Measuring the dynamic Effects of Fiscal Policy shocks in Pakistan

by

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Abstract
This preliminary study characterizes the dynamic effects of shocks in government spending and taxes on macroeconomic variables in Pakistan. It employs a five variable structural Vector Auto regression model covering the time period 1973:1-2008:4 for the variables GDP, inflation, the interest rate, net taxes and government expenditure. The identification of fiscal policy shocks is achieved through two approaches; the recursive approach proposed by Fatas and Mihov (2001), and the structural VAR approach proposed by Blanchard and Perotti (2002).

1. Introduction
The role of fiscal policy in influencing economic activity has been one of the most extensively discussed issues by both academics and policy-makers. The contemporary literature on the role of fiscal policy can be divided into two general schools of thought. The neo-classical literature claims that the expansionary fiscal policy decreases private sector output through crowding out and hence inflation. An increase in public debt leads to an increase in the interest rates which in turn decrease output and inflation. In addition, an increase in public debt leads to an increase in public expectations of future taxes, which in turn increases labour supply and consequently lower real wages and consumption, and along with current activity and inflation. On the other hand, the New Keynesian School argues that the increase in public spending increases demand and hence increases economic activity, i.e. output. This is a so called ”crowding in” or “multiplier” effect.
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 stabilizing capability of fiscal policy variables. Finally, the dynamic effects of discretionary fiscal policy on macroeconomic variables has recently been revived within the framework of vector autoregressions in the work of Blanchard and Perotti (2002). The current paper focuses on this third strand of research to evaluate discretionary fiscal policy shocks in Pakistan.

In Pakistan monetary policy is aimed at the dual objectives of inflation control and output growth. However, the presence of huge budget deficits constrains the ability of monetary policy to attain these objectives. In Pakistan, the fiscal deficit has a direct impact on inflation as government expenditure constitutes a large part of aggregate expenditure that might lead to demand pull inflation, and an indirect impact as the fiscal deficit is financed partly through the central bank. Hence, inflation emerges as a fiscal driven monetary phenomenon. Several empirical studies have found a connection between the budget deficit, money growth and inflation, both for developing and industrialized economies. For industrialized economies, most of these studies conclude that there is little evidence that government debt influences money growth and inflation. In developing countries, it is often argued that high inflation materializes when governments face large and persistent deficits that are financed through money creation.

The research presented here empirically evaluates the effects of discretionary fiscal policy shocks on economic variables using a structural vector autoregression framework. It is relevant in the sense that Pakistan is facing a rise in public debt and fiscal imbalances which poses concerns about fiscal sustainability of the economy. Earlier literature revolved around the discussion about the relative importance of fiscal and monetary policy on aggregate economic activity (Hussain, 1982; Massood and Ahmad, 1980; and Saqib and Yasmin, 1987) which investigates the relative importance of fiscal and monetary policy on aggregate economic activity. Hence there is a need to examine the effects of exogenous fiscal policy shocks on a set of key macroeconomic variables within a SVAR framework which relies on institutional information about the tax and transfer systems and the timing of tax collections to identify the automatic response of taxes and spending to activity, and, by implication, to infer fiscal shocks.
Blanchard and Perotti (2002) suggest that the structural VAR approach seems more suitable for the study of fiscal policy than of monetary policy. They argue that there are many factors which contribute to the movement in budget variables, in other words, there are exogenous (with respect to output) fiscal shocks. In addition, decision and implementation lags in fiscal policy imply that, at high enough frequency—say, within a quarter—there is little or no discretionary response of fiscal policy to unexpected movements in activity. Thus, with enough institutional information about the tax and transfer systems and the timing of tax collections, one can construct estimates of the automatic effects of unexpected movements in activity on fiscal variables, and, by implication, obtain estimates of fiscal policy shocks. Having identified these shocks, one can then trace their dynamic effects on GDP. Earlier Yasmin et al. (2008) evaluate fiscal policy effects for Pakistan but the current paper differs from their study as it employs different set of variables and uses structural VAR identifications. Their study is based on the methodology suggested by Canzoneri et al. (2001), and Tanner and Ramos (2002), which employs an unrestricted Vector Autoregressive Model (VAR) model. They use the cyclically-adjusted primary deficit as a measure of fiscal policy stance. Although the adjusted deficit does deliver information about current policy, it is inappropriate in dynamic macroeconometric analysis because all of the competing theories implies that spending increases and tax cuts have different effects on the economy.

The paper is structured as follows: section two reviews the fiscal policy trends in Pakistan, section three analyses the related literature, section four sketches the channels by which fiscal policy affects output and prices, it also describes the data and addresses the methodological issues related to the specification and identification of the VAR, Section five provides the empirical analysis and discusses the results. Section six concludes with the main findings and policy implications.

2. Fiscal policy in Pakistan

Like many other developing economies, the Pakistan economy is also characterized by huge fiscal deficits and finds it difficult to satisfy its inter-temporal budget constraint with conventional revenue and public borrowings. In addition to market borrowing, government generates funds through financial repression. Financial repression includes; i) government borrowing at below-market interest rates, intermediated by a network of publically controlled banks and financial institutions ii) financial intermediaries setting loan rates on private domestic
credit which differed from the exchange-rate adjusted world interest rate. Since 1991, another major source of financing comes from foreign currency deposits in Pakistan. During the period between 1965 and 1972, due to domestic and international political disturbances, the share of defense expenditure increased. In early 1970s, the initiation of nationalization strategy also contributed to the massive fiscal expenditure in terms of public investment. This increase in development expenditure initially financed by external borrowing, was not accompanied by higher revenues. The lack of a political consensus on broadening the tax base has prevented any substantive growth in revenues as a percentage of GDP, and the deficit remains high because of the political and administrative inability to either raise revenues or reduce. (Haque and Montiel, 1994).

Consequently, during the 1980s and 1990s, policy has been preoccupied by the need to contain growing fiscal deficits and the accompanying increase in public indebtedness, and efforts to curb the cost of debt servicing (Haque and Montiel, 1994). Credits controls and ceilings on interest rates further encouraged dollarization of the economy in the 1990s, and the buildup of large potential quasi-fiscal losses. Empirical studies which examine the fiscal imbalances sustainability in Pakistan suggest that a combination of concessional external finance, imperfect private capital mobility and relatively rapid economic growth have allowed the government to borrow, both domestically and externally, at rates below the marginal cost of funds in international private capital markets. However, the increasing recourse to domestic non-bank borrowing in the 1980s, to finance ongoing deficits, rapidly raised the stock of domestic public debt and the magnitude of associated debt servicing (Haque and Montiel, 1994).

There is a general consensus that a rule based fiscal policy can promote financial discipline. A rule based fiscal policy requires the government to commit to a fiscal policy strategy or to specific fiscal targets that can be monitored. To encourage fiscal sustainability and macroeconomic stability a fiscal policy rule can be used as an instrument. In Pakistan, macroeconomic imbalances have contributed to deceleration in economic growth and investment which in turns was translated into a rise in poverty levels. In this context, a rule-based fiscal policy, enshrined in the Fiscal Responsibility and Debt Limitation (FRDL) Act 2005, was passed by the Parliament in June 2005. This act is intended to instill financial discipline in the country and to ensure responsible and accountable fiscal management by all governments – the present and the future, and to encourage informed public debate about fiscal policy. It requires the
government to be transparent about its short and long term fiscal intentions and imposes high standards of fiscal disclosure.

Figure 1: Govt. Expenditure and Tax Revenues as the % of GDP

There has been considerable improvement in the fiscal deficit and the overall fiscal deficit which averaged nearly 7.0 percent of the GDP in the 1990s has steadily declined to 2.3 percent in 2002-03(Figure1) but increased to 3.3 percent in 2003-04 because of higher development spending. the fiscal deficit has remained above 4.0 percent of GDP for the last three years (2005-06 and 2006-07, 2007-08) mainly because of earthquake related spending and higher development expenditure, particularly towards financing of physical and human infrastructure projects. Higher government spending on the war against the terrorists in the country's northwest region also contributing to rising level of fiscal deficits.

2. Literature Review

The most fundamental achievement of the Keynesian revolution was the reorientation of empirical literature to analyse the influence of fiscal actions on macro economy. Before that, government expenditure and tax revenues were considered as a way to redirect resources from private sector to public sector but no role to affect aggregate level of spending and employment in the economy. Alvin Hansen argued that ‘in a highly developed industrialized country well endowed with modern and efficient capital facilities,’ either the LM curve is infinitely elastic or the IS curve is insensitive to variations in the rate of interest (1949, pp. 171, 173). Under these special circumstances, known as the ‘fiscalist’ case, it is argued that monetary policy per se would prove wholly ineffective in raising income, whereas fiscal policy would be effective even if the quantity of money were pre assigned. Hansen believes, however, that normally both the IS and LM curves would be sensitive to interest rates: ‘In these circumstances fiscal policy and
monetary policy are needed to reinforce each other - the one without the other can only be partially effective’ (p. 173).

The theoretical literature categorizes the effects of fiscal policy into demand side effects and supply side effects. The simple Keynesian model assumes price rigidity and excess capacity so that a fiscal expansion leads to a multiplier effect on aggregate demand and output. Extensions of this model allow for crowding out and therefore a fiscal expansion is paid for by increased borrowing that leads to higher interest rates which reduce investment. However, Krugman and Obstfeld(1997) argue that a distinction between temporary and permanent policy changes is important. As a temporary fiscal expansion that has no long run effects will not influence expectations, a permanent fiscal expansion can add to crowding out, private agents will expect an initial increase in interest rates and the appreciation of exchange rate will persist and can become larger. In addition, the Keynesian approach assumes that consumption decisions are determined by the current income level. If consumers are forward looking and they are fully aware of government’s inter temporal budget constraints, they will anticipate that a reduction in government saving through a tax cut is fully offset by higher private savings and aggregate demand is not affected(Barro, 1974).

The supply side effects of fiscal policy have long run implications. Policies which are oriented to promote a supply side response can address capacity constraints and their impact is primarily longer term. If a fiscal expansion is imparted through tax cuts and spending increases, then such an expansion will increase the fiscal multiplier (Hemming et al, 2002). Alessina and Perotti(1997) find that an increase in labour income taxes can have a significant negative supply side impact in unionized, imperfectly competitive labor market where before tax wages and hence labour cost also increase to reflect the higher taxes. Neo classical models also suggest that fully anticipated policies affecting aggregate demand (but not aggregate supply) have no effect on growth either in the short run or the long term (Lucas, 1975; and Sargent and Wallace(1975). Only unanticipated policies have an effect, which emerges entirely through supply side (Lucas and Stokey, 1983.; and Chari and Kehoe, 1998).

The impact of fiscal policy on economic activity also depends on institutional structure. These factors include inside and outside lags. Inside lags reflect the time it takes to recognize that fiscal policy should be changed and these lags are the function of political process and the
effectiveness of fiscal management (Hemming et al, 2002). Outside lags reflect the time it takes for fiscal measures to feed through to aggregate demand (Blinder and Solow, 1974).

To analyze the effects of fiscal policy on economic activity the empirical literature includes three types of studies. First, studies which concentrate 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 (Byrant et al, 1988; 1993; McKibbin,1996;Saito,1997;Dalsgaard et al,2001; Bartolini et al,1995) and small dynamic general equilibrium models which are calibrated and then solved numerically (Rotemberg and Woodford, 1993; Devereux et al, 1996, Ludvigson,1996; Ramey and Shapiro, 1998; Ardgna , 2001). 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 a number of studies which employ reduced form equations to evaluate the impact of fiscal policy on output (Eisner, 1989; Romer&Romer, 1994; Perry& Schultz,1993). Barro (1981) finds that temporary changes in defense 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 auto-regressive equation for GDP. Weber (1999) employs a co-integration regression and error correction model to estimate long run and impact multipliers from post-war US data and finds a long run multiplier between 1.1 and 1.4. These estimates are very close to those estimated by Baxter and King (1993).

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 and others(2002) 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. While analyzing the impact of government expenditure on output in Pakistan, Looney (1995) suggests that in the large manufacturing sector, the private investment does not suffer from real crowding-out associated with the government’s non-infrastructural investment program. Hyder (2001) tests the crowding-out hypothesis for Pakistan, using a vector error-correction framework including gross domestic product, public investment and private investment. He confirms the complementary relationship between public and private investment. By using a co-integration VAR, Naqvi (2002) evaluates the relationship between the economic growth, public investment and private investment for Pakistan. He provides the evidence that past government investment has had a positive impact on private investment.

4. Data and Methodology

4.1 Data

This paper employs quarterly data on public expenditure ($g_t$), net taxes ($nt_t$) and GDP ($y_t$) in real terms, the consumer price index ($p_t$) and interest rate of government bonds ($r_t$). $g_t$ is defined as the sum of public consumption and public investment, whereas $nt_t$ includes public revenues net of transfers, excluding interest payments on government debt. The data for the fiscal variables is available in annual series so these data series are interpolated from annual to quarterly series. All variables are seasonally adjusted and enter in logs except the interest rate, which enters in levels. The sample covers the period 1973:1-2008:4.

4.2 The model

The reduced-form VAR can be written as

$$X_t = u_0 + u_1(t) + A(L)X_{t-1} + u_t$$

(1)

Where $u_0$ is a constant, $t$ is a linear time trend, $X_t=(g_t, y_t, p_t, nt_t, r_t)$ is the vector of endogenous variables and the only the $A(L)$ is an autoregressive lag polynomial. The vector $U_t=(u_{1t}^g, u_{1t}^y, u_{1t}^p, u_{1t}^{nt}, u_{1t}^r)$ contains the reduced-form residuals, which in general will have non-zero correlations. We follow Blanchard and Perotti (2002) and choose a log length of two
quarters on the basis of leg length selection criteria i.e. SC and HQ. The use of a higher lag order as in Mountford and Uhlig (2005) does not affect the results.

As the reduced-form disturbances will in general be correlated it is necessary to transform the reduced-form model into a structural model. Pre-multiplying the equation (1) by the (kxk) matrix $A_0$ gives the structural form

$$A_0 X_t = A_0 u_t + A_0 u_1 + A_0 A(L) X_{t-1} + B e_t$$

(2)

where $B e_t = A_0 u_t$ describes the relation between the structural disturbances $e_t$ and the reduced-form disturbances $u_t$. In the following, it is assumed that the structural disturbances $e_t$ are uncorrelated with each other, i.e., the variance-covariance matrix of the structural disturbances $Se$ is diagonal. The matrix $A_0$ describes the contemporaneous relation among the variables collected in the vector $X_t$. In the literature this representation of the structural form is often called the $AB$ model (Lütkepohl 2005). Without restrictions on the parameters in $A_0$ and $B t$ this structural model is not identified.

4.3 Identification of Fiscal Policy Shocks

The empirical literature classifies four approaches to identify a structural VAR to analyse the fiscal policy effects on macro variables. These approaches include; first, the recursive approach introduced by Sims (1980) and applied to study the effects of fiscal shocks by Fatas and Mihov (2001); second, the structural VAR approach proposed by Blanchard and Perotti (2002) and extended in Perotti (2005, 2007); third, the sign-restrictions approach developed by Uhlig (2005) and applied to fiscal policy analysis by Mountford and Uhlig (2005); and, fourth, the event-study approach introduced by Ramey and Shapiro (1998) to study the effects of large unexpected increases in government defence spending and also used by Edelberg et al. (1999), Eichenbaum and Fisher (2005), Perotti (2007) and Ramey (2007). In this paper we use two identification approaches i.e the recursive approach and the structural VAR approach proposed by Blanchard and Perotti (2002).

4.3.a The Recursive Approach

The recursive approach restricts $B$ to a $k$-dimensional identity matrix and $A_0$ to a lower triangular matrix with percent diagonal, which implies the decomposition of the variance-covariance matrix $\Sigma_u = A_0^{-1} \Sigma_e (A_0^{-1})'$. This decomposition is obtained from the Cholesky decomposition $S_u = PP'$ by defining a diagonal matrix $D$ which has the same main diagonal as $P$ and by specifying $A_0^{-1} = PD^{-1}$ and $\Sigma_e = DD'$ i.e. the elements on the main diagonal of $D$ and $P$ are equal to the
standard deviation of the respective structural shock. The recursive approach implies a causal ordering of the model variables. Note that there are $k!$ possible orderings in total. In this paper we order the variables as follows: spending is ordered first, output is ordered second, inflation is ordered third, tax revenue is ordered fourth and the interest rate is ordered last. This implies that the relation between the reduced-form disturbances $u_t$ and the structural disturbances $e_t$ takes the following form:

$$
\begin{bmatrix}
1 & 0 & 0 & 0 & 0 \\
\gamma_{y,g} & 1 & 0 & 0 & 0 \\
\gamma_{p,g} & \gamma_{p,y} & 1 & 0 & 0 \\
\gamma_{m,g} & \gamma_{m,y} & \gamma_{m,t,p} & 1 & 0 \\
\gamma_{r,g} & \gamma_{r,y} & \gamma_{r,p} & \gamma_{r,r} & 1
\end{bmatrix}
\begin{bmatrix}
 u_t^e \\
u_t^y \\
u_t^p \\
u_t^m \\
u_t^g
\end{bmatrix}
= 

\begin{bmatrix}
1 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 1
\end{bmatrix}
\begin{bmatrix}
e_t^g \\
e_t^y \\
e_t^p \\
e_t^m \\
e_t^r
\end{bmatrix}

(3)

Government spending is ordered first as it does not react contemporaneously to shocks to other variables in the system. Movements in government spending, unlike movements in taxes, are largely unrelated to the business cycle. Therefore, it seems plausible to assume that government spending is not affected contemporaneously by shocks originating in the private sector. Output does not react contemporaneously to the shocks in tax, inflation and interest rate but it is affected contemporaneously by spending shocks. Inflation does not react contemporaneously to tax and interest rate shocks, but it is affected contemporaneously by government spending and output shocks. Taxes do not react contemporaneously to interest rate shocks, but are affected contemporaneously by government spending, output and inflation shocks, and the interest rate is affected contemporaneously by all shocks in the system. Ordering the interest rate last can further be justified on the grounds of a central bank reaction function implying that the interest rate is set as a function of the output gap and inflation and given that spending and revenue are not sensitive to interest rate changes.

4.3.b The Blanchard-Perotti approach

The identification approach introduced by Blanchard and Perotti (2002) relies on institutional information about tax and transfer systems and about the timing of tax collections in order to identify the automatic response of taxes and government spending to economic activity. This paper follows the identification scheme introduced by Perotti (2005) as he employs a five variable VAR model. The relationship between the reduced form disturbances $u_t$ and the structural disturbances $e_t$ can be written as
The variance-covariance matrix of the reduced-form disturbances in the above system of equation has ten distinct elements whereas it has 17 unknown parameters to estimate so it is not identified. To achieve identification Blanchard-Perotti approach suggests some additional restrictions on these seven parameters. Given that interest payments on government debt are excluded from the definitions of expenditure and net taxes, the semi-elasticities of these two fiscal variables to interest rate innovations, i.e. $a_{g,r}$ and $a_{nt,r}$, were set to zero. While this assumption appears justified for government expenditure and plays no role when analyzing its effects, it is slightly more controversial for net taxes. As government expenditure comprises of notably public consumption and investment which do not respond automatically to the changes in economic activity hence we can set $a_{g,y} = 0$. The case of the price elasticity is different, though, some share of government purchases of goods and services are likely to respond to the price level. Following Perotti (2005), an eclectic approach is adopted and the price elasticity of government expenditure is set to -0.5. However, setting this price elasticity to zero does not seem to affect the results significantly (Perotti, 2004). This paper uses external information on the output and price elasticities of net taxes and employs the elasticity values of net taxes estimated by Bilquees (2004). Finally, we set the parameter $\beta_{g,n,t}$ equal to zero, which implies that government decisions on spending are taken prior to the decisions on revenue. Imposing these restrictions on the parameter values the relation between the reduced-form and the structural disturbances can be written in matrix form:

$$\Gamma U_i = BV_i$$

Where $V_i$ is the vector containing the orthogonal structural shocks.
Accordingly, the reduced-form residuals are linear combinations of the orthogonal structural shocks of the form: 

\[ U_t = \Gamma^{-1} B V_t \]

5. Estimation and Results

5.1 Recursive Approach

Table 1 gives the estimated coefficients of the contemporaneous relations between fiscal and monetary shocks and economic variables. These coefficients are estimated through the recursive approach suggested by Sims (1980). The first is the contemporaneous effect of government spending on taxes \( \beta_{nt,g} \) which is positive and is highly significant. It suggests that a positive one percent shock in government expenditure increases the taxes by 0.41 percent. This reflects the long term multiplier effect of government spending. An increase in expenditure leads to an increase in output which translates into higher government revenues over the long term. However a negative value of \(\gamma_{y,g}\) suggests the presence of crowding out effect in short run and a positive one percent shock in government expenditure reduces the output by 0.09 percent but it is statistically insignificant. The positive coefficient of \(\gamma_{p,g}\) indicates that a positive shock in government expenditure contributes to high inflation but again it is statistically insignificant. \(\gamma_{r,g}\) also captures a theoretical consistent sign which implies that a positive shock in government spending will increase the interest rate and there is a crowding out effect but it is statistically insignificant. A negative value of \(\gamma_{y,nt}\) is theoretically consistent but statistically insignificant indicates that increase in taxes will reduce the output. The positive and statistically significant value of \(a_{nt,p}\) supports the hypothesis that tax revenues are mostly from indirect taxes. A one percent shock in prices increases taxes by 0.66 percent.

The positive value of \(\gamma_{py}\) suggests a direct relationship between inflation and output. A positive value of \(\gamma_{ry}\) suggests that an increase in output will lead to higher output. This estimate is theoretical consistent. It is also statistically significant. \(\gamma_{nt}\) suggests a strong supply side effect of taxes on output. A tax cut is assumed to increase the output and hence reduces the inflationary
pressure which in turn leads to lower real interest rate. A positive value of $\gamma_{r,p}$ implies a direct relationship between inflation and interest rate but this relationship is statistically insignificant. As in the recursive approach, all elements of $A_0$ above the principal diagonal are restricted to zero and it estimates the size of automatic stabilizers while imposing a zero restriction on the contemporaneous effect of taxes on output and inflation. Perotti (2005) fixes the size of automatic stabilizers and estimates the contemporaneous effect of taxes on output and inflation.

**5.2 Blanchard and Perotti Approach**

Table 2 presents the coefficients estimated through the Blanchard and Perotti (2002) approach. In this case, the estimated coefficient of government shock to tax revenue is negative but statistically insignificant. It suggests that a positive one percent shock in government expenditure decreases the tax revenues by 0.12 percents. However, a positive and a statistically significant value of $\gamma_{y,g}$ explains that an increase in government spending leads to higher output and a positive one percent shock in government expenditure increases output by 6 percent. The positive coefficient of $\gamma_{p,g}$ indicates that a positive shock in government expenditure contributes to high inflation and again it is statistically significant. $\gamma_{r,g}$ also captures a theoretical consistent sign which implies that a positive shock in government spending will increase the interest rate and there is a crowding out effect and it is statistically significant. A positive and significant value of $a_{y,n}$ indicates that increase in taxes will increase the output. The positive and statistically significant value of $a_{p,n}$ further supports this hypothesis. A one percent shock in taxes increases prices by 2.3 percents, hence taxes are inflationary as most of the tax revenues are generated through indirect taxes.

A negative value of $\gamma_{p,y}$ suggests an inverse relationship between inflation and output. An increase in output reduces the inflation and this relationship is highly significant. A positive value of $\gamma_{r,y}$ augments that an increase in output will lead to higher interest rate and this estimate is theoretical consistent and statistically significant. The estimated coefficient of $\gamma_{r,n}$ suggests an inverse relationship between interest rate shocks and tax revenues and in empirical literature it is considered as a supply side effect of taxes. A tax cut is assumed to increase output and hence reduces the inflationary pressure which in turn leads to lower real interest rate. A positive value of $\gamma_{r,p}$ implies a direct relationship between inflation and interest rate and this relationship is statistically significant. Hence the Blanchard and Parotti approach suggests a strong role of government expenditure and taxes in explaining output and inflation in Pakistan.
5.3 Results for the Pure Fiscal Shocks

In this section we present the analysis of fiscal policy shocks through impulse response function generated through the Blanchard and Perotti(2002) SVAR identification i.e. shocks to one fiscal variable at a time without constraining the response of the other respective fiscal variable.

5.3.a The effects of government expenditure shocks

Figure 1 shows the responses of endogenous variables to a positive shock in government expenditure. It reflects that an increase in government expenditure raises the real GDP after the second quarter and this result is persistent over five years time. This evidence is further supported by the cumulative output multipliers which reflect that output increases by 70% over the time span of five years but the multiplier value is still less than one. This result is further consistent with Looney (1995) and Hyder (2001)’s findings which confirm the complementary relationship between public and private investment.

A positive shock in government expenditure leads to lower net-tax revenues until the twelfth quarter and then net-tax revenues rise and remain positive and significant for next eight quarters. Higher government expenditure also brings about a significantly positive response of Consumer Price Index (CPI) for 20 quarters. Such increase in the price level implies higher inflation in the quarters following a positive shock in government expenditure. Likewise, the real interest rate also increases persistently until the tenth quarter, following a positive shock to government expenditure. While the positive response of the interest rate in the short term might be due to higher demand and inflationary pressures and it decreases persistently till the end of twentieth quarter. It is also evident that during the time period of twenty quarters 99% of the unexpected variation in output and inflation is explained by the shocks in government expenditure (Table 5&6). The positive role of government expenditure in explaining the output variation can be attributed to such factors as excess liquidity in the banking system, relatively sustainable public debt scenario, government expenditures for transfer payment program, significant development expenditure for producing those goods and services which has the potential to discharge positive externalities, government micro-credit program and black money linkages.

5.3. b The Effects of Net Taxes

Figure 3 represents the response of endogenous variables to a positive shock in tax revenues. Government expenditure falls in case of tight fiscal policy in terms of high tax revenues. This
finding is theoretically inconsistent because higher revenues encourage government spending and this relationship is statistically insignificant. The GDP response to a tax shock is positive. These tax shocks are also inflationary as the consumer price index is persistently increasing due to a positive shock in tax revenues. In addition, an increase in tax revenues results into higher interest rate for shorter time and at the end of tenth quarter interest rate starts decreasing till the end of twentieth quarter.

5.3.c Robustness Checks

In order to evaluate that either the estimated results are consistent with the assumptions made about the some coefficients in matrixes G and B, some alternative specifications are tried. First about the ordering of the fiscal variables; to justify that either taxes are before government expenditure or the opposite, the alternative model is re estimated with the assumption $\beta_{nt,g} = 0$ and estimate $\beta_{g,nt}$ in (3) and the differences are minimal with the identical output multipliers. The model also assumes the price elasticity of government expenditure exogenously and sets $a_{g,p} = 0.5$, to check its robustness we try to estimate $a_{g,p}$. In addition in the first model we assume output and price elasticities of net taxes as $a_{nt,y} = 0.96$ and $a_{nt,r} = 0.71$. In order to check the consistency of these values we try to estimate $a_{nt,y}$ and $a_{nt,r}$ and the results are almost identical to the first specification (Table 4) and the output multipliers of government expenditure were exactly the same as those reported in the first row of Table 3. In order to account for the monetary policy response to fiscal policy the discount rate is replaced by short term interest rate (call money rate), the results show only the marginal difference and the main conclusions remain valid. The impulse responses generated through this new identification also reflect the consistent patterns in the endogenous variables to fiscal policy shocks.

6. Conclusion

This paper is a preliminary study which evaluates the macroeconomic effects of fiscal policy in Pakistan using SVAR methodology for the period 1973:1-2008:4, drawing on a new set of quarterly data built from the annual data series taken from International Financial Statistics. It employs the recursive approach introduced by Sims(1988) and the Blanchard and Perotti(2002) approach to identify the SVAR model. The estimations through recursive approach suggest a statistically insignificant role of government expenditure socks in explaining the variation in output and inflation. Whereas the results from Blanchard and Perotti (2002) approach reveal a
significant role of government expenditure and taxes in explaining the changes in output and inflation in Pakistan. The empirical evidence suggests that government spending shocks have positive effect on output and inflation. These results can be summarized as following: (i) the output multipliers of government expenditure are increasing over the time period of five years. These are positive in short term, while negative in the longer term; ii) positive shocks in government spending increase the output and yield significant effects on prices; iii) these government shocks also increases the interest rate in short run; iv) positive shocks in tax revenues leads to higher output and inflation; v) increase in tax revenues is also translated into higher interest rate in short term but then interest rate starts rising.

We can derive two main policy conclusions from these results. Firstly, fiscal policy is able to stimulate economic activity through expenditure expansions at the cost of higher inflation and public deficits and lower output in the medium term. Secondly, attempts to achieve fiscal consolidation by increasing the tax burden seems to be successful in short term and medium term but, such a policy might slow economic activity in the long run.

Although VARs are a useful forecasting tool in the short term but their use is limited on the basis of two caveats. Firstly, their accuracy declines at longer horizons. Therefore, the conclusions obtained regarding the long-term responses to fiscal policy shocks, in general, have to be interpreted with caution. Secondly, the econometric model employed in this paper ensures the symmetry of the responses to shocks of equal absolute value with opposite signs. However, the real economy may not be symmetric and, accordingly, reactions to fiscal expansions might be of very different magnitude to fiscal retrenchments, with the size of the difference depending on a complex set of variables, including the initial state of public finances. This potential asymmetries cannot, however, be captured by our estimates. In addition fiscal variables data series are interpolated due to no availability of quarterly data so they are not free from econometric issues associated with interpolation of data.
References


vii. Analytical Foundations of Fiscal Policy, with A.S. Blinder, 1974, in Blinder et al., The Economics of Public Finance


Appendix

Recursive Approach

Table 1

<table>
<thead>
<tr>
<th>$B_{nt,g}$</th>
<th>$\gamma_{y,g}$</th>
<th>$\gamma_{p,g}$</th>
<th>$\gamma_{r,g}$</th>
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<th>$\gamma_{p,y}$</th>
<th>$\gamma_{r,y}$</th>
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<th>$a_{nt,p}$</th>
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Blanchard and Perotti (200) Approach

Table 2

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Table 5

Variance Decomposition of LY

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<th>Tax revenues shocks</th>
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<td>Period</td>
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Figure 5.

Response to Structural One S.D. Innovations

Response of LY to Shock4

Response of LCPI to Shock4

Response of LT to Shock4

Response of INT to Shock4
Figure 6