investments and exports

To test the Granger causality by means of the procedure proposed by Toda and Yamamoto (1995) we will go through several stages. In the first stage we determine the size of the lag for the $VAR(p)$ which is estimated. Since we only have a rather reduced period of time available, the estimation of a VAR model with the lag size equal to 3 determines us to obtain for each equation 13 parameters which is very much if we take into account that we only have available 22 values in the sample of each variable. We will estimate several VAR models where a variable is represented by remittances and the other variable is represented by the GDP, investments and respectively exports. The value of the p lag is selected based on the information criteria available for the estimation: Akaike (AIC), Schwarz (SC), Hannan-Quinn (HQ). The information criteria can indicate a different lag size. If the choice is made according to the Schwarz criterion, unlike the other information criteria, it favours models with a reduced number of parameters.

The information criteria from table 1 indicate that the VAR models must be estimated with a lag equal to 1.

The next step implies the determination of the maximum integration order of the variables that we selected for the estimation of the VAR models. To this aim, we used the extended Augmented Dickey-Fuller test (ADF) (1979) and the Phillips-Perron test (1988). The results presented in the table above confirm that the GDP and exports are integrated of order 2 while remittances and investments are integrated of order 1. As a consequence, the maximum integration order is 2 therefore $d_{max}=2$, when we take into consideration the GDP or the exports for the estimation of the VAR models and $d_{max}=1$ when we estimate the VAR model by means of investments. (Table 2)

Table no. 2: Testing the integration order of the variables

	Level of the variable		The first difference of the variable		The second difference of the variable	
	Model with intercept	Model with intercept and trend	Model with intercept	Model with intercept	Model with intercept and trend	Model with intercept
ADF Test						
GDP	-0.664157 (0.8351)	-2.543636 (0.3061)	-3.681674 (0.0131)	-3.537199 (0.0624)	-6.149451 (0.0001)	-10.80358 (0.0000)
remittances	-2.559172 (0.1168)	-3.814909 (0.0362)	-6.789020 (0.000)	-6.643380 (0.0002)		
investments	-1.290025 (0.6142)	-2.061231 (0.5362)	-4.138085 (0.0050)	-4.026840 (0.0250)		
exports	-0.599225 (0.8477)	-2.539849 (0.3078)	-1.623805 (0.4507)	-1.123735 (0.8957)	-9.403327 (0.0000)	-9.369867 (0.0000)
PP Test						
GDP	-0.694043 (-0.694063)	-1.711957 (0.7096)	-3.669352 (0.0134)	-3.522181 (0.0641)	-8.799876 (0.000)	-10.80358 (0.000)
remittances	-2.479261 (0.1343)	-3.814909 (0.0362)	-8.635567 (0.0000)	-9.478151 (0.0000)		
investments	-1.226181 (0.6429)	-2.112658 (0.5098)	-4.338546 (0.0032)	-4.190854 (0.0182)		
exports	0.060746 (0.9543)	-2.374164 (0.3807)	-1.680907 (0.04251)	-2.419001 (0.3597)	-4.899297 (0.0010)	-4.893189 (0.0046)

Note: The null hypothesis of the ADF test implies that the series is integrated. Between brackets we have the probabilities associated to the test

To determine the causality among the GDP, remittances, investments and exports by means of Toda and Yamamoto's procedure (1995), we will estimate 3 VAR models. The results obtained after the estimation of the VAR models are presented in Annex 1. The results obtained from the Granger causality test through the Toda and Yamamoto's method (1995) are presented briefly in table 3. The table contains the computed values and the probabilities associated to the test χ^2 . The null hypothesis supposes that the dependent variable is not Granger caused by the independent variable.

Table no. 3: The results of testing the causality by means of Toda and Yamamoto's procedure (1995)

Independent variable \ Dependent variable	GDP	remittances	investments	exports
GDP		3.993776 (0,2621)		
remittances	1.733298 (0.6296)		0.617742 (0.7343)	3.143943 (0.3700)
investments		4.297771 (0.1166)		
exports		2.452375 (0.4840)		

Note: the table presents the values of the test χ^2 , for Granger causality, according to the Toda and Yamamoto's procedure (1995) and the associated probabilities

Even if we had to analyze variables that had a different integration order, we used the Granger causality test by means of the Toda and Yamamoto's procedure (1995) in order to identify whether remittances, received by persons living in Romania, may influence the gross domestic product, investments or exports of the country. The results obtained and presented in table 3 confirm that remittances do not influence on the long run these macroeconomic variables.

Conclusions

Romania and the countries of Central and Eastern Europe were affected by international migration. If immediately after the fall of communism people who were members of ethnic minority groups emigrated, later on the migration was facilitated by agreements between developed countries and the CEE for seasonal work. The migration from Romania, a country in Central and Eastern Europe, presented the same characteristics. The accession of Romania to the European Union and lifting restrictions on labour markets of Western European countries facilitated Romanians' access to the European labour market. The migration due to searching for a job abroad created and developed remittance flows to Romania. Remittances represent for a country the main gain after the loss of its workforce. It is also the main factor which influences the relationship between the developed countries and the developing countries. After the direct foreign investments, they are the most important source of external funds. They do not depend on economic conditions and are counter-cyclic. In the developing countries, remittances contribute to poverty reduction.

Using remittances at microeconomic level by funding education and healthcare expenses caused positive effects. But the positive effects should also be identified at macroeconomic level. The flow of remittances generated an increase in imports, an appreciation of the exchange rate, which in turn made exports less competitive. Remittances should have positive macroeconomic effect and should determine economic growth. The existence of yearly registrations of remittances during 1994-2015 allowed their study by means of a method that involves the modelling of time series. The determination of Granger causality of remittances on Romania's economic situation, of investments and exports is highlighted by the Toda and Yamamoto's procedure due to the statistical and econometric characteristics of macroeconomic variables: they are not integrated of the same order. The estimation of the VAR models which are at the basis of this procedure could not have been performed for a smaller sample of records of remittances. The high number of parameters which is estimated through this method determines the significant increase of the freedom levels. The results confirm that there is no Granger dependence between remittances and GDP, and investment and export respectively.

The limits of this analysis are determined by the data quality registered regarding remittances. The lack of careful monitoring of remittances as well as of the migration flow makes for an incomplete perspective. The year 2005 is the first year when the banking system enabled the immediate monetary transfers. A part of the remittances that arrived through unofficial channels due to this facility must have arrived in the country through official channels and thus, they must have been registered. As a consequence, future research – when the data sample will allow it – could be performed either after the year 2005 in order to have data collected under the same financial development conditions or for the extended data sample and the modelling must allow a discontinuity moment of the trend in the year 2005. Therefore, economic policy makers should focus on one hand on finding solutions to register remittances for an accurate database and on another hand, on applying specific measures to save and direct remittances to productive fixed investments in order to stimulate economic growth in Romania.

Possible research directions could be represented by the knowledge of remittance effects at microeconomic level. Do the persons who receive remittances direct them to savings or do they use them immediately? Do the persons who receive remittances perform productive economic activities for which they receive money or are they encouraged to live only at the expense of the money received from the work of others abroad? In other words, do remittances support the culture of dependence? The answers to these questions could also justify the results obtained at macroeconomic level.

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Annex 1: The estimation of VAR models which are at the basis of testing the causality by means of the Toda and Yamamoto's procedure (1995)

Table no. 1: The estimation of the VAR model (GDPR, REMR)

Estimated parameters	GDPR	Estimated parameters	REMR
β_1	0.721659 [2.13237]	θ_1	1.85E-08 [0.75725]
β_2	-0.272515 [-0.68022]	θ_2	-5.24E-09 [-0.18076]
β_3	0.329948 [1.16300]	θ_3	-2.00E-09 [-0.09742]
γ_1	3194965 [0.69493]	δ_1	0.117164 [0.35248]
γ_2	7097055 [1.47005]	δ_2	-0.026169 [-0.07497]
γ_3	8979254 [1.58089]	δ_3	-0.263755 [-0.64227]
α_{GDPR}	2.00E+10 [2.00129]	α_{REMR}	-57.68971 [-0.07973]

Note: GDPR, REMR represent the real values of GDP and of remittances, respectively;
Between square brackets, there are the values of the statistics test t (Student) computed for testing the significance of the parameters of the VAR model with the general form:

$$Y_t = \alpha_Y + \sum_{i=1}^{p+d_{max}} \beta_i Y_{t-i} + \sum_{j=1}^{p+d_{max}} \gamma_j Y_{t-j} + u_{Y_t}$$

$$X_t = \alpha_X + \sum_{i=1}^{p+d_{max}} \theta_i X_{t-i} + \sum_{j=1}^{p+d_{max}} \delta_j X_{t-j} + u_{X_t}$$

Table no. 2: The estimation of the VAR model (REMR, GFCF)

Estimated parameters	REMR	Estimated parameters	GFCFR
β_1	0.289684 [1.05909]	θ_1	917868.5 [0.42434]
β_2	0.101107 [0.33865]	θ_2	4587330 [1.94291]
γ_1	1.10E-08 [0.35633]	δ_1	0.798765 [3.26602]
γ_2	3.78E-09 [0.13084]	δ_2	-0.134548 [-0.58834]
α_{REMR}	354.4921 [0.66157]	α_{GFCF}	6.62E+09 [1.56136]

Note: REMR, GFCFR represent the real values of remittances and investments;
Between square brackets, there are the values of the statistics test t (Student) computed for testing the significance of the parameters of the VAR model with the general form:

$$Y_t = \alpha_Y + \sum_{i=1}^{p+d_{max}} \beta_i Y_{t-i} + \sum_{j=1}^{p+d_{max}} \gamma_j Y_{t-j} + u_{Y_t}$$

$$X_t = \alpha_X + \sum_{i=1}^{p+d_{max}} \theta_i X_{t-i} + \sum_{j=1}^{p+d_{max}} \delta_j X_{t-j} + u_{X_t}$$

Table no. 3: The estimation of the VAR model (REMR, EXPR)

Estimated parameters	REMR	Estimated parameters	EXP
β_1	0.114178 [0.38808]	θ_1	-0.364545 [-0.29794]
β_2	-0.025179 [-0.08331]	θ_2	-0.019959 [-0.01588]
β_3	-0.123266 [-0.37970]	θ_3	2.042295 [1.51272]
γ_1	0.019293 [0.27900]	δ_1	0.508232 [1.76726]
γ_2	0.030601 [0.37832]	δ_2	-0.019597 [-0.05826]
γ_3	-0.012171 [-0.16876]	δ_3	0.543258 [1.81136]
α_{REMR}	-6.796040 [-0.01134]	α_{EXP}	4275.769 [1.71572]

Note: REMR, GFCFR represent the real values of remittances and exports;
Between square brackets, there are the values of the statistics test t (Student) computed for testing the
significance of the parameters of the VAR model with the general form:

$$Y_t = \alpha_Y + \sum_{i=1}^{p+d_{\max}} \beta_i Y_{t-i} + \sum_{j=1}^{p+d_{\max}} \gamma_j Y_{t-j} + u_{Y_t}$$

$$X_t = \alpha_X + \sum_{i=1}^{p+d_{\max}} \theta_i X_{t-i} + \sum_{j=1}^{p+d_{\max}} \delta_j X_{t-j} + u_{X_t}$$