8. THE FISCAL CONSOLIDATION CONSEQUENCES ON ECONOMIC GROWTH IN ROMANIA

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Abstract

In the context of the economic and financial crisis the modification of the fiscal policy coordinates was seen either as a way to alleviate the impact of the crisis on the economic growth or as a necessity in order to reinsure fiscal sustainability. In both cases a correct estimation of the fiscal multipliers is crucial. This paper estimates the level of the fiscal multipliers for Romania in order to assess the impact on the economic growth generated by the fiscal consolidation process initiated in 2010. The results show that the levels of the fiscal multipliers are relatively low. However, there is an important difference between the values of the fiscal multipliers in the boom times compared to the periods when the economy operates below its potential and the empirical results showed a level of about 0.1 for the budgetary expenditure over the period 2000Q1-2008Q2 and around 0.4-0.5 during 2008Q3-2014Q1, while the revenue multiplier was around 0.1 in both periods.

I. Introduction

The economic and financial crisis that began in 2007 represented a major challenge for the economic policy makers considering that its severity reached levels not seen since the Great Depression, but also an opportunity for the macroeconomic research to deeply understand how the globalized economic system operates in order to raise and test new theories given the information provided by the current crisis. The research of the effects of the fiscal policy on the economic activity experienced an accelerated development in the last years, given that the change of fiscal policy coordinates was seen either as a solution to mitigate the effects of the crisis, or as a necessity arising from its consequences for the sustainability of the public finances position in many countries. Thus, during the economic downturn in 2009, many countries have

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considered implementing a fiscal stimulus, in line with the solutions offered by the Keynesian theories to lessen the severity of the economic recession, but in the case of numerous economies the issue of initiating a program of fiscal consolidation has been raised, given the lack of fiscal space necessary to stimulate the economy, this being exhausted by the pre-crisis pro-cyclical fiscal policies. In both cases, quantifying the impact of fiscal policy changes on the production is of particular interest, as it affects the manner and the speed at which the expansion/fiscal consolidation program is to be implemented, but also the obtained results.

The fiscal policy stance in Romania during 2004-2013 was significantly pro-cyclical as the economic advance of over 6% per year in the period 2006-2008 was accompanied by a sharp deterioration in the structural budget balance, from -3.5% to -8% of GDP respectively, virtually exhausting the fiscal space that could have been used to mitigate the effects of an adverse economic shock. In these circumstances, the crisis has imposed the initiation of an ambitious fiscal consolidation plan, with the structural budget deficit being rapidly reduced from 9.6% in 2009 to 1.7% in 2013. Given these developments, the fiscal policy impact on real GDP, *i.e.* the fiscal multiplier, is particularly important both in terms of designing a fiscal consolidation program but also in terms of comparing the advantages and disadvantages between rules-based and discretionary fiscal policy.

This paper is structured as follows: the next section presents the current approaches in the literature to the fiscal multipliers factors of influence in general and also the estimated values for Central and Eastern Europe countries, followed by the description of the methodology of estimation, and later the presentation of the data used and the results obtained from the econometric analysis. The last section presents the conclusions and the implications of the empirical estimates for the economic policy makers.

II. Literature review

By definition, the fiscal multiplier is the ratio of output change (ΔY) to an exogenous change in the budgetary position (due to variations in expenses, ΔG, or taxes, ΔT) compared to the baseline scenario, by assuming no-policy changes, respectively. Generally, there is a consensus in the literature regarding the factors that influence the size of fiscal multipliers and Spilimbergo *et al.* (2009) realized a summary of the most important of these.

First of all, the size of the fiscal multipliers is large if "losses" are limited; *i.e.* a small part of the fiscal stimulus is saved or used for the acquisition of imported goods and services. These conditions are met when: the stimulus package is mainly based on increasing spending against reducing taxation, given that the first-round effects on aggregate demand are immediate in the first case, while households may decide to save some of the tax cuts in the second case; the marginal propensity to consumption is high – the hand-to-mouth consumers or those without access to credit are targeted; the agents do not consider that future tax increases are necessary in order to offset the higher debt associated to the stimulus package, either due to the increased importance they attach to the short term, or due to myopia - in other words, the economic agents are not

Ricardian ones. It is also important that the marginal propensity to import to be small, in this context the fiscal multipliers are higher in countries with less open economies. The small size of automatic stabilizers contributes to a more efficient transmission of a fiscal stimulus, given that the increase of budgetary expenses for example is not accompanied by an automatic increase in the collected taxes that would have a contractionary role. In addition, a high output gap could mean that a fiscal stimulus does not require a response from monetary authorities concerned with price stability.

Moreover, an important role in augmenting the effect of the fiscal policy on the real GDP dynamics is represented by the accommodation character of a fiscal package from a monetary policy perspective, as follows: the nominal interest rate is not increased in response to a fiscal expansion and, thus, the investment's and/or private consumption's crowding out is not generated. A fixed exchange rate regime is compatible with higher fiscal multipliers, given that it is not possible for a fiscal stimulus to contribute to the exchange rate appreciation. In the case of a floating exchange rate regime, the Mundell-Fleming model points to a reduced impact of the fiscal expansion on output through the net exports channel. In terms of applying a strict inflation targeting policy, there are premises that the multipliers have very low values due to the crowding out effect.

In addition, not all countries can afford to undertake fiscal stimulus considering that they are characterized by a high level of indebtedness and the decision to contract even more debt to stimulate the economy can generate negative effects on production. Thus, the positive effect on the aggregate demand caused by increasing government spending or by reducing taxes is lower than the negative one generated by raising interest rates due to creditworthiness deterioration involving higher risk premiums or due to economic agents' decision to increase savings in order to pay higher taxes in the future, as demonstrated by Kirchner *et al.* (2010) and Nickel and Tudyka (2013). Basically, in this situation the fiscal multipliers are negative. This hypothesis is consistent with the situation of the sovereign debt crisis in the Euro Area and is also supported by recent literature regarding the possibility that a contractionary fiscal policy could lead to economic growth even in the short run (Alesina and Perrotti, 1996;, Alesina and Ardagna, 2009).

Moreover, the financial market characteristics can significantly influence the size of fiscal multipliers – for example, the limited possibilities of financing the public debt may lead to crowding out, with negative impact on investments or, on the contrary, a positive effect may be obtained as far as there are numerous captive investors in government bonds (investors which have very limited investment opportunities) and the financing costs can be maintained at low levels. In addition, the limited access to credit of companies and households can increase the effectiveness of a fiscal stimulus, given that economic agents will tend to spend supplementary amounts in order to smooth consumption or investment needs.

In practice, determining fiscal multipliers is a difficult task, with very different estimates based on the type of analysed economy (advanced, emerging), depending on the estimation method, the considered period in the empirical analysis (expansion, recession), but even in the researches conducted on comparable data on the same country.

One of the uncertainty sources in the estimation of fiscal multipliers is generated by the existence of a bidirectional relationship between the used variables, respectively between the budgetary aggregates and real GDP. More precisely, the expenditures and especially the budget revenues react automatically to the business cycles through the automatic stabilizers without the consideration that this situation signals a change in the fiscal policy stance. A discretionary answer of it may be represented, for example, by an increase in budgetary expenditures or a reduction in taxes when the output gap decreases and falls into a negative area. In order to determine practically the fiscal multipliers, researchers take into account the exogenous fiscal shocks, but there still is no unified methodology to identify them and therefore there are different estimates of the size of shocks and hence the value of the multipliers. Also, insufficient length of the data series used in the econometric estimates is another problem, especially in the case of emerging economies.

An additional source of uncertainty arises from the fact that fiscal multipliers are not constant over time, as they depend on the business cycle, and are higher in the periods of recession compared to the expansion periods, as shown by recent studies (Spilimbergo *et al* (2009), Baum and Koester, 2011 and Auerbach and Gorodnichenko, 2012).). This situation is explained mainly by the central bank's accommodative behaviour in relation to a fiscal stimulus; it usually decides not to make increases in the intervention interest rate as a result of the fiscal policy stance, especially in the case of a negative output gap. Thus, both through the interest rate channel and the net exports channel (an increase in the interest rates would lead, ceteris paribus, to an appreciation of exchange rate with inhibitory effect on the net exports), the attitude of the central bank is to support the government's actions in the case of a fiscal stimulus or to partially counteract such efforts under circumstances of fiscal consolidation. Also, during the recession periods the share of economic agents (companies or households) that face difficulties in accessing credit is higher and the impact of fiscal policy on output is boosted.

Regarding the quantification of the fiscal multipliers, there is a fairly rich recent literature, while the economic and financial crisis has fostered a growing interest in studying this problem, but it focuses mainly on developed countries, and the findings are far from being unitary. Ilzetzki *et al,* (2011) showed that the effects on production of a stimulus depended crucially on the fundamental characteristics of each country such as the level of development, the exchange rate regime, the openness and level of indebtedness. Thus the aforementioned authors came to the following conclusions from an empirical analysis that included data related to the budgetary expenditure in 44 countries: the effect on output caused by an increase in the government consumption is higher in industrialized countries than in developing ones; the fiscal multiplier is relatively high in countries with fixed exchange rate regime and zero in those with floating exchange rate; the fiscal multipliers in the open economies are smaller than in the closed ones; the fiscal multipliers in the heavily indebted countries are also zero. On average the fiscal multipliers related to the budgetary expenditures are 1.5 in the developed countries and 0.5 in the emerging economies.

In the World Economic Outlook published by the IMF in 2010, within a dedicated chapter regarding the macroeconomic effects of a fiscal consolidation process, it was concluded based on a sample of developed countries and using data for a period of 30 years that

on average a deficit reduction of 1 percentage point of GDP results in a production decrease by 0.5 pp. The impact of the fiscal consolidation on GDP is mitigated by the nature of accommodation from the central bank that acts to reduce interest rates and improving net exports supported by exchange rate depreciation. Also, the expenditures cuts have a contractionary effect lower than tax increases due to the different policy of the central bank and fiscal consolidation has a lower impact on production in the heavily indebted countries.

Spilimbergo *et al.* (2009) propose a rule of thumb for assessing fiscal multipliers related to budgetary expenditures assuming a constant interest rate: between 1 and 1.5 for large advanced countries, between 0.5 and 1 for countries with average size of the economy and in small and open economies less than 0.5. The authors also argue that the multipliers are lower (approximately half compared to the above values) in the case of the budgetary revenues while substantially higher values may be recorded for investment expenditures. A negative value of multipliers is also possible where risks are relevant to the sustainability of public finances.

The literature on the determination of fiscal multipliers in CEE countries in general and in Romania in particular is quite poor, the more so as their value can change over time depending on the business cycle position. Mirdala (2009) studied the effects of fiscal policy shocks on output in 2000-2008 in six CEE countries (Bulgaria, Czech Republic, Poland, Romania, Slovak Republic, Hungary) by applying VAR models, using as identification techniques the Cholesky ordering or the estimation of a structural VAR. Thus, a budgetary expenditure shock has only in Romania positive lasting effects on production (up to 7 years), generating an impact on medium term (about 4 years) in the Czech Republic, Slovakia and Poland, while in Bulgaria and Hungary the shock is absorbed in a period of up to one year. Regarding the impact of a shock of the fiscal revenues, it is found to be positive, contrary to economic theory, in all studied countries, except in Poland where the effect on output is zero. This finding is explained by the fact that an increase in tax revenues should not be automatically associated with an increase in taxation and it could be explained, for instance, by improving collection efficiency favoured by deep structural changes experienced by the countries analysed between 2000 and 2008. The research did not explicitly determine the size of fiscal multipliers and was limited to studying the relationship between fiscal policy shocks and production and their persistence.

Haug *et al.* (2013) studied the effects of the fiscal policy on output in Poland in the period 1998Q1-2012Q4 estimating a structural VAR model using both fiscal and monetary variables and concluded that budgetary expenditure multiplier has a value of 0.14 in the quarter following the implementation of the fiscal stimulus, while the cumulative multiplier over 12 quarters reaches a value of 0.48. The budgetary revenue multiplier is identified as positive, again in contradiction to the theory, but the value is low, i.e. 0.09 on impact, while cumulated after 6 quarters it reaches a maximum of 0.15. The authors indicate as a possible source for the positive value of the budgetary revenue multiplier the fact that in Poland there was an increase in consumption taxes concomitantly with a reduction in income taxes, given that the distortionary character is higher for the latter category of taxes.

Muir and Weber (2013) estimated the fiscal multipliers in Bulgaria in the period 1999Q1-2011Q4 and concluded that they were different, depending on the position in the economic cycle (expansion or recession) which is measured by the output deviation from the potential level. Thus, the analysed period is divided into two sub-periods, 1999-2006 and 2007-2011, especially since in the data series a structural break appears to be, possibly explained by the EU accession, and the results indicated a level of about 0.2 and 0.3 for budgetary expenditure multipliers and about -0.4 and -0.5 for budgetary revenue in the first year following the fiscal shock, higher values of multipliers in absolute terms being recorded under an existing negative output gap. Instead, Karagyozova-Markova *et al.* (2013) analysed the Bulgarian economy over the same period as in the above study and concluded that the value of the government expenditure multiplier is between 0.2-0.4 on impact and 0.7-0.9 after 12 quarters from the shock, while on the revenue side, the multipliers have values and even different signs depending on the identification method, *i.e.* 1.02 when using Cholesky ordering and -0.21 when estimating a structural VAR, the reported values being the ones cumulated after 12 quarters.

Stanca *et al.* (2013) estimated the fiscal multipliers for Romania in the period 2000Q1-2012Q4 based on several structural VAR models and concluded that their size is between 0-0.2 for budgetary expenditure, a value closer to the upper end of the range being recorded by personnel expenses, and between 0-0.1 for budgetary revenue. The authors concluded that the results appear to confirm the standard implications of the Mundell-Fleming model that the fiscal policy is relatively ineffective in small open economies under floating exchange rate regime. In this context, the opportunity cost of giving up the discretionary fiscal policy once the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union is adopted appears to be low.

III. The methodology for the fiscal multipliers estimation

From the perspective of how to estimate fiscal multipliers, the literature has evolved into two main areas, using vector autoregressive models (VAR) or structural general equilibrium models (DSGE). The advantage of VAR models is given by the absence of restrictions arising from theoretical considerations, being more suitable for some data series that are not long enough. An advantage of DSGE models is represented by the fact that they allow more easily the quantification of fiscal multipliers related to certain categories of revenue or expenditure.

However VAR models remain the most commonly used econometric method of estimating the effects of monetary and fiscal policy shocks. Nevertheless, the identification of fiscal policy exogenous shocks remains a challenge for economists, given that the different methods of estimation lead to different results of fiscal multipliers. In practice, four major methods of identifying the fiscal policy shocks have been outlined:

- The recursive approach – introduced by Sims (1980) and subsequently applied by Fatas and Mihov (2001) and then by many others. This involves identifying the impulse-response functions through Cholesky ordering and requires strong restrictions on the relationships between the variables included in the model. For example, in order to determine the budgetary expenditure multiplier it is assumed

that the shocks related to real GDP or budgetary revenue does not contemporary influence the budgetary expenditure, and at the same time, the production is influenced by an expenditure shock after a quarter, but does not immediately respond to a shock in revenue. The taxes are the last to be ordered, which implies that they are contemporary influenced by both the production and budgetary expenditure shocks.

- The structural VAR approach – introduced by Blanchard and Perotti (2002) which is the most used method to estimate the fiscal multipliers for both the Euro Area and CEE countries. Basically, the method uses institutional information regarding the automatic response of the budgetary expenditure and revenue to the evolution of production (in fact elasticities) in order to identify restrictions on the relationship between reduced form VAR residues and structural shocks.

- The sign restrictions approach – developed by Uhlig (2005) and applied by Mountford and Uhlig (2005) and Caldara and Kamps (2008). From the economic point of view, the method involves a prior relationship between production and taxes in line with that expected from theory. From the econometric point of view, sign restrictions are imposed for the impulse-response functions in order to simultaneously identify the business cycle and fiscal policy shocks.

- The narrative approach – Romer and Romer (2010) use information related to the US economy from official documents, such as the reports of the Congress, to identify the size and the fiscal policy shocks motivation for the budget deficit reduction, and partially replacing the econometric approach with economic arguments. The disadvantage of this method is represented by the fact that very long series of observations are required and these are available in very few cases.

The methodology used in this paper will consider the estimation of VAR models, and the fiscal multipliers estimation will be based on several identification strategies (Cholesky ordering, structural VAR according to the method proposed by Blanchard and Perotti in 2002 or the estimation of a VAR with monetary and fiscal variables as proposed by Fatas and Mihov in 2001). In the empirical analysis, the models are estimated using the EViews econometric software. A VAR model is a linear model in which each variable is expressed in relation to the other contemporary endogenous variables or expressed with a certain number of lags. The general form of a reduced form VAR model is:

$$y_t = \Gamma_0 + \sum_{i=1}^{p} \Gamma_i y_{t-i} + \Delta_x x_t + e_t, \tag{1}$$

where y_t is a k vector of endogenous variables, x_t represents a m vector of exogenous variables, Γ_i and Δ_x are matrices composed of coeficients that will be estimated, e_t is a vector of residues in reduced form with a covariance matrix $\Sigma = E[e_t, e_t']$. The reduced form residuals can be contemporary autocorrelated, but are uncorrelated with their own lags or with the independent variables.

In order to analyze the impact of various shocks on the variables of interest, the reduced form residuals must be decomposed into uncorrelated structural shocks. Thus, the relationship between the reduced form residuals e_t and the structural innovations u_t is described by:

$$Ae_t = Bu_t \tag{2}$$

Where the structural innovations u_t have as variance-covariance matrix the identity matrix $E[u_t, u_t'] = I$. The *kxk* matrices A and B must be estimated and describe the short-term relations between shocks.

In a first stage a three-dimensional reduced-form VAR will be estimated, using the following variables: budgetary expenditure g_t, budgetary revenue t_t and production y_t. In practice a VAR in levels with a deterministic trend is estimated given the non-stationarity of the series. Afterwards, the Johansen cointegration test and information criteria for the selection of lags are applied. In the quasi-majority of the literature, in order to compute the impulse-response functions by using the Cholesky identification scheme, the following ordering of the variables $[\, g_t, y_t, t_t\,]'$ is used, with the choice being mainly driven by economic considerations. This particular ordering implies that government spending does not contemporary respond to shocks in production or fiscal shocks. At the same time the production is affected in a quarter by the expenditure shocks, but do not immediately respond to revenue shocks. The placing of net taxes on the last position in the system implies that they are contemporary influenced by both government spending and production shocks. The assumed contemporaneous relations between the variables are based on the following economic arguments: changes in budgetary expenditure are mostly independent from the business cycle unlike changes in taxes and it seems reasonable to assume that spending does not respiond contemporaneously to shocks coming from the private sector; placing taxes after output recognizes the effect of output shocks to the tax base and, thus, a contemporaneous effect on tax receipts. Basically, this ordering captures the impact of the automatic stabilizers but rules out the potentially important contemporaneous effects of discretionary tax changes on GDP. . It is also important to stress that after the initial shock, in the next quarters the endogenous variables of the model can interact freely without any restrictions related to their ordering. However, the choice of the variables ordering necessary for using the Cholesky identification scheme is somewhat arbitrary and debatable and this method is used in combination with more sophisticated methods that address these shortcomings.

If we note the vector of reduced form residuals with $e_t = [e_t^g\, e_t^y, e_t^t]'$ and the structural innovations vector with $u_t = [u_t^g u_t^y, u_t^t]'$, the Cholesky identification scheme implies that:

$$\begin{pmatrix} 1 & 0 & 0 \\ -a^{gy} & 1 & 0 \\ a^{gt} & -a^{yt} & 1 \end{pmatrix} \begin{pmatrix} e_t^g \\ e_t^y \\ e_t^t \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} u_t^g \\ u_t^y \\ u_t^t \end{pmatrix} \tag{3}$$

Thus, we can write the above relationship algebraically, as a system:

$$e_t^g = u_t^g \tag{4}$$
$$e_t^y = a^{gy} e_t^g + u_t^y \tag{5}$$
$$e_t^t = a^{gt} e_t^g + a^{yt} e_t^y + u_t^t \tag{6}$$

In a second stage, alternative schemes may be used to identify the VAR. To solve certain shortcomings of the Cholesky approach, Blanchard and Perotti (2002) used institutional information on the budgetary revenue and expenditure to impose identification restrictions on the relationship between the reduced form residuals and the structural shocks. Specifically, they use the following approach (structural VAR):

$$\begin{pmatrix} 1 & 0 & 0 \\ -a^{gy} & 1 & -a^{ty} \\ 0 & -a^{yt} & 1 \end{pmatrix} \begin{pmatrix} e_t^g \\ e_t^y \\ e_t^t \end{pmatrix} = \begin{pmatrix} 1 & 0 & b^{tg} \\ 0 & 1 & 0 \\ b^{gt} & 0 & 1 \end{pmatrix} \begin{pmatrix} u_t^g \\ u_t^y \\ u_t^t \end{pmatrix} \tag{7}$$

where a^{ij} shows how variable *i* contemporary responds to a shock in variable *j*. Algebraically, the above relation can be written as:

$$e_t^g = b^{tg} u_t^t + u_t^g \tag{8}$$
$$e_t^y = a^{gt} e_t^g + a^{ty} e_t^t + u_t^y \tag{9}$$
$$e_t^t = a^{yt} e_t^y + b^{gt} u_t^g + u_t^t \tag{10}$$

In a third stage, we can estimate a fiscal and monetary VAR. A potential problem with the three-variable VAR is represented by a possible misspecification due to omitted variables. To address this problem, we consider the interaction with the monetary policy by estimating a VAR with five variables that also includes inflation (p) and the short-term interest rate (r). For simplicity a Cholesky scheme with the following ordering $[g, y, p, t, r]$ can be estimated as in Fatas and Mihov (2001). In addition to the economic arguments for choosing the ordering of the variables in the case of the three-dimensional reduced-form VAR, the placing of inflation before taxes reflects that a price shock has a contemporaneous effect on tax receipts while ordering the interest rate last can be explained by the fact that the central bank sets the interest rate in relation to the evolution of the inflation and the output gap while spending and revenues as they are defined here without interest expenditure are not sensitive to interest rate changes.

IV. Data and results

In the empirical analysis quarterly data for Romania corresponding to the period 2000Q1-2014Q1 were used, the variables considered being as follows: government spending – this was calculated as the sum of general government final consumption and general government gross fixed capital formation expenditure, net taxes – these were determined as the difference between tax revenues and the sum of social benefits other than transfers in kind and the interest paid by state for public debt (budgetary aggregates are expressed in ESA95 standards), real GDP, inflation – measured as the annualized rate of quarterly change in Harmonized Index of Consumer Prices, the money markets interest rate-3 months (ROBOR3M). Budgetary expenditure, net taxes and GDP are expressed in real terms based on GDP deflator, and in the econometric estimates the data are expressed in logarithms. Interest rate and inflation are in percentage points. It should be noted that not including transfers in government spending simultaneously with their deduction from budgetary revenue represents a standard practice in estimating the fiscal multipliers, the reason being that they have redistribution effects similar to those of taxes.

In the econometric estimation, the data series were divided into two sub-periods, 2000Q1-2008Q2 and 2008Q3-2014Q1, given that applying the models over the entire period of analysis did not produce stable and robust results, most likely, because of the existence of a structural break in the third quarter of 2008, a moment that marked the beginning of the economic crisis in Romania. The crisis was accompanied by a deep change in the macroeconomic parameters of the Romanian economy in general and of the fiscal policy in particular. Thus, the steep economic downturn that began in the third quarter of 2008 simultaneously with the accumulated imbalances adjustment – *i.e.* extremely high current account and budgetary deficits – under the reversal of the capital flows and the severe decline in external demand changed the paradigm of economic growth in the 2000-2008 period and, most likely, the monetary and fiscal policy transmission mechanism. Moreover, recent literature on estimating fiscal multipliers highlights the possible existence of different levels depending on the position within the economic cycle, a stronger impact of fiscal policy on output in case of recession and lower in case of expansion. Dividing the data series into the two sub-periods mentioned above allows for the investigation of this hypothesis given that the two intervals correspond mostly to a period in which the output gap was positive (2000Q1-2008Q2) and one in which the economy operated below the potential level (2008Q2-2014Q1).

Next, 5 models were estimated in order to investigate the impact of the fiscal policy on output, according to the methodology described above, namely a 3-variable VAR using the Cholesky identification scheme and then a structural VAR using two methods of identification, a 5-variable VAR, also including monetary variables and, as identification scheme, we used again the Cholesky ordering and the estimate of a structural VAR.

Using the latter option involves *ex ante* identification restriction, i.e. the value of a^{yt} from matrix A, which means the elasticity of net taxes to production. In order to estimate the level of this parameter, we used the elasticities of the components of net taxes determined by Altar *et al.* (2012) to compute a weighted average, with the weights determined as the average share of each revenue aggregate in total net taxes for the period 2008-2013. The values used are shown in the table below (where CIT stands for corporate income tax, VAT for value added tax, SSC for social security contributions and PIT for personal income tax) and the calculations' result indicated a level of 1.18 for the aggregated elasticity of net taxes:

In the case of the 3 variables structural VAR, the parameters b^{tg} and b^{gt} were all set to zero to identify the fiscal policy structural shocks, *i.e.* either the budget expenditure decisions are taken before those regarding taxes in the first case, or vice versa in the latter case. Both variables were estimated because of the lack of theoretical considerations to justify one of the two options. The stationarity tests performed (Augmented-Dickey Fuller and Phillips Perron) suggested trend stationarity in the case of the quasi-majority of the series with 10% degree of significance.

However, it is well known from the economics and statistics literature that sometimes it is difficult to distinguish between the deterministic and stochastic trends in the data. In this paper we chosed to estimate the VAR in levels with a deterministic trend considering also the prevailing practice from the literature.

The elasticity of net taxes to production and average weight of each component of net taxes

	CIT	VAT	SSC	PIT	Other revenues	Transfers	Interest paid
Elasticity	1.19	0.97	0.75	1.02	1	-0.18	0
Avg. weight 2008-2013 (%)	6.03	24.29	27.39	10.74	31.54	39.08	4.49

Source: Altăr *et al.* (2012), own calculations

The Johansen cointegration tests did not indicate the presence of cointegration relationships and the number of lags used in the application of the informational criteria were as follows: 1 for the VAR models estimated for the period 2000Q1:2008Q2 and 3 for the VAR models estimated for the period 2008Q3:2014Q1. The resulting errors are not correlated and are homoskedastic and the VAR models are stable. Investigating the implications of the fiscal policy on output is achieved by determining the impulse-response to shocks.

After estimating the 3 models, the fiscal multipliers are computed. Given that EViews calculates the impulse-response functions by default for each variable to structural shocks equal to one standard deviation, to obtain the fiscal multipliers, the tax elasticities must be calculated – which measures the impact of a 1% change in budget revenues or expenditure on GDP - $\frac{\Delta\%Y/}{\Delta\%G}, \frac{\Delta\%Y}{\Delta\%T}$. Thus, it is necessary that the impulse-response functions are normalized by the standard deviation of the respective shock. Secondly, the fiscal multipliers $\frac{\Delta Y(t+n)}{\Delta G(t)}, \frac{\Delta Y(t+n)}{\Delta T(t)}$ are obtained by dividing the elasticities to the share of revenues and expenses in GDP - $\frac{G}{Y}, \frac{T}{Y}$.

The results implies calculating the cumulative fiscal multipliers based on the reason that a change in the conduct of the fiscal policy at time t can affect production for several years. This paper considers the assessment of the fiscal consolidation impact initiated in Romania in 2010 on the real GDP. The following table summarizes the results for the cumulative fiscal multipliers regarding the budgetary revenues and expenditures based on the 5 models estimated separately for the two sub-periods considered.

The results confirm the existence of different fiscal multipliers depending on the position in the economic cycle. Thus, during 2000Q1-2008Q2, within the period of economic boom, they are very low, about 0.1 in the case of expenditure and about 0.1-0.15 in the case of budgetary revenues, while in the period 2008Q3: 2014Q1, characterized by a negative output gap, the fiscal multipliers are about 0.4-0.5 for expenditure and 0-0.1 for net taxes.

The results indicate that a fiscal policy shock lasts relatively little, about 8-12 quarters, considering that, in general, most of the impact occurs the first 4 quarters. As in other studies, the revenue fiscal multipliers have values close to zero or slightly positive, contrary to the economic theory.

Table 2

The cumulative fiscal multipliers based on VAR models

Cumulative fiscal multipliers		2000Q1:2008Q				2008Q3:2014Q1			
		4Q	8Q	12Q	16Q	4Q	8Q	12Q	16Q
VAR 3 - Cholesky	Expenditure	0.04	0.06	0.07	0.07	0.53	0.37	0.33	0.33
	Revenue	0.08	0.12	0.13	0.14	0.09	0.11	0.11	0.11
VAR 3 – Struct.1	Expenditure	0.04	0.06	0.07	0.07	0.53	0.37	0.33	0.33
	Revenue	0.04	0.07	0.09	0.09	0.01	0.03	0.03	0.02
VAR 3 – Struct. 2	Expenditure	0.04	0.06	0.07	0.07	0.52	0.36	0.32	0.33
	Revenue	0.04	0.08	0.09	0.09	0.02	0.04	0.04	0.03
VAR 5 - Cholesky	Expenditure	0.03	0.05	0.07	0.07	0.49	0.44	0.44	0.48
	Revenue	0.07	0.14	0.16	0.17	0.08	0.11	0.08	0.08
VAR 5 Structural	Expenditure	0.03	0.05	0.07	0.07	0.49	0.48	0.44	0.47
	Revenue	0.06	0.12	0.14	0.15	-0.03	0.03	-0.08	0

Source: Own calculations

This can be explained by several factors, as shown by Auerbach and Gorodnichenko (2011): (i) identifying the net taxes shocks depends on the ability to separate the revenue structural innovations of their automatic response to production changes, the key element being the income elasticity to GDP which can be variable; (ii) many of the tax changes may not arise from changes in tax rates - for example improving the collection favored by modifying the structure of the economy; (iii) possible effects on aggregate supply generated by tax policy change given that these effects are more possible in the case the tax changes rather than expenditure changes. Considering all these aspects, the literature on fiscal multipliers focuses mainly on the budgetary expenses multipliers.

It is important to note that there are higher fiscal multipliers in periods in which the economy operates below its potential, and this can be explained by several factors. First, the share of economic agents who face difficulties in accessing credit is clearly significantly higher in the period 2008Q3: 2014Q1 compared to the first period analyzed, provided that the boom was accompanied by an even more non-government credit expansion supported by capital flows from abroad. Secondly, in times of boom, the central bank's attitude was one of neutralizing the fiscal stimulus, given the need of keeping inflation under control in conditions of a strong positive output gap, while for the period 2009-2014 the interest rate decreased only gradually due to the constraints on monetary policy conduct. Third, a increased in precautionary saving simultaneously with the investment demand curve shifting to the left as a result of a diminishing confidence favored by the manifestation of the economic crisis (the more so as Romania had to adjust an extremely high current account deficit) are strong arguments in favor of much higher fiscal multipliers in this period. On the contrary acts the risk premium decrease due to the successful implementation of the fiscal consolidation program; implemented during a record period by Romania, which managed to adjust sharply its structural deficit from 9.6% of GDP in 2009 to 1.7% in 2013.

Considering the results obtained for the fiscal multipliers, the consequences of implementing the ambitious fiscal consolidation plan initiated by Romania in 2010 on the economic growth can be estimated. The calculation is based on the consolidation effort in structural terms and considering the headline deficit in order to eliminate the influence of the cyclical component of budget deficit, thus adequately reflecting the change in the fiscal policy stance. Also, it is important to mention that the previously determined multipliers for budgetary expenditures are considered, given the arguments supporting the difficulty of estimating the value of net tax multipliers. In addition, given that the estimates have shown that the fiscal policy shocks occur overwhelmingly in the first 4 quarters subsequent to the shock, the fiscal adjustment performed in each year will be considered to have an impact on the real GDP growth only in that year. The fact that the fiscal consolidation process was initiated in mid-2010 and not at the beginning of the year was also ignored, because the main objective of calculations was related to the determination of the cumulative impact on production. Thus, given that Romania intents to comply with the medium-term objective in 2015, which would be equivalent to completing the fiscal consolidation process, the cumulative impact on production in the period 2010-2015 is about 4.3 pp of GDP, equivalent to an annual average of about 0.72%.

Table 3

The consequences of the fiscal consolidation process initiated in Romania in 2010 on economic growth

Year	2010	2011	2012	2013	2014	2015
Fiscal impulse (% of GDP)	-3.5	-2.3	-1.3	-0.8	0	-0.7
Multiplier	0.5	0.5	0.5	0.5	0.5	0.5
Impact of GDP (%)	-1.75	-1.15	-0.65	-0.4	0	-0.35

Note: The figures for 2014 are estimates; those for 2015 reflect the Government forecast from the draft budget for 2015.
Source: Own calculations

V. Conclusions and policy implications

The present study aimed to estimate the fiscal policy impact on real GDP growth in general and to evaluate the consequences of the fiscal consolidation program initiated in Romania in 2010 on growth in particular. The methodology used to determine the fiscal multipliers consisted in estimating VAR and structural VAR models. The results indicated a small size of the multipliers, in line with those forecasted by the Mundell-Fleming model regarding the limited impact of the fiscal policy on output in small open economies like that of Romania. However, there is an important difference between the values of the fiscal multipliers in the boom times compared to the periods when the economy operates below its potential, the empirical results showing their level for the budgetary expenditure of about 0.1 over the period 2000Q1-2008Q2 and about 0.4-0.5 during 2008Q3-2014Q1, while the revenue multiplier was about 0.1 in both periods. Beyond the motivation regarding the study of the fiscal policy effects on output during

the periods of expansion versus those of recession, the division of the analyzed interval in two sub-periods is justified by the existence of a structural break in the third quarter of 2008, which coincides with the economic crises start in Romania. The data series limited size is obviously a limitation of the analysis.

A slightly positive result of the budgetary revenue multiplier, contrary to the economic theory, is a common result in the literature, and the explanations are related to the complex links between the tax system and output which are difficult to quantify by these models, the current analysis focusing on the size of the expenditure multiplier. We notice a much higher level of the fiscal multipliers in the case of a negative output gap, which can be explained by a higher percentage of economic agents who face difficulties in receiving credit in such periods, a monetary policy response to the program consolidation through a slow reduction in the reference interest rate and a higher saving as a precaution in case of a crisis. The low budget multiplier in Romania before the crisis can be also explained by the monetary policy response to the expansionary fiscal policy at that time, *i.e.* by practicing extremely high levels of reserve ratios and reference interest rates.

Another conclusion of the analysis is the fact that the fiscal policy shocks in Romania have a short duration, most of their impact being consumed in the first four quarters. In this context, the response of economic growth to the fiscal consolidation program initiated by Romania in 2010 can be calculated by multiplying the annual fiscal impulse by the determined multiplier, the results indicating a cumulative impact of about 4.3 p.p. of the GDP, equivalent to an average of -0.72% per year in the period 2010-2015.

The results also have important implications for the economic policy makers through the evaluation of the costs and benefits of the discretionary fiscal policy versus rule-based fiscal policy, but also in terms of building an optimal fiscal consolidation program.

Thus, the discretionary fiscal policy appears to have relatively low benefits because of the small size of the fiscal multipliers and therefore a limited possibility to stimulate the economy in case of a recession. However, the fiscal policy has a significant impact on real GDP growth in the case of a negative output gap. In this context, the benefits of prudent fiscal policies during boom periods are obvious, as the fiscal space created in this way could be used to stimulate the economy in the case of recession. A rule-based fiscal policy, in fact adopted by Romania with the signing of the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union, seems appropriate for the low levels of the fiscal multipliers in absolute terms, which have a higher value in recession, but not sufficient to advocate for a discretionary fiscal policy.

Considering the elaboration of an optimal fiscal consolidation program, the low level of fiscal multipliers is an argument in favour of implementing a consolidation package based on a sharp deficit reduction in the first part of the envisaged period for fiscal consolidation, followed by a gradual completion of the program within the period considered, instead of implementing a gradual adjustment in which the most important part occurs towards the end of the envisaged period. The benefits linked to the risk premiums reduction determined by the fiscal sustainability restoration and thus an interest reduction with impact on public investment and interest expenses may occur more quickly. In terms of the mix between spending cuts and tax increases, the determined fiscal multipliers are not likely to provide an answer to this question, given

the difficulties of estimating the net tax multiplier through these methods. However, despite this frequent situation, the majority of economists consider that the fiscal adjustment is preferable to be achieved on the expenditure side, in view of the possible long-term response of the aggregate supply to tax increases, but also the central banks' policy of accommodating more frequent to fiscal consolidation programs through expenditure. This is because the increase in indirect taxes (VAT, excises) has a direct impact on prices and is opposed to the objective of price stability, so the central banks are reluctant to reduce interest rates in response to the reduction in the aggregate demand generated by such measures.

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