EXPLAINING RECENT ROMANIAN MIGRATION: A MODIFIED GRAVITY MODEL WITH PANEL DATA

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Abstract

The present paper contributes to studies on Romanian emigration from a demographic, spatial, and temporal perspective. The purpose of this paper is to assess the selected economic and demographic variables' impact on the volume of Romanian emigration to the European Union (EU) during 2010-2017. The analysis was done using a gravity model. The models used in this study are the fixed effect model (FEM) and the random effect model (REM), both applied to panel data. The results show that the economic and demographic factors have a significant influence on the emigration's destination, and the socio-economic and demographic situation in the host country determines the flow migration from Romania. The paper strengthens the literature through an empirical analysis of the economic and demographic determinants of Romanian emigration to the EU from the perspective of the country of origin.

Keywords: gravity model, migration, Romanian emigration

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1. Introduction

The need to understand the emigration's determinants, in particular, why, where, when, and how people decide to emigrate, is one of the most relevant topics in Romania, in the context of an increasing deficit on the domestic labour market. Seen as a cause of this deficit, more and more attention is being paid to the emigration process and the measures at the national level to reduce this phenomenon.

During the pre-accession period and later in the first 7 years of the post-accession period, the mobility of Romanian citizens was the subject of numerous discussions on the flow of emigration. Currently, Romania is an EU member state with full rights, and Romanian citizens enjoy the same rights as all the citizens of the countries of residence. According to Eurostat, 3.4 million Romanians are currently residents in other EU member states, and the number of those leaving is increasing.

In this context, this paper discusses the determinants of mobility between Romania and the other EU member states by applying an extended gravity model that allows us to understand specific determinants of emigration and their significance in making decisions on emigration. The decision to migrate is determined by a multitude of factors, both economic and non-economic factors. Migrants may be "pushed" from Romania because of unemployment or poverty, or they may be "attracted" to the countries of destination by higher incomes or more efficient public services. When deciding to migrate, people analyse both the pull and push factors, the benefits and the costs of migration.

In this paper we aim to examine to what extent the particular economic and social factors influence the magnitude of emigration flows and the choice of destination. Using a static gravity model, based on panel data, we are trying to identify the main determinants of Romanians' mobility to other EU member states for the period 2010-2017. A micro gravity model was implemented to understand the changes involved in both international migration flows (Hanson and McIntosh, 2016) as well as to analyse alternative destinations (Beine et al., 2011; Grogger and Hanson, 2011).

The gravity model applied in this study uses as the dependent variable, the flow of emigrants from Romania, and as independent variables, the stock of Romanian emigrants, the population of the 10 countries included in the analysis, the distance between the capital of Romania and the other countries. An essential factor of attraction is the economic condition in the countries of destination, for whose analysis of the poverty rate and the GDP were used. We consider that the integration of these variables contributes to an understanding of the determinants of Romanian mobility and its future dynamics and, at the same time, to the diversification of the specialized literature (Goschin, 2016; Sandu and al., 2006).

We expect to obtain a positive relationship between the outflow of emigrants and the size of population in the destination country, as well as with the previous stock of Romanian already in the destination country. Also, the states with a favourable socio-economic situation should attract more Romanian emigrants, while a high poverty rate should have a negative influence over the Romanian emigration. Furthermore, the distance between states is expected to be in a reverse connection with the inflow of Romanians.

Concerning the structure of the work, after this introductory section, in the second part, we present the information obtained from the review of the specialized literature. Part 3 details the methodological framework that was the basis of the work and the most important aspects related to the data and methods used to evaluate the impact of the different determinants on the emigration through the extended gravity model, the various estimation methods used in the analysis, the variables and their hypotheses. Section 4 presents the research hypotheses and the empirical findings regarding determinants with a positive effect on emigration. We finished with concluding remarks where the most relevant results are briefly presented.

The paper contributes to the studies on identifying the factors that determine the emigration from Romania to other EU member states, based on the empirical analysis of social, economic, and demographic factors. We consider that the analysis of these determinants can provide valuable information for the decision-makers for the elaboration and implementation of policies that will lead to a better understanding of the migration flow and, consequently, the strategies to be implemented.

2. Recent Migration from Romania to the European Union

Romania was a net emigration country even before 1989. Despite attempts by the Communist regime to keep the emigration's flow under control, there were different forms of migration, and the available data show a flow that registered a modest but steady growth. The most frequent reason for emigration was the reunion of the family, having as main destinations the Germany and Israel, and ethnic emigration was allowed and encouraged by the Romanian authorities. The emigration of ethnic minorities, especially Germans, Hungarians, and Jews, defined migration from Romania also in the first half of the 1990s (Sandu, 2018). At the beginning of the '90s, in parallel with this ethnic emigration, there was also an increase of asylum seekers to obtain legal residence in Europe, being registered a significant increase from 8000 applications in 1988 to 116,000 in 1992. Similarly, in the case of asylum seekers, the main destination was also Germany (UNHCR, 1994).

In the mid-1990s, Romanians started migrating to Western European countries through intermediaries or with networks' support (Diminescu, 1999). The destinations have diversified, and Romanians migrating not only to Western Europe but equally to Turkey and Israel (Diminescu, 2003); the profile of migrants also changes being mostly young men who have been employed in construction or agriculture in jobs below their qualification level of qualification. During this period, temporary emigration to foreign countries gradually has changed into an economic migration having as primary determinant the economic recession amplified by the industrial restructuring measures with dramatic effects over increased unemployment (Anghel and Horváth, 2009). In the meanwhile, the economies of the Western European countries were experiencing a period of economic growth that favoured the absorption of the foreign labour force. To control the increase of foreigners, a change of attitude of the countries of Western Europe towards the "economic refugees" is noticed, in the sense of a gradual tightening of the legislation regarding immigration and asylum.

This period was followed by the emigration of the Romanian labour force to a large extent in Western Europe, either under the bilateral labour agreements between Romania and the

European governments or by using the opportunity offered to eliminate the visa requirement for Romanians in the Schengen area.

The first agreement was signed between the governments of Romania and Germany in 1990, and the aim was "to establish on a sustainable basis the sending of personnel from Romanian companies to ensure economic cooperation." Subsequently, the agreements with Germany were diversified, and bilateral labour exchange agreements with other European governments were concluded (Şerban, 2011). Although the Agreement with Spain was the most widely publicized during that period, the most significant flow was registered between Romania and Germany.

The elimination from January 1, 2002, of the visa regime for the Romanian citizens traveling in the Schengen area and the accession of Romania to the European space represented essential stimuli regarding the emigration in the contemporary history of Romania. The EU facilitated visa liberalization through a pragmatic approach on migration management so that access to Romanian citizens was allowed without a visa subject to the readmission agreements. In parallel, Romania has started the preparatory procedures for accession to the Schengen area, respecting the EU *acquis* on migration, borders, and asylum.

The statistical data show a significant increase in the flow of Romanian emigrants since 2002, a flow that reached a maximum point immediately post-accession. The travel regime allowed Romanian citizens to travel for tourism purposes and to reside legally for 3 months. This possibility has become an opportunity for those interested to work abroad so that thousands of migrants have been irregularly employed abroad. The favourite destinations were Italy and Spain and the economic sector construction or homecare (Sandu and al., 2006). The labour market in the EU15 becomes a destination for Romanian workers, in the form of temporary migration between Romania and western European destinations. The prevalence of these flows was mostly illegal or semi-legal (Şerban, 2011), due to the administrative barriers to access the labour markets such as obtaining a work permit.

Table 1. Number of Romanian citizens on 1 January by country of residence, 2002-2018

Country/year	2002	2007	2014	2018
Austria	17.750	21.882	59.702	102.270
Belgium	3.198	26.383 ¹	56.695	86.562
France	na	na	87.087	118.565
Germany	88.102	78.452	260.542	586.594
Hungary	44.977	66.951	30.924	22.747
Italy	95.039 ²	342.200	1.081.400	1.190.091
Spain	66.997	538.400	728.252	673.593
United Kingdom	6.809 ²	57.644 ¹	137.036	416.092

Source: Source: Eurostat (online data codes: *migr_emi4ctb* and *migr_pop1ctz*)

¹ No data available for 2007. The first data available from 2010 were used.

² No data available for 2002. The first data available from 2003 were used.

The 2007 enlargement of the European Union had as result the application of the principle of free movement of EU workers, that defines the right for nationals of EU Member States to establish their residence and to work in any other EU state, has raised a number of fears and worries regarding the massive emigration of the workforce from Romania and Bulgaria to the west. As a result, except Sweden and Finland, all 2004 pre-enlargement Member States (EU15) have decided to apply measures to restrict access to the labour market for Romanian workers. After accession, as can be seen from the data presented in Table 1, the increase of the flow was based, forwards, on the destinations preferred by the Romanians, such as Italy and Spain (Italy became the most important receiving country for the Romanians, attracting 1,100,000 people, with a 10-fold increase since 2002). New destinations, such as Great Britain, Germany, France, or Scandinavian countries, attract Romanian workers, regardless of the liberalization or restriction of the labour market (Anghel et al., 2016). The statistics regarding the considerable growth registered in 2007 must be interpreted with caution, as they reflect not only a real increase of the flow towards Romania but also a regularization of the situation of those previously irregular in the territory of the different EU member states (Sandu, 2018). Post-accession migration is characterized by heterogeneity, including both high-skilled migration - for example, doctors, but also the low skilled labour force, both women and men, from rural and urban (Sandu, 2010).

All restrictions on free access to the labour market in the EU have been lifted since January 1, 2014, when the limits imposed by the United Kingdom, Germany and Austria were eliminated. Since then, there was an increase in temporary emigration, that can be explained not only by the total liberalization, but also as an effect of exit from the economic crisis as well as the expanding networks across Europe that facilitate mobility (Roman and Goschin, 2014; Sandu, 2018).

The data provided by Eurostat shows that the number of Romanians residing in another EU member state has increased from 230217 in 2002 to 1.083.348 in 2007 and has reached over 3,5 million in 2019³. According to Eurostat and United Nations statistics for 2017, it is estimated that since 1990 Romania has lost almost 18.2% of its population due to the emigration flow (Dospinescu and Russo, 2018). Following the enlargement of the EU, increasing migration flows have led to an analysis and evaluation of the consequences of this phenomenon. In general, these studies continue to focus mainly on the costs and benefits of migration to the country of destination. While some authors have discussed the potential benefits of immigration (Borjas, 1995), others have pointed out that it raises the unemployment of unqualified natives, redistributes social assistance payments and other similar effects (Boeri and Brücker, 2005; Hansen, 2003). Analysing the potential macroeconomic benefits of Romanian migration, Roman and Strat used panel data regressions and emphasized the positive effects of foreign direct investments (Roman and Strat, 2019).

Regarding the impact on the labour markets in the countries of origin, economist studies show the effects of remittances on poverty (Ciupureanu and Roman, 2016), the impact on economic growth (Epstein and Radu, 2007; Roman, 2013), the negative effects on children (Botezat and Pfeiffer, 2014) or reintegration on the labour market. The free movement of Romanians has helped to reduce the pressure on the internal labour market, has had an effect

³ Author calculation based on <https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>

on reducing unemployment, and increasing the remittance rate to Romania. Equally, however, recent emigration has had negative effects on the labour market by reducing the supply and has considerable demographic effects (Ghetau, 2018).

These developments and discussions around them show that mobility was a challenging issue in Romania-EU relations and will continue to be a challenge, depending on changes at the European level, such as the effect of Brexit on migration to the UK.

3. Gravity models: a brief Literature review

The complexity of international migration has resulted in different theories, models, and theoretical approaches that try to explain the reasons for people's migration. Economic models of migration developed by Harris and Todaro (Harris and Todaro, 1970), are reference works in the study of migration. Massey (Massey, 1999), Morawska (Morawska, 2007) and de Haas (Haas, 2011) refer to economic factors in deciding to migrate and try to explain migration based on income differences between different states. King (King, 2012) mentions a fundamental division between these theories and approaches: the theories that try to explain and discuss the push/pull factors that lead people to migrate and the theories that try to understand why and how the movement perpetuates once it has begun.

The gravity model has been used to describe the interaction of various factors that influence an individual decision to migrate and result in an increase of bilateral migrants' flows or stocks. The use of the gravity model has grown considerably since Tinbergen (Tinbergen, 1962) first used it to explain international trade. Starting from the model of Newtonian physics, "the gravity model of migration puts forth that the volume of movement between two places is directly proportional to the product of their masses (i.e. populations) and inversely proportional to the square of the distance between them" (King, 2012). Once Flowerdew and Salt (Flowerdew and Salt, 1979) adopted the model to analyse migration, gravity models became a widely used tool for analysing migration flows mainly due to its efficiency (Karemera et al., 2000; Lewer and Van den Berg, 2008; Poot et al., 2016; Ramos and Suriñach, 2013).

Although the simple gravity model refers to the migration between two countries taking into account the relative size of the countries of origin and destination and the distance between them, the extended models include more variables that cover other factors influencing migration, such as economic factors, stability, linguistic proximity (Grogger and Hanson, 2011).

The relevance of analysing these factors influencing migration consists of understanding the dimension of the flow and the choice of destinations, which is not random and can explain why the real migration rate is lower or higher depending on specific countries, considered to be less or more attractive alternatives. Neoclassical macroeconomic theory shows that migration is caused by differences in labour supply and labour demand (Massey et al., 1993). According to this theory, the difference in income is an essential factor of attraction. However, this difference in revenues can be a factor, only when the migrant finds a job. Considering that poverty risk is a direct consequence of net income, the two indicators being directly correlated, we appreciated that it is relevant to analyse how the flow of emigration relates to the poverty rate. Prada (Prada, 2017) showed that increasing the poverty rate for people aged 18 to 24 has resulted in a reduction of net migration of EU 28 in 2004-2013 while increasing the

employment rate of the population from 15 to 24 years and the decrease of the dependency ratio had a positive impact on migration. A high unemployment rate can also be a push factor. Migrants move from regions with high unemployment to states with employment opportunities. Both of the determinants mentioned above, namely the poverty rate and unemployment rate, represent important incentives for migration. Numerous empirical studies have focused on wage difference, unemployment rate, and distance as factors that determine migration costs (Borjas et al., 2010). In addition, the socio-economic status of the emigrant influences the inclination towards migration (either it is very poor and it has nothing to lose, or it is instinctive enough to be able to secure its life until entering a stable phase).

The distance between regions is another factor that determines the availability to migrate. According to Price (1949), in the case of equal opportunities, the number of migrants will decrease inversely in proportion to the increase in distance. Empirical studies have shown that migration is influenced by physical distance, and the costs increase over distance; this effect is more pronounced for low-educated migrants (Beine et al., 2011). Adserà and Pytliková (Adserà and Pytliková, 2015) have shown that historical ties reduce migration costs by facilitating the transfer of human capital.

The gravity models have also begun to be used to forecast future migration flows (LeSage and Pace, 2008). The gravity model was also applied in the analysis of the determinants of internal migration in Romania between 2004-2008 (Bunea, 2012).

4. Data and estimation method

4.1. Data and variables used

Regardless of the increased use of these models by researchers, the empirical studies of international migration outflows from Romania using gravity models are limited. This paper aims to identify the intensity of flows from Romania to 10 destination countries through an empirical analysis using a gravity model to reveal socio-economic factors affecting the choice of emigration to destination countries. To achieve this goal, the micro-level analysis use panel data on the bilateral flow and stock for the period 2010 - 2017. The restriction regarding the period is because 2017 was the last year with available data.

The availability of data limited the selection of the sample of countries. Still, we considered important to maintain in this sample, the states that attracted a large number of Romanians during the 90s (Germany and Hungary), the states that were the principal destinations for Romanians since 2000 even if they lost their attractiveness due the economic crisis (Italy, Spain, Portugal) and the states whose attractiveness has increased significantly in recent years (Denmark, the Netherlands, the United Kingdom). The analysis was conducted for ten countries, representing the top 10 countries in Europe where over 95% of Romanians emigrate in the last decade (Austria, Belgium, Denmark, Germany, Hungary, Italy, Netherlands, Portugal, Spain, and United Kingdom).

The variables of the gravity models are the size of the populations, with positive influence, and the physical distance, with negative influence. Economic variables can be gross domestic product per capita, number of new companies created, level of wages, etc. Labour market variables include: levels and / or employment and unemployment rates, as well as changes in

working conditions. In our study the following variables were included and tested in the econometric models (all in logarithm and interpreted as migration elasticities):

- dependent variable (MR): the in-migrant / out-migrant ratio;
 - The migration flow from Romania to the respective country of destination - OECD International Migration Database
- independent variables:
 - GDP Current prices, euro per capita - Eurostat
 - Gross domestic product at market prices - Eurostat
 - Road distance between the capitals of the two countries - Erasmus+,
 - Migrant Stock - OECD International Migration Database
 - Corruption Perception Index - Transparency International Romania
 - The total population on January 1st - Eurostat
 - People at risk of poverty or social exclusion - Eurostat
 - Unemployment rate - Eurostat
 - Language - Europe's Mosaic of Languages by Harald Haarman

Table 2. Descriptive statistics for the variables included in the analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
Inflow Migration	80	33.155	51.448	2.027	230.603
Stock Migration	80	239.815	333.735	5.076	1.168.552
Population	80	31.445.853	27.053.721	5.534.738	82.521.653
Distance	80	1.660	686	643	2.975
Risk Poverty	80	23	5	15	35
Corruption	80	70	15	39	94
Unemployment Rate	80	9	5	4	26
GDP per capita	80	2464	756	990	3640
Language	80	2,5	1,7	1	3

This table displays the descriptive statistics for the major variables in this study.

The main reason to use panel data series in this analysis was the small number of countries in Europe where a significant amount of Romanians migrate. More accurate estimators and more data could be obtained with the help of panel modelling. Despite the efforts of institutions such as Eurostat or OECD to harmonize data on migration, there are still many limitations. It should be mentioned that the official data on the volume of migration are indicators of legal migration and do not fully cover the real dimension of the phenomenon. The source of the data used is the OECD (Organization for Economic Co-Operation and Development) and Eurostat database for the stock of Romanian nationals and the inflow of Romanian migrants for each year included in the analysis. For the distance between the capitals, the risk of poverty, and the population on January 1, in the destination countries, we used the data provided by Eurostat.

Analysing the evolution of the emigration trends from Romania, we can notice an increasing trend, the most significant increase being registered in 2014, the year in which the restrictions on the labour market were eliminated entirely. The highest value was registered in 2017, namely 427,000 emigrants.

Figure no. 1: The outflow of Romanian emigrants in the period 2010-2017

Source: International Migration Database OECD

Analysing the trend of emigration flows from Romania, it is evident that both the volume and the destinations are changing. Thus, some states record a significant decrease in the flow between 2010-2017. Italy and Spain, the main destinations of the Romanian migration, starting with the 2000s, are experiencing a significant decline of flows, so that the volume in 2017 represents 47%, respectively 60% of the inflow registered in 2010. Significant reductions of the flow are also recorded in the case of Hungary (45 %) or Portugal (40%). During the same period, the flows to Austria, Belgium, the Netherlands, and Denmark are rising. It should be noted that in the case of Austria the highest growth is registered in 2014, the first year in which the restrictions on access to the labour market were eliminated entirely. A special mention must be made in the case of Germany and the United Kingdom. Both states have completely liberalized the access to the labour market for Romanian citizens since January 2014. The number of Romanian emigrants has seen a significant increase in both countries, so it is evident that the preferences of Romanian migrants are now heading to Germany, the United Kingdom, the Netherlands, and the traditional destinations pass on a background.

Figure no.2: The inflow in selected states of Romanian emigrants, 2010-2017

Source: International Migration Database, OECD

4.2. Method: panel data models and gravity modelling

Gravity models have been widely applied in the analysis of migration to identify the main influential factors that could influence the individual's decision to migrate. The basic version of the gravity model proposed by Tinbergen (Tinbergen, 1962) implies the following explanation, which is based only on the dimension of the studied economies and on the distance between them:

$$\log M_{ij} = \beta_0 + \beta_1 \times \log Y_i + \beta_2 \times \log Y_j + \beta_3 \times \log D_{ij} \quad (1)$$

where M_{ij} = the migration outflow from country i to the respective country of destination j , in the form of inflows of foreign population according to nationality criterion,

Y_i = PIB in country i ,

Y_j = GDP in see j ,

D_{ij} = distance between the country i and country j .

Thus, starting from this basic model, we can use a gradual approach, constructing assumptions about other factors that may exert a specific influence on migration flows.

Given the proposed specifications, the hypotheses we will test in this research are the following:

- The first hypothesis assumes that demographic factors are the determining factors of intra-community mobility from Romania. We expect a positive indicator of the regression coefficients for the size of the population in the destination country and the outflow of emigrants from Romania, as well as for the previous stock of Romanian already in the destination country, and the annual inflow.
- The second hypothesis assumed that the states with a favourable socio-economic situation are the states which attract a higher volume of emigration. We expect a negative indicator of the regression coefficients for the poverty rate in the destination country and a positive one in case of GDP per capita.
- The third hypothesis assumed that the distance between states is inversely related to the inflow of Romanians, so greater the distance between capitals, smaller the number of Romanians emigrants.

The framework models proposed by us in this article have been estimated using both specifications, namely: fixed effects (FEM) and random effects (REM). Following the application of the Hausman test we obtained that the random effects modelling is more appropriate than the one with fixed effects. Hausman test uses the following assumptions:

H_0 : the preferred model is random effects

H_1 : the model is fixed effects

Considering that the p-value is higher than 5% we will accept the null hypothesis which suggests us to use random effects in our estimations.

The static gravity model applied to migration was extended to the following mathematical form:

$$\log M_{ij} = \beta_0 + \beta_1 \times \log Y_{it} + \beta_2 \times \log D_{ij} + \sum \beta_k \times \log P_{jht} + \varepsilon_{ij} \quad (2)$$

where M_{ij} = the migration outflow from Romania (country i) to the respective country of destination j , as inflows of foreign population,

Y_j = Population from country j ,

D_{ij} = Road distance between country i and country j ,

ε_{ij} = Residual variable,

β_i = Model parameters;

P_{jh} = List of explanatory variables specific to the country of destination.

In order to have a valid gravity model, we have to test the following hypothesis:

- **the lack of autocorrelation error** – The autocorrelation of random errors can be defined as the presence of a correlation between random perturbations, ordered temporally in the case of chronological series, or spatially, in the case of transversal series. Autocorrelation can be determined using the Durbin-Watson test which uses the following assumptions:

$H_0: \rho = 0$ (there is no autocorrelation of errors)

$H_1: \rho \neq 0$ (there is an autocorrelation of errors)

- **the lack of multicollinearity** – is determined by the presence of the correlation between exogenous variables. Multicollinearity occurs because two (or more) variables are related – they measure essentially the same thing.
- **the normality of the error distribution** – Gravity model assumes normality for the residual errors, which represent variation in Y which is not explained by the predictors. It may be the case that marginally (i.e. ignoring any predictors) Y is not normal, but after removing the effects of the predictors, the remaining variability, which is precisely what the residuals represent, are normal, or are more approximately normal. Normality of the error distribution can be determined using the Jarque-Bera test which uses the following assumptions:

H_0 : errors are normally distributed

H_1 : errors are not normally distributed

When the p-value is higher than 5% we will accept the null hypothesis, otherwise we will accept the alternative hypothesis.

All proposed econometric models were estimated using the E-Views 10.0 software package. We used logarithms to increase the matching of the data set and to reduce the variability in some variables.

The panel type model is much more restrictive in terms of:

- Estimation by a single coefficient of the impact of a variable on a group of time series dependent;
- With the help of the fixed effects we estimate specific coefficients for each time series (dependent variables);

- More extensive database when there is not enough history or the subject analysed has recently been measured;
- The main advantage of this type of modelling is that it allows you much greater flexibility in modelling the differences in the needles regarding individual behaviour.

The regression model used in this type of modelling is:

$$Y_{it} = \alpha_i + \beta_{it} \times X_{it} + \varepsilon_{ij} \quad (3)$$

where $i = 1, 2, 3, \dots, T$, $t = 1, 2, 3, \dots, T$,

Y_{it} = the value of the endogenous (dependent) variable for unit i at time t ;

X_{it} = the value of the exogenous (independent) variable for unit i at time t ;

ε_{ij} = deviation variable, for unit i at time t ;

α, β = the parameters (coefficients) of the regression model.

The results of a panel regression, compared to a regression that uses time series or only cross-sectional variables, has the advantage that it offers a double index on its variables. That is, the index shows the cross-sectional dimension (more precisely among the countries included in the analysis), and the index t the dimension of time (temporal).

5. Empirical findings and discussion

Considering the ones mentioned in the methodology section, we started the process estimation of static gravity models using an ordinary least squares (OLS) method. The most important empirical results of the estimation process for the proposed models are presented in the Table 3. These indicate that the inflow of emigration is influenced by several demographic and geographic factors, depending on the model.

The outcomes are based on random effects estimation, and we tested the lack of autocorrelation error, the lack of multicollinearity, and the normality of the error distribution.

Notwithstanding of the model, almost all the parameters of the variables included in the model are significant at a statistical threshold of 95% and in line with specialized literature. The results show that between the population of the country of immigration and the inflow of immigrants in a year, there is a direct connection, so the larger population in a host country will attract a higher number of Romanians. Unlike the size of the population, the higher the distance between the capitals (Romania vs. the capitals of the countries of emigration), the smaller is the inflow of immigrants.

In the first model we aimed to identify the correlation between the stock of migrants and the distance. One of the first results, which is in line with previous studies identified in the literature, refers to the stock of Romanian emigrants, which shows that it has a direct and positive influence on the inflow of migrants, so that the larger the stock, the more it attracts more new immigrants. The results obtained in our analysis are consistent with the results obtained from previous studies, which show that a 10 percent increase in bilateral migration stock leads to a four percent increase in bilateral migration flows over the next decade (Beine and Parsons, 2012; Bertoli and Fernández-Huertas Moraga, 2013). Another result is that individuals prefer the countries of destination, with a high population density, which can be

interpreted as an indicator of high standards of living (the coefficient of the variable is positive and statistically significant).

Table 3: Panel regression estimates

ln (Inflow Migration)	Model 1	Model 2	Model 3	Model 4
ln (Stock Migration)	0,020 (0,181)	0,340** (0,152)	0,306* (0,876)	0,483*** (0,158)
ln (Population)	1,396*** (0,345)	0,980*** (0,265)	0,999*** (0,269)	0,745** (0,292)
ln (Distance)	-1,482* (0,907)	-2,205** (0,101)	-0,729* (0,385)	-0,753 (0,993)
ln (Risk Poverty)		-1,238** (0,517)	-1,264** (0,520)	
ln (Corruption)				1,637** (0,544)
ln (Unemployment Rate)				-0,881** (0,231)
ln (GDP per capita)	2,263*** (0,459)			
ln (Language)			-0,049 (0,119)	
Constant	-3,787*** (0,860)	-0,479 (0,754)	-0,289 (0,876)	-1,654** (0,644)
Observations	70	70	70	70
R-squared	54,63%	58,88%	59,38%	61,16%

Robust Standard Errors in parenthesis

**** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

However, the analysis of the flow of the Romanian emigration raises questions regarding the influence of these factors compared to the economic determinants, if we consider the diminution of the flow to the states where the stock of Romanians is very high (Italy, Spain) and the increase of some destinations where previously present Romanians were insignificant (Denmark, Holland).

Many studies explicitly consider GDP per capita as an explanatory variable. Our study underlines the influence of the economic conditions of the country of destination, namely the level of poverty and the level of unemployment as defining aspects for the Romanians' decision to emigrate. Thus, in all models, the coefficient of GDP per capita is positive and has a strong statistical significance, thus confirming the hypothesis that there is a high probability that the emigration flows will decrease during the recession and increase during the periods of economic growth.

In the second and third models, we include the risk of poverty, which is inversely proportional to the flow of emigrants, so that if the risk of poverty increases, emigration decreases. The results regarding intra-community migration flows are in line with the previous findings on migration flows (Biagi et al., 2011), which have shown that economic and labour market variables, especially poverty and unemployment, are determinants of long-distance migration flows.

The analysis of the impact of a common language, included as a variable in model 3, confirmed that the migration flow decreases when the ability to learn the language of the host country is increased by similarities, but the parameter is not significant within the model.

The model 4 includes additional variables such as corruption or unemployment rate. Our results are in line with the data obtained by Bertoli (Bertoli et al., 2013; Bertoli and Fernández-Huertas Moraga, 2013), which shows that a high unemployment rate has the effect of reducing the flow of migrants. Another result relates to the level of unemployment in the country of destination, so Romanian emigrants tend to change their migration behaviour and to orient themselves towards countries that somehow provide them with various employment opportunities.

Analysing the reliability of the model, we can see that we are obtaining an improved model, once we introduce new variables. Thus, in the case of model 3, we receive a model quality of 59%, so that 59% of the flow of Romanian emigrants is influenced by the variation of the variables included in the model. Even more, in the fourth model, the quality was 61%. The remaining 39% is represented by other factors that were not taken into account in the model.

6. Conclusions

In this paper, we analyse the effects of the particular economic, demographic and social variables on the intra-community mobility from Romania in the period 2010-2017. The gravity model was applied to panel data to assess the intensity and direction of the impact of the potential determinants for ten destination states (Austria, Belgium, Denmark, Germany, Hungary, Italy, Netherlands, Portugal, Spain, United Kingdom), which indicate the usefulness of such an approach in modelling the phenomena of intra-community migration in Romania.

The economic characteristics of the countries of destination, measured by GDP per capita, the risk of poverty, and the level of unemployment are one of the most important factors of attraction, having a positive and statistically significant coefficient in all the estimated models. Unemployment rate supports the hypothesis that Romanian immigration is generated by the search for better employment opportunities and confirms the significant role of the labour market in relation to intra-Community emigration.

Other important attraction factors, with positive influence and with statistically significant coefficients, identified in the analysis carried out are: population density (as an indicator of the degree of development) but also the volume of the stock of Romanian migrants in the state of destination, which confirms the results obtained by Bunea (Bunea, 2012), namely that the existing social networks and the availability of information tend to catalyse future immigration.

In summary, we can confirm the working hypotheses based on the obtained results. We have obtained a positive relationship between the outflow of emigrants and the size of population in the destination country, as well as with the previous stock of Romanian already in the destination country. Also, the results underlined that Romanian emigrants are attracted by the states with a favourable socio-economic situation, while the poverty rate act as a discouraging factor for mobility.

Thus, in addition to the scientific usefulness of the study that performs an analysis of these factors for emigration from Romania, we consider that the study also has a practical utility, in

the sense in which it may represent the basis for the elaboration of some public policies on emigration that take into account these results.

The approach presented does not cover all possible options in relation to the phenomenon of migration. Among the problems that remain open for examination, the following should be mentioned: an in-depth analysis of the determinants of migration in times of crisis, or the spatial relationships that may arise in the case of migrations determined by political factors. As a future research direction, we consider it useful to extend the analysis by including all EU Member States in the analysis, to identify the changes imposed in the volume and destination of the Romanian emigration since 2020 as consequence of Brexit, to obtain an image of other determinants in choosing a specific destination in this case.

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Annex I. Definition of variables

Indicator	Source	Definition
Inflow Migration	International Migration Database OECD	The migration flow from Romania to the respective country of destination (thousands of people), in the form of inflows of foreign population according to the criterion of nationality
GDP per capita	Eurostat	It is defined as the value of all goods and services produced less the value of any goods or services used in their creation, euro per capita.
Distance between capitals	European Commision, Erasum guide	Represents the distance between the capital of Romania and the capital of the countries included in the analysis
Stock Migration	International Migration Database OECD	The migration stock from Romania to the respective country of destination (thousands of people).
Corruption	Transparency International Romania	It is a composite index, which is based on data on corruption from specialized surveys conducted by several leading independent institutions.
Population	Eurostat	Total population at 1st January
Risk Poverty	Eurostat	People at risk of poverty or social exclusion
Unemployment Rate	Eurostat	The unemployment rate is the number of people unemployed as a percentage of the labour force.
Number of Romanian citizens on 1 January by country of residence	Eurostat	The number of inhabitants on 1 January of the year in question (or, in some cases, on 31st December of the previous year).
Language	Europe's Mosaic of Languages by Harald Haarman	Number of common languages