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## **MACRO-ECONOMIC DETERMINANTS OF MIGRATION. A COMPARATIVE ANALYSIS FOR OLD VS. NEW EUROPEAN MEMBER STATES**

***Abstract.** The objective of this paper is to identify and measure the macro-economic factors having a significant impact on migration flows in European countries. A comparative analysis is proposed between Old Member States (traditionally receiving countries for migrants) and New Member States (with lower net migration rates). Thus, two panel data regression models are estimated for identifying the determinants of net migration (period 2000 – 2017). The factors considered are consistent with the migration theories: labour market factors (unemployment, income), social factors (Gini inequality coefficient, poverty rate) and other factors (economic freedom, health system). Obtained results confirm the economic theories of migration. Unemployment is a significant and strong supply push factor for migration, while income emerges as a significant factor only for the Old Member States. Inequality is endorsed as a significant push factor for all countries, while economic freedom has a significant positive influence on the net migration rate only for the New Member States. Health related variables are not validated as migration determinants. The findings of this paper can be further used for developing migration projections but also for establishing migration policies recommendations that could lead to better integration of migrants.*

***Keywords:** migration, migration determinants, panel data regression, unemployment, earnings, economic freedom, Gini index.*

**JEL Classification: F22, E24, O15**

### **1. Introduction**

Migration is a very complex phenomenon, involving macro-, meso- and micro- triggers that combined determine the final decision of the individual to migrate. Apart from constituting an important component of the change in population, migration is also a key element for population forecasts and also for labour market force projections. As highlighted by Jennissen (2004), the presence of migrant population would have a positive influence on the natural population growth, considering the age-characteristics and fertility rates of migrants are

commonly higher compared to those of the local population. Moreover, for European countries, mostly showing a decline in the natural population growth, the migration phenomenon is much more relevant for population growth. In this context it becomes very important to identify and quantify the drivers involved in the decision to migrate. These can be macroeconomic drivers (not dependent on the individual), mesoeconomic (that are closer to the individual but not entirely under his control) and microeconomic (entirely related to the individuals' characteristics). In this paper we will focus on the *macroeconomic factors that trigger migration*.

Several migration theories identified as factors influencing migration: income differences or income inequality, economic development, the tax system, economic cycle, the opportunity of new working places, unemployment and others (Kumpikaite and Zickute, 2012). People choose to migrate in order to find better living conditions or to escape from unfavorable situations in their home country. This is the fundamental of the push and pull theory that was first put forward by Lee (1966) and constitutes one of the main neo-classical theories of migration. The supply-push factors influence the individual to move from the origin country, while demand-pull factors attract the migrants to the destination country.

Considering the growing interest and importance for the subject as outlined above, *this paper proposes a multidimensional perspective to identify and quantify the macro-economic factors having a significant impact on migration flows for European countries*. Since traditionally western European economies are receiving countries for migrants, while ex-communist ones are sending countries with lower figures for the net migration (Jennissen, 2004), we assume an additional research objective: *a comparative analysis between macro-economic determinants of migration in Old vs. New Member States of the European Union*. Thus, two panel data regression models are used to identify the triggers of net migration. The factors considered are in line with the migration theories and they can be split in three categories: factors related to the labour market (unemployment, income), social factors (Gini inequality indicator, poverty rate) and other factors (economic freedom, health system). According to the rational expectation theory (Haug, 2008), individuals decide to migrate in the country where the sum of factors benefit is the highest. As such, *a novelty element of the paper is considering in the model variables to assess the health system of the host country to test whether this aspect is taken into consideration by migrants when choosing their destination country*.

*Results confirm there is a difference between migration determinants in Old vs. New Member States*. Unemployment and Gini are common push factors for both categories of countries, but Income is a significant pull factor only for the Old Member States, confirming the receiving country status of these economies. Economic Freedom is a significant factor only for the New Member States, thus there is a higher marginal utility of economic freedom for migrants coming to new member states. Estimation results also show that the health system (measured by the number of hospital beds and by the health expenditure) is not a significant determinant for the migration decision.

The paper unfolds as follows: next section presents a literature review of seminal but also recent migration studies focusing on factors of migration; chapter 3 introduces the methodology; chapter 4 presents the empirical results; the following chapter is devoted to results and discussions. Finally, the last section of the paper draws the main conclusions and implications of the results for policy makers.

## 2. Literature review

One of the first attempts to identify the determinants of migration dates from over one hundred years ago, when Ravenstein (1889) set out the “rules” or “principles” of migration. One of this principles stated that the main causes for migration are economic, as individuals look to maximize their earnings moving to places with higher wages. This laid the foundation of the neo-classical theory (Hicks, 1932) which considers that differences in earnings determine the migration flows from a low to a high wage region and triggers the reallocation of resources to a new equilibrium. In this way, the earnings imbalance will adjust to the same level in all countries (Massey, 1993). An extension of this theory is offered by Harris-Todaro (1970) who introduce a probability of employment in the utility function of migrants. In this new approach, the migration depends on the expected and not on the actual difference in earnings. Migrants choose the destination that maximizes their earnings weighted with the probability to find a job in the destination region. In a different paper, variables such as income, unemployment, urbanization in origin and destination countries are found to be significant triggers of migration (Todaro, 1980).

The difference in earnings is usually studied together with the unemployment, most papers treating them jointly as integral components of the migration process (Josifidis et al., 2014). Usually, low-wage destinations display high unemployment rates (Eggert et al., 2010). What is more, high wage regions tend to have more high-skilled workers. Due to this high demand of high-skilled workers they attract also foreigners which causes a brain drain out of poorer regions or countries. Thus, economic factors such as unemployment or wages and earnings are important determinants that trigger migration. We will keep in mind that differences in incomes across countries have frequently been argued to be the main root cause of migration.

Another strong relationship is the one existing between migration and poverty. Usually migration is seen as an escape from poverty. Stark et al. (2009) consider relative poverty a more accurate indicator than absolute poverty. The relativity dimension of poverty is explained by the fact that people might feel poor when comparing themselves with others in order to find that their income is lower than others' income. In this context, the household members decide to migrate not necessarily to increase the absolute income in the household, but rather to improve the position of the household in relation to a reference group. A study on internal

migration in Germany from eastern to western Germany in 1990 showed that the aversion to relative deprivation is an important factor in the magnitude of migration. (Hyll, Schneider, 2014).

Closely related to the relative deprivation is the income inequality in the origin as a factor contributing to the intensity of migration. Inequality refers to the distribution of economic measures (e.g. income) among individuals in a group within a population (in a country for example). Stark (2006) found that the income inequality measured by the GINI coefficient is positively related to the Total Relative Deprivation. Moreover, the significant relationship between income inequality and migration can be confused with that between Total Relative Deprivation and migration. Czaika (2013) finds, using data from developed and developing economies, that income inequality at origin has a negative correlation with migration rates. Moreover, Mihi-Ramirez et al. (2017) find that the income inequality (measured by the Gini index) is positively related to developed (rich) countries in EU28, but not significant for developing (poor) countries in EU28. Thus, there is a contradictory relationship between income inequality at origin and the migration response to this factor, measured by the Gini index.

In a more recent study, Stark et al. (2020) try to provide an explanation of these inconclusive results regarding the Gini coefficient and the intensity of migration. They conclude that when studying incentives of migration, there needs to be made a distinction between two measures of income inequality – the Gini coefficient and the total relative deprivation (calculated as the Gini coefficient multiplied with the disposable income in a population and the population size). Although it is expected the two would yield the same qualitative change in the inequality, based on data from EU countries (2018), the direction of the relationship between the two differ from country to country. Their work provides evidence that for a given change in incomes, the Gini coefficient and the Total relative deprivation can behave differently.

Another string of literature studied the effect of corruption as a push factor of migration. For instance, Dimant et al. (2013) use a panel of 111 countries and confirm corruption as a determinant of migration, especially for skilled migration. However, it appears that the relationship is valid also for non-skilled migration (Cooray and Schneider, 2014). This conclusion is reinforced by Poprawe (2015) who uses a gravity model on OECD countries to show that high corruption discourages immigration but is a trigger for emigration. Countries with higher levels of corruption will offer a less secure business context and thus worse working conditions, encouraging individuals to move to countries with lower levels of corruption (Poprawe, 2015).

Adding to this, Hall and Lawson (2014) conclude that the economic freedom also indirectly influences migration, since higher economic freedom is usually positively associated with a higher economic growth. For EU countries, Mihi-Ramirez et al. (2017) show that the economic freedom index has a strong

positive effects on migration in all European countries (demand pull-factor), but with more relevance in the group of poorer economic countries.

To sum up, based on the findings in the literature review, the following determinants will be included in the models as potential factors for migration: unemployment rate, income, poverty rate, Gini index, Economic Freedom index. Additionally, we will consider also two variables assessing the health system status: number of hospital beds and health expenditure as percentage of GDP. Only two variables to characterize the health system were included considering limited availability for other variables (e.g.: medical doctors per hundred thousand inhabitants).

### 3. Methodology

Panel data analysis is the analysis of datasets in which entities are observed across times and it allows for controlling a certain type of omitted variables without actually observing them. By studying the changes in the dependent variable over time, one can exclude the effect of the disregarded variables that are different across entities but are constant over time. The main idea is that if unobserved variables (specific to countries for example) affect the dependent variable but remain constant in time it follows that the changes in the dependent variable must arise from other sources. The notation for panel data will be the following:

$$(x_{1,it}, x_{2,it}, \dots, x_{k,it}, y_{it}), i = 1, 2, \dots, n; t = 1, 2, \dots, T$$

Where “ $i$ ” is the subscript for the entity being observed (in our case study the country) and “ $t$ ” is the subscript for the date at which the entity is observed (in our case study the year). Using these notations we would have data for the variables  $x_1, x_2, \dots, x_k, y$ .

The main advantage that motivate using panel data related methods is that in panel data estimation, the individual heterogeneity of individual entities (countries) can be taken into account explicitly; moreover, combining time series with cross-sectional observations, panel data offers “more informative data, more variability, less collinearity, more degrees of freedom and more efficiency” (Baltagi, 2001).

A first type of method in dealing with panel data is the fixed effect regression model (which we will denote with FE). In this method, one controls for omitted variables in panel data when these omitted variables vary across countries (entities), but are time invariant. FE remove the effect of these time invariant characteristics from the independent variables in order to assess the net effect of the independent variables on the dependent variable. An important assumption to mention is that these characteristics are unique to the individual and should not be correlated with the others.

One way to take into account the countries’ individuality is to include  $n$  different intercepts in the model, one for each country, but still assume the

coefficients of the independent variables are constant across entities. In this case, the fixed effects model would be written as:

$$y_{it} = \beta_1 x_{1,it} + \beta_2 x_{2,it} + \dots + \beta_k x_{k,it} + \alpha_i + u_{it} \quad (1)$$

Where:  $x_{j,it}, j = 1, 2, \dots, k$  – represents the value of regressor  $j$ , for entity  $i$  and time period  $t$ .

$\beta_j, j = 1, 2, \dots, k$  – represent the coefficients of the independent variables, that do not vary across individuals.

$\alpha_i, i = 1, 2, \dots, n$  represent the entity specific intercepts.

Stock and Watson (2003) suggest the following form of the time invariant intercept,  $\alpha_i$ :

$$\alpha_i = v + z_i, i = 1, 2, \dots, n. \quad (2)$$

Where  $z_i$  is an unobservable variable that varies from one entity (country) to the next but does not change over time (for instance  $z_i$  could represent the cultural attitudes specific to the society). The variation in the entity fixed effects ( $\alpha_i$ ) comes from the omitted variables ( $z_i$ ) that vary across entities but not over time.

Alternatively, the entity specific intercepts in the fixed effects model could be expressed using binary (dummy) variables. The dummy variables would absorb the influences of all omitted variables that differ from one country (entity) to another, but remain constant in time. One should pay attention for introducing only  $(n-1)$  dummy variables:

$$y_{it} = \beta_0 + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \dots + \beta_k x_{k,it} + \gamma_2 D_{2i} + \dots + \gamma_n D_{ni} + u_{it} \quad (3)$$

Where:  $D_{2i} = 1$  if  $i = 2$  and 0 otherwise,  $D_{3i} = 1$  if  $i = 3$  and 0 otherwise.

$\beta_j, j = 1, 2, \dots, k$  will be the same as in model (1).

Equations (1) and (3) are equivalent considering:

$$\alpha_1 = \beta_0; \alpha_i = \beta_0 + \gamma_i, i \geq 2.$$

In order to estimate a fixed effects model, two approaches can be used. The first one is by estimating model in equation (3), the LSDV (Least Squares Dummy Variable) model. It is an easy to estimate model, but the problem appears when there is a large number of sections (or entities) in the panel data. If this is the case, the number of parameters to be estimated increases and consequently the model loses many degrees of freedom. As per Baltagi (2001), even if the estimated coefficients of the regressors ( $\hat{\beta}_j$ ) are consistent, the coefficients of the individual effects ( $\hat{\gamma}_j$ ) are not.

An alternative strategy is to use the so-called “entity-demeaned” OLS algorithm (as per Stock & Watson, 2003). The steps of this algorithm, also known as the “within” algorithm are:

- 1) Compute the group means for each individual group:  $\bar{x}_{j,i}, \bar{y}_i, \bar{u}_i, j = 1, \dots, k; i = 1, \dots, n.$
- 2) Transform the dependent and the independent variables in deviations from their group means:

$$\begin{aligned} \widetilde{x}_{j,it} &= x_{j,it} - \bar{x}_{j,i}, i = 1, \dots, n; j = 1, \dots, k. \\ \widetilde{y}_{it} &= y_{it} - \bar{y}_i, i = 1, \dots, n. \end{aligned}$$

3) Run OLS on the transformed model:

$$\widetilde{y}_{it} = \beta_1 \widetilde{x}_{1,it} + \beta_2 \widetilde{x}_{2,it} + \dots + \beta_k \widetilde{x}_{k,it} + \widetilde{u}_{it} \quad (4)$$

Thus, the coefficients of the independent variables are estimated by OLS regression of the “entity-demeaned” variables. However, since model (4) does not have intercept, the coefficient of determination for this model is not the accurate one.

Another method of estimating panel data regression is by considering the random effects approach. In the random effect method, the unobserved variable specific to the individual entity is encompassed in the error term. The entities will have a common mean value for the intercept (let's denote this with  $\alpha$ ) and the specific differences in the intercept values of each country would be reflected in an error term (denoted with  $\varepsilon_i$ ).

$$y_{it} = \alpha + \sum_{j=1}^k \beta_j x_{j,it} + \varepsilon_i + u_{it} \quad (5)$$

We will obtain a composite error term,  $w_{it}$  which is composed of  $\varepsilon_i$ , the individual (cross section) specific error and  $u_{it}$ , a combined both cross section and time series error:

$$w_{it} = \varepsilon_i + u_{it} \quad (6)$$

Thus substituting equation (6) in (5), we obtain:

$$y_{it} = \alpha + \sum_{j=1}^k \beta_j x_{j,it} + w_{it} \quad (7)$$

The difference between the fixed and the random approach is that while in the fixed approach model each entity has its own intercept value, in the random effects model the intercept ( $\alpha$ ) is the common to all entities (is the mean value of all the entities intercepts) and the error  $\varepsilon_i$  is the random deviation of each entity's individual intercept from the mean value. As in the fixed effects model,  $\varepsilon_i$  is not observable, it can be considered a latent variable.

The assumptions regarding the error term are the following:

$$\varepsilon_i \sim N(0, \sigma_\varepsilon^2); u_{it} \sim N(0, \sigma_u^2); E(\varepsilon_i u_{it}) = 0; E(\varepsilon_i \varepsilon_j) = 0, i \neq j.$$

$$E(u_{it} u_{is}) = E(u_{it} u_{jt}) = E(u_{it} u_{js}) = 0, i \neq j; t \neq s.$$

Thus, the assumptions sustain that the error components are not correlated neither with each other, nor across entities or time series units. From the above assumptions, it follows that:

$$E(w_{it}) = 0; var(w_{it}) = \sigma_\varepsilon^2 + \sigma_u^2$$

Moreover, it can be shown that error terms for same entity are correlated as follows:

$$cov(w_{it}, w_{is}) = \begin{cases} \sigma_\varepsilon^2, & t \neq s \\ \sigma_\varepsilon^2 + \sigma_u^2, & t = s \end{cases}$$

$$corr(w_{it}, w_{is}) = \frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + \sigma_u^2}, t \neq s$$

This means that for each entity, the correlation between two errors at two different time periods remains the same, irrespective of the lag between the two time periods. Secondly, the correlation structure of the error term is the same also between different entities (cross-sections).

The correlation structure of the error term is important because it has to be taken into account when estimating the parameters of the model. Since the error terms are correlated, one cannot apply OLS to estimate the parameters, rather GLS (Generalized Least Squares). Since usually the true value for  $\sigma_\varepsilon^2$  and  $\sigma_u^2$  are unknown, the Feasible Generalized Least Squares method should be used.

To illustrate this, first the matrix notation will be introduced. Thus equation (7) can be written in matrix notation as:

$$Y_i = V_i\gamma + W_i$$

Where:  $V_i = [1, X_i]$ ,  $\gamma = (\alpha, \beta)'$  and  $W_i = \varepsilon_i I_T + U_i$

The covariance matrix for the error term can be written as:

$$E[W_i W_i'] = \Omega = \begin{bmatrix} \sigma_\varepsilon^2 + \sigma_u^2 & \cdots & \sigma_\varepsilon^2 \\ \vdots & \ddots & \vdots \\ \sigma_\varepsilon^2 & \cdots & \sigma_\varepsilon^2 + \sigma_u^2 \end{bmatrix}; E[U_i U_i'] = \begin{bmatrix} \sigma_u^2 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & \sigma_u^2 \end{bmatrix} = \sigma_u^2 I_T$$

The feasible GLS estimator is determined as:

$$\hat{\gamma} = \left( \sum_{i=1}^n V_i' \hat{\Omega}^{-1} V_i \right) \sum_{i=1}^n V_i' \hat{\Omega}^{-1} Y_i$$

Where

$$\hat{\Omega} = \hat{\sigma}_\varepsilon^2 I_T I_T' + \hat{\sigma}_u^2 I_T$$

The variance of  $\varepsilon_i$  error component is estimated by  $\hat{\sigma}_\varepsilon^2$  using the group mean regression (“between” regression), while the variance of the  $u_{it}$  component, estimated by  $\hat{\sigma}_u^2$  is based on the Fixed Effects “within” estimator introduced above (eq. 4). Estimation of all models was done in Stata 13.

## 4. Results' of model estimation

### 4.1 Database description

The dependent variable used in the two estimated models is the Crude Rate of Net Migration plus adjustment. It is determined as the ratio of net migration to the average population of each year. It is expressed in 1000 persons (of the average population). Net migration is the difference between the total number of immigrants and the total number of emigrants; the statistical adjustments refers to adjusting the net migration by taking the difference between total population change and the natural change; roughly, the indicator covers the difference between inward and outward migration. The variable is named “Net Migration” in the model.

The following are the independent variables in the models:

- Unemployment: The long term unemployment rate represents the share of unemployed persons since 12 months or more in the total number of active persons in the labour market.
- Income: Adjusted Gross disposable income of households per capita is calculated as the adjusted gross disposable income of households and divided by the PPP (purchasing power parities) of the actual individual consumption of



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households and by the total resident population (in purchasing power standard (PPS) per inhabitant).

- Gini: the Gini Coefficient (of equivalised disposable income) is defined as a relationship between the cumulative shares of the population disposed based on the equivalised disposable income and the cumulative share of the equivalised total disposable income received by the population. The coefficient is expressed on a scale from 0 to 100.
- Poverty: At-risk-of-poverty rate is defined as the proportion of persons with an equivalised disposable income lower than the risk-of-poverty threshold; the risk-of-poverty threshold is considered 60% of the national median equivalised disposable income.
- Economic Freedom: 0 to 10 index that measures the degree of economic freedom present in five major areas: size of government, legal System, sound money; freedom to trade internationally, Regulation.
- Hospital beds: available beds in hospitals; the variable is considered per hundred thousand inhabitants.
- Health expenditure: total expenditure on health as percentage of GDP (%).

The data source for all variables except Economic Freedom is Eurostat. The data source for the Economic Freedom is the Fraser Institute.<sup>1</sup> Data has been collected for the period 2000 – 2017 (18 years), for 25 EU countries<sup>2</sup>.

#### 4.2 Justification of two models estimation

The distribution of the average Net Migration rates (period 2000 – 2017) for the EU countries is showed in Figure 1 below. It can be observed that the countries with the lowest average Net Migration for the period 2000 – 2017 are: Lithuania (-8.84), Latvia (-7.19) and Romania (-5.48). Bulgaria, Estonia, Poland and Slovakia also record negative averages of the Net Migration for the analysed period. This was expected since these Central and East European economies are traditionally sending countries for migration (Jennissen, 2004). On the other hand, the highest average Net Migration rates are recorded for Luxembourg, Spain and Sweden, traditionally receiving countries for migrants. This behaviour of the Net Migration rate suggests splitting the group of countries in two: traditionally sending and traditionally receiving countries for migration, since the determinants for migration could be different between the two.

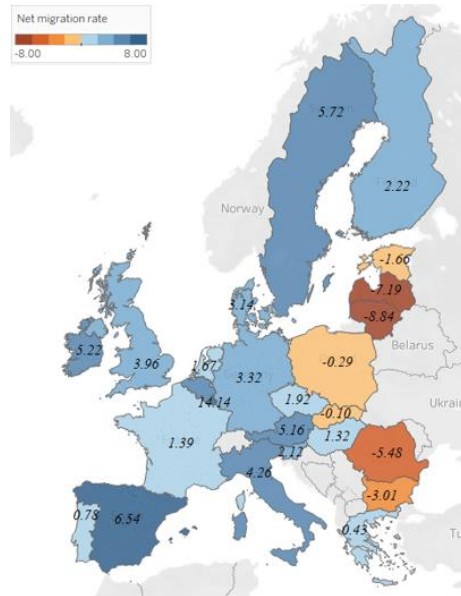
Figure 2 shows the strong correlation between the level of real GDP/capita, chain linked volume (2010) in Euro/capita and the Net Migration rate (averages for the period 2000 – 2017 were considered). Countries with lower GDP/capita have

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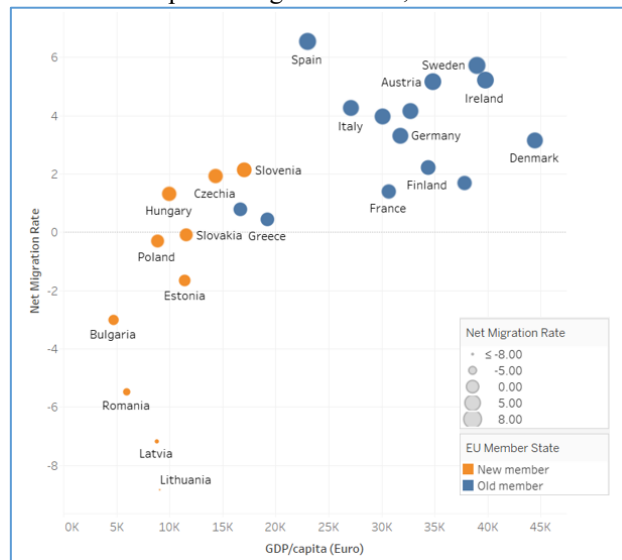
<sup>1</sup> <https://www.fraserinstitute.org/economic-freedom/dataset?geozone=world&min-year=2&max-year=0&page=dataset&filter=0>

<sup>2</sup> Croatia, Cyprus, Malta not included considered missing information. United Kingdom was included in the database.

also negative or low levels for the Net Migration rate, showing that the “poorer” countries are those generally originating the immigration flows (sending countries). On the opposite, countries with higher GDP/capita have higher migration rates, suggesting these are mainly receiving countries for migrants.



**Figure 1 – Average Net Migration for the period 2000 – 2017 for the EU countries**  
 Source: author’s processing in Tableau, based on Eurostat data



**Figure 2 – Net Migration rate vs. GDP/capita – comparison between old and new EU member states;** Source: author’s processing in Tableau, based on Eurostat data

Figure 2 introduces also the information regarding the quality of new or old EU member state. The new member states are considered those adhering after 2004. The Old Member States group is composed of: Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, United Kingdom, Austria, Finland, Sweden; the New Member States group will thus contain: Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Bulgaria, Romania.

The behaviour of Net Migration for old and new member states justifies splitting the dataset in these two groups. From this analysis it is straightforward that for the entire period analysed, *the group of New member states act as Sending Countries of migrants, while the Old member states take the role of receiving countries. Thus, the empirical application will be divided in two, one model estimated for the Old member states and another model will be estimated for the New member states.*

#### 4.3 Model Estimation for the Old Member States

Levin-Lin-Chu unit root tests show that the series are stationary at a 5% level of significance except for the variable “Hospital beds” (table 1). The first difference of the “Hospital beds” is stationary for a 0.1% level of significance. Thus, in the estimated model we will use the first difference for this variable.

**Table 1 – Unit-root test results for the variables included in the model (sample – old member states);** Source: author’s own results

Variable	t-statistic*	P-value	Stationarity
Net Migration	-3.36	0.0004	Stationary
Unemployment	-4.19	0.0000	Stationary
Ln_Income	-4.61	0.0000	Stationary
Gini	-1.71	0.0434	Stationary
Poverty	-2.15	0.0156	Stationary
Economic Freedom	-2.79	0.0026	Stationary
Hospital beds	0.73	0.7678	Non-Stationary
D. Hospital Beds	-4.00	0.0000	Stationary
Health expenditure	-4.19	0.0000	Stationary

\*Adjusted t, Levin – Lin – Chu

The results obtained from both the fixed and random effects models show that the variable Hospital beds (first difference) is not significant for explaining the variation in the migration rate (P-value 0.76 in the fixed effects model and as high as 0.992 for the random effects model). The coefficient associated with variable Gini is not significant in the fixed effects model (p-value 0.21), but it is significant at a 0.05 level of significance in the random effects model. In the re-estimated model after removing variable Hospital Beds, the coefficient of Gini remains

insignificant (P-value 0.29) in the fixed effects model, while the coefficients for all variables are significant at a 5% threshold in the random effect model (Table 2).

**Table 2 – Results of estimation for fixed and random effects models for Old Member States;** Source: author's own results

	Fixed Effects	Random Effects
Unemployment	-1.0468*** (0.0903)	-1.0295*** (0.0881)
Ln_Income	4.9042** (2.4037)	8.1458*** (1.5631)
Gini	-0.1777 (0.1691)	-0.3282** (0.1391)
Poverty	0.6876*** (0.1657)	0.7331*** (0.1417)
Economic Freedom	-4.5181*** (1.5230)	-2.9796*** (1.0923)
Health Expenditure	-1.4840*** (0.4175)	-1.7844*** (0.2965)
Intercept	-1.6247 (25.7912)	-40.0461** (17.8813)
R2	Within 0.4184 Between 0.6589 Overall 0.5056	Within 0.4109 Between 0.8405 Overall 0.5828
F	29.85***	229.47*** (Wald chi2)
Corr (u <sub>i</sub> , xb)	0.2190	0 (assumed)
Sigma <sub>u</sub>	2.0795	1.3274
Sigma <sub>e</sub>	3.0081	3.0081
Rho	0.3233	0.1629

\*\*\* Significant at 0.01; \*\* Significant at 0.05  
(standard errors of the coefficients are reported in parenthesis)

#### 4.4 Model estimation for the New Member States

The Levin-Lin-Chu unit root tests show that the series are stationary at a 5% level of significance, thus they will be introduced as such in the estimated models (Table 3).

Introducing all variables in the fixed effects and random effects models, we find that some variables are not statistically significant. Namely, the coefficient of variable Income is insignificant in both models at a 5% level of significance. Similarly, the coefficient of the *Poverty* variable is not statistically significant (P-value of 0.53 in the fixed effects model and 0.20 in the random effects model). Lastly, the coefficient of the variable Hospital Beds is also not significant (P-value

Macro-Economic Determinants of Migration. A Comparative Analysis for Old Vs. New European Member States

0.156 in the fixed effects model and 0.436 in the random effects model). After dropping the three variables, we obtain the estimates of the two models in Table 4.

**Table 3 – Unit-root test results for the variables included in the model (sample – new member states);** Source: author’s own results

Variable	t-statistic*	P-value	Stationarity
Net Migration	-17.4491	0.0000	Stationary
Unemployment	-5.6964	0.0000	Stationary
Ln_Income	-4.6007	0.0000	Stationary
Gini	-2.2864	0.0111	Stationary
Poverty	-2.7342	0.0031	Stationary
Economic Freedom	-4.3874	0.0000	Stationary
Hospital beds	-3.3559	0.0004	Stationary
Health expenditure	-3.0770	0.0010	Stationary

\*Adjusted t, Levin – Lin – Chu

**Table 4 – Results of estimation for fixed and random effects models for New Member States;** Source: author’s own results

	Fixed Effects	Random Effects
Unemployment	-0.3900** (0.1547)	-0.3893*** (0.1461)
Gini	-0.3527** (0.1377)	-0.5432*** (0.1226)
Economic Freedom	4.3493*** (1.1280)	4.3283*** (1.0755)
Health Expenditure	-1.1240* (0.5841)	-0.4513 (0.4765)
Intercept	-15.6762 (8.0909)	-13.3742** (7.5791)
R2	Within 0.1663 Between 0.0205 Overall 0.0855	Within 0.1483 Between 0.5198 Overall 0.3147
F	8.28***	38.90*** (Wald chi2)
Corr (u_i, xb)	-0.1069	0 (assumed)
Sigma_u	3.9181	2.2254
Sigma_e	3.5999	3.5999
Rho	0.5422	0.2765

\*\*\* Significant at 0.01; \*\* Significant at 0.05; \* Significant at 0.1  
(standard errors of the coefficients are reported in parenthesis)

#### 4.5 Robustness check

In order to choose between the fixed and random models estimated for the Old Member States, we apply the Hausman test (Table 5), whose result suggests that the random effects model is the suitable one.

**Table 5 – Hausman test results for the Old Member States**

Chi-Square	P-value
8.21	0.2228

Moreover, the Breusch and Pagan Lagrangian Multiplier test for presence of random effects shows that the panel effects exist in the model and thus have to be taken into consideration in estimating the model. Thus, from an econometric point of view the right model for the Old Member States sample is the random effects model.

**Table 6 – Breusch and Pagan Lagrangian Multiplier random effects test results for the Old Member states**

Chi-Square	P-value
17.13	0.0000

Pesaran's test of cross sectional dependence shows that the residuals are not correlated across entities (P-value 0.25), thus there is no contemporaneous correlation in the random effect model. However, the heteroscedasticity test shows that the random effects model is affected by heteroscedasticity, thus the model is re-estimated using the robust option. The results are not very different compared to the original model

The Hausman test for the fixed and random effects models estimated for the New Member States shows that the fixed effects model is the most suitable in this case (Table 7).

**Table 7 – Hausman test results for the new member states**

Chi-Square	P-value
20.91	0.0003

#### 5. Results and discussions

Firstly, the results obtained for the factors related to the labour market will be discussed. Unemployment and differences in earnings are usually considered jointly in analysing the determinants of the migration process. The long-term unemployment undertakes better the migration processes. This can be explained by the fact that migrants usually search for a job in their origin country for a longer period and only after the job-searching action has no results they decide to emigrate. As per Jennissen (2003), the labour market differences between sending and receiving countries can be levelled out by the eliminating disparities in unemployment levels. What is more, it is argued that the migration process is determined by the unemployment (thus labour market conditions) at destination. This assumption is validated in both estimated models, since the coefficient associated with variable unemployment is highly significant (at 1% significance level) and *has a negative sign both for the model estimated on the Old and New*

## Macro-Economic Determinants of Migration. A Comparative Analysis for Old Vs. New European Member States

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*Member States. This confirms that unemployment is an important supply-push migration determinant, as theorized by Jennissen (2003).*

Regarding the income, based on the neo-classical economic theory of migration, the differences of earnings between countries constitute the main factor of labour migration (Massey et al, 1993). For the Old Member States model, for the Income variable it was obtained a highly significant coefficient (at 1% level of significance) with a positive sign. *This is a strong support for the neo-classical economic migration theory and certifies that people tend to move from low-income sending countries to high-income receiving countries*, which are the Old Member states in our model. However, the coefficient related to variable Income is not significant for the model estimated on the New Member States model. *This was expected, since New Member States are mostly sending countries and to a lower extent receiving countries for migration, thus the earnings in this group of countries doesn't act as a pull factor for migrants, as it is the case for the Old Member States.*

Secondly, we will discuss the results obtained for the social factors. The Gini coefficient is a proxy for the inequalities, an indicator that gained a lot of popularity. Circular cumulative theory (Stark, Taylor 1989) argues that people from economies with higher inequalities are also more prone to migrate. In both Old and New Member States models, the coefficient of the Gini variable is significant at a 5% significance level and is negative in both cases. *Thus, inequality (measured by the Gini coefficient in the models) has a significant negative effect on the crude rate of net migration both for Old Member states and for New Member States.* This supports the neo-classical theory considering migration the consequence of inequalities, validating the Gini coefficient as a supply-push factor for all European economies. As opposed to the results obtained for the Gini coefficient, the poverty level of the receiving country is not a significant factor for the New Member States. For the model including the Old Member States the association between poverty and crude rate of net migration is significant and positive. The positive sign of the coefficient appears to contradict the theory of Stark et al. (1988) that the incentive to emigrate will be higher in countries that experience more economic inequality and poverty. However, one has to consider that the model is estimated only for the old Member States, thus developed countries with lower poverty levels and as stated earlier, traditionally receiving countries for migrants. Moreover, the new economics of migration highlights that not only poverty is an important factor for migration, but also relative poverty – given by the economic position of a household in relation to other households in the community. Hence, the main aspect we contain is that the absolute poverty rates in the Old Member States do not discourage immigrants to choose these countries as their migration destination.

Lastly, we obtained a positive, highly significant coefficient (at 1% level of significance) associated with the Economic Freedom only for the New member states. Economic freedom is a determinant of migration, in that people tend to

move away from economies with lower economic freedom to those with more economic freedom (Hall and Lawson, 2014). The obtained result is also consistent with the results obtained by Mihi-Ramirez et al. (2017) *who argue that this result can be justified with a higher marginal utility of the economic freedom for developing European economies (new member states) compared with developed European economies (Old Member States)*. Otherwise said, economic freedom weights more or is more valuable in migrants coming to New member states. This might explain the negative coefficient, borderline significant in the robust estimation (at 10% level of significance) associated with the Economic Freedom for the Old Member States. The reasons migrants choose as their host country a developed European economy are related directly to Income, while Economic Freedom is just a secondary aspect considered.

By including the Health Expenditure and the Number of Hospital beds variables as possible determinant factors in our models, we wanted to test whether migrants consider the better health system when moving to a different country (both factors having a positive association with the health system). The theoretical motivation for this lies in the circular cumulative causation theory arguing that reasons of migration are differences in living standards between different countries (Massey et al. 1993). Nonetheless, the coefficient of the variable Hospital beds is not significant in any of the models, while the coefficient of Health Expenditure is significant at a 1% level of significance for both models. However, the coefficient of Health Expenditure is negative, *thus we cannot conclude that migrants consider the health system when choosing their host country*.

### **Conclusions**

Migration theories have proposed several potential factors that could trigger international migration. These include neoclassical theories of migration, new theories of migration and one of the most popular theories to determine the causes of migration, the push and pull theory (Kumpikaite and Zickute, 2012). However, apart from descriptive studies, empirical macro-econometric models to test these migration theories were scarce.

The objective of this paper is to determine and assess the macro-economic – labour, social or health related determinants of migration in Europe. We used panel data regression models to quantify the impact of macro-economic factors on the Crude Rate Net Migration of European economies. A preliminary analysis of the dependent variable's distribution shows a different behaviour of this net migration rate for Old Member States (receiving countries for migrants) and New Member States (sending countries for migrants). Thus, we decide to estimate two models for the two groups of countries, consistent with the approach of Mihi-Ramirez et al. (2017). The independent variables included were: Unemployment rate, Income per capita, Gini coefficient, At-risk-of-poverty rate, Economic Freedom Index and two other factors related to the Health system (number of beds in hospitals and health expenditure as percentage in GDP). The analysed period was 2000 – 2017. Levin-Lin-Chu panel unit root tests were applied to verify the



stationarity of the variables included in the models. Hausman test showed the random effects model is the best fit for the Old Member States model, while the fixed effects one was the best fit for the New Member States model.

Results obtained confirmed the economic theories of migration. For the labour dimension, unemployment turns out to be a significant and strong supply push factor for migration. Income emerges as a significant determinant only for the group of Old Member states, confirming the neo-classical economic theory of migration stating that the differences of earnings between countries represent one of the main factor of labour migration (Massey et al, 1993). Moving on to the social dimension, the Gini coefficient is confirmed as a significant push factor for migration both for Old Member, as well as for New Member States. Poverty appears to be a factor with a lower explanatory power, not significant for the group of New member states and with a positive coefficient for the Old Member States. As far as the Economic Freedom is concerned, the factor has a significant positive influence on the net migration rate only for the New Member States. Finally, health related macroeconomic variables were introduced in the model also considering the circular cumulative causation theory stating that reasons of migration are differences in living standards between different countries (Massey et al. 1993). However, the health system could not be validated as a migration determinant.

International migration has a significant impact on the European population dynamics, thus for all these reasons, identifying and studying the factors determining international migration becomes of high importance. The results of this paper could be further used for developing migration projections but also to develop migration policies that could lead to a better labour and social integration of migrants.

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