

# IMPACT OF THE INFLATION ON THE EXCHANGE RATE AND ON THE AVERAGE SALARY

Case study

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## Keywords

Inflation rate  
Salary earnings rate  
Exchange rate euro/leu  
Testul Augmented Dickey-Fuller

## JEL classification

C51, C82, E31

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## Abstract

*Inflation has been and is considered one of the negative phenomena of the national economy. In this article we aimed to analyse the connection between the inflation rate and a few important macroeconomic variables such as the exchange rate and the nominal average salary as well as the analysis of the evolution in time of these variables. The objective of the research is to prove the causal relationship between the inflation rate and the RON/Euro exchange rate, respectively between the inflation rate and the nominal average salary, which are made using statistical methods and regression methods. The analysis of the trend and of the causal relationships among the three variables uses annual series from the 2000 – 2012 period.*

## 1. INTRODUCTION

Inflation is one of the most “harmful” economic phenomena manifested in contemporary economies (Mândricelu, 2012). It is present in the economy or any country when there is excess of money supply compared to the quantity of goods and services.

The exchange rate was used as an antiinflationist anchor. Despite these precautions of the National Bank, between the evolution of the exchange rate and the inflation, i.e. between the domestic and the external depreciation of the RON, there was a driving effect, resulted for the evolution at different paces and different times of the two phenomena. (Moroianu)

All countries aim at increasing the purchasing power. This increase in the purchasing power is made by increasing the salary level. The increase in the salary level determines most prices which lead to inflation. At the same time "Human resources managers were forced to redefine traditional human resources practices, and instead of merely limit themselves to the simple recognition of rights obtained by the staff, to also aim at providing the required promotion and training, to balance

salaries compared to the inflation rate and increase them gradually or according to skills (Bondoc, 2008).

## 2. RESEARCH METHODOLOGY

The analysis of the relationship among the inflation rate, the exchange rate and the nominal average salary is made using unifactorial linear regression models: in which  $y_t$  is the dependant variable,  $x_t$  is the independent variable,  $\varepsilon$  is the random variable of the model that highlight the influence of other factors.

An important requirement that must be met by the analysed time series is to check the stationary nature with the help of the Augmented Dickey-Fuller test. The time series are stationary if  $t\_Statistic$   $t\_Critical$  and the probability  $p$  is lower than the significance threshold  $\alpha = 0.05$  (erb nescu, 2013).

The parameters of the linear regression model are determined using the ordinary least squares method (OLS).

## 3. DATA ANALYSIS AND RESEARCH RESULTS

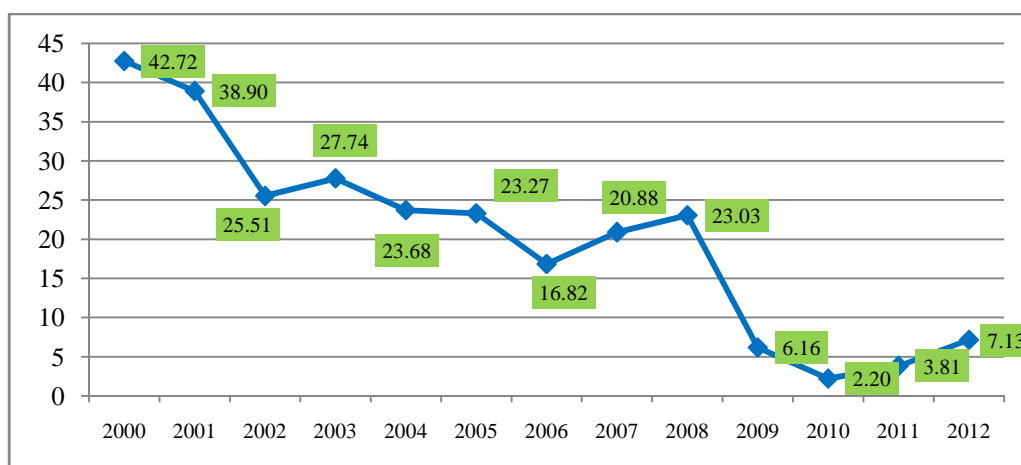


Figure 1- Change the % of nominal earning

Source: Processing operations on data from Statistical Yearbook of Romania, NBR bulletin monthly

The nominal average monthly net salary gain, in 2012, was 1547 lei/person, which is an increase compared to the

previous year by 103 lei/person (7.13%). In the analysed period, 2000 – 2012, the nominal salary gain is on an uptrend,

which increases annually on average by 110.8 lei/person (17.77%) while the percentage changes of the nominal salary gain has a downtrend. From 2000 and until 2008 the percentage changes of the salary vary within the range 42.72% and 16.82%,

period in which the economic growth is put at national level. From 2009 when the effects of the economic crisis are also felt in Romania, the percentage changes of the salary decrease significantly, varying between 2.20% and 7.13%.

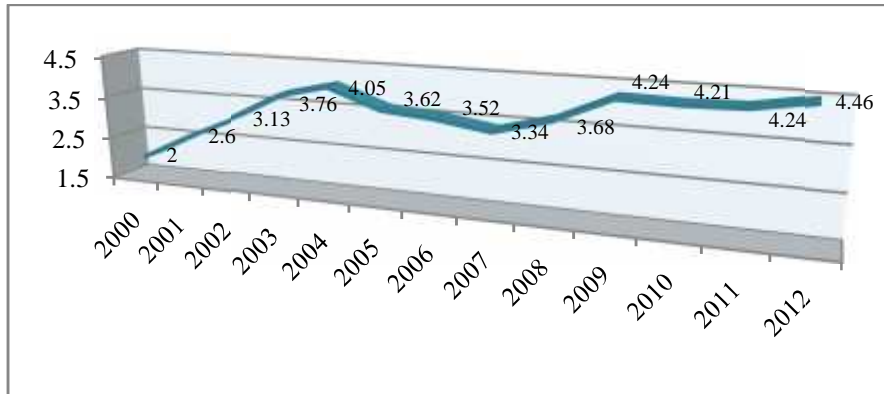


Figure 2 - Exchange rate euro/leu from 2000-2012

Source: Processing operations on data from Statistical Yearbook of Romania, NBR bulletin monthly

We can notice from Figure 2. a sharp increase in the RON/euro exchange rate until 2004 (4.05 lei) after which the evolution of the leu exchange rate becomes more balanced. Starting with 2005 and until 2008 the national currency is appreciated compared to euro, which can be due to foreign investments. In the analysed period, 2000-2012, the leu/euro exchange rate increases with an annual average of 0.21 lei (6.91%). Compared to 2011, in 2012, the national currency depreciates compared to euro by 0.22 lei (5.19%).

Starting with 2000, the annual inflation rate shows a downtrend (from 45.7% in 2000 to 3.33% in 2012), annually decreasing on average by 3.53 percentage points. In 2008, the annual inflation rate increases compared to the previous year by 3.01 percentage points, and in 2012, the annual inflation rate is below the 2011 value by 2.46 percentage points, when it reaches 3.33%.

Comparing the annual inflation rate with the annual increase pace of the nominal salary we can see that the nominal salary increases quickly, which determines the increase in the real salary.

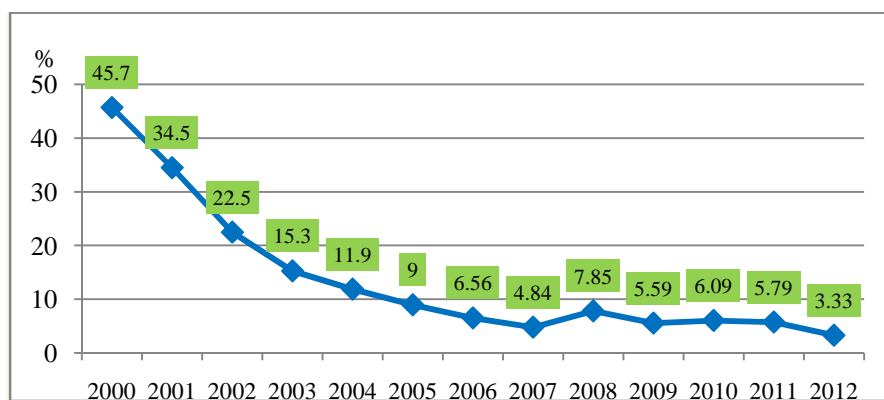


Figure 3 - The annual inflation rate from 2000-2012

Source: Processing operations on data from Statistical Yearbook of Romania, NBR bulletin monthly

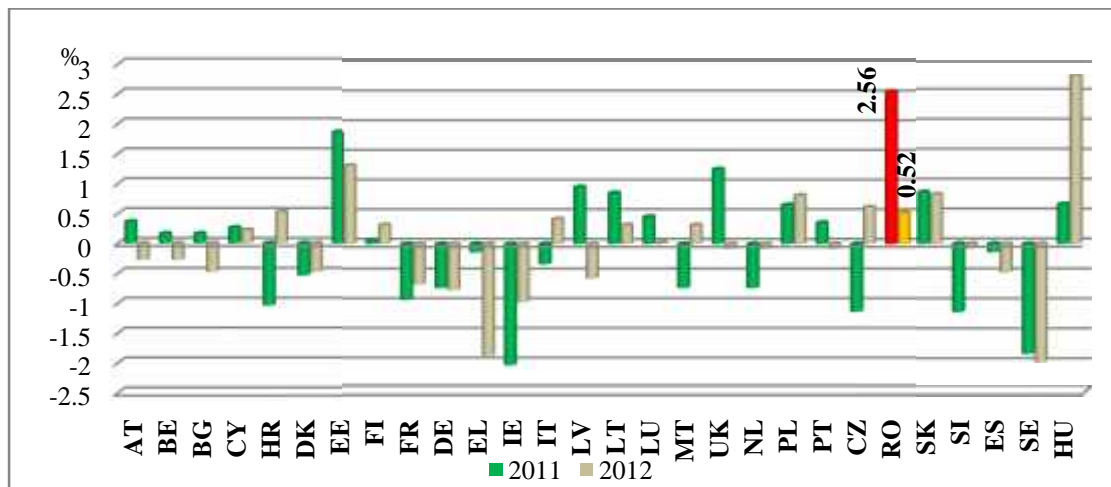


Figure 4 - Location of the annual inflation rate of the EU Member States compared to the EU average

Romania had the highest annual inflation rate among the 28 European Union member countries in 2011, with an inflation that reached 5.78% and a deviation of 2.56 percentage units compared to the EU average. Estonia is the following country in which the annual inflation rate has a high level, reaching 5.1%, above the EU average by 3.7 percentage points. In contrast, Ireland (1.2%) and Sweden (1.4%) were the countries with the lowest annual inflation rate.

In 2012, the annual inflation rate is 3.3% by 0.52 percentage points above the EU average, placing Romania on the 6<sup>th</sup> place together with Croatia.

We will analyse below the relationship between the inflation rate and the macroeconomic variables: the leu/euro exchange rate and the salary increase rate.

Before analysing the relationship among the three variables we must check the stationary nature of the data series: the annual inflation rate, the leu/euro exchange rate, and the salary increase rate. The stationary nature of the data series is checked using the Augmented Dickey-Fuller test made available by Eviews. It can be said that all three series are stationary if we accept a significance level of 1% (see table 1).

Table 1 - Test results of the Augmented Dickey-Fuller

	t-Statistic	Prob
<b>Rate of inflation</b>		
Augmented Dickey-Fuller test statistic	8,095773	0,0000
Test critical values:		
1% level	4,121990	
5% level	3,144920	
10% level	2,713751	
<b>Exchange rate euro/leu</b>		
Augmented Dickey-Fuller test statistic	3,275560	0,0042
Test critical values:		
1% level	2,816740	
5% level	1,982344	

10% level	1,601144	
The wage growth rate		
Augmented Dickey-Fuller test statistic	3,019641	0,0063
Test critical values:		
1% level	2,792154	
5% level	1,977738	
10% level	1,602074	

Source: Processing operations on data from Statistical Yearbook of Romania, NBR bulletin monthly

A significance contribution in the mitigation of inflationary pressures may come from the leu/euro exchange rate. In order to determine the impact of the inflation rate in Romania on the leu exchange rate we will analyse the

regression between the inflation rate variable, viewed as independent variable and the exchange rate variable, which is a dependent variable of the unifactorial regression model (see table 2).

Table 2 - Estimation of parameters of an econometric model that describes the relationship between Exchange rate and the inflation rate achieved using the method of least squares (OLS)

The dependent variable: rata_schimb				
Included observations: 13				
rate_exchange = a + b*inflation_rate				
	Coefficients	Standard error	t-Statistic	Prob
a	4,273188	8,746932	9,180439	0,0000
b	-0,048625	6,837926	-7,71853	0,0000
R-squared	0,844139	The average rate of inflation		13,76538
Multiple R	-0,91877	F-statistic		59,57578
		Prob		0,000009
Durbin – Watson stat	1,714850	JB		2,67
		Prob		0,262882

The two estimators of the parameters  $a$  and  $b$  are significantly different from zero because for the estimator  $a$  we have  $t_{\text{calculated}} = 9.18$   $t_{0,05;1;11} = 2.2$  respectively for the estimator  $b$  we have  $t_{\text{calculated}} = 7.72$   $t_{0,05;1;11} = 2.2$  with both probabilities  $p = 0 < \text{significant threshold } 0,05$ . The calculated value of the test  $F$  is bigger compared to the table value, which means that the model is significant and then the inflation rate is an important variable that influences the exchange rate.

The regression function describing the relationship between the exchange rate and the inflation rate takes the following

form:  $\text{exchange\_rate} = 4,27 - 0,05 * \text{inflation\_rate}$ .

The relationship between the exchange rate and the inflation rate has a high and indirect intensity (the correlation ratio is -0.92). The inflation rate increase by a percentage unit leads to the decrease in the exchange rate (appreciation of the national currency) by approximately 0.05 percentage points. In a proportion of 80% the exchange rate variation is justified by the inflation rate variable.

The similar evolution of the inflation rate and of the salary increase rate leads to the need of determining the independent and dependent variables. A two-way relationship can be established between the two variables: thus if the

inflation leads to salary increases to maintain the purchasing power, then salary increases will cause inflation (see table 3).

Only the estimator of the parameter  $b$  is significantly different from zero because  $t_{\text{calculated}} = 5.15$   $t_{0,05;1;11} = 2.2$  and the probability  $0.00032 < \text{significant}$

threshold. The calculated value of the  $F$  test is higher compared to the table value of the test ( $F_c = 26.48$   $F_{0,05;1;11} = 4.84$ ), which means that the model is significant and thus the inflation rate is an important variable that influences the salary increase rate.

Table 3 - Estimation of parameters of an econometric model that describes the relationship between wage growth rate and the inflation rate achieved using the method of least squares (OLS) in the period 2000 to 2012

Dependent variable: salary_increase_rate				
Included observations: 13				
salary_increase_rate = a + b* inflation_rate				
	Coefficients	Standard error	t-Statistic	Prob
A	-3,49264	3,923115	-0,89027	0,392375
B	0,85678	0,16649	5,146138	0,00032
R-squared	0,706532	Mean dependent var		13,76538
Multiple R	0,840554	F-statistic		26,48273
		Prob		0,00032
Durbin – Watson stat	1,650086	JB		0,835831
		Prob		0,658418

The regression function describing the relationship between the salary increase rate and the inflation rate takes the following form: salary increase rate = -3.49 + 0.86\* inflation rate

The nominal level of the salaries is strongly influenced by the inflation rate (the intensity of the relationship between the two variables is 0.84). The increase in the inflation rate by a percentage unit leads to the increase in the salary level by 0.86 percentage points. The variation of the salary increase rate is justified in a proportion of 84% by the inflation rate variable.

#### 4. CONCLUSIONS

Following our research we can conclude that the annual average inflation rate had a strong influence on the nominal salary and on the exchange rate. Thus in the analysed period, the inflation rate has a downtrend leading to the depreciation of the national currency and to the decrease in the average salary.

Compared to the EU countries, in Romania we can see an improvement of the analysed indicators in 2012, because the inflation rate decreased to 0.52%. However, Romania has one of the lowest positions among the EU countries.

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