

Quantifying the Impact of Fiscal Policy on Economic Growth in the Romanian Economy: A Bayesian Approach

Alina Bobasu

Abstract—The interest in fiscal policy has gained momentum due to the recent financial crisis and to the fact that monetary policy has proved inefficient in fighting recession. This paper studies the impact of fiscal policy on aggregate demand in the Romanian economy using Bayesian techniques. Therefore, a Bayesian VAR framework over 2000Q1-2014Q2 period is considered in order to simulate the responses of economic growth to fiscal policy shocks.

The main findings suggest that the impact of government expenditure and revenue shocks on economic growth is nevertheless insignificant and therefore, discretionary policy measures are negligible in a small open economy like Romania.

Index Terms—Bayesian VAR models, economic growth, Fiscal Compact, fiscal multipliers, fiscal shocks.

I. INTRODUCTION

The impact of fiscal policy on economic growth has been a subject of much controversy during the last years. The fiscal policy is one of the major subjects of interest lately, mainly due to the actual economic crisis and to the fact that most countries have adopted fiscal measures as an automatic stabilizer of their economies. More specifically, the economic and financial crisis brought into light the effects that discretionary fiscal policy measures may have on real economic activity. A lot of emerging countries adopted fiscal consolidation measures in order to diminish their budgetary deficits, while others that have kept their fiscal balance under control along the years, tried to boost demand by adopting fiscal stimulus packages.

The later was the case in some industrialized countries that have rapidly exhausted their tools, the scope of monetary policy proving hence to be a limited one (e.g zero bound). As far as the Romanian economy is concerned, taking into account the austerity measures that the Romanian government took in order to re-launch economic activity, a very obvious question to which this paper tries to offer valuable answers is what impact the fiscal policy measures could have had on macroeconomic developments.

Therefore, this paper tries to shed some light on the magnitude of the impact of fiscal policy on economic growth in the Romanian economy by employing a Bayesian VAR framework. The importance of the study relies on the very scarce empirical studies that have analyzed fiscal policy in

emerging countries and taking into account the importance of this subject since the Fiscal Compact relies on quantifying the effectiveness of discretionary fiscal policy measures. Taking into account the austerity measures that the Romanian government took in order to re-launch economic activity, a very obvious question to which this paper tries to offer valuable answers is what impact the fiscal policy measures had on macroeconomic developments.

The paper is organized as follows: Section II present a very brief literature review regarding the impact of fiscal policy on real economic activity, Section III presents a brief overview of the methodology and Section IV describes the data and analyses the results of the empirical investigation. Section V concludes.

II. BRIEF LITERATURE REVIEW

Studies focusing on fiscal policy rely mostly on analyzing this controversial issue in advanced economies; nevertheless, there are some studies focusing on the magnitude of fiscal multipliers in emerging economies, quantified either by employing a panel data framework either by using single country models.

Reference [1] analysis the impact of fiscal policy shocks in five emerging economies from Central and East Europe and concludes that government spending shocks range between -0.04 and 0.01, while a revenue shocks has an impact between -0.10 and 0.03 on economic growth.

Small fiscal multipliers are also found by [2] in their analysis on the Bulgarian economy, namely 0.04 for a government sending shocks and -0.33 for a revenue shock. They hence find very similar results with other studies conducted on emerging economies: a modest impact of fiscal policy on the real output and the need for a transparent fiscal policy in order to gain the desired results.

Reference [3] focused on the Czech Republic economy and found that the output gap response to a government spending shock stands at -0.42 after 1 year while the response to a revenue shock is -0.02.

All in all, a great amount of the studies focusing on assessing the impact of fiscal policy on economic growth in emerging economies reveals that fiscal multipliers are generally small or even insignificant and depend on several structural characteristics of the country like its degree of openness and exchange rate regime.

As far as the empirical framework is concerned, most of the literature relies on structural VAR models in order to estimate the effects of fiscal policy using the framework developed by reference [4] in their benchmark work published in 2002. This

Manuscript received November 5, 2014; revised January 13, 2015. This work was supported in part by the Bucharest Academy of Economic Studies, under Grant POSDRU 159/1.5/S/142115.

The author is with the Doctoral School of The Bucharest Academy of Economic Studies, Romania (e-mail: alina_bobasu@yahoo.com).

has been further extended by [5] and [6] by incorporating sign restrictions into the VAR model. A more intuitive approach, based on case studies, is the narrative methodology which accounts for a proper identification of the moment when a fiscal discretionary measure is announced. For instance, reference [7] identifies three exogenous episodes for expansionary spending and uses them as dummy variables in their study in order to assess the extent to which fiscal measures impact economic growth.

DSGE models are nevertheless the most complex approach as they are, on one hand, based on micro foundations and allow for the consistent identification of the changes in the economy structure, while on the other hand, need a large calibration of parameters that may somewhat be subject to criticism. Against this background, reference [8] uses a DSGE model with Non-Ricardian features in order to investigate the impact of fiscal shock on output within the Czech economy.

The current analysis proposes a Bayesian framework in order to assess the impact of fiscal policy on economic growth, this approach having the advantage of dealing with possible issues that may appear in small data sample.

III. METHODOLOGY

The empirical analyses relies on a simple VAR model which accounts for influences running in both direction, namely from fiscal shocks to real economy but also vice versa.

The VAR model in its reduced form can be written as:

$$Y_t = X_t B + \varepsilon_t$$

In a more compact form, the equation above can be written as:

$$y_t = (I_M \otimes x_t) b + \varepsilon_t$$

$$b = \text{vec}(B)$$

where y_t is the vector comprising the observations on the variables, b is the vector of the coefficients, I_M is the identity matrix and ε_t is the vector of errors assumed to be identical and independent distributed. The posterior of b in the case of no priors and taking into account only the observed data of the variables, is centered at Ordinary Least Squares of the estimates. This is very easy to do, but has the disadvantage the VAR models estimated with OLS yield very poor out of sample forecasts. Therefore, in order to improve the robustness of the results and reduce estimation uncertainty of the coefficients, the likelihood function of the VAR model is combined with prior information regarding the distributions of the parameters which is in fact what Bayesian estimation does. More specifically, having a prior $p(b, \Sigma)$ and the likelihood function $L(Y_{1,T} / Y_{-p+1,0}, b, \Sigma)$ we get the posterior distribution of the coefficients by using Bayes rule:

$$p(b, \Sigma / Y) \sim L(Y_{1,T} / Y_{-p+1,0}, b, \Sigma) p(b, \Sigma)$$

When setting the prior of the covariance matrix of the

parameters, there is a wide variety to choose from: Minnesota prior, Normal-Wishart prior, Normal-Diffuse prior, etc., the latter two being in fact extended version of the Minnesota prior developed by reference [9] (1993, 1997). The prior distributions of the parameters considered here are the Minnesota priors. This kind of priors are the most common among empirical work related to Bayesian VAR models, mainly because they reflect the typical trending behavior of macroeconomic time series. At the same time, imposing Minnesota priors is the simplest way of dealing with the variance covariance matrix of the VAR coefficients. Therefore, we assume that the prior for the VAR coefficients are normal and given by:

$$p(b) \sim N \left(\begin{matrix} \hat{b}_0 \\ (1+np)n \times 1 \end{matrix}, \begin{matrix} H \\ (1+np)n \times (1+np)n \end{matrix} \right)$$

where H represents the prior of the variance-covariance matrix $\Sigma = E[\varepsilon_t \varepsilon_t']$. The Minnesota prior assumes that the prior H is diagonal.

Returning to our VAR model in its reduced form, it can be shown that the posterior of the VAR coefficients is given by:

$$\text{Post}(b | \Sigma, Y_t) \sim N(M^*, V^*)$$

where:

$$M^* = (H^{-1} + \Sigma \otimes X' X)^{-1} \otimes (H^{-1} \tilde{b}_0 + \Sigma^{-1} \otimes X' X \hat{b})^{-1}$$

$$V^* = (H^{-1} + \Sigma \otimes X' X)^{-1}$$

After imposing prior restrictions, we derive the conditional posterior for the coefficients and the variance-covariance matrix of the VAR model.

The main advantage of using Bayesian estimation is that it brings additional information into the model, by setting the priors, and therefore the analysis is more accurate and more precise. The additional information brought about by the data series help deriving the posterior distribution of the coefficients. The fiscal shocks are identified using a recursive Choleski identification scheme.

IV. DATA AND RESULTS

For the analysis, quarterly accrual fiscal data (ESA 95 definition) are used¹ rather than cash data as the use of ESA definition data allows the comparison with other studied.

In order to simulate the responses to various fiscal shocks, the following variables are used: government expenditure, government revenues, real GDP and real effective exchange rate. All variables are expressed in logarithm and seasonally adjusted before estimation. All the series are used in their first difference in the VAR model in order to eliminate any stationarity problem that may arise. The source of the data series is Eurostat. Further details on the data are provided in Table I.

¹ Accrual data are preferred rather than cash data due to the limited time span for the later.

As pointed before, the main advantage of estimating with Bayesian techniques is that impulse response function are more precise. The selection criteria indicate an optimal number of lags equal to 1.

Below are presented the economic growth responses to fiscal policy shocks. The analysis shows weak responses of the GDP in either of the cases, government expenditure and revenue shocks. The government expenditure shock turned to have an insignificant impact on GDP as Fig. 1 shows, the responses of real GDP over 1 to 10 quarters being clustered around zero.

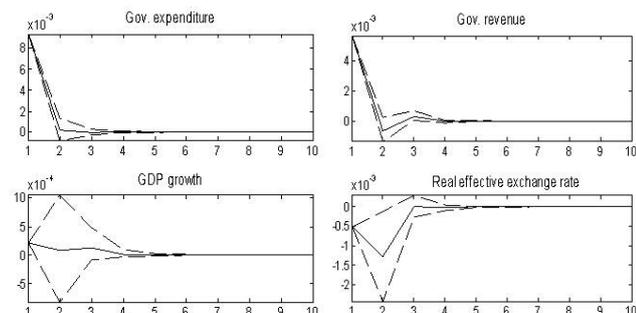


Fig. 1. Impulse Response functions to a government expenditure shock.

However, the response of economic growth to a positive revenue shocks is positive as Fig. 2 depicts. Although significant, the response of GDP growth to a positive government revenue shock is a relatively small one and seems to fade away in approximately three quarters.

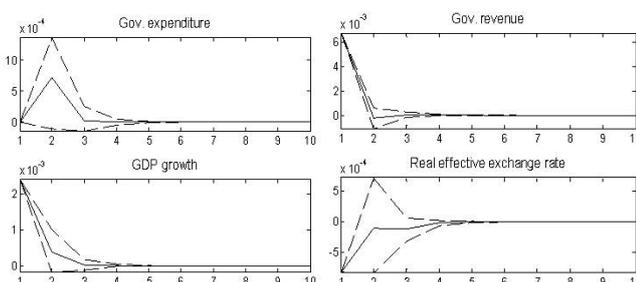


Fig. 2. Impulse Response functions to a government revenue shock.

TABLE I: DATA DESCRIPTION

Data	Description	Data treatment
Government expenditure	Compensation of employees+government gross fixed capital formation+intermediate consumption	The series were deflated using the GDP deflator and seasonally adjusted using
Net revenue	Government revenue-transfers=indirect taxes+direct taxes+social security contributions-social benefits and social transfers in kind	Demetra Software
Real GDP	GDP at 2005 market prices	
Exchange rate	Real effective exchange rate, deflated with consumer price index and computed based on 28 trade partners	

In both figures, the dashed lines are the 16% and the 84% percentiles corresponding to a 68% confidence interval, while the solid line represents the median corresponding to the set of “accurate” response.

The results and the interpretation of the impulse response functions should be however interpreted with cautious given the limitation of the data sample. Moreover, the estimated could be affected by omitted variables taking into account that the Romanian economy underwent many structural changes during the analyses period of time.

In order to check the accuracy of our estimation we take a close look at other empirical studies conducted on emerging economies. Reference [1] finds insignificant responses of GDP growth to fiscal shocks in emerging counties for Central and East Europe. Reference [10] finds small fiscal multipliers and therefore weak responses of economic growth to fiscal shocks and conclude that particularly spending multipliers are small due to a combination of a negative government consumption multiplier partially offset by a positive government investment multiplier.

V. CONCLUSION

The paper focuses on quantifying the impact of fiscal policy on economic growth using a Bayesian VAR framework. The analysis points to weak responses off the aggregate demand to fiscal shocks, revealing the aspects reached by other empirical works, namely, fiscal policy seems to be inefficient in small open economies. Therefore the cost of foregoing discretionary fiscal policy as recommended by the Fiscal Compact appears to be a relatively small one.

The government sector’s² ability to contribute to the stabilization of macroeconomic fluctuations is relatively low in Romania due to the relatively small size of automatic stabilizers as compared to other European economies. Due to small fiscal stabilizers, the Romanian economy would therefore need higher discretionary fiscal stimulus (higher structural deficit) during recession periods in order to stimulate the economy to return to its potential level. A generally agreed fact is that Romania needs to improve the efficiency of automatic stabilizers, the reducing of structural deficit being marked by the necessity of stronger fiscal instruments. Other important requirements would be the increase of EU fund’s absorption and of the public spending efficiency in the context of a much more limited space regarding the use of other fiscal policy tools imposed by the Fiscal Compact. So we must take into account, that to some extent, discretionary fiscal policy canceled the benefits of automatic stabilizers that otherwise may have provided some countercyclical pushback, this being in fact the main advantage and reason of using a mix in economic policies. Moreover, during the crisis, the need of reducing the budgetary deficit became a major requirement for our country (mainly due to financial constraints) and lead to continuing the pro-cyclicality of fiscal policy, which prior to this, contributed to the overheating of the economy up to 2007.

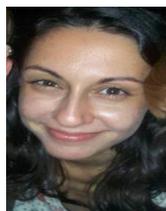
There are however several caveats of the analysis: first of all, the time span is relatively short and this aspect may affect

² Countries like Netherlands, Denmark, Sweden or Finland have large fiscal stabilizers due to tax progressivity.

the robustness of the results, although Bayesian techniques are the most recommend in this case and deal with possible shortcomings relating to short samples. Secondly, Romania is an emerging country affected by structural changes which are easily dealt with in a time varying framework, this being one of the future approaches the paper could be extended with, in line with others studies, for example reference [11].

REFERENCES

- [1] J. Cuaresma, M. Eller, and A. Mehrotra, "The economic transmission of fiscal policy shocks from western to eastern Europe," Austrian Central Bank, issue 2, 2011.
- [2] D. Muir and A. Weber, "Fiscal multipliers in Bulgaria: Low, but still relevant," IMF Working paper, no. 49, 2013.
- [3] V. Klyuev and S. Snudden, "Effects of fiscal consolidation in the Czech Republic," IMF Working Paper, no. 65, 2011.
- [4] O. Blanchard and R. Perotti, "An empirical characterization of the dynamics effects of changes in government spending and taxes on output," *Quarterly Journal of Economics*, vol. 117, no. 4, 2002.
- [5] F. Canova and E. Pappa, "The elusive costs and the immaterial gains of fiscal constraints," *Journal of Public Economics*, vol. 90, 2007.
- [6] A. Mountford and H. Uhlig, "What are the effects of fiscal policy shocks?" SFB 649 Discussion paper, CEPR, London, 2006.
- [7] V. Ramey and M. Shapiro, "Costly capital reallocation and the effects of government spending," presented at Carnegie - Rochester Conference Series on Public Policy, 1998.
- [8] Z. Stork and J. Zavaacka, "Macroeconomic implications of fiscal policy measures in DSGE," Ministry of Finance, Czech Republic, 2010.
- [9] K. Kadiyala and S. Karlsson, "numerical methods for estimation and inference in bayesian VAR-models," *Journal of Applied Econometrics*, John Wiley & Sons, Ltd., vol. 12, no. 2, pp. 99-132, 1997.
- [10] E. Ilzetki, E. Mendoza, and C. A. Vegh, "How big (small) are fiscal multipliers?" NBER Working Paper, no. 16479, 2010.
- [11] M. Kirchner, J. Cimadomo, and S. Hauptmeier, "Transmission of government spending shocks in the euro area: Time variation and driving forces," ECB Working Paper, no. 1219, 2010.



Alina Bobasu was born in Craiova, Romania on 14th April 1987. She graduated from the Bucharest University of Economic Studies in 2009, receiving her bachelor degree. She completed her master in 2011 and was awarded the prize for the best dissertation paper of the year. Her research interests include macroeconomics, international finance and banking.

She enrolled for a PhD in 2013 with the thesis "Modelling monetary and fiscal policy interactions in emerging economies". She also works as an economist at the National Bank of Romania in the Forecasting Models Division.