The trend of the Romanian migration flow explained by means of statistical models

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Abstract

Over time, the migration phenomenon developed an interdependence relationship with economic development, political stability and social factors. Starting from this context, this paper aims at studying the Romanian emigration flow according to the country of destination between 1990-2016 and the way in which the gross domestic product per capita (GDP) influenced this emigration flow between 2008-2016. The initial hypothesis was that only certain countries were priority targets of the Romanian emigration flow. In our scientific approach we used EUROSTAT and TEMPO databases. In the first part of the paper we used cluster analyzes to confirm that only certain countries are priority destinations, and in the second part we included a multiple linear regression model to find out if the gross domestic product of the country affects in any way the decision to emigrate.

Keywords: Romanian emigration flow, emigration countries, statistical model.

Introduction

The migration phenomenon has an impact on the European Union as a whole, but also on the Member States. Against this backdrop, policies have emerged addressing the challenges that migration has confronted lately, related to integration into the labour market, respect for migrants' rights, and the fight against illegal migration.

Migration is a phenomenon with positive effects on the economies of the involved countries, i.e.: coverage with specialized workforce in recipient countries; coverage of money needs in the countries of departure; a demographic balance that has emerged as a result of an aging population, especially of in the developed countries.

Okolski (2004), studying the migration processes in the Central and Eastern European countries, notices the existence of several types of migration: migration for settlement (family

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reunification, ethnic criteria); circulatory migration; migration for asylum or involving refugees; transit migration; spatial mobility; migration for work, studies and professional development.

The situation of emigration in Romania is similar to that of Central and Eastern Europe countries. Immediately after the fall of communism, the number of people who emigrated was very large and most of them belonged to the minority ethnic groups. Then, an important definitive migration occurred until 2000, after which the emigration caused by the economic factors was the most common (Gheţău, 2007)

Regarding the Romanian migration after the fall of communism in 1989, Daminescu (2013) describes three phases of this phenomenon:

- the first phase (1990-1994) was marked by a short-term movement to the neighbouring countries;
- the second phase (1994-2000) caused by searching for a job, under the pressure of the economic crisis;
- the third migration phase, which began in 2002, after the elimination of entry visas to the Schengen area.

Between 1990-1994, five were the destinations preferred by Romanians: Israel, Turkey, Hungary, Italy and Germany. In 1995 the Romanian started migrating mostly to Italy and Spain (Dida, 2013). If we refer to the emigration from Romania, it is not a surprise that the target countries with the largest volume of immigrants are Spain and Italy because language affinity is an advantage, all three languages having Latin roots. Spain was a difficult target for immigrants due to the difficulty of obtaining the visa (in 1992 Spain becomes a member of the Schengen Area); on the other hand, a particular opportunity was offered by the 1992 Barcelona Olympics. Beyond the undeniable importance in the field of sports that such an event naturally generates, there is also the less discussed reality of the clandestine migration for work in the Kingdom of Spain. As regards the legal status of the migrants (not only for Spain but also for other destinations), the request of political asylum was facilitated by the turbulent events in Romania during the 1990s when the "communist reflexes" inherited in 50 years of "red history", and later the miner's actions, caused major prejudice to the country's image. However, this could be used precisely to request political asylum (coordinator Sandu, 2006). Between 2000 and 2010, the Romanian emigration corridors to Italy and Spain ranked among the top ten international migration corridors. Suciu (2010) shows that between 2006 and 2007, the number of Romanians living in Spain and Italy has doubled, from almost 800 thousand people in 2006 to 1.75 million in 2007. The OCDE report: "Talent Abroad: A Review of Romanian Emigrants", published in 2019, shows that after 2007 the global economic crisis caused the decrease of Romanian emigration, which resumed its upward trend, with the migration flow increasing by 60% between

2009 and 2016. Three European countries "absorbed" 62% of the total Romanian emigrants. Italy ranks first, with over 1 million people. Germany comes second, with 680 thousand people, followed by Spain with 573 thousand people. According to OECD, the relocation of Romanians to EU countries lead to a decrease of the population from 22.4 million in 2000 to 19.5 million in 2018. Thus, in Romania emigration became a major social-economic phenomenon. Moreover, an IMF study (2016) indicates that, in the absence of emigration, Romania would have had a 10% increase in real GDP, and the difference of per capita income between Romania and EU member countries would have been reduced by 6.5%.

The purpose of this research is to study the Romanian migration flow according to the country of destination during 1990-2016 and the way in which it was influenced by the GDP between 2008-2016. Starting from the hypothesis that only some countries were the "priority" targets of the Romanian migration flow, we confirm the reality of the Romanian migration volume, however not for all the countries considered in the statistical model, but only for a single destination - Spain.

By showing that Italy, Spain and Germany are the destinations preferred by the emigrating Romanian citizens, this paper may find its utility by giving the aforementioned countries the motivation to model the migration laws so as to encourage a connection that favours the improvement of the transnational flow. Thus, the concerned parties from the said countries can take measures to eliminate the negative effects of social capital, by avoiding the closure of Romanians within the immigrant community and by encouraging the emergence of transnational communities. Transnational communities are already a strong challenge for the traditional ideas of belonging to the nation state.

1. Literature Review

Classical migration theories of the Sixteenth and Eighteenth centuries were dominated by mercantilism, which claimed that national economic policy was aimed at accumulating monetary reserves through a positive balance of trade, especially of finished products, and stimulated emigration towards colonies.

Adam Smith (1723-1790) investigated migration, claiming the need to break down barriers between states, populations and capital movements (Smith, 1785). The first to state migration laws was Ernst Georg Ravenstein (1834-1913) who quoted 7 migration laws and stressed that migration was driven by the "push/pull" process, i.e. unfavourable conditions in a region causing migratory flows to favourable conditions in another region. Starting from Ravenstein's ideas, most researchers have delivered migration theories that are derivations of his theories. John Hicks, winner of the Nobel Prize in 1932, said that "the differences in net economic benefits, mainly wage differences, are the

main causes of migration" (translation p.76). By his statement, Hicks laid the foundations for neoclassical migration theory preparing the way for modern analysis of the migration phenomenon. Neoclassical theories of the 1970s laid the foundations for international migration theory (Massey *et al*., 1993), considering the individual as the cause of the migration phenomenon. Neoclassical economic theory, developed by Larry A. Sjaastad (1934-2012), articulates the relationship between the migrant and human capital investment, with reference to the costs and benefits of migration (Sjaastad, 1962). Sociologist Andrè Gunder Frank (1929-2005), developing the theory of dependency, states that the global economy is not equal for all countries because the poor countries are subordinated to the rich ones, the former being attributed the production of raw materials with low added value, while industrial production, with high-added value belongs to rich countries. While in neoclassical theory migration reduces real wage disparities between regions, in Keynesian theory, migration reduces unemployment disparities (Jennissen, 2007, pp. 411-436).

Everet Lee (1917-2007) has developed hypotheses about the volume of migration, defining migration, according to migrants' characteristics, as a permanent / semi-permanent change of residence (Lee, 1966, p. 49). In the last 10-15 years, international entities such as OECD, IOM, and IMF, have become interested in the volume and effects of migration on development. For many researchers, the analysis of the relationship between migration and development has resulted in studies that explain the link between remittances and the economic growth of migrants' countries of origin. (Carling, 2014) The interest in studying the phenomenon of Romanian migration has increased along with the magnitude of the migration captured by the official statistics. Investigations were carried out on the Romanian migration phenomenon, including: 2007 (Metro Media Transilvania) study on social, working and living conditions of Romanians in Italy (coord. by Dâncu), 2008 (CURS Bucharest) captures the migration phenomenon in Spain and Italy (coord. by Abraham), 2010 (Italian Foundation Caritas) studies Romanian migration to Italy, 2011 (Soros Foundation) captures the migration of Romanian medical staff.

According to Martinez-Vela (2001), migration is a mechanism that ensures the transmission of capitalist-type economic relations from a central core of economies (developed economies) to semi-peripheral and peripheral countries (underdeveloped and developing economies). There are push factors that favour migration and pull factors in the destination economy, which convince individuals to leave their home countries in search of a higher standard of living. Starting from these push and pull factors, migration was analyzed by the literature by means of gravitational models. These gravitational models are practical descriptions of the random utility model (Grogger and Hanson, 2011; Ortega and Peri, 2013; Beine and Parsons, 2015) that compare the utility of a person living in the country of origin, with the utility of the same person living in another country. Gravitational models have also begun to be used

to forecast future migration flows, as part of demographic forecasts (LeSage and Pace, 2008). Kim *et al*. (2010) developed a model that attempts to identify who loses and who wins in the migration process between the countries of origin and the recipient countries, defined as East and West, by using three production factors: skilled labour, unskilled labour, material capital.

This theory suggests that the effects of migration on GDP per capita in the receiving country/country of destination depend on the disparities between the skills of the natives and immigrants, the effects of scale and the responsiveness of the production factors and outputs markets (Fry, 2014). Lalonde and Tope (1997) use an econometric model that shows how migrants have a modest influence on the labour market in the recipient countries, but they can influence tax earnings (Collado *et al*., 2004)

The research developed by Holland (2011) aims at evaluating the macroeconomic impact of migration both in the country of origin and in the receiving country, but also at highlighting the destination of the migration flows. The study shows that for receiving countries the impact of migration on GDP is low. Another study (Manole *et al*., 2017) targeting EU-28 countries shows that migration has a significant positive impact on economic development: an increase of 100,000 migrants leads to an average GDP growth per inhabitant of the receiving country by 0.838% compared to the EU-28 average.

2. Research methodology

Studies on emigration are based on the idea that most of the factors determining emigration are the result of the differences of economic development between the departure and the destination area. At present, within the EU, official emigration does not entirely capture the phenomenon of emigration, there being a number of emigrants that are not registered in the official statistics. There are difficulties in estimating the stock of migrants (i.e. the number of people who, at one point, have their habitual residence abroad for a period of at least 12 months), difficulties generated by the complexity of the migration phenomenon, but also by the limited availability of data sources referring to migrants.

For official statistics, INS measures annual migrant and immigrant flows in accordance with the definitions for long-term international migration.

The annual migrant flows represent the number of people who change their residence from the territory of Romania to the territory of another state, for a period of 12 months and over (INS, Experimental Statistics- Exploratory study on migration stocks, 2019).

According to the same study, the emigrant flow estimated for a certain year includes people who leave the country and do not return to Romania for at least 12 months (in the case of Romanian

citizens, these people are still recorded within the Romanian population based on their address, as they have their domicile in Romania, but they are excluded from the resident population).

The aim of this paper is to identify the main destination countries preferred by Romanian emigrants. Using public data on the total number of definitive Romanian emigrants, retrieved from the TEMPO database, we propose a model of cluster analysis per country of destination of the Romanian emigrants, in two variants:

- for the period between 1991-2000;
- for the period between 2001-2006;
- for the period between 2007-2016;

combined with an analysis of GDP values per capita, from the main destination countries of the Romanian migratory flow during the said periods.

We started with a method which involves dividing the statistical units into groups called clusters, based on the Euclidean distance, because the TEMPO database variables are numerically continuous.

We chose the cluster analysis as we consider that this can be a tool that aims at reducing sets of objects or variables to a smaller number of information entities, which are clusters (Ionescu, 2015).

The software package we used was SPPS, and it offers three different clustering methods: K-means clustering, hierarchical clustering and two-step clustering. We opted for two-step clustering because the Two-Step Cluster analysis in SPSS is a scalable method that was designed to cope with large data sets, thus extending the facilities offered by the other grouping methods: K-means, respectively hierarchical clustering. In this method, the data set is covered only once and both quantitative and categorical (ordinal) variables can be used. The name Two - Step comes from the 2 steps that must be fulfilled:

- Pre-clustering of cases (instances) into several sub-clusters.
- Clustering of the subgroups resulted during the previous step into a desired number of groups.

The method also allows the automatic selection of the number of groups.

The proposed cluster analysis model is based on the volume of Romanian migrants towards the following 9 different destinations, of which 7 are European (Israel is assimilated as an European destination) and 2 are non-European (Canada and the United States of America), as follows: 1) Austria, 2) Canada, 3) France, 4) Germany, 5) Greece, 6) Israel,7) Italy, 8) Spain (dates only between 2001 and 2006), 9) USA.

The choice of the 9 countries is explained by the fact that the aforementioned database includes only these destination states. The group of states includes three destinations in the Mediterranean area, the Romance language and culture of which resemble the Romania's ones (Italy, Spain, France);

two areas less preferred by the flow of Romanian migrants, where German language is spoken (Austria and Germany); and three extra-European destinations (of which one is more famous - Israel - based on ethnic affinities and an emigration flow prior to 1989, when the Jewish population migrated from Romania to Israel, and the other two destinations famous for the restricted access based on visa).

In the case of the database used by us, data regarding Spain could only be obtained starting from 2001. Therefore, for the specified period, the clusters will be considered in two distinct time periods: a) 1991-2000, when only 8 destinations are considered and b) 2001 – 2006, and c) 2007-2016, when all 9 destinations are considered. The assumption of the creation of a certain number of clusters is applied, differentiated, for each time interval. In order to compare the average values of the number of emigrants in destination countries, a cluster analysis is performed, which aims, at the level of the variables used, at restricting their number, in order to keep only the essential data. The categories of information that will be obtained starting from the initial variables (of the continuous variables type), as they are reproduced in the INS-TEMPO_POP_309D Source, will contain entities with similar characteristics, without imposing, a priori, a predetermined number of such categories, usually called clusters. As we will work with a number of people that are emigrants, we will take into account the average values. However, the number of clusters will be allowed to be constantly different from 1, based on the considerations below, so in some cases no more than 3 clusters are allowed. The use of the Euclidean distance for measuring the distance between the statistical units, when taking into account continuous numerical variables, is the most recommended method (Cumatrenco, 2007).

The final part of the study shows the research of the influence of the real GDP variable per capita of the destination country on the number of Romanian emigrants, using the EUROSTAT database. We applied a Pearson correlation model, followed by the discussion of the corresponding linear regression model. Our starting point was the hypothesis that the destination countries, priority targets of Romanian emigrants, were France, Germany, Italy, and Spain, for the period 2007-2016.

The reason for the selection of this target group of predictors is related to the affinities of language and culture for France, Italy and Spain and the existence of a migratory flow to a central European destination (Germany), preferred by people with above-average school education (usually university tertiary education)

For the period under study, the averages and the standard deviations for real GDP per capita from the 4 mentioned countries (Spain, France, Italy, Germany) are shown in table 1.

Table 1. Descriptive Statistics

	Mean	Std. Deviation	N
Spain	23011.11	797.566	10
France	31177.78	446.592	10
Italy	26311.11	904.771	10
Germany	33222.22	1261.723	10

Source: own representation

3. Results

3.1. Studying the volume of the migration flow from Romania during 1991-2000

The 1991-2000 decade, concerning Romania, is the period of slow transition from the centralized to the market economy, of price liberalization (as per the governmental decisions taken in 1991). The decrease of the standard of living is a harsh reality of the period, over which the post-communist political evolutions overlapped.

During the last decade of the twentieth century, also, the first democratic change took place, by elections, regarding the state authorities (1992, 1996). Based on the preliminary considerations regarding the selection of the target countries for the migrants from Romania, the creation of 3 clusters is allowed.

Table 2 - The values of the mean and standard deviation for the period 1991-2000 for the number of definitive migrants on the mentioned destinations

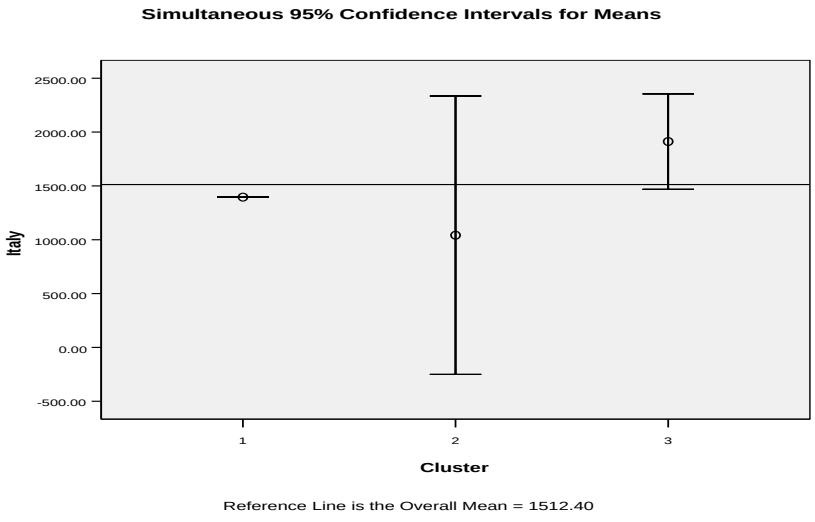
		Cluster			
		1	2	3	Combined
Austria	Mean	4630.00	1575.50	1190.60	1688.50
	Std. Deviation	.	1199.85	757.26	1356.29
Canada	Mean	1661.00	1666.50	2240.60	1953.00
	Std. Deviation	.	178.21	217.02	351.32
France	Mean	1512.00	913.75	1283.40	1158.40
	Std. Deviation	.	236.10	562.51	456.49
Germany	Mean	20001.00	7484.25	5479.80	7733.70
	Std. Deviation	.	4723.92	2583.37	5474.97
Greece	Mean	354.00	131.00	268.60	222.10
	Std. Deviation	.	62.10	56.70	97.66
Israel	Mean	519.00	382.50	456.80	433.30
	Std. Deviation	.	69.00	103.23	92.70
Italy	Mean	1396.00	1042.00	1912.00	1512.40
	Std. Deviation	.	532.41	250.32	557.58
USA	Mean	5770.00	1702.25	2785.00	2650.40
	Std. Deviation	.	638.88	322.64	1293.54

Source: own representation

Table 2 shows the mean and standard deviation values for the clusters created for the 1991-2000 period and the average values for this period. The 3 clusters have the following percentages of the total statistical units (years of the reference period): 10%; 2) 40%; 3) 50%, so basically, only 2 of the 3 created clusters count. In the destination countries, the average values are compared with the "overall mean" value, which covers the entire 10-year period, reported in the "combined" column. Thus, Germany has an average of 20001 migrants in cluster 1 (only in 1991, the year in which the effects of the transition from a totalitarian regime to a democratic one were acutely felt), and the overall mean is 7733. In the other 2 years of the period under study, the volume of migration to Germany is much lower: 7484, and 5479, respectively. This country has the largest imbalance between the migratory volumes over the time periods during the last decade of the last century. In terms of comparing the values of the standard deviations, Germany records, for clusters 2 and 3, the most heterogeneous situations, as opposed to Israel, also due to the number of migrants which is relatively low in absolute values. In contrast, Italy's clusters means are very close and matching the overall mean: mean (1/2/3 / overall) = 1396/1042/1912/1512.

Next, the average confidence intervals for the 3 clusters are represented, in the case of the "number of immigrants in Italy" variable.

Figure 1. The confidence interval of the population means for each cluster in the case of the volume of emigration to Italy

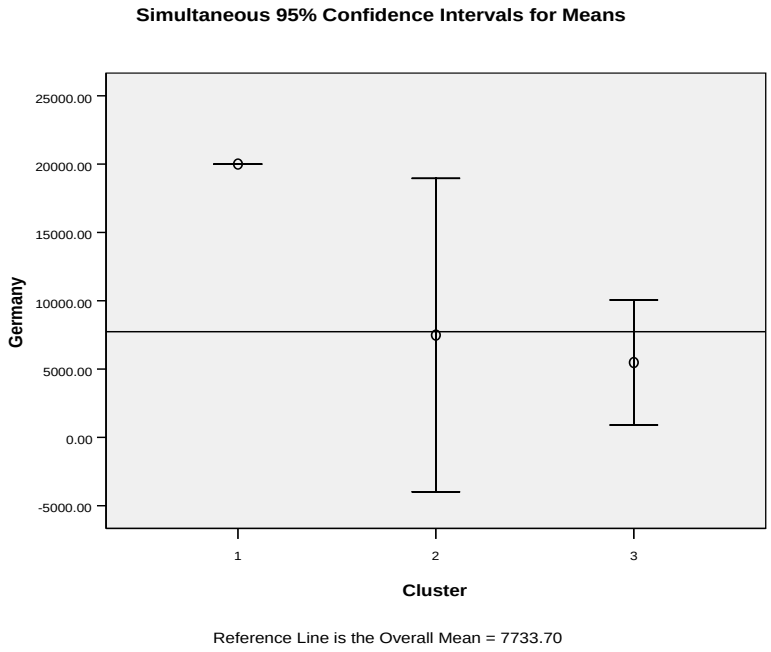


Source: own representation

It is noticeable that, although relatively close, the average values on the clusters that matter, the second and the third, differ significantly between them (they are on both sides of the overall mean

value), so according to the migratory volume, Italy contributes significantly to this grouping, at the division into clusters of the statistical units in this study.

Figure 2. The confidence interval of the population means for each cluster in the case of the volume of emigration to Germany

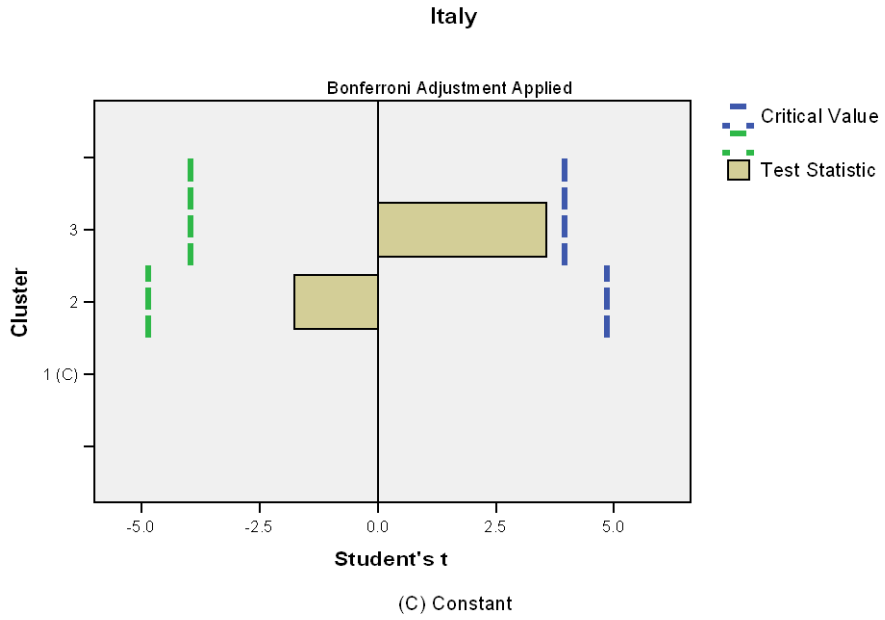


Source: own representation

It is noticeable that, although relatively close, the average values on the clusters that matter, the second and the third, differ significantly between them (they are on the same side of the overall mean value), so Germany does not contribute significantly to this grouping, according to the migratory volume, at the division into clusters of the statistical units in this study. The migration flow to this country has been continuous, but with very different values, throughout the period after 1990 and until 2000.

Next, the average differences for the 3 clusters are represented, in the case of the variable "number of immigrants in Italy".

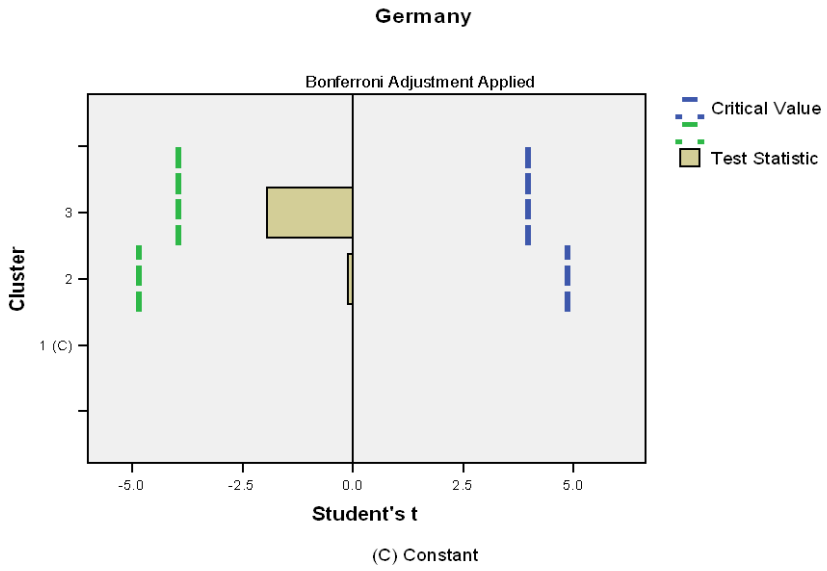
Figure 3. Testing the differences between the mean volume of migration to Italy and the mean statistical migrant population



Source: own representation

If it had reached the critical threshold t_{critic}, the average number of migrants corresponding only to cluster 3 would have been significant. Even so, this mean is the closest to the critical t, of all the 8 random variables.

Figure 4. Testing the differences between the mean volume of migration to Germany and the mean statistical migrant population



Source: own representation

Compared to the previous figure, the average number of migrants corresponding to cluster 3 and not only is far from significant.

3.2. Studying the volume of the migration flow from Romania during 2001-2006

This approach starts with the presentation of the means and standard deviations for the 3 clusters.

Table 3. The values of the mean and standard deviation for the period 2001-2006 for the number of definitive migrants on the mentioned destinations

		Cluster			
		1	2	3	Combined
Austria	Mean	167.00	293.00	454.75	379.83
	Std. Deviation	.	.	107.96	148.50
Canada	Mean	2483.00	1437.00	1441.00	1614.00
	Std. Deviation	.	.	177.63	447.41
France	Mean	463.00	233.00	411.50	390.33
	Std. Deviation	.	.	90.37	106.14
Germany	Mean	854.00	1305.00	2487.75	2018.33
	Std. Deviation	.	.	523.64	844.81
Greece	Mean	105.00	60.00	102.25	95.67
	Std. Deviation	.	.	29.65	28.88
Israel	Mean	279.00	106.00	110.25	137.67
	Std. Deviation	.	.	44.65	77.41
Italy	Mean	1486.00	1317.00	2680.00	2253.83
	Std. Deviation	.	.	574.13	797.82
USA	Mean	1876.00	1356.00	1930.50	1825.67
	Std. Deviation	.	.	169.89	265.96

Source: own representation

Table 3 shows the mean and standard deviation values for the clusters created for the 2001-2006 period and the average values for this period. The 3 clusters have the following percentages of the total statistical units (years of the reference period): 1 year of 6, i.e. 16.7%; 2) 1 year of 6, i.e. 16.7%; 3) 4 years of 6, i.e. 66.6%;, thus, basically, 1 of the 3 created clusters counts.

The period under study revolves around the first major reconfiguration of Romania at European and Euro-Atlantic level, respectively the accession to NATO, which allowed Romania to build stronger transatlantic relations with the 2 states on the North American continent. Later, on January 1, 2007, Romania became a member of the EU.

The confidence interval of the population means for each cluster in the case of the volume of emigration to North America is shown in Figure 5a and 5b.

Figure 5a. The confidence interval of the population means for each cluster in the case of the volume of emigration to Canada

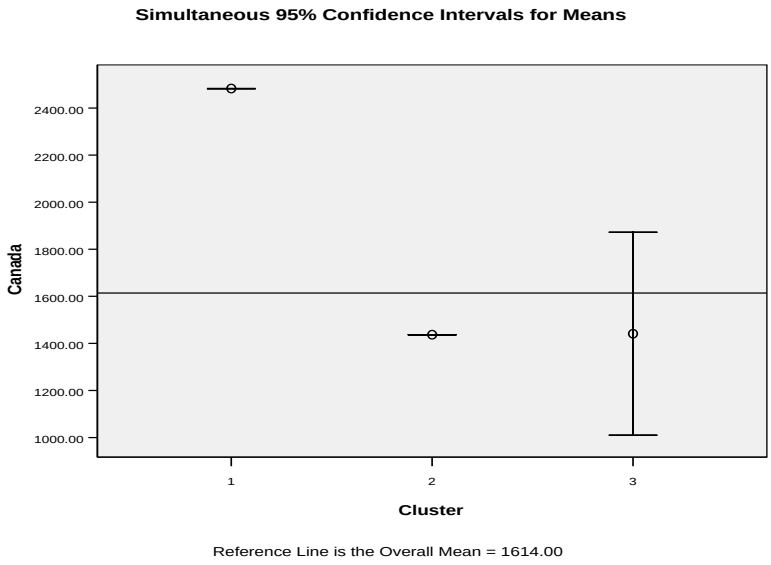


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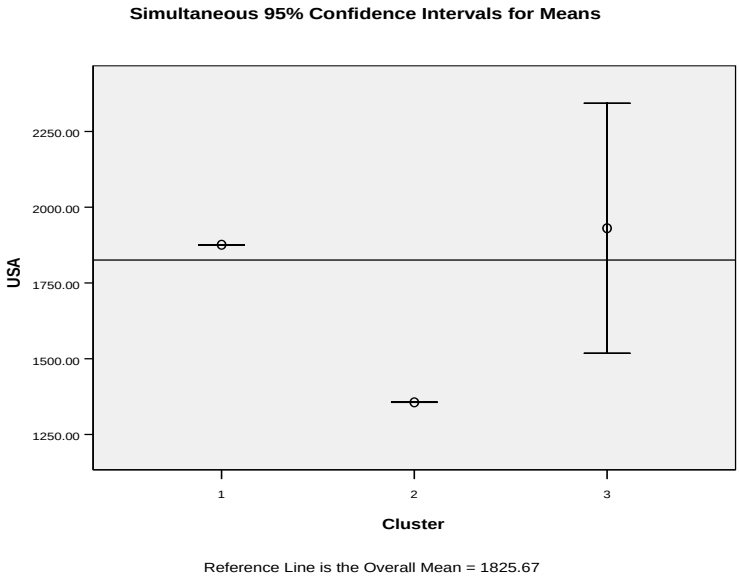
Fig.5b. The confidence interval of the population means for each cluster in the case of the volume of emigration to USA



Source: own representation

The trend difference corresponding to cluster 3 is noticeable, i.e. the last 4 years: a constant maintenance of the mean volume of migrants to Canada, under the value “overall mean”, whereas, in the case of the US, there is a significant increase of the respective mean for cluster 3.

Figure 6a. The confidence interval of the population means for each cluster in the case of the volume of migration to Italy.

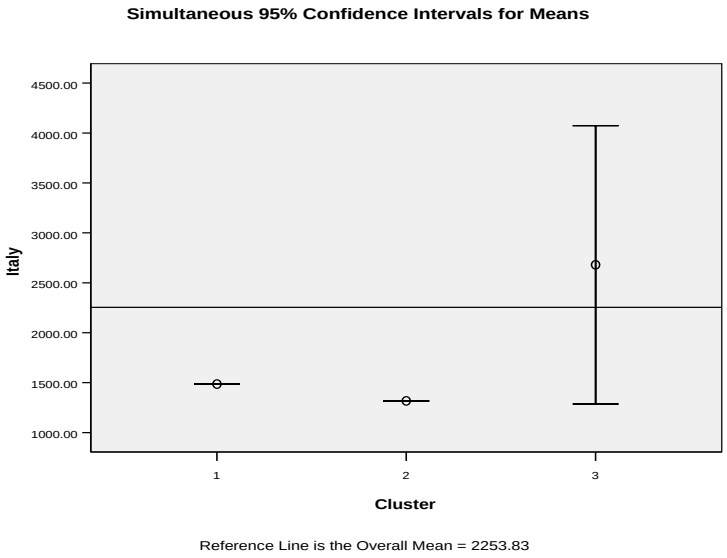


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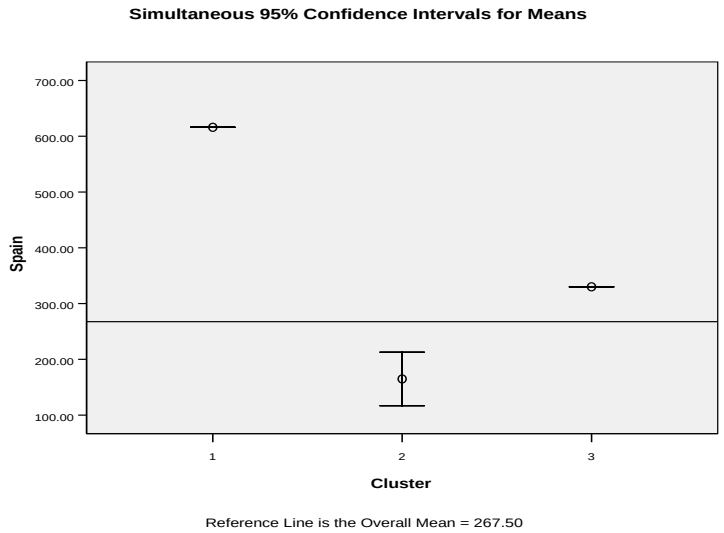
Fig.6b. The confidence interval of the population means for each cluster in the case of the volume of migration to Spain.



Source: own representation

By comparing figure 6a and 6b we can spot the difference of trend corresponding to cluster 3, i.e. the last 4 years of the period under study:

1) the value for Italy as destination is constant, followed by a significant increase over the "overall mean" value;

2) the value for Spain as destination is decreasing in cluster 2, followed by an increase, both significant.

Next, the mean differences for the 3 clusters are represented, in the case of the variable "number of immigrants in Canada and USA".

Figure 7a. Testing the differences between the mean volume of migration to Canada and the mean statistical migrant population

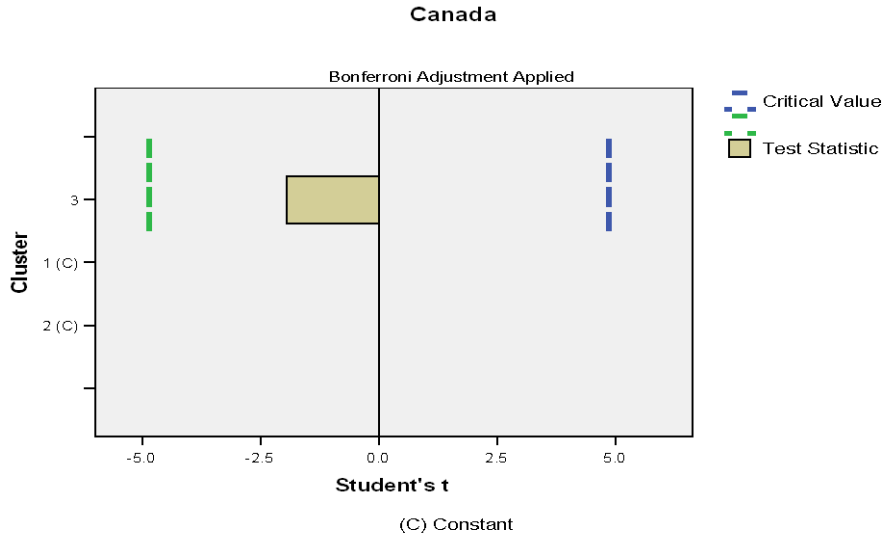


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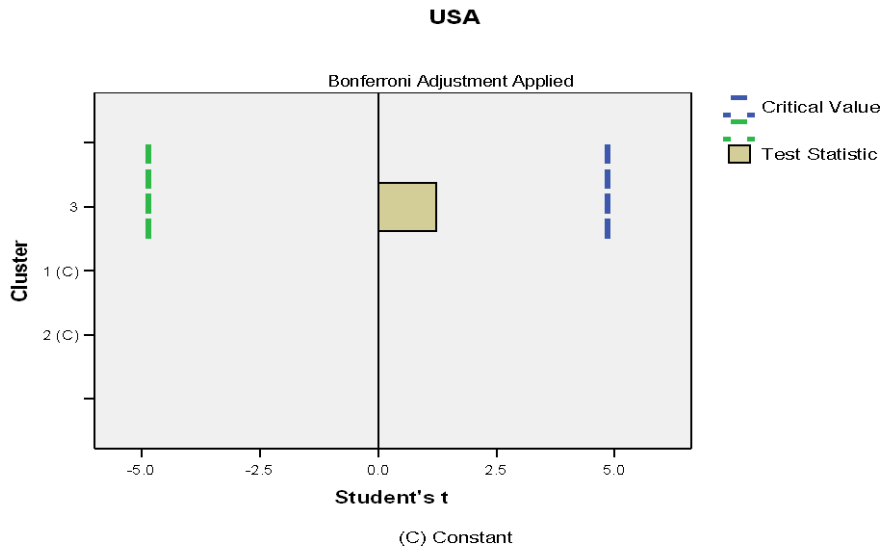
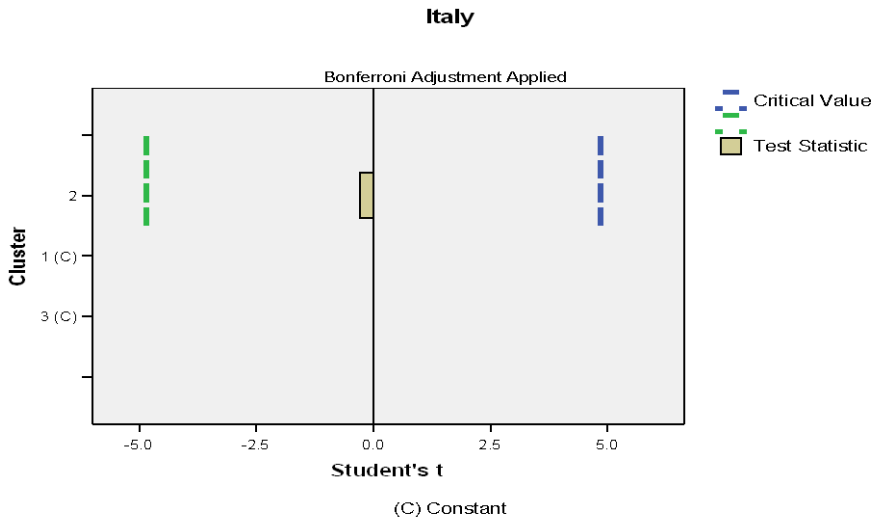
Figure 7b. Testing the differences between the mean volume of migration to USA and the mean statistical migrant population



Source: own representation

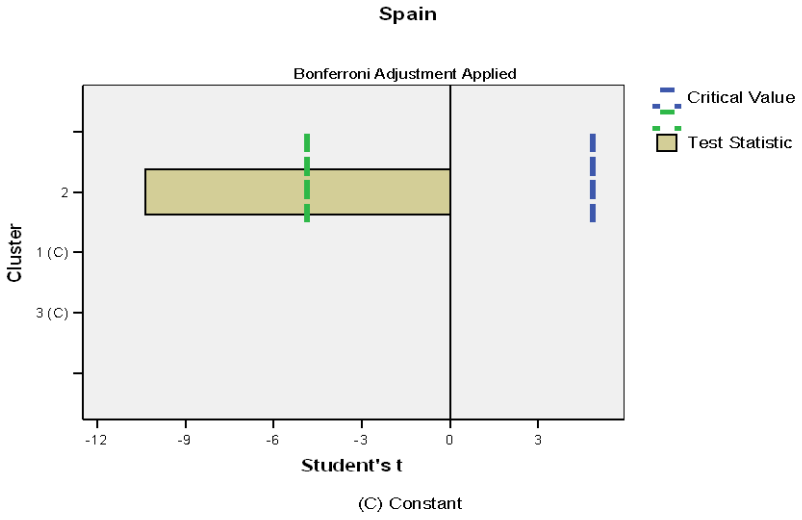
Next, the mean differences for the 3 clusters are represented, in the case of the variable "number of immigrants for Italy and Spain".

Figure 8a. Testing the differences between the mean volume of migration to Italy and the mean statistical migrant population



Source: own representation

Figure 8b. Testing the differences between the mean volume of migration to Spain and the mean statistical migrant population



Source: own representation

Reaching the critical threshold t_{critic}, the mean number of migrants corresponding to cluster 2 - only for Spain - is significantly different from the mean of the whole population. This is the only mean in the study that exceeds the critical threshold t, of all the 9 random variables.

3.3. Studying the volume of the migration flow from Romania during 2007-2016

This period includes the year when Romania joined the EU, as well as a sufficiently extended post-joining period. Approximately the same countries were taken into consideration so as to cover

the European destination areas. No migratory flow values have been identified for non-European destinations. Having the same working hypotheses as for the periods 1991-2000 and 2001-2006, 3 clusters are obtained, according to tables 4 and 5.

Table 4. The distribution of the 10 years of the period under study into clusters created for 2007-2016

		N	% of Combined	% of Total
Cluster	1	2	20.0%	20.0%
	2	7	70.0%	70.0%
	3	1	10.0%	10.0%
	Combined	10	100.0%	100.0%
Total		10		100.0%

Source: own representation

Cluster 2 includes 7 of the 10 years and its weight is the most significant compared to the other 2 clusters (70%)

Table 5. The values of the mean and standard deviation for 2007-2016 for the number of definitive migrants to the specified destinations

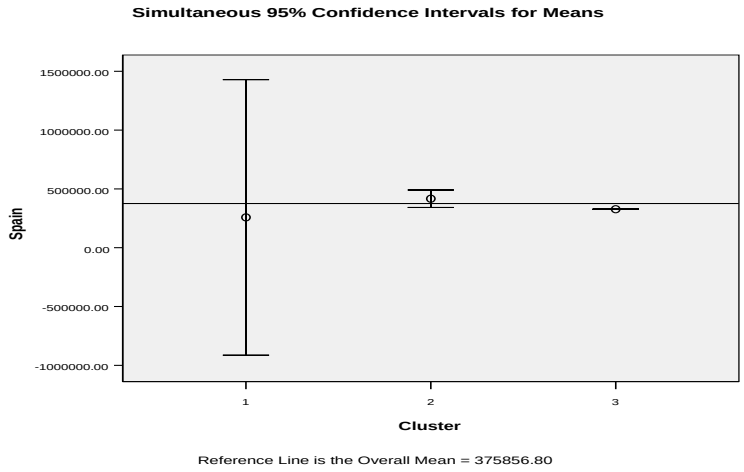
		Cluster			
		1	2	3	Combined
Germany	Mean	687371.50	279827.86	533762	386730.00
	Std. Deviation	71442.53	41339.01	.	181886.11
Ireland	Mean	56987.00	75349.14	62056	70347.40
	Std. Deviation	12652.97	6153.30	.	10478.26
Greece	Mean	41722.00	93724.86	106535	84605.30
	Std. Deviation	1869.59	30083.06	.	33622.86
Spain	Mean	257748.50	416535.14	327325	375856.80
	Std. Deviation	43393.02	59722.58	.	85062.88
France	Mean	230075.00	275168.14	309805	269613.20
	Std. Deviation	13747.57	24470.07	.	31161.98
Italy	Mean	66030.00	108151.86	157065	104618.80
	Std. Deviation	21095.82	28562.85	.	35207.68
Austria	Mean	50730.50	53165.00	64428	53804.40
	Std. Deviation	1177.33	1886.26	.	4181.36
United Kingdom	Mean	372397.00	330658.00	340440	339984.00
	Std. Deviation	77513.05	23403.46	.	36522.20

Source: own representation

The structure of the used database shows small differences as particular examples of destination states, as opposed to the other 2 previous periods to which the cluster analysis is applied.

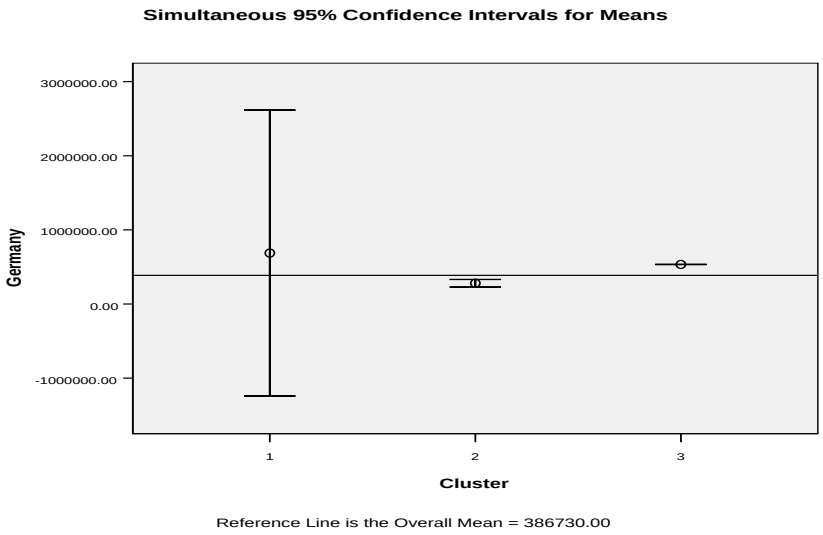
Figures 9 and 10 capture the confidence intervals of the mean population as clusters in the case of the migration volume with the destinations Spain and Germany.

Figure 9. The confidence interval of the population mean for each cluster in the case of the volume of migration to Spain 2007 - 2016



Source: own representation

Figure 10. The confidence interval of the population mean for each cluster in the case of the volume of migration to Germany 2007 - 2016

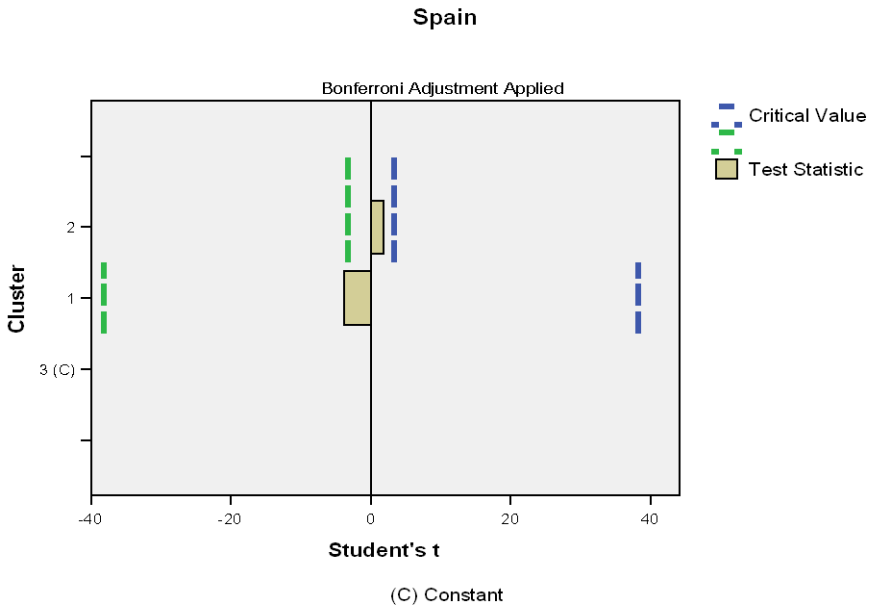


Source: own representation

Comparing figures 9 and 10, as opposed to the previous periods, it is found that the profile of the confidence intervals regarding the number of immigrants between the 2 destinations that were clearly different, now these differences have disappeared: clusters 2 and 3, i.e. the last 8 of the 10 years of the period under study look extremely similar for both countries of destination.

Next, comparing figure 11 and 12, the differences between the mean volume of migration per given destination in the case of Spain and Germany are investigated.

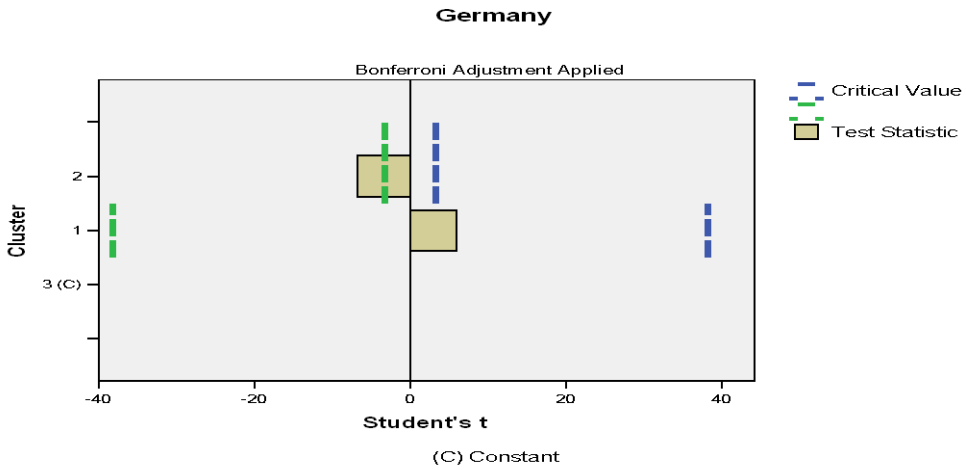
Figure 11. Testing the differences between the mean volume of migration to Spain and the mean statistical migrant population irrespectively of the destination 2007-2016



Source: own representation

The t-test value, in the case of cluster 2, is close to the critical value of t, but without reaching it.

Figure 12. Testing the differences between the mean volume of migration to Germany and the mean statistical migrant population irrespectively of the destination 2007-2016



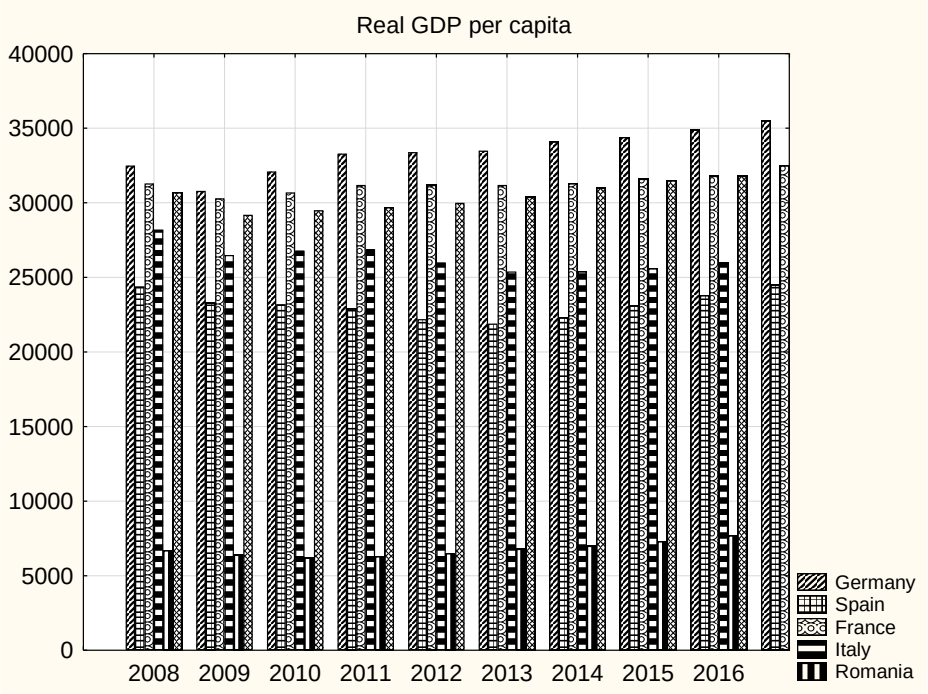
Source: own representation

In figure 12, Germany is the only destination in the group of countries chosen for immigration between 2007-2016. In the case of cluster 2, there is a statistically significant difference regarding this country compared to the "overall mean" value, an aspect that will be confirmed, in the case of Germany, by the correlation and regression models discussed at the end.

3.4. Research on the influence of the gross domestic product (GDP) per capita, from the Western European countries, on the number of emigrants from Romania to the EU countries in the period 2008-2016

It is obvious that the values of GDP per capita are significantly lower in Romania as opposed to the western European states chosen as immigration destinations. This is illustrated in fig. 13. We are looking for a regression model that can "link" the variable "the number of migrants from Romania for the respective destination" to the "real GDP per capita" values of the respective destination countries.

Figure 13 - Comparison of the real GDP Euro per capita values for Romania and 5 western European states



Source: own representation using data from Eurostat data

The 4 destination countries have per capita GDP values that are close to each other, but each one is very different from that of Romania's.

Correlation is the first step in establishing a link between two variables, followed by regression, which represents a "formalization" of the respective link, in the form of a linear equation represented as y = a *x + b or nonlinear, following other type of nonlinear equations. The significance of the quantities in the expression y = a*x + b is shown below: y = dependent variable (criterion); x = independent variable (predictor), "*" - the sign of multiplication; a = slope of the straight line; b = ordinate at the origin

Germany and Spain are chosen as destination countries. It will be demonstrated that only in the case of the first country there is a statistically significant influence

Table 6. Regression linear models reflecting the influence of the predictor "country_of_destination_GDP" on the variable-criterion "number of Romanian emigrants" between 2008-2016 in the case of Germany as a country of destination

Model 6.1-Germany	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.697[a]	.485	.412	573.113

a. Predictors: (Constant), Germany_GDP

Model 6.2-Germany		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2166993.125	1	2166993.125	6.597	.037[b]
	Residual	2299210.875	7	328458.696		
	Total	4466204.000	8			

a. Dependent Variable: Germany-number of Romanian emigrants

b. Predictors: (Constant), Germany_real GDP per capita

Source: own representation

In the case of emigration to Germany, the regression model is validated by the corresponding ANOVA test ($p < 0.05$, which is a favourable result of the research hypotheses), and the R^2 value is small. A percentage of 48% of the variant of the criterion is explained by the predictor, i.e. a somewhat satisfactory value.

Next, we refer to the same type of data in the case of Spain.

Table7. Regression linear models reflecting the influence of the predictor "country_of_destination_GDP" on the variable-criterion "number of Romanian emigrants" between 2008-2016 in the case of Spain as country of destination

Model 7.1-Spain	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.536[a]	.288	.186	1758.991

a. Predictors: (Constant), Spain_GDP

Model 7.2-Spain		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8747137.683	1	8747137.683	2,827	.137[b]
	Residual	21658333.872	7	3094047.696		
	Total	30405471.556	8			

a. Dependent Variable: Spain

b. Predictors: (Constant), Spain_GDP

Source: own representation

In the case of emigration to Spain, the regression model is not validated by the corresponding ANOVA test ($p > 0.05$, which is not a favourable result), and the R^2 value is too small. Only 28% of the variant of the criterion is explained by the predictor, i.e. a non-satisfactory value.

Conclusions

The objective of our research was to study the volume of the Romanian migration flow between 1990-2016 according to the country of destination, and the way in which the real gross domestic product (GDP) per capita of the countries of destination between 2008-2016 could have influenced this migration flow. We have chosen the period 2008-2016 in order to eliminate the influence of Romania's becoming a EU member state in 2007; such influence was felt through the differences between the 2 time periods upon which the cluster analysis was applied by comparison. A questionable aspect of the study is given by the selection of the sample of countries, imposed by the availability of official data, which only cover the official emigration, resulting in an underestimation of the reality of the migration phenomenon.

We started from the first hypothesis that certain countries were primary targets of the Romanian migration flow. The cluster analysis was used in this respect. This analysis confirmed, for two large periods of time (1991-2000 and 2001-2006, both before Romania's accession to the EU), specific differences, depending on the time (year) of reference and the migration destination. In the first period, the migration to Italy as destination country was predominant, while, for the second period, the migration to Spain as destination country became the most important, without ignoring other destinations from the Francophone area (France, Belgium) or German-speaking countries (Austria, Germany). In fact, at present, Spain and Italy also have the largest Romanian communities formed after 1990, when the migratory phenomenon of the Romanian population in Western European countries began. Moreover, in Castellon area, and in isolated areas of Italy, there are cases of ethnic Romanians, who had arrived in those places time ago, and who are elected in the executive or legislative local bodies.

As for the second hypothesis regarding whether and how the real gross domestic product (GDP) per capita of the countries of destination, during the period 2008-2016, could have influenced the number of emigrants from Romania in the respective destinations, it was pointed out that, only in the case of Germany, the real variable GDP per capita significantly influences the number of emigrants to that specific destination. This result is not a failure in itself, because a variable such as real GDP per capita has, intrinsically, many other latent variables, impossible or very difficult to detect from the INS or Eurostat databases, which are, by their nature, built on large and very large samples; it

would have been almost impossible to conduct a survey against the background of the migratory economic-social phenomenon, which remains a sensitive topic at present. It would have been simplistic, even if attractive, to assign such a predictor role to the GDP.

In this context, the path can be opened to a new study that can investigate how the law in Italy or Spain, the "holders" of the largest number of compatriots established there, manages to develop social security systems, to integrate migrants socially and economically, and to harmonize the individual relations with the collective ones. If we look to the opposite direction, in the conditions in which there is an acute crisis of labour force in the fields of activity in which those who left after 1990 work abroad, one can suggest punctual or general solutions regarding the way in which Romania, through its central and local authorities, can stimulate the repatriation of the migrants.

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