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Is Discretionary Fiscal Policy Effective? Evidences for Tunisia and Egypt

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***A*bstract:** This paper applies multivariate Blanchard-Perotti SVAR methodology to analyze disaggregated short-term effects of fiscal policy on macroeconomic aggregates in Egypt and Tunisia. The main finding of this paper is that, strong evidence shows that fiscal policy procyclical in Egypt and Tunisia. This procyclicality arises from the weakness of automatic stabilizers and the procyclical bias of discretionary fiscal policy.

The principal results of this paper are: (i) positive shocks to government spending caused crowding out effects. (ii) The impact of fiscal shocks on inflation and interest rates is mostly economic counterintuitive. Revenue shock in the short term decreases inflation and interest rate in Egypt and increases inflation and interest rate in Tunisia. An expenditure shock decreases inflation and interest rate in Egypt. The case of Tunisia seems to be more economically intuitive, in fact, an expenditure shock decreases inflation, in the short run, while in the medium run, inflation increases above the initial level, while interest rate acts in the opposite direction.

JEL Classifications: E32, E62; H30, H50; C12

Keywords: SVAR model, Fiscal shocks, Government spending, Tax revenues

1. Introduction

Fiscal policy is assessed to have significant effects both on micro-decisions of economic agents as well as on aggregate economic activity. In this context, government is an important player in any economy, and its fiscal policies regarding taxes and spending affect disposable income, consumption, investment and private agent's decisions in general. Nevertheless, compared to the large empirical evidence on the effects of monetary policy, research on fiscal policy effects has received much less attention. In many ways, this is due to the political dependence but also because of its complexity and distributional dimension. Consequently, the apprehension on the effects of fiscal policy remains limited (Leeper (2010)). This lack of attention contrasts with recent public

debates on the role of fiscal policy in the period of crisis (Spilimbergo *et al.* (2008), Alfonso *et al.* (2010).

Furthermore, researcher's views on both the short run and long run effects of fiscal policy remain rather mixed. This heterogeneity is also in line with divergent theoretical underpinnings: neoclassical models state that the private consumption should fall following a positive shock to government consumption via the so-called crowding out effect, while models with (neo) Keynesian features find the opposite (Woodford (2010)).

Although the theoretical literature is well developed for fiscal policy but it has received much less attention in applied economic research until recently. The empirical literature on fiscal policy can be grouped into three categories. The first category focuses on the evaluation of the macroeconomic impact of large reductions in the budget deficit. The second line of research analyzes the stabilization capability of fiscal policy variables. Finally, the dynamic effects of discretionary fiscal policy on macroeconomic variables have recently been revived within the framework of vector auto-regression in the work of Blanchard and Perotti (2002).

This new empirical macroeconomics has been applied mainly for developed economies while developing economies have received little attention so far in these applications, in spite of its relevance to tackle real policy issues such as fiscal policy. Countries such as Tunisia and Egypt are currently faced with sharp shocks such as temporary expansionary fiscal policy needed to respond to the new aspirations of their citizens. Additional budgets have been put in place in order to accommodate these new expectations.

This paper aims at addressing these issues within the SVAR framework used in Perotti (2002). The objective of this paper is to estimate a SVAR model for Tunisia and Egypt and to use it for the simulation of such policy shocks. We would like to assess whether additional temporary government spending is likely to help achieve merely social goals or to result in real effects on economic activity and employment. To this end, the results of fiscal shocks on economic activity, inflation and interest rate will be shown and analyzed. Fiscal shocks are disaggregated into two components: revenue and expenditure shocks, so the difference between the effects of these shocks, the mutual influence and the intensity and duration will be examined.

Hence, this paper aims to examine the implication of the use of disaggregated fiscal policy instruments and to investigate the strength of fiscal policy in terms of business cycle smoothing. The empirical research will provide answers to the fundamental questions of this paper, referring to the direction, intensity, and duration of disaggregated macroeconomic consequence of fiscal shocks.

This paper is organized as follow: Section 2 presents theoretical and empirical reviews. Section 3 outlines the specification of the VAR model and the identification method. Section 4 discusses the effects of fiscal shocks. In addition, section 5 presents conclusion and policy recommendations.

2. Empirical Reviews

To analyze the effects of fiscal policy on economic activity, the empirical literature includes three types of studies. First, one based on the estimation of fiscal multipliers through macroeconomic model simulations and reduced form equations. Second studies, which analyze the episodes of fiscal contraction. Third studies which evaluate the determinants of fiscal multipliers and elaborate the relationship between fiscal policy, interest rates, investment and exchange rates.

To derive the estimates for multipliers, empirical literature employs two types of models; large macroeconomic models estimated empirically such as the IMF MULTIMOD Model (Saito (1997)) and Small Dynamic General Equilibrium Models that are calibrated and then solved numerically

(Rotemberg and Woodford (1992), Devereux *et al* (1996), Ramey and Shapiro (1998)). However, these estimates depend on the specification of fiscal policy shocks, the monetary policy response function and the extent to which expectations are forward looking (Hemming (2002)).

There are number of studies, which employ reduced form equations to evaluate the impact of fiscal policy on output (Romer and Romer (2007), Perry and Schultz (1993)). Barro (1981) finds that temporary changes in defence spending have strong positive effect on output. While estimating the fiscal policy effects on activity, endogeneity problem can be dealt with by the identification of exogenous fiscal shocks. Ramey and Shapiro (1997) identify three episodes of sharply increased military spending and use these as dummy variables in a univariate autoregressive equation for GDP.

Due to the institutional factors and data deficiencies, little empirical literature is available on the short-term effects of fiscal policy on economic activity for developing countries. Gupta *et al*. (2005) examine the fiscal adjustment and expenditure composition on growth in short run for 39 low-income countries. They find that one percent reduction in the deficit to GDP ratio results in per capita real growth of 0.25 to 0.5 percent in the short run and Keynesian effects of fiscal policy are larger for those low-income countries who have achieved fiscal and macro stability. Haque and Montiel (1991) estimate a dynamic, small open economy Mundell Fleming model for a sample of 31 developing countries and suggest that a short and medium term effects of increased government spending are contractionary while there is no long-term effect.

Recursive approach. This approach identify the VAR model using Cholesky decomposition (recursive ordering) as suggested by Sims (1980). Fatas and Mihov (2001) applied Sims method to fiscal VAR model to identify fiscal shocks. According to this approach, the first variable ordered in the system (government spending in the three variables VAR) responds only to its own exogenous shock. The next variable (output) responds to government spending contemporaneously and to its own shock. The third variable, taxes, ordered last will respond contemporaneously to both variables (government spending and output). The advantage of this method is its simplicity, so the results are strongly sensitive to the ordering of variables in the model.

Sign restriction approach. This approach was developed by Montford and Uhlig (2002) by using sign restriction to identify fiscal shocks while controlling for the monetary and business cycle shocks. The identification method of imposing sign restriction on impulse response functions helps in addressing three main difficulties in using vector auto-regression: firstly the distinction between systematic discretionary shocks and automatic response of fiscal variables to business and monetary shocks, secondly the definition of fiscal shock and thirdly the issue of lag between the announcement and the implementation of fiscal policy since the announcement may results in changes in macroeconomic variables before there are movements in the fiscal variables. This approach in contrast to the other approaches relies on macroeconomic time series data alone for shock identification and does not require assumption about the sluggish reaction of some variables to the macroeconomic shocks (Montford and Uhlig (2002)).

Narrative approach. The last approach is the narrative approach/ the dummy variable or the event study approach developed by Ramey and Shapiro (1998), Eichenbaum, Edelberg and Fisher (1999) to identify the periods of military build-ups for the US economy. They tried to capture the dynamic effects of a shock in government spending by constituting dummy variables for the increase in government defence spending. Assumption is that these build-ups are exogenous to GDP and unanticipated by the private sector. The fiscal shock is identified by tracing the impulse response of the date dummies. The response of private consumption to a fiscal policy shock was founded negative.

Blanchard and Perroti approach. This approach is applied by Blanchard and Perroti (2002). The authors apply a methodology, which combines institutional information and SVAR analysis. This is also the approach taken in this paper and is discussed further in the following sections.

3. Econometric Approach

This section describes the model and approach for estimating the effects of fiscal policy on economic activity.

3.1 Specification

Our identification of fiscal policy shocks is based on the methodology of Blanchard and Perotti (2002) and Perotti (2002). Their approach is closely related to the one proposed by Bernanke and Mihov (1996). The main idea is to exploit fiscal policy decision lags to identify discretionary fiscal policy shocks.

As usual, the strategy to identify the structural shocks in VAR model consists on imposing restrictions based on economic theory and the behaviour of policy makers.

The reduced form VAR model is defined by the following dynamic equation:

$$X_t = C(L)X_{t-1} + U_t$$

Where $X_t = [TA, G, Y, P, R]$, and $U_t = \left[u_t^{TA}, u_t^G, u_t^Y, u_t^p, u_t^R\right]$. $X_t, C(L), U_t$ are respectively the vector of endogenous variables, an autoregressive lag polynomial in the operator L and the vector of reduced form residuals.

Three variables are retained to capture the effect of fiscal policy on economic activity. TA presents real net taxes, G real government spending and Y real GDP. All variables are log-transformed. The variable P represents price level measured from GDP deflator. R measures short term interest rate. We assume these two variables to control the impact of the monetary policy.

Data are extracted from databases IFS, WDI, and GFS. We use quarterly data, because this is essential for identification of the fiscal shocks. The number of lags for the VAR is chosen to be four as suggested by the Akaike information (AIC). The residuals of the 4-lags VAR model appear to be serially uncorrelated, further supporting this lag length choice.

3.2 Identification Method

The reduced form residuals of the TA_t and G_t equations, u_t^{TA} and u_t^G can be thought as linear combinations of three types of shocks: first, the automatic response taxes and government spending to innovation in output, prices and interest rates. In the case of the residual from the net tax equation, it is useful to think of this component as the unanticipated changes in taxes in response to output innovations, given the tax rates and the definition of tax base. Second, the systematic, discretionary response of policymakers to output, price and interest rate innovations; again in the case of the net tax residual, it is useful to think of this component as change in tax rates in response to output innovations. Third, random discretionary shocks to fiscal policies; these are "structural" fiscal shocks, which unlike the reduced form residuals are uncorrelated with each other and with all other structural shocks (Perotti (2002)).

We follow the identification method proposed by Blanchard and Perotti (2002) and Perotti (2002). As it is standard in the literature on Structural VAR, we assume the following relationship between the reduced form residual U_t, and the structural shocks V_t

$$AU_t = BV_t$$

Where the structural innovations V_t are assumed orthogonal, the covariance matrix is assumed an identity matrix $E\left(V_t V_t^{'}\right) = I$. Only fiscal shocks have a clear economic interpretation in our analysis.

The matrix A and B describe the instantaneous relations between the reduced form residuals and the structural shocks, we can obtain the structural form of the VAR by pre-multiplying (1) by the matrix A:

$$AY_t = AC(L)Y_{t-1} + AU_t = AC(L)Y_{t-1} + BV_t$$

The representative system of equations presented by Perotti (2002) is as the following form:

$$u_t^{ta} = \alpha_{ty} u_t^y + \alpha_{tp} u_t^p + \alpha_{tR} u_t^R + \beta_{tg} v_t^g + v_t^{ta}$$
$$u_t^g = \alpha_{gy} u_t^y + \alpha_{gp} u_t^p + \alpha_{gR} u_t^R + \beta_{gt} v_t^{ta} + v_t^g$$
$$u_t^y = \gamma_{yt} u_t^{ta} + \gamma_{gy} u_t^g + v_t^y$$
$$u_t^p = \gamma_{py} u_t^y + \gamma_{pt} u_t^{ta} + \gamma_{pg} u_t^g + v_t^p$$
$$u_t^R = \gamma_{Rt} u_t^y + \gamma_{Rp} u_t^p + \beta_{Rta} v_t^{ta} + \beta_{Rg} v_t^g + v_t^R$$

The coefficients $\alpha_{i,j}$ capture both the automatic elasticity of fiscal variable i to the "macroeconomic" variables j and the discretionary change in variable i enacted by the policymaker in response to an innovation in these macro variables. The coefficients $\beta_{i,j}$ measure instead how the structural shock to the fiscal variables affect contemporaneously the fiscal variable i. To estimate the effects of unexpected exogenous changes in fiscal policy, one is interested in recovering the series of the shocks v_t^g and v_t^{TA}

The main interest of this paper is the identification of structural shocks v_t^{ta} and v_t^g, and studying the responses of the macroeconomic variables, in particular real GDP, to these shocks. To identify these two structural shocks we need to impose further restrictions. Here we use the observation made by Blanchard and Perotti (2002) and Perotti (2002) that is takes policymakers and legislatures more than a quarter to react to a GDP shock. This virtually eliminates the possibility of discretionary adjustment of fiscal policy in response to unexpected movements in GDP, inflation and interest rate.

Still, without further restrictions, one would not be able to identify the coefficient $\alpha_{i,j}$; for instance, in the first equation an OLS regression of u_t^{ta} on u_t^y, u_t^p, u_t^R is equivalently to a Choleski decomposition where fiscal policy variables are ordered at last which would not provide a consistent estimate of α_{ty}, since output, inflation and interest rates could all respond to fiscal shocks in the same quarter. In order to identify the system, we need an external estimate of the automatic contemporaneous elasticities $\alpha_{i,j}$.

The approach used here was based on two assumptions. It takes longer than three months to decide and implement a discretionary change in fiscal policy in response to observed output or price innovations. As a consequence, in quarterly data the systematic discretionary components u_t^g and u_t^{ta} is zero: the coefficients $\alpha_{i,j}$ reflect only the first component, the automatic response to economic activity. This would still be of little help if one had to estimate the $\alpha_{i,j}$, because v_t^g and v_t^{TA} are correlated with the reduced form residuals. We compute these elasticities based on institutional information, as described in Appendix. With these elasticities, one can define the cyclically adjusted fiscal shocks as:

$$u_t^{ta,CA} = u_t^{ta} - (\alpha_{ty} u_t^y + \alpha_{tp} u_t^p + \alpha_{tR} u_t^R) = \beta_{tg} v_t^g + v_t^{ta}$$
$$u_t^{g,CA} = u_t^g - (\alpha_{gy} u_t^y + \alpha_{gp} u_t^p + \alpha_{gR} u_t^R) = \beta_{gt} v_t^{ta} + v_t^g$$

This is the first step of the identification procedure. In the second step, the two structural shocks v_t^g and v_t^{TA} must be identified. To do so, one needs to take stance on the relative ordering of the two cyclically adjusted fiscal policy shocks; that is to decide which fiscal variable reacts to the other contemporaneously. One could assume that tax shocks come first; in this case $\beta_{tg} = 0$ in (3a) comes first and one can estimate β_{gt} in (3b) by simple OLS regression of the cyclically adjusted government spending residual $u_t^{g,CA}$ on the cyclically adjusted tax residual $u_t^{ta,CA}$; a symmetric procedure applies if government spending shocks comes first.

The coefficients of the equations of real GDP, GDP deflator and interest rate can be estimated recursively by means of instrumental variables regressions. One can estimate the output equation:

$$u_t^y = \gamma_{yt} u_t^{ta} + \gamma_{gy} u_t^g + v_t^y$$

Using v_t^g and v_t^{TA} as instruments for u_t^g and u_t^{TA}, and similarly for the deflator equation

$$u_t^p = \gamma_{py} u_t^y + \gamma_{pt} u_t^{ta} + \gamma_{pg} u_t^g + v_t^p$$

Finally, the interest rate equation $u_t^R = \gamma_{Rt} u_t^y + \gamma_{Rp} u_t^p + \beta_{Rta} v_t^{ta} + \beta_{Rg} v_t^g + v_t^R$ can be estimated using $v_t^{ta}, v_t^g, v_t^y, v_t^p$ as instruments.

It is necessary to point out some facts regarding the nature of the fiscal shocks whose effects we are observing. Shocks v_t^g and v_t^{TA} represent a one-time increase in expenditures or revenues by one standard deviation compared to the average of period. Perotti (2002) points out that although one can argue that due to the nature of the budget process there is only one fiscal shock per year, in practice the fiscal authorities with numerous revisions and changes in tax policy often change the course of fiscal policy.

3.2.1 Unit Root Tests

Tables 1 and 2 present the results of the standard augmented Dickey Fuller (ADF), Philips-Perron (PP) unit-root tests. The test was performed with the inclusion of both an intercept and a linear trend. Results indicate the acceptance of a null hypothesis of a unit root at 5% significance for all variables in level. However, the hypothesis of unit roots in first differences can be rejected at 5% significance for all variables tested.

Table1. Unit root tests: Egypt

		Level			First Difference		
Tests	**Variables**	**t statistics**		**Order of integrat.**	**Variable**	**t-statistics**	**Order of integrat.**
ADF	**LTA**	-1.210991		**I(1)**	**ΔLTA**	-10.75947	**I(0)**
	LG	-1.625940		**I(1)**	**ΔLG**	-5.638964	**I(0)**
	LGDP	0.219750		**I(1)**	**ΔLGDP**	-2.901023	**I(0)**
	P	0.346697		**I(1)**	**Δ P**	-3.620131	**I(0)**
	R	-0.693073		**I(1)**	**ΔR**	-3.764328	**I(0)**
PP	**LTA**	-1.433177		**I(1)**	**ΔLTA**	-6.263801	**I(0)**
	LG	-1.294720		**I(1)**	**ΔLG**	-4.802718	**I(0)**
	LGDP	-1.647811		**I(1)**	**ΔLGDP**	-3.750846	**I(0)**
	P	-1.167541		**I(1)**	**Δ P**	-3.757451	**I(0)**
	R	-0.867442		**I(1)**	**ΔR**	-3.739658	**I(0)**
ADF	**Critical values**	**1%**	**5%**	**10%**	**1%**	**5%**	**10%**
	Constance	*-3.510259*	*-2.896346*	*-2.585396*	*-3.511262*	*-2.896779*	*-2.585626*
	Intercept & trend	*-4.071006*	*-3.464198*	*-3.158586*	*-4.072415*	*-3.464865*	*-3.158974*
PP	*Constance*	*-3.507394*	*-2.895109*	*-2.584738*	*-3.508326*	*-2.895512*	*-2.584952*
	Intercept & trend	*-4.066981*	*-3.462292*	*-3.157475*	*-4.068290*	*-3.462912*	*-3.157836*

Table2. Unit root tests: Tunisia

		Level			First Difference		
Tests	**Variables**	**t statistics**		**Order of integrat.**	**Variable**	**t statistics**	**Order of integrat.**
ADF	**LTA**	-0.173403		**I(1)**	**ΔLTA**	-7.775333	**I(0)**
	LG	-2.544134		**I(1)**	**ΔLG**	-3.557635	**I(0)**
	LGDP	-1.605715		**I(1)**	**ΔLGDP**	-6.092533	**I(0)**
	P	1.542525		**I(1)**	**Δ P**	-4.643840	**I(0)**
	R	-1.440942		**I(1)**	**ΔR**	-4.388473	**I(0)**
PP	**LTA**	0.562834		**I(1)**	**ΔLTA**	-5.608914	**I(0)**
	LG	-1.767039		**I(1)**	**ΔLG**	-10.90818	**I(0)**
	LGDP	-1.597621		**I(1)**	**ΔLGDP**	-4.973357	**I(0)**
	P	1.228620		**I(1)**	**Δ P**	-4.334442	**I(0)**
	R	-0.943259		**I(1)**	**ΔR**	-5.905666	**I(0)**
ADF	**Critical values**	**1%**	**5%**	**10%**	**1%**	**5%**	**10%**
	Constance	*-3.510259*	*-2.896346*	*-2.585396*	*-3.511262*	*-2.896779*	*-2.585626*
	Intercept & trend	*-4.071006*	*-3.464198*	*-3.158586*	*-4.072415*	*-3.464865*	*-3.158974*
PP	*Constance*	*-3.507394*	*-2.895109*	*-2.584738*	*-3.508326*	*-2.895512*	*-2.584952*
	Intercept & trend	*-4.066981*	*-3.462292*	*-3.157475*	*-4.068290*	*-3.462912*	*-3.157836*

3.2.2 Cointegration Tests

As unit root tests indicate the existence of a unit root a cointegration test was the next step. The results are presented in table 3 and 4. The results of Johansen cointegration tests identify two long run relationships among the variables. Such a result suggests that a Structural Vector Error Correction Model could be estimated to consider the cointegration relations.. The absence of cointegration relationships that are economically relevant Biau and Girard (2005), reject SVECM specification. In addition, Blanchard and Perotti (2002) find no significant difference in results when imposing the cointegration relationship among the variables. Consequently, the SVAR model in this analysis is specified in levels.

Table 3. Cointegration test: Egypt

Hypothesis	Trace statistic	0.05 Critical value	Probability
None***	76.51344***	60.06141	0.0011
At most 1**	45.82074**	40.17493	0.0122
At most 2	23.34115	24.27596	0.0653
At most 3	4.364148	12.32090	0.6582
At most 4	0.989847	4.129906	0.3710

Note: Asterisks ** and *** imply statistical significance at the levels of 5% and 1%, respectively.

Table 4. Cointegration test: Tunisia

Hypothesis	Trace statistic	0.05 Critical value	Probability
None***	100.7001***	88.80380	0.0053
At most 1**	66.94751**	63.87610	0.0270
At most 2	39.97576	42.91525	0.0955
At most 3	18.17815	25.87211	0.3321
At most 4	6.854175	12.51798	0.3600

Note: Asterisks ** and *** imply statistical significance at the levels of 5% and 1%, respectively.

4. Empirical Results

Plots in figures 1, 2, 3, 4 display the dynamic impact of government expenditures and taxes upon the GDP, inflation and interest rates for a horizon of 10 quarters, the shock amounting to a positive innovation (increase) of both the fiscal variables. Each graph includes a point estimation of impulse response functions as well as lower and upper bounds for 95 per cent confidence interval. As usual, the solid lines depict the variable percent change in response to a standard deviation of one in the respective fiscal variable whereas the dotted lines represent the 95 per cent error bands.

While interpreting the fiscal variables shocks one should have in mind that shocks from government spending or revenues are not caused by any of the other variables in the model, because the structural shocks are derived from residuals of the VAR equation.

4.1 Effects of Government Spending

In this section, we comment the response of the fiscal and the macroeconomic variables to exogenous shocks to government spending. The impulse responses are constructed assuming a shock equal to a standard deviation of one. The response of variables to positive innovations in government spending shows behavioural patterns that cast doubts on the real effect of shocks. The magnitude of impact upon GDP, inflation and interest rates were surprisingly minimal following a standard deviation of one increase in fiscal variables.

Figure 1 shows the responses of endogenous variables to a positive shock in government expenditure in Tunisia. It reflects that an increase in government spending raises the real GDP in the short run and this result is persistent over six quarter's times. It increases on impact by around 0.07 percentage points and then it increases further to reach a peak of 0.15 percentage points in the 3th quarter. It slowly returns to trend by the end of 6th quarter after which it turns into a negative effect.

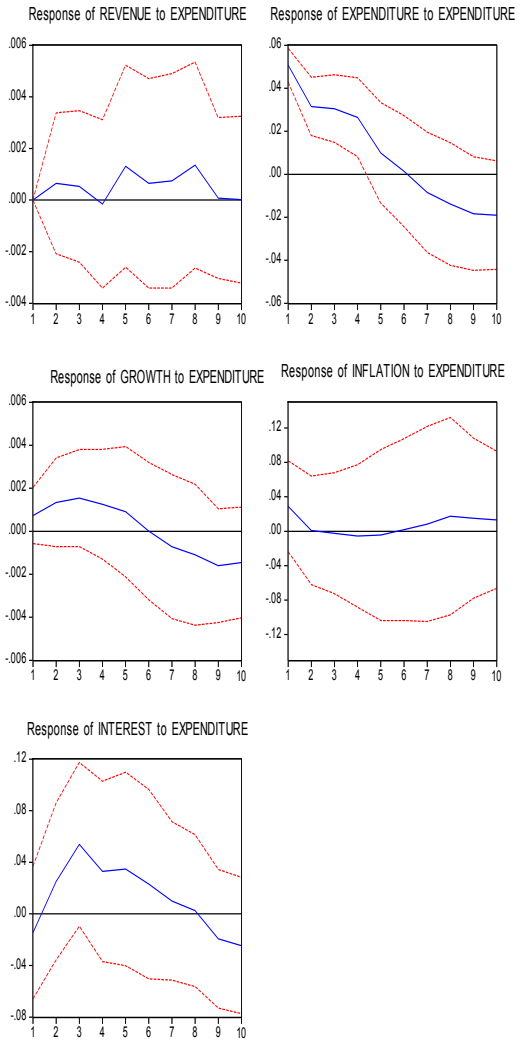

Figure 1. Impulse Response Functions of Government Spending in Tunisia

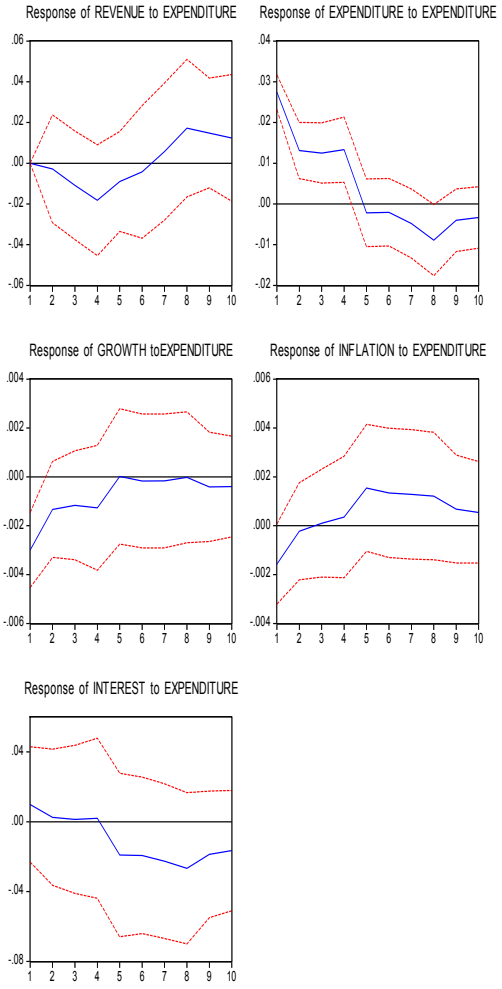

Figure 2. Impulse Response Functions of Government Spending in Egypt

Figure 2 presents the impulse response functions for Egypt. It reveals that real GDP falls in case of expansive fiscal policy in terms of high government spending in the short run. The mentioned effect vanishes within four quarters. It decreases on impact by around -0.03 percentage points. After four quarters, it turns into a positive effect and reach a peak of +0.001 percentage points. A possible explanation of this unconventional direction of influence (negative effect) may be the predominant of the crowding out effects of private investment as against the output effect in Egypt.

Figures 2 and 3 show the cumulative responses of output to government spending shock for each country. With the cumulative responses, we present the total increase of GDP during the period due to fiscal policy shock.

In Tunisia, the cumulative response of GDP to a shock in spending is positive throughout the shown period and reflects that output increases by 57% over the time span of six quarters but the

multipliers value is still less than one. The GDP responses to government spending shocks appear quite small, if compared to standard textbook presentations of the impact of fiscal expansions. In Egypt, the cumulative response of GDP to a spending shock is negative during all shown period.

In conclusion, in Tunisia and for GDP case, the impulse response pattern permits to infer that, the fiscal shock gives way to a typical but limited Keynesian demand push, lasting for six quarters; it is worth stressing here that apart from the fact that the lack of persistence is accompanied by a rather negligible response size (less than 0.2 percent), the response soon becomes negative raising suspicions of crowding out effects.

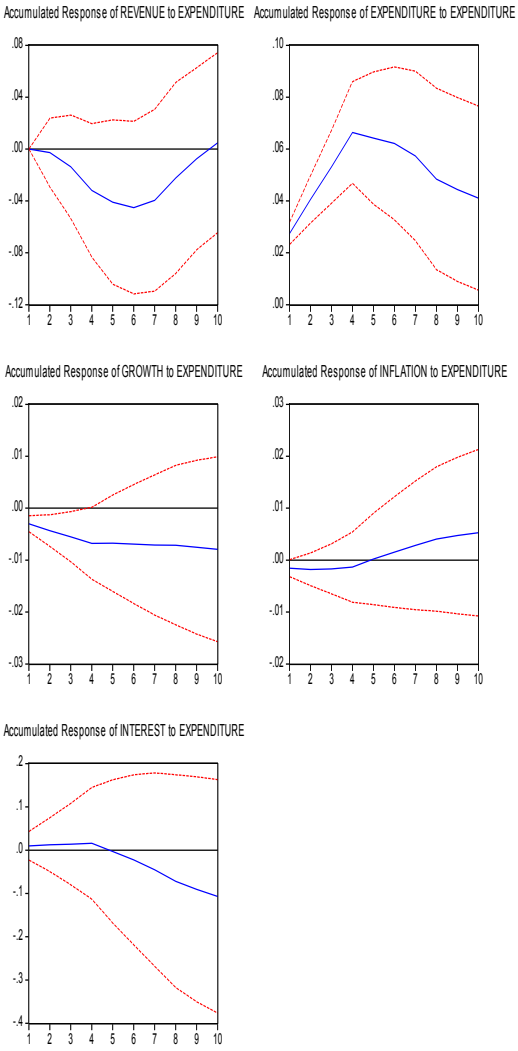

Figure 3. Accumulated Impulse Response Functions of Government Spending in Tunisia (Five plots on the left)

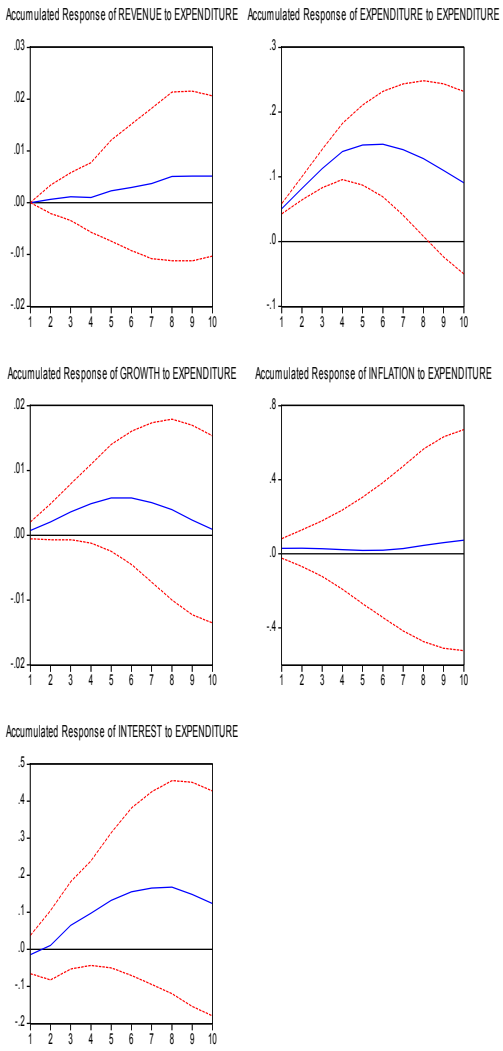

Figure 4. Accumulated Impulse Response Functions of Government Spending in Egypt (Five plots on the right)

The effect of an expenditure shock on revenues appears quite small and disappears after four to five quarters. This effect is in line with the growing public debt, because if taxes are not sufficiently responsive to increase in government expenditure, the needed fund will be debt-financed.

Expenditures are quickly stabilized after the initial shock of spending, from which it is evident that future level of government spending do not depend on independent expenditures shocks.

Higher government spending brings about a positive response of Consumer Price Index. In Tunisia, spending shock has a minimal effect on inflation (0.02 percentage points) that vanishes within two quarter. This increase is entirely offset in the second quarter. Afterwards the effects are negligible. The response of the price level is close to zero during the remaining period. The limited response of inflation to government spending shock is in line with results obtained by other studies (Perotti (2002), Henry, *et al* (2004)).

For Egypt, expenditure shock has a more pronounced inflationary effect. The response of inflation rate is hump-shaped. Initially, the inflation rate falls by -0.15 percentages points, afterwards it increases and remains constantly positive. It reaches a peak in the 5th quarter, at 0.15 percentages points.

An expenditure shock lowers the interest rate within one quarter and again raises it above the initial level at which it is maintained for seven quarter in Tunisia. In Egypt, expenditure shock on interest rate has insignificant effect in the first three quarters after which it turns into a negative effect.

4.2 Effects of Tax Revenues

In this section, we present the response of the fiscal and the macroeconomic variables to exogenous shocks to tax revenues. Figures 5 and 6 plot the impulse responses of tax revenue in Tunisia and Egypt; Figures 7 and 8 plot the accumulated impulse response in Tunisia and Egypt, respectively. The impulse responses are constructed assuming a shock equal to a standard deviation of one. It is important to highlight in the beginning that the effect of a standard deviation of one increase in tax revenues on GDP, inflation and interest rates were surprisingly minimal.

In Egypt, revenue shock on GDP has negative effect in the first two quarters after which it turns into a positive, but volatile effect. After 8 quarters, the mentioned effect vanishes. It decreases in impact by around -0.2% percentage points and then it increases further to reach a peak of 0.2 percentage points in the 5th quarter. It slowly returns to trend by the end of 8th after which it turns into negative effect. The cumulative response of GDP to a revenue shock is positive along time horizon.

In Tunisia, the impulse response function shows the opposite pattern. In fact, revenue shock on GDP has positive effect in the first four quarters after which it turns into a negative effect. It increases in impact by around 0.5% percentage points after then it decreases further to reach a trough of -0.5 percentage points in the 8th quarter.

The cumulative response of GDP to a revenue shock is negative in the period of shock and in the first quarters. It becomes positive in the 4th quarter and remains positive until the end of the presented period.

Product's negative response to shocks to taxes depicted by the graph for at least two quarters in Egypt and four quarters in Tunisia seems to be somehow agreeing with supply-side supporters' view that a displacement of private economic activity is to be expected soon after a tax increase. Nevertheless, the markedly low impact along time horizon calls for caution when uttering definite conclusions.

Government spending falls in case of tight fiscal policy in terms of high tax revenue in Tunisia. This finding is theoretically inconsistent because higher revenues encourage government spending. In Egypt revenues shock increases government expenditures after two quarters of negative effect.

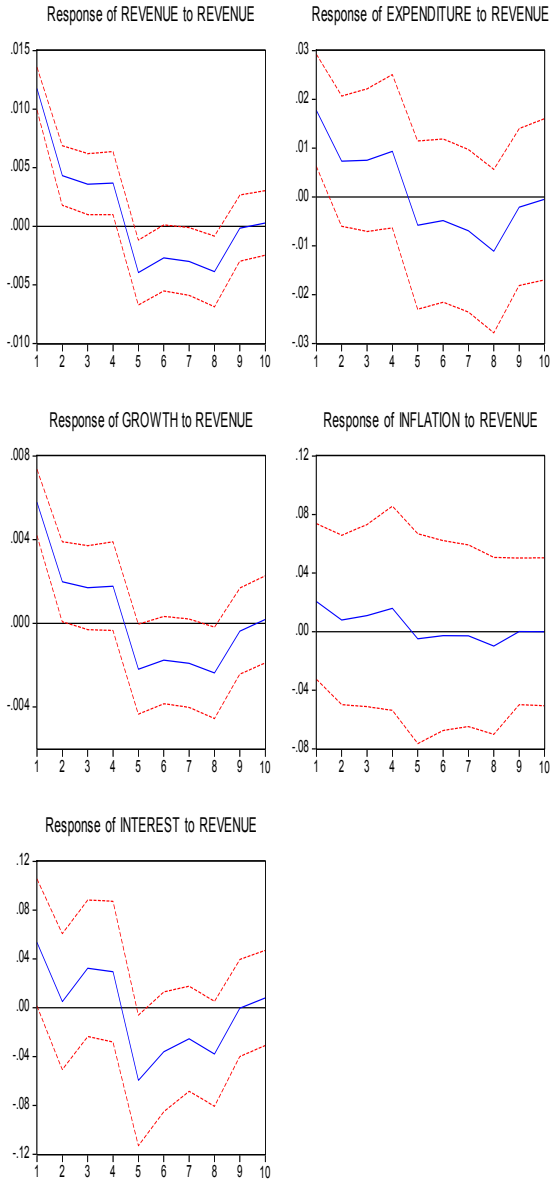

Figure 5. Impulse Response Functions of Tax Revenue in Tunisia

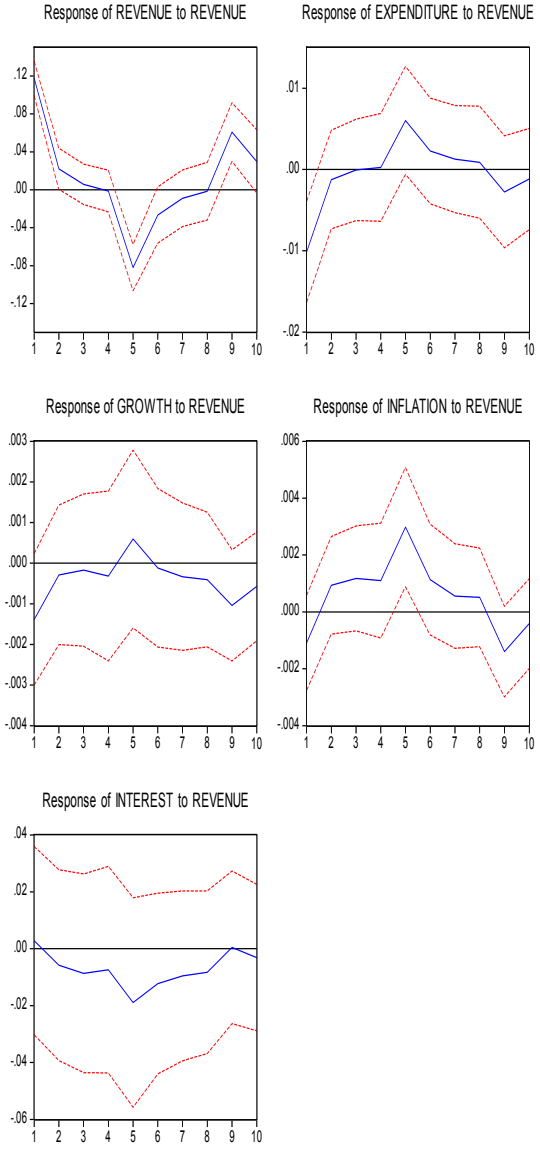

Figure 6. Impulse Response Functions of Tax Revenue in Egypt

In both countries, revenues shocks have a minimal effect on inflation. In Tunisia, the initial four quarter revenue shock effect on inflation is positive when it turns to the negative effect, which prevails until the 10th quarter, which is consistent with the textbook knowledge of the economic policy of stable exchange rate (Gartner (2006), Mankiw (2007)). A tax shock raises inflation the first six months and then it stabilizes in spite of the presence of the permanent effect of taxes. This is because the shock is implemented in the inflationary expectations after one year. So, for Egypt an increase in tax revenues decrease inflation in short term. This effect is persistent over four quarter's times after which it turns into positive effect during two quarters and then become negative until the end of observation's period.

Revenues shocks have the greatest impact on the interest rate in Tunisia. In Egypt, the impact is surprisingly minimal, so the directions of effects are in line with the conclusion of textbook on a stable exchange rate (Gartner (2006), Mankiw (2007)). Interest rate reacts negatively to the tax shock, and return to the initial level. In Tunisia, the initial four quarter tax shock effect on interest rate is positive when it turns to the negative effect that prevails until the 9th quarter.

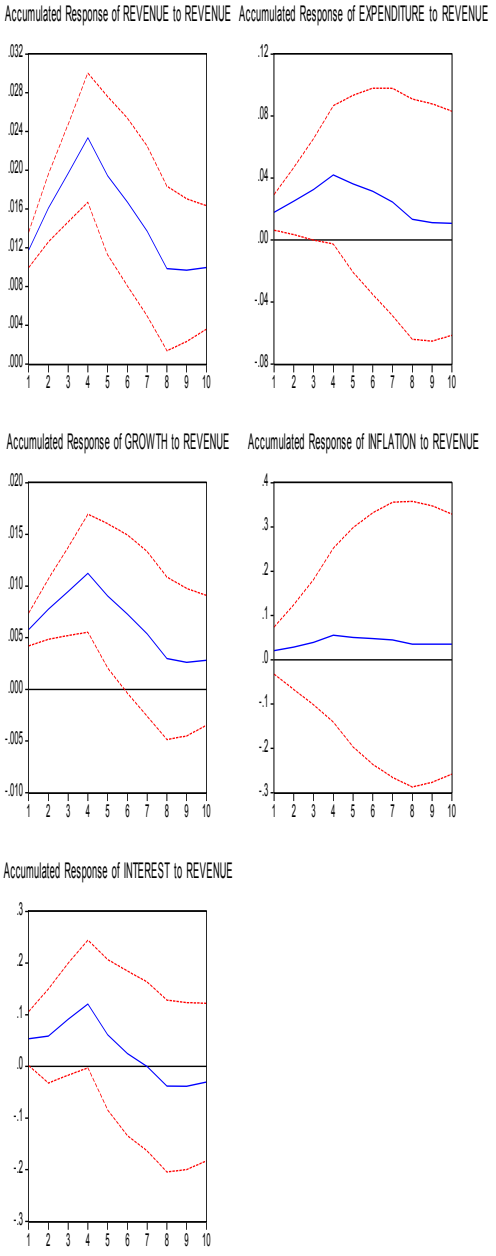

Figure 7. Accumulated Impulse Response Functions of Tax Revenue in Tunisia

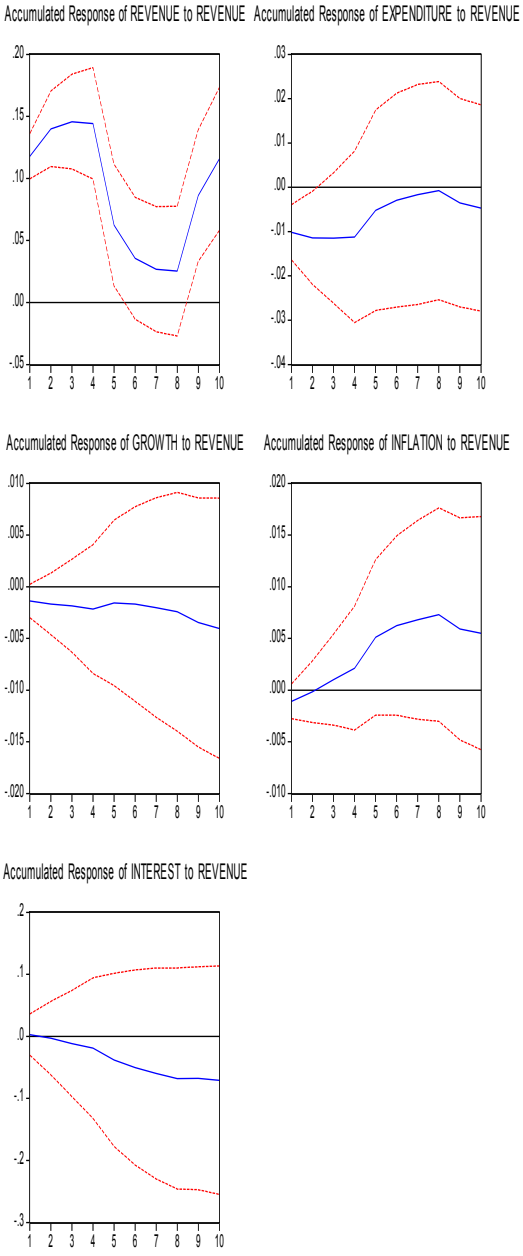

Figure 8. Accumulated Impulse Response Functions of Tax Revenue in Egypt

5. Conclusions and Policy Recommendations

In this paper, the effects of fiscal policy shocks on the Tunisian and Egyptian economies are quantified using the Blanchard and Perotti (2002) SVAR approach. This paper has studied the effects of fiscal policy on GDP, inflation and interest rate.

According to the impulse response functions, we can conclude that: (1) positive shocks to government spending caused increasing production impact but soon after the plot's decreasing pattern supplied crowding out evidence. (2) The interest rate shows the relatively strongest response to fiscal shocks, while the inflation shows the weakest response. (3) The impact of fiscal shocks on inflation and interest rates is mostly counterintuitive. Revenue shock in the short term decreases inflation and interest rate in Egypt and increases inflation and interest rate in Tunisia. An expenditure shock decreases inflation and interest rate in Egypt. The case of Tunisia seems to be more economically intuitive, in fact, an expenditure shock decreases inflation, in the short run, while in the medium run, inflation increases above the initial level, while interest rate acts in the opposite direction.

We believe that the contribution of this paper is in study of the consequences of fiscal policy on inflation and interest rate, and separately observing the effects of fiscal policy instruments, as well testing their mutual influence.

The main finding of our paper is that there is strong evidence that fiscal policy is procyclical in Egypt and Tunisia. This procyclicality arises from both the weakness of automatic stabilizers and the procyclical bias of discretionary fiscal policies.

Despite the fact that in industrial countries countercyclical discretionary policy contributes to dampen aggregate fluctuations, in developing economies discretionary policy is usually procyclical. In addition, in most MENA countries automatic fiscal stabilizers – such as income taxes and transfer programs built into the fiscal system – are too small to have a significant smoothing effect on aggregate fluctuations.

The stance of fiscal policy should continue to improve. In Egypt, despite the adjustment efforts in the recent years, sizable budget deficits and their financing needs continue to create uncertainties about effectiveness of fiscal policy. Other specific features of the budgetary structure constitute a challenge for Tunisia and Egypt. These include the difficulty to generate tax revenue, in particular for direct tax and rigidities on the expenditure side due to the high share of wage and salaries, subsidies, military spending and interest expenditure.

Countercyclical discretionary fiscal policy requires advanced institutional reforms. Running optimal fiscal policies requires a reduction of public indebtedness. This can only be achieved via reform of public finances, continued fiscal discipline and sustained economic growth. Enhancing and maintaining fiscal discipline will be facilitated by improving the institutional framework in which fiscal policy operates, via more effective budgetary management and transparency, and eventually via fiscal rules, which so far not being widely used in the region.

Fiscal policies need to be credibly and sustainably financed. There is consensus that fiscal interventions need to be timely in order to be effective, and that mistimed interventions can be counter-productive. This has been a challenge in Tunisia and Egypt where data quality (to identify downturns and recoveries in real time) and fiscal institutions (to design and implement any proposed spending increases) are weak.

References

[1] Alesina, A., and Perotti, R. (1995), "Fiscal Expansion and Adjustment in OECD Countries", *Economic Policy*, 21: 205-240.

[2] Alfonso, A. Gruner, H. & Kolerus, C. (2010), "Fiscal Policy and Growth do Financial Crises Make a Difference", *Working Paper* No.1217, European Central Bank.

[3] Barro, R. (1974), "Are Government Bonds Net Wealth", *Journal of Political Economy*, 82(6): 1095-1117.

[4] Barro, R. (1981), "Output Effects of Government Purchases", *Journal of Political Economy,* 89(6): 1086-1121.

[5] Bartolini, L., Razin, A., and Symansky, S. (1995), "G7 Fiscal Restructuring in the 1990s: Macroeconomic Effects", *Economic Policy*, 20: 109-146.

[6] Baxter, M., and King, R. (1993), "Fiscal Policy in General Equilibrium", *American Economic Review*, 83(3): 315-334.

[7] Blanchard, O. and Perotti, R. (2002), "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output", *The Quarterly Journal of Economics,* 117(4): 1329-1368.

[8] Blinder, A., and Solow, R. (1973), "Does Fiscal Policy Matter", *Journal of Public Economics*, 2(4): 319-337.

[9] Devereux, M., Head, A., and Lapham, B. (1996), "Monopolistic Competition, Increasing Returns, and the Effects of Government Spending", *Journal of Money, Credit, and Banking*, 28(2): 233-254.

[10] Edelberg, W., Eichenbaum, M., and Fisher, J. (1999), "Understanding the Effects of a Shock to Government Purchases", Review *of Economic Dynamics*, 2(1): 166-206.

[11] Fatas, A., and Mihov, I. (2001), "Government Size and Automatic Stabilizers: International Evidence", *Journal of International Economics*, 55(1): 3-28.

[12] Giavazzi, F., and Pagano, M. (1990), "Can Severe Fiscal Contractions be Expansionary? Tales of Two Small European Countries", *NBER Macroeconomics Annual*, Vol.5: 75-110.

[13] Gupta, S., Clements, B., Baldacci, E., and Mulas-Granados, C. (2005), "Fiscal Policy, Expenditure Composition and Growth in Low Economic Countries", *Journal of International Money and Finance*, 24(3): 441-463.

[14] Haque, N., and Montiel, P. (1991), "Dynamic Reponses to Policy and Exogenous Shocks in an Empirical Developing Country Model with Rational Expectations", *Economic Modelling*, 8(2): 201-218.

[15] Hemming, R., Kell, M., and Mahfouz, S. (2002), "The Effectiveness of Fiscal Policy in Simulating Economic Activity- A Literature Review", *IMF Working Paper* No.02/208.

[16] Leeper, E. (2010), "Monetary Science, Fiscal Alchemy", Prepared for the Reserve Bank of Kansas City's Jackson Hole Symposium, *Macroeconomic Policy: Post-Crisis and Risk Ahead*, August 26-28, 2010.

[17] Lucas, R. (1976), "Econometric Policy Evaluation: A Critique", *Carnegie Rochester Conference Series on Public Policy*, 1(1): 19-46.

[18] Mountford, A., and Uhlig, H. (2002), "What are the Effects of Fiscal Policy Shocks", *CEPR Discussion Papers* No. 3338.

[19] Perotti, R., and Kontopoulos, Y. (1999), "Government Fragmentation and Fiscal Policy Outcomes: Evidence from OECD Countries", In: James M. Poterba & Jürgen von Hagen (eds), *Fiscal Institutions and Fiscal Performance*, Chicago: University of Chicago Press.

[20] Perotti, R. (2002), "Estimating the Effects of Fiscal Policy in OECD Countries", *Working Paper 186,* European Central Bank. [On-line] Available at www.ecb.int/pub/pdf/scpwps/ecbwp168.pdf .

[21] Ramey, V., and Shapiro, M. (1998), "Costly Capital Reallocation and the Effects of Government Spending", *Carnegie Rochester Conference on Public Policy*, 48(1): 145-194.

[22] Romer, C., and Romer, D. (2007), "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Policy", *NBER Working Paper* No.13264.

[23] Rotemberg, J., and Woodford, M. (1992), "Oligopolistic Pricing and the Effects of Aggregate Demand Activity", *Journal of Political Economy*, 100(6): 1153-1207.

[24] Saito, J. (1997), "The Japanese Business Cycle After 1991: How is it Different, and Why?" *Journal of Asian Economics*, 8(2): 263-293.

[25] Sargent, T., and Wallace, N. (1975), "Rational Expectations, the Optimal Monetary Instrument and the Optimal Money Supply Rule", *Journal of Political Economy*, 83(2): 241-254.

[26] Spilimbergo, A., Symansky, S., Blanchard, O., and Cottarelli, C. (2008), "Fiscal Policy for the Crisis", *IMF Staff Position Note, SPN/08/11*, International Monetary Fund. [On-line] Available at www.imf.org/external/pubs/ft/spn/2008/spn0801.pdf .

[27] Woodford, M. (2010), "Simple Analytics of the Government Expenditure Multiplier", *NBER Working Paper* No.15714.