Dynamic Effects of Changes in Government Spending in Pakistan's Economy

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In recent prolonged recessions across the world, nearly every government in Asia, Europe, and North America is pursuing some vigorous form of fiscal stimulus policy, defined generally as debt-financed consumer-oriented tax cuts and substantial increases in government spending to push up aggregate demand in the hope that economic output, jobs, and incomes follow [Foster (2009)].

The effect of an increase in government spending on macroeconomic activities and the way these effects are transmitted have long been a subject of analysis and debate as two different theories have been proceeded to elaborate this issue. The main reason for the disparity between these two theories lies in how the consumer is implicit to behave in each case. The Keynesian framework treats expansionary fiscal policy as exclusively an exogenous increase in aggregate demand making demand-constraint firms to sell more output that ultimately boost income, employment and through multiplier effect enhance consumption as short run phenomena of price stickiness make output demand determined prices to alter steadily and firms mainly follow the cost push from increasing wages. The consumers in this model are assumed to behave in non-Ricardian fashion with consumption depending on their current disposable income and not on their lifetime income. Therefore, the effect of increase in government spending depends on the way it is being financed with the multiplier escalating with the size of deficit finance.

Contrary to it, the real dynamic general equilibrium model, [Baxter and King (1993)] with optimising agents and flexible prices, takes fiscal policy as influencing the economy through negative wealth effect commenced by the tax financing of increasing government expenditure. The model featured infinitely lived Ricardian household with consumption decisions determined by intertemporal budget constraint at any point in time. This phenomenon would provoke a fall in private consumption coupled with an increase in labour supply therefore results in raising output and employment whereas lowering wages. The wealth effect analysis differs from the aggregate demand effect analysis since equilibrium output and employment brought about by fiscal policy results from the optimal response of household labour supply thus with respect to wages and private consumption the findings of neoclassical general equilibrium framework are in contrast with Keynesian framework.

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The empirical facts are not supportive in discriminating the two theories since there are two set of studies implying contrary and opposing results. The reason might be that the method of financing: taxes, borrowing domestically or from abroad, and monetisation of debt may also determine the outcome of fiscal policy. The approach of raising taxes and growing concerns about increasing public debt are not political popular, therefore, the central bank accommodates the increased government spending by issuing more credit, creating an increase in the monetary base. The effectiveness of fiscal policy is highly dependent on the effects of government spending in crowding out private spending. In theory, a dollar increase in government spending that is financed by an equal increase in taxes increases aggregate demand and, hence, economic activity, i.e., the balanced budget multiplier is positive. An increase in government spending that is not matched by an equal increase in taxes creates budget deficit as in case of Pakistan. The deficit is financed by government debt and it has important implications for economic activity. Specifically, the effectiveness of an increase in government spending is less likely to be enhanced, the more the government debt and the higher the degree of monetisation. The consumers may anticipate a future increase in taxes if government spending is financed by increasing debt as in Ricardian case. Hence, private consumption may decrease, offsetting the positive effect of an increase in government spending on aggregate demand. Similarly, an increase in government spending that is financed by debt increases the demand for domestic credit, raising the interest rate. Higher the public debt, the higher is the risk premia in interest rates. In addition, financing government spending by borrowing from domestic financial institutions decreases available credit for the private sector. Accordingly, higher government spending is bound to crowd out private investment.

Government spending in the Pakistan has risen from 6.6 billion in 1980-81 to 260.9 billion rupees in 1990-91 and it increase to 2279 billion rupees in 2007-08. The spending drift has been accompanied by deficits and a growing public debt 1715 billion rupees in 2001-02 to 3209 billion in 2007-08. The government spending changes often lead to significant shifts in macro-economic variables.

The present study investigates the effects of government spending on macroeconomic variables by estimating Vector Autoregressive model. The impulse response functions are presented to analyse the transmission mechanism for the variables including government spending per capita, GDP per capita, consumption per capita, debt to GDP ratio, long term interest rate and real exchange rate. The effects of fiscal shocks are examined keeping track of the debt dynamics that arises following a fiscal shock, i.e., increase in government spending and allowing for the possibility that taxes, spending and interest rates might respond to the level of the debt, as it evolves over time. The present study contributes to the existing empirical literature by characterising the dynamic effects of shocks in government spending for a developing economy. The debt to GDP is included as a feedback to obtain accurate responses to the dynamic effects of fiscal shocks as discussed in the conventional economics.

The study is organises as follows. Section 2 discusses the theoretical and empirical literature in this area briefly. The methodology and data is presented in Section 3. The empirical results are discussed in Section 4 and last section concludes the study.

2. LITERATURE REVIEW

Extensive theoretical literature investigates and scrutinises the consequences of government spending on the macro economy. Neoclassical framework developed by Hall (1980), Baro (1981, 1987), Aschauer and Greenwood (1985), Mankiw (1987) is the pioneer work to study the effects of fiscal policy on the macroeconomic variables. Later on neoclassical growth model is further extended by Aiyagari, Christiano, and Eichenbaum (1990) and Baxter and King (1993) by incorporating a government sector evaluating the consequences of a government expenditure shock. These models explored that government expenditure augmentation generates a negative wealth effect for the household which results in reducing consumption and increasing labour supply. In addition, enlarged labour supply stimulates real wages to shrink and interest rates to rise.

The neoclassical growth model is further extended by introducing market imperfections, increasing returns to scale as well as monopolistic and oligopolistic competition [Rotemberg and Woodford (1992) and Devereux, Head, and Lapham (1996)] asserting that government spending shock boost demand for goods which ultimately increase labour demand and hence real wages. Gali, Lopez-Salido, and Valles (2007) broaden the New Keynesian model through incorporating consumers who neither borrow nor save and consume the disposable income each period, consequently do not reduce consumption in response to a positive government expenditure shock. The government spending modelling with oligopolistic pricing and monopolistic competition taking increasing returns shows that an increase in government spending can enhance productivity, wages, and private consumption [Rotemberg and Woodford (1992) Devereux, Head, and Lapham (1996)]. The evidence postulates that an increase in military spending increases output more than hours and hence raises rather than lowers the real wage. The outcome however contradicts the predictions of the neoclassical model.

The empirical consequences of government spending shocks have not gained significant consideration in spite of extensive theoretical work on government spending. The studies commenced for the assessment of these insights consist of the studies on the comparative results of permanent and impermanent alteration in government spending [Barro (1981)], the connection of government spending with consumption or Solow residuals [Hall (1980)]; or the impact of government spending on real interest rates [Barro (1987, 1981); Evans (1987) and Plosser (1987)].

A small number of studies are conducted to examine the consequences of government spending shocks on the macroeconomic behaviour. The existing empirical studies categorise dual results determined by the particular credentials plan of the government expenditure shock. Ramey and Shapiro (1998) using descriptive approach to identify the Vector Autoregressive (VAR) model work out large military build-ups in the US, the Korean war, the Vietnam war and the Carter-Reagan build-up as abrupt and unanticipated boost in government expenditures. The macroeconomic variables respond to those events in standard way as output and hours rise and consumption and real wages fall. Eichenbaum and Fisher (2005) use an analogous methodology to approximate the impulse responses of macroeconomic variables to unanticipated alteration in government expenditure and contrast those to impulse responses approximated by standard neoclassical model. The empirical evidence shows that hours worked goes up, investment

shortly enlarge, whereas real wages and consumption decline hence implying that the standard neoclassic model can report plausibly well for the consequences of unanticipated changes in fiscal policy. An analogous evidence is drained by Edelberg, Eichenbaum, and Fisher (1999), who transform a neoclassic growth model by evaluating two type of capital, non-residential and residential capital. Blanchard and Perotti (2002) using structural VAR approach to explore government expenditure shock necessitate fiscal policy variables not to react instantly to other innovations in the economy; specifically they make use of the recursiveness assumption. Their conclusions confirm and substantiate the results of Ramey and Shapiro (1998) pertaining to output and hours worked but are contradictory to consumption and real wages. Mountford and Uhlig (2005) adopting a structural VAR, but without considering any timing restriction make use of sign restrictions to limit the reactions of fiscal variables, whereas the reactions of other macroeconomic variables are left without any restriction. In addition they permit for a pre-announcement of fiscal policy shocks and their findings corroborate the results of Blanchard and Perotti (2002) apart from consumption which shows a weak positive response.

Ravn, Schmitt-Grohé, and Uribe (2007) discharge Ramey's critique towards the usage of structural VAR models as they argued that shocks are by assumption orthogonal to the information set and accordingly make out a structural VAR as in Blanchard and Perotti (2002). Chung and Leeper (2007) highlights the significance of the intertemporal government budget constraint for a structural VAR analysis so as to approximate reduced form shocks that can be plot into structural innovations, government debt and private investment. Leeper, Walker, and Yang (2008) dealing with the matter of exploring pre-announced tax shocks assert that the estimated impulse response functions are biased due to a variation in the information set of the agents in the economy and the information set of the econometrician intending to approximate the effects of pre-announced tax shocks.

Kriwoluzky (2009) estimates a structural VAR considering the pre-announced nature of fiscal shock by checking the signs of important variables like investment whereas response of other variables of interest is left open. The study considers the criticism of Leeper, Walker, and Yang (2008) regarding the estimation of structural VAR as the restrictions are directly applied on the impulse response functions of the VAR thus necessitating them to be well-matched with the impulse response functions of the dynamic stochastic general equilibrium (DSGE) model with forward looking agents leading to closing the gap in the information sets of the econometrician and agents of the economy.

As pointed out by Ramey (2008) another issue that needs to be considered is the composition of government expenditures and what component is used in the estimation as abstracting from government transfers, government expenditures are defined as the summation of government investment expenditures and government consumption expenditures and both categories have different implications for the variables of interest. Turnovsky and Fisher (1995) pointed out that an increase in government investment expenditures enhances productivity and consequently private consumption and real wages. Involving government investment expenditures would therefore support Keynesian outcome, that is to say an increase in both variables of interest and make impure the analysis. Furthermore, the study pointed out that quantitatively government

consumption expenditure is more relevant as they are about five times larger than the government investment expenditure since the 1970s.

3. METHODOLOGY AND DATA

The identification of fiscal shocks and for the empirical characterisation of fiscal policy transmission, there are three distinct approaches that have been widely employed in the literature. Blanchard and Perotti (2002) apply a structural VAR approach; government spending is assumed to be predetermined within the quarter and identification is achieved by restricting the contemporaneous relationships between the fiscal and other variables included in the VAR. Under this assumption, the reduced-form residuals from a regression of government spending on the lags of all other variables in the VAR are identified as structural government spending shocks. Ramey and Shapiro (1998) identify the dates at which the relevant military initiatives were first announced and trace the dynamic response of the economy to these announcements using dummy variables arguing that such events are truly exogenous source of variation in government spending. Mountford and Uhlig (2009), Romer and Romer (2009) and Enders, Müller, and Scholl (2008) have used a narrative approach which is based on sign restrictions to identify shocks.

Following Blanchard and Perotti (2002) and Favero (2007); Corsetti, *et al.* (2009), the present study adopts unrestricted VAR analysis. Let y_t a vector of macro variables: aggregate output, and private consumption both in logs and per-capita terms; a measure of the ex-ante long-term real interest rate and the log of the real exchange rate; the public debt scaled by GDP, the following model is estimated. The study of the dynamic response of macroeconomic variables to shifts in fiscal policy is typically carried out estimating a VAR of the following form:

$$Y_t = \sum_{i=1}^{k} C_i Y_{t-i} + u_t \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (1)$$

Where $Y_t \equiv [g_t, con_t, \text{int}_t, er_t, debt_t]$ is five dimensional vector in logarithm of per capita government spending (g_t), per capita private consumption (con_t), long run interest rate (int_t), real exchange rate (ex_t) and debt to GDP ratio ($debt_t$). The ordering of the variables are very important in VAR models. Government spending is ordered first as it does not react contemporaneously to shocks to other variables in the system. The changes in government spending, unlike changes 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. Private consumption does not react contemporaneously to the shocks in tax, interest rate and exchange rate but it is affected contemporaneously by spending shocks. Taxes do not react contemporaneously to interest rate shocks, but are affected contemporaneously by government spending, private consumption shocks, and the interest rate and exchange rate are affected contemporaneously by all shocks in the system. Ordering the debt to GDP comes last can justified on the grounds of debt is set as a function of all variables in the vector of variables.

It is expected that consumers respond differently to an innovation in government spending depending on whether or not they believe government to meet its intertemporal budget constraint by adjusting taxes and/or spending in the future. The dynamic behaviour of taxes and spending following a fiscal shock depends on the debt stabilisation motive in the fiscal reaction function and create heterogeneity of impulse responses to fiscal shocks [Favero (2007)].[1] Romer and Romer (2007) also find that the effect of tax shock on output depends on whether the change in taxes is motivated by the government's desire to stabilise the debt, or is unrelated to the stance of fiscal policy.

A feedback from the level of debt ratio to taxes and government spending is necessary for stability of the debt, unless the rate of growth of the economy is exactly equal to the average cost of financing the debt. Such a feedback is a feature of the Pakistani fiscal data as is revealed by a positive correlation between the government surplus-to-GDP ratio and the government debt-to-GDP ratio [Javid, Arif, and Sattar (2008)]. The interest rates, an important variable in the transmission of fiscal shocks, depend on future expected monetary policy and on the risk premium: both may be affected by the debt dynamics. It is expected that the impact of a given fiscal shock on interest rates will be very different depending on whether the shock produces a path of debt that is stable or not [Favero (2007)].

Data

The data series for this study are extracted from International Financial Statistics (IFS) CD-ROM (2008) issued by *International Monetary Fund, Pakistan Statistical Year Book* 2008, *Pakistan Economic Survey* (Various Issues). The data set includes government expenditure, private consumption, long-term real interest rate and real exchange rate; tax and public debt scaled by GDP for the period 1971–2008. All data series are converted in to year 2000 rupees.

4. EMPIRICAL RESULTS

To analyse the macroeconomic effect of government spending changes methodology suggested by Favero (2007) and Perotti (2007) is adopted using the Pakistani data for the period 1971–2008. The systematic relationship between government spending and macroeconomic variables are estimated by an unrestricted Vector Autoregressive Model (VAR) model how government spending innovations are transmitted to consumption per capita, output per capita, long run interest rate, real exchange rate and debt to GDP ratio. The advantage of this methodology is that it only requires the estimation of a relatively small number of parameters and it does not impose any restrictions on the economy. The VAR models are characterise with no a priori distinction between endogenous and exogenous variables and forecast performance is better than the one obtained by simultaneous equation model.

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[1]For instance, Perotti (2007) finds that the effect on US consumption of an increase in government spending is positive and statistically significant in the 1960s and 1970s, but became insignificant in the 1980s and 1990s. Favero (2007) finds a sharp difference in the way US fiscal authorities responded to the accumulation of debt in the two samples as explanation. Since the early 1980s, following a shock to spending or taxes, both fiscal policy instruments are adjusted over time in order to stabilise the debt ratio. This does not appear to have happened in the 1960s and 1970s, when there is no evidence of a stabilising response of fiscal policy.

For estimation, first step is to test the stationarity of each variable. The Augmented Dickey-Fuller (ADF) unit root test is applied on government spending, consumption, debt to GDP, long-term interest rate and real exchange rate with a constant and a trend. The ADF test results show the acceptance of the unit root in all series, that is, all the series are non-stationary at level, which is indicative of I(1) process, and therefore all the variables are taken in first difference for further analysis.

The VAR model includes five variables: government spending, aggregate output, and private consumption, all in logs and per-capita terms; the log of long-term real interest rate, real exchange rate; debt to GDP ratio following Chung and Leeper (2007), Favero (2007), Coretti, *et al.* (2008). The three years lags are selected for VAR model estimation based on the Akikia Information Criteria. The VAR allows to identify how the government spending shock influences macroeconomic variables by estimating the impulse response functions and variance decomposition. The two set of impulse responses are used in the model one considering the debt to finance the deficit in face of rising government spending and other omitting debt because the VAR methodology reveals possible differences in the results.

The following Figure 1 displays the impulse response function using VAR model, which provides an empirical exploration of the possibility of an expansionary fiscal contraction.

Fig. 1. Dynamic Impact of Government Spending Shock on Macro-variables
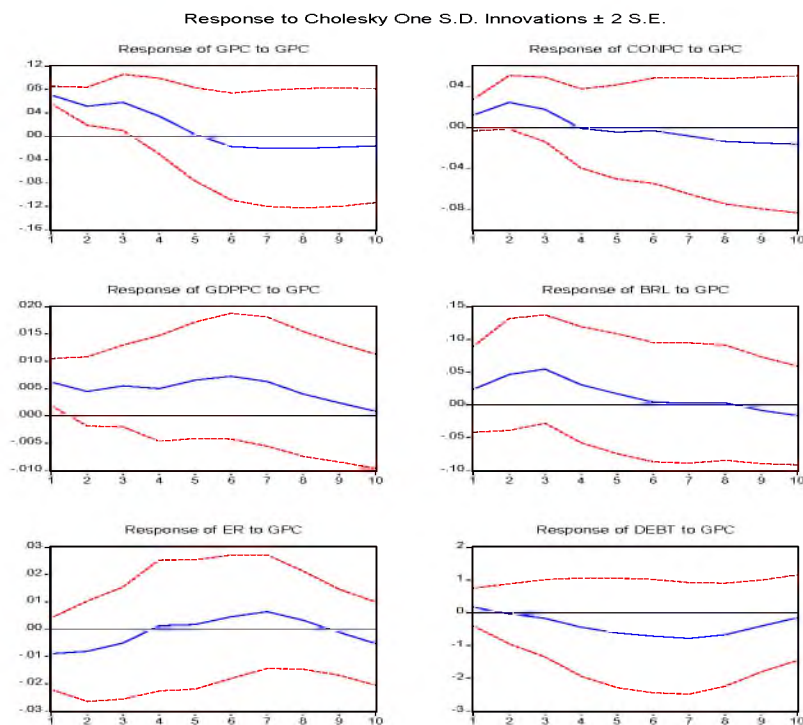
Note: The VAR model is estimated with three lags and a constant.
The ordering is government spending, consumption output, interest rate, exchange rate and debt to GDP ratio.

As figure shows government spending has a negative impact on consumption, output (GDP) and exchange rate. The government spending reacts strongly negative and persistently to its own shock Blanchard and Perotti (2002) find the same result. These results suggest that the impulse responses of consumption to a government expenditure shock increase instantaneously for one year but decline thereafter and one can say that the standard neoclassic model can account reasonably well for the effects of fiscal policy shocks in Pakistan's economy during 1970–2008. In those models, an increase in government expenditures creates a negative wealth effect for the households reduce consumption and increase labour supply. The increased labour supply induces real wages to decrease and interest rates to increase. The consumers may anticipate a future increase in taxes if government spending is financed by increasing debt as Ricardian case suggests. Hence, private consumption may decrease, offsetting the positive effect of an increase in government spending on aggregate demand. Similarly, an increase in government spending that is financed by debt increases the demand for domestic credit, raising the interest rate. The higher the public debt, the higher is the risk premia in interest rates. In addition, financing government spending by borrowing from domestic financial institutions decreases available credit for the private sector. Accordingly, higher government spending is bound to crowd out private investment.
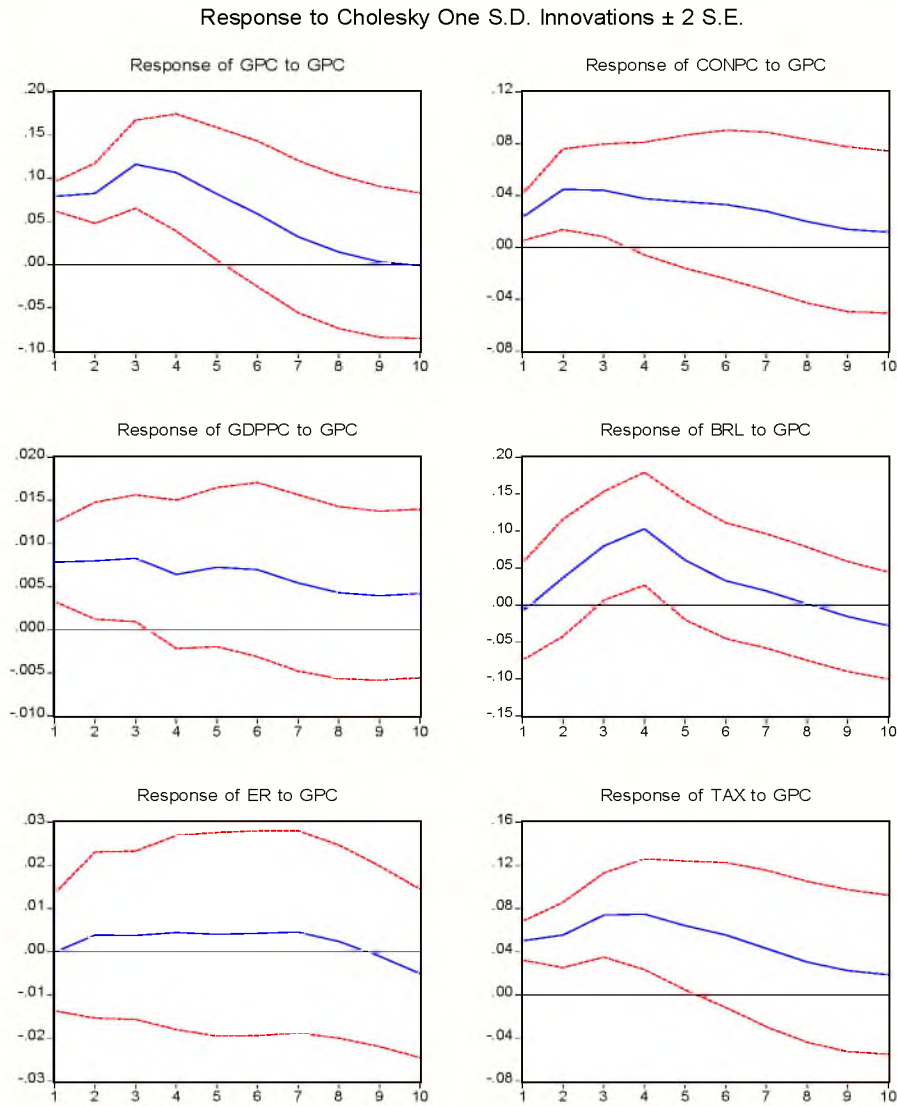
An expansion in government spending leads to rise in the real interest rate and an immediate increase in consumption and output. In the long run, there is a permanently lower interest rate, and a lower capital stock, employment, and output. Higher interest rate crowds-out private investment and moderates the effect of government spending on aggregate demand in short run in case of Pakistan's economy. In the long run this moderating effect has negative impact on interest rate. The empirical evidence suggests that in short period there is stimulating effect of expansionary fiscal policy, it is only one side which correctly describes that deficit financing can raise the level of demand in part of the economy and ignores government borrowing to finance deficit spending that automatically reduces demand elsewhere [Foster (2007)]. Cagon, *et al.* (2009) find the impact of first year of spending expansion is very small and multiplier is less than one as consumption and investment crowd out. An unexpected increase in government spending, beyond what it would occur through automatic stabiliser, weakly stimulate the economy, that is 1 percent increase in government spending increase output by 1.3 percent after one year [Moutford and Uhlig (2002)]. A number of factors underlie the crowding out effect in the face of fiscal spending. Higher interest sensitivity of investment demand increases crowding out. An accommodating monetary policy would offset the tendency of the interest rate to rise following an increase in government spending and reduce the possibility of crowding out. Edelberg, Eichenbaum, and Fisher (1999), Eichenbaum and Fisher (2005), Corsetti, *et al.* (2009) confirm our finding by showing that hours worked go up, investment shortly enlarge, whereas real wages and consumption decline hence implying that the standard neoclassic model can report plausibly well for the consequences of unanticipated changes in fiscal policy. Blanchard and Perotti (2002), Ramey and Shapiro (1998) and several other subsequent studies find contradictory results suggest that fiscal expansion boost private consumption and output which is consistent with Keynesian analysis and contradicts the neoclassical as well as standard new Keynesian analysis.

The result of impulse response indicate the real exchange rate tend to appreciate in response to rise in government spending. This finding is according to recent open economy literature but also with the conventional literature Mundell-Fleming model of Dornbush (1980). This finding is in opposite of some studies for example Kim and Robini (2008), Monachilli and Perotti (2006), Raven, Schmitt-Grohe, and Uribe (2007) document depreciation of real exchange rate as result of fiscal expansionary shock. Furthermore, to finance deficit in face of rising government spending by debt, in the short run debt to GDP decline whereas in the long run stabilisation effect of debt occurs and debt to GDP ratio start rising [Favero (2007)]. The interest rates increase in the face of expansionary fiscal spending, as government debt builds up with fiscal expansion, the rising risk of default or increasing inflation risk further reinforce crowding out through interest rates. Therefore, interest rates are likely to be more flexible to adjust upward in the face of expansionary shocks to government spending for period of three years. An increase in government spending that is financed by domestic borrowing is expected to result in, however, a smaller multiplier. The borrowing increases the demand for the limited pool of available credit, increasing pressure on the interest rate. Higher interest sensitivity of investment demand increases crowding out. An open economy permits government to finance its deficit by importing saving, if in turn not matched by an increase in the imports of goods and services to preserve the balance of payments. Therefore, the increase in domestic demand due to deficit spending is fully offset by reduction in demand arising from an increase in exports [Foster (2009)].

In the empirical literature there are other explanations of negative effect of expansionary government spending on consumption and output. Bailey (1971) indicated that there might be a degree of substitutability between government spending and private consumption. Barro (1981) incorporated it into a general model to examine the direct effect of government purchases of goods and services on consumption utility. Kormendi (1983) and Aschauer (1985) applied the permanent-income approach and find a significant degree of substitutability between private consumption and government spending for the United States. Ahmed (1986) estimates the effects of UK government consumption in an intertemporal substitution model and finds that government expenditures tend to crowd out private consumption. Aiyagari, Rao, Christiano, and Eichenbaum (1990) and Baxter and King (1993) explored the effect of government spending shocks on various economic aggregates in a one sector neoclassical growth model with constant returns to scale and variable labour supply and conclude that increases in government spending significantly led to a decline in private consumption.

When in the VAR model tax to GDP ratio is included the results remains the same as shown in Figure 2. The tax shows a negative response to innovation in government spending. Blanchard and Perotti (2002) also find that tax respond positively to government spending shock. The positive reaction of expansionary shock on tax and a negative effect on debt seems to indicate evidence of Recardian behaviour. An increase in tax revenue signals a reduction in future government liabilities and therefore triggers a positive wealth effect. On the other hand an increase in government debt causes a reduction in the present value of future income and therefore reduces current consumption.

Fig. 2. Dynamic Impact of Government Spending Shock on Macro-variables

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of GPC to GPC

Response of CONPC to GPC

Response of GDPPC to GPC

Response of BRL to GPC

Response of ER to GPC

Response of TAX to GPC

Note: The VAR model is estimated with three lags and a constant.
The ordering is government spending, consumption output, interest rate, exchange rate and tax to GDP ratio.

The Figure A1 in Appendix displays the impulse response function using VAR model. Blanchard and Protti (2002) and several other subsequent studies suggest that fiscal expansion boost private consumption and output. This finding is consistent with Keynesian analysis, this finding contradicts the neoclassical as well as standard new Keynesian analysis which suggests that higher government spending have a negative wealth shock for private consumption facing a large tax burden, consumers work more and consume less. The result of impulse response indicate the real exchange rate tend to

depreciate in response to rise in government spending. The other empirical findings support this result, for example Kim and Robini (2008), Monachilli and Perotti (2006), Raven, Schmitt-Grohe and Uribe (2007) document depreciation of real exchange rate as result of fiscal expansionary shock. This finding is in opposite of recent open economy literature but also with the conventional literature. The empirical investigation demonstrating variation in the effects of expansionary shocks to fiscal spending not including the method of financing is called half story by Foster (2009). The method of financing in the face of positive government spending shocks is also important. The fiscal stimulus approach breaks down because the second half of the story is ignored, deficit financing must be financed and financing carries budgetary consequences and economic costs [Foster (2009)]. In addition, the effects of government spending may vary, however, with the source of financing.

The results in Figure A1 are supported by several empirical findings, e.g., Karras (1994) examines the change of private consumption in response to increases in government spending across a number of countries and finds that public and private consumption are better described as complementary rather as substitutes. In other words, in the aggregate, they are best described as complementary goods in the sense that an increase in government spending tends to raise the marginal utility of private consumption. Based on the idea of complementarily between public and private consumption involves public spending which complements private spending include defense public order and justice [Ganelli and Tervala (2009)]. Devereux, Allen, and Beverly (1996) examine the impact of government spending shocks and found that an increase in government consumption generates an endogenous rise in aggregate productivity. The increase in productivity raises the real wage sufficiently that there is a substitution away from leisure and into consumption. Thus, an increase in government expenditures leads to an increase in private consumption. These findings imply that private consumption cannot be responsible for any crowding-out effects that government spending might have on aggregate demand. On the contrary, private consumption is probably crowded-in.

The decomposition of government spending variability is reported in Table 1. The results suggest that in case of Pakistan, variability is mostly explained by debt to GDP

Table 1

Variance Decomposition of Government Spending

Period	GPC	CONPC	GDPPC	BRL	ER	DEBT
1	0.06883	0.01952	0.00718	−0.05489	−0.00894	0.21090
2	0.06191	0.03419	0.00470	0.00161	−0.01018	0.13382
3	0.07244	0.02867	0.00383	0.03026	−0.01108	0.22877
4	0.06142	0.01808	0.00338	0.06541	−0.00793	0.30341
5	0.03193	0.01766	0.00511	0.02452	−0.00626	0.24789
6	0.01481	0.01981	0.00592	0.00876	−0.00341	0.16529
7	0.00339	0.01798	0.00514	0.00413	0.00067	0.07557
8	0.00513	0.01425	0.00474	0.00236	0.00141	0.11607
9	0.00732	0.01298	0.00455	−0.00233	0.00009	0.20408
10	0.01142	0.01418	0.00432	−0.01036	−0.00310	0.31698

Cholesky Ordering: GPC CONPC GDPPC BRL ER DEBT.

Table 2

Variance Decomposition of Government Spending

Period	GPC	CONPC	GDPPC	BRL	ER	TAX
1	0.07900	0.02317	0.00782	–0.00866	–0.00014	0.05006
2	0.08255	0.04474	0.00798	0.03692	0.00382	0.05546
3	0.11614	0.04401	0.00828	0.07983	0.00376	0.07387
4	0.10667	0.03760	0.00640	0.10291	0.00443	0.07468
5	0.08191	0.03514	0.00724	0.06072	0.00399	0.06419
6	0.05886	0.03307	0.00695	0.03283	0.00425	0.05542
7	0.03229	0.02791	0.00541	0.01893	0.00456	0.04291
8	0.01447	0.02003	0.00428	0.00174	0.00232	0.03056
9	0.00320	0.01389	0.00393	–0.01561	–0.00106	0.02241
10	–0.00137	0.01174	0.00420	–0.02788	–0.00510	0.01855

Cholesky Ordering: GPC CONPC GDPPC BRL ER TAX.

ratio suggesting that as increase in government spending that is financed by debt increases the demand for domestic credit, raising the interest rate. The consumers may anticipate a future increase in taxes if government spending is financed by increasing debt. Hence, private consumption may decrease, offsetting the positive effect of an increase in government spending on aggregate demand. Similarly, an increase in government spending that is financed by debt increases the demand for domestic credit, raising the interest rate. The government spending leads to increase in first year and declining effect thereafter on consumption where as output continuously negative trend.

5. CONCLUSION

The effects of changes in government spending on aggregate economic activity and the way these effects transmitted is central issue in macroeconomics on which there is no widespread agreement. The present study presents a dynamic analysis of the hypothesis that fiscal spending expansion is expansionary during the period 1970–2008. To analyse the transmission mechanism of government spending innovations, the impulse response functions are reported for following five variables: government spending per capita, GDP per capita, consumption per capita, debt to GDP ratio, long-term interest rate and real exchange rate. The consumption and output respond negatively to the innovation in government spending which is consistent with the standard neoclassic model. The interest rates increase in the face of expansionary fiscal spending. As government debt builds up with fiscal expansion, the rising risk of default or increasing inflation risk reinforce crowding out through interest rates. The real exchange rate tends to appreciate in response to rise in government spending. This finding is according to recent open economy literature but also with the conventional literature Mundell-Fleming model of Dornbush (1980). The empirical investigation demonstrates that the effects of government spending also vary with the source of financing. To finance deficit in face of rising government spending by debt, in the short run debt to GDP decline whereas in the long run stabilisation effect of debt occurs and debt to GDP ratio start rising [Favero (2007)]. The positive reaction of expansionary shock on tax and a negative effect on debt

seems to indicate evidence of Recardian behaviour. An increase in tax revenue signals a reduction in future government liabilities and therefore triggers a positive wealth effect. On the other hand an increase in government debt causes a reduction in the present value of future income and therefore reduces current consumption.

There are certain limitations of the unrestricted VAR approach. It would be appropriate to apply restricted VAR techniques and use the restrictions derived by the dynamic stochastic general equilibrium (DSGE) model. Further disaggregation of government spending might be needed, to in depth analysis of the issue. The use of different econometric tests and approaches improve the reliability of the results regarding the effects of changes in government spending on aggregate economic activity and how these effects are transmitted.

APPENDIX

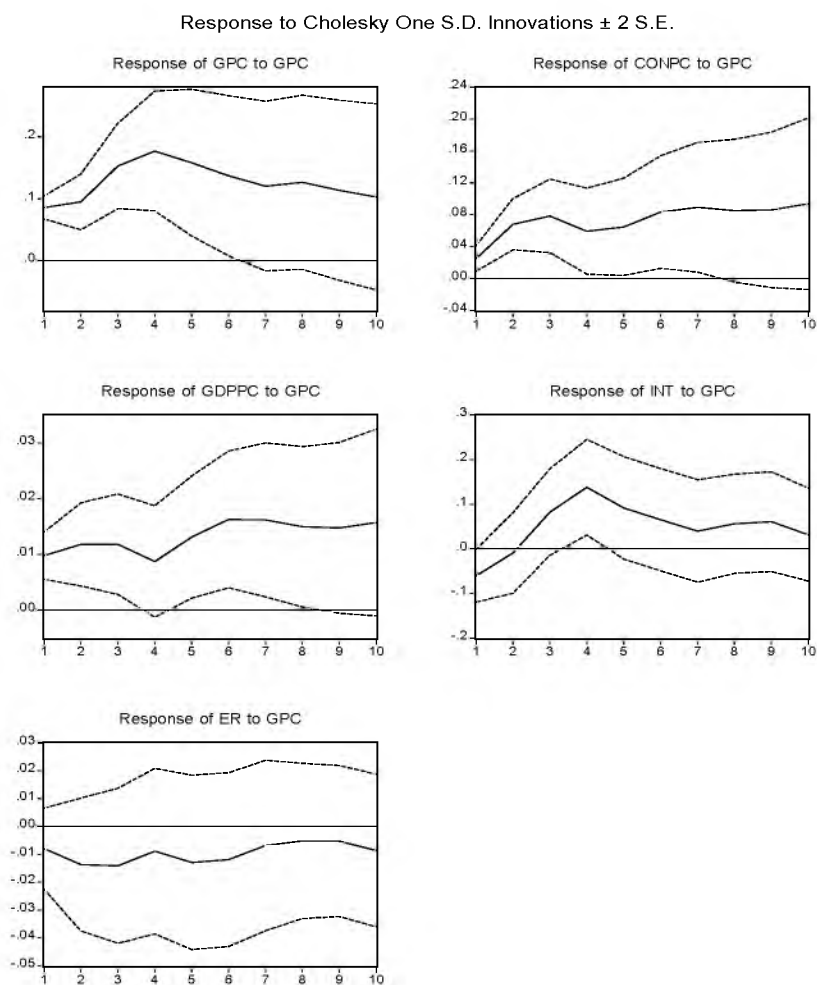### Fig. A1. Dynamic Impact of Government Spending Shock

Response to Cholesky One S.D. Innovations ± 2 S.E.

Table A 1

Stationary Test

	Level	First Difference
conpc	0.902	-3.93*
gdppc	-2.06	-3.44*
gpc	-0.49	14.60*
Debt/GDP	-1.76	-2.72**
er	-0.23	-5.37*
int	-2.13	-6.69*
tax	-1.42	-4.43*

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