Does migration influence corruption in Europe?

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Abstract. *Corruption and migration influence the country level of development, so they have been debated and studied for a long time. Has been written a lot about the two phenomena and their relations with many social and economic factors, but the two also influence each other. The higher the level of corruption in a country, the more people will be more likely to migrate and vice versa. This study aims to study the link between the two phenomena considering the countries from Europe, over time, for the period 2008-2016, highlighting the implications in the economy. The variables analyzed are the Corruption Perception Index and the number of emigrants. The methods used are panel regression and cluster analysis and the processing and analysis was performed using the statistical software SAS (version 9.2) and SPSS (version 13 and 25). The findings show that there is a link at European level between the two phenomena, corruption and migration have a similar trend over time, and significant differences are registered between countries.*

Keywords: level of development, corruption, migration, panel analysis, cluster analysis, Europe

Introduction

Corruption and migration are phenomena that concern everyone, with various implications in many other areas, such as: political, social, demographic, medical and educational. Migration is a phenomenon that has existed since ancient times. People have migrated to find better conditions, both economic and social. After the fall of the Berlin Wall, migration has grown in Europe, reaching very high figures in the current period. In the period after 1945 the migration was restricted to the countries of Eastern Europe and the former Soviet Union. In 1989, the Soviet Union broke down and Communist regimes in Eastern Europe fell, one of the consequences being increased migration. The people choose to go where is appropriate for them, both economically and socially.

Migration is a consequence of globalization, divided internationally into: low skilled labor migration, high skilled labor migration, illegal migration, international travel, lifestyle

migration, environmental migration, trafficking in human beings and smuggling, asylum and refugee protection, internally displaced persons, Diaspora. Of all, the most irregular level is recorded by labor migration (Betts, 2001).

Migration is an emerging phenomenon that has the role of transferring tactical knowledge, abilities and capital (Williams, 2006). Exchanges between regions have increased both in terms of intensity, speed and scale. These exchanges involve exchanges of goods and services, but also the efforts required to respond to these challenges and to cooperate internationally (Faist, 2006).

The main factors influencing migration are grouped into three categories: i) economic and demographic rate - high unemployment rate, low wages, high poverty gap, lack of jobs, poor education and health conditions; ii) political conflicts, corruption and low levels of government; and iii) cultural and social discrimination, human rights abuses (Gurcinaite, 2014).

Migration is associated with the place of origin and destination, the obstacles and the personal characteristics that intervene, so that the intensity of migration is influenced by these factors. Changes in migration volume are correlated with the diversity of regions and populations with economic difficulties and fluctuations (Lee, 1966).

Corruption is a phenomenon faced by all countries; its intensity depends on economical, cultural, behavioral and educational factors. Corruption is quantified by the Corruption Perception Index, calculated by the Transparency International Organization. The Corruption Perceptions Index is a composite index that aims to identify the level of corruption in a country and offer the possibility of ranking the countries regarding corruption.

Studies over time have shown that developed countries have a low level of corruption, and the less developed one register a high level of corruption. Migration is related to the level of development, which means that we expect the number of emigrants to be higher in countries with high level of corruption, meanwhile the number of emigrants in the countries with a low level of corruption to be small.

This article presents the results that aim to establish the link between variables that describe corruption and migration across Europe over time. In the first stage, it is established whether there is a link between the two phenomena and the direction and intensity of the phenomenon, and the second stage establishes the relationship between them and the implications in the economy.

Literature review

The specialists reveal that the phenomenon of migration has many causes and numerous implications in many areas. The evolution of migration and its influence factors are one of the most discussed research topics in the literature, the main reasons for migration are financial, standard of living, living costs, corruption level, political system, health system, education.

Ariu and Squicciarini (2013) have studied migration and have determined that factors influencing the phenomenon of migration are: nature of workplaces, wages, immigration policies, living standards and living costs. Following the 1990 survey, they have determined that corruption is an important factor for migration. The conclusion of the study revealed

that skilled indigenous peoples would leave corrupt countries, seeking to go to countries with a lower level of corruption, where labor is supposed to be meritocratic. So, in corrupt countries there will be a shortage of human capital, they are attracted by less corrupt countries.

Dimant et al. investigates how migration is influenced by corruption, analysing 111 countries for a period of 15 years, between 1985 and 2000. The study's findings show that corruption is driving migration and diminishes the education return. Therefore, corrupt countries will experience a low level of education and high emigration figures.

In 2015, Poprawe presents a functional relationship between migration and corruption, using transversal data from 230 countries. The analysis shows that more corrupt countries encourage emigration and discourage immigration, as nobody is looking for unfavorable and unpredictable economic conditions, insecurity and low quality of life.

Dimant et al. establishes the link between migration and corruption using data from 207 OECD countries between 1984 and 2008. Using the fixed-effects model and Tobit regressions, it establishes that the influence of general migration on the country of destination is insignificant, while immigration from corrupt countries increases corruption in the destination country (Dimant et al., 2014).

Dunlevy analyses immigration from 50 countries to 87 foreign countries during 1990-1992 and the results indicate that the factor that most influences immigration is the corrupt political system (Dunley, 2006).

A study on corruption has been conducted in Ukraine, highlighting that both the political and socio-economic systems are governed by corruption. The results reveal that along with the financial factor, corruption is an important factor in the migration process (Lapshyna, 2014).

Pi and Zhou analyse corruption in connection with migration of skilled and unqualified people and their remuneration. The conclusion is that the reduction of corruption is reflected in the economic situation and the decrease in unemployment (Pi & Zhou, 2015).

Cooray and Schneider investigated the relationship between corruption and migration according to the level of education. The results showed that corruption influences the number of highly educated emigrants, and the number of low and middle school migrants increases to a certain level of corruption, after decreases. The conclusion of the study is that reducing corruption must be reflected in a high level of education and, implicitly, in a lower migration (Cooray & Schneider, 2014).

Methodology

The purpose of the study is to determine whether there is a link between corruption and migration, using empirical data. The analysis is related to 26 countries of Europe for the period 2008-2016 and the analysed variables are: number of emigrants and the Corruption Perception Index. The data source is the Eurostat¹ website and Transparency International², and the processing and analysis was performed using the statistical software SAS (version 9,2) and SPSS (version 13 and 25).

¹<http://ec.europa.eu/eurostat>

² <https://www.transparency.org>

CPI is the Corruption Perception Index, calculated by Transparency International. This index is rated on a scale of 1 to 100, low values of this index indicate a high level of corruption, and high values indicate a low level of corruption.

EM represents the number of emigrants.

The methods used in the analysis are: panel data analysis and cluster analysis.

For the analysis of corruption and migration from a transversal and longitudinal perspective, it is proposed to use the panel data analysis. A longitudinal study presents data from subjects of the same sample over time. These studies are conducted in a wide variety of contexts and for a wide variety of purposes, but in many situations they have considerable analytical advantages over transversal studies. These advantages have been increasingly recognized and appreciated in recent years, resulting an increased number of longitudinal studies. This increase occurred on governmental, academic and the private sector (Lynn, 2009).

Panel data is a set of cross-section data Y_{it} ($i = 1, \dots, n$ and $t = 1, \dots, T$) obtained from statistical observation of the variables characteristic of a group of n countries periodically, a defined time interval, T (Baltagi, 2005).

In panel data analysis, the following model for estimating the variation of a resultant variable according to the determinant factors is considered:

$$y_{it} = b_{0it} + b_{1it}x_{1it} + \dots + b_{kit}x_{kit} + w_{it} \quad (1)$$

Notations:

y_{it} – the values of the dependent variable;

x_{kit} – are the values of the independent variable, X_k , where:

$i = 1, \dots, n$ – n represents the countries;

$t = 1, \dots, T$ – t represents the periods of time, respectively the years.

Because the number of coefficients ($n * T * (k + 1)$) is greater than the total number of observations ($n * T$), the model is difficult to estimate based on traditional methods and it is necessary to use different coefficients. Thus, four canonical models can be defined: fixed effects (individual and transversal), compound errors (random effects), compound coefficients and random coefficients (Jaba et al., 2013).

The study considers model with fixed effects because we assume that the influence of the factorial variables (X_k) on the variable explained (Y) is the same for all countries, regardless of the time period. So, for estimating the impact of migration on the corruption in European countries for 2008-2016 period, the following model is proposed:

$$CPI_{it} = b_0 + a_i + d_t + b_1EM_{it} + w_{it} \quad (2)$$

Cluster analysis is used to classify the countries by CPI.

Cluster analysis assumes grouping similar observations in homogeneous subsets, revealing patterns related to the studied phenomenon. To evaluate if exists a similarity between objects, are used a remote function and a wide variety of grouping algorithms. First are calculated similarity measures between observations and once the observations are grouped into clusters are calculated similarity between clusters (Boccard et al., 2010).

Cluster analysis is an exploratory tool that sorts data vectors into homogeneous groups when adhesions to true clusters are unknown. Grouping methods are different, are

using similarity matrices or the distance between individual vectors and vector groups (Wilks, 2011).

The four major types of grouping methods can be: hierarchical, partitioning, overlaying, and ordering algorithms. Algorithms are validated by determining the ability of methods to recover cluster configurations that are known to exist in data (Milligan & Cooper, 1987).

Sokal and Michener developed group correlation matrices and the correlation method represent the base for hierarchical grouping algorithm (Sokal & Michener, 1958). The objective of hierarchical grouping algorithm is dendrogram. The dendrogram assembles all elements into a single tree. A node is created to joins two or more data and calculates a node expression profile by averaging the integrated elements (Eisen et al., 1998).

Results and discussions

A series of descriptive statistics on the estimated values of the corruption index in 2008-2016 are presented in Table 1. As can be seen, the average corruption index remained stable over time, around 62-66, the highest values were recorded over the past two years, 2015 and 2016. This can be observed, also from the figure no. 1.

Table 1. Descriptive statistics for the corruption perception index for 2008-2016 for Europe

Year	Statistics	Value
2008	Mean	64.7692308
	Standard Deviation	17.0160106
	Minimum	38.0000000
	Maximum	93.0000000
2009	Mean	63.3846154
	Standard Deviation	18.0888406
	Minimum	38.0000000
	Maximum	93.0000000
2010	Mean	62.8846154
	Standard Deviation	18.8538101
	Minimum	35.0000000
	Maximum	93.0000000
2011	Mean	62.5000000
	Standard Deviation	19.5576072
	Minimum	34.0000000
	Maximum	94.0000000
2012	Mean	63.4230769
	Standard Deviation	15.5516509
	Minimum	36.0000000
	Maximum	90.0000000
2013	Mean	63.6923077
	Standard Deviation	15.1993927
	Minimum	40.0000000
	Maximum	91.0000000
2014	Mean	64.5769231
	Standard Deviation	14.9054972

2015	Minimum	43.0000000
	Maximum	92.0000000
	Mean	66.0769231
	Standard Deviation	14.7781544
	Minimum	44.0000000
2016	Maximum	91.0000000
	Mean	65.0384615
	Standard Deviation	14.5670334
	Minimum	44.0000000
	Maximum	90.0000000

Source: Authors' own research, using SAS

Figure no. 1: Dynamics of the CPI

Source: Authors' own research, using SAS

The CPI map (Figure no. 2) shows that during the analyzed period the value of this index remained constant or fluctuated very little, the countries registration major changes are: Spain, Poland and Hungary. In Spain and Hungary, the corruption index has fallen, which means that the level of corruption has increased. Spain is an EU Member State since 1999 and a Member State of the Schengen Area since 1995, a member of the Schengen area, is an area of freedom of movement of the population. As there is freedom of movement throughout the whole period of time, the number of emigrants has increased, being correlated with the increase level of corruption, CPI being, also the result of the migration phenomenon. In Poland the corruption index grew, which means that the level of corruption has fallen. Although it became a member state of the EU in 2004, Poland became a member of the Schengen area in 2007, which has led to an increase in the number of emigrants. Although the number of emigrants has risen steadily, over the past few years it has fallen, which means

the decrease level of corruption was partly a result of the migration phenomenon in the case of Poland, also.

**Figure no. 2: Europe map on CPI
(2008 vs 2016)**

Source: Authors' own research, using SPSS

he dendrogram (Figure no. 3) shows that in 2008 the analyzed countries were heterogeneous regarding CPI, and in 2016 they were uniformed, registering much smaller differences. For example, Romania in 2008 forms itself a cluster, and in 2016 Romania forms a cluster with Hungary, Italy, Croatia, Slovakia and Greece, registering a higher index compared to 2008, which means a lower level of corruption. If we analyse emigration in Romania, we find the figures declined in 2016 compared to 2008, indicating that the CPI is influenced by the number of emigrants.

**Figure no. 3: Dendrogram of countries in Europe on CPI
(2008 vs 2016)**

Source: Authors' own research, using SPSS

The main statistical results obtained in SAS 9.2 for the fixed-effects model show us the extent to which the estimated model explains the variation of the resulting variable (Corruption Perception Index) and the validity of using this model. The main statistics on the use of the model with fixed effects are summarized in Table 2.

Table 2 shows that Sum of Squares Errors (SSE) is 2191.6596 and Mean Square of Error (MSE) is 11.0134, obtained by dividing SSE to 199 (the number of associated degrees of freedom: 26 countries $\times$ 9 years - 35 parameters of the fixed effects model). Based on the determination ratio (R-Square) it can be noticed that the fixed-effect model obtained by the panel analysis explains 96.48% of the variation in the corruption perceptions index is defined by number of emigrants. The study also examines the hypothesis of homogeneity.

Table 2. Statistics on the evaluation of the fixed-effects model

Regression model statistics			
Sum of Squares of Errors	2191.6596	Degrees of Freedom	199
Mean of Squares of Errors	11.0134	Root of Squares of Errors	3.3186
Determination Ratio (R^2)	0.9648		

Source: Authors' own research, using SAS

The results obtained from the homogeneity hypothesis test (see Table 3) support the estimation of the corruption perception index when using fixed effects models. Moreover, the number of emigrants has a constant influence over time on Corruption Perception Index. Since the probability of a calculated test statistic F (Fisher) higher than its theoretical value is 0.0029, the assumption of homogeneity is assumed for the level of the analyzed sample. This shows that the corruption assessment model is unique and representative in the countries of Europe included in the study.

Table 3. Testing the homogeneity hypothesis based on the F test

F test for no Fixed Effects			
Number of Fixed Effects	Degrees of Freedom	F Value	Pr>F
8	199	3.06	0,0029

Source: Authors' own research, using SAS

The results obtained from the estimation of the corruption perception index through the model with fixed effects are presented in Table 4. The values of the regression model estimates, shown in Table 4, show that the number of emigrants does not have a significant influence on the perception of corruption at the level of the 26 countries from Europe.

It is considered that the influence of migration on the corruption index is constant for the entire period, regardless of the country. In the case of the fixed temporal effects estimated in the regression model, i.e. the longitudinal differences in the years included in the study (d_t), there are significant differences for each analyzed year. It can be concluded that from a period to another the time factor has a significant influence on the corruption perception index in relation to migration.

For the model obtained, it is noted that out of 25 (= 26-1) fixed cross-effects, i.e. individual differences between the countries included in sample (a_i), 22 are significant. This indicates a heterogeneity of countries from the point of view of the individual (transversal)

perspective, i.e. each country has specific characteristics regarding the relation between the corruption index and the number of emigrants.

Table 4. Estimation of the regression model parameter

Variable	Estimate	Standard Error	Pr> t	Variable	Estimate	Standard Error	Pr> t
TS1	-0.24169	0.9217	0.7934	CS9	1.949005	1.5670	0.2150
TS2	-1.6015	0.9250	0.0850	CS10	-36.4388	2.0877	<.0001
TS3	-2.10105	0.9251	0.0242	CS11	-25.7968	2.3332	<.0001
TS4	-2.49876	0.9231	0.0074	CS12	-1.73376	2.1331	0.4173
TS5	-1.57834	0.9227	0.0887	CS13	-33.7262	2.0134	<.0001
TS6	-1.32498	0.9212	0.1519	CS14	-26.5784	2.3282	<.0001
TS7	-0.43216	0.9219	0.6397	CS15	-23.3036	2.2528	<.0001
TS8	1.066201	0.9217	0.2488	CS16	6.02748	2.3947	0.0126
Intercept	77.46295	2.3060	<.0001	CS17	-20.4002	2.4172	<.0001
Emigration	3.097E-6	5.465E-6	0.5716	CS18	8.958422	2.0335	<.0001
CS1	-1.32956	2.2200	0.5499	CS19	-20.759	1.6833	<.0001
CS2	-31.2179	2.3639	<.0001	CS20	-15.056	2.2852	<.0001
CS3	-13.8688	2.3848	<.0001	CS21	-35.6871	1.7341	<.0001
CS4	-26.6309	2.2604	<.0001	CS22	-29.503	2.4284	<.0001
CS5	15.25977	2.2627	<.0001	CS23	-15.0957	2.3786	<.0001
CS6	-9.62842	2.4091	<.0001	CS24	-16.7101	1.5880	<.0001
CS7	13.68326	2.3802	<.0001	CS25	13.46479	6.01	<.0001
CS8	-7.79622	1.6052	<.0001				

Source: Authors' own research, using SAS

The link between migration and corruption perceptions for the period 2008 - 2016 in Europe is direct, but weak and the regression equation contains the cross-sectional component, the variable number of emigrants being insignificant. From a temporal point of view, behavior regarding corruption and migration is similar, with significant differences between countries, with specific characteristics for each variables.

Conclusion

People are looking for good living conditions, so they will emigrate where they are best. Corruption is one of the main reasons for emigration. A corrupt country will record a large number of emigrants and a small number of immigrants. As the level of corruption is lower, the number of emigrants will decrease, and the number of immigrants will increase. The average Corruption Perception Index for the countries in Europe for the period 2008-2016 remains stable over time, around 62-66, slightly larger than the middle of the scale, which represent a low level of corruption in Europe.

Countries that change their Corruption Perception Index over the analyzed period are: Spain, Hungary and Poland, and in their case exists a correlation between this change and the phenomenon of migration. When the number of emigrants drops, the level of corruption also decreases and vice versa.

In 2008 the analyzed countries registered different CPI, and in 2016 were registered smaller differences between countries. For example, in 2008 Romania forms itself a cluster, in 2016 Romania forms a cluster with Hungary, Italy, Croatia, Slovakia and Greece. The

registered CPI in 2016 means a lower level of corruption, and is correlated to smaller figures regarding emigration, indicating that the CPI is influenced by the number of emigrants in Romania.

Another conclusion of the study is that although previous studies support a link between migration and corruption perceptions, the link between 2008 and 2016 in Europe is weak and the regression equation contains the cross-sectional component, the variable number of emigrants being insignificant. From a temporal point of view, the behavior regarding corruption and migration is similar, with significant differences between countries, with specific characteristics for each variable.

Although the relation between the two variables is direct, it is very weak. This may be due the fact that the Corruption Perception Index is a composite index that is determined on the basis of expert assessments and opinion polls. It is possible that these opinions are more influenced by economic factors, and migration has a small influence. This can be explained by the fact that people report corruption from personal perspective (living standards, unemployment rate, education level, job security), migration being less important, it has a greater influence only if the person is affected by this phenomenon.

Although at the individual level there is a link between migration and CPI, over time, the link loses its intensity and significance. An explanation could be the use of the fixed-effect model, which means removing the mean of the transversal or temporal dependent variable and then using a regression equation using the resulting data.

References

- Auriu, A., Squicciarini, M.P. (2013). The balance of brains—corruption and migration. *Science & Society*. EMBO reports (2013), 14 (6), 502-504.
- Baltagi, B. (2005). *Econometric Analysis of Panel Data*, 3rd Edition. West Sussex: JohnWiley&Sons.
- Betts, A., 2001. *Global migration governance*. New York: Oxford University Press.
- Boccard, J., Veuthey, J. L., and Rudaz, S. (2010). Knowledge discovery in metabolomics: an overview of MS data handling. *Journal of separation science*, 33, 290–304.
- Cooray, A.V., Schneider, F. (2014). Does Corruption Promote Emigration? An Empirical Examination. *IZA Discussion Paper*, No. 8094.
- Dimant, E., Krieger, T., Meierrieks, D. (2013). The effect of corruption on migration, 1985–2000. *Applied Economics Letters*, 20 (13), 1270-1274.
- Dimant, E., Krieger, T., Redlin, M. (2014). A Crook is a Crook ... But is He Still a Crook Abroad? On the Effect of Immigration on Destination-Country Corruption. *German Economic Review*, 16 (4), 464-489.
- Dunley, J.A. (2006). The Influence of Corruption and Language on the Protrade Effect of Immigrants: Evidence from the American States. *Review of Economics and Statistics*, 88 (1), 182-186.
- Eisen, M.B., Spellman, P.T., Brown, P.O., Botstein, D. (1998). Cluster analysis and display of genome-wide expression patterns. *Proceedings of the National Academy of Sciences*, 95 (25), 14863-14868.
- Faist, T. (2006). The Transnational Social Spaces of Migration. *Working Papers – Center on Migration, Citizenship and Development*, No. 10.

- Gurcinaite, V., 2014. Labour Force Migration within EU: Analysis of Push and Pull Factors. Central European University, Department of Economics, Available at: http://www.etd.ceu.hu/2014/gurcinaite_viktorija.pdf.
<https://ec.europa.eu/eurostat/data/database>
<https://www.transparency.org>
- Jaba, E., Robu, I.B., Balan, C.B., Robu, M.A. (2013). The Panel Data Analysis of Fraud Risk. *Financial Auditing*, 05, 25-36.
- Lapshyna, I. (2014). Corruption as a Driver of Migration Aspirations: the Case of Ukraine. *Economics and Sociology*, 7 (4), 113-127.
- Lee, E.S., 1966. A theory of migration. *Demography*, 3 (1), 47-57.
- Lynn, P. (2009). *Methodology of Longitudinal Surveys*. 1st Edition. Chichester: Wiley.
- Milligan, G.W., Cooper, M.C. (1987). Methodology Review: Clustering Methods. *Applied Psychological Measurement*, 11 (4), 329-354.
- Pi, J., Zhou, Y. (2015). The impacts of corruption on wage inequality and rural–urban migration in developing countries. *The Annals of Regional Science*, 54 (3), 753–768.
- Poprawe, M. (2015). On the relationship between corruption and migration: empirical evidence from a gravity model of migration. *Public Choice*, 163 (3–4), 337–354.
- Sokal, R. R., Michener, C. D. (1958). A statistical method for evaluating systemic relationships. *Univ Kans Sci Bull*, 38, 1409-1438.
- Wilks, D.S. (2011). *Statistical Methods in the Atmospheric Sciences*, Volume 100 (International Geophysics) 3rd Edition, San Diego: Academic Press.
- Williams, A.M. (2006). International labour migration and tacit knowledge transactions: a multi-level perspective. *Global Networks*, 7 (1), 29–50.