

INTEREST RATE, EXCHANGE RATE AND INFLATION IN ROMANIA. CORRELATES AND INTERCONNECTION

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Abstract: *The connection between the interest rate, the exchange rate and inflation is important due to their impact and volatility on the economical balance. This article aims to establish the relation between these factors, first on a theoretical level, followed by an econometric one, taking Romania as being the subject. By applying the regression method, the study aims to establish an interdependence relation between inflation, exchange value and interest rate, and conclude by answering which of these has a more powerful impact on modifying the others by testing several hypotheses.*

Key words: *interest rate, inflation rate, exchange rate*

JEL Classification: *E43*

1. INTRODUCTION

The survey aims to explore the evolution of the exchange rate, inflation and interest during 2005-2014 in Romania and to determine what correlations exist between these indicators. It will check whether and how theoretical approaches about correlations established between these indicators apply to the actual situation of Romania.

„In Romania, the exchange rate close to its equilibrium level, established through market mechanisms, has proven extremely difficult given the conditions under which the public does not realize the objective constraints of the process and react, naturally, unfavorable, with each decision by the authorities to devalue the national currency.” (Isărescu, CM, 2006, p.15)

The financial crisis began, worldwide, in August 2007, when the fragile financial stability generated negative consequences on the majority of macroeconomic indicators. The roots of the crisis are found however far more, with various views on the fundamental causes. It is generally accepted that US mortgage lending standards were relaxed in the early 2000s and the increasing rates of mortgage delinquency sent a shock of major US financial institutions.

In the literature we have identified a number of channels through which monetary policy has contributed to the accumulation of financial imbalances. One is considered reference interest rate channel that has been kept low for too long.

Loose monetary policy has reduced the cost of wholesale funding intermediaries (Adrian et Shin, 2008). Global imbalances are also associated with a greater dispersion of current account deficits and higher net capital flows between different areas. At a country level, the current account deficit is offset by larger net capital inflows, so foreign investors sustain the national economy in destination countries that are typically emerging countries. Large capital inflows can also reduce financing costs for wholesale domestic banks.

Many of the flows are temporary and reflect differences in interest between the source country and the recipient country. When monetary policy rates in advanced economies return to normal levels, they shall create problems for recipient countries. (Ostry et al, 2010)

Even before the crisis, some experts have argued that global imbalances have reduced long-term interest rates worldwide (Bernanke, 2005). The argument advanced was that worldwide, an excess of desired savings with respect to investment, lead to a „saving glut.”

Others (Caballero et al., 2008) have argued that the coexistence of global imbalances with low interest rates have not derived from a „savings glut”, but from a lack of safe financial assets. In particular, growth in emerging economies has outgrown the capacity of these countries to develop their economy financial safety.

Seeing the above findings, we can include in these assumptions Romania, after 2008 the economic crisis was felt precisely because we exceeded the capacity of developing financial safety. Other economists believe that EU integration has led to the spread of the crisis in Romania.

The crisis of 2007-2008 triggered the financial markets and then expanded in other markets, and it seems to have imprinted a permanent volatility, so that countries and markets can no longer expect any stabilization for guidance in making decisions, but as supports (Yoshikami, 2012), need to adapt to this new economic environment and try to unlock its fluctuating character, while minimizing the risks.

The reasons underlying this topic are related to the opportunity and importance of the influence of fluctuations in inflation, interest rates and the exchange rate on the Romanian economy.

The actuality and importance of the subject is emphasized due to the following:

- The exchange rate is an indicator of macroeconomic stability with strong effects on the banking system since depreciation has negative repercussions on the quality of the loan portfolio;
- It is one of the indicators of nominal convergence pursued at joining the Eurozone, action in progress;
- It is a dynamic variable whose mobility is determined by a wide range of economic, financial and social policies, most notably the inflation;
- Inflation is the key determinant of the price formation of consumer goods;

- Inflation expectation is one of the most important channels through which monetary policy affects economic activity;
- Inflation expectations play a decisive role in the transmission mechanism of interest rate impulses to the real economy (the real interest rate is calculated as the difference between the nominal rate and the expected inflation rate);
- The interest rate is treated with importance in the current economy due to its role as leverage for savings and the income redistribution (state used to guide economic activity).

The article is divided into six parts. To begin with, there are presented the importance of macroeconomic indicators and novelty items addressed in the paper. The second part captures the correlation between interest rate, inflation and the exchange rate depicted by the specialty literature. The next chapter analyzes the economic situation of Romania during 2005-2014 as revealed by indicators such as GDP, inflation, unemployment, exchange rate, the benchmark interest rate.

The fourth part presents data that formed the basis of the study and highlights the reference interest rate developments, inflation and the exchange rate during 2005-2014 in Romania.

The last section highlights the correlation between the benchmark interest rate, inflation and the exchange rate through a mathematical model.

As methodology of calculation, it was used “regression method” and the „*least squares*”.

For the study, we intend to analyze the situation of Romania during 2005- 2014 and, based on a mathematical model, to demonstrate that our country falls into at least one of the theories about correlations of the indicators listed above. There is interdependence between the exchange rate and interest rate, and inflation ceased to evolve the same rate as the interest rate.

2. LITERATURE

In recent years economic imbalances subject was discussed with the wish to find the main causes of these imbalances and the formulation of hypotheses and theories applicable to any market participant to minimize the associated risk.

Studies in this area are based on the analysis of the main factors that destabilize the economy by putting the spotlight exchange rate fluctuations, inflation and interest rate as well as economic growth rate and indebtedness. Among those elements were discovered, often interdependence relations.

Interest rates, inflation and exchange rates are all highly correlated. Through „*manipulation*” of interest rates, central banks influence on inflation and the exchange rate. Therefore, higher interest rates attract foreign capital which determines the currency appreciation. Interest rate impact is attenuated, however, if other factors lead to currency depreciation.

2.1 Interest-inflation relationship

Inflation is a serious imbalance in the present economy, represented by a generalized increase in prices and a simultaneous decrease in the purchasing power of the national currency. It is a final indicator that shows whether government policies monetary, fiscal, and legal are coordinated and lead to stability in consumer prices. (Coman, A., Pop, R, 2015)

Despite the fact that the phenomenon and the inflationary process are widespread, economists pay particular attention to them; inflation is still rather vague concept (Văleanu, N., I., 1992, p.221), and the nature of inflation remains complex and controversial.

Inflation cannot be explained through reasoning about cause-effect relationships; rather, it is a process, a series of linked events, a „detonator” (Page, A., 1998, p. 38), with factors which help fuel price increases.

Real interest rate is the remuneration of capital calculated by subtracting inflation from the nominal interest rate. Nominal interest rate is the effective remuneration of capital in the current expression at market price. This interest is characterized by dynamic, some instability, oscillation and volatility. From this definition we can see the strong link of inflation with the interest rates.

The relationship between nominal interest rates and inflation has been frequently explored in both dimensions (theoretical and empirical) by many researchers. Some studies focus on the influence of inflation on interest rates, while others investigate the effect of interest rate on different price levels.

The specialized literature begins with the well-known Fisher theory (1930). According to Fisher's hypothesis, inflation is the main determinant of interest rates, if inflation increases by one per cent the interest rate rise by the same percentage. Following Fisher's theory, many researchers have sought to examine the interaction between inflation and interest rates. We mention here J. M. Keynes, R. W. Garrison or M. Friedman, Darly Feldstein, Robert Mundell and James Tobin.

According to the theory of Darly Feldstein, who accepts the Fisher theory, „*interest rate rises and falls with inflation, even if the percentage of changes in rates varies substantially.*”

Fisher's relationship also caused some criticism from some economists. The latest criticisms were made by Robert Mundell and James Tobin, who argue that changes in inflation rate modify real interest rate level ex-ante in the opposite direction.

If inflation rises, interest rate decreases and vice versa. The increase in inflation reduces the real value of the investment. To counteract the diminished value of the investment, investors will have to save more. Increased savings in terms of increasing inflation rate reduces the gain to compensate for deferred consumption and thus ex-ante real interest rates decrease.

Low inflation means the opposite, because the real value of the investment rises and economies decline. Mundell and Tobin argue that ex ante real interest rate is not constant and hence the nominal interest rate (market) changes in the same direction with inflation, however not by the same percentage, but smaller.

The classic concept, represented by David Ricardo and Alfred Marshall, addresses interest as determined by the rate of return that can be achieved by using capital or the price to be paid for using capital, price set as balance between global demand for capital and capital stock offered in the market.

Neoclassical, represented by Irving Fisher, defines interest as the price of money currently being expressed in money of tomorrow.

First of all in reality, inflation depends precisely on the pace of monetary expansion, namely the monetary policy rate, as shows J. M. Keynes, which makes a new concept, opposite to Ricardo and Marshall. He contests the idea that the interest rate is simply a variable, which adjusts savings offer and demand of equity investors. For Keynes, the interest rate is a pure financial size, resulted in psychological predispositions globally perceptible.

„Analysis conducted by Keynes establishes a link between „monetary sphere” and the „actual sphere” through interest rate. According to the Keynesian theory, the interest rate creates a link between monetary sphere and the real sphere, while influencing money demand and investment. Therefore, the interest rate is the main channel of transmission of monetary policy effects on the real economy. So, Keynes rejected the dichotomy between monetary and real phenomenon (specific of Classics) and currency neutrality.” (Basno et al, 1997, p. 165)

Secondly, due to liquidity preference, Keynes assumes that interest rate is not affected *caeteris paribus* by the increase or decrease in borrowed funds offer.

In the conception of R. W. Garrison, the main focus in Keynesian theory investment falls on the idea of collapse in terms of decreasing consumption. Even if the interest rate would decrease, investment would not be encouraged, because the decrease in consumption could have an overwhelming adverse. (Garrison 2001, pp. 161-162)

However, neither followers of Keynesianism opted in periods that followed the Great Depression for a tight monetary policy, on the contrary they promoted a policy of cheap money to maintain a low interest rate on government loans. (Friedman, Schwartz, 2009)

„The contemporary model implies that nominal interest rate maintains its rising trend, even if the real rate of growth of money supply has returned to the previous level, and prices cease to rise. As long as the growth rate of money supply exceeds domestic product growth rate, there is an excess demand for goods and individuals will predict inflation. Depositors will insist to receive a nominal interest rate at least equal to the real interest rate plus expected inflation rate. (...) In turn, borrowers will be willing to pay higher interest rates because they know that that price increases will allow them to pay interest at a higher real interest rate. Thereby the contemporary theory of interest brings together the real and monetary theories via the effect of anticipation of prices.” (Basno et al, 1997, pp. 167-169)

2.2 Exchange rate - interest rate relation

Over time, several theories have emerged regarding the exchange rate and the foreign exchange market. We mention here: the theory of purchasing power parity and interest rate parity theory.

In essence, the theory of purchasing power parity says that a country can establish independently the exchange rate to the inflation rate. It establishes therefore the link between inflation and a currency against another currency and it is explained the evolution of the exchange rate in the medium and long term.

Empirical tests done to demonstrate this theory were numerous, however have provided different results depending on countries and currencies studied, some of them behaving according to the theory, and others not.

Interest rates parity theory shows that the exchange rate is on par, if the difference between interest rates in the two countries is compensated by the difference between interest rate futures and spot.

The influence of interest rate explains, in particular, spot exchange rate developments. The relationship between interest rate and exchange rate can be analyzed for short or long term.

In the short term, interest rate movements cause a fluctuation of the exchange rate at sight. Thus, if a country's Central Bank will proceed to raising interest rates, it will attract foreign investors, which will liquidate the assets in other currencies and will buy securities in the currency of that country.

Selling foreign currencies and buying that country's currencies results in immediate appreciation of its currency in relation to other currencies. In reverse, the reduction of interest in that country leads investors to liquidate assets denominated in the currency of that country to make investments in other currencies. Massive currency sales in that country, accompanied by purchases of foreign currency, have the effect of depreciation of the national currency against other currencies.

These theories have generated more debate on foreign policy envisioned by the Central Bank, namely free exchange rates (floating) or managed exchange rates (fixed).

For decades, the exchange rate has been the center of debate of macroeconomic policies in emerging markets. In many countries, the nominal exchange rate was often used as a way to curb inflation, in countries other - especially in Latin America - the exchange rate has been used as a way to tax exports.

Moreover, studies that have directly examined the relationship between interest rates and exchange rate have revealed conflicting results. Thus Eichenbaum and Evans (1995) find that for the G7 model of interdependence between interest rate and exchange rate is available.

On the other side, Calvo and Reinhart (2002) have shown that in developing countries there is no systematic relationship between the two variables.

A short-term interest rate policy instrument is typically used by decision makers to affect currency values (and monetary conditions in general). Where there is no a clear relationship between interest rates and exchange rates for emerging countries, why do policy makers persist in using interest rate with the aim of influencing the exchange rate?

There is a voluminous empirical literature on the relationship between the interest rate and the exchange rate.

Baig and Goldfajn (1999) studied the link between real interest rate and the exchange rate for Asian countries during July 1997- July 1998 using the auto regression vector (VAR) through which they could demonstrate the relationship between interest rate and exchange rate.

Furman and Stiglitz (1998) examined the effect of an increase in interest rates, inflation and non-monetary factors on the exchange rate for 9 emerging countries in the 1992-1998 periods. They pointed out that the high rate of interest was associated with a further depreciation of the nominal exchange rate, but the effect was more pronounced in low inflation.

Kwan and Kim (2004) investigated the empirical relationship between the exchange rate and interest rate four Asian countries in times of crisis - Indonesia, Korea, Philippines and Thailand. Using a VAR-GARCH model, they examined the empirical relationship between exchange and interest rates, they have investigated the dynamics between them, which has changed due to the crisis.

2.3 Inflation - exchange rate relationship

If inflationary effects of exchange rate changes are large, the authorities will need to implement monetary and fiscal policies to offset inflationary consequences of exchange rate changes.

Monetarist theories indicate that the exchange rate between two currencies is influenced by demand and supply of money, on the money market. So oversupply of currency drives depreciation. Monetarists also consider that a price increase causes additional demand for currency which contributes to an appreciation of the currency. Also, GDP growth stimulates demand and determines its appreciation.

A Keynesian model is the Mundell-Fleming, which shows the influence of balance of payments flows on the exchange rate. In turn, balance of payments equilibrium is strongly influenced by market and monetary assets.

In 1976, Dornbusch has deepened the Mundell-Fleming model. His model identified an inverse relationship between the exchange rate and interest rate.

Taking Dornbusch's ideas in 1988, Messe and Rogoff tried to find a connection between the two variables, but could not demonstrate the existence of a direct link between the exchange rate and interest rate.

Sanchez (2005) demonstrated by his model that inflation will increase from year to year at the time when the amount of money will be multiplied by lending and hence by raising interest rates. Moreover, it showed that the more a country borrows in foreign currency, inflation will increase by 0,16% more than that of a local loan. The exchange rate has been used and is still used as an anti-inflationary anchor.

3. ECONOMIC SITUATION OF ROMANIA DURING 2005-2014

Following the overthrow of the communist regime in late 1989, the Romanian state has passed through a decade of instability and economic decline, caused to some extent by an obsolete industrial base and the lack of structural reform.

After Romania became a market economy, it faced structural imbalances. The worst effects of these structural imbalances have resulted in tense situations caused by the uncertainty of the economic environment and different shocks induced by ambiguous or contradictory economic policies.

High rates of inflation in 1995-1996 led to a decline of all other macroeconomic indicators, less on economic growth which was appointed by central bank officials as an „*unhealthy growth*.“ Fighting against inflation decreased GDP in the coming years at which point there was an inverse relationship between inflation and growth.

The paper analyzes the period after 2005 and captures the diverse stages of economic development of Romania. We refer here to the period 2005-2008 when growth registered the highest value.

2006 marked the largest growth in history 7,7%. In 2007 the economic growth was 6%, above estimations of specialists, under a very difficult year, marked by drought.

During the same period, Romania joined the European Union by aligning with the EU regulations. Romania has benefited in this period of various pre and post accession funds were an „*engine*“ of economic growth.

The year 2007 finds Romania with a portfolio of favorable macroeconomic indicators, with stability trend, which helped her integrate into the EU. Inflation and exchange rates are more volatile in Romania than in other EU member states, because the economy has an alert rhythm of development by attracting capital which finances investments and consumption. Prices and wages are below the EU average, but largely due to the fact that inflation has been historically at high levels.

The first year of participation of Romania in EU mechanisms was a complicated one, consisting of two semesters with significantly different developments. The first half of 2007 was marked by the existence on international financial markets of an excess liquidity in search of high returns. The recently acquired membership and capital account liberalization (a process completed in September 2006) encouraged significant inflows of foreign funds.

This abundant funding led to a significant appreciation of the currency, with favorable short-term effect in inflation reduction plan, but with negative implications on the evolution of the current account of balance of payments, the calibration of monetary policy response being necessary.

The period 2008-2011 is characterized by penetration of the financial crisis on international markets and the effect of all national indicators. 2008 captures the way from stable to negative.

Briefly, the main indicator of the evolution of economic growth, GDP, had large fluctuations in the case of our country. The largest decrease was recorded in 2009 when due to the financial crisis; Romania's GDP fell by 15% compared to 2008.

In 2010, there was a slight increase from 2009, when GDP grows by 3 percent over the previous year.

In the period July 2008-2010, the annual inflation rate decreased from 9.04 percent to 4.38 percent; during this period the trend has undergone two significant disruptions caused by the steep increase of the leu exchange rate at the end of 2008 and the higher excise taxes on tobacco products in late 2009 and early 2010.

In 2011, Romania had less than 1% of the EU's GDP (Eurostat, 2012) rising by 2,3% compared with 2010; in 2012 the economy grew by only 0,6% and in 2013 it reached 3,5% GDP, for which Romania has announced the exit from the crisis.

The period 2011-2014 is one in recovery, unemployment rates, inflation and interest decreasing but with a devaluation of the leu against the euro.

4. DATA

The data used refers to quarterly series inflation rate, RON/EURO exchange rate, quarterly series and NBR's benchmark interest rate, all quarterly series.

From 2005 until September 2011, it has been used the NBR reference interest rate and from that date until 2014, it has been used monetary policy rate, which is the benchmark interest rate used by the central bank.

We used the RON/EURO because Romania is an EU member, and has set as target the year 2019 to entry into the euro area, trade relations are expressed in euro, for the most, a substantial part of the foreign reserves of BNR are in EURO, population holds significant savings in EURO, and a large part of the prices (excise, housing) use as a basis the EURO.

In the table below we present the annual inflation rates, exchange rate and interest rate in the period 2005-2014. Based on the tables and graphs we will try to find correlations between these indicators.

Table 1 Inflation, interest rate and exchange rate in Romania (period 2005-2014)

Period (year)	Inflation rate (%)	Reference interest rate	Exchange rate ron/euro
2005	9.00	13.37	3.6209
2006	6.48	8.43	3.5258
2007	4.84	2.40	3.3353
2008	7.85	4.40	3.6826
2009	5.59	1.80	4.2399
2010	6.09	2.80	4.2122
2011	5.79	6.25	4.2391
2012	3.40	5.80	4.4593
2013	4.00	4.90	4.4190
2014	1.13	3.18	4.4437

Source: own processing based on the data from NBR Annual Report 2005-2013

Analyzing the situation in Romania through the indicators of the table, we see a lower inflation rate, while a decrease in the reference interest rate and exchange rate increase. So we can estimate the existence of an inverse relationship between interest

rates and exchange rates. The following charts will represent each indicator, followed by an interpretation of the evolution of values.

If we analyze the trend of the exchange rate on the chart above, we see its growth during 2007-2009, then stagnation until 2011 and rising again until 2012.

Also in the above chart we see slight appreciation of the leu during the years 2005- 2006 and even 2007 due to restrictive policies and integration of Romanian economy with the EU.

According to the Convergence Report (pp.52-53) published in May 2008 by the European Central Bank in which it analyzes the first evolution of the Romanian economy, currency fluctuations RON / EUR ranged from 10,8% (appreciation) and 9,6% (depreciation), the reference value used being the average of April 2006.

Interest rate applied by the central bank in the period 2005-2014 showed an intense fluctuation. The chart shows higher values (+ 13,37%) in 2005, which means that Romania still had a high inflation rate.

The period after the accession has fluctuations, but no longer records figures of 2005, the most important jump being highlighted in 2011 (6,25%).

The financial crisis has brought to the forefront the importance of interest rates as economic recovery process. Under these circumstances, the central bank dropped its benchmark interest rate at historic levels of 1,8% in 2009, in order to stimulate economic growth.

Interest rate varies in direct proportion to the inflation rate and the business cycle (increasing and decreasing in periods of expansion in recessions). We can conclude that in 2005 where there has been an interest rate of 13,37% we have the highest inflation in the analyzed period but growth, and the year with the greatest recession is 2009 where interest rate recorded 1,8%, under the conditions of an inflation rate which is on a downward path.

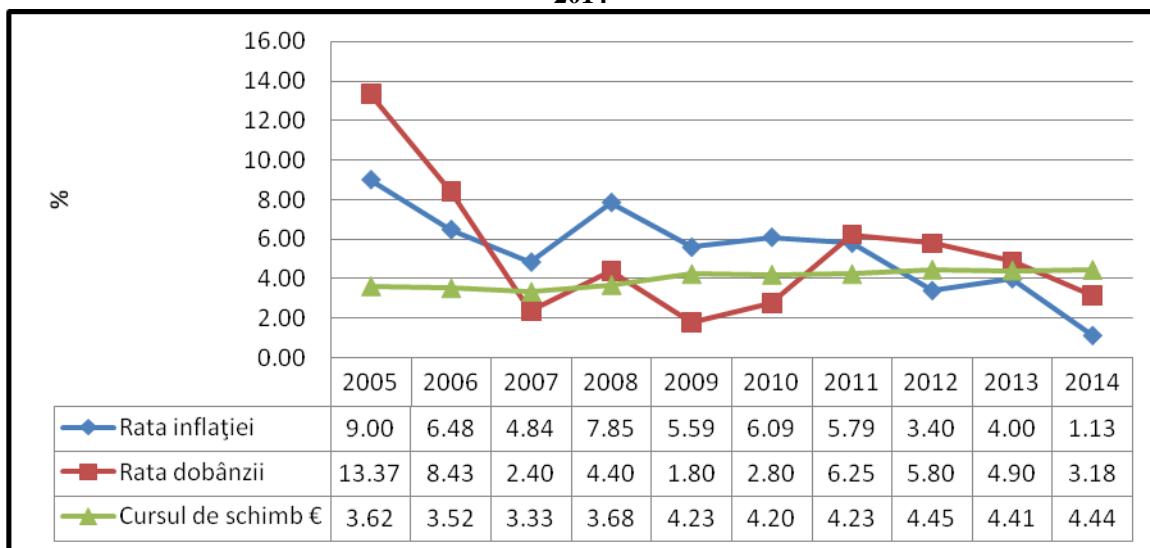
The inflation rate in the period under review has a downward trend, although sometimes fluctuating, due to specific economic conditions in each year.

The highest inflation was recorded in 2005 (9%). This value is influenced by the tensions on the food market, by impact of higher worldwide oil quotations on fuel and natural gas prices, by strong lending activity but also by structure and dynamics of the Romanian economy. The lowest value was recorded in 2014 (1,13%) below the proposed target of NBR.

„Inflation targeting was adopted by NBR in August 2005, after completing a preparatory process whose last step was the creation and functional testing of framework for economic analysis and monetary policy specific to direct inflation targeting.” (NBR, 2005)

Simultaneously, they were satisfied the other requirements and criteria which determine the effectiveness of this strategy, including lowering the annual inflation rate below 10% since 2006, to which are added relative flexibility of the exchange rate and reducing the vulnerability of the economy to fluctuations.

Chart 1: Inflation rate evolution, reference interest rate and exchange rate in Romania during 2005-2014



By the chart above, we present the parallel progress rate, inflation and the exchange rate in the period 2005-2014.

Overall, we note that the interest rate and inflation rate have, in the analyzed period, a powerful downward trend. The interest rate is slightly lower than the inflation rate in 2007-2011 as a result of policies pursued by the central bank to stimulate lending.

The financial crisis has brought to the forefront the importance that the interest rate has in the economic recovery. In these circumstances, both the ECB and NBR lowered the monetary policy rate to historically low levels to stimulate economic growth. However, a low interest rate trigger capital outflows from the country with the effects of currency depreciation.

Most states aim inflation targeting under the conditions of practicing a system of floating exchange rates. The consequence of this lies in the increasing volatility corroborated both for the interest rate and the exchange rate.

In the first period proposed for analysis, 2005-2011, we see a similarity between the interest rate fluctuations and inflation rate. In 2005 both the interest rate and inflation rate had high values but interest rate exceeded the rate of inflation, favorable to savings.

Beginning of the period analyzed, 2005 is significant because, with it, are being conducted inflation targeting policies by the NBR, which will have effects in the near future. If 2005 is the year when savings have favorable conditions in the coming years inflation has exceeded the interest rate, maintaining this status until 2011 when the interest rate exceeds the 0,46 percent inflation rate.

The exchange has a slight appreciation in 2006 but since 2007 the national currency recorded depreciation amid increased risk aversion towards greater international financial markets as a result of intense financial turbulence and concerns about the widening deficiency of current account.

Overall ron-euro exchange rate shows a steady depreciation of the leu from 3,6209 ron / euro to 4,437 ron / euro under the careful and discreet control of the NBR.

5. THE MODEL

The macroeconomic model developed is based on the „regression method” which is a statistical method to research the link between variables using a function called regression a function. This method can be considered as a generalization of dispersion analysis.

In the model developed, we used as the dependent variable the interest rate and as constants, exchange rate and inflation.

5.1. Setting regression equations

To identify the most suitable model, we calculate the sum of squared deviations between actual values and adjusted values (after proposed models). It is considered that the most appropriate model for the sum of squared deviations is the lowest. The specification is valid for unifactorial regression models and for multifactor regression models.

We tested several models, taking into account different values lags, and the best model for estimating the level of interest is:

$$\text{Interest (t)} = 18,241 + 0,2592 * \text{Inflation (t)} + 0,116 * \text{Inflation (t-2)} - 1,166 * \text{Exchange rate (t-3)} - 2,349 * \text{Exchange rate (t-4)} - 0,992 * \text{Exchange rates (t-5)} + 0,369 * \text{Exchange rate (t-6)} + 0,565 * \text{Exchange rate (t-8)}$$

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	,999 ^a	,998	,997	,116167

Predictors: (Constant), I-2, C-5, I, C-4, I-3, C-8, C-3, C-6

Dependent Variable: D

It manages to capture 99.8% of the variance interest on the analyzed period.

Coefficients^a

Model (Constant)	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
18,241	,736			23,916	,000
I-2	,116	,016	,128	7,447	,000
C-5	-,992	,158	-,187	-6,257	,000
I	,259	,019	,278	13,423	,000
C-4	-2,349	,155	-,429	-15,141	,000
I-3	,183	,021	,178	8,818	,000
C-8	,565	,153	,092	3,696	,002
C-3	-1,166	,152	-,186	-7,654	,000
C-6	,369	,166	,065	2,230	,040

a. Dependent Variable: D

$$\text{Interest (t)} = 18.241 + 0.2592 * \text{Inflation (t)} + 0.116 * \text{Inflation (t-2)} - 1.166 * \text{Course (t-3)} - 2.349 * \text{Exchange rate (t-4)} * \text{Exchange rate} - 0.992 * \text{(t-5)} + 0.369 * \text{Exchange rate (t-6)} + 0.565 * \text{Exchange rate (t-8)}$$

5.2. Verification of viability and power forecasting model (statistical tests)

After conducting statistical tests to the following conclusions are:

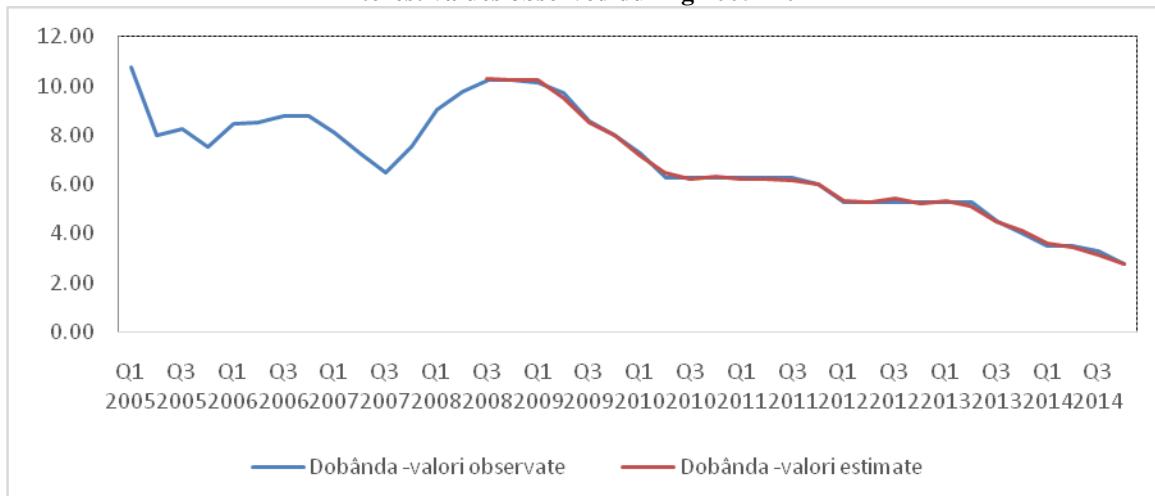
- An increase of one unit in inflation in quarter t lead to an increase in interest in quarter t with 0,2592 units - the relationship is a direct one between current inflation and current interest,
- An increase of one unit in inflation in quarter t-2 leads to an increase of interest in quarter t with 0,116 units - the relationship between current interest and inflation is straightforward in the last 2 quarters,
- An increase of one unit exchange rate in quarter t-3 leads to a decline in interest of 1,166 units in quarter t (or a decrease in the exchange rate in quarter t-3 leads to an increase of 1,166 units of interest in the first quarter t) – there is an inverse relationship between current interest and the latter 3 quarters' exchange rate,
- An increase of one unit of the exchange rate in quarter t-4 leads to a decline in interest in the quarter t with 2,349 units (or a decline in the exchange rate in quarter t-4 leads to an increase in interest in the quarter t to 2,349 units) - the relationship is reversed between current interest and the latter 4 quarters,
- An increase of one unit of the exchange rate in the quarter t-5 leads to a decrease in interest in t quarter with 0,992 units,
- An increase of one unit of the exchange rate in the quarter t-5 leads to a decrease in interest in t quarter with 0,992 units,
- An increase of one unit of the exchange rate in the quarter t-6 leads to an increase in interest in quarter t with 0,369 units - direct relationship between current interest is one and the last 6 quarters,
- An increase of one unit of the exchange rate in the quarter t-8 leads to an increase in interest in quarter t with 0,565 units – between current interest and the exchange rate 8 quarters latter there is a direct relationship.

5.3. Performance and limitations of the model and calculations

In terms of the magnitude of the influence of predictive variables of interest, we can analyze standardized regression coefficients:

- Inflation in quarter t (current period) has the greatest influence on the forward interest, an increase by one unit of the standard deviation leads to an increase of 0.278 standard deviations of current interest.
- The leu / euro t-4 quarter exchange (of one year ago) has the greatest influence on interest in the opposite direction, an increase of one unit standard deviation unit leads to a decrease of 0, 429 standard deviations on current interest.

Chart 2 Overlap estimated values of interest with the help of econometric model on the evolution of interest values observed during 2005- 2014



6. CONCLUSION

After testing the mathematical model we can see that the influence of the exchange rate and inflation did not have an immediate effect in the case of Romania but a delayed effect. According to the theory Fisher, in which inflation rate that increases by one unit will increase the interest rate by the same amount, partially applies to Romania, namely: increasing inflation rate affects the interest rate increase but only by 0,278 standard deviations in the current period t.

According to the model, the relationship between the exchange rate and interest rate is determined in inverse proportion: the growth rate leu/ euro in the t-4 quarter (one year ago) leads to a decrease of 0,429 standard deviations of current interest.

Following this chart, we see that the expected interest rate fluctuations from the calculation coincide very much with the rate registered in Romania in the analyzed period, indicating that the proposed mathematical model is a valid one, and inflation and exchange rates are important factors influencing on interest rates.

It is worth noting that the model is faithful also during the crisis that Romania has had, which shows that the dependent variable, interest rate, is strongly driven by independent variables inflation and exchange rates (the model certified a validity of 98,8%, the SIG being less than 0,5, down from which the model would become invalid).

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