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MACROECONOMIC PERFORMANCES UNDER INFLATION TARGETING. THE CASE OF ROMANIA

Abstract: *This paper aims to analyze the macroeconomic performance of inflation targeting in terms of inflation, output, exchange rates and interest rates behaviour, as well as their volatilities. The study gives an overview of inflation targeting features with focus on Romanian experience. Using econometric models and statistical analysis we highlight several indicators before and after inflation targeting adoption and discuss the performance of the new regime. Another paper's goal is to evaluate the performance of the monetary policy strategy in terms of transmission mechanism of the monetary policy impulses. With other words, as the monetary policy interest rate is the most important instrument used currently, we aim to measure the performance of inflation targeting regime on inflation by studying the characteristics of interest rate transmission mechanism on inflation. In order to do this, we use the VAR technique, assessing the monetary policy interest rate transmission mechanism. Our paper brings new empirical evidence.*

Keywords: *inflation targeting, transmission mechanism, economic performance, monetary policy, monetary policy strategy, central banks, inflation.*

JEL Classification: **E31; E52; E58; C87 ; C13; C51**

1. Introduction

An increasing number of countries have adopted inflation targeting since New Zealand first adopted this framework in the early 1990s. This paper attempts to illustrate how inflation targeting influenced the macroeconomic performance of Romania taking into account the effects on inflation rate, output, interest rates and exchange rates.

Central bank independence, fiscal dominance, the economic structure, the technical infrastructure are composing the challenging environment for the monetary policy. Fraga et al. (2003) suggested that inflation targeting emerging-market economies performed less well than developed economies motivated by the fact that inflation targeting is more challenging in emerging markets.

The National Bank of Romania (NBR) introduced the direct inflation targeting monetary policy strategy in August 2005. This new regime brought a series of benefits for the central bank, including a transparent focus on inflation.

The objective of this paper is particularly to examine inflation targeting in an emerging country, a case study of the Romanian economy and discuss if the favorable effects are due to inflation targeting adoption. Vega and Winkelried (2005) found clearer evidence of a favorable outcome that inflation targeting in emerging market economies has been associated with better macroeconomic performance than alternative policy regimes. Ball and Sheridan (2003) applied similar approach to industrial countries, finding no significant benefit from adoption of inflation targeting.

Since we are particularly interested in revealing the impact of inflation targeting on the Romanian economy, out database covers also the period prior adoption in order to reflect the impact of the regime switching. The innovation in our study consists of new empirical evidence, as the literature regarding the effects of inflation targeting (and additionally this approach of measuring the performance through the transmission mechanism) is at the moment very poor.

A central bank can influence the dynamics of aggregate demand and inflation by using various tools which reveal their effects on the economy through many different channels. The monetary policy operational framework consists of the set of monetary policy instruments by means of which the central bank implements its monetary policy in order to achieve its primary objective. Having this in mind, we aim to evaluate the performance of the monetary policy strategy in terms of transmission mechanism of monetary policy impulses. With other words, as the monetary policy interest rate is the most important instrument used by the central bank currently, we aim to measure the performance of inflation targeting regime by studying the characteristics of interest rate transmission mechanism (impact on inflation) before and after IT adoption. In order to do this, we use the VAR technique, a key argument is that VAR models are successfully being used to assess the transmission mechanism.

The rest of the paper is structured as follows. Section 2 provides an overview of inflation targeting in Romania. Section 3 examines inflation targeting effects in Romania using econometrical models, volatility analysis, impulse response function and variance decomposition, while Section 4 states our conclusions. In section 5 we state the main references which we found that are related to this topic.

2.   Overview of inflation targeting in Romania
Following the liberalization of prices, the measures taken within the Romanian central bank's monetary policy during 1990-1999 have resulted in the construction of monetary policy transmission mechanism and tools. Since November 1990 until May 1997, the liberalization of prices has continuously fueled inflation. The inflation rate reached values of 200-300% in the first years of transition, so that in 1995 to drop to a value of approximately 25%. In 1997, the liberalization of energy prices and agricultural products, measures that generated an excessive increase in

inflation again, led to an inflation rate of 180%. Since 1999 inflation has reduced, as a result of a restrictive monetary policy and the currency depreciation slowdown.

Regarding the monetary policy strategy, the only viable alternative for the National Bank of Romania was the monetary targeting as a result of the inability of the central bank to use the monetary policy interest rate due to the fragility of the banking system; the use of exchange rate as a nominal anchor has been constrained by the lack of substantial foreign exchange reserves. Thus, monetary targeting strategy has achieved a gradual disinflation, the inflation rate decreased from 295.5% the maximum reached in December 1993 to an inflation rate consisting of one-digit value in 2005, when the central bank abandons the monetary targeting strategy.

The National Bank of Romania adopted the direct inflation targeting regime in August 2005 in order to strengthen the bank's credibility and to continue the sound process of disinflation. In this extremely important process of implementing inflation targeting, the NBR received technical assistance from the Czech National Bank as well as from the International Monetary Fund.

As the National Bank of Romania governor noted, the underlying reasons for adopting the inflation targeting strategy were:
- Expected ineffectiveness of the monetary targeting regime
- Taking into account the convergence with the European Union, achieving sustainable disinflation was mandatory
- Undesirable influence of the capital account liberalization on the exchange rate targeting strategy.

Inflation targeting adoption requires a preparatory process, which in the case of Romania consisted in the fulfillment of various criteria and requirements such as:
- Indisputable independence of the central bank proved in the new NBR Statute in July 2004
- One-digit value inflation rate of 9.3% at the end of 2004
- Strengthened credibility of NBR as a consequence of remarkable disinflation
- Elimination of fiscal dominance
- Periodical reports regarding inflation published by NBR since 2003
- Stable financial sector
- Increase of the flexibility of the exchange rate in October 2004 by adopting a soft managed floating exchange rate floating instead of the hard managed floating exchange rate.

Subsequently, the National Bank of Romania defined a set of instruments that allows effective communication and therefore, increases the monetary policy transparency. Among others, we mention the quarterly inflation report, the press releases, public consultations, communication of the Board decisions on monetary policy issues.

The inflation targeting strategy adopted by the NBR has the following characteristics[1]: a CPI-based inflation target; target set as a midpoint within a target band of +/-1 pp; announcement of annual inflation targets for longer time horizons (initially two years), thereby emphasizing the focus of monetary policy on medium-term developments; maintenance of a managed float exchange rate regime; joint formulation and announcement of inflation targets by the NBR and the government.

The choosing of CPI, provided by the National Institute of Statistics, is explained by the public transparency and availability of the index.

In order to have an overview of inflation targeting features in emerging market economies we present in the following table the characteristics of the regime in Romania (already discussed), Czech Republic, Hungary, Thailand and South Africa.

Table 1. Features of inflation targeting in some emerging countries

Feature	Romania	Czech Republic	Hungary	Thailand	South Africa
Adoption date	August 2005	January 1998	August 2001	May 2000	February 2000
Current target	2.5%±1 pp	2%±1 pp	3% ±1 pp	2.5%± 1.5pp	3%-6%
Target adoption/duration	Starting 2013	Starting 2010	Starting 2005	2015	2004
Inflation measure	CPI	CPI	CPI	CPI	CPIX
Target announcement	Central bank	Central bank	Central bank	Monetary Policy Committee & Minister of Finance	Central Bank
Inflation Report	Yes	Yes	Yes	Yes	Yes
Primary objective	Price stability	Price stability	Price stability	Price stability	Price stability
Published forecast	Yes	Yes	Yes	Yes	No

The first emerging country that adopted inflation targeting was the Czech Republic (in this UE particular area), in need of a new nominal anchor, at the beginning of 1998. Poland followed in the mid 1998, while Hungary shifted to inflation targeting regime only in 2001. Regarding the Latin emerging countries that introduced inflation targeting it should be noted that the first were Mexico and Brazil.

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[1] As defined by the National Bank of Romania: www.bnro.ro – monetary policy/inflation targeting

Moreover, an important feature to be analyzed is the current target, in particular the choosing of either a target point with a tolerance band or a target range. As observed, when countries choose a target point, the tolerance band is usually 1 percentage point, but there are exceptions, for example Thailand (1.5pp). In South Africa the inflation target was specified as a range or band of achieving an average rate of increase in consumer prices. Most emerging countries target the CPI due to the availability and the understanding of the index by the public.

The primary objective of the emerging countries analyzed, stated in their statute is price stability. However, the central banks, including the National Bank of Romania, declare that they support the general economic policy of the Government or sustainable economic growth and employment in the long run. Special attention has been paid as a result of the financial crisis to the objective: financial stability. Although not the primary objective of central banks, financial stability is currently an explicit goal.

3.   The effects of inflation targeting in Romania

3.1 Data look-through

Since we are particularly interested in revealing the impact of inflation targeting on the Romanian economy, out database covers also the period prior adoption in order to reflect the impact of the regime switching.

Our data consist in four main time series, namely, CPI, real GDP, Exrate, IR which represent in this order the Consumer Price Index determined by the Romanian National Institute of Statistics, the Gross Domestic Product calculated also by the Romanian National Institute of Statistics, the EUR/RON exchange rate and the interest rate.

The frequency of the data is quarterly and the observed period is Q1 1995 – Q4 2014. The source of the data is as follows: for the CPI and GDP the National Institute of Statistics (Tempo Online database), while for the EUR/RON exchange rate and interest rate the source is the National Bank of Romania (interactive database).

The GDP series is seasonally adjusted and expressed in millions of RON. While in the case of GDP we took the raw data provided by the institute of statistics and deflated it in order to obtain the real GDP, for the CPI and the Exrate we performed some calculations to determine the quarterly value. The CPI provided by the institute of statistics is monthly and expressed as month-over-month, thus we calculated the average per quarter. The same approach was used for the exchange rate which, in the raw form, is the monthly average exchange rate. It should be noted that as of 1 July 2005, Romania's legal tender, previously coded as ROL, has been redenominated so that ROL 10,000 are exchanged for 1 new leu (RON). Consequently, we made the transformation from ROL to RON for the period Q1 1995- Q3 2005 in order to reduce the impact of this denomination. Please note that euro came into existence on 1 January 1999. Regarding the interest

rate, we used the short-term interest rate, 6M, available on Eurostat database, quarterly data.

Finally, we also define another series, MPIR, namely the monetary policy interest rate which is available from January 2003 in NBR interactive database. This monthly series is used in our study to reflect the transmission mechanism of a monetary policy shock on IPC and thus, on inflation.

3.2 Methodology

Our paper aims to analyze the macroeconomic performance of inflation targeting in terms of inflation, output, exchange rates and interest rates behavious as well as their volatilities.

Firstly, the statistical approach used to estimate the volatility of certain macroeconomic indicators is the standard deviation. We employed this method to compare inflation targeting success in reducing volatility. This statistic is easy to calculate, but certainly indicates only whether the volatility reduced or increased, being unable to determine the factors that have contributed to this effect.

Consequently, we further define multiple linear regressions which attempt to model the relationship between various explanatory variables and a response variable by fitting a linear equation to observed data. Building a model is far from being a simple process. We made a priori research in order to identify the relationships between variables presented by economic theory and other studies. The econometric models developed are dynamic, using lagged variables to incorporate feedback over time or to offset certain dependencies between variables.

Dummy variables are frequently used to highlight: regime switching, seasonal analysis and qualitative data applications. We define a qualitative independent variable, probably the most important in this study, namely the dummy variable IT, which highlights the influence of the inflation targeting strategy on the considered dependent variables. Basically, IT takes the value 0 in the period before inflation targeting adoption, i.e. prior Q4 2005, and the value 1 since the new regime adoption (regime switching rationale).

In addition, in order to mitigate and assess the impact of the recent economic crisis, we employed a dummy variable containing the value 1 for the crisis period namely Q4 2007-Q4 2013 and 0 for the rest of the observed period.

We also embedded in our study a vector autoregression analysis and impulse-response function. The purpose of using VAR technique is that the impulse response describes how inflation reacts over time to impulses of the most important monetary policy instrument under inflation targeting, namely the monetary policy interest rate. In order to evaluate inflation targeting regime we split the database in two subsets, the splitting criteria being the moment of IT adoption, and we analyze the monetary policy transmission mechanism of the interest rate before and after IT adoption using the two unrestricted VAR models.

The first step always consists in verifying stationarity. In order to ensure stationarity of the data we employed individual unit root tests for all the time series – ADF – Augmented Dickey-Fuller unit root test. The unit root test is compulsory as research has shown that non-stationary data leads to spurious regression.

Subsequently, we took appropriate measures to reduce non-stationarity effects applying proven methods.

3.3 Effects on real GDP

As depicted in Figure 1, Romania seems to have lower output volatility after inflation targeting adoption. The output volatility was determined as the standard deviation of real GDP. In particular, the average real GDP increased, but there are various drivers that contribute to economic growth, thus we cannot state that the success is due to the new monetary policy strategy. Although, apparently, inflation targeting led to lower output volatility and economic growth.

Figure 1. Comparative analysis – output volatility before and after inflation targeting
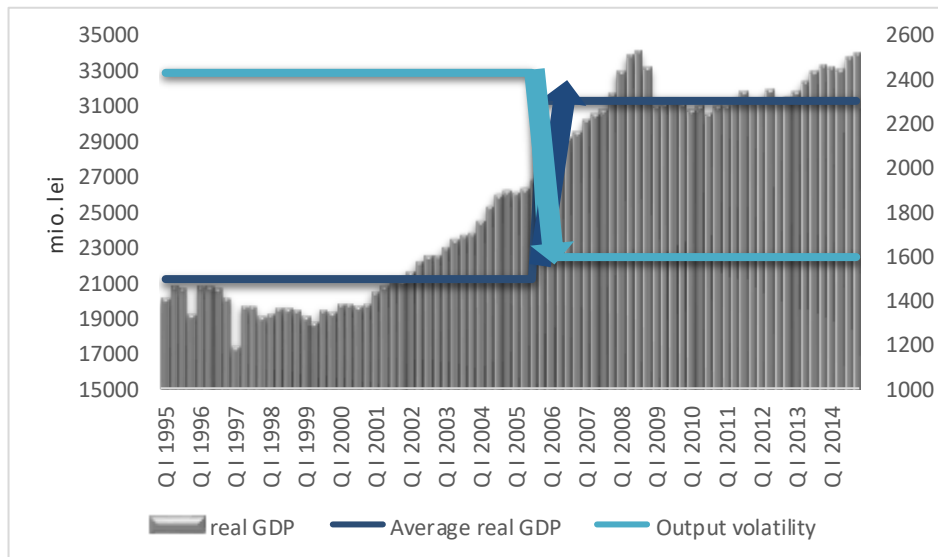
Since the comparative analysis is not a robust method to quantify the effect of inflation targeting strategy on economic growth, we develop an econometric model of the form:

$$\log(realGDP)_t = \alpha + \beta IT_t + \gamma \log(realGDP)_{t-1} + \delta(IR_{t-1} - \pi_{t-1}) + \theta Exrate_{t-1} + \vartheta Dum_t + \varepsilon_t$$

Here $\log(realGDP)_t$ is the real output logarithm at the time t, $(IR_{t-1} - \pi_{t-1})$ is considered the real short-term interest rate at time $t-1$ and $Exrate_{t-1}$ is the exchange rate at time $t-1$. IT_t is a dummy variable which equals one starting with the first quarter after the adoption of inflation targeting and zero otherwise. As we aim to capture the influence of the economic crisis we have also employed a dummy variable (Dum_t) containing the value 1 for the crisis period namely Q4 2007-Q4 2013 and 0 for the rest of the observed period. For

model calibration we used Eviews, whereas the estimation method employed was ordinary least squares (OLS). The results based on the 80 observations are as follows:

Table 2. Estimation output

Dependent variable: $\log(realGDP)_t$				
No. of observations: 80				
Variable	**Coefficient**	**Std. Error**	**t-statistic**	**P-value**
intercept	1.840618	0.551436	3.337866	0.0013
IT_t	0.039710	0.017445	2.276259	0.0258
$\log(realGDP)_{t-1}$	0.816195	0.055638	14.66981	0.0000
$(IR_{t-1} - \pi_{t-1})$	-0.044850	0.015634	-2.86868	0.0054
$Exrate_{t-1}$	0.008130	0.003979	2.050702	0.0439
Dum_t	-0.004104	0.009999	-0.41047	0.2827
R-squared: 0.924136	**Durbin-Watson statistic: 2.199053**			
F-statistic: 905.7011	**P-value: 0.000000**			

The variable responsible for capturing the effects of inflation targeting monetary policy strategy on the economic situation, in particular on real GDP, is IT_t. Therefore, inflation targeting appears to influence the output taking into consideration the P-value which states that the coefficient is statistical significant. If we set IT=1, i.e. we consider inflation targeting strategy adopted, the model becomes:

$$\log(realGDP)_t = (\alpha + \beta) + \gamma\log(realGDP)_{t-1} + \delta(IR_{t-1} - \pi_{t-1}) + \theta Exrate_{t-1} + \vartheta Dum_t + \varepsilon_t$$

And if IT=0, namely we do not take into account the monetary policy strategy, the model has the following form:

$$\log(realGDP)_t = \alpha + \gamma\log(realGDP)_{t-1} + \delta(IR_{t-1} - \pi_{t-1}) + \theta Exrate_{t-1} + \vartheta Dum_t + \varepsilon_t$$

As it can be seen, the impact on the real GDP of practicing inflation targeting resides in the β coefficient which is of positive value. Consequently, the adoption of inflation targeting brings a positive effect on the economical result as we noticed from the empirical analysis.

The other variables included in the model are statistical significant as well, excepting Dum_t, the dummy variable capturing the financial crisis for which the related coefficient is significantly different from zero only with 72% confidence. In the light of this result we cannot conclude that the financial crisis has or not significant influence on the economic situation, although the sign of the coefficient is negative, just as the economical theory states and economical reality as well.

As we expected, the previous value of the real GDP has an important influence on the current amount and we can assert that when the previous real GDP increases with 1%, the actual real GDP increases, on average, with 0.82%. Regarding the exchange rate, the results highlight a positive relation, basically, when the exchange rate increases with 1 monetary unit, the real GDP increases, on average, with 0.81% (when the currency depreciates, i.e. the exchange rate increases, the exports are encouraged which will lead to an increase in the GDP).

It worth mentioning that the model is properly specified as F-statistic emphasizes and in addition R-squared shows that an important proportion of 92% of real GDP variation is influenced by the variance of the variables in the model.

3.4 Effects on inflation

It is natural to consider that an appropriate measurement of the success of inflation targeting could be the frequency of hitting the official target over time. However, it is more appropriate to measure the success of the strategy by assessing the efficiency of the inflation targeting in obtaining a lower and stable inflation.

Figure 2. Frequency of hitting the target
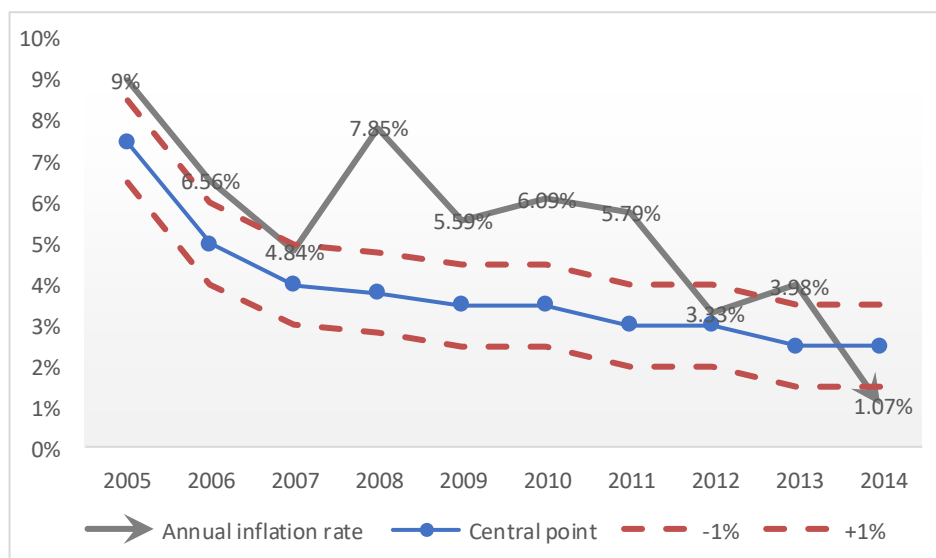
Disinflation has been successfully achieved in Romania after inflation targeting adoption. The inflation rate dropped from over 40 % in 2001 to 1.07 % at the end of 2014. Due to the fact that Romania became a member state of the European Union in January 2007 inflation increased again and reached the value of 7.86%. Currently, we assist to both a minimum monetary policy interest rate and inflation rate (located right at the lower limit of the corridor) following the intention of NBR to encourage lending which collapsed after the recent economic crisis.

Thereby, we emphasize the crucial role of the monetary transmission process which has essential influence on achieving price stability via inflation targeting. The uncertainty about the propagation of the monetary impulses into the real sector proved to be quite a challenge for emerging market economies, especially in Romania.

In order to achieve its primary objective (in Romania, the primary objective of monetary policy is the maintenance of price stability) the National Bank of Romania (NBR) has a mix of monetary policy instruments at its disposal. The central bank does not control the prices directly by using these instruments, but through a complex transmission process, the transmission mechanism which describes the impact of monetary policy impulses in the economy's price level. According to Belke and Polleit (2009) the transmission process is typically subject to variable and not fully predictable time lags. We aim to evaluate the performance of the monetary policy strategy in terms of transmission mechanism of monetary policy impulses.

In our study, the VAR technique is used to assess the monetary policy interest rate transmission mechanism. Using the VAR it is possible to determine a monetary policy shock and then examine the response of the endogenous variables to the monetary impulse. The analysis of the impact of a monetary policy shock (or an unexpected change) provides important information about the transmission mechanism.

Since the monetary policy interest rate is the most important instrument used currently by the central bank, we aim to measure the performance of inflation targeting regime by studying the characteristics of interest rate transmission mechanism on inflation.

In order to assess inflation targeting regime we split the database in two subsets, the splitting criteria being the moment of IT adoption (August 2005/Q4 2005), and we analyze the monetary policy transmission mechanism of the interest rate before and after IT adoption using the two unrestricted VAR models.

We built two models VAR(6) since the FPE: Final prediction error and the AIC: Akaike information criterion from the VAR Lag Order Selection Criteria in Eviews showed as adequate the lag 6. The VAR is unrestricted and consists only of the variables of interest, in particular MPIR and CPI (as defined in Data look-through).

The Impulse-Response approach below provides information on the propagation of monetary policy.

Figure 3. Impulse-response function before vs. after IT adoption
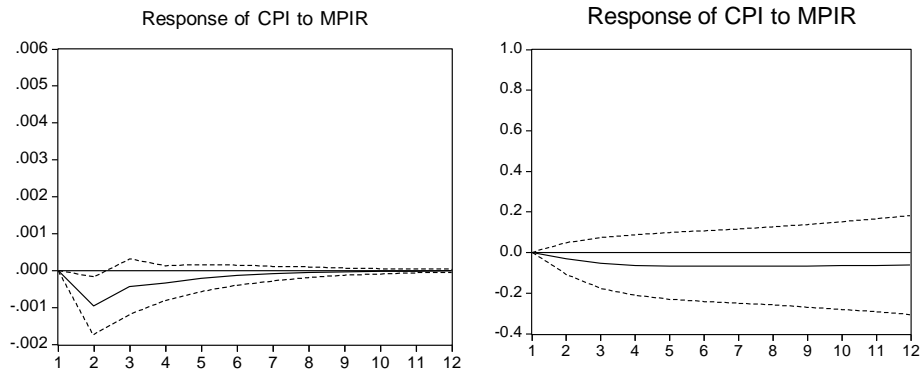
As illustrated by the impulse-response output (see Figure 3), the transmission mechanism in Romania tends to be slow and the response of the inflation (but of other macroeconomic variables as well) to changes in monetary policy rate is significantly inefficient compared to other developing countries. The OX axis represents the time frame expressed in months, while the area between the dotted lines represents a 95% confidence interval.

A positive shock on the monetary policy interest rate before IT adoption causes a slight decrease in the inflation rate and in accordance with Figure 3 (left side – before IT) the impulse produces its effect only for a short time period, while after the new regime adoption the effect is still persistent after 12 months. Birman (2012) concluded that the monetary policy interest rate had a poor effect on inflation before the implementation of the inflation targeting (IT), while the interest rate shock has a persistent effect on inflation after the adoption of IT. Consistent with Birman findings, out study reveals that the effect of the interest rate on inflation is quite persistent after IT adoption, according the impulse-response result. Our results are also consistent with Dedu V. And Stoica T. (2014) paper, which reveals that the monetary policy shock has a persistent effect on inflation.

Some studies show that there is a lag of about one to three years until the monetary policy impulse has an effect on prices. Our analysis reveals smaller lag of about 3-4 months after IT adoption and an impact on the inflation variance of below 10% (after 3 months), which might illustrate an improved transmission mechanism and a more efficient control of the central bank on inflation as compared with past experience. However, NBR should focus on the transmission mechanism of monetary policy since all efforts to increase lending had not the expected success.

Summing up, as a measure of inflation targeting performance, the monetary policy interest rate transmission mechanism, in our opinion, illustrates a slight improvement, yet there is room for perfecting the control of the central bank over inflation and other macroeconomic variables. We, therefore, consider that

inflation targeting adoption improved significantly the monetary policy transmission in Romania.

Table 3. Effects on inflation volatility

Inflation rate volatility prior IT	Inflation rate volatility after IT
3.19	0.36

Levin et al. (2004) examined the experience of inflation targeters and non-targeters since 1994 in a number of OECD countries and emerging countries and they found that inflation is more persistent for non-targeters especially when the focus is on core inflation and not CPI. They also found that GDP growth volatility is the same for targeters and non-targeters, but inflation volatility is higher for inflation targeters. As we found that in Romania the real GDP volatility reduced after inflation targeting, we employ the same approach for inflation volatility.

As depicted in Table 3, inflation volatility has significantly decreased after inflation targeting regime adoption. Nevertheless, we recognize that there is a question regarding the extent to which the reduction of inflation rate is due to the introduction of inflation targeting or due to a whole range of other institutional changes (fiscal policy, a greater degree of central bank independence and credibility, more sound financial system, deepening of financial intermediation) which were introduced/achieved along with inflation targeting regime (in fact they mostly represent prerequisites).

3.5 Effects on interest rates

In order to highlight the effects of inflation targeting on interest rates we employ a model of the form:

$$IR_t = \alpha + \beta IT_t + \gamma IR_{t-1} + \delta CPI_t + \theta CPI_{t-1} + \vartheta \log(realGDP)_{t-1} + \varepsilon_t$$

where all the variables in the model are defined in the subsection Data look-through.

The most important variable in our study is, IT, the dummy variable which equals one starting with the first quarter after the adoption of inflation targeting and zero otherwise. The model also contains CPI as a measure of inflation with one order of delay, in order to prevent a possible correlation between the dummy variable and the past inflation performance.

For model calibration we used Eviews, whereas the estimation method employed was ordinary least squares (OLS). The results based on the 80 observations are as follows:

Table 4. Estimation output

Dependent variable: IR_t				
No. of observations: 80				
Variable	**Coefficient**	**Std. Error**	**t-statistic**	**P-value**
intercept	-2.140832	2.509312	-0.853155	0.1964
IT_t	0.073193	0.072703	1.006737	0.3174
IR_{t-1}	0.486571	0.086824	5.604142	0.0000
CPI_t	0.075425	0.006386	11.81188	0.0000
CPI_{t-1}	-0.018495	0.009805	-1.886249	0.0632
$log(realGDP)_{t-1}$	0.349452	0.203858	-1.714197	0.0907
R-squared: 0.874420	**Durbin-Watson statistic: 1.978164**			
F-statistic: 101.6607	**P-value: 0.000000**			

The variable responsible for capturing the effects of inflation targeting monetary policy strategy on interest rates is IT_t. Surprisingly, inflation targeting appears not to influence the interest rates taking into consideration the P-value which states that the coefficient is not statistical significant. However, this result is not so clear taking into account the 69% probability of inflation targeting to be significant.

In contrast, the interest rate is influenced by the past values of interest rate, the CPI and past CPI, and also by the real GDP with confidence of 90%. Regarding the relationship between the variables in the model and the dependent variable the result are as follows: as we expected the coefficients assigned to the previous values of IR and CPI are positive which means that if the CPI increases, than the IR will increase as well, on average, as the interest rate is considered also a price (price of the money). The sign of the relationship between interest rate and real GDP can be explained like this: when the real GDP decreases, the central bank is forced to reduce the interest rate in order to encourage the lending, therefore the consumption and investments increase which can lead to economic recovery. This is the approach that NBR pursued lately.

It worth mentioning that the model, as F-statistic emphasizes, is properly specified and in addition R-squared shows that an important proportion of 87% of interest rate variation is influenced by the variance of the variables in the model.

Table 5. Effects on interest rate volatility

Interest rate volatility prior IT	Interest rate volatility after IT
0.37	0.03

Carlos Eduardo Gonçalves S, Joao M (2008) and Lin Ye (2010) studied interest rates behavior explained by inflation targeting in a sample of 36 emerging economies over the period 1980 -2005. The analysis revealed that inflation targeting stabilized average short-term interest rates for targeters, which is consistent with Ball and Sheridan (2005) results. Their findings showed also a reduced level of volatility for both groups of countries, targeters and non-targeters, but lower level for targeters countries than those adopting alternative monetary regimes.

Applying our volatility measurement approach, that is standard deviation, we conclude that our results are in accordance with the ones outlined above. Interest rate volatility in Romania decreased after inflation targeting adoption, moreover the interest rates reached the absolute minimum ever (monetary policy interest rate of 2%, however high as compared with the countries in EU zone).

3.6 Effects on exchange rates

It is asserted that the adoption of inflation targeting leads to increased exchange rate fluctuations, having the motivation that the central bank focuses on stabilizing the domestic value of the currency instead of its external value. There are, however, theoretical arguments suggesting that a low and stable inflation contributes to exchange rate stability.

In an emerging country, as in the case of Romania, political tensions and the lack of investor confidence significantly influence the exchange rate and generate major depreciation of the national currency. The effects of these factors were exacerbated by the recent economic crisis, but the current exchange rate regime of the leu, managed floating, is allowing a flexible response of the monetary policy. Sabban et al. (2003) suggested that the importance of real shocks in nominal and real exchange rate fluctuations as well as the ability of the exchange rate to act as a shock absorber have increased after the adoption of inflation targeting regime. One of the benefits of floating exchange rates is the capacity of absorbing real shocks.

Table 6. Effects on exchange rate volatility

Exchange rate volatility prior IT	Exchange rate volatility after IT
0.87	0.41

Table 6 compares fluctuations in EUR/RON exchange rates before and after inflation targeting. Exchange rate volatility is calculated using standard deviations. Notice that after inflation targeting adoption by NBR, the average exchange rate fluctuation has slightly decreased. Therefore, it is not obvious that inflation targeting in Romania led to increased exchange rate volatility. As Gudmundsson (2001) stated that the increased exchange rate volatility seems to be related to the previously existence of a fixed exchange rate regime rather than to the adoption of inflation targeting.

4. Conclusion

Monetary policy based on inflation targeting has gained an increasing attention and popularity since New Zealand first adopted the framework in early 1990. Inflation targeting has performed less well in emerging market economies than in developed economies because of the following main challenges: central bank independence, fiscal dominance, economic structure, technical infrastructure. In the particularly case of Romania, monetary policy is still facing the problem of administered prices and increased volatility of the exchange rate. Supply-side shocks represent a particular challenge to monetary policy and data deficiencies are problematic in Romania, due to the absence of accurate and complete time series.

The issue of the macroeconomic performance of inflation targeting remains controversial as our results confirm previous studies and invalidate others. Specifically, our results indicate that inflation targeting actually improves macroeconomic performance of Romania by achieving disinflation and reducing its volatility and at the same time inflation targeting is found to have a positive and statistically significant impact on real GDP, as reflected by the significance of the dummy variable. On the other hand, inflation targeting has no impact on interest rates given the non-significance of the dummy variable, suggesting that short-term interest rate behavior of Romania is explained by external determinants other than inflation targeting. Even though interest rate volatility reduced after inflation targeting regime adoption, we cannot assign this success to the actual monetary policy strategy given the results of the econometric model.

Moreover, we consider that inflation targeting adoption improved significantly the monetary policy transmission in Romania taking into consideration our VAR analysis results before and after inflation targeting adoption.

Even if inflation volatility has significantly decreased after inflation targeting regime adoption, we recognize that there is a question regarding the extent to which the reduction of inflation rate is due to the introduction of inflation targeting or due to a whole range of other institutional changes (economical structure, the set of monetary policy instruments, fiscal policy, a greater degree of central bank independence and credibility) which were introduced/achieved along with inflation targeting regime.

All in all, Romania has pursued a favorable path after inflation targeting regime adoption: inflation has declined at an absolute minimum value, the

economic situation is stable even if we passed a major financial crisis, the interest rates and exchange rates volatility substantially diminished.

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