

ASPECTS OF EXTERNAL MIGRATION USING ECONOMETRIC METHODS

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***Abstract:** The phenomenon of external migration represents a major problem Romania is facing, with negative effects on the labor market, economic growth and families. The factors underlying this phenomenon are economic, social and cultural. The present work aims to analyze through econometric methods if the decision to leave the country is taken according to gender and macroregion. The chi-square test was used in data analysis and interpretation.*

***Keywords:** migration, labor market, econometrics, chi-square test.*

***JEL Classification:** C02, E20, O15.*

1. Introduction

The paper aims to analyze the relationship between external migration and the macroregions from which people who choose to emigrate come. The data used in our approach are official data made available to those interested by the National Institute of Statistics through its own website. Thus, in this paper, we used the permanent emigrants from Romania in 2022, by gender and macroregion of origin.

Permanent emigrants or emigrants with a change of residence are persons of Romanian citizenship who emigrate abroad, giving up their residence in Romania and establishing their residence on the territory of another state (Institutul Național de Statistică, 2024a). Further, to make this paper easier to read, we will use the notion of emigrant to designate permanent emigrants or emigrants with a change of residence.

Our approach targeted migration, because Romania is no stranger to this phenomenon, especially after 1989, and in specialized literature this phenomenon has been and still is intensely debated. Population migration is not accidental, but is influenced by social, political, and economic transformations in different regions of the country, says Bălănescu (2011, p.108).

Mîndrican and Matei (2023, p.190) consider that migration has become a social phenomenon over the years. In the work written by the two authors mentioned above, appears the information according to which the main reasons that influence individuals in making this decision are age, marital status, level of qualification from a professional point of view, background, professional perspectives, etc. We have completed these factors that influence the decision to migrate with those that target gender and macroregion of origin.

Table 1. Emigrants - contingency table corresponding to 2022

		GENDER		
		MALE	FEMALE	TOTAL
Macroregions (observed values)	MACROREGION ONE	4121	4601	8722
	MACROREGION TWO	9494	10128	19622
	MACROREGION THREE	5810	6206	12016
	MACROREGION FOUR	3770	4308	8078
	TOTAL	23195	25243	48438

Source: Created by the authors based on data provided by the National Institute of Statistics, <http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table>, Accessed on: 27.03.2024

In 2022, out of the 48438 emigrants, 25243 were female and 23195 were male. Data presented in Table no. 1 shows that most emigrants come from macroregion two. The structure of this indicator by gender demonstrates that for both genders, most emigrants are also from macroregion two. Macroregion two is made up of the northeast region and the southeast region, two of the less developed regions of Romania.

Of the total of 48438 emigrants in 2022, 8412 emigrants chose Italy as their destination country, 7642 emigrants Germany and 7356 emigrants Spain. These countries are in the top three positions in the ranking of the number of emigrants by destination country. Comparing the values recorded for these three countries to the total number of emigrants, we have the following percentages: Italy – 17.36%, Germany – 15.77% and Spain – 15.18%.

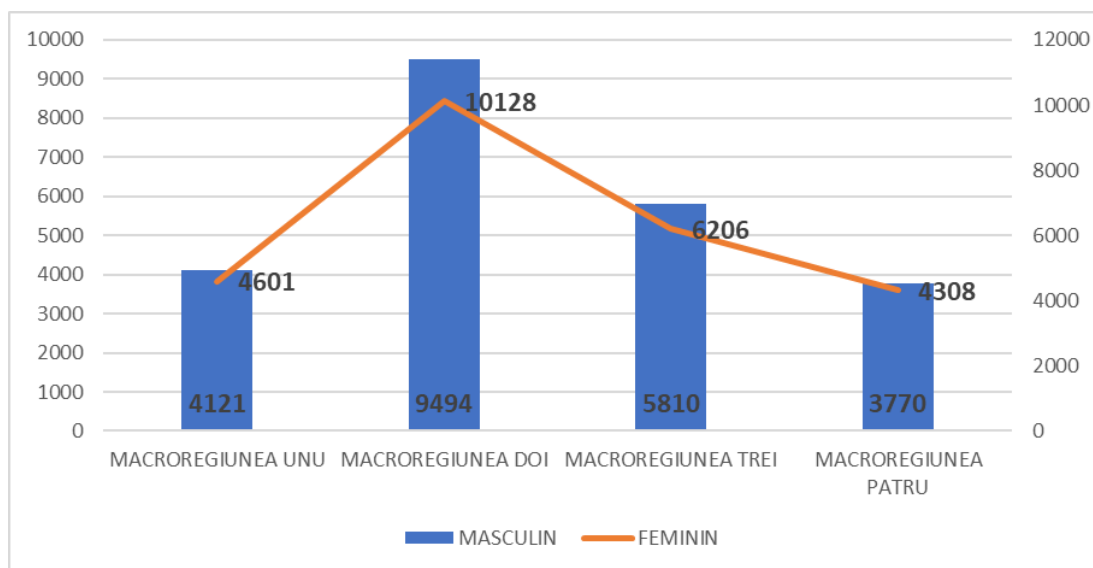


Figure 1. Graphical representation of the values from the contingency table corresponding to the year 2022

Source: Created by the authors based on the data from Table no. 1

In 2022, in terms of male emigrants, the lowest number was recorded in macroregion four (3770) and the highest number in macroregion two (9494). The same situation is found for female emigrants, where the same two macroregions are in first and last place.

Table 2. Structure of emigrants by gender at macroregion level in 2022

		GENDER (%)		
		MALE	FEMALE	TOTAL
Macroregions (observed values)	MACROREGION ONE	47.25	52.75	100
	MACROREGION TWO	48.38	51.62	100
	MACROREGION THREE	48.35	51.65	100
	MACROREGION FOUR	46.67	53.33	100

Source: Created by the authors based on the data from Table no. 1

In Table no. 2, was calculated the structure of emigrants by gender at the macroregion level in 2022. This table allows us to observe which gender has more emigrants from a relative point of view. Thus, at the level of the year analyzed in this paper, it is observed that in percentage terms, females are the ones who emigrate at the level of all development macroregions. The highest percentages are found in macroregion four (53.33%) and macroregion one (52.75%). In the other two macroregions, the percentage of females who emigrated is approximately close (51.62% and 51.65%) (Institutul Național de Statistică, 2024b).

In order to understand the migration phenomenon in the current period, it is necessary to know the following statement by Ari (2023, p.138) “migration is an essential component of human civilization's development, and it is strongly linked to evident disparities in the developmental processes of various locations”.

2. Determining the association of qualitative variables

In this paper, we want to observe whether there is a link between external migration and the macroregions from which people who choose to migrate come. To achieve this, we consider a complete set of data on the distribution of people in gender categories (male / female) and membership in development macroregions (one / two / three / four).

Considered as a way to assess the link between two categorical variables (variables that can be divided into discrete categories), the chi-square test (χ^2) determines whether the difference between the observed data and the expected data is due to chance or if there is a relationship between the variables studied.

Using the Chi-square test, we test whether the decision to leave the country is made according to gender and macroregion, by detailing five steps.

Step 1: Define the following hypotheses (Teselios, Albici and Antonescu, 2013):

H0: There are no significant differences between the observed and expected values, in other words, there is no association between the variables analyzed.

H1: There are significant differences between the observed and expected values, in other words, there is an association between the variables analyzed.

In the case of the present study, we formulate the following hypotheses:

Null hypothesis H0: The decision to leave the country is independent of gender and belonging to one of the macroregions.

Hypothesis H1: There is an association between the variables.

Step 2: We calculate the expected values using the formula:

$$Expected_value_{ij} = \frac{Total_line_i \cdot Total_column_j}{Grand_total} \quad (1)$$

The organization of the expected values obtained according to formula (1) is presented in Table 3.

Table 3. Table of expected values corresponding to 2022

		GENDER	
		MALE	FEMALE
Macroregions (observed values)	MACROREGION ONE	4176.61	4545.38
	MACROREGION TWO	9396.18	10225.82
	MACROREGION THREE	5753.97	6262.02
	MACROREGION FOUR	3868.22	4209.77

Source: Created by the authors based on the data from Table no. 1

Step 3: We calculate the number of degrees of freedom as equal to the number of columns in the table minus one multiplied by the number of rows in the table minus one. In the case of our study there were 4 rows and 2 columns.

Therefore, the number of degrees of freedom $\nu = 3$ (2)

We choose the significance level (i.e. the probability of rejecting the null hypothesis) as 0.05.

Step 4: The theoretical value for the 0.05 significance level and 3 degrees of freedom is:

$$\chi^2_{0,05;3} = 7,81$$

Step 5: To calculate the chi-square value, we must first calculate the ratio of the square of the difference between the observed values and the expected values.

The results of these calculations are presented in Table 4.

Table 4. Ratio between the square of difference among observed and expected values

		GENDER	
		MALE	FEMALE
Macroregions (observed values)	MACROREGION ONE	0.74	0.68
	MACROREGION TWO	1.02	0.94
	MACROREGION THREE	0.55	0.50
	MACROREGION FOUR	2.49	2.29

Source: Created by the authors based on the data from Table no. 3

Chi-square is the sum of all values in Table 3, i.e. $\chi^2_{calc} = 9,21$

To determine whether to reject the null hypothesis H_0 , the value obtained for chi-square must be greater than the theoretical value, for the significance threshold of 0.05.

We observe that the empirical value of the random variable $\chi^2_{calc} = 9,21$ is greater than the theoretical value $\chi^2_{0,05;3} = 7,81$, therefore it can be stated that the difference between the expected and observed values is not due to chance.

3. Conclusions

Migration is a socio-demographic phenomenon with implications for the labor market and implicitly for the economy. In the present paper, it was found that 40.51% of Romanian emigrants in 2022 come from macroregion two. This is a significant percentage, considering that the next macroregion records 24.81% (macroregion three), and the other macroregions have percentages of 20% (macroregion one – 18% and macroregion four – 16.68%).

It is found that the differences between the observed and expected values are statistically significant in order to guarantee with a 95% probability that there is a connection between the variables. Therefore, the null hypothesis H_0 is rejected with a 5% probability, in other words, gender and belonging to one of the macroregions determine the decision to leave the country

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