Pakistan Economic and Social Review
Volume 54, No. 2 (Winter 2016), pp. 205-231

SIZE AND IMPACT OF FISCAL MULTIPLIERS
An Analysis of Selected South Asian Countries

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Abstract. Due to recent global financial and economic crisis a key issue in current research and for policy makers is the size of fiscal multipliers. Proper knowledge of fiscal multipliers is essential for the designing and implementation of fiscal policies. This research work intends to contribute in the literature on the size of fiscal multipliers for selected South Asian countries (Bangladesh, India, Pakistan and Sri Lanka) by using Panel Vector Autoregressive (PVAR) technique over the period 1982-2014. Results obtained from accumulated Impulse Response Functions (IRFs) show that government expenditures have overall positive impact on output in these countries. Among expenditures government investment multipliers are greater than government consumption multipliers on all time horizons. This finding suggests that governments should put more emphasis on public investment while allocating budget in these countries. When controlling for public debt, cumulative fiscal multipliers exhibit lower values. Additionally, the results also show that during business cycle phases government expenditures show more efficacies in recessions while lower effect in expansions.

Keywords: Fiscal multipliers, Panel vector autoregressive, Impulse response function, Government expenditures, Business cycles

JEL classification: C32, E32, E62

I. INTRODUCTION

Many economists are of the view that macroeconomic stabilizations should be handled mainly by monetary policy (Farhi and Werning, 2012). But

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unfortunately monetary policy is not free from constraints that restrict its efficiency. For example, the economy may entrap into the situation of liquidity trap (close to lower bound interest rate scenario) that prohibit further reduction in interest rates. Furthermore, there are many countries that belong to currency unions (like European countries, Eastern Caribbean Currency Union (ECCU) etc.) or states with in the country don't have the choice of independent monetary policy (Farhi and Werning, 2012).

The latest worldwide economic crisis had brought the attention of authorities towards the usefulness of fiscal policy for two reasons: the first argument was that during that time, the credit and monetary policy had hit its lower limit (a situation of zero lower bound interest rate),[1] in this situation there is no choice for policy makers to rely on the fiscal policy for stimulating economic activity and employment during the period of slump. The second argument was that it was expected to have long lasting recessionary phases across the countries. In this situation, fiscal stimulus regardless of its conventional lags in implementation would have adequate time to give positive results and stable the economy.

The most important channel through which global financial crisis (GFC) hit the economies of South Asia was exports. The United States and European economies were major markets for the exports of South Asian countries. There was a sharp decline in the growth of exports of the South Asian countries due to a sharp decline in demand in the Western economies.

TABLE 1

Growth of Exports Demand, Annual Change, Percentage

Countries	2006	2007	2008	2009	2010	2011	2012	2013	2014
Bangladesh	25.5	13.0	7.1	0.0	0.9	29.3	12.5	2.5	3.2
India	20.4	5.9	14.6	–4.7	19.6	15.6	6.7	7.3	–0.8
Pakistan	9.9	1.5	–4.6	–3.4	15.7	2.4	–15.0	13.6	–1.6
Sri Lanka	3.8	7.3	0.4	–12.3	8.8	11.0	0.2	5.9	4.9

Source: Asian Development Bank, Key Indicators for Asia and the Pacific 2015.

The recent crisis was due to the shortage of demand. During zero interest rate situations the basic goal of a policy should not be to increase

[1]By the end of 2008, the short-run nominal interest rate which is the main operating tool of monetary policy had reached to its very low value regarding to an effective lower bound by the central bank.

aggregate supply by providing aggregate supply incentives. Instead the goal of a policy should be to boost up the overall spending of an economy, *i.e.* aggregate demand. Output is demand determined at zero interest rate situations. Correspondingly, aggregate supply is usually relevant in the model because it talks about future inflation from the expectations of people. Therefore, we can say that the policies that are formulated to boost up the aggregate supply are counter-productive because at zero interest rate they can create deflationary pressure in an economy. So, as a consequence of this policy makers should not formulate such policies that increase the supply of goods when the problem is that there are not much buyers (Eggertsson, 2011). Fiscal policy has an advantage over monetary policy, that increase in government spending can immediately increase the aggregate demand.

From 2008-2009, both the developed and developing nations has undertaken various fiscal policy stimuli to boost the declining economy. It is not possible to access the impact of the fiscal policy on economic growth without proper study on the size, sign and the magnitude of the fiscal multipliers. Moreover, size of expenditure (spending) multipliers also portrays the quality and effectiveness of fiscal policy. These factors and also the lack of empirical estimations on the size of fiscal multipliers for a panel of South Asian economies (Pakistan, India, Bangladesh and Sri Lanka) have been a source of motivation behind this study. This research tries to investigate the size and sign of government expenditures and government revenue (taxes) multipliers for selected South Asian countries. This study also tries to estimate the effect of debt dynamics and business cycle phases (recession and expansion) on the magnitude of fiscal multipliers.

This research paper is structured as follow: Section II discusses the theoretical mechanism behind fiscal multipliers; Section III reviews the background literature; Section IV discusses the data and methodology; Section V discusses the estimation and results and in section VI conclusion and policy implications are discussed.

II. THEORETICAL MECHANISM BEHIND FISCAL MULTIPLIERS

Initially the concept of "multiplier" was introduced by Kahn (1931) and then further elaborated by Keynes (1936). According to Keynes-Kahn textbook version of multipliers if public expenditure (G) increases by one unit, as a consequence of this aggregate demand increases by more than one unit. The initial round of spendings stimulate the next rounds of spending in this way the final impact on output is multiplier times the original increase in

spending. If the initial increase in public spending is ΔG and marginal propensity to consume (*MPC*) is "*c*" then change in output is *k* times ΔG, where *k* is the fiscal multiplier and equals $k = 1 / (1 - c)$ and for taxes it is given by $-MPC / (1 - MPC)$, under the assumption of close economy. The value of multiplier is the accumulated effect on output through various rounds of spending[2] (Bose and Bhanumurthy, 2015).

In simple terms fiscal multiplier refers to the ratio of change in output due to some exogenous change in fiscal instrument – such as government expenditures or government taxes. There are several types of fiscal multipliers depending on different time horizons. Impact multiplier is the ratio of change in output (at time t_0) due to an exogenous change in the fiscal variable at time t_0, *i.e.* $\Delta Y_{t0} / \Delta G_{t0}$. Cumulative multiplier is defined as the ratio of cumulative change in output due to cumulative exogenous changes in the fiscal variables. $\Delta Y_{t0+i} / \Delta G_{t0+N}$ where $i = 0, 1, \ldots, N$.

In the case of zero lower bound (ZLB) interest rate situation the multiplier for output is greater than unity. The whole mechanism behind this result is that government spending promotes inflation in an economy. As the nominal interest rate is fixed, this reduces the real interest rate which motivates the investors to enhance their investment (their current spending). The increase in consumption in turn of this leads to more inflation, in this way it creates a feedback loop. The fiscal multiplier is increasing in the degree of price flexibility. The whole mechanism relies on the response of inflation (Farhi and Werning, 2012). The core thinking behind taking these policy actions are that both recession and inflation are opposite of one another. During periods of inflation there is too much money circulating in an economy, but during the phases of recession there is not enough money. So during recessionary phases in order to put money in the economy government increases its expenditures to create inflationary situation in the economy.

Many macroeconomics models predict that a rise in government spending will have an expansionary effect on aggregate output; these models are generally differing according to their implicit effect on consumption. As the later variable (consumption) is the largest component of aggregate demand, its response is the crucial determinant about the size and sign of government spending multiplier.

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[2] $[1 / (1 - c)]$ is the summation of the series $c + c^2 + c^3 + \ldots \infty$, *i.e.* additions through multiplier rounds.

The weak Keynesian and IS-LM model predict that consumption will increase after a shock in government spending. In these models MPC is high because consumers are not forward looking and they do not fully consider that in future taxes will increase to compensate for current increase in debt and increase in government spending due to their finite horizon. In other words, in the IS-LM model consumers behave in a non-Ricardian fashion, *i.e.* rule of thumb consumers. From another perspective when a shock in government spending is given its effect on output is weaken due to domestic crowding out effects from investment for a large economy, although in a small but financially integrated economy the size of the fiscal multiplier is further curtailed due to negative effect of real exchange rate on foreign demand and marginal propensity to imports.

The Real Business Cycle (RBC) models are considered as the stochastic versions of the Classical Models. The characteristics of these models are the presence of micro foundations and intertemporal considerations. The RBC model has infinitely lived and forward looking behaviour consumers with no nominal rigidities and whose consumption decision are based on intertemporal considerations. In these models positive government spending shock will have a negative wealth effect and this positive shock reduces the consumption in favour of saving while increase the labour supply and have a negligible increase in output. Hence, reduction in tax has no effect on consumption and on income. This reduction in tax is usually portrayed as Ricardian equivalence (Barro, 1974). On the other hand, a tax shock that is not followed by any discretionary changes in government spending have no effect on output, because this lower tax today will be balanced by higher future taxes and in this way present discounted value will remain unchanged (Ricardian Equivalence). But when government spending is financed by distortionary taxes, then both social welfare and output level will be reduced, therefore giving a negative value of government spending multiplier.

Summing up we can say that different types of models will give us different magnitudes of the multipliers. The reason of the difference of the impact of fiscal variables across these models lies in the fact of how consumers behave in each model. In addition to this, the size of multiplier also depends seriously on the conduct of monetary policy, level of public debt, trade openness, exchange rate regimes, uncertainty and saving rate.

Taxes and public expenditure/spending multipliers are key parameters for accessing the effectiveness of fiscal policy in managing output fluctuations. These multipliers provide a quantitative measure of change in output as a result of increase in taxes or spendings.

An estimation of the size and the sign of the fiscal multipliers are essential for the designing and implementation of fiscal policies. If a government spending multipliers are smaller than expected, then expansionary fiscal policy will be failed to boost the economic activity of a country sufficiently and it will also increase the public indebtedness (along with associated debt service) as a percentage of GDP. The second important component of fiscal policy is taxes (revenue side) a tax multiplier that have a larger than expected (more negative) value may depress the economic activity more than anticipated and it will sooner or later destroy the tributary base from which all the taxes are collected (Gonzalez-Garcia *et al.*, 2013).

III. REVIEW OF LITERATURE

The topic of fiscal multipliers again gets attention from the policy makers and economists, due to recent crisis. Therefore modern literature on this topic has grown rapidly and most of the empirical work uses VAR framework for the estimation of fiscal multipliers. This research tries to give a very selective overview of the most important issues and results.

According to economic theory government spending has positive effect on stimulating the aggregate demand for an economy. Marattin and Salotti (2011) found that increase in government spendings had a significantly positive effect on private consumption and private investment for European Union (EU) from 1970-2006, but these effects died out gradually (faster in the case of private consumption). Jamec *et al.* (2011) used quarterly data of Solvenia for taxes and government spending from 1995:1 to 2010:4. They found positive government spending shocks had positive effect on output, private consumption and investment on impact, but shocks became insignificant for next periods. On the other hand, tax shocks had negative effect on impact and shock also became insignificant in next periods. Bose and Bhanumurthy (2015) estimated positive expenditure multipliers from 1991-2012 for Indian economy where tax multipliers were in the range of –1. On the same lines Silva *et al.* (2013) accessed public spendings had a negative effect on output on impact but cumulative effect was positive. On the other hand, taxes had overall negative effect on output, for a panel of Euro area from 1998-2008. For Mediterranean countries Minea and Mustea (2015) analyzed positive and significant respond of output on impact by giving shock in government consumption and investment. But after one year government investment became three times larger than government consumption multipliers.

Studies also show that fiscal multipliers are small and short lived for instance, Trezzi *et al.* (2010) estimated short lived and small fiscal multipliers for Argentina, based on the data from 1993Q4-2004Q3. On the same pattern Parkyn and Vehbi (2014) investigated positive but small fiscal multipliers for short-run in the case of New Zealand. These small and short-lived multipliers might be due to some leakages from the economies. As Espinoza and Senhadji (2011), Silva *et al.* (2013) and Gonzalez-Garcia *et al.* (2013) accessed weak and below unity value of multipliers due to substantial leakages through remittances, imports and degree of openness.

According to available literature, business cycle phases also affect the size of fiscal multipliers. Many studies support the fact that fiscal multipliers are countercyclical in nature, for instance; Bachmann and Sims (2012) checked the effect of confidence as a transferring channel of fiscal policy shocks into economic activities for US data. They found that confidence level turned the size of multipliers larger in recessions than those in expansions, especially when cumulative effect on output was considered. On the same lines, Auerbach and Goronichenk (2013) estimated larger multipliers for recessions while smaller even negative for expansions but not statistically different from zero for large number of OECD countries from 1985-2010. Baum *et al.* (2012) found larger government spending and revenue multipliers when output gap was negative as compared to positive output gaps for six of G7 economies. De Cos and Moral-Benito (2016) accessed specific multipliers for Spain that depend upon conditions of public finances, the health of banking sector and the business cycle by using data from 1986-2010. They estimated spending multipliers were around 1.4 during crises situations and 0.6 during normal times. In a study closer to ours, Silva *et al.* (2013) also investigated positive spending multipliers for recessions and smaller even negative for expansions. Chouliarakis *et al.* (2013) found that during negative output gap the impact multipliers was above 0.5 (and also significant) and during positive output gap the value of spending multipliers was very low and statistically insignificant.

Exchange rate regimes also affect the size of fiscal multipliers as Ilzetzki *et al.* (2013) and Chouliarakis *et al.* (2013) found larger multipliers for economies having fixed exchange rates than that of floating exchange rate regimes.

Fiscal multipliers also vary from country to country and it depends upon different characteristics of the countries for instance, empirical estimations of Ilzetzki *et al.* (2013) for 144 countries (24 are developing countries) from 1960-2007 showed that government consumption multipliers were larger in

industrial than in developing countries, open economies had lower fiscal multipliers than closed economies, fiscal multipliers for high debt countries were also zero and finally government investment multipliers were larger than government consumption multipliers. On the same pattern different techniques of estimating fiscal multipliers give different values like, Yadav *et al.* (2012) used two different identification schemes, *i.e.* recursive VAR (based on Cholesky decomposition) and structural VAR (based on Blanchard and Perrotti, 1999) to accessed fiscal multipliers for Indian economy over the time period from 1997Q1 to 2009Q2. They found that impulse response function obtained from different identification schemes behave in a similar fashion but the value of multipliers was different.

IV. DATA AND EMPIRICAL METHODOLOGY

A usual methodology that is used for assessing the effectiveness of fiscal policy is the Vector Autoregressive (VAR) approach. VAR is a system of multivariate simultaneous equations, in which each variable under consideration is regressed on a constant and finite number of its own lags as well as the lags of other variables in the system. VAR treats all variables as endogenous. VAR was introduced by Sims (1980) into an empirical economics.

Following the recent literature about estimating the fiscal multipliers this study estimates VAR model. Particularly, this study makes a panel dimension with a VAR framework to estimate a PVAR model with annual data for selected South Asian countries (Bangladesh, India, Pakistan and Sri Lanka). There are two reasons behind the use of this particular methodology. Firstly, the PVAR methodology combines the traditional VAR technique with panel data, which captures the unobserved individual heterogeneities. Another advantage of using panel data is that it increases the number of observations, but the disadvantage is that there is a need to impose some restrictions about some homogeneity. Therefore, by just focusing on selected South Asian countries (Bangladesh, India, Pakistan and Sri Lanka) this study limits the potential heterogeneities, as these countries share some similarities like having floating exchange rates, belongs to same region, all are developing countries and all having lower middle income levels except Bangladesh.[3] Secondly, this study uses annual data rather than quarterly, unlike a sufficient amount of empirical literature is on quarterly data. The reason behind the use of annual data is that there is no quarterly calendar for

[3]According to WDI Bangladesh is low income country.

the revision of fiscal policy and usually major fiscal policy decisions are taken at the start of new fiscal year and hence due to this reason annual interpretation of fiscal shocks may be facilitated (Marattin and Salotti, 2011).

Data on real variables are collected on annual basis in billions of dollars from 1982-2014 for a panel of four South Asian countries from *Asian Development Bank* (ADB),[4] *International Financial Statistics* (IFS) and *World Development Indicators* (WDI).

In order to make empirical estimation first of all this study will estimate average fiscal multipliers from taxes and government expenditures and afterward estimates disaggregated fiscal multipliers by just considering different items on expenditure sides.

THE PVAR MODEL

On the basis of recent literature, structural version of our model can be written as, indexing countries as $i = 1, 2, \ldots, N$ and time as $t = 1, 2, \ldots, T$.

$$Az_{it} = \Lambda_0 + \Lambda_1 z_{it-1} + \varepsilon_{it} \quad (1)$$

where

z_{it} = vector of endogenous variables of the model (namely government expenditures, revenues, GDP)

A = matrix described simultaneous relationship between variables.

Λ_1 = matrix of coefficient of lagged variables.

ε_{it} = vector of errors.

Multiplying equation (1) by the inverse of matrix A, namely A^{-1} we obtain equation (2)

$$Az_{it}(A^{-1}) = \Lambda_0 A^{-1} + \Lambda_1 A^{-1} z_{it-1} + \varepsilon_{it} A^{-1} \quad (2)$$

Suppose:

$$\Lambda_0 A^{-1} = \Gamma_0$$

$$\Lambda_1 A^{-1} = \Gamma_1$$

$$\varepsilon_{it} A^{-1} = e_{it}$$

The reduced form of above system, which is actually estimated, is expressed as

[4]Key indicators for Asia and the Pacific 2014.

$$z_{it} = \Gamma_0 + \Gamma_1 z_{it-1} + e_{it} \quad (3)^5$$

In this scenario of rapid growth and development, it is very difficult task for any nation to finance its all development expenses with its own domestic resources. Therefore, accumulation of external debt is a common phenomenon of almost all developing countries. In spite of its positive impact a major consensus of economist is that debt is a burden on a nation. In order to control the effect of debt on the growth of GDP, this study considers the debt as an exogenous variable. Usually exogenous terms are not included in VAR models, but Lütkepohl (2005) introduces exogenous variables in the VAR (p). So the above reduced form equation after adding the exogenous variable (DEBT) can be written as

$$z_{it} = \Gamma_0 + \Gamma_1 z_{it-1} + B_0 DEBT_{it} + e_{it} \quad (4)$$

The above equation can be estimated on a group of selected countries, it is particularly appropriate for cases in which the time dimension of the data is relatively limited. In addition, in every PVAR specification we include fixed effects to account for time-invariant unobserved country heterogeneity.

In a standard form of the model, the errors e_t are at composites of the white noise processes and therefore have zero means, individually serially uncorrelated and have constant variance.

IDENTIFICATION OF THE PVAR

The interpretation of the individual parameters is difficult in VAR models. Therefore, the practitioners of this technique often estimated the so called IRFs. IRF describes the reaction of one variable due to a shock in another variable in the system by holding all other shocks equal to zero. On the same pattern this study computes the response of output by giving shock into fiscal variables under PVAR model by using impulse response analysis. However, the major problem that is highlighted in the literature is the identification of the truly exogenous shocks. Due to this reason the study follows the recursive formulation approach (Cholesky decomposition) proposed by Sims (1980). Under recursive formulation approach arrangement of the variables is very important. The identifying assumption behind the arrangement of the variables is that the variables that come earlier in the ordering affects the following variables contemporaneously, as well as with lags, but the

[5]This derivation help is taken from Inessa Love's paper "Financial Development and Dynamic Investment Behavior: Evidence from Panel Vector Autoregression".

variables that comes later only affect the previous variables with a lag. This arrangement of the variables actually shows the causal relationship between the variables (Silva *et al.*, 2013). In other words, the variables that come earlier in the system are more exogenous and those variables that come later are more endogenous.

For this study the chosen order of the variables are: GOVERNMENT EXPENDITURES, GDP, and TAXES. This arrangement of the variables means that output responds contemporaneously to changes in government expenditures, but government expenditures does not respond contemporaneously by changes in output. Similarly, output has a contemporaneous effect on tax revenues but the converse is not possible. The reason behind this arrangement of variables is that the political process requires some substantial delays for designing and implementation of the changes in the tax rates, which at the margin have an effect on the output level, investment and consumption plans also take some time to adopt to a policy even after being enacted (Silva *et al.*, 2013).

For disaggregated model, in which government expenditures are split into government investment and government consumption, the arrangement of the variables are in this way: GOVERNMENT INVESTMENT, GOVERNMENT CONSUMPTION, GDP, and TAXES. Here constant term and DEBT are also considered as exogenous variables. Regarding to the specific ordering of the variables, it is decided to always order government consumption expenditures after government investment expenditures, as it is quite reasonable that investment generates current consumption (Gonzalez-Garcia *et al.*, 2013).

Debt is usually considered as a burden and debt services act as a leakage from the economy. Therefore, a separate model is estimated in which debt is not considered as an exogenous variable, in order to compare government expenditure multipliers with and without controlling for debt.

Additionally, aggregated PVAR model has been separately estimated across business cycle phases (expansions and recessions) and results of fiscal multipliers in expansions and recessions are compared. The output gap is used for the measurement of economic activity or "excess demand", it is the difference between actual and potential output. Output gap represent business cycle fluctuations which are basically identified with deviation from the trend of the process. In this study output gap is computed with the help of Hoddrick-Prescott filter (Silva *et al.*, 2013). The sample is split into two parts: one sub-sample includes the observations in which output gap is negative (recessions) and second part of the sample contains observations in

which output gap is positive (expansions). The years that show expansions and recession phases are mentioned in Table 2.

TABLE 2

Identification of Business Cycle Phases
for a Panel of South Asian Countries

Countries	Years	
	Expansions	Recessions
Bangladesh	1982, 1984, 1989, 1993, 1994, 1995, 1999, 2000, 2003, 2004, 2008, 2009, 2010, 2011, 2014	1983, 1985, 1986, 1987, 1988, 1990, 1991, 1992, 1996, 1997, 1998 2001, 2002, 2005, 2006, 2007, 2012, 2013
India	1982, 1983, 1988, 1990, 1995, 1996, 1997, 1999, 2000, 2005, 2007, 2008, 2010, 2011	1984, 1984, 1986, 1987, 1991, 1992, 1993, 1994, 1998, 2001, 2002, 2003, 2004, 2006, 2009, 2012, 2013, 2014
Pakistan	1982, 1984, 1987, 1988, 1992, 1995, 1996, 2000, 2003, 2004, 2005, 2006, 2007, 2008, 2011, 2014	1083, 1985, 1986, 1989, 1990, 1991, 1993, 1994, 1997, 1998, 1999, 2001, 2002, 2009, 2010, 2012, 2013
Sri Lanka	1982, 1986, 1987, 1988, 1994, 1995, 1996, 1997, 1998, 2000, 2005, 2006, 2008, 2009, 2011, 2014	1983, 1984, 1985, 1989, 1990, 1991, 1992, 1993, 2001, 2002, 2003, 2004, 2007, 2010, 2013

Before analyzing and providing the estimation results, a few preliminary tests on the model and variable specifications are applied. First of all, the VAR methodology requires that all variables to be stationary. This study proceeds with the — Im-Pesaran-Shin (IPS 2003) test and Fisher Type Tests that are developed by Maddala and Wu (1999) and Choi (2001) — panel unit root tests on the above mentioned variables. All variables are stationary at their first difference. Secondly, a VAR methodology required optimal number of lags. For this study the optimal chosen numbers of lags are 3 and by including three lags the models also become stable.

V. ESTIMATION AND RESULTS

The common practice in the literature is the use of the log variables or the growth rate of the variables for computing fiscal multipliers, not only from standard linear VAR models but also from non-linear VAR's. Therefore, the estimated IRFs do not directly reveal the value of fiscal multipliers because the estimated elasticities[6] must be converted to currency equivalents. Virtually all the estimations using VAR models obtain the expenditure multipliers by using an *ex post* conversion factor which is based on the sample averages of the ratio of GDP to government expenditures, *Y/G*. Sometimes inflated multipliers can be derived because of higher mean of *Y/G*. Thus this practice of converting elasticities into multipliers by using *ex post* conversion factors can lead to upward biased estimates (Owyang *et al.*, 2013). To avoid this bias, this study does not convert the variables to log or growth rates rather use all variables in their original units (*i.e.* billion dollars). Therefore, the impulse response function (IRF) directly gives the value of required fiscal multipliers in spite of elasticities.

For the analysis of impulse response function there is a need of some estimates for their confidence intervals. Standard errors of Impulse Response Function (IRF) are reported by using 1000 Monte Carlo simulations to generate their confidence intervals.

MODEL 1: AGGREGATE MODEL

Model 1 contains three endogenous variables namely: Government expenditures, GDP and Taxes. Constant term and debt is considered as exogenous variable. Figure 1 shows the accumulated impulse response function of D(GDP) to a shock in D(GEXP) and D(TAXES). Accordingly government expenditures have an overall positive impact on output. Initially taxes show positive effect but later on it becomes negative. On *x*-axis numbers of years are plotted (from 1-10 years in future) and on *y*-axis value of the multipliers (change in output due to a shock in the given fiscal instrument) are plotted.

In Figure 1, Accumulated IRFs of GDP (at first difference) to shock in Government Expenditures (at first difference) and taxes (at first difference) respectively, aggregate model. Dotted lines show upper and lower bounds and smooth line shows behaviour of variable (GDP).

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[6] $\text{Elasticity} = \dfrac{\text{Percentage Chane in Output}}{\text{Percentage Change in Fiscal Variable}}$

FIGURE 1

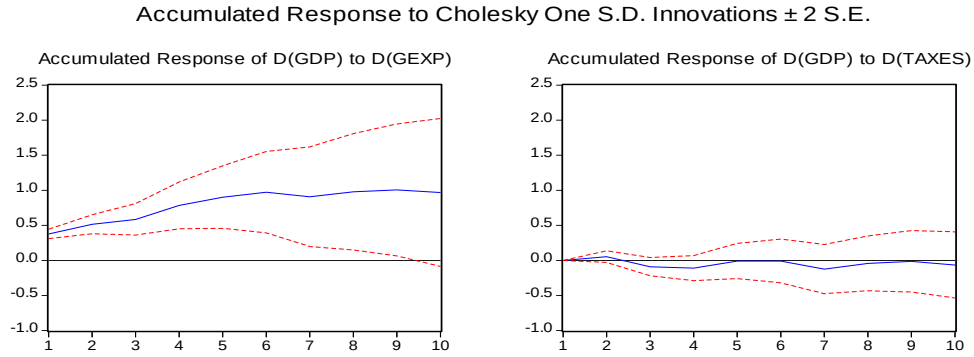

Table 3 shows fiscal multipliers for up to 10 years in future. The results show that output will be changed by a billion dollar due to a billion dollar exogenous shock[7] in expenditures in the upcoming 9 years. When a shock is given to both government expenditures and taxes individually, in case of government expenditures shock remain significant up to 9th period but in case of taxes shock is not statistically different from zero in any of the year. On impact the value of government expenditure multiplier is 0.3777. This value can be interpreted as, if one billion dollars shock is given to government expenditures as a consequence of this GDP rises by 0.3777 billion dollars. Less than 1 value of multipliers means that initial increase in expenditures is eroded due to some counteracting effects. There are two reasons of these counteracting effects, first is, crowding out of productive private sector activities and second reason is increased fiscal impulse translated into higher imports that do not used to increase domestic output (Gonzalez-Garcia *et al.*, 2013). This is the reason that's why high degree of openness weakens the effectiveness of fiscal policy in boosting the economy.

As the shock is dissipated to the future time horizon, in case of government expenditure shock is statistically different from zero up to 9th year so its cumulative[8] multiplier value is 1.005. Current shock of a billion dollar in government expenditures will increase the output to 1.005 billion dollars in the future 9th year (after 9 years). It means that in case of government expenditures the accumulated response of GDP is equal to initial shock of 1 billion after the span of 9 years.

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[7]In the literature the term "exogenous shock" refers to a change in spending or revenue that is not induced by the macroeconomics environment.

[8]In this study 9 years cumulative multipliers are also referred to as long-run multipliers.

TABLE 3

Cumulative Fiscal Multipliers, Government Expenditure vs. Taxes

Period	Government Expenditure Multipliers	Tax Multipliers
1	0.3777*	—
2	0.5152*	0.0535
3	0.5846*	–0.0895
4	0.7848*	–0.1100
5	0.9017*	–0.0099
6	0.9720*	–0.0087
7	0.9080*	–0.1235
8	0.9780*	–0.0431
9	1.0050*	–0.0134
10	0.9687	–0.0645

* shows significant at 5% level of significance

Source: Authors' own calculations.

In initial four years after the shock in government expenditures, the rise in output is higher than other periods. Although in other periods level of output rises but the pace of this rise in output is much lower than initial periods. For instance, from 1st to 4th year output rises from 0.3777 to 0.7848 (change in output is of 0.4071) and from 5th to 9th period the value of multiplier ranges from 0.9017 to 1.005 (change in output is of 0.1039). In this model, the value of tax multiplier is very low and statistically insignificant. There are many reasons behind lower tax multipliers and some will be discussed in the results of Model 2.

MODEL 2: DISAGGREGATED MODEL

In this model government expenditures are split into government investment and government consumption to check their effect on GDP separately.

In Figure 2, Accumulated IRFs of GDP (at first difference) to shock in Government Investment (at first difference), Government Consumption (at first difference) and taxes (at first difference), a disaggregated model. Dotted

lines show upper and lower bounds and smooth line shows behaviour of the variable (GDP).

FIGURE 2

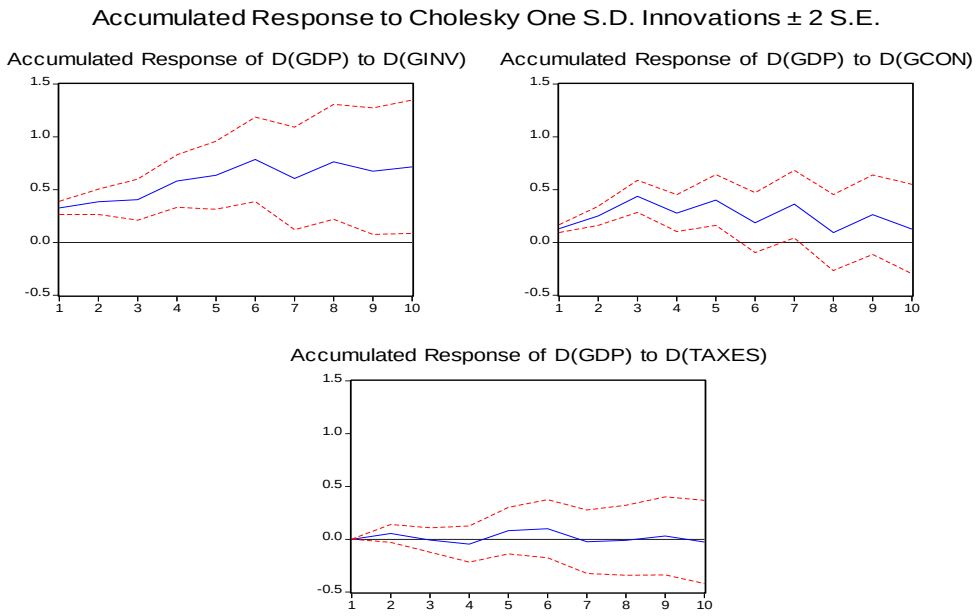


Figure 2 shows the IRFs of the disaggregated model. On *x*-axis numbers of years are plotted (from 1-10 years in future) and on *y*-axis value of the multipliers are plotted.

Table 4 shows the values of the impact and cumulative multipliers for government investment, government consumption and taxes.

Shock is statistically significant up to 10th period for government investment and for government consumption shock is statistically different from zero only for first five years and for 7th period. For taxes shock is not different from zero for entire span of 10 years. On impact the value of government investment multiplier and government consumption multipliers are 0.3268 and 0.1305 respectively. According to their interpretation if one billion dollars shock is given to government investment and government consumption separately, as a consequence of this output rises by $ 0.3268 billion (from investment shock) and $ 0.1305 billion (from consumption shock) immediately. As the shock is dissipated to future time horizons so on cumulative terms the value of government investment and government consumption multipliers are 0.7161 (cumulative 10 years) and 0.4018 (cumulative 5 years) respectively. If at present time a billion dollars positive

shock is given as a consequence of this after 10 years government investment will accumulatively increase output up to $ 0.7161 billion and after 5 years government consumption accumulatively increase output up to $ 0.4018 billion.

TABLE 4

Cumulative Fiscal Multipliers, Disaggregated Model – Government Investment, Government Consumption, and Taxes

Period	Government Investment Multipliers	Government Consumption Multipliers	Tax Multipliers
1	0.3268*	0.1305*	—
2	0.3847*	0.2519*	0.0550
3	0.4047*	0.4366*	–0.0074
4	0.5809*	0.2775*	–0.0456
5	0.6359*	0.4018*	0.0814
6	0.7864*	0.1867	0.0999
7	0.6054*	0.3628*	–0.0234
8	0.7634*	0.0934	–0.0099
9	0.6741*	0.2630	0.0316
10	0.7161*	0.1265	–0.0259

*shows significant at 5% level of significance

Source: Author's own calculations.

In short-run[9] the effect on an output due to shock in government investment is lower than other periods, *i.e.* in short-run change in output is about $ 0.05 billion (from 1st to 2nd year). Output significantly rises in other periods up to 6th period than start declining. For instance, the change in output from 3rd to 6th period is $ 0.38 billion and from 7th to 10th period is $ 0.11 billion.

[9]Short-run is defined as a time gap ranging from simultaneous effects to one year distance from the fiscal shock (Boussard *et al.*, 2013). In this study 1st year is considered as impact multiplier and up to 2nd year is considered as short-run multipliers.

In case of government consumption multipliers the pace of the rise of GDP due to shock in government consumption is very slow and less than government investment multipliers. For instance, in short-run (0.25 vs 0.38) and in long-run (0.40 vs 0.63). The results indicate that at all time horizons government consumption multiplier is less than government investment multipliers. This suggests that during allocation of budget, policy makers should emphasis on public investment either in the form of infrastructure or human resource development because it not only have a positive impact on output at the time of implementation of these measures but also in longer run it contributes more in output as compared to public consumption.

According to an economic theory, an increase in the output (GDP) can be attained by increasing the government expenditures. Results of both aggregate and disaggregated models of this study support this fact. On the other hand, according to fiscal multiplier literature the value of government investment multiplier is higher than government consumption multipliers. This fact is also evidenced at all-time horizons, like on impact (0.32 vs 0.13) and cumulative multipliers are (0.63 vs 0.40).[10] In above both models, tax multipliers are very small and shock in taxes is statistically insignificant. There might be many reasons behind lower and insignificant tax multipliers for these countries. Firstly, developing countries usually have lower tax bases. Typically tax collection is very low in low income countries around 10-20 percent of their GDP, while high income countries collect more taxes like 40 percent of their GDP (Besley and Persson, 2014). Secondly, low income countries mostly have many small scale firms and large informal sector. It is difficult to impose proper taxes on large informal and small sector of the poor economies, such as village shops and street vendors, because there is no formal record of their incomes and transactions (Besley and Persson, 2014). The size of the informal sector is strongly negatively related to income taxation (Schneider, 2002). Thirdly, these countries have agrarian economies in which farmer's incomes are seasonal and unstable, so it's difficult to calculate base for an income tax. Therefore, taxes play a diminishing role in these economies (Tanzi and Zee, 2001). Fourthly, governments of developing countries have alternative sources for revenues such as foreign aid, which are sometime larger than domestically generated tax revenues and a significant fraction of GDP. For example, according to *World Development Indicators* (WDI) for a sample of low income countries the average share of aid was around 10 percent of their gross national income

[10]In case of government consumption multipliers shock is significant accumulatively and consecutively up to 5th period that is why both multipliers are compared for 5th period.

from 1962-2006 (Besley and Persson, 2014). Fifthly, income is unevenly distributed in developing countries and there was a lack of efficient, well trained and well educated tax administration (Tanzi and Zee, 2001). These are the few reasons behind lower and insignificant tax multipliers for these countries.

All the models show smaller and less than unity values of multipliers. There may be three possible reasons for the lower value of multipliers in a panel of these countries. Firstly, usually people of South Asian economies are habitual of savings like for their future and for some other precautionary motives but not for investment purposes and savings act as a leakage. The whole process of multipliers relies on consumptions, as the consumption of one person is the income of other and so on. But savings act as a leakage, higher the value of saving lower will be the consumption which gives lower value of multipliers. Multiplier formula, $k = 1/mps$, also shows inverse relation between marginal propensity to save and multiplier. Secondly, it might be possible that people have more inclinations towards imports which reduce the value of multipliers as imports are also leakages in the economy. Thirdly, greater than unity value of multipliers could be attained when interest rate is at its lower bound. Unlike developed nations, South Asian economies do not face the situation of lower bound on interest rate.

MODEL 3: ROLE OF DEBT

In this era of rapid growth and development it is very difficult for a nation to finance its all development expenditures with its own resources. Therefore to cover the gap between revenue and expenditures it has to borrow from some external and internal sources. As far as the contribution of the debt is concerned, approximately one third effect of debt on growth is through physical capital accumulation and two third is through the growth in total factor productivity (Poirson *et al.*, 2004). But as all knows that debt is a burden and when a nation starts repaying it, it usually increases than its principal value. Developing nations do not have sufficient capacity to absorb the external debt positively, as a result, debt exerts negative impact on their economies. Debt repayments are act as a leakage in the economy so it leads to lowering the value of the fiscal multipliers.

For assessing the impact of debt dynamics aggregate Panel VAR (PVAR) model has been re-estimated by just using three variables (government expenditure, GDP and taxes) as endogenous without controlling for debt (debt is not considered as exogenous)

For this model equation (3) is estimated and Table 5 presents the cumulative value of government expenditure multipliers without controlling for debt dynamics, and compared the multipliers with aggregate model that is calculated by controlling (as an exogenous) debt dynamics. All the multipliers are statistically different from zero for all time horizons and model is also stable.

TABLE 5

Comparison of Government Expenditure Multipliers with and without Controlling for Debt Dynamics

Period	Government Expenditure Multipliers	
	without controlling for debt	controlling for debt
1	0.3560*	0.3777*
2	0.4693*	0.5152*
3	0.4994*	0.5846*
4	0.6546*	0.7848*
5	0.7259*	0.9017*
6	0.7788*	0.9720*
7	0.8120*	0.9080*
8	0.9046*	0.9780*
9	0.9811*	1.0050*
10	0.9853*	0.9687

* shows significant at 5% level of significance.

Source: Authors' own calculations.

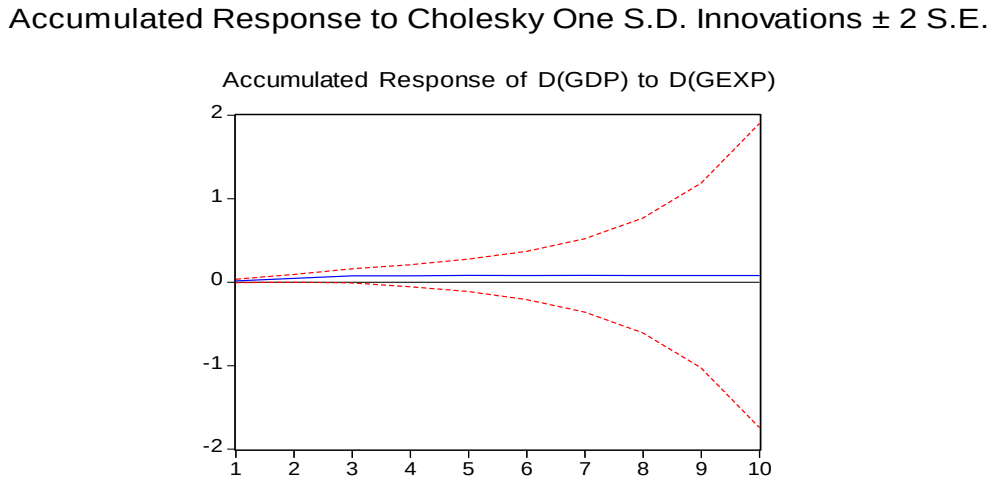
Table 5 shows that, on impact the value of government expenditure multiplier is 0.3560 without controlling for debt which is lower than controlled model (*i.e.* 0.3777). This model shows that at all time horizons the value of government expenditure multipliers are less than as compared to controlled model. These results are consistent with many studies that show that debt burden hinders the economic growth of a country (Ilzetzki *et al.*, 2013; Batini *et al.*, 2014; Calderon and Fuentes, 2013).

The short-run period shows that if government expenditures are increased by a billion dollar it leads to increase the output by 0.11 billion dollars, which is less than controlled model because debt acts as a leakage in the economy. Same is the case with long-run multiplier as its value is 0.9811 (which is lower than 1.005 in a controlled model).

MODEL 4: FISCAL MULTIPLIERS ACROSS BUSINESS CYCLE PHASES

Baseline (aggregate) PVAR model is re-estimated for analyzing multipliers across business cycle phases. GDP series is detrended with the help of Hodrick-Prescott (HP filter) technique to compute output gaps. According to this two samples are obtained: one sub-sample includes observations that have positive output gap (expansions) and the other sub-sample contains observations having negative output gap (recessions). In this case sample size is reduced therefore appropriate lag length is 1.

FIGURE 3

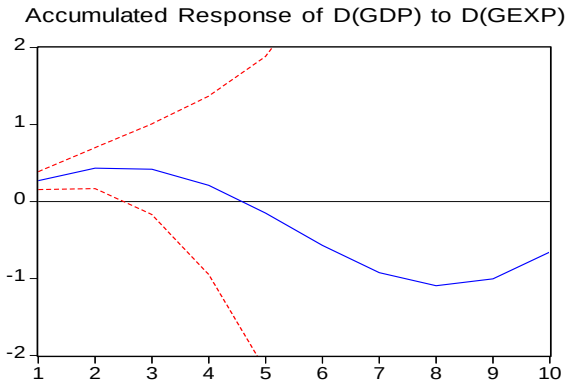


In Figure 3, Accumulated impulse response function of GDP (at first difference) due to shock in Government Expenditures (at first difference), in expansions. Dotted lines show upper and lower bounds and smooth line shows behaviour of variable.

In Figure 4, Accumulated impulse response function of GDP (at first difference) due to shock in Government Expenditures (at first difference), in recessions. Dotted lines show upper and lower bounds and smooth line shows behaviour of variable.

FIGURE 4

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



Figures 3 and 4 show IRFs for expansions and recessions.

Table 6 compares government expenditure multipliers across business cycle phases (expansions and recessions). The size of government expenditure multipliers is higher and statistically significant up to 2nd period for recessions but insignificant and lower for expansions.[11] On impact if one billion dollar shock is given to the economy in the form of government expenditures, it increases the output level to $ 0.2705 billion in recessions. This positive and significant size of multiplier during recessions is in accordance with the empirical evidences and theoretical literature.

When an economy is in recession (downswings), expansionary fiscal policy can be adopted. In case of recent GFC some expansionary steps are taken by the governments of different countries for mitigating the effects of crisis. A deflationary and recessionary gap occurs due to a decrease in aggregate demand — *i.e.* GDP is at a level lower than it would be in a full employment situation. In this situation government may increase their spending by starting public works such as construction of roads, ports, dams, telecommunication links, providing electricity to new areas and irrigation works etc. Governments can also buy different types of goods and materials and provide employment opportunities to workers. These public expenditures have both direct and indirect effects in increasing aggregate demand. Through direct effects, income of those will increase who supply labour for

[11]This result is consistent with empirical evidences, for instance, Auerbach and Goronichenk (2013) and Chouliarakis *et al.* (2013) also find insignificant fiscal multipliers for expansions.

these projects and sell materials. The output of these public works also goes up together with the increase in incomes. As the consumption of one person is the income of other therefore, who gets more income they spend further on consumer goods according to their *MPC*. This thing creates multiplier effects. Another tool of expansionary fiscal policy is to cut taxes, which will have an indirect effect on aggregate demand curve by increasing the disposable income of the consumers.

TABLE 6

Government Expenditure Multipliers for Expansions and Recessions

Period	Government Expenditure Multipliers	
	Recessions	Expansions
1	0.2705*	0.0144
2	0.4335*	0.0455

* shows significant at 5% level of significance

Source: Authors' own calculations.

Another important argument is that the simplest Keynesian model also assumes excess capacities in the economy. As during the periods of recessionary gaps there exist some excess capacities in the consumer goods industries, therefore, expansionary public spending promote optimism in the "animal spirits" of the entrepreneurs. Once the expectations of the entrepreneurs will become optimistic, they will make use of idle capacity, demanding larger workforce and eventually more investment and so expand their productive capacity and these excess capacities also lowers the probability of crowding out of private investment. In short positive climate will increase effective demand and with it employment, consumption and revenues initialing cumulative, virtuous circle of growth. Due to these excess capacities expansionary fiscal policy will yield higher value of government expenditure multipliers in recession than in expansions.

VI. CONCLUSIONS

Size of the fiscal multipliers is always a great scrutiny for both policy makers and economists because multipliers are among one of many factors that need to be considered in setting fiscal policy. In this context, this research work intends to contribute the literature on the size and magnitude of the fiscal multipliers for selected South Asian economies (Bangladesh, India, Pakistan

and Sri Lanka) by using Panel VAR model relying on annual time span from 1982-2014.

Estimated results shows that for baseline (aggregate) model government expenditures have overall positive impact on output. Among the expenditures government investment is the main driving force for increasing output and government investment multiplier is greater than government consumption multipliers on all time horizons. During allocation of budget policy makers should put more emphasis on public investment either in the form of infrastructure or human resource development because it not only has a positive impact on output at the time of implementation of these measures but in long-run also.

Debt is always a burden for lower middle income countries and debt servicing act as leakages in the economy. As a consequence of this when aggregate model is re-estimated without controlling for debt dynamics, it gives impact and cumulative (long-run) multipliers lower than that of controlled model. Additionally, this research supports that across business cycle phases the efficiency and effectiveness of government expenditures is larger in recessions and lower in expansions. The size of government expenditure multiplier is higher in recessions as compared to expansions.

According to the results of this research, the concerned authorities of these countries should give more emphasis on government investment expenditures, especially in the field of skill development and capital accumulation as these are helpful in enhancing the productivity of a nation.

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