"Dimitrie Cantemir" Christian University
Knowledge Horizons - Economics
Volume 7, No. 3, pp. 198–204
P-ISSN: 2069-0932, E-ISSN: 2066-1061

www.orizonturi.ucdc.ro

ECONOMETRIC MODEL REGARDING THE FINANCIAL STABILITY AT THE MACROECONOMIC LEVEL

Mirela NICULAE[1], Mihaela SIMIONESCU[2]

[1] *Faculty of Finance, Banking and Accountancy, Dimitrie Cantemir Christian University, Romania, Email: mirela_s_radu@yahoo.com*
[2] *Institute for Economic Forecasting of the Romanian Academy, E-mail: mihaela.simionescu@ipe.ro*

Abstract *In this study, a vector-autoregression of order 2 was proposed to explain the evolution of monetary policy interest rate and consumer index of prices, which is better correlated with the interest rate than the GDP during 2000:Q1-2013:Q4. According to Granger causality test for the stationary data, at 1% level of significance the inflation rate is a cause for the interest rate.The variation of the logarithm from interest rate in the first period is due only to the changes in this variable. In the second period, 0.63% of the variation in log_ir is due to the changes in log_CPI. The impact of the inflation increases in time, the contribution of log_cpi arriving till 5.33% in the 10th period. 41.32% of the variation in log_cpi is due to the changes in log_ir, the influence of this variable decreasing over time, till 20.64% in the 10th period. The stability of interest rate can be better ensured by controlling the inflation rate and mentioning it to a stable value*

Key words:

vector-autoregression, interest rate, consumer index of prices, financial stability

JEL Codes:

C51, E40, G28

1. Introduction

International financial crisis started in 2008 has shown that there is a need to strengthen shock resistance of a financial system. In this respect, at the European level, regulatory authorities and prudential supervision have developed mechanisms and appropriate instruments, including the dispute settlement procedures of the situation of banks whose activity is considered that may adversely affect the proper functioning of the system. Thus, the mechanisms and macroprudential policy instruments affect systemic risk mitigation and ensure financial stability.

To assess financial stability in the Romanian economy context, we proposed an non-theoretical econometric model - vector- auto regression model (VAR). The variables used in the model are the price index of consumer goods and the interest rate. VAR models were proposed to reveal the inter-relationship between multiple time series. Type VAR models are frequently used for previewing systems of time series which are connected together, but also to analyse the impact of dynamic innovation on this system of variables.

2. Literature review

During the last decades there have been three standard strategy of monetary policy successful in respect of the provision of effective nominal anchors, respectively monetary aggregates, the exchange rate and inflation. Frankel (1995) suggested a strategy to be the most suitable for savings half opened, namely "dismissed" nominal incomes; however, a major problem arising from this strategy is that it has not been put into practice either in the industrialized countries, or the emerging markets (Mishkin and Savastano, 2000). The process in the context of the opening of national economies, financial stability has become a fundamental element of macroeconomic stability, Having regard to that inputs of capital take advantage of financial system vulnerabilities to penalize promptly errors or any other measures nesustenabile on economic policy. Jaime Caruana (2005), says that "with all that we have a well structured framework to discuss and implement monetary policy, our thinking with respect to financial stability is less advanced." Haugland and Vikøren (2006) emphasize that, although it is not very clearly what important considerations should be given to the financial stability and price stability, with regard to the application of monetary policy, "both communication ss well as monetary policy decisions indicates that financial stability is about to hold a role better stated in the monetary policy, but may be due to recognition that financial stability has consequences for future developments at the level of inflation and of production" (Isărescu, 2008).

It can appreciate a direct link between the macroprudential positive policy and financial stability, such a transparent policy, the potency financial stability will be solid and credible, by default by touching and important objective of the monetary policy.

The Agreement Basel III aims to strengthen the stability banking system, through the use of stringent standards necessary for improving the ability to discover to it to absorb shocks of economic and financial sector, as well as reducing the risk of incident from financial sector to real economy (Walter, 2010). Reforms affect the microprudential level, with the aim of increasing resistance individual banking institutions to periods of stress and, respectively, the macroprudential, with the aim to reduce the frequency of financial crises. New standards are designed to improve the ability of the banking to absorb shocks, by means of a better risk management under a consolidated governesses and in increased transparency conditions. (Nucu, 2011)

3. Background research

As a result of recent international financial crisis, regulatory authorities have drawn up a new legislative framework, known as the Regulations Basel III, which entered into force in the year 2014. As follows:

- Directive no.2013/36/UE of The European Parliament and Council since 26.06.2013;
- Regulation no. 575/2013 of The European Parliament and Council since 26.06.2013.

These European regulations have been adjusted through E.O. no.113/ 2013 and Regulation BNR no.5/ 2013. Basically, these normative acts shall provide for:

- consolidation of the equity capital of the own loan institutions and the assurance of the banking activity return on investment;
- more rigorous measurement of the risks in all spheres of activity of credit institutions and appropriate cover with provisions of the risks undertaken;
- increase in banking staff responsibility on all the bearings of competence, so, banking activity should be one prudent and healthy (Bunescu, 2015).

The European Committee for systemic risk (CERS) published in 2013 Recommendation concerning intermediate objectives and macroprudential policy instruments, which contributes to improving macroprudential supervision.

In such a context, it is useful the decomposition on the variant and the impulse response function analysis. The response-impulse function analysis shall scrutinize the effect of a shock occurred at a given time within one of model innovations on present and future values of endogenous variables. Decomposition on the variant brings information about relative importance of each innovation regarding the effect on the variables dynamics of VAR model.

4. Methodology of research

The following variables have been chosen, quarterly data being collected over the period 2000:Q1-2013:Q4: monetary policy interest rate, real GDP and index of consumer prices. The data are provided by the National Institute of Statistics and National Bank of Romania. The data are seasonally adjusted using moving average method for GDP and spread and Tramo/Seats methos for the rest of the variables.

The matrix of correlation for all the variables that have been included in the study with seasonally adjusted data was computed. The objective is to determine the variables that are more correlated with the interest rate.

Table 1

Correlation matrix of different economic variables during 2000:Q1-2013:Q4

Variable	IR_SA	GDP_SA	CPI_SA
IR_SA	1.000000	0.382600	-0.533567
GDP_SA	0.382600	1.000000	-0.842278
CPI_SA	**-0.533567**	-0.842278	1.000000

Source: authors' computations

As we can see from the previous table, there is a stronger correlation between interest rate and index of consumer prices than between interest rate and GDP. Therefore the VAR model will be constructed with interest rate and index of consumer prices.

The data were not stationary, being transformed as it follows: for the consumer price index and interest rate the logharitm was applied.

All the lag criteria excepting LogL indicated that the lag should be 2. For this model all the tests were checked, resulting that the errors are independent from the second lag, homoskedastic, following a normal distribution. The model satisfies the stability condition. The results of the tests are presented in Appendix 1.

LOG_IR = 0.8518625812*LOG_IR(-1) - 0.46352629*LOG_IR(-2) + 3.817651185*LOG_CPI(-1) - 7.614673781*LOG_CPI(-2) + 0.2534705446

LOG_CPI = 0.01187569342*LOG_IR(-1) + 0.0009554476811*LOG_IR(-2) + 0.4855293834*LOG_CPI(-1) + 0.4534035819*LOG_CPI(-2) - 0.003963517846

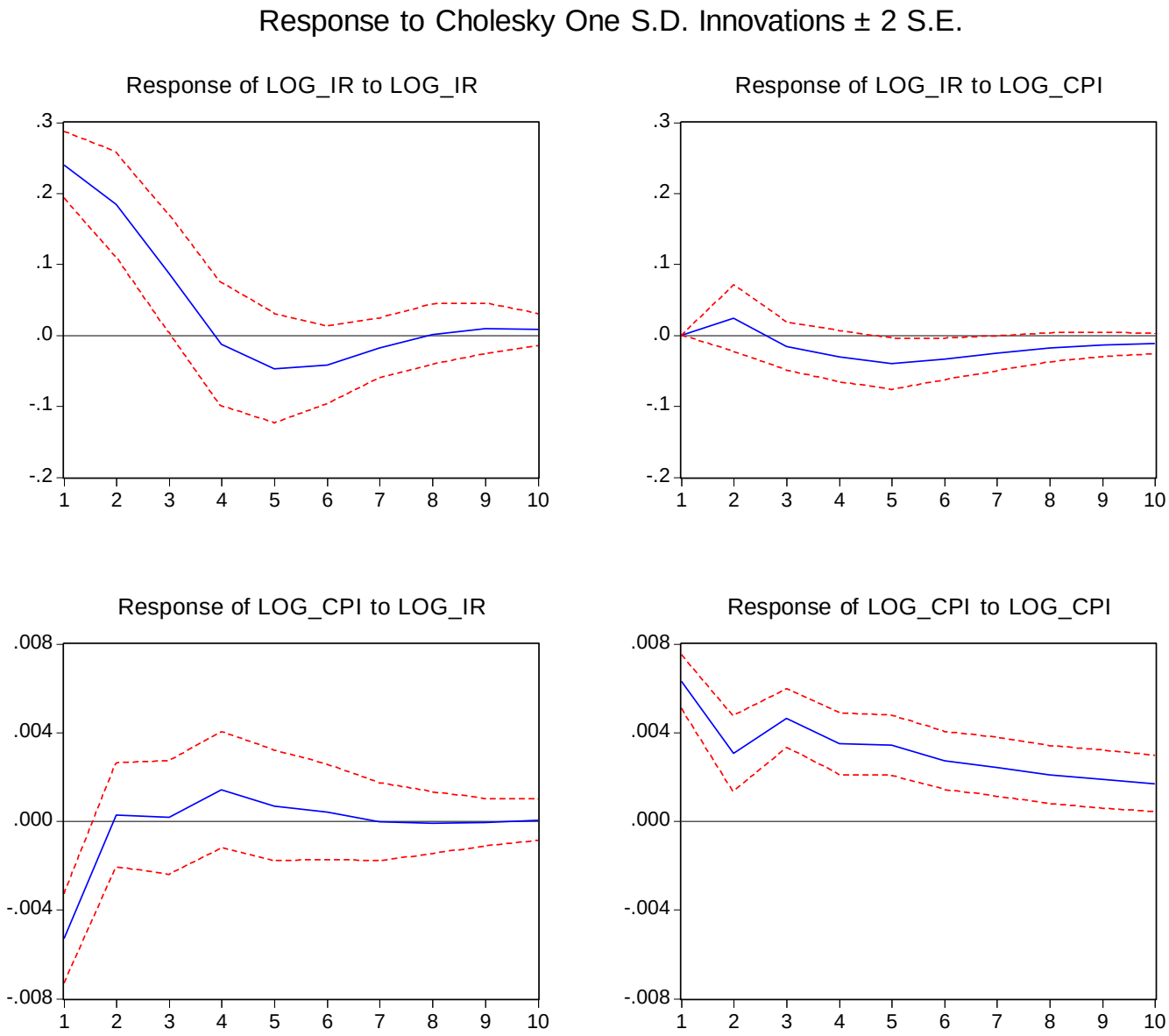

Fig 1- Impulse-response function in the VAR(1) model

Source: authors' graph

The variation of the logarithm from interest rate in the first period is due only to the changes in this variable. In the second period, 0.63% of the variation in log_ir is due to the changes in log_CPI. The impact of the inflation increases in time, the contribution of log_cpi arriving till 5.33% in the 10th period. 41.32% of the variation in log_cpi is due to the changes in log_ir, the influence of this variable decreasing over time, till 20.64% in the 10th period.

Table 2

Variance decomposition of the variables

Variance Decomposition of LOG_IR:

Period	S.E.	LOG_IR	LOG_CPI
1	0.240161	100.0000	0.000000
2	0.303717	99.36997	0.630030
3	0.316368	99.16856	0.831442
4	0.318073	98.26933	1.730673
5	0.324074	96.76949	3.230514
6	0.328574	95.79273	4.207268
7	0.330063	95.22402	4.775979
8	0.330537	94.95244	5.047562
9	0.330949	94.79371	5.206294
10	0.331263	94.66920	5.330803

Variance Decomposition of LOG_CPI:

Period	S.E.	LOG_IR	LOG_CPI
1	0.008244	41.32874	58.67126
2	0.008800	36.37102	63.62898
3	0.009949	28.48093	71.51907
4	0.010633	26.69465	73.30535
5	0.011189	24.48150	75.51850
6	0.011523	23.20433	76.79567
7	0.011777	22.21695	77.78305
8	0.011959	21.55076	78.44924
9	0.012105	21.03522	78.96478
10	0.012221	20.64139	79.35861

Source:authors' computations

According to Granger causality test for the stationary data, at 1% level of significance the inflation rate is a cause for the interest rate.

Pairwise Granger Causality Tests			
Sample: 2000:1 2013:4			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Probability
LOG_CPI does not Granger Cause LOG_IR	54	3.22154	0.04848
LOG_IR does not Granger Cause LOG_CPI		4.76951	0.01281

Therefore, we can conclude that the stability of interest rate can be better ensured by controlling the inflation rate and mentioning it to a stable value.

Roots of Characteristic Polynomial
Endogenous variables: LOG_IR LOG_CPI
Exogenous variables: C
Lag specification: 1 2

Root	Modulus
0.886190	0.886190
0.476394 - 0.479054i	0.675606
0.476394 + 0.479054i	0.675606
-0.501585	0.501585

No root lies outside the unit circle.
VAR satisfies the stability condition.

VAR Lag Order Selection Criteria
Endogenous variables: LOG_IR LOG_CPI
Exogenous variables: C

Sample: 2000:1 2013:4
Included observations: 54

Lag	LogL	LR	FPE	AIC	SC	HQ
0	128.8897	NA	3.12E-05	-4.699620	-4.625954	-4.671209
1	185.1589	106.2862	4.50E-06	-6.635514	-6.414516	-6.550284
2	202.5328	31.53045*	2.75E-06*	-7.130845*	-6.762514*	-6.988794*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

VAR Residual Serial Correlation LM Tests
H0: no serial correlation at lag order h

Sample: 2000:1 2013:4
Included observations: 54

Lags	LM-Stat	Prob
1	24.67346	0.0001
2	5.972821	0.2012
3	5.148148	0.2724
4	44.30754	0.0000
5	4.117998	0.3903
6	2.910015	0.5730
7	7.927418	0.0943
8	20.56141	0.0004
9	3.880049	0.4225
10	1.212600	0.8760
11	2.742340	0.6018
12	2.914366	0.5723

Probs from chi-square with 4 df.

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
H0: residuals are multivariate normal

Sample: 2000:1 2013:4
Included observations: 54

Component	Skewness	Chi-sq	df	Prob.
1	-0.090449	0.073629	1	0.7861
2	-0.151728	0.207192	1	0.6490
Joint		0.280821	2	0.8690

Component	Kurtosis	Chi-sq	df	Prob.
1	3.324188	0.236470	1	0.6268
2	2.552937	0.449697	1	0.5025
Joint		0.686168	2	0.7096

Component	Jarque-Bera	df	Prob.
1	0.310100	2	0.8564
2	0.656889	2	0.7200
Joint	0.966989	4	0.9148

5. Conclusions

The construction of VAR model for interest rate and consumer index of prices is an example of econometric model for identifying the measures for having a financial stability. According to Granger causality test for the stationary data, at 1% level of significance the inflation rate is a cause for the interest rate. However, the correlation between GDP and interest rate is quite low and the policies should be oriented to ensure a low and stable inflation rate.

References

1. Albulescu, C.T., (2012), Stabilitatea financiară, politica monetară şi coordonarea bugetară în UEM, Economie teoretică şi aplicată, Volumul XIX (2012), No. 8(573), pp. 77-88;
2. Baltagi, B.H., (2008), Econometric Analysis of Panel Data, vol.1, John Wiley & Sons Ltd;
3. Baltagi, B.H., Demetriades , P. O., & Law, S. H., (2009), Financial development and openness: Evidence from panel data. Journal of development economics, 89 (2), 285-296;
4. Baum, C.F., (2001), Residual diagnostics for cross-section time series regression models; The Stata Journal, Vol. 1, No. 1, pp. 101–104;
5. Bunescu, P., (2015), Activitatea bancară – Context, Reglementare şi Adaptabilitate, disponibil la www.bnro.ro/files/d/Evenimente/2015/R20150219PB.pdf;
6. Campbell, J.Y., Lo, A. W. C., & MacKinlay, A. C. (1997). The econometrics of financial markets (Vol. 2). Princeton, NJ: Princeton University Press;
7. Isărescu, M., (2008), Probleme ale politicii monetare într-o ţară emergentă. Cazul României, Publicaţiile Academiei Regale de Ştiinţe Economice şi Financiare, pp. 1-55;
8. Nucu, A.E., (2011), Provocările Basel III pentru sistemul bancar românesc, Economie teoretică şi aplicată, Volumul XVIII, No. 12(565), pp. 57-68;
9. Tomuleasa, I.I., (2013), Macroprudenţialitatea şi stabilitatea financiară, Management Intercultural, Volumul XV, Nr. 3 (29), pp. 353-365;

10. Triandafil, C.M., (2012), Studii economice. Politica macro-prudenţială şi procesul de convergenţă la nivelul Uniunii Europene, Academia Romana, Institutul National de Cercetari Economice, pp. 1-22;
11. *** - Implementarea politicii monetare în zona euro. Documentaţia generală privind instrumentele şi procedurile de politică monetară ale eurosistemului aplicabilă de la 1 ianuarie 2012, Banca Centrală Europeană, Jurnalul Oficial al Uniunii Europene 14.12.2011