2 RESPONDING TO CRITICISM OF MONETARY POLICY IN ROMANIA IN THE DECADE SURROUNDING THE 2008 FINANCIAL CRISIS (2004-2013)

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Abstract

We use the experience of Romania between 2004 and 2013 to show that (i) once faced with huge capital inflows and persistent inflationary expectations (as it was the case between 2004 and 2008), a country may lose the interest rate as its main monetary policy instrument and (ii) an interest rate cut might not be a way to alleviate a recession induced by a capital flows sudden stop (as happened in 2009) if the private sector is highly indebted in foreign currency. In the first case, the loss of policy instrument appears because high inflation expectations require an increase in the interest rate, whereas high capital inflows widen the inflationary output gap and tend to appreciate the currency, requiring a cut in the interest rate. In the second case, a large policy rate cut needed to stimulate growth would result in a high depreciation, with the negative effects on the balance sheets of households, companies and banks, potentially outpacing the benefits of larger exports, thus depressing recession. We use the results produced by the National Bank of Romania's Macroeconomic Modelling and Forecasting Department to show that: a) the claim that a higher increase in the monetary policy rate may have led to a lower inflation before the 2008 crisis is not grounded; b) an abrupt cut in interest rate would have depressed the recession of 2009.

Keywords: monetary policy; inflation; external imbalances; capital inflows; interest rate

JEL Classification: E31, E37, E51, E58, F31, F32, G01

1. Introduction

The analyses conducted by some critics of monetary policy in Romania produced essentially two types of comments: one in which monetary policy was criticised for the too slow (too meagre and/or too late) increase in reference rates as compared to inflation. This was largely the case prior to the outbreak of the 2008 global financial crisis.

The second type of comments consisted in criticising the overly slow reduction in the monetary policy rate and did not take into account the fact that several episodes of abrupt

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fall in inflation were due to favourable supply-side shocks. This was the case after the global crisis hit Romania as well, starting in the latter part of 2008.

This criticism received partial direct or indirect support or was fought explicitly or implicitly in some academic papers, among which Ciurilă și Murărașu (2008), Bahna et al. (2015), Copaciu (2012), Andrieș and Pleșcău (2020), Nagy and Benyovszky (2014), Bădescu (2016), Căpraru *et al.* (2015), Gonzales and Tadle (2021), Popescu (2012), Goczek (2015), Moder (2019), Olteanu (2012), Apostoaie și Roman (2010)

In order to see to what extent the criticism was warranted, our approach is to explain the deviation of inflation from the target depending on its determinants and the monetary policy response to developments in those factors. To this end, we will proceed by referring to the factors of influence described in principle in supply and demand equations of a neokeynesian model. Specifically, we will explain the deviation of inflation from the target through a series of factors based on the model and results produced by the National Bank of Romania's (NBR) Macroeconomic Modelling and Forecasting Department (MMFD).

In this model, inflation is distinctly explained for CORE3 inflation (or adjusted CORE2, as it is used in NBR's official reports), which are under the monetary policy scope of influence, and for non-CORE3 inflation. The model determinants of CORE3 inflation are the output gap (x_{2_t}), inflation expectations, $(E_t\{\pi_{t+1}\})$, inflation persistence (π_{t-1}) and imported inflation (π^M). CORE3 inflation not explained by the aforementioned factors is attributable to a single factor (F), so that the supply equation has the generic form:

$$\pi_t = a_1[a_2\pi_{t-1} + (1 - a_2)E_t\{\pi_{t+1}\}] + (1 - a_1)\pi^M + a_3x_{2_t} + F_t \qquad (1)$$

Non-CORE3 inflation represents the weighted average contribution of inflation rates of products with volatile prices (vegetables, fruit, eggs, fuels) or whose prices are potentially influenced by other policies (tobacco, alcohol, goods and services with administered prices). Non-CORE3 inflation adds to the CORE3 inflation yielded by condition (1) to obtain headline CPI inflation.

The analysis based on the MMFD's model spans the period from 2003 to 2013 using vintage of data as released by National Institute for Statistics (NIS) in 2013 (latest observation for Q3 2013). This timeframe saw several particulars of inflation, which are worth mentioning prior to analysing the factors that prompted inflation to veer off the target: (i) the contribution of CORE3 inflation to annual CPI inflation has generally been lower than that of the non-CORE3 component, except for the periods 2003 Q4-2004 Q2, 2008 Q2-2009 Q1, 2009 Q3 and 2012 Q2; (ii) the contribution of inflation expectations to annual inflation followed a downward path.

Not only inflation, but also its deviation from the target is most often explained by the non-CORE3 determinants of inflation. Based on the model constructed and used by the NBR for inflation targeting, the contributions to inflation deviation from the target during 2003-2013 are listed in Figure 1 through Figure 4 presented in Annex 1 displayed on the online version of the paper.

In order to make the presentation simpler, we will distinguish between two relevant periods of inflation deviation from the target: the one prior to the outbreak of the crisis in Romania and the other in the aftermath of the crisis.

2. Criticism of monetary policy ahead of the crisis

To be precise, we consider that knock-on effects of the global crisis on the Romanian market emerged as of 2008 Q4, when the economy entered recession for the first time since 2000. Consequently, in this section we will focus on analysing inflation deviations from the target in the period ending in 2008 Q3.

The period under review features five policy-relevant changes. The first change consisted in the closing of the negative output gap resulting from the recession spanning 1997-1999. The quarterly output gap returned to positive territory in 2004 Q3, pointing to the re-emergence of excess demand in the domestic economy.

The second change consisted in the fact that the previously steadily negative contribution of CORE3 inflation to the deviation of annual CPI inflation from the target became positive for the first time in 2007 Q4 and remained in positive territory until 2009 Q3. By comparison, the contribution of non-CORE3 inflation has been positive at all times, except for 2012 Q3.

The third change was the introduction of inflation targeting as a monetary policy strategy starting August 2005. Given the unstable relationship between monetary aggregates and the inflation rate, the central bank shifted from targeting the monetary base to using the policy rate as a means of attaining the inflation target. One of the consequences of this shift is that the policy rate is no longer the result of calibrating money supply, but rather the monetary policy response to the deviation of inflation from the target.

The fourth change was marked by the increase in capital flows to Romania at relatively high levels as of 2005. Capital inflows reached very high levels starting in the latter part of 2006. From this perspective, the shift to inflation targeting was a necessity. Large capital inflows would have no longer allowed inflation to be kept at bay by targeting the monetary base, which was actually under foreign investor control. Capital (money) inflows surged in 2006 and 2007, triggering a constant liquidity surplus, which monetary policy had to mop up.

Finally, the global financial crisis broke out in 2007 Q3 (9 August) and it eventually pushed the domestic economy into recession in 2008 Q4.

To sum up, prior to the downturn of the Romanian economy there were five distinct periods: the period up to the closing of the output gap (2003 Q1-2004 Q2); the following period up to the adoption of inflation targeting (2004 Q3-2005 Q3); the period between the shift to inflation targeting and the surge in capital inflows (2005 Q4-2006 Q3); the period of massive capital inflows, up to the outbreak of the global crisis (2006 Q4-2007 Q3); finally, the period between the global crisis setting in until the domestic economy entered recession (2007 Q4-2008 Q3), when the contribution of CORE3 inflation to the deviation of CPI inflation from the target was positive and relatively high for the first time.

The deviation of inflation from the target and the contributions of non-CORE3 inflation and CORE3 inflation during the five periods are listed in Appendix A. In order to keep our analysis simple and focused on the criticism that interest rates rose too little or too late prior to the economy entering recession, we will refer solely to the period following the shift to inflation targeting.

Data in Table 1 suggest that the monetary policy response was in the appropriate direction when the deviation of CPI inflation from the target became strongly positive during 2007 Q4-2008 Q3 as compared to that seen from 2005 Q4 until 2007 Q3. The larger deviation of annual CPI inflation from the target was ascribable in a proportion of 78 percent to the significant increase, from negative to positive readings, in the contribution of CORE3 inflation, a component under monetary policy influence, also via changes in the interest rate.

Monetary policy reacted by raising the average nominal interest rate by 1 pp during 2007 Q4-2008 Q3 compared to the 2005 Q4-2007 Q3 period, which resulted in a 1.43 pp increase in the average real interest rate (the nominal effective interest rate went up 1.4 pp, pushing the real effective interest rate 1.83 pp higher). It did not attempt to correct the deviations from the target generated by developments in volatile or administered prices or by the direct effect of supply-side shocks.

Table 1

The average contributions of non-CORE3 inflation and CORE3 inflation to the average deviation of annual CPI inflation from the target and the real monetary policy rate

Period	Deviation of annual CPI inflation (pp)	Contribution of non-CORE3 inflation (pp)	Contribution of CORE3 inflation (pp)	Real monetary policy rate (%)	Real monetary policy rate gap (%)	Real *effective* monetary policy rate gap (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2005 Q4-2007 Q3	0.25 (0.62)	1.58 (1.59)	-1.33 (-0.97)	1.78 (7.97)	-0.57	-1.24
2007 Q4-2008 Q3	3.95 (4.45)	2.39 (2.22)	1.56 (2.23)	3.20 (8.96)	0.69	0.42

Note: Under columns (2) to (4), quarterly (annualised) data are listed in parentheses. Under column (5), the average nominal monetary policy rates are listed in parentheses.
Source: Data Sets - Macroeconomic and Forecasting Department of the National Bank of Romania (2002-2013); National Bank of Romania: Bucharest, Romania.

Table 2 lists the quarterly contributions of non-CORE3 inflation and CORE3 inflation to the deviation of annual CPI inflation from the target and the real monetary policy rates. It is noticeable that the contribution of annual CORE3 inflation widened at a relatively fast pace and peaked at a historical high of 2.18 pp in 2008 Q2 (see also Figure 1 in Annex 1 presented in the additional online material associated with the paper). On the other hand, non-CORE3 inflation saw its contribution diminish, meaning that the two contributions to the deviation of annual CPI inflation from the target were equal for the first time in the history of inflation in 2008 Q3. Against this background, some analysts criticised monetary policy for not cooling off CORE3 inflation even more, so as to avoid knock-on effects on annual CPI inflation.

Table 2

Annual contributions to the deviation of CPI inflation from the target (percentage points)

Period	Deviation of annual CPI inflation (pp)	Contribution of non-CORE3 inflation (pp)	Contribution of CORE3 inflation (pp)	Real monetary policy rate (%)	Real monetary policy rate gap (%)	Real effective monetary policy rate gap (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2007 Q2	-0.62 (0.22)	0.55 (1.81)	-1.17 (-1.59)	2.75 (7.33)	0.30	0.16
2007 Q3	0.77 (2.40)	1.38 (2.64)	-0.61 (-0.24)	2.14 (6.48)	-0.38	-0.66
2007 Q4	2.65 (8.14)	2.13 (3.40)	0.52 (4.74)	1.70 (7.33)	-0.85	-0.99
2008 Q1	4.05 (5.89)	2.68 (2.98)	1.37 (2.91)	3.04 (8.68)	0.50	0.35

Period	Deviation of annual CPI inflation (pp)	Contribution of non-CORE3 inflation (pp)	Contribution of CORE3 inflation (pp)	Real monetary policy rate (%)	Real monetary policy rate gap (%)	Real effective monetary policy rate gap (%)
2008 Q2	4.75 (2.95)	2.56 (1.39)	2.18 (1.56)	3.97 (9.67)	1.46	1.16
2008 Q3	4.34 (0.82)	2.17 (1.12)	2.17 (-0.30)	4.12 (10.17)	1.66	1.15

Note: Under columns (2) to (4), quarterly (annualised) data are listed in parentheses. Under column (5), the average nominal monetary policy rates in the respective quarter are listed in parentheses.
Source: Data Sets - Macroeconomic and Forecasting Department of the National Bank of Romania (2002-2013); National Bank of Romania: Bucharest, Romania.

This criticism is justified if there are means to reduce core inflation, but monetary policy does not resort to them. In order to see to which extent these means actually existed, the following question needs to be answered: could a larger increase in the policy rate have diminished the contribution of three major inflation determinants – namely inflation expectations, output gap and imported inflation – to the rise in the contribution of CORE3 inflation to the deviation of CPI inflation from the target?

We will take a two-stage approach to answering this question. First, we will examine the contributions of the three determinants to see whether (i) they have been relatively high or rising towards relatively high levels and (ii) the relations between them would have allowed a larger increase in the policy rate. As far as the latter is concerned, for instance, if the contribution of the output gap were very small or zero and that of inflation expectations were relatively high, a somewhat large increase in the policy rate would not be possible without negatively affecting output and employment. By contrast, if, for example, all three components had relatively high positive contributions, a somewhat large increase in the policy rate is necessary to curb inflation. If, in this latter case, the monetary authority did not raise the interest rate, it would trigger seemingly justified criticism, because in the NK model a policy rate hike would cool off inflation.

However, in practice, there may be certain special circumstances, in which an increase in the monetary policy rate not only that it cannot curb inflation, but it can even fuel it. Thus, in the second stage, we will check whether such circumstances existed in Romania, providing solid grounds for the monetary policy pursued some time prior to the economic downturn.

2.1. The analysis of the three determinants' contributions: an apparently correct criticism of the interest rate policy during 2007 Q4-2008 Q3

The main drivers of the increase in CORE 3 inflation contribution to the deviation of CPI inflation from the target in 2007 Q4-2008 Q3 versus 2005 Q4-2007 Q3 were indeed the output gap, inflation expectations and imported inflation. The contributions of these three factors are presented in Table 3 (see also Figure 3 and Figure 4 in Annex 1 presented in the additional online material associated with the paper).

Imported inflation, which is under the influence of foreign prices and the leu exchange rate, saw the largest adjustment of the contribution to the deviation of inflation from the target: 0.99 percentage points for the annual inflation and 1.31 percentage points for the annualised quarterly inflation. From the negative quarterly influences, which pushed inflation down during 2003-2007, the contributions of imported inflation turned positive starting with 2007 Q4, particularly on account of the leu depreciation induced by the increase in risk aversion

after the outbreak of the international financial crisis. As regards this component, the answer to the question above is positive: a rise in interest rate would have resulted in the slower leu depreciation and the lower contribution of imported inflation to the deviation of CPI inflation from the target. Ceteris paribus, the size of the contribution of this factor and the direction of its movement would have warranted a higher or earlier interest rate increase.

Table 3

The average contributions of inflation expectations, output gap and imported inflation to the average deviation of annual CPI inflation from the target before the Romanian economy's entry into recession

Period	Annual CPI inflation deviation (pp)	Contribution of inflation expectations (pp)	Contribution of output gap (pp)	Contribution of imported inflation (pp)
(1)	(2)	(3)	(4)	(5)
2005 Q4-2007 Q3	0.25 (0,62)	0.56 (0.56)	0.73 (0.92)	-0.49 (-0.47)
2007 Q4-2008 Q3	3.95 (4.45)	0.56 (0.82)	1.37 (1.56)	0.50 (0.84)
2008 Q3	4.34 (0.82)	0.79 (0.92)	1.56 (1.62)	0.83 (-0.29)

Note: Under columns (2) to (5), quarterly (annualised) data are listed in parentheses.
Source: Data Sets - Macroeconomic and Forecasting Department of the National Bank of Romania (2002-2013); National Bank of Romania: Bucharest, Romania.

Unlike imported inflation, the contributions of inflation expectations and the output gap to the deviation of annual CPI inflation stayed in positive territory during 2004 Q4-2008 Q3.

The positive contributions of inflation expectations to the deviation of annual CPI inflation fluctuated between 0.21 percentage points and 0.99 percentage points during 2005 Q4-2008 Q3. In this period, the inflation target was lowered several times. In this context, the adjustment of inflation expectations' contribution during 2007 Q4-2008 Q3 as against 2005 Q4-2007 Q3 was relatively low: zero for the annual inflation and 0.26 percentage points for the annualised quarterly inflation. As shown in Appendix B, the adjustments were larger in some sub-periods.

In annual terms, the average contribution of inflation expectations to inflation deviation from the target masks, however, a gradual increase in contributions from 0.34 percentage points in 2007 Q4 to 0.79 percentage points in 2008 Q3. In quarterly terms, the contribution of inflation expectations was relatively high and stable during 2007 Q4-2008 Q3, fluctuating in the narrow interval of 0.77-0.92 percentage points.

Similarly to the exchange rate, which has an impact on imported inflation, the answer to the question above is again positive: a higher interest rate increase would have contained inflation expectations insofar as the expectations also have a rational component. The size of the positive contribution of inflation expectations and the direction of their movement warranted, *ceteris paribus*, a higher and earlier monetary policy rate increase.

Finally, the output gap had a larger contribution once the behaviour of economic agents turned euphoric. The average contribution of the output gap to the CPI inflation deviation from the target grew by 0.64 percentage points during 2007 Q4-2008 Q3 versus the previous period for both annual and annualised quarterly inflation. The output gap contribution to the deviation of annual CPI inflation from the target became positive in 2004 Q4 and further moved up, accounting for half of total positive contributions at end-2008. Moreover, during

2008 Q1-2009 Q1, no other CORE 3 or non-CORE 3 inflation factor generated more excess inflation than the output gap (excess demand).

When analysed based on the basis of quarterly influences, the conclusions remain relatively unchanged. In quarterly terms, during 2008 Q1-2008 Q3, output gap did not make the largest contribution to inflation deviation from the target on a continuous basis, as compared, for example, with the contribution of administered prices or fuels. In contrast, the output gap was the only factor which had a positive contribution of over 1 percentage point to the inflation deviation from the target in each quarter during 2006 Q4-2008 Q3.

In view of the relatively large contributions of the three factors to the CPI deviation from the target, the criticism to the then monetary policy seems just. The monetary policy rate increases from 6.5 percent in 2007 Q3 to 10.17 percent in 2008 Q3 (the effective interest rate rose from 6.2 percent in 2007 Q3 to 9.66 percent in 2008 Q3) appears to have been insufficient in terms of the need to narrow the output gap. In fact, this conclusion seems to hold for the entire pre-crisis period during which the inflation targeting regime was in place. The monetary policy rate picked up from 7.5 percent in 2005 Q4 to 10.17 percent in 2008 Q3 (the effective monetary policy rate moved up from 4.9 percent in 2005 Q4 – an all-time low recorded before the recession – to 9.66 percent in 2008 Q3 and 14.2 percent in 2008 Q4, the peak seen during the inflation targeting period). In real terms, the interest rate rose from 2.14 percent in 2007 Q3 to 4.12 percent in 2008 Q3 (the real effective rate grew from 1.85 percent in 2007 Q3 to 3.61 percent in 2008 Q3 and 7.6 percent in 2008 Q4). Nevertheless, the deviation of GDP from the potential widened further.

According to many analysts, the inflation deviation from the target would have been smaller if the central bank had increased the interest rate earlier and/or to a larger extent. Indeed, in the New Keynesian model, a high enough increase in interest rate could have pushed the output gap down to zero. In the strict framework of the NK model, the answer to the question above is positive in the case of output gap as well: an increase in the interest rate contributes to output gap narrowing by cutting demand. Similarly to other components, the size of the contribution of the output gap and the direction of its movement warranted, *ceteris paribus*, a higher and/or earlier increase in the monetary policy rate.

2.2. Special conditions: massive capital inflows and the mixed effects of interest rates

Would closing the output gap to zero have been practically possible outside the considered model via higher interest rate increases?

The answer is negative, as the slope of the balance of payments curve is positive. For this reason, as output grows and the current account deficit widens, the interest rate increases in order to raise the capital necessary for financing the larger current account deficit. Thus, the *ceteris paribus* clause invoked when we stated that higher interest rates would have contained imported inflation, inflation expectations and the output gap was breached by wide margins. As a result, an ever higher interest rate increase would have raised even more capital to fuel the inflationary gap. The more abrupt rise in interest rates would have also implied a faster appreciation of the leu, with disinflationary implications. However, there were periods when the leu appreciation and the rise in inflation expectations coexisted (Croitoru, 2013).

During 2004-2008, capital inflows exceeded the current account deficit and the central bank intervened in the forex market to purchase nearly USD 10 billion. This was not necessarily a sign that the interest rate was too high, but an indication that capital inflows also had other

determinants, among which the euphoric expectations on the economy's future, including Romania's anticipated accession to the EU, played a major part. The expectations that the leu would appreciate further if the central bank strictly pursued inflation targeting also fostered the capital inflows. Increased capital inflows pushed asset prices higher (asset prices being not covered by the monetary policy reaction function).

A very important element, yet disregarded by the dominant theory, was that the expected return on speculative investment rose faster than interest rates. At a certain time, the expected return on investment in assets was much higher than interest rates, making possible (profitable) the debt (credit) financing of asset purchases (investment) or consumption. For instance, real estate loans for investment purposes had turned profitable as the real estate prices increased faster than the interest rate on a yearly basis.

The breakdown by debtor of the Romanian economy deteriorated. Increases were recorded by the share of unhedged borrowers (which could use cash flows to finance interest solely) and the share of Ponzi debtors, who were granted loans only because asset prices rose to such a large extent that the value of those assets was considered enough to cover debts; however, Ponzi debtors lacked cash flows to cover at least the interest on their loans. Thus, despite the increase in interest rates, consumption and investment continued to grow at high rates, making a positive contribution to economic growth and the inflationary output gap.

In this process, even the leu appreciation contributed, on a net basis, to the rise in output above the potential level. On the one hand, the leu appreciation pushed import prices down, thus making net exports have a negative contribution to economic growth during 2003-2008. On the other hand, however, the leu strengthening rendered foreign currency-loans more convenient than leu-denominated loans. Foreign currency loans therefore rose at a faster pace than leu-denominated loans, spurring private consumption and output, but at the same time creating mismatches between leu-denominated assets and foreign currency-denominated liabilities of households and companies.

Nevertheless, the negative contribution of net exports to the output growth did not offset the positive contribution of consumption and investment. The net result was the increase in output above the potential level, the credit deviation from the trend and the build-up of external imbalances. The monetary policy response was in line with a philosophy which includes financial stability as a distinct factor. Output gap rose gradually and during 2006-2008 it was the component with the largest average contribution to the deviation of (annual or quarterly) inflation from the target (see Figure 3 in Annex 1 presented in the additional online material associated with the paper).

2.3. The monetary policy dilemma before the crisis

These developments show that monetary policy was faced with a dilemma during the period of massive capital inflows, when the differential between interest rates and returns on assets was negative. On the one hand, according to the New Keynesian framework, the interest rate increase appeared necessary in order to cool off inflation, particularly via anchoring inflation expectations.

For instance, one year before the economic recession there was an imperative need to raise interest rates in response to the change in expectations. Indeed, inflation expectations had a larger contribution to the deviation of annualised quarterly inflation from the target (from 0.24 percentage points, on average, during 2006 Q4-2007 Q3 to 0.82 percentage points during 2007 Q4-2008 Q3).

Over the two periods, the nominal monetary policy rate went up from 7.71 percent, on average, to 8.96 percent, corresponding to real rates of 3 percent and 3.2 percent and to the real rate gaps of 0.58 percent and 0.69 percent. The conclusion was that a higher interest rate hike would have been needed to keep the contributions of expectations unchanged from the previous period.

On the other hand, the cut in interest rate seemed practically necessary to avoid a swifter rise in capital inflows, which had already hit all-time highs, thus pushing output above the potential level and fuelling inflation expectations. For instance, monetary policy rate stood at 2.67 percentage point higher in 2008 Q3 than in 2005 Q4, while the quarterly and annual inflationary output gaps widened by 7.8 percentage points and 8.2 percentage points, respectively. During 2005 Q4-2008 Q3, the average monetary policy rate was 8.3 percent. Thus, a relatively small rise in the policy rate was associated with the relatively wide increases in the inflationary output gap. However, this conclusion should be adjusted considering that the effective monetary policy rate went up 4.76 percentage points (from 4.9 percent in 2005 Q4 to 9.66 percent in 2008 Q3), which correlates with the same changes in the output gap. Regardless of this adjustment, the output gap widening was obviously triggered by other factors as well and could not be controlled by monetary policy rate changes.

When confronted with this dilemma, the central bank extended the range of instruments it used to achieve its price stability and financial stability objectives. The instruments included limiting household indebtedness to banks, limiting credit as percent of the building value, increasing reserve requirements to 40 percent, limiting foreign currency-denominated loans to 300 percent of share capital at most, etc. In addition, liquidity management was focused on bringing interbank rates below the monetary policy level during some periods after the adoption of inflation targeting. The evolution of these instruments during 2003-2008 is given a summarised, yet well informative description in (Isărescu, 2008; Isărescu, 2009; Popa *et al.*, 2009; Georgescu, 2010).

Thus, the monetary policy conduct was a combination of interest rate changes and the use of prudential and administrative instruments. In certain periods, such as 2005, in order to fend off capital inflows, monetary policy "opted for the easing of the interest rate policy, aimed at deterring volatile capital inflows and for offsetting its relative loss of autonomy and effectiveness by using other levers at its disposal in order to put a break on the extremely fast lending process (...); the mix of complementary measures adopted and implemented by the NBR was designed to make broad monetary conditions restrictive enough for the continued sustainable curbing of inflation" (Popa *et al.*, 2009, p. 35).

Transferring part of a task to contain excessive demand on prudential and administrative measures meant, de facto, admitting the dilemma faced by the interest rate policy and its ineffectiveness in lowering demand when large capital inflows and inflation expectations coexist.

These contributions to the output gap deviation from zero (graphically presented în Figure 5 of the Annex 1 in the additional online material associated with the paper) are calculated using the NBR's forecasting model that leaves – as it should – prudential and administrative measures out of account and allows an interest rate hike to contribute to output gap narrowing.

According to the model, during 2005 Q3-2006 Q4, the real interest rate deviation had a positive contribution to the widening output gap, ranging from 0.1 percentage points to 0.4 percentage points. This indicates that, in the above-mentioned period, real interest rates

applied by banks on leu-denominated loans and deposits were smaller than their equilibrium levels, thus contributing to the increase in output gap. After that, the contribution of real interest rates was almost nil.

The gap persistence, *i.e.*, its previous increasing levels, made the largest contribution to the output gap. In 2004 Q4-2008 Q4, the gap persistence had a contribution between 0.7 percentage points and 8 percentage points. The average contribution of the gap persistence to the output gap stood at 6.5 percent during 2007-2008 and 7.4 percentage points in 2008, reflecting the increasingly strong euphoric perceptions of economic agents. The relatively high contributions indicate that the prudential and administrative measures were little effective, as they could neither ensure tighter broad monetary conditions in 2007 and 2008, nor prevent the build-up of external vulnerabilities. The euphoric perception was so strong that even in 2009, the year of GDP collapse, the average quarterly contribution of the persistence to output gap was 3.1 percentage points.

Against the background of the economic agents' generalised euphoria concerning the future increases in asset prices, wages, general government income etc., the prudential and administrative measures were avoided, proving ineffective in their turn. Thus, the inflationary output gap widened further, reflecting the strong rise in wage earnings, which was occasionally stronger than that of labour productivity (for instance during 2006-2007), the substantial increase in credit above the potential level and the pro-cyclical fiscal policy.

The pro-cyclical fiscal policy had a positive contribution to the output gap widening for a long period of time. The contribution of the fiscal impulse to the output gap was positive (ranging from 0.2 percentage points to 0.7 percentage points) in each quarter during 2006 Q1-2008 Q3, except for 2007 Q1. Its average contribution to the output gap during 2007 Q4-2008 Q3 stood at 0.5 percentage points.

In addition, capital flows tended to change the financial structure of the economy from stable to unstable. The financial structure was worsening as the output gap widening entailed the build-up of external imbalances and higher inflation.

The level of the monetary policy rate was the result of a trade-off, but not between the stabilisation of inflation and the stabilisation of output. The interest rate hike contributed to the decline in inflation and, starting with 2007 Q3, to the slower currency depreciation which would have had a negative impact on output growth via the balance sheets of entities that had been taking loans in foreign currency. The trade-off was made between price stability and financial stability. An ever higher increase in interest rate would have not led to the desired reduction in inflation, but it would have weakened the structure by debtor of the economy, creating conditions for the financial destabilisation of the economy. The NBR did not fall into the trap of raising the interest rate to levels that would have accelerated even more the rise in foreign currency-denominated loans.

3. Criticism of monetary policy after the fallout from the crisis was visible

In order to make the presentation easier to follow, we will divide the period after the outbreak of the crisis in Romania in two. The first period starts with 2008 Q4, when output declined in quarterly terms for the first time, and ends with 2010 Q1, when the quarterly output gap turned negative. The second period spans from 2010 Q2 to 2013 Q3, the final quarter for which data were available at the time this paper was prepared. The core and non-core

inflation contributions to the annual inflation deviations from the target from 2008 Q4 to 2013 Q3 are presented in Table 4.

3.1. The high interest rate moderated the decline during 2008 Q4-2010 Q1

GDP dynamics slowed down relatively fast during 2008 Q3-2010 Q1. The effects of the crisis were strongly felt in 2008 Q4 and 2009 Q1, when, in real time, data output dropped quarter on quarter by 2 percent and 5.7 percent, respectively. Eventually, in real time output fell by 6.8 percent in 2009 versus 2008.

Table 4

Deviation of inflation from the target after the Romanian economy's entry into recession

Period	Annual CPI inflation deviation (pp)	Non-CORE3 inflation contribution (pp)	CORE3 inflation contribution (pp)	Real monetary policy rate (%)	Real monetary policy rate gap (%)	Real effective monetary policy rate gap (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2008 Q4	3.02 (2.78)	1.44 (0.40)	1.58 (2.38)	3.58 (10.25)	1.16	5.14
2009	1.95 (1.14)	1.42 (1.55)	0.54 (-0.41)	3.55 (9.14)	1.24	1.96
2010 Q1-2013 Q3 (averages)	1.87 (1.82)	2.07 (0.76)	-0.20 (-0.26)	0.97 (5.83)	-1.21	-1.45

Note: Under columns (2) to (4), quarterly (annualised) data are listed in parentheses. Under column (5), the average nominal monetary policy rates are listed in parentheses.
Source: Data Sets - Macroeconomic and Forecasting Department of the National Bank of Romania (2002-2013) and own computation.

As the recession deepened, inflation went down and appeared to be much less of a problem. Annual CPI inflation dropped from 8.6 percent in 2008 Q2 to 4.6 percent in 2010 Q1. The decline was attributed to CORE3 inflation, which fell from 7.5 percent to 1.1 percent in the above-mentioned period (Figure 6 in Annex 1 presented in the additional online material associated with the paper). Against this background, the deviation of CPI inflation from the target narrowed from 4.75 percentage points in 2008 Q2 to 1.1 percentage points in 2010 Q1 (see Figure 1 in Annex 1 presented in the additional online material associated with the paper).

Following these developments, the monetary policy criticism reversed. Many analysts considered that policy rate changes were inappropriate in relation to the economic downturn. Monetary policy changes seemed not to be in line with output developments. For instance, when output contracted by 2 percent in 2008 Q4 versus 2008 Q3, the effective monetary policy rate picked up 4 percentage points in real terms (Table 5). Something similar happened in 2009 (Table 6). Such an interest rate increase is generally unusual and the more so unusual it appears during an economic downturn. The effective monetary policy rate grew in 2008 Q4 on the back of interbank money market developments (Croitoru, 2013).

Table 5

GDP, monetary policy rate and the contributions of fundamentals to inflation deviation after the Romanian economy's entry into recession

Period	Annual CPI inflation deviation	Contribution of inflation expectations (pp)	Contribution of output gap (pp)	Contribution of imported inflation (pp)	Real monetary policy rate (%)	Economic growth (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2008 Q3	4.34 (0.82)	0.79 (0.92)	1.56 (1.62)	0.83 (-0.29)	4.12 (3.61)	0.4*
2008 Q4	3.02 (2.78)	0.89 (1.16)	1.53 (1.25)	0.78 (1.81)	3.58 (7.55)	-2.0*
2009	1.95 (1.14)	0.98 (0.87)	0.72 (0.25)	0.02 (-0.68)	3.55 (4.26)	-6.8**
2010 Q1-2013 Q3 (averages)	1.87 (1.82)	0.74 (0.76)	-0.20 (-0.26)	0.06 (0.18)	0.97 (0.73)	

Note: Under columns (2) to (5), quarterly (annualised) data are listed in parentheses. Under column (6), the real effective monetary policy rates are listed in parentheses. Under column (7): * quarterly economic growth rate; ** annual economic growth rate.
Source: Data Sets - Macroeconomic and Forecasting Department of the National Bank of Romania (2002-2013); National Institute for Statistics.

In contrast, monetary policy rate remained relatively unchanged in nominal terms (Table 2 and Table 4) and decreased slightly in real terms, remaining consistent with the change in the contributions of some CORE3 inflation factors to the deviation of CPI inflation from the target (Table 5). Despite the decline in output, the quarterly output gap contribution to inflation deviation was further positive and highly inflationary, contracting from 1.62 percentage points in 2008 Q3 to 1.25 percentage points in 2008 Q4. In addition, the quarterly contribution of imported inflation turned positive, rising to 1.81 percentage points, whereas the contribution of inflation expectations added 0.24 percentage points to reach 1.16 percentage points.

In 2008 Q3, the three factors (output gap, inflation expectations and imported inflation) had a cumulated contribution of merely 2.25 percentage points (or 41.2 percent) to the total positive contributions (including those related to non-CORE3 inflation) of 5.46 percentage points to the deviation of the annualised quarterly inflation from the target. In 2008 Q4, the three factors accounted for 4.22 percentage points (or 70 percent) out of the total 6.04 percentage points of positive contributions, warranting the central bank's decision to increase the interest rate.

Even in 2009, when the output dropped by 6.8 percent as compared to 2008, the quarterly output gap contribution was still inflationary (Table 6 below and Figure 4 in Annex 1 presented in the additional online material associated with the paper), although declining gradually, and turned negative no sooner than in 2010 Q1. Monetary policy rate was cut from 10.25 percent in 2008 Q4 to an average of 9.15 percent in 2009 (in real terms, from 3.58 percent to 3.55 percent). In contrast, the real effective monetary policy rate was lowered from 7.55 percent in 2008 Q4 to an average of 4.26 percent in 2009. Moreover, the real interest rate gaps remained relatively high in 2009 (Table 6).

Table 6

The contribution of fundamentals to the deviation of CPI inflation during 2009-2010 Q1

Period	Annual CPI inflation deviation (pp)	Contribution of inflation expectations (pp)	Contribution of output gap (pp)	Contribution of imported inflation (pp)	Real monetary policy rate (%)	Real monetary policy rate gap (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2009 Q1	3.01 (5.82)	0.99 (1.12)	1.25 (0.34)	0.71 (0.79)	3.85 (10.15)	1.49 (2.60)
2009 Q2	2.39 (0.5)	1.05 (1.05)	0.87 (0.21)	0.06 (-2.01)	3.73 (9.74)	1.40 (1.52)
2009 Q3	1.37 (-3.15)	1.03 (0.84)	0.52 (0.24)	-0.01 (-0.58)	3.19 (8.69)	0.92 (1.32)
2009 Q4	1.03 (1.4)	0.85 (0.48)	0.25 (0.19)	-0.69 (-0.91)	3.41 (8.00)	1.18 (2.41)
2010 Q1	1.13 (6.21)	0.69 (0.43)	0.15 (-0.04)	-1.19 (-1.11)	2.77 (7.19)	0.56 (-0.54)

Note: Under columns (2) to (5), quarterly (annualised) data are listed in parentheses. Under column (6), the real effective monetary policy rates are listed in parentheses. Under column (7), data for the real effective monetary policy rate gap are listed in parentheses.
Source: Data Sets - Macroeconomic and Forecasting Department of the National Bank of Romania (2002-2013) and own computation.

The monetary policy critics stated that the central bank was overly concerned with curbing inflation in a period of economic downturn, so that it cut the interest rate insufficiently, thus contributing to the deepening of the recession.

There is a solid reason why this criticism is incorrect: in 2009, when the output collapsed, there was no trade-off in setting the interest rate, as the objectives of stabilising inflation and stabilising output were not conflicting. On the one hand, in 2009, the relatively high interest rate diminished the contributions of inflation expectations and output gap to the positive deviation of annual CPI inflation from the target (Table 6 above and Figure 4 in Annex 1 presented in the additional online material associated with the paper), in line with the objective of the central bank. The cumulative contribution of these two factors to the deviation of annual CPI inflation from the target fell from 2.42 percentage points in 2008 Q4 (of total 5.13 percentage points of all positive contributions in 2008 Q4, *i.e.*, from 47 percent) to 1.1 percentage points in 2009 Q4 (of total 3.06 percentage points of all positive contributions in 2009 Q4, *i.e.* from 14 percent). In quarterly terms, the said cumulative contributions diminished from 2.41 percentage points in 2008 Q4 (of total 6.04 percentage points of all positive contributions in 2008 Q4, *i.e.* from 40 percent) to 0.67 percentage points (of total 3.5 percentage points of all positive contributions in 2009 Q4, *i.e.* from 19 percent).

On the other hand, the relatively high interest rate contributed to minimising contractionary effects. The relatively high interest rate and foreign currency sales by the central bank prevented a relatively strong depreciation of the leu, which would have put pressure on the balance sheets of companies and households highly indebted in foreign currency. Thus, monetary policy prevented the deepening of the recession. The expansionary effects of a lower interest rate would have been exceeded by the contractionary effects of a stronger leu depreciation.

3.2. The "free"-from-core-factors inflation period: 2010 Q2-2013 Q3

As soon as the quarterly contribution of the output gap to inflation deviation turned negative, the real interest rate dropped from 3.41 percent (4.64 percent if we refer to the real effective interest rate) in 2009 Q4 to largely negative values during 2010 Q2-2011 Q2. During 2010 Q2-2013 Q3, the average real monetary policy rate was 0.84 percent (0.67 percent in terms of the real effective interest rate), contributing to output growth.

During 2010 Q2-2013 Q3, the average deviation of average annual CPI inflation from the target was 1.9 percentage points, very close to the 2 percentage point contribution of non-core inflation. Periods of increasing deviation alternated with periods of lowering deviation, the extreme values ranging from -1.12 percentage points to 4.93 percentage points.

If we define periods starting with the quarter that marked a sign reversal in inflation deviation from the target and ending with the quarter preceding a major change in the opposite direction, the resulting periods are as follows (Figure 1 in Annex 1 presented in the additional online material associated with the paper): 2010 Q3-2011 Q2 (four quarters of growth); 2011 Q3-2012 Q2 (four quarters of decline); 2012 Q3-2013 Q1 (three quarters of growth) and 2013 Q2-2013 T3 (two quarters of decline).

Table 7 shows that in each period, except for 2011 Q3-2012 Q2, non-CORE3 inflation made the largest contribution to inflation deviation from the target. One might ask why the interest rate was kept unchanged at 6.25 percent during 2010 Q3-2011 Q3 and at 5.25 percent during 2012 Q2-2013 Q2 if the inflation deviation was largely determined by non-CORE3 inflation.

Table 7

Average contributions to the deviation of annual CPI inflation from the target during 2010 Q3-2013 Q3 (percentage points)

Period	Annual CPI inflation deviation (pp)	Non-core inflation contribution (pp)	CORE3 inflation contribution (pp)	Real monetary policy rate (%)	Real monetary policy rate gap (%)
(1)	(2)	(3)	(4)	(5)	(6)
2010 Q3-2011 Q2	4.35 (5.03)	3.90 (4.07)	0.46 (0.96)	-0.39 (6.25)	-2.63
2011 Q3-2012 Q2	-0.05 (-1.03)	0.33 (-0.52)	-0.38 (-0.51)	1.81 (5.79)	-0.4
2012 Q3-2013 Q1	1.86 (3.76)	1.84 (3.48)	0.02 (0.28)	0.80 (5.25)	-1.34
2013 Q2-2013 Q3	1.60 (-2.82)	1.86 (-1.59)	-0.26 (-1.23)	0.89 (4.97)	-1.29

Note: Under columns (2) to (4), quarterly (annualised) data are listed in parentheses. Under column (5), the average nominal monetary rates are listed in parentheses. During the periods specified in the table, the real interest rates and the real effective interest rates were equal. Thus, the real monetary policy rate gap was equal to the real effective monetary policy rate gap.
Source: Data Sets - Macroeconomic and Forecasting Department of the National Bank of Romania (2002-2013); National Bank of Romania and own computation.

The answer is that the average contribution of 1.42 percentage points of inflation expectations to the deviation of the annualised quarterly inflation during 2010 Q3-2011 Q2 (Table 8 column 3) was the largest ever recorded after 2002. The 5 percentage point VAT

rate hike in July 2010 had a substantial contribution to rekindling inflation expectations. In 2010 Q3, the VAT rate-induced inflation, as well as its contribution to the deviation of annualised quarterly inflation from the target was 4.86 percentage points.

Table 8

Average contributions of inflation expectations, output gap and imported inflation to the average deviation of annual CPI inflation from the target during 2010 Q3-2013 Q3

Period	Annual CPI inflation deviation (pp)	Contribution of inflation expectations (pp)	Contribution of output gap (pp)	Contribution of imported inflation (pp)
(1)	(2)	(3)	(4)	(5)
2010 Q3-2011 Q2	4.35 (5.03)	0.99 (1.42)	-0.15 (-0.22)	0.39 (0.43)
2011 Q3-2012 Q2	-0.05 (-1.03)	0.89 (0.43)	-0.22 (-0.28)	0.12 (0.23)
2012 Q3-2013 Q1	1.86 (3.76)	0.35 (0.64)	-0.36 (-0.34)	0.23 (-0.14)
2013 Q2-2013 Q3	1.60 (-2.82)	0.69 (0.65)	-0.35 (-0.39)	-0.12 (0.27)

Note: Under columns (2) to (5), quarterly (annualised) data are listed in parentheses.
Source: Data Sets - Macroeconomic and Forecasting Department of the National Bank of Romania (2002-2013).

However, the temporary nature of the impact from the VAT rate hike on the annual CPI inflation was correctly understood by market operators. Expected inflation declined after four quarters since the VAT rate hike. In the four quarters that preceded the VAT rate increase, expected inflation stood at 4.8 percent. The VAT rate hike pushed expected inflation to an average of 6.9 percent during 2010 Q3-2011 Q2 (four quarters), which declined afterwards to an average of 4.1 percent during 2011 Q3-2012 Q2. Keeping the policy rate at 6.25 percent during 2010 Q3-2011 Q3 contributed to minimising the second-round effects of the VAT rate increase, which are usually frequent in such situations.

As intended, the interest rate was cut gradually from 6.25 percent to 5.25 percent during 2011 Q3-2012 Q2, when the contribution of CORE3 inflation to the deviation of CPI inflation from the target was negative. During that period, the contribution of inflation expectations to the quarterly inflation deviation was negative and the contributions of inflation expectations to the deviation of annualized quarterly inflation from the target dropped from 1.12 percentage points in 2011 Q3 to about 0.2 percentage points in each quarter until 2012 Q3. Again, one could ask why the interest rate was not cut below 5.25 percent during 2012 Q3-2013 Q2, when the deviation of annual CPI inflation from the target was almost entirely determined by non-CORE3 inflation. Again, the answer is that during that period the contribution of inflation expectations rose from 0.23 percentage points in 2012 Q3 to 0.84 percentage points in 2013 Q1 (with an average of 0.64 percentage points). All these data prove that the interest rate policy was also appropriate during the period in which output was below the potential level (2010-2013). Although inflation deviation from the target was largely determined by non-CORE3 inflation, inflation was not "free" from demand-related factors. The contributions of inflation expectations to inflation deviation were relatively high, rendering necessary the status-quo of the interest rate for relatively long periods.

To sum up, our analysis shows that the interest rate policy was appropriate in all the periods under review. Before the crisis, when the economy was confronted with massive capital inflows, higher interest rates than those set via monetary policy would not have led to the decline in inflation, but only to the faster build-up of external imbalances.

In contrast, during the period spanning from 2008 Q4, when the economy saw a quarterly decline for the first time, to 2010 Q1, when the output gap turned negative, a more abrupt decrease in interest rate would have sharpened the recession. The negative effects that the leu depreciation resulting from the more abrupt decline in interest rate would have had on the balance sheets of entities indebted in foreign currency would have exceeded the positive effects on fostering exports. Finally, during 2010 Q2-2013 Q3, as expected, nominal interest rates did not respond to the inflation deviations from the target determined by non-CORE inflation, but only by those deviations determined by CORE3 inflation (Table 1 above and Figure 1 in Annex 1 presented in the additional online material associated with the paper).

4. Conclusions

We analysed the monetary policy in Romania and the criticism it faced a few years before and several years after the economy fell into recession in 2008. We show that, prior to the crisis, criticism is not grounded when claiming that a higher increase in the monetary policy rate may have led to a lower inflation. On the one hand, an increase in the interest rate was necessary to moderate inflation expectations. On the other hand, a cut in the interest rate was required to dampen capital inflows. The latter had an influence on inflation through the widening of the inflationary output gap and the appreciation of the leu, which contributed to the decrease in import prices and therefore to the decline in inflation. The monetary policy was confronted with a dilemma. We show the response of the monetary policy to this dilemma.

After going into recession, the monetary policy was criticised for an insufficient cut in the policy rate, which allegedly deepened the recession. We showed that, given the private sector's high indebtedness in foreign currency, a larger policy rate cut would have resulted in a higher depreciation of the leu. In this line of thinking, the lower rate would have put pressure on the balance sheets of households, companies and banks, deepening the recession. During 2010 Q3 - 2013 Q3, CPI inflation deviations from the target were almost entirely triggered by inflation which is not directly influenced by the monetary policy. We demonstrated, in this case too, that inflation was not a variable "free" from the influence of core demand factors, because inflation expectations were positive and relatively high in some subperiods.

Appendix A

Average contributions made by non-CORE3 inflation and CORE3 inflation to the average deviation of annual CPI inflation from the target and the real monetary policy rate

Period	Annual CPI inflation deviation (pp)	Contribution from non-CORE3 inflation (pp)	Contribution from CORE3 inflation (pp)	Real monetary policy rate (%)	Real monetary policy rate gap (%)	Effective real policy rate gap (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2003 Q1 - 2004 Q2	-1.40 (0.78)	0.85 (0.93)	-2.25 (-0.15)	6.08 (19.71)	3.38	3.38
2004 Q3 - 2005 Q3	0.70 (1.06)	1.76 (2.55)	-1.06 (-1.49)	3.36 (13.00)	1.37	1.15
2005 Q4 - 2006 Q3	0.78 (0.38)	2.33 (1.76)	-1.54 (-1.38)	0.54 (8.22)	-1.71	-2.61
2006 Q4 - 2007 Q3	-0.28 (0.86)	0.83 (1.41)	-1.10 (-0.55)	3.01 (7.71)	0.58	0.12
2007 Q4 - 2008 Q3	3.95 (4.45)	2.39 (2.22)	1.56 (2.23)	3.20 (8.96)	0.69	0.42
2008 Q3	4.34 (0.82)	2.17 (1.12)	2.17 (-0.30)	4.12 (10.17)	1.66	1.15

Note: Under columns (2) to (4), quarterly (annualised) data are listed in parentheses. Under column (5), the average nominal monetary policy rates are listed in parentheses.
Source: Data Sets - Macroeconomic and Forecasting Department of the National Bank of Romania (2002-2013) and own computation.

Appendix B

Average contributions made by inflation expectations, output gap and imported inflation to the average deviation of annual CPI inflation from the target before the Romanian economy fell into recession

Period	Annual CPI inflation deviation (pp)	Contribution from inflation expectations (pp)	Contribution from the output gap (pp)	Contribution from imported inflation (pp)
(1)	(2)	(3)	(4)	(5)
2003 Q1 - 2004 Q2	-1.40 (0.78)	0.03 (0.75)	-0.59 (-0.45)	-1.13 (-0.75)
2004 Q3 - 2005 Q3	0.70 (1.06)	0.62 (0.60)	0.13 (0.23)	-0.93 (-0.99)
2005 Q4 - 2006 Q3	0.78 (0.38)	0.66 (0.87)	0.43 (0.69)	-0.37 (-0.34)
2006 Q4 - 2007 Q3	-0.28 (0.86)	0.47 (0.24)	1.03 (1.16)	-0.61 (-0.60)
2007 Q4 - 2008 Q3	3.95 (4.45)	0.56 (0.82)	1.37 (1.56)	0.50 (0.84)
2008 Q3	4.34 (0.82)	0.79 (0.92)	1.56 (1.62)	0.83 (-0.29)

Note: Under columns (2) to (4), quarterly (annualised) data are listed in parentheses.
Source: Data Sets - Macroeconomic and Forecasting Department of the National Bank of Romania (2002-2013) and own computation.

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