Theoretical and Applied Economics
Volume XXXI (2024), No. 1(638), Spring, pp. 5-14

The unemployment rate and the future of the employment market in Romania The impact of inflation A study on the Romanian post-pandemic economy dominated by uncertainty

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Abstract. *This study was conducted to understand the fluctuation of the unemployment rate and the inflation rate in Romania in the post-pandemic years. Also, the study aims to highlight the future of these two variables based on the forecasted values, but also on the possible future state of the economical and geopolitical framework. For this purpose, the correlation between the inflation and unemployment rate in the last 4 years in Romania is going to be analyzed using a linear regression model. Based on the output of the model, a series of conclusions is going to be highlighted related to the impact of the inflation rate on the fluctuation of the unemployment rate in the post-pandemic period (2020-2023). The research will indicate that there is still a strong correlation between the two variables and that a high percentage (more than 91%) of the fluctuation of the unemployment rate in Romania in the post-pandemic years is explained by the fluctuation on the inflation rate.*

Keywords: unemployment, inflation rate, Philips curve, Covid-19, Linear regression, correlation.

JEL Classification: E24, E31.

1. Introduction

First of all, before diving in the main subject of the paper, a short definition of the terms that are going to be utilized and discussed is necessary. Therefore, from a theoretical perspective, the inflation rate represents the percentage change in the general price level of goods and services in an economy over a specific period of time. It is commonly expressed on an annual basis and is a key indicator used to measure the rate at which the overall level of prices for goods and services is rising. Thus, if we were to understand the impact of the inflation rate, a positive inflation rate indicates that prices are rising, while a negative inflation rate (deflation) implies a general decrease in prices. A moderate and predictable inflation is generally considered normal in a growing economy. Central banks and policymakers often target a specific inflation rate as part of their monetary policy to maintain price stability and support sustainable economic growth. Inflation can impact various aspects of the economy, including purchasing power, interest rates, and investment decisions (Gârlă, E., 2012). Continuing with the other variable, the unemployment rate represents the percentage of the labor force that is unemployed and actively seeking employment within an economy. It is a key economic indicator used to assess the health of the labor market. The unemployment rate is calculated by dividing the number of unemployed individuals by the total labor force (the sum of employed and unemployed individuals) and then multiplying the result by 100 to express it as a percentage (Guranda, M., 2014).

Throughout the years, the examination of statistical data series revealed a clear and consistent inverse correlation between the inflation rate and the unemployment rate. Simply put, there appears to be a compensatory relationship between inflation and unemployment. This means that achieving lower unemployment may entail accepting higher inflation, or conversely, reducing inflation may come at the cost of higher unemployment. This reciprocal correlation is graphically depicted by the Phillips curve (Anghelache, C., Isaic-Maniu, A, Mitruț, C, Voineagu, V., 2006). We can conclude from the relationship between the two variables that as long as the unemployment rate maintains its natural level, the inflation rate does not fluctuate. On the same page, if the unemployment rate rises above its natural level, then the inflation rate will register a decrease.

However, in the recent years, there are some specific articles which focus on the possibility that the Philips curve theory lacks the applicability in the current economy.

Therefore, the current paper aims to identify if the correlation between the inflation and the unemployment rate in Romania in the post-pandemic years is still strong, or if there are some specific changes in this area. In terms of methodology, the first part of the paper is going to focus on the bibliographic research, presenting the current state of the literature review related to the subject. After the literature review, a linear regression and correlation model is going to be performed using the data set from 2020 until 2023, in order to indicate how strong the correlation between the unemployment and inflation rate is in the current Romanian economy.

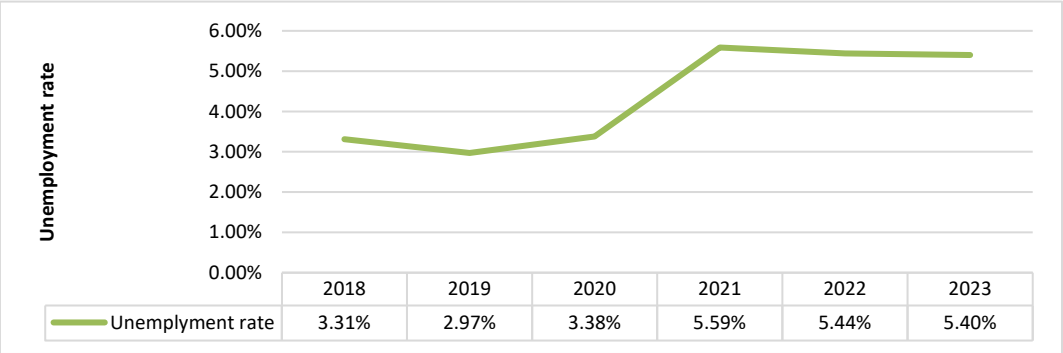
2. Literature review

Conjectural factors and non-economic crises, such as COVID-19, redefine the functioning and efficiency of the labor market and profoundly change the demand for human capital, having direct and profound effects on education for the labor market. The outbreak of the COVID 19 epidemic meant, as in the case of other epidemics, for all states, an external shock, both on the supply side and on the labor demand side (EURES, 2023). The sudden deterioration in the health status of the population, and in particular the working population, had destructive effects on human capital. A poor state of health, as well as the risk of death, causes reductions both in the number of hours active people are willing to work and in work productivity. The fact that the risks are higher for older workers, who possess more professional experience, accentuates the reduction in labor productivity (Boboc, C., 2020). The reduction in the intensity of economic and social activities, however, had and still has notable effects on the various components of the labor supply. Thus, a segmentation of the employed population is taking shape, at the time of taking measures to drastically reduce economic-social activity, into essential workers and non-essential workers (Radulescu, C., 2021).

In Romania, the impact of the COVID-19 pandemic on employment was significant. There were notable shifts in the imbalances between labor supply and demand, affecting both the overall economy and specific sectors. The sudden reduction in economic activity caused a severe decrease in the demand for labor, the total number of suspended and terminated employment contracts exceeded one million, starting from the first part of April 2020 (Ministerul Muncii și Protecției Sociale, 2020). Of course that, currently, the situation of the labor market in Romania has changed and the situation is not as drastic as it was during 2020, as many companies adapted to the current economic environment. However, the labor market in Romania is far from stable or in a good shape. The evolution of the unemployment rate in the post-pandemic years (2021-2023) highlights how the levels of the unemployment rate increased significantly, by approximately 2% in 2021, and this level was maintained until the end of 2023 (Matei, E., Mindrican I., 2023).

The European Commission indicates also that the Romanian labor market remains constrained, primarily due to unfavorable demographic patterns. The unemployment rate is expected to see a slight decrease to approximately 5.4% in 2023, maintaining a low level in the next two years, despite subdued economic growth. Anticipated strong growth in nominal wages, both in the public and private sectors, is forecasted to persist at a double-digit rate in 2023 and continue robustly into 2024 (European Commission, 2023). Consequently, a substantial increase in real wages is projected for both the current year and the following year.

Graphic 1. *Evolution of the unemployment rate in Romania 2018-2023*

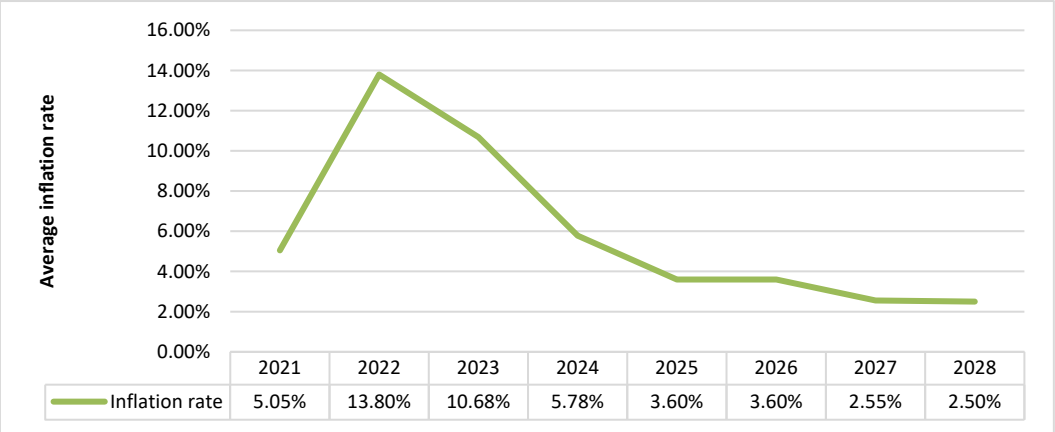


The European Centre for the Development of Vocational Training, indicated in a recent publication the fact that in the future the prediction indicates a significant decrease of the unemployment rate, as there will be new job openings, especially in key sectors such as health, transportation, food, social care and accommodation. The same prediction published by the European Centre for the Development of Vocational Training indicates that most of the new job openings, based on the structure of the job demand, will require employees with low qualification levels. This fact highlights once again an important characteristic of the Romanian market, which is job polarization, as usually the job demand will require either low or high level of qualification and only 16.67% of the job demand requires a medium qualification level. Therefore, in terms of the number of job openings, the study conducted by the European Centre indicates that between 2022 and 2035 in Romania we will have a total of 4,253,700 new job openings. However, out of this forecasted number (Cedefop, 2021), 82% will represent replacements and only 18% new actual jobs. Also, the study indicates a decrease in the number of jobs which requires farm and related workers. On the other hand, most of the new job openings will require professionals and service and sales workers.

Graphic 2. *Total job openings by occupation in Romania in 2022-2035*

Related to the inflation subject, an important indicator related to this topic is represented by the average inflation rate. The International Monetary Fund defines this metric as an inflation gauge calculated by assessing the year-on-year fluctuations in the average consumer price index. The latter represents the average price level in a country based on a standard basket of consumer goods and services. The values presented here denote the percentage change in this index measure over a one-year period (O'Neill, A., 2023). In a research conducted recently in November 2023 which approaches the evolution of the average inflation rate in Romania, a forecast of this indicator is also included. Based on the research outcome, although the average inflation rate increased significantly especially in the post-pandemic period (with a spike during 2022 and 2023), in the upcoming years, until 2028, the level of the inflation should decrease with approximately 8% compared with its current percentage (10.68%), reaching a rate of 2.5% until 2028. If the forecast turns out to be accurate this will indicate that Romania's average inflation rate will return to its usual level before the Covid-19 pandemic (2.65% during 2020).

Graphic 3. *Evolution and forecast of the inflation rate in Romania (2021-2028)*



	2021	2022	2023	2024	2025	2026	2027	2028
Inflation rate	5.05%	13.80%	10.68%	5.78%	3.60%	3.60%	2.55%	2.50%

The same author has conducted a similar research related to the unemployment rate in Romania, which shows that this indicator also increased after the pandemic (after 2020), from 3.91% in 2019 to 5.44% in 2022. However, based on the most recent data related to the unemployment rate in 2023, the percentage is decreasing, (5.4% as an average during 2023) even if the decrease is not that impactful (only 0.19% decrease from 2021 to 2023) (O'Neill, A., 2023).

Generally, the relationship between inflation and the unemployment rate is often analyzed within what is known as the "Phillips curve". This economic theory suggests that there is an inverse relationship between inflation and unemployment, at least for a short period of time. According to this theory, when inflation is low, unemployment is generally high and vice versa. This can be explained by the idea that in periods of economic growth and low inflation, the demand for labor is higher, leading to a decrease in unemployment. On the other hand, during periods of recession and high inflation, the demand for labor may fall, leading to an increase in unemployment. However, there are some specific studies which focus on the possibility that the Philips curve is dead and actually not applicable anymore

on the current economic environment. This idea is captured also in a recent article which indicates that the belief that the Phillips curve is no longer relevant has never been more pronounced, particularly over the past five decades (Hooper, P., 2020). Also, another study, conducted specifically on the Romanian economic environment indicates that the curve described by A.W. Phillips, and the reverse relationship between unemployment and inflation rate is applicable for the time period of 1996-2012 only for the age group 15-19 years in Romania (Moise, O., 2015).

3. Data and methodology

The current research is focused around how the two main indicators discussed in the literature review part – inflation and unemployment rate fluctuated during the pandemic and post-pandemic years in Romania and the correlation that might exist between these two indicators. In other words, the main point of the research is to test if the Philips curve and the reverse relationship between the inflation and unemployment rate is applicable in the Romanian post-pandemic economy. Therefore, the data used in this research relates only to the pandemic year and the years after the Covid-19 pandemic, which means that the data set contains the inflation rate and the total unemployment rate for the years 2020, 2021, 2022 and 2023. The data set was created based on the information provided on the Statista database.

Table 1. *Dataset used for the research*

Year	Unemployment rate	Inflation rate
2020	3.38%	2.60%
2021	5.59%	5.05%
2022	5.44%	13.80%
2023	5.40%	10.68%

From a methodology perspective, because this research aims to indicate if the correlation between the inflation and the unemployment rate in Romania in the last 4 years, the research performed is a quantitative one, using the linear regression model to calculate the correlation of the two indicators and to indicate how the relationship between these two indicators can be approached. Both the correlation and the regression model were created using Microsoft Excel.

Also, another interesting perspective is to approach and understand the current relationship and correlation between these two indicators in the context of the uncertainty which characterizes the current economic environment in Romania. This uncertainty is triggered by the Covid-19 pandemic, but also by the current geopolitical environment.

3.1. Correlation

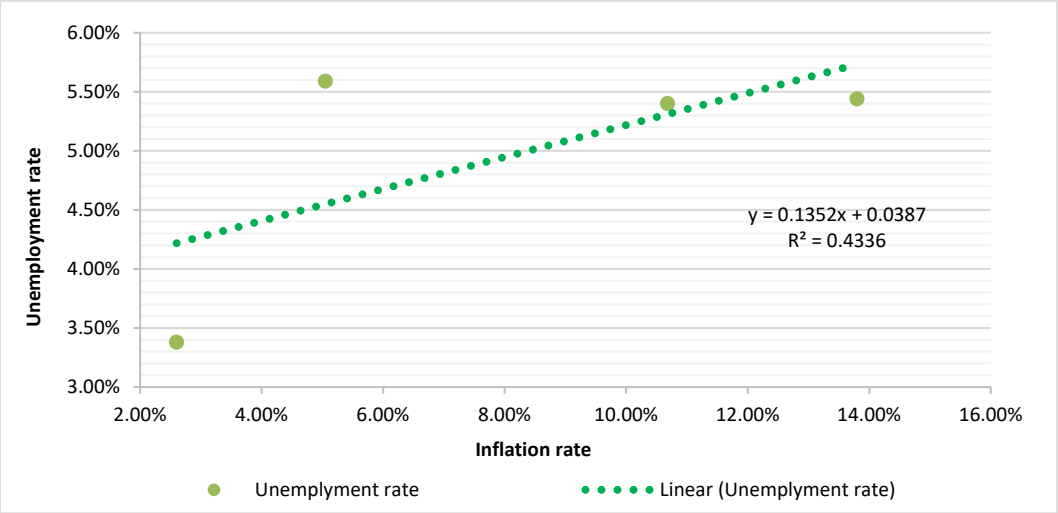
Firstly, using the Excel formula (COREL) in order to calculate the correlation coefficient between the unemployment and the inflation rate, the outcome of coefficient value is 0.66. Also, using the correlation function form the Data analysis option the same output is obtained.

Table 2. *Output for the correlation between the unemployment and inflation rate 2020-2023*

	Unemployment rate	Inflation rate
Unemployment rate	1	
Inflation rate	0.658468545	1

Additionally, the relationship between the two variables is presented in the below scatter plot, created by using the unemployment rate as a dependent variable (Y) and the inflation rate as the independent variable (X). By using the scatter plot option, we can indicate how much the fluctuation of the independent variable can affect the fluctuation of the dependent variable. In our case, we can observe how much the fluctuation of the inflation rate can impact the fluctuation of the unemployment rate. In our case, a correlation coefficient of 0.66 between the inflation rate (independent variable) and the unemployment rate (dependent variable) indicates a moderately strong positive correlation. In other words, as the inflation rate increases, the tendency is for the unemployment rate to also increase. Since the correlation coefficient is positive, it implies a direct relationship, which means that higher inflation is associated with higher unemployment, and vice versa. It's important to note that correlation does not imply causation. While there is a statistical association between inflation and unemployment, it doesn't necessarily mean that one variable causes the other. Other factors and complexities may be at play, especially considering the complexity of the economic environment.

Graphic 4. *Unemployment and inflation rate in Romania (2020-2023)*



Continuing the research model, by using the Data Analysis and regression function in Excel Microsoft, a linear regression model is created. The first part of the model contains a series of correlation coefficients such as Multiple R, R square and Adjusted R Square. The value of each coefficient is indicated in the below table. While analyzing each coefficient, it is important to mention that firstly, Multiple R represents the correlation coefficient between predicted values and actual values in a multiple linear regression model. It is also known as coefficient of multiple correlation or coefficient of multiple determinations. In our case, a value of 0.9185 can be interpreted as follows: in Romania, between 2020 and 2023, 91.85% from the variation of the unemployment rate can be explained by the variation of the inflation rate.

The next coefficient in the regression model is the R-squared, alternatively referred to as the coefficient of determination. It serves as a statistical metric employed to elucidate the extent to which the independent variables (the predictors) in a multiple linear regression model clarify the variability observed in the dependent variable (the outcome). In our case, the value of R square is 0.8437, which means that 84.37% of the variation of the unemployment rate in Romania can be explained by the variation of the inflation rate for the selected period.

In multiple linear regression, the standard error is a measure of the precision of the regression coefficient estimates. It measures the average amount by which the actual Y values in the data set deviate from the Y values predicted based on the regression equation. Specifically, the standard error estimates the variability of the residuals, which are the differences between the actual Y values and the predicted Y values. A smaller standard error indicates that the model fits the data well and the predicted Y values are close to the actual Y values. In our case, the standard error value is 0.02298, which can be considered a low value, which indicates that the predicted values are more accurate and closer to the actual values, while a larger standard error would indicate that the predicted values are less accurate and further from the actual values.

Table 2. *Regression statistics*

Regression Statistics	
Multiple R	0.91854604
R Square	0.84372683
Adjusted R Square	0.5103935
Standard Error	0.02298563
Observations	4

3.2. Linear regression model – ANOVA

Related to the linear regression model, the ANOVA table output contains a significant value, used in order to help us deliberate if the null hypothesis needs to be accepted or not. In our case, the null hypothesis indicates that in the last 4 years in Romania the fluctuation of the inflation rate didn't determine the fluctuation of the unemployment rate. The value used in order to decide if the null hypothesis is accepted or not is the F statistic (F test).

In our case, the output of the F test is 16.19 and in order to take the decision, this value needs to be compared with the F statistic for a 5% confidence level and 3 degrees of freedom (obtained by using the FINV function in Excel Microsoft). Therefore, the F statistic output value is 10.12, which means that in our model, the F test has a higher value compared with the F statistic value (16.19 > 10.12), therefore the null hypothesis is not accepted.

Table 3. *ANOVA output table*

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	0.008557592	0.008558	16.19715	0.056553
Residual	3	0.001585018	0.000528		
Total	4	0.01014261			

4. Findings of the research

Based on the conducted research and on the linear regression model, the conclusion that there is a medium to strong correlation (correlation coefficient of 0.66) between the inflation and the unemployment rate in Romania after the pandemic period can be drawn. Of course, based on the multiple studies which exist on this topic and the theory based on the Philips curve, the relationship between these two variables was clear, however, taking into consideration the latest research which tend to indicate that the theory based on the Philips curve is no longer applicable, the need of the above performed research appeared.

Also, based on the statistic output for the linear regression model, in the post-pandemic years, in Romania, more than 91% of the fluctuation of the unemployment rate was determined by the fluctuation of the inflation rate. This finding can indicate that in Romania's case, in the post-pandemic economic environment, the relationship between the unemployment rate and the inflation rate is still strong.

5. Conclusion

Taking into consideration all the analyzed references and the conducted research, the main conclusion of the paper indicates that there is still a strong relationship between the unemployment rate and the inflation rate in Romania. Also, taking into consideration the high increase in the inflation rate in the past years, the correlation between these two variables can indicate a possible negative scenario for the Romanian economy in the future if the inflation rate will continue to increase. However, based on the forecasts illustrated in the first part of the paper, the inflation rate will decrease by up to 8% in the next 5 years, which means that, based on the correlation between the two variables, the unemployment rate in Romania will also decrease significantly. This affirmation is also sustained by the research conducted by the European Centre for the Development of Vocational Training, which indicates that in the next 11 years, the number of job openings in Romania will increase with 4,253,700, out of which 82% will represent replacements and only 18% new actual jobs. The sectors which will experience the highest decrease in the number of jobs are the ones that require farm and related workers, while the sectors with most of the new job openings will be the ones which require professionals and service and sales workers. This conclusion is accurate if we think about the future of technology, especially in the context of AI utilization rate and the increase in job automation.

Related to the uncertainty of the Romanian market after the Covid-19 pandemic, indeed, we can see that in the post-pandemic years, especially in 2021, there was a significant increase especially in the unemployment rate. The inflation rate, however, increased, but, it took a longer time for it to reach its highest level (in 2023). If we analyze the fluctuation and the increase of each of these variables, we can also see that while the unemployment rate increased drastically in 2021, its level remained almost flat (with small increases) in the next 2 years, while the inflation rate increased constantly through the years. Of course, this difference in the fluctuation of the variables can be explained by the drastic modification in the job structures in the pandemic and post-pandemic labor market, because especially in 2021, most of the suitable jobs were redirected to a remote environment.

The current situation of Romania is improving if we take into consideration the forecasted values of the inflation and unemployment rate. However, we need to take into consideration that new uncertainties appear, with the war between Russia and Ukraine still ongoing and the new war between Israel and Palestine, which make the geopolitical environment very unpredictable. Thus, the evolution of these two indicators needs to be analyzed in the upcoming years, in the context of the geopolitical environment changes, in order to understand how it might impact their fluctuation.

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