FISCAL POLICY IMPACT ON INFLATION VOLATILITY IN ROMANIA IN THE ECONOMIC CRISIS CONTEXT

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1. Introduction

The actual economic crisis leads to much macroeconomics disequilibrium. One of undesired effects is increasing the inflation. This study tries to reflect the impact of the fiscal policy on inflation volatility in Romania in the economic crisis context.

The economic crisis time was marked by new mutations in the policy measures adopted by the Government, measures imposed by deterioration of macroeconomic indicators.

This study presents some aspects regarding fiscal policy in Romania following some variables like the share of public expenditures in GDP and the share of public revenues in GDP –used as a proxy for global tax burden.

According to Blanchard (2010) in the aftermath of the Great Depression and following Keynes, fiscal policy had been seen as a — perhaps the — central macroeconomic policy tool. In the 1960s and 1970s, fiscal and monetary policy had roughly equal billing, often seen as two instruments to achieve two targets—internal and external balance, for example. In the past two decades, however, fiscal policy took a backseat to monetary policy.

The fiscal policy is a powerful tool which can be used by the government for influencing the economy and more important is an indirect tool with many effects in both the short term and the long run.

The new context of the crisis has returned fiscal policy to center stage as a macroeconomic tool for influencing the economy. This fact was determined by two causes: first, to the extent that monetary policy, including credit and quantitative easing, had largely reached its limits, policymakers had little choice but to rely on fiscal policy. Second, from its early stages, the recession was expected to be long lasting, so that it was clear that fiscal stimulus would have ample time to yield a beneficial impact despite implementation lags (Blanchard et all, 2010).

The starting point of this paper is the correlation tested by Rother (2004). The author realizes a study for revealing the possible link between discretionary fiscal policies and inflation volatility, using a panel data regression for 15 OECD countries for 35 years. The empirical results suggest that volatility in discretionary fiscal policies has contributed to inflation volatility in the sample analyzed. The results are robust with regard to changes in the specification of inflation volatility, the data frequency, the sample period and econometric methodology. Regarding the size of the impact, an increase in discretionary fiscal policy volatility by one standard deviation is could raise inflation volatility by 10% to 17%.

Romania and other Eastern countries have been promoted before the economic crisis started a highly procyclical fiscal policies driven by consumption booms an extraordinary economic growth. But now are forced to cut spending and increase taxes.

For the countries with a low level of public debt it is quite easy to use the fiscal tools for promoting and stimulating the economic recovery, comparing with the countries with a high level of

indebtness and with not enough space for aplying the fiscal measures.

2. The fiscal policy under economic crises

The most important fiscal measures were oriented to increasing the public revenues for covering the needs of financing the public expenditures.
Also the governments have adopted large fiscal stimulus programs to counter the economic crises effect.

The fiscal policy, play a major role in the European Union countries under the restrictions of the Maastricht criteria that targeted the fiscal deficit to 3% of GDP and public debt to 60% of GDP. Two are the major directions for the fiscal policy in the economic crisis context: first, increasing some taxes (for instance VAT rates) for stoping the declining in the tax revenues and increased on social benefits. Second the need for fiscal stimulus (well timely, targeted and temporary), in order to boost the demand and promote resilience in the short term.

That explain, what, even in the crisis period, the state that face with high fiscal deficits (Romania, Malta, Poland and Lithuania) was notified by the Commission that are under the excessive deficit procedure (EDP) (Pelinecu & Caraiani, 2010).

Aizenman et all (2011) sustain that most emerging markets have provided significant counter cyclical fiscal stimuli during the 2008-9. The priority for emerging markets is to solidify their tax base, whilst continuing their fiscal stimulus aimed at improving the physical and the human infrastructure.

For the EU countries the economic and financial crisis has clearly had a major impact on consumption taxation. Stagnant since 2002, VAT standard rates have often changed from 2009 onwards, in the vast majority of cases upwards. The speed and extent of the growth is impressive, more than 2 percentage points on average in just three years. In Romania the VAT rate increase was the highest comparing with EU countries – 5% in just one year.

In conditions of economic crisis the government may use the VAT to increase the tax receipts but not without macroeconomic consequences (Mara, 2009). A major consequence in this direction is increasing inflation.

For this reason the purpose of our study is to confirm the correlation between fiscal policy and inflation and also to point that the government policy has to be oriented for establishing through fiscal policy as lower as possible negative effect on inflation.

3. Methodology

In order to determine the relationship between the real inflation volatility and the expected inflation volatility in the Romanian economy, we employed a Vector Autoregression model. To determine the expected inflation volatility a GARCH (p, q) model, proposed by (Bollerslev, 1986,1988) was used, namely:

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i \cdot \varepsilon_{t-i}^2 + \sum_{i=1}^{p} \beta_i \cdot \sigma_{t-i}^2 \qquad (1)$$

The VAR models were popularized in econometrics by Sims (1980), and they include a regression system, that captures the evolution and the interdependencies between multiple time series. In the general form, the model can be described as follows:

$$Y_t = B + A_1 Y_{t-1} + A_2 Y_{t-2} + ... + A_p Y_{t-p} + \varepsilon_t \quad (2)$$

Where Y_t represents dependent variables' vector with *(kx1),* while A_p is a *(k x k) matrix* coefficient*,* and ε_t plays the role of the residuals, with a dimension of *(k x 1), and which captures* the shocks in series*.*

In our case we will apply a VAR model with two variables, Y_t^1 and Y_t^2, which can be described as follows:

$$Y_t^1 = \alpha_1 + \sum_{j=1}^{k} \beta_{1j} Y_{t-j}^1 + \sum_{j=1}^{k} \delta_{1j} Y_{t-j}^2 + \varepsilon_{1t} \quad (3)$$

$$Y_t^2 = \alpha_2 + \sum_{j=1}^{k} \beta_{2j} Y_{t-j}^1 + \sum_{j=1}^{k} \delta_{2j} Y_{t-j}^2 + \varepsilon_{2t} \quad (4)$$

This model is considered to be a bilateral causality model, because of the two variables included, Y_t^1 and Y_t^2. Four types of causality can be distinguished, as follows:

– Unidirectional causality from Y_t^2 to Y_t^1, so Y_t^2 is a cause for Y_t^1 ($Y_t^2 \rightarrow Y_t^1$), if the estimated coefficients from equation (3) are statistically different from zero, while the set of estimated coefficients from equation (4) are not statistically different from zero.

– Unidirectional causality from Y_t^1 to Y_t^2, so Y_t^1 is a cause for Y_t^2, ($Y_t^1 \rightarrow Y_t^2$), if the estimated coefficients from equation (3) are not statistically different from zero, while the set of estimated coefficients from equation (4) are statistically different from zero.

– Bilateral causality $Y_t^1 \leftrightarrow Y_t^2$ if the estimated coefficients are statistically different from zero in both regressions.

– Independence between the variables, Y_t^1 and Y_t^2 if the estimated coefficients are not statistically different from zero in both regressions.

The lst step was the construction of a multiple linear regression, in order to modelate the relationship between the real inflation volatility and the representative fiscal policy variables.

4. Descriptive analysis of the employed variables

The statistical data used in this study consists in quarterly data starting from the first quarter of 2007 to the fourth quarter of 2010, which were extracted from http://insse.ro/ respectively http://epp.eurostat.ec.europa.eu, totaling 16 observations for each series. We considered this time window as we tried to capture the behavior of the studied variables during the financial crisis. A brief description of the variables used in the study is presented below:

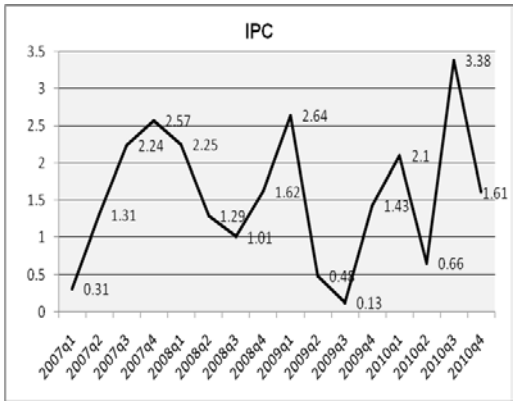
Table 1. Description of variables

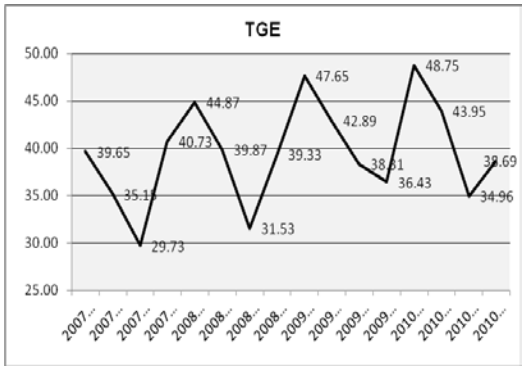
	Description
SDIPC	Inflation volatility, measured by the quarterly standard deviation of the natural logarithm of the CPI inflation rates.
GAIPC	The expected volatilty of inflation, estimated through a GARCH model, namely GARCH(0,2) , obtaining $GARCH = 0.0037^{***} + 2.1054 \cdot GARC$ $-1{,}1177 \cdot GARCH_{(-2)}^{***}$ *** Significant at 1%; ** Significant at 5%. This variable reflects the level of expected inflation, thus incorporating the expectations on inflation volatility.
SDTGE	The volatility of total general government expenditure, as a percentage of GDP, measured by the standard deviation of the quarterly natural logarithm. The share of toatal expenditures in GDP is used as a proxy for the size of the government.
SDTGR	The volatility of total general government revenue, as a percentage of GDP, measured by the standard deviation of the quarterly natural logarithm. The global fiscal burden measured through the share of total revenue in GDP is used as a proxy for the fiscal policy.
SDTPI	The volatility of taxes on production and imports, as a percentage of GDP, measured by

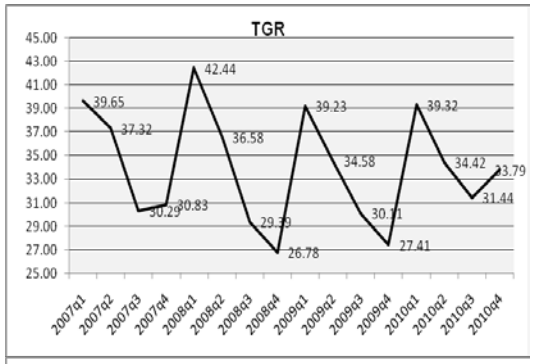
	the standard deviation of the quarterly natural logarithm. This kind of taxes are included in the goods and services prices, and any increse of this taxes can generate inflation. In this case we have to mention that the most important indirect taxes are VAT and excises, and the results are different because excises are aplied only to some categories of goods.
SDTVA	The volatility of value added taxes, as a percentage of GDP, measured by the standard deviation of the quarterly natural logarithm.
SDLB	The volatility of Net lending (+) /net borrowing (-), as a percentage of GDP, measured by the standard deviation of the first difference.

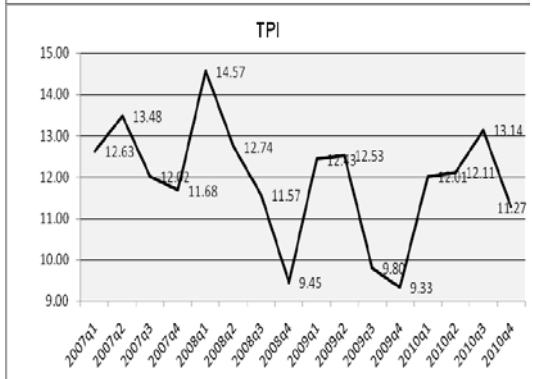
(Source: own processing)

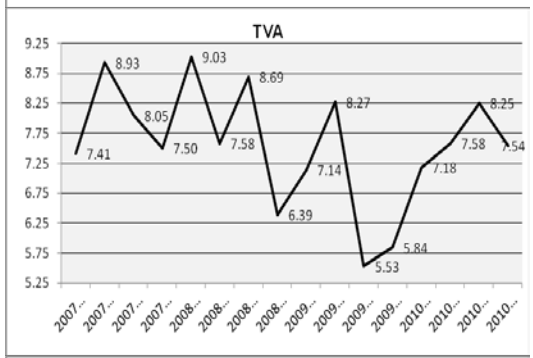
Figure 1. The evolution of the variables

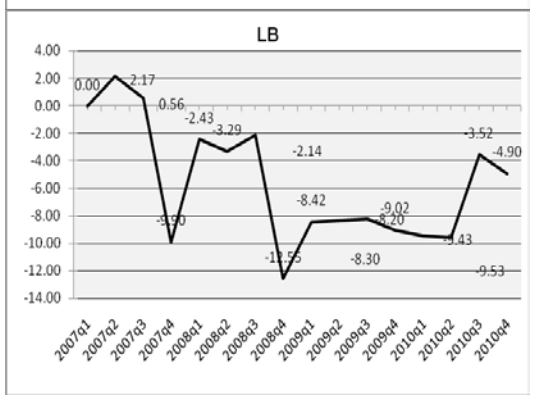












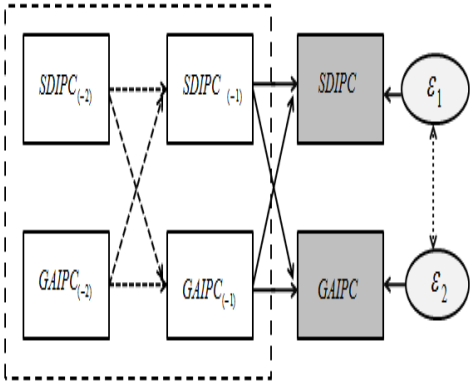
(Source: own processing)

We can observe that the evolution of the series is similar, characterized by oscillating volatility, with similar trends of slight decrease.

5. Empirical findings

A first step was to apply a VAR model on the variables SDIPC and GAIPC. This model was used to determine the causal relations between the real inflation volatility, SDIPC, and the expected volatilty of inflation, GAIPC, estimated by a GARCH model. The Var model was estimated with two lead-lag interaction between the series, in order to explain the behavior of the series in the moment *t*, we included the variables until the *t-2* moment. It can be observed in the figure below the relationships that are revealed through the selected VAR model.

Figure 2. The path diagram of the relations between SPIPC and GAIPC in a VAR model for k=2.



Source: own processing after Agung,(2009), *Time Series Data Analysis Using EVIEWS, John Wiley&Sons, pg. 322*)

Thus such a model is useful from our point of view, because it allows to identify the causality between the variables SDIPC and GAIPC. The results of the model are shown below:

Table 2. The VAR model

	$SDIPC$	$GAIPC$
$SDIPC_{(-1)}$	1,2772*** (0,1818) [7.0271]	0.0046*** (0.0014) [3.3824]
$SDIPC_{(-2)}$	-0.5667*** (0.1678) [3.3774]	-0.0013 (0.0013) [-1.0502]
$GAIPC_{(-1)}$	-0.5630 (3.1243) [-0.1802]	2.1182*** (0.0233) [90.9343]
$GAIPC_{(-2)}$	0.3444 (4.5558) [0.0756]	-1.0490*** (0.0340) [-30.8808]
C	0.6116 (2.2171) [0.2759]	-0.1035*** (0.0165) [-6.2618]
R^2	0,8772	0,9999
Adjustat R^2	0,8363	0,9999

(Source: own processing)
Standard errors are found in ( ), while the t-statistics in [ ].
*** Significant at 1%; ** Significant at 5%.

We can observe that inflation volatility for the moment *t* depends on the previous quarter volatility, specific for the moment *t-1*, $SDIPC_{(-1)}$, and also depends on the inflation volatility of the previous quarter, specific for the time period *t-2*, $SDIPC_{(-2)}$. According to our model, $SDIPC$ does not depend on the expected inflation volatility from the previous quarter, $GAIPC_{(-1)}$ or $GAIPC_{(-2)}$, which forces us to apply another model to see how the inflation volatility depends on the variables characteristic for fiscal policy.

In terms of the VAR models, the investors, to value their expectations regarding the inflation volatility, they need to adapt their expectations to the volatility of the last quarter, for moment t, to predict the inflation volatility for the moment t +1. But in their estimates a major role is played by the expected volatility of the previous quarter, $GAIPC_{(-1)}$ respectively $GAIPC_{(-2)}$.

According to the Var Granger causality test the following realtions can be found inside the model:

Dependent variable: $SDIPC$			
Excluded	Chi-sq	Df.	Prob.
$GAIPC$	0.4145	2	0.8128
Dependent variable: $GAIPC$			
Excluded	Chi-sq	Df.	Prob.
$SDIPC$	13.6223	2	0.0011

(Source: own processing)

Granger causality test underlines the Var models results, namely that $GAIPC$ is not an explanatory variable for the real inflation volatility, but, on the other hand, $SDIPC$ is for the expected inflation volatility. In this case we can identify a unidirectional causality model. This feature, according to which expectations of inflation volatility are regularly reviewed by the investors, confirms that the financial crisis has amplified the uncertainty, so their estimates regarding their expectations need to be adjusted in each period.

To see how the inflation volatility is influenced by the variables characteristic of the fiscal policy, the following regression was estimated, where initially all the mentioned variables were included. In the end only those were preserved which were significant at the level of 5%. The obtained regression is presented below:

$$SDIPC = 21.0602 \cdot SDTGR_{(-2)}^{***} - 34.5787 \cdot SDTPI^{***}$$
$$+ 15{,}1037 \cdot SDTVA^{***} - 0.0936 \cdot SDLB_{(-2)}$$

with a coefficient of R^2 of 0,7284 and an adjusted R^2 of 0,6605. The regression is stable, the residuals are not autocorrelated, with the Q(10) Satistics=9,1888(Prob.=0,514); and follow the normal distribution law with JB=4,9179, (Prob.=0,0855).

The coefficient on the absolute change in the fiscal policy stance measured through the global tax burden has the expected positive sign and is highly significant, suggesting that a change in the fiscal stance between years *t*-1 and *t* drives up the volatility of the inflation process in *t*. The size of the government in the previous period has no significant impact on the inflation volatility. A high and positive correlation we can observe in the case of VAT volatility, even if the volatility indirect taxes has a negative sign. Because the budget deficit was considered in analysis with the sign (-), the regression shows a positive corrleation, fact that tell us there is a quite powerful impact on the volatility inflation through budget deficit. This is another reason for reducing the budget deficit or at least maintaining a limit for it.

5. Conclusions

One limitation of our analysis is that our sample includes only a limited number of observations. This study try to show us that for a long time increasing the tax burden and increasing VAT it is not a good solution, because al this measures have a powerful impact on inflation. A limited budget deficit can be a good measure for maintaining an acceptable level of inflation.

We hope that after Romania will pass the economic crisis effects that VAT rate will drop and the fiscal policy will be oriented to better measures for reducing the budget deficit and the public debt.

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