

THE RELATIONSHIP BETWEEN THE NUMBER OF STUDENTS AND EMPLOYED POPULATION IN ROMANIA

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Abstract: *The paper aims to present the relationship between the number of students and employed population at the level of our country for a period of 11 years (2013 - 2023). The Kendall coefficient, one of the non-parametric methods for establishing the link between statistical variables, will allow us to observe the relationship between the two indicators. The values recorded the number of students and employed population are official data, provided by the National Institute of Statistics. The result obtained after calculating the Kendall coefficient demonstrates that there is a link between these indicators, it is reverse and of low intensity.*

Key words: *students, employment, Kendall coefficient, Romanian economy.*

JEL classification: *E24, I25.*

1. Introduction

Any economic activity actively utilizes the labor factor (Angelescu, 2003). All organizations involve people as a fundamental resource, as they ensure the development, existence, and success of those organizations.

The importance of the population in an economy is determined by its dual role: as a consumer in the goods and services market, and as a creator of goods and services through the use of labor. The employed population refers to people who have a job and represents the most important segment of the active population (Badea et al., 2020).

Popescu and Ciurlău state that the valorization of labor resources is based on the relationship between economic growth – competitiveness – employment – sustainable human development, as this paradigm increases the complexity of employment.

"The contemporary world is returning to the true purpose of economics, both at the individual and social level. Currently, a new mode of development is required, one that integrates the human dimension from a different perspective—that of complexity and diversity—in which education plays a key role. Education becomes an integral part of the globalization process and a fundamental economic resource that can support long-term competitive advantage." (Costea et al., 2010)

Considering the above statements regarding the importance of employment and education in an economy, this paper aims to analyze the relationship between the employed population and the number of students enrolled in bachelor's degree higher education. The values recorded for the number of students enrolled in bachelor's studies and for the employed population, presented below, are provided by the National Institute of Statistics.

The recorded values for the employed population are presented as totals and are not broken down by gender. The number of students enrolled in bachelor's degree programs includes both public and private educational institutions, as well as all forms of study (full-time, part-time, and distance learning).

The evolution of the employed population in the Romanian economy is presented in Figure 1. The data highlighted in this figure show a downward trend over the analyzed period (2013–2023). Although the overall trend is decreasing, fluctuations did occur during the 11 years covered by our analysis.

In 2013, there were 8.549 million employed persons in the Romanian economy, while in the most recent year, 2023, this number decreased to 7.696 million—showing a difference of 853 thousand employed persons. The highest number of employed people was recorded in 2018, with 8.688 million individuals. It can be observed that the three years prior to the COVID-19 pandemic (2017, 2018, and 2019) are the years in which the highest employment figures were registered.

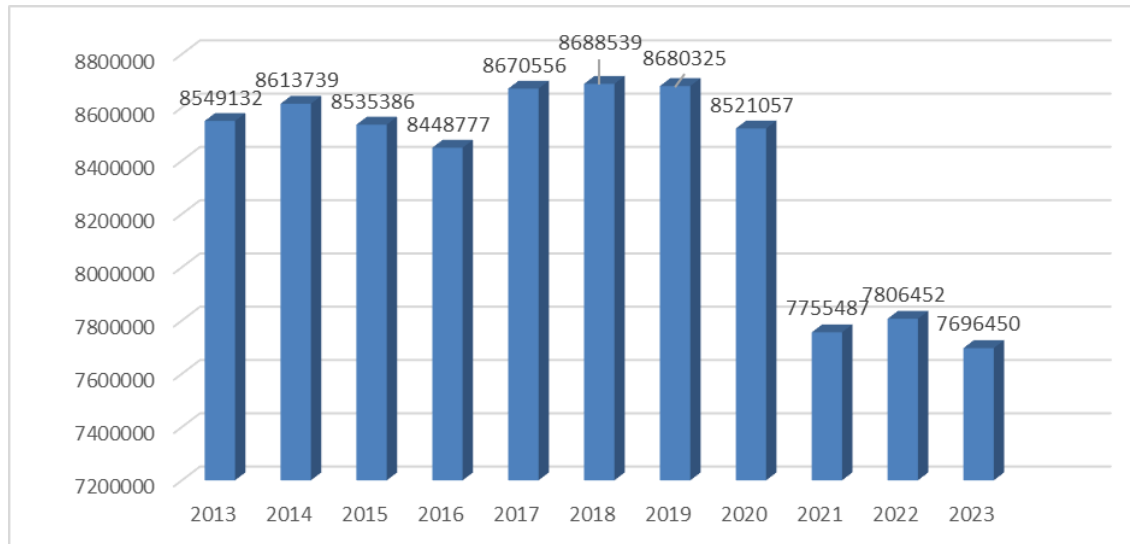


Figure 1. Employed Population (persons)

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

The number of students enrolled in bachelor's degree higher education is the second indicator analyzed in this paper. The analyzed period is the same, as we aim to further examine whether there is a relationship between the two indicators.

The evolution of the number of students enrolled in bachelor's degree programs in Romania is illustrated in Figure 2. The data presented in this figure show a downward trend over the analyzed period (2013–2023), as well as the presence of fluctuations throughout the entire timeframe.

In 2013, there were 433,234 students enrolled in Romania, while in the most recent year, 2023, the number decreased to 414,998 students—a reduction of 18,236 students. The highest number of students in Romania was recorded in the first year of the analyzed period.

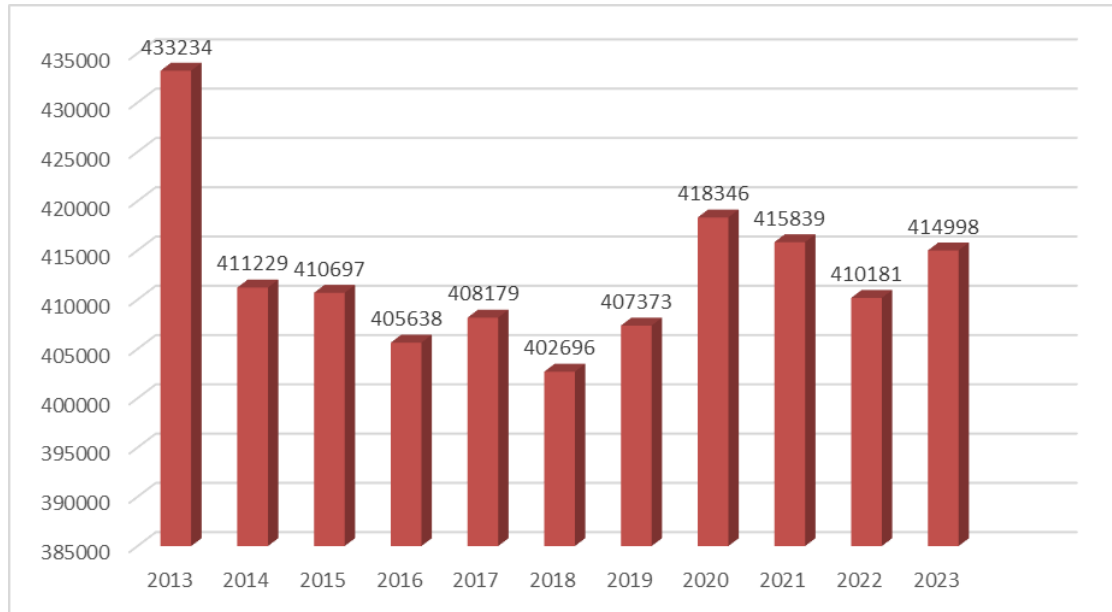


Figure 2. Number of Students Enrolled in Bachelor's Degree Higher Education (persons)

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

After presenting the two indicators, which form the basis of this paper, it is interesting to analyze the employed population based on education level. The structure of the employed population by education level has primarily focused on university and high school studies in the last two years of the analyzed period.

Table 1. Employed Population by Education Level

Level of education	2022 (persons)	2023 (persons)	2022 (%)	2023 (%)
University level	1881921	1754620	24.11	22.80
High school level	3355956	3274128	42.99	42.54
Other level of education	2568575	2667702	32.90	34.66
Total	7806452	7696450	100	100

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

Table 1 highlights the number of employed persons based on their level of education, as well as their structure for 2022 and 2023. We can observe that the percentage of the employed population with university education decreases from 24.11% in 2022 to 22.80% in 2023. A similar trend is seen in the percentage of the employed population with high school education, which decreases from 42.99% to 42.54%, a much smaller decrease compared to the one observed in the population with university education.

2. Research Methodology

In this paper, to demonstrate the relationship between the number of students enrolled in undergraduate university education and the employed population, we will use a statistical method that checks the dependency between two or more variables. The statistical method that will be used is a non-parametric method for analyzing statistical relationships, namely the Kendall coefficient. This coefficient allows us to analyze the relationship between the two indicators and prove the existence of a link between the variables, its direction, and intensity.

The result obtained after calculating the Kendall coefficient shows the intensity of the relationship between the variables. The Kendall coefficient takes values between 1 and -1 (Bădița et al., 1998). The closer the result is to 0, the weaker the relationship, and the closer it is to 1 or -1, the stronger the relationship (Grigorescu, 2010). The same result also provides information about the direction of the relationship, i.e., if it is positive, it indicates a direct relationship, while if it is negative, it indicates an inverse relationship.

In determining the Kendall coefficient, it is necessary to establish which variable is independent and which is dependent. We consider that the number of students enrolled in undergraduate university education influences the employed population. Clearly, this is not the only factor affecting the employed population.

Based on what has been mentioned above, the two variables in this paper are considered as follows:

- The number of students enrolled in undergraduate university education is the independent variable (denoted as X);
 - The employed population is the dependent variable (denoted as Y).
- The hypotheses we start with are as follows:
- There is a relationship between the number of students enrolled in undergraduate university education and the employed population;
 - The relationship between the number of students enrolled in undergraduate university education and the employed population is a direct relationship.

We will now verify whether the hypotheses we started with are true or not. By calculating the Kendall coefficient, we have the opportunity to demonstrate that there is a relationship between the number of students enrolled in undergraduate university education and the employed population in the Romanian economy. The values recorded by the two indicators over a period of 11 years (2013-2023) will be used in our calculations.

3. Main Results

The Kendall coefficient is one of the non-parametric methods for analyzing statistical relationships. To calculate the Kendall coefficient, it is necessary to determine the specific ranks for the two indicators.

The Kendall coefficient is calculated using the following formula:

$$C_K = \frac{2 \sum (P-Q)}{n(n-1)} \quad (1)$$

Where:

P - number of ranks higher than the rank being examined;

Q - number of ranks lower than the rank being examined;

n - number of pairs.

Table 2. Specific Ranks of the Kendall Coefficient

X	Y	R _x	R _y	P	Q	P-Q
402696	8688539	1	11	0	10	-10
405638	8448777	2	4	6	3	3
407373	8680325	3	10	0	8	-8
408179	8670556	4	9	0	7	-7
410181	7806452	5	3	4	2	2
410697	8535386	6	6	2	3	-1
411229	8613739	7	8	0	4	-4
414998	7696450	8	1	3	0	3
415839	7755487	9	2	0	0	0
418346	8521057	10	5	1	0	1
433234	8549132	11	7	0	0	0
Total						-21

Source: Created by the authors

The Kendall coefficient is one of the non-parametric methods for analyzing statistical relationships. To calculate the Kendall coefficient, we need to establish the specific ranks for the two indicators.

The Kendall coefficient is calculated using the following formula:

$$C_K = \frac{2 * (-21)}{11(11 - 1)} = -0,381$$

The value of the Kendall coefficient is -0.381. This result indicates that there is a relationship between the two indicators; this relationship is inverse and of medium intensity. The result obtained demonstrates that only one of the two hypotheses we started with is true. The first hypothesis stated that there is a relationship between the number of students enrolled in higher education and the employed population, which is true since we obtained -0.381 when calculating the Kendall coefficient. The second hypothesis referred to the direct relationship between the number of students enrolled in higher education and the employed population. This hypothesis is not true, as the result shows that the relationship between the two indicators is inverse.

4. Conclusions

A non-parametric method for establishing the relationship between variables has facilitated the analysis of the relationship between the number of students enrolled in higher education and the employed population, and helped demonstrate the existence of a relationship between the two indicators. Between the number of students enrolled in higher education and the employed population, there is an inverse relationship with medium intensity. This result shows that the number of students enrolled in higher education has a small influence on the employed population, but more importantly, this influence is inverse, meaning: when the number of students increases, the employed population decreases.

New directions for research emerge from the results obtained: identifying the factors that influence the employed population, observing whether students who have completed a bachelor's degree work in the field in which they graduated, etc.

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