SOME ISSUES INVOLVED BY THE POLICIES CONCERNING EXCHANGE RATE AND INFLATION. QUANTITATIVE APPROACH

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Abstract
The paper examines several facets of the interaction between "inflation targeting policy" and "pegged float exchange rate regime", using the last version of the Romanian macromodel. The implications induced by changes in the following exogenous variables are quantitatively estimated:

• CBE – coefficient measuring the Central Bank's intervention on the forex currency market, which is attached to the equation of the exchange rate, and

• CBM - coefficient measuring the Central Bank's intervention on the domestic monetary market, which is attached to the equation of the reference interest rate.

The model simulations refer to leading macroeconomic variables, especially the real economic growth, the foreign trade balance (net exports), the consumer price index, and the nominal exchange rate.

Keywords: exchange rate, reference interest rate, simulations

JEL classification: C15, E52

Introduction

Romania – like the other emerging economies – has been confronted on the monetary plan with many challenges, from which two were dominant: the prices' volatility and the frequent high current account deficits.

• Under these conditions, National Bank (NBR) has adopted at the beginning of 2000-th the inflation targeting strategy (Isarescu, 2003). The conceptual framework and practical problems of such a policy have been extensively discussed in academic and financial-banking publications (Bernanke, 2003; Snowdon and Vane, 2005; Abel, Bernanke, and Croushore, 2008; Roger, 2009).

• One the other hand, simultaneously with the forex market's liberalisation, a pegged float exchange rate regime has been applied (Isarescu, 2006). Some authorised classifications (IMF, 2004; Transition Economies, 2006) included Romania among the countries practicing exchange rates within crawling bands. The problems associated to this system have also been largely debated (Ghosh et all, 1997, 2008; Mussa et all, 2000;

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Krugman and Obstfeld 2000; Edwards, 2001; Snowdon and Vane, 2005; Marcu, 2008; Abel, Bernanke, and Croushore, 2008).

Obviously, the inflation targeting policy and the pegged float exchange rate regime often interfere, which generates some dilemmas regarding the role of the exchange rate as an inflation-anchor and as a parameter of international competitiveness. The main objective of the present paper is to numerically examine this issue, on the example of Romanian economy.

1. Interaction between Exchange Rate and Inflation in Romanian Macromodel

The paper's estimations are based on the last version of the Romanian macromodel (Dobrescu 2006a, 2006b) with several subsequent improvements (mentioned in RJEF 2007-2010). This version introduced for the first time a structural decomposition of economy (six sectors), associated with input-output techniques. The behavioural relationships have been selected depending on their concordance with standard macroeconomic theorems and the peculiarities of the Romanian economy, and also on the plausibility of the simulations' results. They refer to labour market, output, domestic absorption, foreign trade, prices, exchange rate, and reference interest rate.

Some of them are directly involved in determining the correlation between exchange rate and inflation.

- The index of the total factor productivity ITFP (included in the production function) is computed as follows:

ITFP=f(alpha, GFCFc, DDP(-1), ru(-1), OF) (1)

(+/-) (+) (+) (+) (+/-)

where:

alpha – elasticity of output with respect to labour; its impact (+/-) was discussed, for example, in (Dobrescu, 2009);

GFCFc - gross fixed capital formation in real terms, as a measure of the investment intensity;

DDP - domestic demand pressure, defined as DDP=(DAD/DAD(-1))/(GDP/GDP(-1)}, in which DAD represents domestic absorption and GDP – gross domestic product (both at current prices); usually, this factor does not affect instantaneously the utilization degree of productive capacities, its effect becoming more visible later (that is why the first lag was preferred);

ru - unemployment rate, which exercises a compelling influence on labour-intensity of the employed workers;

OF - effect of other factors, such as institutional changes, business environment, natural conditions, trend, etc.

- Another relationship involving prices and monetary variables refers to the private consumption:

CHc=f(YDc, IR, CHc(-1)) (2)

(+) (-) (+)

where:

CHc – consumption of households at constant prices (CHc(-1) is included as an inertial parameter);

IR – reference interest rate of the National Bank of Romania (NBR);

YDc – disposable income at constant prices; taking into account the available information, disposable income is approximated by the sum

YD=GDP-(BR-TR)+NOCAE*ERE

where YD – disposable income and GDP – gross domestic product (both at current prices), BR – general consolidated budget revenues, TR - government transfers, (including pensions, unemployment benefits, social assistance, and labour income of public sector workers), NOCAE - net incomes and current transfers (in Euro), and ERE – exchange rate (RON per Euro).

- The gross fixed capital formation (GFCF) is determined in connection with the disposable income (YD), the reference interest rate of NBR (IR), and the foreign direct and portfolio investment (FDPIE):

GFCF=f(YD, IR, FDPIE) (3)

(+) (-) (+)

- The foreign trade refers to all transactions - either with goods or with services - expressed in Euro.

The following equation has been adopted for exports (XGSE):

XGSE=f(WTc, MGSE, ICOsdr) (4.1)

(+) (+) (+)

where WTc – world trade as volume, MGSE – imports, and ICOsdr – index of the international competitiveness.

Symmetrically, the imports (MGSE) are given by the relationship:

MGSE=f(FCc, GFCFc, ICOsdr) (4.2)

(+) (+) (-)

in which FCc - the final consumption and GFCFc - the gross fixed capital formation, both at constant prices; again the international competitiveness is involved, but – normally – with negative sign.

Its index (ICOsdr) is defined as follows:

ICOsdr=(ERE/ERE(-1))*WTDsdr/PGDP (4.3)

where ERE – exchange rate, WTDsdr – world trade deflator (special drawing rights), and PGDP – gross domestic product deflator.

- The macromodel admits the gross domestic product deflator (PGDP) as a leading price index. It is determined as the ratio between indices of nominal (IGDP) and real (IGDPc) gross domestic product. In such a definition, PGDP seems to be the most representative expression of the supply-demand interaction.

The consumer price index (CPI) and the price index of tangible fixed assets (PK) are, therefore, estimated in two phases: as econometric equations (these determinations are marked with the suffix eq) and, subsequently, as components of the GDP deflator, with which they must be compatible.

The consumer price index (CPI) is connected to the broad money M2 (as an important exogenous monetary variable included in macromodel) and the exchange rate (which incorporates the influence of international markets):

CPIeq=f(M2, ERE) (5.1)

(+) (+)

A similar approach was adopted for the price index of tangible fixed assets (PK):

PKeq=f(M2, ERE) (5.2)

(+) (+)

An explicit relation of the consumer price index and the price index of tangible fixed assets to the gross domestic product deflator is also specified, introducing the corrective coefficient PRC:

CPI=CPIeq*PRC (5.1a)

PK=PKeq*PRC (5.2a)

In principle, this coefficient results from the assumed condition

PGDP=shch*CPI+shgfcf*PK (5.3)

where:

shch=CH/(CH+GFCF) and

shgfcf=GFCF/(CH+GFCF).

We remind that CH is the final consumption of households and GFCF - gross fixed capital formation, both at current prices; therefore shch+shgfcf=1. Other methodological influences can be also taken into consideration

- The exchange rate is approximated by relationship:

ERE=f(ERE(-1), PGDP, NCINXE, CBE) (6)

(+) (+) (-) (+)

in which NCINXE=NOCAE+FDPIE+XGSE, as a measure of capital inflows from abroad. The last determinant (CBE) approximates the Central Bank's intervention on the forex currency market. CBE>1 is used in the case of a desired depreciation of the national currency, while a converse policy presumes CBE<1. A complete free exchange regime would involve the equality CBE=1, as a permanent condition.

- For the reference interest rate of NBR (IR), the relationship

IR=f(IR(-1), GDP, M2, STIRAE, CBM) (7)

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was admitted as acceptable; STIRAE means the short-term interest rate in advanced economies; CBM is an exogenous coefficient measuring the Central Bank's intervention on the domestic monetary market.

2. Simulations: Assumptions and Results

1. The presented equations are directly involved in the configuration of the binomial "exchange rate – inflation". They have, however, many indirect influences through their complex interaction with other blocks (especially concerning the real economy). The present macromodel applications contain, therefore, two main monetary tools usable in the Central Bank's policies: CBE and CBM.

2. They allow to quantitatively estimate some possible effects of the monetary policies. With this goal, the simulations were performed on the Base Scenario for the Romanian economy during 2010th (described in Dobrescu, 2010). Certainly, the significance of our analysis does not change if other scenario is adopted as framework of simulations.

The implications induced by the variation of each of the mentioned tools (CBE and CBM), under constancy of the other, will be hereafter commented. Therefore, the macromodel was solved successively for the values of CBE and, respectively CBM, within the range 0.65-1.15. The resulted effects are illustrated by four of the main annual indicators:

- rIGDPc – rate of the gross domestic product at constant prices, as an estimation of the real economic growth (rIGDPc=IGDPc-1);
- rNX – rate (to GDP) of the net exports, as an expression of external equilibrium;
- rCPI – rate of consumer price index, as a measure of the domestic inflation (rCPI=CPI-1); and
- rIERE – a similar indicator for the nominal exchange rate (rIERE=IERE-1).

These symbols are completed with suffix E for variable CBE (when CBM=1), and with suffix M for changing CBM (when CBE=1).

3. The Graph CBE characterises the behaviour of the Romanian economy induced by different degrees of the Central Bank's intervention on the forex market. (Figure no. 1)

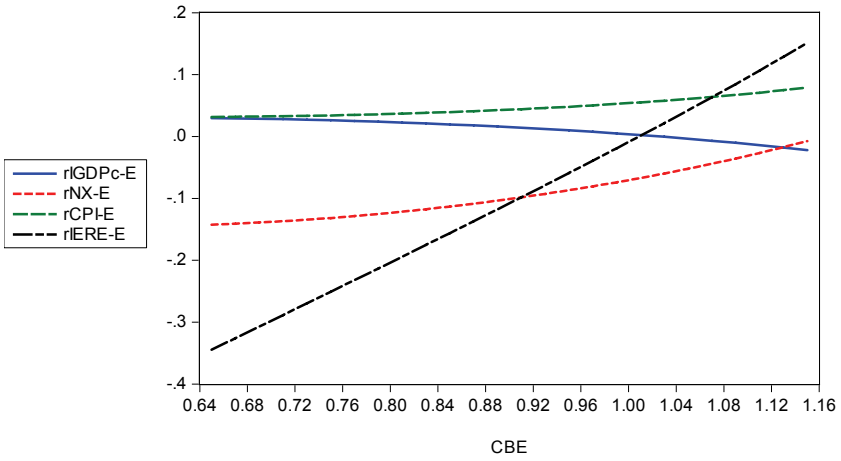

Figure no. 1 Graph CBE

3.1. Normally, under such assumptions the nominal exchange rate (rIERE-E) registers a pronounced rising trend.

3.2. Consequently, the rate (to GDP) of the net exports (rNX-E) improves visibly. But this result comes mainly from the contraction of imports, which suggests that the present structure of economy is not yet an export-oriented one.

3.3. Such a circumstance recoils on economic growth (rIGDPc-E passes from positive to negative values).

3.4. Since the hypotheses concerning the nominal revenues (especially expected disposable incomes) are unchanged, the compression of the real output and the depreciation of the national currency reverberate into domestic inflation (rCPI-E).

4. The possible consequences of the Central Bank's intervention on the reference interest rate are sketched in Graph CBM. (Figure no. 2)

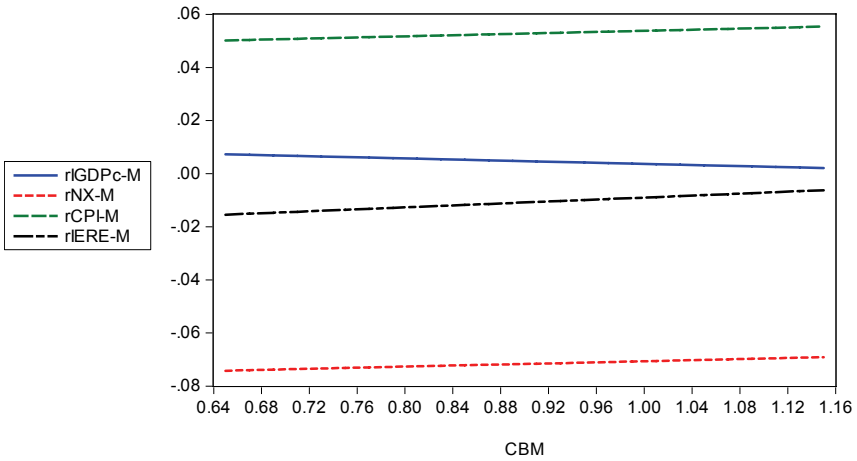

Figure no. 2 Graph CBM

The reference interest rate (IR) increases thus from 0.041 (for CBM=0.65) to 0.07249 (in the case of CBM=1.15).

4.1. The nominal exchange rate (rIERE-M) slightly increases.

4.2. The ratio of the net exports to GDP (rNX-M) ameliorates, but again as an effect of the significant reduction of imports. The exports – which depend on imports (relationship 4.1) - also diminish. These, however, are included into NCINXE (itself an explanatory variable of ERE, as in formula 6). As a result, the nominal exchange rate does not decrease despite the growing reference interest rates.

4.3. The economic growth (rIGDPc-M) restrains (but in a limited proportion).

4.4. This is accompanied by a slightly accentuating inflation (rCPI-M).

Generally, the application CBM indicates the Romanian economy still exhibits a relatively rigid behaviour towards the changes in the interest rates. Its sensitivity seems to be clearly higher when the modifications in the exchange rate are implied.

Conclusions

The macromodel can be used for many other analyses concerning the relationship between nominal exchange rate and inflation.

Thus it would be approximated the preferable values of CBE and CBM (separately or jointly), which could allow to reach given desirable targets (rate of the net exports, real economic growth, etc). In this paper we narrowed down to several such possible attempts, solely as illustrations.

Undoubtedly, these exercises must be cautiously taken into consideration, due the simplifications inherently adopted in such simulations.

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