Evaluation of optimal monetary policy strategy in Romania in the context of fulfilment of convergence criteria

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Abstract: *Adopting the euro currency implies the fulfilment of Maastricht convergence criteria, which implies a number of challenges for the macroeconomic policy mix, due to the existence of the conflict between them. The paper analyzes empirically the main monetary policy strategy in the context of euro in Romania.*

The results of the study show that inflation targeting is an optimal monetary policy strategy to achieve real and nominal convergence criteria.

Keywords*: monetary policy strategy, euro, inflation, Maastricht criteria.*

JEL Classification: *E_{31}, E_{52}.*

1. Introduction

The achievement of the nominal and real convergence in the candidate countries to the euro zone represents a difficult task of the macroeconomic policy mix, the nominal and real convergence being two processes that influence one another. Thus, finding the balance between economic growth and the disinflation represents a challenge to the candidate countries (Nerlich, 2002). But, this isn't the only contradiction between the convergence criteria, as the price stability

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criteria too threaten the fulfilment of the other nominal convergence criteria. The greatest challenge in the countries acceding to the EMU is the simultaneous achievement of the price stability and exchange rate criteria.

For these countries the inflation stability remains a crucial issue for the choice of the best possible monetary strategy for the accession to the euro zone (Beko and Festić, 2005).

The countries that joined the EU have become members of the Economic and Monetary Union with a derogation concerning the introduction of the euro currency. The Maastricht Treaty specifies the criteria that a member state must fulfil upon the accession to the euro zone. In accordance with the prerequisites of the treaty, the monetary policy must have price stability as a fundamental objective.

2. Literature review

In the speciality literature there is not a monetary policy that matches all the candidate countries on the way towards adopting the euro currency.

Choosing the monetary policy strategy depends on the characteristics of each economy. For instance, Estonia, a small and open economy and thus more vulnerable to the volatility of the exchange rate, has opted for the currency board.

In the case of a country with a small, open economy, any fluctuation in the exchange rate reflects itself in a significant way in the price level (Coricelli et al., 2006). Thus, a fixed exchange rate eliminates the influence of the exchange rate on the rate of inflation.

Some authors (Buiter and Grafe (2002) or Coricelli (2002)) opt for the adoption of the fixed exchange rate conditions in these countries, because it increases the credibility of the monetary policies, and, also, consolidate the links with the EU and the EMU.

For example, the success of targeting exchange rate in Cyprus is due, first, to the central bank's credibility and, therefore, to the anchoring inflationary expectations. In order to ensure the sustainability of this regime, the authorities followed prudent economic policies using the developments in monetary aggregates, credit and the current account as warning indicators.

Sepp and Randveer (2002) evaluate three alternative monetary policy strategies at the currency board in Estonia:

1. pegged exchange rate arrangement with inflation or output gap targeting;
2. floating exchange rate arrangement with inflation or output gap targeting;
3. floating exchange rate regime excluding any monetary policy target.

Because the Estonian economy is very open and small, it is influenced significantly by the external environment, the inflation being an important function of the imported inflation. In this case, the inflation rate is the main monetary transmission channel, the tradable goods sector holding a relatively large share. Given the fact that the non-tradable goods sector is relatively small in Estonia, and the related demand of this sector is influenced by the interest rate, the effectiveness of this monetary policy instrument is low. The author concludes that the arrangement based on a currency board is the best monetary policy strategy for the Estonian economy, capable of fulfilling the Maastricht criteria.

Examining the pros and cons of the currency board, Gulde et al. (2000) consider that the countries that apply this strategy are capable of fulfilling the convergence criteria.

Opposing them, Salater's opinion (2002) is that the fixed exchange rate regimes (including the currency board) are less effective than the inflation targeting strategy together with floating exchange rate in fulfilling the price stability criteria, because of the Balassa-Samuelson effect in the euro candidate countries. The author concludes that, in the case of a rapid economic growth, only a flexible exchange rate could fulfil the inflation criteria. Because the Balassa-Samuelson effect is absorbed by the nominal appreciation of the exchange rate, the risk of growing current account deficit appears.

Choosing the monetary policy strategy depends on the characteristics of the economic and financial structures of the states, including the extent of economic openness.

3. Empirical analysis of the viability of the monetary targeting strategy in Romania

Adopting a monetary targeting strategy requires the fulfilment of two conditions. Firstly, the existence of a strong link between the monetary aggregate chosen as an intermediate target and the ultimate policymaker's objectives (inflation rate) is necessary. Secondly, the monetary aggregate target must be well controlled by the central bank.

Some authors focus on the possibility of the central bank to control monetary aggregate chosen as target without making any reference to the money-inflation relationship, while others stressed the importance of the money-inflation relationship and ignored the analysis of the other condition.

Most empirical studies demonstrate the viability of the monetary targeting strategy by modelling money demand function and testing the stability of parameters.

In our opinion, to show that this strategy is a viable option it is necessary to examine both conditions. In the analysis we followed the methodology used by Boughrara (2004) who investigated (through cointegration tests and Granger causality) the conditions that must be fulfilled for making the strategy of targeting monetary aggregates more efficient. The results of this study show that M2 monetary aggregate, albeit it is controllable in the long run, it is not perfectly controllable in the short-run and, accordingly, the M2 aggregate does not provide clear signals about the intentions of the policy makers. Regarding the relationship between intermediary and final objectives, econometric results showed the lack of them, both on short and long term. This can be explained by reducing the inflation rate to single digit levels, which means that the money growth rates lose informational content and become less useful indicators of monetary policy.

Therefore, the empirical analysis is based on checking the existence of strong and predictable relationship between M2 monetary aggregate and inflation rate, (expressed by the consumer's price indicator), on the one hand, and relationship between money base and M2, on the other hand.

Choosing the analysis period was determined by the availability of data concerning the money base and the M2 monetary aggregate. Thus, the analysis was performed on two periods: 1994-1999 and 2000:01-2005:07.

To check the two conditions of this monetary strategy we used the cointegration technique that shows the number of cointegrating relations and Granger causality tests that shows if a variable (y) is influenced by another variable (x). Granger causality tests show how much of the current y depends on its past values and then we see if adding the lagged values of the x can improve the explanation of the variable y. X Granger causes y if x helps in the prediction of y. Accordingly, we will verify if M2 Granger causes inflation rate and M0 Granger causes M2.

For performing the test we used monthly data concerning the monetary base, M2 and CPI, and the data source is represented by monthly bulletins and annual reports of National Bank of Romania from the analysed periods.

Firstly, we performed tests on stationarity of data series (Augmented Dickey Fuller). The results show us that inflation and monetary base are stationary in level, while the M2 money supply is stationary in the first difference for both analysed periods. The number of lags used in cointegration and Granger tests were chosen by estimating a VAR, and choosing the optimal number is accomplished by Akaike criterion. Thus, the number of lags used is 2 for both periods.

In order to check if the M2 is related to the final objective, we analyzed the relationship on the long run between these variables using the Johansen procedure. The results (see Annex) shows that there is a cointegration relationship between M2 and the inflation rate for the period 1994-1999, at a significance level of 5%, which means that there is a causal relationship between the two variables, at least in one direction. The existence of a cointegration relationship suggests a strong long run relationship between two variables. Causality test suggests that M2 Granger causes an inflation rate with a probability of 7% during 1994-1999.

If the period mentioned above justifies the effectiveness of the monetary targeting strategy, the same cannot be said about the period 2000-2005. The tests indicate that there is no cointegration relationship between M2 and the inflation rate. The lack of a cointegrating relationship and thus a causal relationship between M2 and the inflation rate suggests that the money supply has no influence on inflation and therefore the monetary aggregate can not be used as intermediate target for achieving the final objective of the National Bank of Romania.

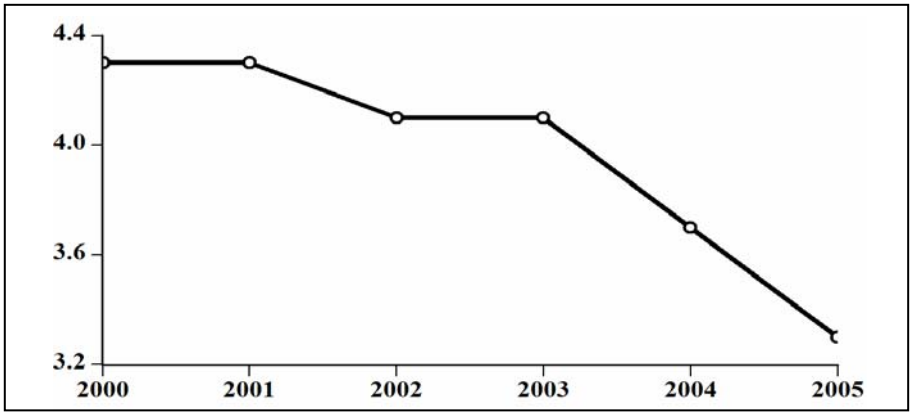
Using the same methodology, we checked the second condition, namely, the National Bank of Romania's ability to control M2 through the monetary base.

Applying the cointegration test to variables M0 and M2 for the period 1994-1999 and 2000:01-2005:07, we see that there is no cointegration relationship between the two monetary variables (see Annex). The monetary authority can control only a part of the money supply, namely the monetary base, but there are other factors that are outside the control of the monetary authority. These factors are included in the money multiplier, which means that in the analysed period it was unstable.

The econometric tests results justify the low efficiency of the strategy based on the monetary anchor, which led monetary authorities to opt for another monetary strategy. Low efficiency of this strategy was due to money demand instability and unpredictability (affected by structural and institutional changes and the

development of the macrostabilization process in the transition period), reflecting the volatility of velocity of money and money multiplier and thus the difficulty forecasting these variables. (Popa et al., 2009).

The instability of the demand for money may be reflected by the evolution of the money velocity. Money velocity for M2 aggregate monetary recorded a downward trend during 2000-2005, from 4.3 rotations/year in 2000 to 3.3 rotations/year in 2005, reflecting increased demand for money (Figure 1). This trend is justified by high rates of economic growth, downward trend of the opportunity cost of holding money and consolidating disinflation.



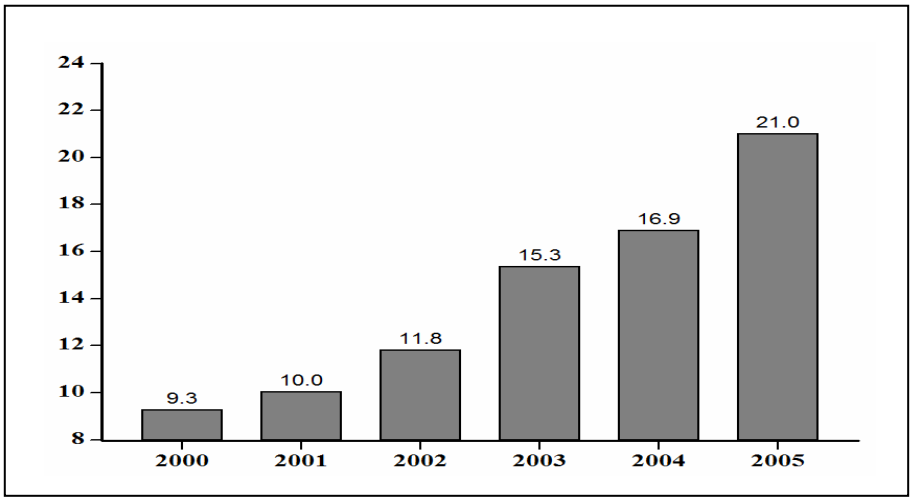
Source: National Bank of Romania, Annual Report 2004, p. 241, Monthly Bulletins, December 2005, p. 16, National Institute of Statistics, http://www.insse.ro/cms/rw/pages/index.ro.do, author's calculations.

Figure 1. Money velocity (M2) in Romania (2000-2005)

Regarding the instability of the money multiplier, it was influenced, in particular, by the significant increase of the weight of non-government credit in GDP (from 9.3% in 2000 to 21% in 2005) (Figure 2). This evolution was determined by the increase in bank liquidity (due to the reduction in the reserve requirements in lei from 30% in 2000 to 16% in 2005), intensifying competition in the banking system, the recovery in credit demand in the context of the economic growth, the reducing instability and lower interest rates.

In our opinion, in the context of capital account liberalization (prerequisite for accession to the EU) the ability to control monetary aggregates reduces. Thus, to

avoid sharp exchange rate appreciation, the monetary authorities's purpose is to reduce the interbank market rate in order to diminish the difference between the internal and external interest rate.



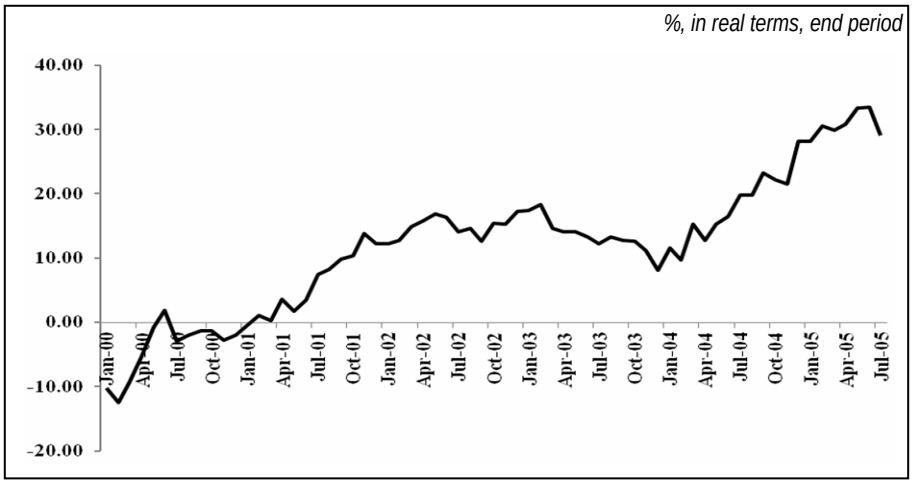
Source: National Institute of Statistics, http://www.insse.ro/cms/rw/pages/index.ro.do, National Bank of Romania, Monthly Bulletins, 2000- 2005, author's calculations.

Figure 2. The share of non-government credit in GDP in Romania (2000-2005)

But, the reduction in interest rates has a negative impact on the money creation and hence on money supply. During 2000-2005, the interest rate recorded a downward trend imposed by increased risk to attract speculative capital, but also by dampening inflationary pressure. Thus, the reference interest rate fell from 35% in 2000 to 9.68% in 2005, which determined an upward trend growth of money supply (Figure 3).

Therefore, we consider that the use of monetary aggregates as an intermediate target in the context of the liberalization of capital flows and the necessity of currency stability is inefficient.

The empirical analysis suggests that the strategy of targeting monetary aggregates could not be used in Romania, which required of another nominal anchor for achieving price stability.



Source: National Bank of Romania, Monthly Bulletins, 2000-2005, author's calculations.

Figure 3. Annual growth rate of M2 in Romania (2000-2005)

4. Limits of the use of the targeting exchange rate in the context of the euro adoption

The New Member States of the European Union that have not yet joined the Euro Area are characterized by different arrangements on exchange rates. These range from currency boards in Bulgaria, Lithuania, conventional fixed peg arrangements in Latvia, managed floating (Romania) and independent floating (Hungary, Czech Republic, Poland). These differences can be explained by the nature of the economic shocks and structural characteristics of each economy, such as size, openness, flexible labour markets.

Although some authors support the adoption of flexible exchange rate on the way to the euro, three new member state of Economic Monetary Union have used targeting exchange rate in the period before euro adoption. But, these states have a very small economy (expressed as share in Euro Area GDP) and a relatively high degree of openness.

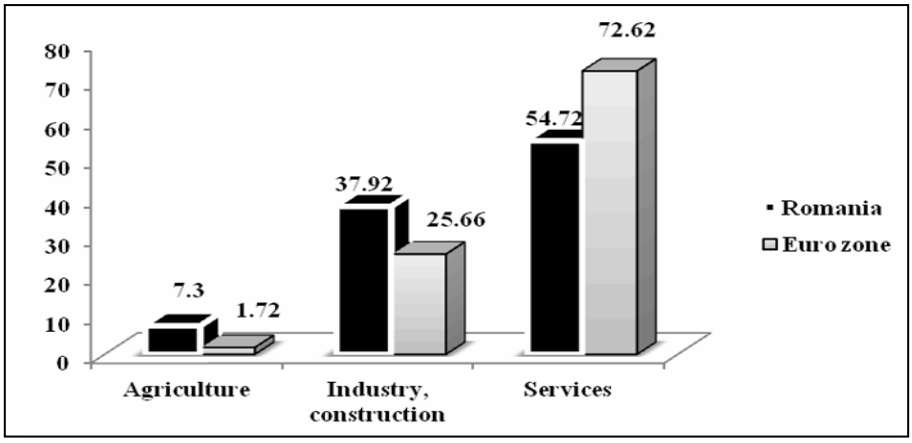
Unlike them, Romania's economy is larger, being the third largest among the new EU member states, after Poland and the Czech Republic. Romania recorded an upward trend in the share in euro area GDP: from 0.65% in 2001 to 1.33% in 2010. Regarding the openness of the economy, the Romanian

economy is not very open compared to other states, registering the lowest values.

On the other hand, to make the strategy effective, it is necessary to align the economic structures and trade with the Euro Area, as domestic interest rate is influenced by the one from the euro area. Romania has a different economic structure as compared to the Euro Area and therefore there is a risk of asymmetric shocks (Figure 4).

In order to exercise a control over interest rates and inflation, Romania needs an independent monetary policy to react to domestic shocks. Therefore, under the liberalization of capital movement, we cannot adopt a fixed exchange rate according to the principles of the theorem "impossible trinity" highlighted by economists J.M. Fleming and R.A.Mundell.

Although the use of exchange rate as an anti-inflationary anchor would have a positive impact on inflation, particularly by anchoring inflation expectations at 2% levels, it has certain limits.



Source: Eurostat, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes, author's calculations.

Figure 4. Structure by sectors of the economy in Romania and the Euro Area (2006-2010) (%)

Adopting a monetary policy strategy based on the exchange rate was not a viable option for the central bank because of the gradual liberalization of capital movement, thereby undermining the effectiveness of this strategy (Popa et al., 2009).

The governor of the National Bank of Romania, Mugur Isărescu, believes that the anchorage of the leu against another currency more stable in a form of crawling peg or currency board would not fit Romania during the pre-accession to the European Union because the latter requires a restrictive fiscal and income policy and the economy is extremely vulnerable to external shocks. If these measures are not applied, the currency board fails (Isărescu, 2003).

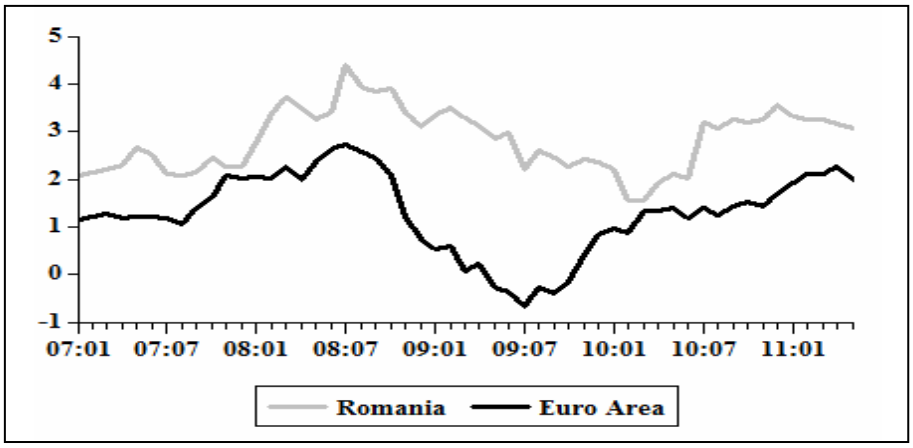
According to this strategy, linking the national currency to the euro would involve an interest rate close to the Euro Area one, which was not suitable for the Romanian economy. In the context of high inflation rates, real rates became negative, and therefore the consumption was encouraged.

The option for a fixed exchange rate is not the best solution for Romania, due to the Balassa-Samuelson effect. The impact of the Balassa-Samuelson effect on inflation in the period 1997-2006 was between 0.69% (2005) and 4.76% (2000) (Dumitru, 2009). The author states that the results are correlated with labour productivity growth. Therefore, the higher the productivity differential is, the stronger the impact is. Also, a significant contribution to the size of the inflationary impact has the share of non-tradable goods in the consumption basket. In Romania, at present, they hold 18.33%, which means that the impact is relatively small, but we expect to increase their share due to real convergence and, therefore, the effect will increase.

At a fixed exchange rate, the tradable goods inflation rate in our country is identical to the Euro Area, which means that inflation differentials with the Euro Area arising from the non-tradable goods prices increase at a higher rate. Figure 5 shows the spread between domestic and foreign inflation rate of non-tradables, the highest inflation differential recorded between November 2008 - November 2009 (over 2%). The existence of these differences are due to differences in productivity between sectors in Romania and the Euro Area.

However, the financial crisis determined a downward trend in inflation in EU countries, while the impact was lower in Romania, justifying the increase in inflation differences mentioned above.

These productivity increases are the result of the catching-up process that Romania registers in order to approach the Euro Area. The economic cohesion necessity is explained by the large differences in GDP/capita between Romania and the European average.



Source: European Central Bank, http://sdw.ecb.europa.eu/, author's calculations.

Figure 5. The inflation rate of non-tradables in Romania and Euro Area (2007:01-2011:05)

To achieve the inflation criteria it is necessary to appreciate the leu against the euro, which means that tradable prices increase very little or decrease. However, in the 2007-2009 period, the national currency depreciated by 27%, thereby amplifying the inflationary process.

Based on the relationship that determines prices of tradable goods in the country (RON/EUR exchange rate* prices internationally), we calculated the nominal appreciation needed to keep inflation at the level provided in the Treaty for the period 2007:01-2011:05.

For calculations we used monthly data from the European Central Bank official statistics concerning the Harmonised Index of Consumer Prices for the 12 components of its share in the consumption basket, both for Romania and for the Euro Area and the rate inflation in the 27 EU Member States.

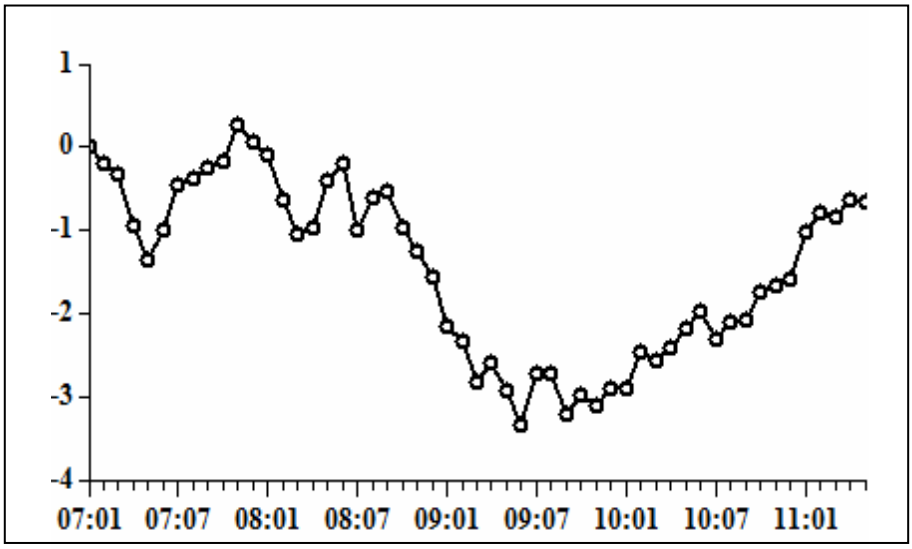
To calculate the inflation rate for the two sectors, we used the classification made by Arratibel et al. (2001) of a HICP components in tradables and non-tradables.

We used as the inflation target (inflation rate overall) the reference value, calculated as the average of the first three Member States with the lowest inflation rates plus 1.5%. Therefore, the inflation rate of tradables in Romania is equal with the difference between the overall inflation rate and inflation rate of non-tradables.

The results show an increasing trend of the leu appreciation against the euro in October 2008-November 2009 period, which coincides with a high inflation differential of non-tradables between Romania and the Euro Area (Figure 6). Therefore, as inflation differential of non-tradables will be higher, the fluctuation of the national currency will be higher.

Because changes in the exchange rate are given by the ratio of consumer price index of tradable goods in Romania and the Euro Area and price fluctuations in this sector (tradables) in the Euro Area were very small, a significant influence on the currency appreciation was exerted by tradable inflation rate in Romania. In turn, this followed a pattern similar to the reference value criterion on price stability, as the non-tradable prices are more rigid. Consequently, currency fluctuations depend on the inflation rate in all EU Member States.

In the analysed period, consumer prices in Romania were influenced, in particular, by the factors that had an impact on prices in all countries, but in case of internal shocks, exchange rate changes depend on non-tradable price developments, the reference value remaining relatively constant.



Source: European Central Bank, http://sdw.ecb.europa.eu/, author's calculations.

Figure 6. Nominal appreciation of the leu / euro (2007:01-2011:05)

Therefore, we consider that a fixed exchange rate is not suitable for the Romanian economy, because it is necessary to absorb the Balassa-Samuelson effect by nominal appreciation of the exchange rate that does not lead to differences as agains the euro area.The inflation criterion can be met through restrictive monetary and fiscal policies that slow economic growth or the nominal exchange rate appreciation (Szapari, 2001). Therefore, the author believes that either criterion, inflation or the exchange rate, must be sacrificed at the expense of the other. Applying strict policy is not a solution because inflation sustainability is conditional on real convergence. On the other hand, one must avoid sharp exchange rate appreciation so as not to lose external competitiveness.

Also, before entering the ERM II exchange rate stability is needed to determine the central parity. Consequently, we believe that meeting the Maastricht criteria requires a combination of these procedures and, therefore, a flexible exchange rate.

5. The role of inflation targeting strategy in convergence with the Euro Area

Romania's accession to the EU implied a change in monetary policy to achieve inflation convergence. Orlowski (2001) believes that the transition economies need an autonomous monetary policy that allows for the stabilization of the inflation, characterized by transparency and forward-looking. From this perspective, the strategy of inflation targeting seems to be most appropriate for nominal convergence achievement.

The main reasons for choosing the strategy of inflation targeting in Romania were (Isărescu, 2008):

- the necessity of the achieving a sustainable disinflation, also from the perspective of the convergence with the EU;
- unstable relationship between monetary aggregates and inflation;
- a peg exchange rate to another currency is extremely risky in conditions of trend appreciation determined by the convergence process and a progressive opening of capital account.

Therefore, by switching to the new monetary strategy the convergence of the inflation rate with the euro area was pursued. In this sense, in order to analyse the convergence of the inflation rate in Romania, we applied the following relationship (Ben-David, 1996):

$$\Pi RO,t - \Pi EU,t = \Phi(\Pi RO,t-1 - \Pi EU,t-1) \quad (1)$$

$\Pi_{RO,t}$; $\Pi_{RO,t-1}$ – inflation rate in Romania in year t, t-1 respectively;

$\Pi_{EU,t}$; $\Pi_{EU,t-1}$ – the Maastricht reference value in year t, t-1 respectively ;

Π – the convergence coefficient.

Φ indicates the degree of convergence/divergence of inflation rate with reference value calculated according to the Maastricht Treaty. If Π < 1 we are in the presence of a convergence process and Π > 1 indicates the divergence of inflation. If the value of Π is less than 1, the degree of convergence is higher.

The analysis is carried out in three periods:

2001:01 - 2005:07 - the period before inflation targeting strategy,

2005:08 - 2006:12 - EU pre-accession period in the presence of the inflation targeting strategy,

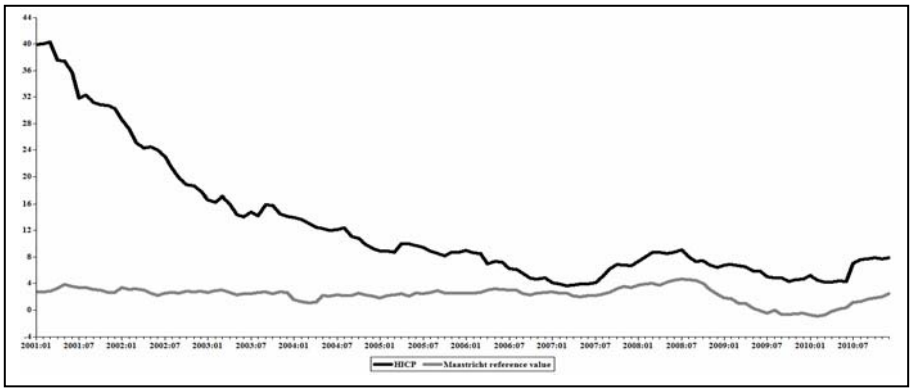
2007:01 - 2010:12 - post-accession period.

In order to estimate the convergence coefficient we used monthly data from the European Central Bank official statistics on the harmonised index of consumer prices (HICP) for the 27 European Union countries.

The econometric results indicate that Romania is in process of convergence, both during the targeting of monetary aggregates and in the period immediately following implementation of new strategies (Π1 = 0.965894, Π2 = 0.947982), mentioning that period 2005 : 08 - 2006:12 is characterized by a greater convergence of the inflation rates.

Contrary to expectations, in the 2007-2010 period there was an increase in the inflation differential, which it is highlighted by the value of Π = 1.007405.

Figure 7 shows the fall of the inflation rate in Romania, as measured by the harmonized index of consumer prices and, thus, the approximation to the reference value calculated according to the Maastricht Treaty, the inflation differential reaching a minimum in March 2007 (1.17%) which justifies the value of Π. The increase in food and oil prices on international markets in the second half of 2007 and the first half of 2008 generated an upward trend in the inflation rate both in Romania and in the European Union.



Source: European Central Bank, http://sdw.ecb.europa.eu/, author's calculations.

Figure 7. Convergence of the inflation rate in Romania (2001-2010)

Since the share of food and housing in the consumption basket of Romanians differs from that in other EU countries, the result of the upward evolution of their prices increased the gap between inflation in our country and the Maastricht criteria. Consequently, the increase in the inflation rate faster in Romania than in other Member States is due to relatively large share of food in the consumption basket (37%) compared to countries that have the lowest levels of inflation in this period: Denmark, Germany, Malta, the Netherlands, Portugal (approximately 12-18%). Regarding the impact of oil prices, it is lower, the differences between the shares of housing are small, except Malta and Portugal where they have a value of 9% (against Romania – approximately 19%).

The mitigation of the prices of raw materials on international markets since August 2008 has generated an increasing convergence of the inflation rate in our country over the next two months, followed by the inflation differential growth, and maintaining during 2009 at 5-6 %. Despite the strong contraction of the economic activity, inflation persisted in Romania, reflecting the existence of rigidities in the goods and labour market and higher excise duties on tobacco products.

If in the first half of 2010 the inflation differential decreased as a result of slowing down the pace of contraction of the European Union countries and hence, an upward trend in the second half of the year, the inflationary gap returned to the 2009 level due to the VAT increase in Romania from 19% to 24%.

From above, we can say that the divergence of the inflation rate in the period from 2007 to 2010 is the result of factors that are outside the sphere of influence

of the monetary policy: the evolution of the international prices, the fiscal and income policy decisions. Therefore, in order to achieve the inflation target, is necessary the coordination of the economic policies.

The challenge of the monetary policy in the context of the euro adoption is to determine the interest rate to fulfil both nominal and real convergence. Thus, a restrictive monetary policy in the presence of the inflationary pressure may result in the slowing down of economic growth, with negative impact on the real convergence process.

Romania should register economic growth to diminish major differences in the GDP/capita between our country and the European average, being one of the real convergence criteria. The GDP/capita in purchasing power parity had an upward trend, reaching 45% of EU average in 2010.

If we suppose an annual GDP growth of 5.5% in Romania, compared with an increase of 1.5% in Europe, the gap would be recovered in about 60 years, without taking into account the currency appreciation in real terms against the euro (Isărescu, 2004). The Governor of the National Bank of Romania states that economic growth of 7-8% per year would be unsustainable and would lead to overheating of the economy and recession; in addition it is inflationary.

In our opinion, inflationary pressures are not generated by the growth rate of GDP, but the excess of current GDP above its potential level. The decrease in the inflation rate to mid-2007 was gradual, since a tighter monetary policy would have not allowed a real GDP growth.

By adopting inflation targeting, it was intended to increase the credibility of the central bank, considered to be essential in achieving the target by anchoring effective inflation expectations on medium term. Thus, inflation expectations channel is the most effective monetary policy transmission channel.

Gürkaynak et al. (2010) showed that inflation expectations were firmly anchored in the United Kingdom (a country with an explicit inflation target) than in the U.S. (a country with no such target). Also, the results indicated a higher volatility of inflation expectations in the United States.

The economic agents and people form their inflation expectations regarding the inflation targets set by the central bank if they is credible. Otherwise, as in the case of Romania, the economic agents use inflation targets adjusted plus 2-3% in order to orientate their business, because in the past four years the central bank missed inflation target.

Based on inflation expectations, employees require an increase in remuneration. If real wages exceed labour productivity growth, there will be an increase in unit labour costs that will be passed on to consumer prices.

Also, inflation expectations influence real interest rate, as there is a negative correlation between the two variables. While maintaining the same nominal interest rate, the lower expectations are, the higher the real interest rate is, being thus an incentive for saving. In this case, the consumption is low, having a positive impact on inflation.

Although in 2009 Romania experienced a severe contraction of the economic activity, reflected by increasing negative output gap, inflation rate remained relatively high. In this context, analyzing the aggregate supply curve (Phillips curve) that show the response of inflation to inflation expectations, the output gap and other shocks, other than those from exogenous variables: $\pi = \pi t + 1 + yt-1 + \varepsilon$, we deduce that the high level of inflation is explained by inflation expectations.

We notice that inflationary expectations are one of the key factors influencing the inflation rate. Therefore, in order to achieve the inflation target a firm anchoring of inflation expectations at a low level is necessary.

Despite the limitations of this strategy, the inflation targeting is a viable alternative to achieve Maastricht inflation criteria. Therefore, the NBR intends to maintain it at least until adopting the Exchange Rate Mechanism II.

6. Conclusions

The application of monetary targeting in the context of accession to the Economic Monetary Union is limited by the liberalization of capital flows. For example, the reduction in the interbank interest rate imposed by the need to diminish the interest rate differential with the euro area determines an increase in money supply by multiplying the credits, the latter registering an upward trend since 2000.

The econometric testing of the two conditions of this strategy indicates that monetary targeting cannot be used in Romania. Cointegration tests show that in the period 2000-2005 there was no cointegration relationship between the monetary base and M2 and between the M2 and inflation rate, which means that, on the one hand, the ability to control the monetary aggregate is low and, on the other hand, money demand is unstable.

Due to the Balassa-Samuelson effect, inflation criteria require the appreciation of the leu against the euro. On the other hand, the uncorrelation with the euro area

economic structures requires independent monetary policy to respond to specific shocks to the Romanian economy. Therefore, we may say that the selection of the exchange rate as intermediate target is not effective in the context of fulfilment of the convergence criteria.

The weakening of the relationship between monetary aggregates and inflation and the risks associated with using exchange rate as a nominal anchor in the liberalization of capital flows determined the monetary authorities to implement other strategies, namely, inflation targeting.

Being characterized by transparency and forward-looking, inflation targeting is considered to be the most appropriate strategy for monetary policy to achieve nominal convergence. Analyzing the degree of convergence of the inflation rate in Romania for three periods (the period prior to the strategy of inflation targeting, the EU pre-accession period in the presence of the inflation targeting strategy and post-accession period), we notice that until the EU accession, Romania was in a process of convergence, the results indicating a higher degree of convergence in a period of inflation targeting.

Increasing inflation differential in the period after the accession to the EU was due to factors that were not under the direct influence of monetary policy of NBR, such as: international prices increase and fiscal policy decisions.

Despite the advantages of this monetary strategy, there still are challenges, one of them is establishment of the optim level of interest rate in order to achieve simultaneous nominal and real convergence. In our opinion, the interest rate adjustment must be made in accordance with the inflation rate. For example, the presence of inflationary pressures can be offset by slight increases in real interest rate, so that it allows the real GDP to grow.

Although it has these disadvantages, the inflation targeting strategy ensures the fulfilment of the nominal and real convergence criteria and, therefore, it will be used at least until the adoption of the Exchange Rate Mechanism II.

Annex

Cointegration tests

Date: 08/04/11 Time: 14:38
Sample(adjusted): 1994:04 1999:12
Included observations: 69 after adjusting endpoints
Trend assumption: Linear deterministic trend
Series: IPC L_M2
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.319977	28.58458	15.41	20.04
At most 1	0.028234	1.976209	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.319977	26.60837	14.07	18.63
At most 1	0.028234	1.976209	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-eigenvalue test indicates 1 cointegrating equation(s) at both 5% and 1% levels

Date: 08/04/11 Time: 14:58
Sample(adjusted): 2000:04 2005:07
Included observations: 64 after adjusting endpoints
Trend assumption: Linear deterministic trend
Series: IPC L_M2
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None	0.117731	8.175491	15.41	20.04
At most 1	0.002480	0.158929	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates no cointegration at both 5% and 1% levels

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None	0.117731	8.016563	14.07	18.63
At most 1	0.002480	0.158929	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-eigenvalue test indicates no cointegration at both 5% and 1% levels

Date: 08/04/11 Time: 17:00
Sample(adjusted): 1994:04 1999:12
Included observations: 69 after adjusting endpoints
Trend assumption: Linear deterministic trend
Series: L_M2 L_M0
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None	0.085820	9.080212	15.41	20.04
At most 1	0.041005	2.889023	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates no cointegration at both 5% and 1% levels

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None	0.085820	6.191189	14.07	18.63
At most 1	0.041005	2.889023	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-eigenvalue test indicates no cointegration at both 5% and 1% levels

Date: 08/04/11 Time: 17:00
Sample(adjusted): 1994:04 1999:12
Included observations: 69 after adjusting endpoints
Trend assumption: Linear deterministic trend
Series: L_M2 L_M0
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None	0.085820	9.080212	15.41	20.04
At most 1	0.041005	2.889023	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates no cointegration at both 5% and 1% levels

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None	0.085820	6.191189	14.07	18.63
At most 1	0.041005	2.889023	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-eigenvalue test indicates no cointegration at both 5% and 1% levels

Date: 08/04/11 Time: 18:50
Sample(adjusted): 2000:04 2005:07
Included observations: 64 after adjusting endpoints
Trend assumption: Linear deterministic trend
Series: L_M2 L_M0
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None	0.155884	10.99900	15.41	20.04
At most 1	0.002392	0.153244	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates no cointegration at both 5% and 1% levels

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None	0.155884	10.84575	14.07	18.63
At most 1	0.002392	0.153244	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-eigenvalue test indicates no cointegration at both 5% and 1% levels

Granger causality tests

Pairwise Granger Causality Tests
Date: 08/03/11 Time: 17:18
Sample: 1994:01 1999:12
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
IPC does not Granger Cause DL_M2	69	0.57512	0.56552
DL_M2 does not Granger Cause IPC		2.74502	0.07182

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