The Impact of Monetary Policy Shocks in a Small Open Economy

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Abstract

In this paper I use an open economy dynamic stochastic general equilibrium model and estimate it for Romanian economy using Bayesian techniques. I estimate then the impact of domestic and external monetary policy shocks. Domestic interest shocks produce strong effects on output and exchange rate, and moderate ones on inflation. The effects are not very persistent. The results show that monetary policy shocks from Euro Area do matter for Romanian economy, but in moderate way. Overall, monetary policy in Romania is found to be less gradual but more conservative than the ECB one.

Keywords: *business cycles, DSGE models, small open economy, monetary policy*

JEL Classification: E32, E52

1. Introduction

The paradigm that nowadays dominates the macroeconomics topic is that of dynamic stochastic general equilibrium approach. This approach originates from the real business cycles model built by Kydland and Prescott (1982), and then extended through the consideration of both other types of shocks besides the technological ones (like monetary, inflationary ones, etc.) and also of different types of imperfections and rigidities (at the prices level, for wages, in the financial markets, etc.). This approach is also known as the New Keynesian approach.

A natural extension of the initial closed economy New Keynesian models, was done by the contributions of Obstfeld and Rogoff (1995; 2000), which sparked the development of the so called new open economy macroeconomics. The new open macroeconomics models share the standard building blocks with the standard closed economy New Keynesian models, like the ones in Gali

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(2002), or Clarida, Gali and Gertler (1999), namely an IS (Investment-Savings) curve, a New Keynesian Phillips curve and a Taylor monetary policy rule.

Numerous open economies two country models were formulated after Obstfeld and Rogoff contributions, like the ones of Gali and Monacelli (2005), Monacelli (2003), Lubik and Schorfheide (2005), Liu (2005), or Adolfson et al. (2005).

While most of the models were constructed and estimated for large open economies, like for the Euro Area and US, or for industrialized countries, Canada, Australia or New Zealand, for example, this paper estimates and analyzes such a model for the case of Romanian economy.

The purpose of this paper is to estimate an open economy dynamic stochastic general equilibrium model for Romanian economy using Bayesian techniques, and to use the results of the estimation in the analysis of the effect of domestic and Euro Area monetary policy shocks. Thus this paper fills the gap of a lack of dynamic stochastic general equilibrium models applied for Romania and it also contributes to the existing literature on monetary policy in Romania through the use of an estimated dynamic stochastic general equilibrium model. Another contribution of this paper is the analysis of the similarities of the ECB and a new member state monetary policy, namely Romania, both in terms of estimated monetary policy reactions functions and of the impact of monetary policy shocks.

This paper is organized as follows. The next section introduces the model and explains its building blocks. I estimate the model using Bayesian techniques in the third section and I discuss the results of the estimation with respect to the reference literature. In the fourth section I simulate the impact of both domestic and Euro Area monetary policy shocks. The last section concludes and draws some possible future developments of this paper.

2. The Model

In this paper I use a slightly changed version of the two country model in Justiniano and Preston (2004). The changes include allowing for interest rate smoothing in the Taylor rule and allowing for different price rigidities in the two countries. I decided to use Justiniano and Preston (2004) paper as it was one of the first studies in the new open macroeconomics field and it was also between the first to focus on the small open economies case. Due to these reasons the paper has become in time a reference study for subsequent papers on applied dynamic stochastic general equilibrium models.

As Justiniano and Preston (2004) argue, this model can be thought of as a more general version of the reference models in Gali and Monacelli (2005) and Monacelli (2003). The more general character comes from the two additional feature, namely habit formation (which is important in the dynamics of a dynamic stochastic general equilibrium model) and price indexation, so that the models in Gali and Monacelli (2005) and Monacelli (2003) appears as special cases where the indexation parameter and the habit formation parameter are restricted to zero.

There are three types of domestic agents. There are representative households, domestic producers and retailers or importers. The domestic economy is completed through the specification of a monetary policy rule.

The domestic households maximize the expected lifetime utility. The utility function comprises consumption with habit formation and leisure. The lack of a monetary balance in the utility function comes from the general agreement that real balances do not matter too much in the dynamics of a dynamic stochastic general equilibrium model.

The domestic producers are monopolistic ones. In a typical way for New Keynesian models, the monopolistic producers face Calvo (1983) type rigidity prices. The Calvo specification implies that in each period the prices can be adjusted with a probability $1 - \theta$, only by a fraction of the firms.

The representative firm maximizes the expected discounted value of the profits, under the constraint given by the demand curve. Prices are assumed to be indexed relative to the past period for both domestic producers and retailers.

The retailers are modeled in a similar way. In determining the price, retailers face Calvo style prices. The representative retailer also maximizes the expected discounted value of the profits, facing a typical demand curve.

The model is closed by adding the conditions related to the exchange rate, terms of trade, law of one price gap, the uncovered interest rate parity, the monetary rule and by specifying the foreign economy.

I modeled the foreign economy using the structural approach. While some of the papers in the literature consider autoregressive processes of order one for the foreign economy, Liu (2005) for example, I considered that a more proper way to represent the foreign economy is through structural equations. Such an approach has several advantages. First of all it allows checking the quality of the estimation with respect to other papers which estimated dynamic stochastic general equilibrium models for Euro Area, like Smets and Wouters (2003) or Rabanal and Rubio-Ramirez (2003). It also allows for a realistic analysis of the impact of the structural shocks on Euro Area economy.

In the next paragraphs I present the model I use in the estimation and analysis from the next sections. The model comprises the following variables, domestic consumption c_t, domestic output y_t, law of one price gap ψ_t, nominal exchange rate e_t, domestic marginal cost mc_t, inflation in domestic final goods sector $\pi_{H,t}$, inflation in domestic retailing sector $\pi_{F,t}$, terms of trade s_t, real exchange rate q_t, nominal interest rate i_t, foreign output y_t^*, foreign marginal cost mc_t^*, foreign inflation π_t^*, foreign nominal interest rate i_t^*, domestic total factor productivity $v_{a,t}$, foreign total factor productivity $v_{a,t}^*$. The model is already in log-linear form.

$$(1-\alpha)c_t = y_t - \alpha\eta(2-\alpha)s_t - \alpha\eta\psi_{F,t} - \alpha y_t^* \tag{1}$$

$$\psi_{F,t} = \left(e_t + \pi_t^*\right) - \pi_{F,t} \tag{2}$$

$$\Delta s_t = \pi_{F,t} - \pi_{H,t} \tag{3}$$

$$q_t = e_t + \pi_t^* - \pi_t = \psi_{F,t} + (1-\alpha)s_t \tag{4}$$

$$\pi_{H,t} - \delta\pi_{H,t-1} = \theta_H^{-1}(1-\theta_H)(1-\beta\theta_H)mc_t + \beta E_t\left(\pi_{H,t+1} - \delta\pi_{H,t}\right) \tag{5}$$

$$mc_t = \phi y_t - (1+\phi)v_{a,t} + \alpha s_t + \sigma(1-h)^{-1}\left(c_t - hc_{t-1}\right) \tag{6}$$

$$\pi_{F,t} - \delta\pi_{F,t-1} = \theta_F^{-1}(1-\theta_F)(1-\beta\theta_F)\psi_{F,t} + \beta E_t\left(\pi_{F,t+1} - \delta\pi_{F,t}\right) \tag{7}$$

$$c_t - hc_{t-1} = y_t^* - hy_{t-1}^* + \sigma^{-1}(1-h)\left[\psi_{F,t} + (1-\alpha)s_t\right] + \sigma^{-1}(1-h)\varepsilon_{g,t} \tag{8}$$

$$\left(i_t - E_t\pi_{t+1}\right) - \left(i_t^* - E_t\pi_{t+1}^*\right) = E_t\Delta q_{t+1} + \varepsilon_{s,t} \tag{9}$$

$$i_t = \rho_r i_{t-1} + (1-\rho_r)\left(\rho_\pi \pi_t + \rho_y y_t\right) + \varepsilon_{r,t} \tag{10}$$

$$y_t^* - hy_{t-1}^* = E_t\left(y_{t+1}^* - hy_t^*\right) + \sigma^{-1}(1-h)\left(i_t^* - E_t\pi_{t+1}^*\right) \tag{11}$$

$$\pi_t^* - \delta\pi_{t-1}^* = \theta_{FD}^{-1}(1-\theta_{FD})(1-\beta\theta_{FD})mc_t^* + \beta E_t\left(\pi_{t+1}^* - \delta\pi_t^*\right) \tag{12}$$

$$mc_t^* = \phi y_t^* - (1+\phi)v_{a,t}^* + \sigma(1-h)^{-1}\left(y_t^* - hy_{t-1}^*\right) \tag{13}$$

$$i_t^* = \rho_{rf} i_{t-1}^* + \left(1-\rho_{rf}\right)\left(\rho_{\pi f}\pi_t^* + \rho_{yf} y_t^*\right) + \varepsilon_{r,t}^* \tag{14}$$

$$v_{a,t} = \rho_a v_{a,t-1} + \varepsilon_{a,t} \tag{15}$$

$$v_{a,t}^* = \rho_{af} v_{a,t-1}^* + \varepsilon_{a,t}^* \tag{16}$$

Equations (1) to (3) determine the equilibrium domestic consumption and show that it depends on three sources of fluctuations, namely terms of trade, law of one price gap and world production, respectively. Consumption is also determined by the habit formation. In equation (1) parameter α stands for the degree of openness of domestic economy, while η is the elasticity of substitution between home and foreign goods.

The fourth equation introduces the relationship between the terms of trade and the real exchange rate. It implies the law of one price gap fluctuations does matter for the real exchange rate, as the terms of trade volatility does too.

The condition for optimality for the monopolistic domestic producers leads to a New Keynesian Phillips Curve which is forward looking, equation (5). The curve also features price indexation. Here θ_H is the degree of price rigidity, β is the discount factor, while δ stands for the degree for price indexation.

The marginal cost is shown to depend on consumption, domestic production, and productivity shocks but also on open economy elements, equation (6). The parameters φ and σ characterize the utility function of the households, and they stand for the inverse elasticity of labor supply and for the inverse elasticity of substitution. The parameter h characterizes the degree of habit formation in the household behavior.

Under similar conditions, a Phillips curve is derived for the importers, equation (7), but one that does not depend on marginal costs. Here θ_F characterizes the degree of price rigidity in the retailing sector.

The relation between the foreign and domestic consumption levels is given in equation (8). Equation (9) combines the uncovered interest parity with the definition of the real exchange rate.

The domestic economy is closed by specifying the monetary policy, and the autoregressive technological process for total factor productivity. I slightly modify the policy rule in Justiniano and Preston (2004) and consider a monetary policy rule like in Clarida et al. (1999). Here ρ_r is the smoothing parameter for the interest rate, ρ_π is the inflation coefficient, while ρ_y is the output gap coefficient.

The foreign economy is a simplified version of the model considered for the domestic economy. Justiniano and Preston (2004) consider a foreign economy with identical preferences. Here I allow for a different degree of price rigidity in the foreign economy. The parameter θ_{FD} characterizes the price rigidity in the foreign economy. The foreign economy Taylor rule is as in Clarida et al. (1999) where ρ_{rf} is the smoothing parameter for the interest rate, $\rho_{\pi f}$ is the inflation coefficient, while ρ_{yf} is the output gap coefficient.

The model is closed by specifying autoregressive processes of order one for both the domestic and the foreign productivity shocks. The degree of autocorrelation is estimated through the coefficient ρ_a for domestic economy and ρ_{af} for the foreign economy.

The system formed by equations (1) – (16) is a rational expectations system in a state vector y_t, driven by a two-dimensional vector of innovations. Formally, the dynamic stochastic general equilibrium model is a collection of first order and equilibrium conditions given by:

$$E_t\left\{f\left(y_{t+1},y_t,y_{t-1},u_t\right)\right\}=0$$
$$E(u_t)=0$$
$$E(u_t u_t^{'})=\Sigma_u$$

Where y is the vector of endogenous variables of dimension (16 x 1), while *u* is the vector of exogenous stochastic shocks of dimension (2 x 1).

3. Data and Estimation of the Model

I estimate the model given in the equations (1) – (16) using Bayesian techniques. Currently, the Bayesian approach is seen as the most proper for the dynamic stochastic general equilibrium models. There is growing literature about the methodology of Bayesian estimation applied on dynamic stochastic general equilibrium models, see An and Schorfheide (2007).

The estimation was done for the period between 2000 and 2006, using quarterly data. I used as variables the domestic quarterly GDP, domestic inflation rate, domestic nominal interest rate, the real exchange rate, and, respectively, Euro Area GDP, Euro Area inflation rate and Euro Area nominal interest rate.

The quarterly interest rate is the average of the monthly interest rate during the current quarter. Quarterly inflation is also obtained using the same procedure. I used the HICP (Harmonised Index of Consumer Prices) for both Euro Area and Romania.

The estimation required to obtain data which is similar in interpretation to the variables in the model. In order to obtain this, I applied the natural logarithm, where it proved necessary, and used the Hodrick Prescott filter in order to obtain variables in gap form.

The prior distributions were set according to literature in the field, namely following Justiniano and Preston (2004) and Liu (2005). For the Euro Area the priors were set closely to the values in papers like like Smets and Wouters (2003), or Rabanal and Rubio-Ramirez (2003). For the parameters characterizing the price rigidity, the prior distribution was chosen as a standard beta distribution centered at 0.70. For the autoregressive processes, the autocorrelation coefficient was chosen with a beta distribution prior centered at 0.70. For the parameters characterizing the utility function, namely h, σ, and η, the prior distributions chosen were standard, with the mean values chosen to be around the typical values in the literature. The standard deviations were modeled as having inverted gamma distributions. Before applying the estimation, two of the parameters were calibrated to values reasonable for Romanian economy, namely β, the discount factor, calibrated to 0.99, and α, the degree of the economy openness, to 0.40.

There are two important principles that characterize the Bayesian approach, namely the fact that, contrary the classical econometrics, the parameters are considered as random variables, and that prior distributions are introduced, which reflect our knowledge about the parameters of the system.

Let $p(\theta)$ be the priors, where θ is the vector of parameters. According to the Bayesian approach, the posterior density, $p\left(\theta|Y\right)$ is the product of the prior and the likelihood of the solved model, $L\left(\theta|Y\right)$. We can write: $p(\theta\,|\,Y)\ \ \alpha L\left(\theta|Y\right)p(\theta)$

I estimated the model using the Dynare software program. Dynare is a program to solve and estimate dynamic stochastic general equilibrium models. It applies to rational expectations general equilibrium models. It solves such systems using a second order approximation done through the perturbation method. It allows estimating the solution model using the maximum likelihood or the Bayesian approach.

The first step in the Bayesian estimation is to estimate the likelihood of the solution to the dynamic stochastic general equilibrium model which can be done in Dynare. Next, one finds the mode of the posterior distribution by simply maximizing the posterior kernel with respect to θ, the vector of parameters. At this moment one can estimate the model using the Bayesian techniques.

I run 100.000 extractions using the Metropolis Hasting algorithm in Dynare. The Metropolis Hasting algorithm allows generating draws from the posterior distribution found through the application of the maximum likelihood. The proposed draws are accepted or not following the comparison of the posterior kernel of the candidate parameter to the value of the kernel from mean of the posterior distribution, which also leads to the computation of an acceptance ration. For the whole sample we can compute an average acceptance rate which represents the fraction of candidate parameters that are accepted. The average acceptance rate for the estimation was of about 40%. Such an acceptance ratio allows visiting the entire domain of the posterior distribution.

Table 1 shows the results of the Bayesian estimation. The posterior distributions indicate a reasonable variability of the estimated parameters. We can also notice that for most of the parameters there are important shifts of posterior means from prior means.

The estimation of the Taylor rule indicates a lower than usual process of smoothing for the interest rate in Romania. Combined with the estimate of the inflation parameter, this yields a high weight for the inflation in the monetary rules. This feature is reasonable in the light of the disinflation program followed by Romania. We can also notice a larger than the usual estimates in the literature for coefficient for the output gap. This result suggests that the central bank paid attention to the fluctuations of output too.

Table 1

Bayesian Estimation Results

Parameters	Prior Mean	Posterior Mean	Confidence Interval	Confidence Interval	Prior Distribution	Standard Deviation
ρ_π	1.5	1.33	0.99	1.65	Gamma	0.25
ρ_y	0.25	0.76	0.47	1.04	Gamma	0.10
ρ_r	0.85	0.56	0.47	0.65	Beta	0.05
σ	1.00	0.46	0.16	0.58	Normal	0.25
η	1.00	1.27	0.78	1.76	Gamma	0.25
h	0.70	0.70	0.59	0.81	Beta	0.10
ρ_a	0.7	0.87	0.73	0.99	Beta	0.20
ρ_{af}	0.7	0.70	0.39	0.99	Beta	0.20
ρ_{rf}	0.85	0.70	0.61	0.80	Beta	0.05
$\rho_{\pi f}$	1.5	1.59	1.16	2.04	Gamma	0.25
ρ_{yf}	0.25	0.35	0.14	0.55	Gamma	0.10
θ_f	0.70	0.53	0.34	0.70	Beta	0.10
θ_d	0.70	0.84	0.79	0.89	Beta	0.10
θ_{fd}	0.70	0.80	0.75	0.87	Beta	0.10
δ	0.70	0.58	0.44	0.72	Beta	0.10
σs	1	6.12	4.62	7.63	Inv. Gamma	Infinite
σz	1	0.60	0.25	0.97	Inv. Gamma	Infinite
σg	1	9.01	4.01	13.97	Inv. Gamma	Infinite
σr	1	3.97	3.03	4.86	Inv. Gamma	Infinite
σa	1	4.48	0.97	8.19	Inv. Gamma	Infinite
σaf	1	4.54	1.78	7.72	Inv. Gamma	Infinite
σrf	1	1.13	0.79	1.47	Inv. Gamma	Infinite

Source: Own computations.

Maria-Dolores (2005) analyzed the significance of the Taylor rules, during the 1998 – 2003 period, for the EU Accession Countries at that moment (namely for Czech Republic, Poland, Hungary and Slovakia).

She found that for the countries which already had adopted inflation targeting, namely Czech Republic, Hungary and Poland, the Taylor rule appears as a successful representation of how the central banks in these countries managed the short term interest rate. Her results imply that in these countries the monetary authority behaved in gradual and conservative way, but not as gradual as the ECB. For Slovakia the results dismissed the relevance of Taylor rule for monetary policy during the sample period.

This estimate for Romania suggests that monetary policy was carried in a conservative way, even more conservative as ECB if we multiply the coefficient of inflation with one minus smoothing parameter of the interest rate. When we compare the estimated result for the inflation coefficient to the estimates for the countries in Maria-Dolores' study we find that Romanian central bank was much more conservative than the central banks in Czech Republic, Hungary, Poland or Slovakia. This result is understandable since Romania was between the last transition economies to fight two digit inflation.

In a more recent study Hradisky et al. (2007) found slightly lower values for the smoothing parameters for the Czech case than Maria-Dolores. They found a 0.83 autocorrelation for the interest rate. Vašíček and Musil (2006) found an even lower smoothing parameter of 0.64 for Czech Republic.

The degree of gradualism, approximated by the interest rate autocorrelation, is found to be lower for Romania. While this seems to be a general rule for EU New Member states, we can notice that the estimates for Romania are lower than those estimated in Maria-Dolores for Czech Republic, Hungary and Poland. We may assume that the adoption of the Inflation Targeting regime may increase the degree of gradualism of monetary policy, so that Romanian monetary policy may become closer to the ECB one in the next years.

The results for the monetary policy rule in the Euro Area are similar to those in reference studies, like Smets and Wouters (2003), Rabanal and Rubio-Ramirez (2003), or Moons et al. (2007) for both inflation coefficient and output gap coefficient.

The estimates of the smoothing parameter in the monetary policy rule for Euro Area range between 0.72 in Rabanal and Rubio-Ramirez (2003), and 0.95 in Smets and Wouters (2003). The autocorrelation of the interest rate is estimated at 0.70 which is in the lower range of the estimates in the literature. Overall my estimates confirm both the conservative character of ECB monetary policy and its gradualism in implementation.

As for price rigidity, I estimate a high degree of price rigidity for domestic producers, with the probability of keeping the prices fixed of 0.84. This is equivalent to changing prices every six quarters, as an average. The retailers face lower price stickiness, which does makes sense. At the same time, the price rigidity in the Euro Area is estimated to 0.80, implying that in average, prices stay fixed for 5 quarters. This estimate is within the range of estimates of other studies on Euro Area, like Smets and Wouters (2003), Rabanal and Rubio-Ramirez (2003), or Moons et al. (2007).

The degree of inflation indexation in Romania is found to be significant, as $\delta = 0.58$. Habit formation in Romanian economy is estimated to be high, with a value of 0.70, sensibly higher than the value in Smets and Wouters (2003).

4. The Impulse Response Functions to the Monetary Shocks

I discuss now the impact of monetary shocks in this estimated dynamic stochastic general equilibrium model for Romania. Most of the previous studies for Romania, or for the more general case of the Central and Eastern European (CEE) countries, focused on the impact of monetary shocks under a different econometric foundation than the one in this paper, namely based on VAR analysis, like Ganev et al. (2002), Elbourne and de Haan (2006), Jarocinski (2006), or Hericourt (2006). One of the first approaches in a dynamic stochastic general equilibrium framework is that of Caraiani (2007).

Elbourne and de Haan (2006) used a sample of ten transition economies to study the monetary transmission mechanism in transition countries. Using a structural vector-autoregressive approach they found negative responses for production and inflation all countries, except production in Romania. They also found evidence that the financial structure is not correlated with the monetary shocks. The sample for Romania was 1994 to 2004. In Romania, following a 1% positive shock, inflation falls by 1.2%, while the exchange rate appreciates by 2%. They explained the positive response of production in Romania (except the first month), through the disinflation program that raised the expectations of private agents about stability, increasing investments and output.

Jarocinski (2006) compared the response to monetary policy shocks in Eastern and Western Europe. He proposed a Bayesian approach to the problem of small data sample for new member states, with common priors for the each of the countries in the two groups, of Western and Eastern countries. For the new member states he used a group formed from Czech Republic, Hungary, Poland and Slovenia. Romania and Slovakia were used only in tests of robustness checks, due to their higher variability of market interest rates. He also used a sample from mide-90's to 2004 as Elbourne and de Haan (2006). His main findings were: interest rate movements are twice stronger in new member states; monetary policy shocks have quite strong impacts on both inflation and output with a few months lag. In line with Elbourne and de Haan (2006) he found that monetary policy is not less effective in the less financial developed countries.

Hericourt (2006) found that, contrary to Ganev et al. (2002) who saw the exchange rate channel as the prevalent one, the interest rate channel and credit channel started to gain importance in the detriment of the exchange rate mechanism. Using several specifications for the vector-autoregressions in order to test different transmission mechanisms, he found that output falls following an interest rate tightening, while the effect does not last too much. He also finds evidence for the price puzzle effects in the selected countries.

Under the dynamic stochastic general equilibrium framework, we can notice the contribution of Caraiani (2007) who estimated a closed economy New Keynesian model with sticky prices for the 1991 – 2002 period for Romanian economy and found that the New Keynesian model can replicate the stylized facts of real data. He also found moderate and persistent effects of monetary policy shocks.

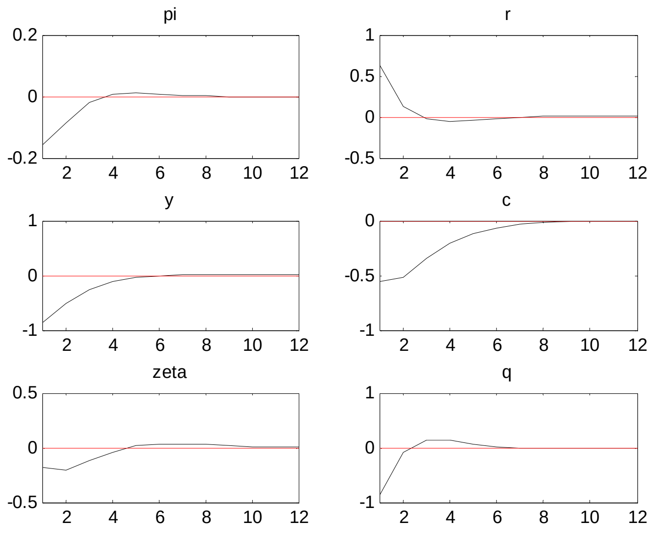
We can see that current research finds significant effects of interest rate shocks on macroeconomic variables. The consensus has moved from the proposition that less financial developed markets imply less important monetary policy effects, to the proposition that monetary policy shocks in CEE have real effects, although not that strong as in the old European Union Members. At the same time we can notice that most of the studies take in consideration a sample that considers a good part of the '90s, characterized by high inflation and economic fluctuations. In this paper, I focus on the 2002 – 2006 period for Romania, which is a period of high rates of economic growth, increased stability, more developed financial markets and the adoption of the inflation targeting regime.

4.1. Domestic Monetary Policy Shocks

Figure 1 shows the impact of a positive interest rate shock on Romanian economy. Due to the lower autocorrelation of the interest rate in the policy rule, the interest rate returns to the steady rate in about two semesters. One percent shock on the interest rate translates into about 0.6% deviation of the interest rate from the steady state, as the negative response of inflation and output translate into a lower interest rate deviation from steady state.

Figure 1

Domestic Policy Shock



Where pi, r, y, c, zeta and q stand for: domestic inflation, nominal interest rate, output, consumption, terms of trade and real exchange rate.

Source: Own computations.

The impact on inflation is the not persistent, and not as powerful as on the output gap. Inflation diminishes by almost 0.2%, and the effect lasts for about one year. This is in line with the usual findings in the literature on CEE countries. There is no price appearance of price puzzles effect for the impact of interest rate on the inflation.

The terms of trade decreases, and the maximum impact is reached after two quarters. At the same time, the real exchange rate appreciates by almost 1% through the uncovered interest rate condition. The causes for the terms of trade worsen are to be found in the appreciation of domestic currency which compensates for the small decrease of inflation.

The impact on output is found to be strong but not persistent. The output decreases by almost 0.9% and the negative effect lasts for about six quarters. This finding is in the higher range of effects of monetary policy shocks on output in CEE countries found by Hericourt (2006). At the same time, not only that the samples used in this paper is different that those used for CEE countries, but also the estimation is done for an economy which already passed through most of the reforms. During the sample period, Romania is already at much reasonable values for inflation and interest rates, and on a stable growth path.

4.2. Euro Area Monetary Policy Shocks

I simulate here the impact of a 1% positive shock in the Euro Area foreign interest rate. The Euro Area output falls by 1%, and the negative impact lasts for approximately six quarters. This finding suggests a stronger result than that of Smets and Wouters (2003), who found a 0.4% contraction for output after an interest rate shock.

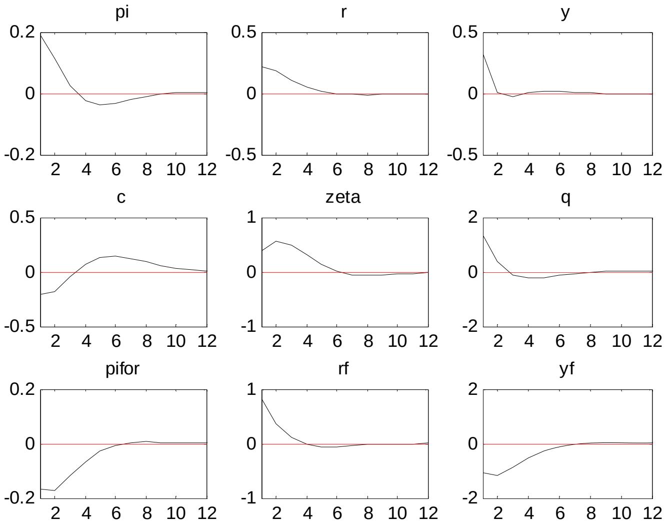
The impact on Euro Area inflation rate is found to be of –0.3%, and it has a persistence of six to seven quarters. This is close to the results in Smets and Wouters (2003) in terms of magnitude. For both inflation and output gap, the persistence is smaller. This results may come from the lower number of rigidity factors.

The impact on the exchange rate mirrors that of from the impact of the domestic interest rate, but is a stronger one. Thus I find that exchange rate falls by two percentage points and the effect lasts for about one year.

The impact on domestic output is found to be moderate and not persistent. Output rises by almost 0.3% due to increased competitiveness. Domestic inflation rises slightly by 0.2%, which leads to a higher domestic interest rate, which causes small negative effects on domestic inflation and output after a few quarters.

F i g u r e 2

Euro Area Monetary Policy Shocks



Where pifor, rf, and yf stand for: foreign inflation, nominal interest rate and output.

Source: Own computations.

Conclusion

From the estimation of the inflation coefficient in the Taylor rule we can conclude that the monetary authority in Romania is found to be more conservative than the ECB. The low smoothing coefficient of the interest rate in the monetary policy rule implies that the central bank in Romania is not as gradual as the ECB. In other words, the changes in the interest rate are sometimes too sudden.

Hradiský et al. (2007) suggested that for a country with less gradualist monetary policy, adopting the euro and ECB monetary policy implies that during a recession the monetary policy becomes too restrictive, while in booms periods, it is too lax.

In the perspective of the Euro adoption, the Romanian national bank should improve its gradualism in monetary policy making. A monetary policy carried in a similar way to the ECB, would ease the integration of Romanian economy in the Euro Area.

Future research should work in a DSGE (Dynamic Stochastic General Equilibrium) model with richer rigidities (like wage rigidities, financial frictions, capital adjustment costs) which would improve both the magnitude of the impulse response functions and their shape. At the same, future research should study monetary policy in a joint determination with fiscal policy.

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