The Growth Effectiveness of Fiscal and Monetary Policies: Empirical Analysis in the Case of Pakistan

Muhammad Usman and Miraj-ul-Haq[1]

ABSTRACT

Empirical indication on the growth effectiveness of monetary and fiscal policies is still debatable. Hence, this study aims to investigate this inconclusiveness by illustrating depictions by two major schools of thought in economics that is classical and Keynesian. To meet the objective we have empirically estimated both short run and long run dynamics of fiscal and monetary policies. The Johansson Juselius (1990) approach of co-integration in a VECM setting is used for empirical analysis, which is based on time series data over the period of 1972 to 2015. The results of Trace test and Maximum Eigenvalue validate the existence of co-integration among fiscal policy, monetary policy and economic growth in case of Pakistan. The result of impulse response function shows that both fiscal and monetary policies positively affect the growth of GDP per capita in the long run.

Key Words: Monetary policy, Fiscal policy, Economic Growth, Co-integration

JEL Classification: ES2, H30, O40, C32

1 Introduction

Currently, both monetary and fiscal policies accorded prominent role in the pursuit of macroeconomic stabilization, however the relative importance of these policies have been a serious debate between the two major school of thoughts that Keynesians and the Monetarists. The Monetarists believe that monetary policy exert greater impact on economic activities, whereas the Keynesian believe that fiscal policy rather than the monetary policy exert greater impact on economic activities.

[1] Muhammad Usman is MS scholar at International Institute of Islamic Economics, International Islamic University, Islamabad, E-mail: usmanhsp56@gmail.com. Miraj-ul-Haq is Assistant Professor at International Institute of Islamic Economics, nternational Islamic University, Islamabad, E-mail: haqmirajeco@gmail.com.

Monetary Policy works under the central bank of an economy that control money supply by setting exchange rate and interest rate. Monetary policy is concerned with the measures used to regulate money supply and credit in the economy with aim to achieve outcomes of the higher economic growth and price stability. Hence, the monetary policy has ability to control the circulation of money and costs of borrowing money known as interest rate. However, one of the main goals of monetary policy is to prevent excessive inflation while fostering economic growth (Noman and Khudri2015).

The Keynesians school of thought pointed out several short comings of monetary policy especially, when an economy gets stack in liquidity trap and argued that the feasible way out is the fiscal policy. Keynesian theorists focus on the liquidity trap as extremely special case, whereas monetary policy becomes inefficient. In the liquidity trap situation, interest rate reaches its minimum level and further increase in money supply will not lead to the interest rate reduction. In such situations public investment must be large enough to provide expenditure equal to the full employment output. As monetary policy will fail to increase investments, hence to restore full employment, whereas, fiscal policy will increase the output through rising government expenditures.

According to Keynesian view government's fiscal policy influences the level of aggregate demand, price stability, full employment and economic growth. As the central government has control over fiscal policy, hence government can change it through tax cut or change in public expenditure, which directly affects economic and business activities. However some studies not agreed to the Keynesian view, for instance, Buiter (1976) argued that, "fiscal policy is considered as less effective or ineffective because of the crowding out effect". The

contribution of government on aggregate demand has also been controversial among policy makers as well as academicians.

Analyzing the monetary policy influence on fiscal policy, interest rates and inflation rates can be identified as direct tools for communication. Interest rate level and volatility have impact on fiscal positions as it directly influences servicing costs and sustainability of debt. Similarly, the level and volatility of inflation rates have impact on public finances. Public finances become more unpredictable and fiscal planning is extremely difficult, when price inflation contributes to the public expenditures that are increased through salaries for public employees. Moreover, high inflation rate reduces the actual value of debt obligations and leads to the increase in real tax burden. A number of studies have analyzed the impact of monetary policy on fiscal policy in case of Pakistan for instance Jawaid, et al, 2010; Jawaid, et al. 2011; Chowdhury, et al. 2015 among others.

Fiscal policy also has an impact on monetary policy. If the fiscal policy is expansionary, which increase the aggregate expenditures and aggregate demand through an increase in government spending or a decrease in taxes. Increase in government expenditures results in the reduction of economic growth level and requires a restrictive monetary policy **(**Rakic B. et al. 2013)**.** Fiscal policy components like unproductive public projects and ineffective tax systems unfavorably impact the potential level of economic growth and require more restrictive monetary policy**. (**Jawaid, S. T. et al. 2010). **"**Monetary and fiscal policies are interrelated in numerous ways, and this puts additional pressure on the monetary and fiscal authorities to pool resources in order to accomplish efficient outcomes" (Jawaid, et al. 2010 and Khan and Qayyum 2007).

The empirical studies using monetarist models suggest that monetary action have a greater impact on economic activities in both developed and developing countries, where the

Keynesian believes that fiscal policy rather than the monetary policy exert greater influence on economic activities. The empirical research has not reached any conclusion concerning both the fiscal and monetary policy in case of single economy. In case of Pakistan the existing literature (Fatima and Iqbal (2003), Alam Ali et al. (2008), Muhammad et al. (2009), Jawaid et al. (2010), Mahmood and Sial 2011, and Kakar (2011)) emphasized in the effectiveness of fiscal and monetary policies. However these studies have not analyzed the responses of these policies to each other. Keeping in view the literature gap, this study investigated the role and relative growth effectiveness of fiscal and monetary policies. In addition, we analyzed the responses of monetary policy and fiscal policy to each other.

The rest of the study is organized as follows; Section 2 presents relevant literature on fiscal and monetary policies and economic growth. Section 3 explores the major channels through which fiscal and monetary policies response to economic growth in Pakistan. Section 4 presents model specification. Section 5 presents data processing and estimation technique. Study concluded with section 6, which draws key findings extracting from the study.

2 Review of Literature

Recently, a well established segment of economic literature discussed the interaction between fiscal and monetary policies. A cascade of literature addressing the issue is on hand and progress is still continued. A number of studies assert about the positive role of government in stimulating economic growth, while other challenges government intervention, considering monetary policy mainly responsible for economic progress. However, emerging group of economists now purports that a more coordinated and co-operated fiscal and monetary policy can do better for economic growth. In this association this session of the study is devoted to present review of existing studies about the subject.

The one comprehensive work have been carried out by Ahmed and Malik (2009). Generalized Method of Moments (GMM) estimation technique was used for dynamic estimation of panel data. The study concluded that financial sector development affects per capita GDP;

through inefficient resource allocation also estimates that the increase in domestic rather than foreign capital accumulation is instrumental in increasing per worker output and hence promoting economic growth in the long run. However the role of government consumption expenditure on economic growth remains adverse due to its detrimental effects on resource allocation efficiency.

Fatima and Iqbal (2003) developed a multivariate model and test the effectiveness of monetary and fiscal policy for the economic growth at five Asian countries (Pakistan, India, Thailand, Indonesia and Malaysia). Johansen and Juselius method were used and multivariate co-integration methodology for long-run relationship among variables. In case of Thailand study found bi-directional causality, while in case of Indonesia, Pakistan, India and Malaysia the study found the uni-directional causality between the variables. They come with the conclusion that the effectiveness of policy differs from country to country depending upon the nature of the economy in question.

Jawaid et al. (2010) investigated the comparative analysis of monetary and fiscal policy in case of Pakistan's economy. Johansson Juselius (1990) estimation technique was used for long run co-integration relationship among economic growth, fiscal and monetary policies. According to their findings in case of Pakistan monetary policy is more effective as compare to fiscal policy. In addition, the co-integration test confirms that there is long run positive relationship among monetary, fiscal policies and economic growth.

Similarly, Alam and Waheed (2006) analyzed the sectoral effects of monetary policy in Pakistan. Results from the sub-sample estimation indicate that the major changes in the transmission of monetary shock to variation in real activity. Following monetary tightening, aggregate output decline and bottoms out after second quarters. The manufacturing wholesale and retail trade and insurance sector seems to decline more in response to the interest rate shocks.

Jawaid, et al. (2011) analyzed the nexus among monetary-fiscal-trade policies and economic growth in case of Pakistan using the time series data. The results of the study indicates that fiscal and monetary policies have positive and significant impact on economic growth in the short run, while trade policy have no significant impact on economic growth. The results of co-integration and error correction model revealed that there is positive and significance relationship

between monetary policy, fiscal policy and economic growth in case of Pakistan. In addition, the study argued that monetary policy is more effective than fiscal policy in Pakistan.

Hussain and Siddiqi (2012) test the fundamental relationship between fiscal, monetary policies and institutions in Pakistan. The insight of co-integration was narrated with the long run equilibrium association among variables. According to the study findings monetary policy and economic institutions are more effective rolled in increased in per capita GDP and revenue but political and social institutions had no significant role. Based on study findings, it is suggested that the government of Pakistan should take steps to improve the efficiency among fiscal aspects and pay special attention to increase the performance efficiency of institutions.

Khan and Qayyum (2007) estimated monetary policy shocks in case of Pakistan. In this association the study applied the Monetary Condition Index (MCI) for weighted sum of changes in short term interest rate and exchange rate relative to value in base period [developed by Bernanke and Mihov (1998)]. An individual Coefficient of estimated results of Monetary Condition Index (MCI) performs better than both the Summarized MCI coefficient and overall measure proposed by Bernanke and Mihov (1998). The analysis concluded that MCI (IS-individual coefficient) plays an important role in determining output and inflation when the economy is not dominated by supply shocks. In addition, the study found that in case of Pakistan supply shocks are dominated, and exchange rate channel is more important than interest rate channel.

Cyrus and Elias (2014) investigated the impact of fiscal and monetary policies by using variance decomposition and impulse response function and found that fiscal policy has significance and positive impact on real output growth in Kenya, while monetary policy shocks have contradiction with fiscal policy shocks.

Akanni and Osinow (2013) analyzed the effect of fiscal instability on economic growth in Nigeria. According to study findings that both total and capital fiscal spending had negative relationship with economic growth while recurrent fiscal spending was on the contrary. In addition, the study found that trade openness and size of labor force had significantly and positively affected economic growth.

Similarly, Noman and Khudri (2015) estimated the effects of fiscal and monetary policies on economic growth in case of Bangladesh. The estimated variables of both the policies shows

significant impact on Bangladesh's economic growth which implies that both policies were balanced and correspondingly contribute in the economic growth of Bangladesh economy.

In similar line Chowdhury and Afzal (2015) investigated the effectiveness of monetary policy and fiscal policy in Bangladesh. The results of Engle Granger test, Trace Statistics and Maximum Eigen value test shows that there is positive and significant relationship among fiscal policy, monetary policy and economic growth in Bangladesh.

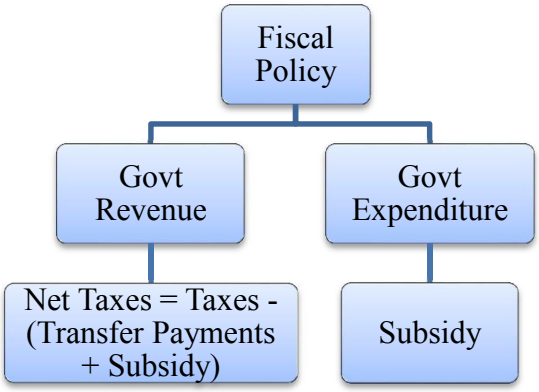
Tesfay (2010) investigated the relative effectiveness of fiscal and monetary policies on economic growth in case of Ethiopia, with the objective of finding out the relative strength of monetary and fiscal policies on economic growth. According to study findings, both money supply and government expenditure were found statistically insignificant to influence the real variables such as GDP and export. However, in the long term, policy variables can only control nominal variables such as inflation and the exchange rate.

3 Fiscal and Monetary Policies Structure in Pakistan

3.1 Fiscal Policy Structure in Pakistan

In Pakistan federal government budget categorizes in two parts; that is public revenue and expenditure. The key objective of fiscal policy is to enhance and sustain economic growth and therefore to reduce unemployment and poverty. By imposing taxes the government receives revenue from the populace (population). The government spending take in form of wages to government employees, development expenditure, social security benefits, health, education, defense etc.

Figure 1: Fiscal Policy Structure in Pakistan

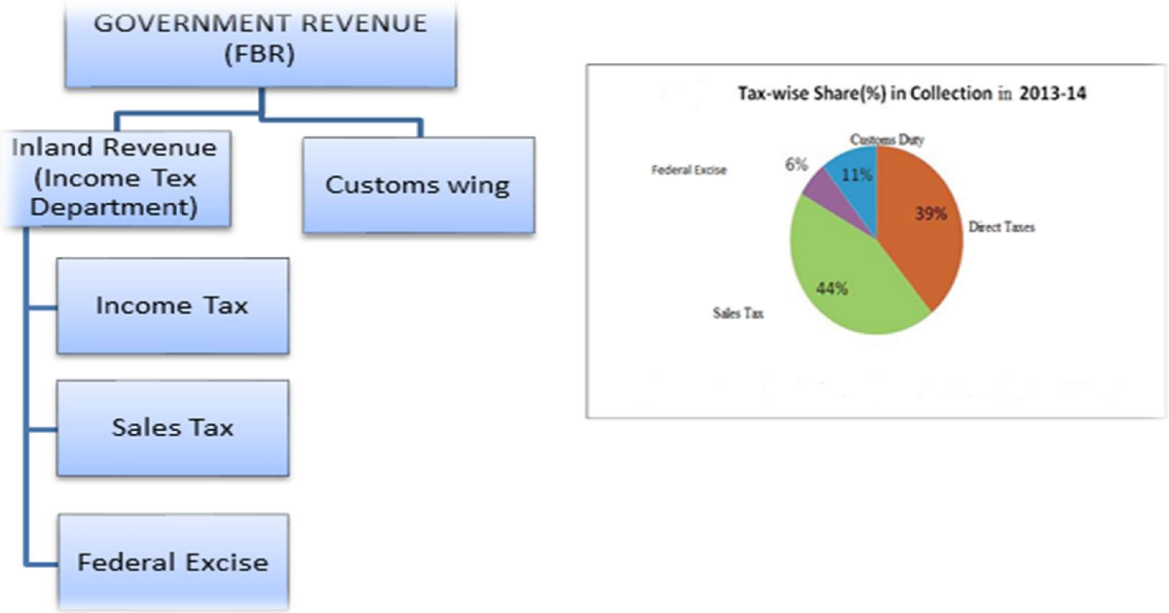


Source: Government of Pakistan (2015), Finance Devision.

3.1.1 Government Revenue

Accorging to Federal Borad of Revenue (FBR) there are two basic catagories of revenue collection in pakistan's economy. First, Inland revenue which is the major source of revenue, in fiscal year 2014-15, it hold about 54% of total revenue collection. Inland revenue has three different classification that is income tax, sales tax and federal excise duties. The share of direct tax is 39%, share of sales tax is 44%, and share of federal excise duty is 6% in inland revenue. Second, Customs Wings in fiscal year 2014-15, its collection is 11% of the total revenue collection.

Figure 2: Protfolio of Public Revenues



Source: Federal Borad of Revenue; Government of Pakistan (2013-2014)

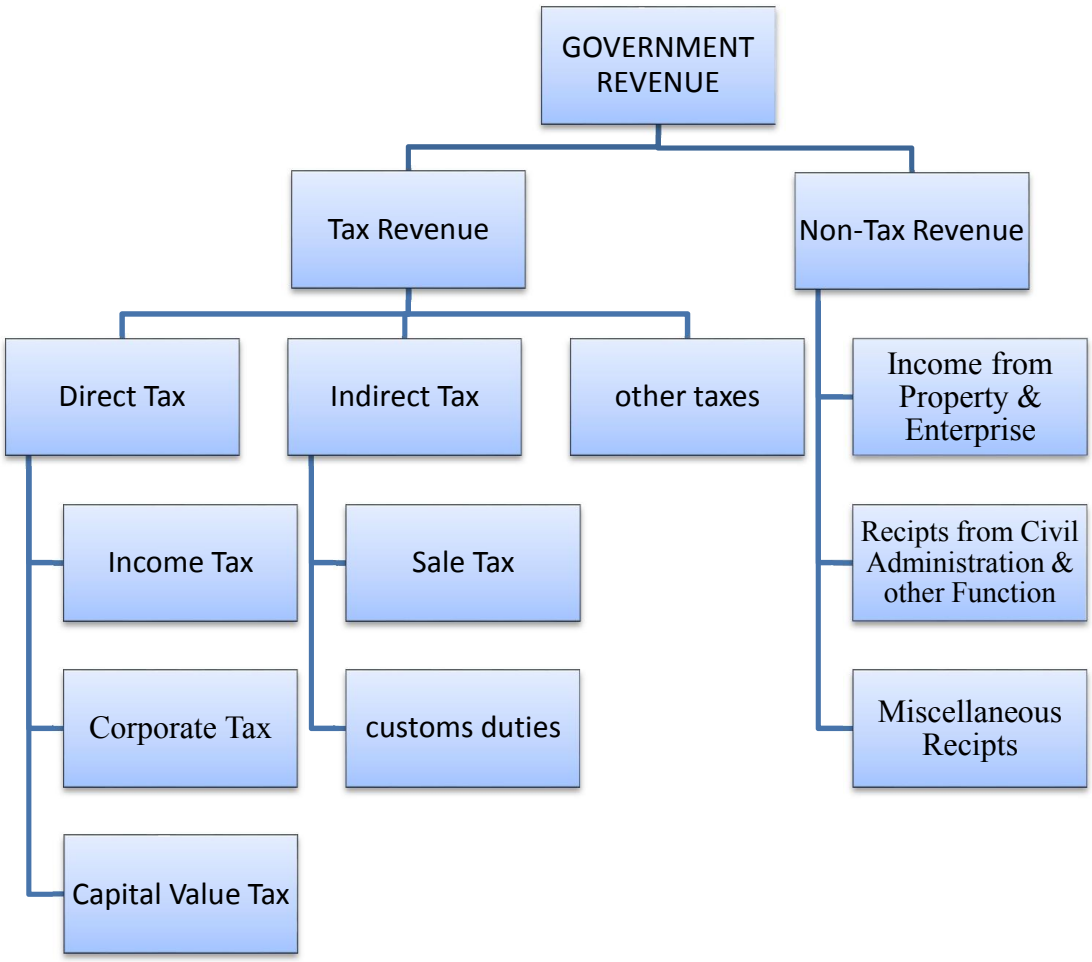
Government of Pakistan gives complete synopsis of fiscal policy 2015-16. Which provides information on revenues and expenditures budgeted for financial year 2015-16 along with budget estimates and revised estimates for the outgoing financial year 2014-15. The budgeting and accounting classification system used in the budget remains the same which was adopted under the New Accounting Model introduced in financial year 2004-05. The Medium Term Budgetary Framework (MTBF) process, initiated in the financial year 2009-10 has been strengthened with experience. Tax revenue in financial year 2014-15 is about 73% of total revenue and non-tax revenue in same year is 27% of total revenue collected by financial sector of Pakistan.

Table 1: Revenue collected by the Government of Pakistan

Year	Tax revenue (%)	Non-tax revenue (%)	Rs in Million
2005-06	66.1	33.9	1,077,000
2006-07	61.26	38.74	1,163,000
2007-08	59.14	40.86	1,545,500
2008-09	66.18	33.82	1,783,602
2009-10	72.28	27.72	2,051,944
2010-11	75.1	24.9	2,235,889
2011-12	79.8	20.2	2,536,752
2012-13	74.9	25.1	2,836,562
2013-14	69.88	30.12	3,597,142
2014-15	73.63	26.37	3,952,472

Source: Government of Pakistan (2015), Finance Devision.

Figure 3: Protfolio of Public Revenues According to Ministry of Finance

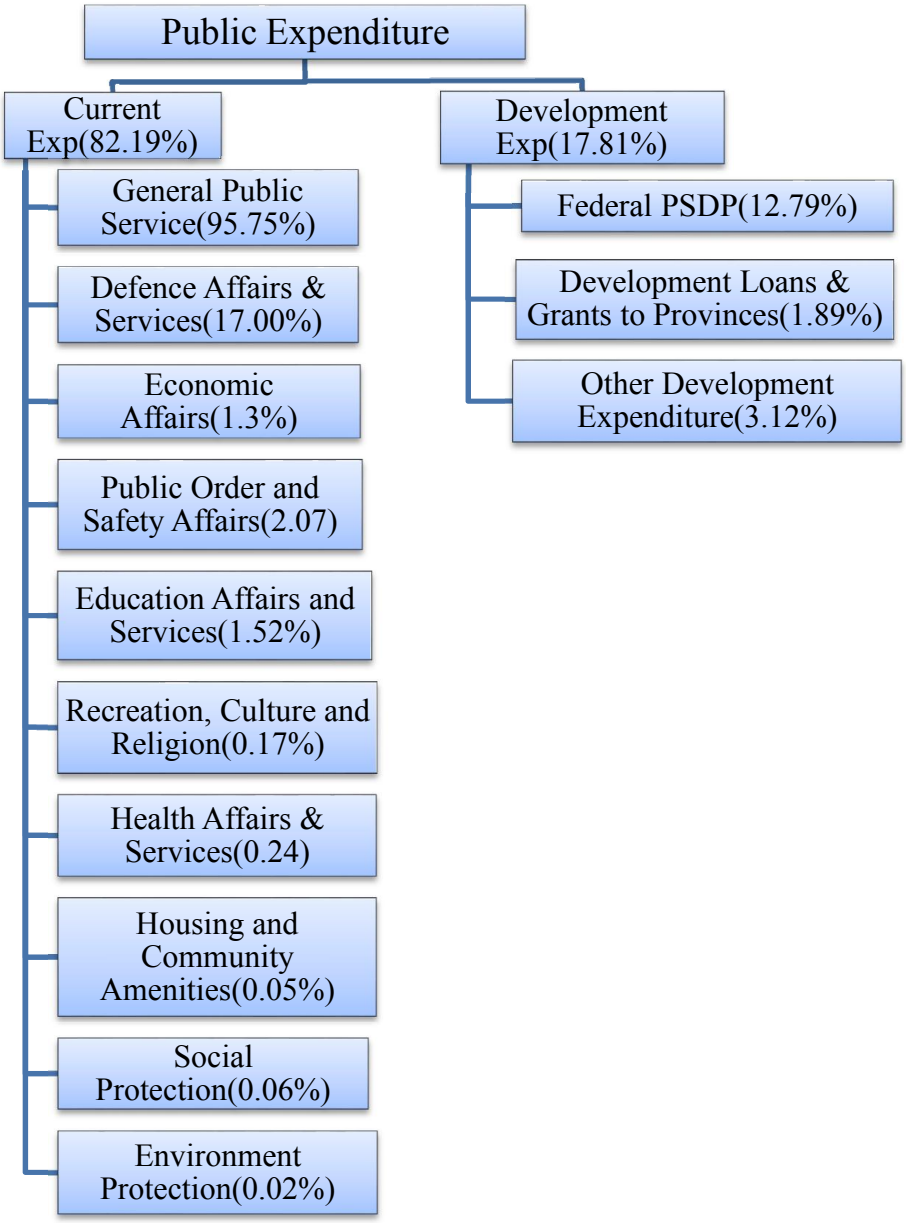


Source: Government of Pakistan (2015), Finance Devision.

3.1.2 Government Expenditure

The federal government of Pakistan has divided the total expenditure in two main parts namely current expenditure, and development expenditure. The share of current expenditure in total public spending is 82.19% and development spending is 17.81 in fiscal year 2014-15. The major parts of total public spending are general public service which is 59.75%, defense is 17%, and Public Sector Development Program (PSDP) is 12.79%. However, the two major sectors (education and health) hold just 2% of total public spending.

Figure 4: Portfolio of Public Expenditure in Pakistan

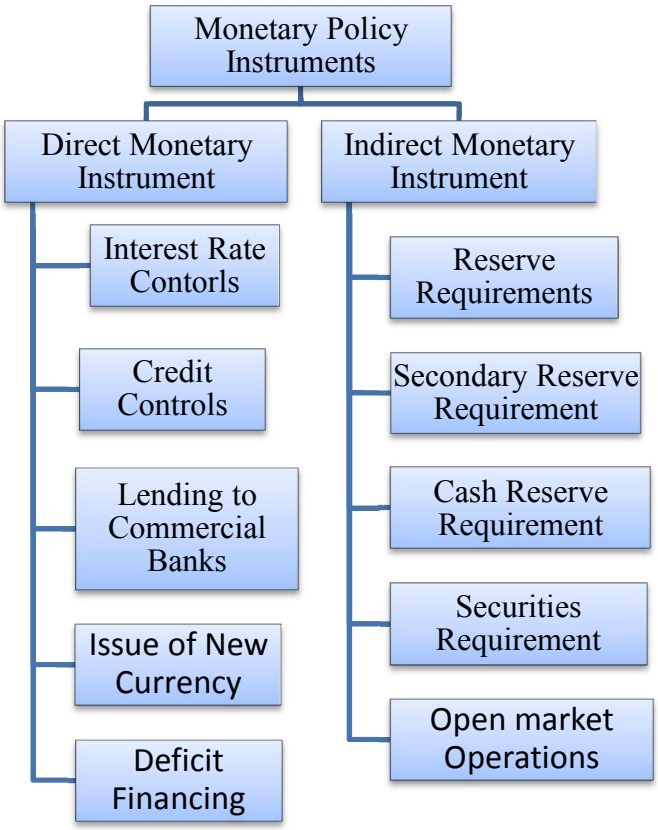


Source: Government of Pakistan (2015), Finance Devision.

3.2 Monetary Policy Structure in Pakistan

Monetary policy is the process by which the monetary authority of a country control the supply of money, often targeting a rate of interest for the purpose of promoting economic growth and stability. In Pakistan, the State Bank of Pakistan has the authority to adopt the tight, neutral or loose monetary policy. The key objectives of a monetary policy in Pakistan are economic growth, price stability, exchange rate stability, balance of payments (BOP) equilibrium, employment, neutrality of money, equal income distribution and credit control.

Figure 5: Structure of Monetary Policy in Pakistan



Source: State Bank of Pakistan (2015).

3.2.1 Direct Monetary Policy Tools

Monetary policy tools are used to manage interest rates, credit and lending. These include direct credit control, direct interest rate control and direct lending to banks as lender of last resort, but they are rarely used in the implementation of monetary policy by the State Bank of Pakistan.

3.2.2 Indirect Monetary Policy Tools

Compare to direct monetary policy tools, indirect monetary policy tools are used more widely than direct tools, indirect policy tools seek to alter liquidity conditions. While the use of reserve requirements has been the traditional monetary tool of choice, more recently, the State Bank of Pakistan shifted towards the use of open market operations to manage liquidity in the financial system and to signal its policy stance. The main factors included in monetary policy are money supply, interest rates, exchange rate, open market operation and inflation rate.

4 Model Specification

The theoretical literature on the subject claims that both fiscal and monetary policies explain real business cycle; and argued that economic growth is equally dependent on these macroeconomic policies. Hence, aggregate output modeling will be rested on three key considerations. First, it is possible to explain fiscal and monetary policies through economic growth (GDP growth) theory. Second, monetary policy and economic growth has possible relationship. Third, how both fiscal and monetary policies explain economic growth, price stability, economic stability, balance of payment, and acceptable level of employment for the economy. (Roomer, 1989).

The economic fluctuations are equally performed in production function, in which output depends on available physical and human capital and technological changes. Output of goods and services depends on quantities of variable inputs, such as capital, labor and productivity of inputs. The relationship between output and inputs is described by aggregate production function. The model below considered is for empirically analyzing the role of fiscal and monetary policies in economic growth through Total Factor of Productivity (TFP) growth. The aggregate output equation takes the form,

$$Y_t = A_t(K_t L_t)$$

Y_t represents the aggregate output, K_t is capital stock, L_t is labor force and A_t is Total Factor of Productivity (TFP) (or Technological Changes). The Cobb Douglas specification takes the form,

$$Y_t = A_t(K_t^{\alpha}), (L_t^{1-\alpha}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where α is parameter, and the econometric model built for economic growth based on fiscal and monetary policy presented Ahmad and Paul (1998), Ahmad (1999), Ahmad and Malik

(2009) and Akanni and Osinowo (2013**)**. The intensive form (per worker form) equation 1 is presented as follows:

$$\frac{Y_t}{L_t} = A(\frac{K_t}{L_t})^{\alpha} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \ldots\ldots\ldots\ldots (2)$$

Taking log equation 2 can be written as;

$$Log(\frac{Y_t}{L_t}) = LogA + \alpha \log(\frac{K_t}{L_t}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Equation 3 indicates that there are two main sources of economic growth namely TFP growth and capital accumulation. In this study our objective is to investigate the impact of fiscal and monetary policies, on these sources of economic growth. The government expenditure can directly intervene into the economy through government investment in public capital (Akanni and Osinow 2013). Government directly and indirectly influences the way the resources are used in the economy. Hence, fiscal policy increases the aggregate demand directly through an increase in public expenditure, which is typically called expansionary fiscal policy. Although, in contrast fiscal policy is often considered contractionary (tight) if it reduce the demand via lower spending (Akanni and Osinow 2013). The demand for goods is a decreasing function of real interest rate, because high interest rates reduce investment demand and increases savings. This model was used to analyze the effect of changes in monetary policy and fiscal policy on the economic growth rate. An expansionary fiscal policy increases the interest rate and output in short run, also an expansionary monetary policy reduces the interest rate and increases the output in short run(Cyrus and Elias, 2014).

There are two different approaches for constructing the model further to capture the fiscal and monetary policies influence on economic growth. First approach is to estimate fiscal and monetary policies variable on each of three variables as appear in equation 3. The TFP, fiscal and monetary policy accumulations are substitute in the estimated growth equation 3. The limitation of this equation is that it requires separate estimation of the TFP series before regressing it on fiscal and monetary structure. The other approach is to substitute the algebraic expression indicating the relationship of TFP with fiscal and monetary variables in to growth equation as specified by Ahmad and Malik, 2009. Follow Ahmad and Malik 2009 the linear relationship to determine TFP.

$$a_t = \theta_0 + \theta_1 GE_t + \theta_2 TAX_t + \theta_3 ER_t + \theta_4 MS_t + \in_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where GE_t, TAX_t, MS_t, ER_t, are government expenditure, tax revenue, broad money, and exchange rate respectively while ε_t is residual term.

Thus both fiscal and monetary policies influence TFP, furthermore government expenditure, government tax revenue, money supply and exchange rate are an important source of TFP growth. Because they are direct indicators for influence the price stability of the economy (Cyrus and Elias, 2014). Other control variables that affect the TFP are government subsidies to private sector, transfer payment, interest rate, bank reserve ratio, and open market operation. According to Cyrus and Elias, 2014 these variables are indicate the macroeconomic stability.

The fiscal and monetary policy variables are included in capital equation and determine the capital accumulation into GDP per capita in Pakistan, which is linear combination of fiscal and monetary policy and control variables.

$$k_t = \gamma_0 + \gamma_1 GE_t + \gamma_2 TAX_t + \gamma_3 ER_t + \gamma_4 MS_t + \delta_1 GDP_t + \pi_t \ldots\ldots\ldots \quad (5)$$

Substitution of equation 4 and 5 into 3 and simplifying collectively fiscal and monetary policy variables also adding the lagged of output term to capture growth inertia yields the following estimable equation.

$$GDP_t = \beta_0 + \beta_1 GE_t + \beta_2 TAX_t + \beta_3 ER_t + \beta_4 MS_t + \beta_5 KF_t + \beta_6 GDP_{t-1} + \in_t \ldots\ldots\ldots \quad (6)$$

The above equations (equation 5 and 6) provide an integrated framework for understanding how fiscal and monetary policies influence long-run economic growth TFP and capital accumulation. This framework capture Schumpeter's (1934) view of finance and development that highlights the impact of financial system on productivity growth and technological change. The framework also incorporates a vast development economics literature arguing that capital accumulation is the key factor underlying economic growth (Ahmad and Malik 2009).

5 Data Processing and Estimation Technique

We used annual time series data over the period of 1972 to 2015 collected from the world development indicators and State bank of Pakistan. We took GDP per capita as proxy of economic growth, general government final consumption expenditure (% of GDP) and net taxes on products (current US$) as proxy of fiscal policy and official exchange rate (LCU per US$, period average), and Broad money (% of GDP) as proxy of monetary policy while gross fixed capital formation (% of GDP) taken as capital accumulation.

Before carrying out a formal analysis, we need to check the initial requirements of time series annual data for the period of 1972 to 2015. Moreover every time series data has trend and to find the pattern of trend we applied the unit root test. The results of Augmented Dickey Fuller (ADF) test are given below in table 2. Based on the Augmented Dickey Fuller (ADF) test, we do not reject null hypothesis and all variables are non-stationary at level. But in case of first difference we reject null hypothesis and all variables are integrated at order 1, and order of integration is I (1).

Table 2: Augmented Dickey Fuller (ADF) Results

Variables	Level		1st Difference	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
GDP_t	2.6542	0.1752	-5.0356	-5.6271
	(1.0000)	(0.9971)	(0.0002)*	(0.0002)
GE_t	-1.5825	-1.5067	-5.3811	-5.3236
	(0.4827)	(0.8118)	(0.0001)*	(0.0004)
TAX_t	0.8984	-1.2729	-6.7148	-6.9529
	(0.9946)	(0.8813)	(0.0000)*	(0.0000)
MS_t	-1.8356	-5.3309	-6.8936	-6.7167
	(0.6588)	(0.1385)	(0.0000)*	(0.0000)
ER_t	0.0237	-1.7638	-4.7956	-4.7850
	(0.9555)	(0.7047)	(0.0003)*	(0.0020)
KF_t	-2.1562	-2.4563	-4.9902	-5.2903
	(0.2247)	(0.3471)	(0.0002)*	(0.0005)

*Shows level of significance at 1% level.

5.1 Co-Integration Results

After sighting the behavior of stationarity, results of all variables are integrated at first order. In order to estimate the equation 6, we use the Johansen and Juselius (1990) co-integration approach which determine two likelihood ratio tests. Trace test and maximum Eigenvalue test and it is more reliable for small sample (Mukhtar and Rasheed, 2010). Trace test use for joint co-integration and null hypothesis is no co-integration (H_O: r =0) and alternative hypothesis is co-integration (H_1: r >0). The maximum Eigenvalue test finds a separately co-integration vector. In

Johansen approach, the numbers of co-integration vectors are determined for non-stationary time series and numbers of restrictions are imposed with Vector Autoregressive (VAR) known as a vector error correction model (VECM).

The selection of lag length is important in the VECM. We select the Akaike Information criterion (AIC), the Schwarz Bayesian criterion (SBC) and Hannan- Quinn criterion (HQC). The SBIC is usually more consistent but inefficient, while AIC is not as consistent but is usually more efficient (Brooks, 2008). The results are shown in table 3. The AIC and HQC recommended that, the lag length is four while SBC recommend a lag length of two. On the basis of SBC we included two lag in our vector error correction model (VECM).

Table: 3 VAR Lag Order Selection Criteria

Lag	AIC	SC	HQ
0	0.040697	0.294029	0.132294
1	-10.51196	-8.738632*	-9.870778
2	-10.20143	-6.908112	-9.010669
3	-10.96590	-6.152590	-9.225557
4	-12.37060*	-6.037300	-10.08068*

*Shows the number of recommended lag length for VECM.

After estimating the VAR based VECM model we simply apply co-integration test and obtain error correction co-efficient and Eigen value coefficients, the sum of product of both the error correction coefficient and co-integration coefficient should be negative, given in table 4. However results indicate that the sum of product error correction co-efficient and co-integration is negative which indicates that the co-integration exists in the model. Through the VECM, we concluded that all variables have short run and long run co-integration.

Table 4: Calculation of Co-Integration through VECM

	Eigenvalue		**Error correction co-efficient**	**CI*EC**
None	0.678894	LGDP	1	0.678894
At most 1	0.535882	LGE	0.670233	0.359166
At most 2	0.440491	LTAX	1.636149	0.720708
At most 3	0.399653	LER	-1.12586	-0.44995

At most 4	0.223954	LMS	-9.93754	-2.22555
At most 5	0.005562	LKF	-6.05247	-0.03366
			Sum	-0.9504

To support the result that variables in equation 6 have co-integration relationship, we use the Trace test and maximum Eigenvalue test for short run and long run co-integration. Trace test indicates that 4 Co-integrating vector at 5 percent level and we significantly reject null hypothesis at 5 percent level of significance, results are given in table 5. Therefore results from Trace test statistics show that there exists stable equilibrium relationship among the considered variables.

Table 5: Trace Test Results of VECM

Hypothesized No. of CE(s)	Eigenvalue	Trace statistic	0.05 critical value	Prob.
None	0.678894	133.4002	95.75366	0.0000*
At most 1	0.535882	86.82485	69.81889	0.0012*
At most 2	0.440491	55.35260	47.85613	0.0084*
At most 3	0.399653	31.54411	29.79707	0.0311*
At most 4	0.223954	10.62393	15.49471	0.2357
At most 5	0.005562	0.228670	3.841466	0.6325

*Shows level of significance at 5%.

Table 6 shows, the Maximum Eigenvalue test which indicates that one equation is co-integrating at the 1 percent level and two equations are co-integrated at 10 percent level of significance and we significantly reject null hypothesis at 1 and 10 percent level of significance. Therefore results from maximum Eigenvalue test statistics show that there exists stable equilibrium relationship among the variables indicated in equation 6.

Table 6: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen statistic	0.05 critical value	Prob.**
None	0.678894	46.57540	40.07757	0.0081*
At most 1	0.535882	31.47225	33.87687	0.0943***
At most 2	0.440491	23.80849	27.58434	0.1415
At most 3	0.399653	20.92018	21.13162	0.0535***
At most 4	0.223954	10.39526	14.26460	0.1872
At most 5	0.005562	0.228670	3.841466	0.6325

*, ** and *** shows level of significance at 1%, 5% and 10 percent respectively.

The co-integration relationship among the GDP_t, GE_t, TAX_t, MS_t, ER_t and KF_t were investigated by using the Johansen technique. The Trace test and Maximum Eigenvalue test indicates that there is four co-integration vectors and three equations in our model. It shows that we reject the null hypothesis of no co-integration and accept the alternative in favor of both vectors and equations have co-integration. This indicates that there are three co-integration vectors and three co-integration equations. This implies that in Pakistan both fiscal and monetary policies have strong co-integration relationship with GDP per capita in long run. This implies that both government of Pakistan (fiscal policy) and State Bank of Pakistan (monetary policy) can play important role for stabilizing positive GDP per capita.

5.2 Impulse Response Functions

Figure 6 shows results of the impulse response function of GDP per capita, government expenditure, tax rate, exchange rate, money supply, and capital formation. The impulse response function was calculated through VAR model after investigating the co-integration behavior among the variables by using the Johansen and Juselius (1990) co-integration approach. Through impulse response function we trace out the responsiveness of the dependent variable to the shocks to the error term.

These random error shocks are calculated by using the Cholesky (1924) approach which shows the dependency behavior of the given variables. The interpretation of Cholesky (1924) approach impulse Response Functions is that if a unit shock has been provided then how much time is required for it to die and for how much periods the shock has an effect.

It is clear from impulse response function presented in figure 6, which shows the relative growth effectiveness of fiscal and monetary policies. The results indicate that both fiscal and monetary policies positively affect GDP per capita (economic growth) in the long run in the case of Pakistan. However, all these shocks are normalized after 10th period of time. Our results are in line with the findings of Mahmood and Sial 2011, Fatima and Iqbal 2003**,** Jawaid et al. 2010.

The money supply has significant and positive impact on economic growth in long run but it responses negatively in the short run, our results are consistent with the findings of Ali et al. (2008) and Muhammad et al. (2009). The exchange rate has positive impact on economic growth in the long run however a negative effect in the short run. The findings indicate that both money supply and exchange rate have a positive effect on economic growth in the long run but have a negative effect on economic growth in the short run. Similarly, monetary policy has a negative respond to economic growth in the short run however have positive responses to economic growth in the long run. The government spending has significant and positive impact on economic growth in short run as well as in long run. Similarly tax rate also has positive impact on economic growth in the short run and in the long run.

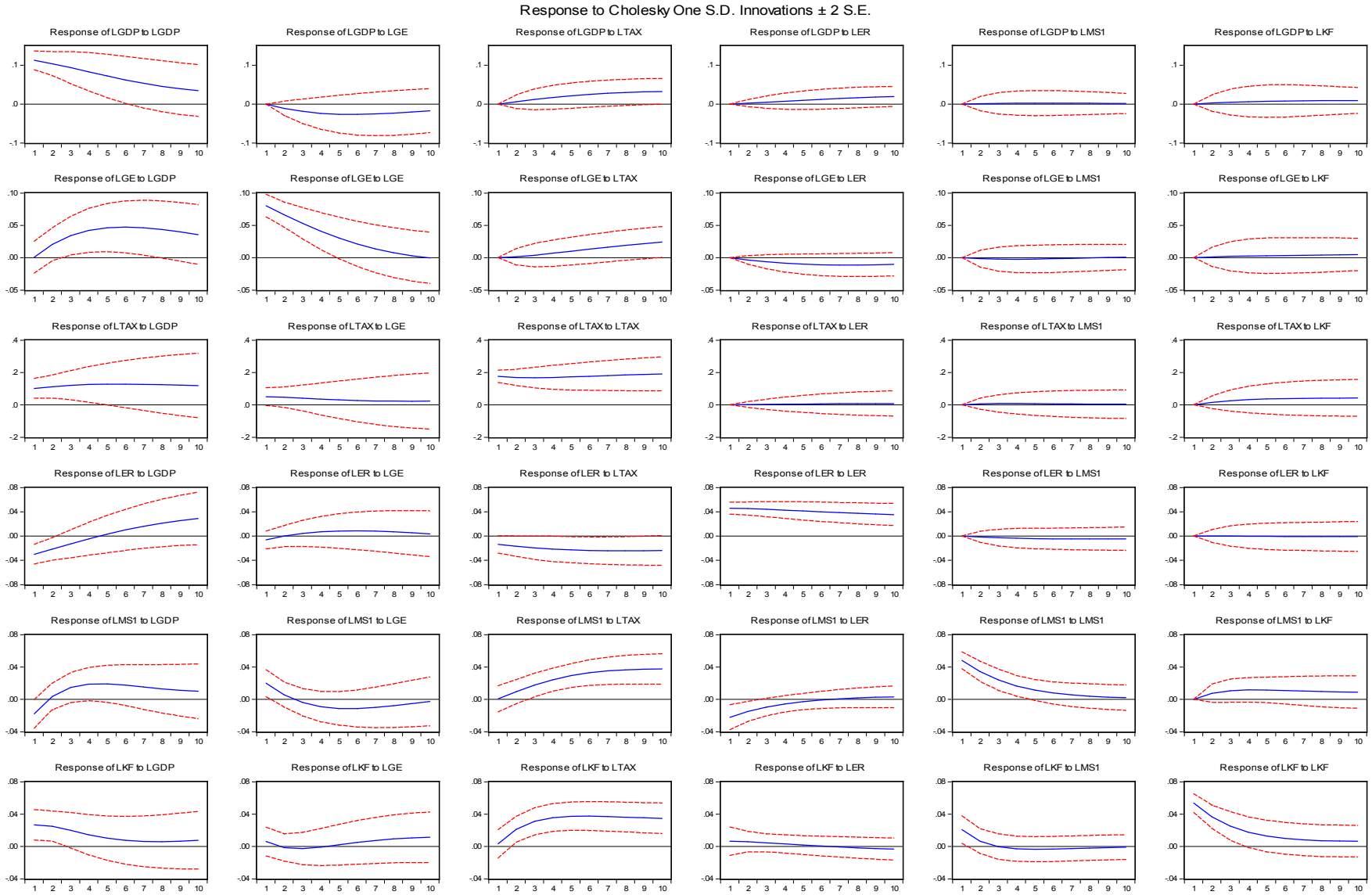
We also check the influence of fiscal policy to monetary policy; which shows that fiscal policy have a negative response to monetary policy however the effect of monetary policy is dying within two periods. The response of fiscal policy into monetary policy is highly negative because of government expenditure negatively treated both exchange rate and money supply in the short run as well as in the long run, because the government budget deficit financing through printing a new currency or borrowing from external resources (IMF or World Bank or Asian Development Bank, etc). The tax rate affects both the money supply and exchange rate positively however it has a relatively lower effect than government expenditure effect, such that the fiscal policy negatively responded to monetary policy. This may be due to unexpected and unproductive government expenditure that case the government budget deficit which is financing through borrowing and printing new money, hence negatively affect the exchange rate and money supply.

The monetary policy have no responses to fiscal policy, as of both money supply, and exchange rate effects are very lower and hold different signs in different time period. The money supply have a positive impact on tax rate whereas exchange rate have a negative effect on tax rate which counteracts the both effect and monetary policy is ineffective to response in fiscal policy.

The capital formation have a positive impact on growth of GDP per capita in the short run as well as in the long run. The effect of capital formation on monetary policy is positive however its effect on fiscal policy not significant.

However, the impact of government consumption expenditure on monetary policy remains negative this may be due to its unfavorable effects on resource allocation. The co-integration test confirms the long run positive impact of both monetary and fiscal policies on economic growth. The results of impulse response indicates that the major positive changes in GDP per capita are due to fiscal policy, which is similar with the findings of Kakar (2011) who found that fiscal policy is very important for sustainable economic growth in Pakistan and fiscal measures are the long run phenomena.

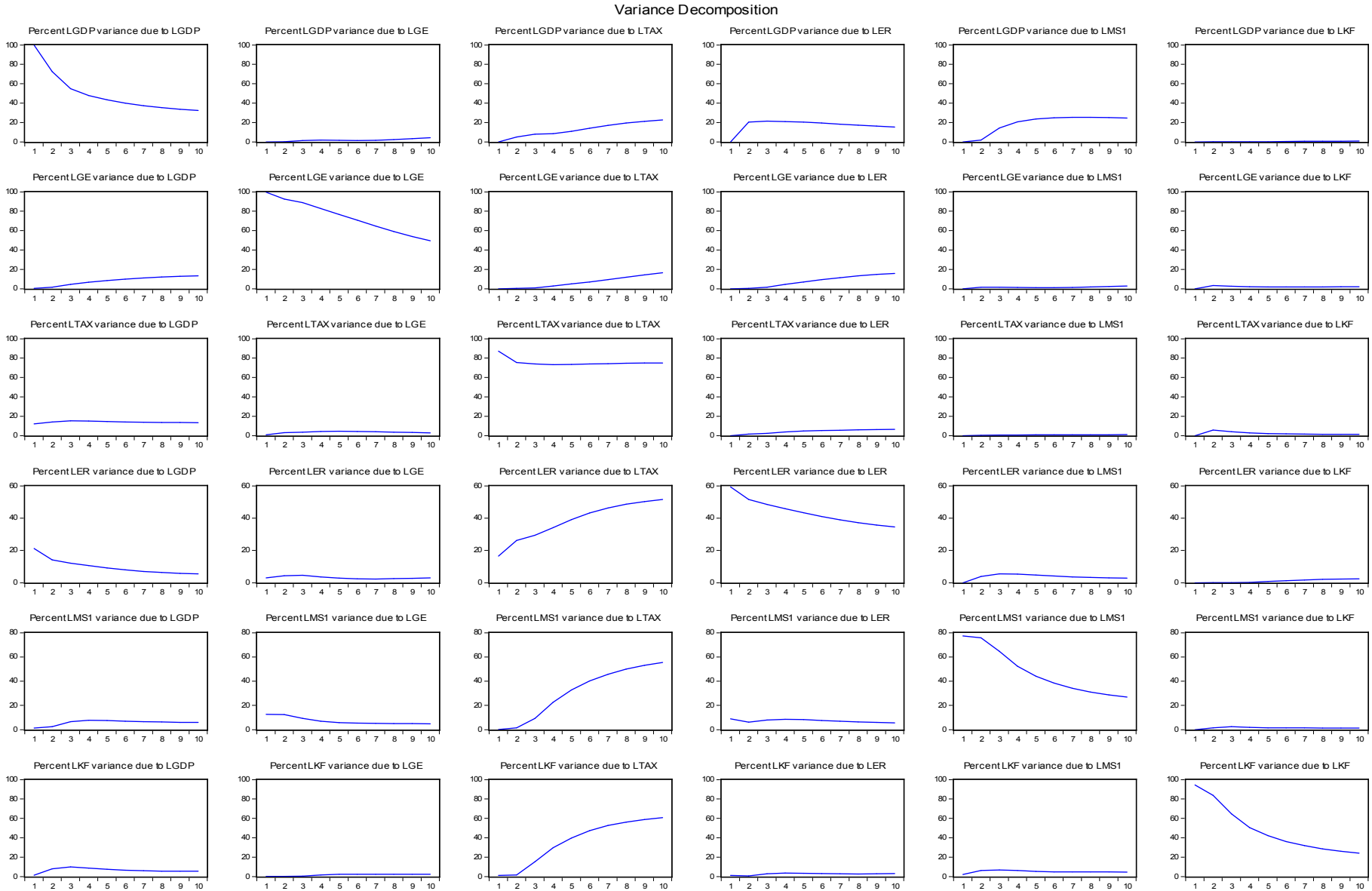
Figure: 6 VAR Base Multiple Graphs of Impulse Response



5.3 Variance Decomposition

Figure 7 shows the variance decomposition based on VAR model, which explained how unanticipated changes in variables occurs due to the endogenous shocks of the other variables. The shocks of government expenditure (GE) and tax rate (TAX) are representation of fiscal policy shocks whereas exchange rate (ER) and money supply (MS) are representing the monetary policy shocks. All these shocks are normalized after 10th period. Figure 7 indicates that GE_t, TAX_t, MS_t, ER_t and KF_t explain the changes in GDP per capita are positive and significant which implies that both monetary and fiscal policies changes caused by an endogenous policy are reflected in to GDP per capita. The one noteworthy result is that monetary policy shocks have lower intensity than fiscal policy shocks in the short run.

Figure: 7 VAR Based Graph of Variance Decomposition



6 Conclusion

The key objective of the study was to analyze the growth effectiveness of fiscal and monetary policies. In this association we used the VECM, co-integration and impulse response function.

To estimate VECM, we use the two lag length that the sum of product of error correction coefficients and co-integration coefficients is negative which indication for co-integration.) To support the existence of co-integration relationship we use the trace test and maximum eigenvalue test for the short run and long run co-integration respectively. The Trace test and Maximum Eigenvalue test indicates that there is four co-integration vectors and three equations in our empirical analysis. This implies that in case of Pakistan both fiscal and monetary policies have strong co-integration relationship with GDP per capita in both short run and in long run.

The impulse response function was used to analyze the relative growth effectiveness of fiscal and monetary policies. The results of impulse response function indicate that both fiscal and monetary policies positively affect growth of GDP per capita in the long run. In addition, it is indicated that all these shocks are normalized after 10th period of time.

The findings of the study also indicate that money supply has significant and positive impact on economic growth in the long run but it negatively responses in the short run. Similarly, the exchange rate has positive impact on economic growth in long run but negatively responded in short run. Hence, it is softly concluded that monetary policy have a negative response to economic growth in the short run, however in the long run monetary policy have a positive impact on economic growth. The government spending has significant and positive impact on economic growth in the short run as well as in the long run. However, tax rate also has positive impact on economic growth in both short run and in long run.

We also check the responses of fiscal policy to monetary policy; which shows that fiscal policy have a negative response to monetary policy, however the monetary policy effect is dying within two lag period.

REFERENCES

Ahmad, E. and Malik, A (2009) "Financial Sector Development and Economic Growth: an Empirical Analysis of Developing Countries", Journal of Economic Cooperation and Development, 30.1(2009), 17-40.

Ahmad. E. (1999), The Role of Capital Inflows and the Neoclassical Growth Model, proceeding of: Reginal Workshop on Return Migration and Long- Term Development Economics in South Asia, Islamabad, may 26-28.

Akanni. K.A, and Osinowo, O.H (2013), "Effects of fiscal instability on economic growth in Nigeria" Advances in Economics and Business 1(2): 142-133, 2013.

Alam T. &Waheed M. (2006)" Sect oral Effects of Monetary Policy: Evidence from Pakistan."Pakistan Development Review, Volume 45, No.4, Part II winter.

Ali, S. Irum, S and Ali, A. (2008). Wether fiscal stsnce Or monetary policy is effective for economic growth in case of south asian cuntries. The pakistan development review 47(4,), pp.791-799. http://www.pide.org.pk/pdf/pdp/2008/vplome 4/791-799.pdf

Buiter, W.H. (1976), Crowding Out and the Effectiveness of Fiscal Policy, Econometric Research Program Princeton University, Research Memorandum, No. 191.

Chowdhury, Abdur R. (1988), Monetary Policy, Fiscal Policy and Aggregate Economic Activity: some further evidence. Vol 20, No.1.pp.63-71

Chowdhury, L.S and Afzal, M.N.T (2015), "The effectiveness of monetary and fiscal policy in Bangladesh", Journal of Applied Business and Economics, vol.17 (1) 2015.

Cyrus, M. and Koech, E. (2014), Monetary and fiscal policy shocks and economic growth in Kenya: VAR econometric approach" journal of world economic research 2014.3(6):95-108.

Economic Survey of Pakistan (2009- 2010), „*Government of Pakistan, Finance Division*, Islamabad.

Fatima, A and Iqbal, A (2003), "The Relative Effectiveness of Monetary Policy and Fiscal Policy in case of Pakistan" Pakistan economic and social Review, vol.XLI, no. 1 & 2(2003) pp.93-119.

Fisher, I. (1922), "The Purchasing Power of Money" (New York: Macmillan, 1922), p. 29.

Fisher, I. (2006). "The Purchasing Power of Money: its Determination and Relation to Credit Interest and Crises: Cosimo, Inc.

Friedman, M. (1970), "the Counter-Revolution in Monetary theory", London: Institute of Economic Affairs. 1970, p. 12.

Friedman, M. and Anna j. Schwartz (1974), "Money and Business Cycles," Review of Economics and Statistics, 45 (Feb. 1963), pp. 32-64, respectively.

Friedman, M. and Heller, W. (1969), "Monetary versus Fiscal Policy," New York: Norton 1969, p.51.

Gordon, R., ed. Friedman, M. (1974), "Monetary Framework," University of Chicago Press, 1974, p.27.

Government of Pakistan (2010), "Pakistan Economic Survey 2009-10" Finance Devising Advisor Wing.

Government of Pakistan 2015; Finance Division, Economic Advisor Wing

Hussain, T. Siddiqi, W.M (2012) "Fiscal, Monetary Policies and Institutions' Role in Pakistan" thussain_eco@yahoo.com&mwsiddiqi@gmail.com *Theoretical and Applied Economics Volume XIX (2012), No. 6(571), pp. 33-50*

Jawaid S.T, Qadri, F.S and Ali, N. (2011), "Monetary- Fiscal-Trade Policy Pakistan and Economic Growth, time series empirical Investigation", International Journal of Economics and Financial Issues, vol-1, no. 3, 2011, PP.133-138.

Jawaid, S.T, Arif, I. and Naeemullah, S.M (2010), "Comparative Analysis of Monetary and Fiscal Policy: a case of Pakistan". NICE research journal vol.3, PP.58-67.

Johansen, S. and K. Juselius, (1990), "Maximum Likelihood Estimation and Inference on Co-integration with Applications to the Demand for Money," *Oxford Bulletin ofEconometrics and Statistics*, 52:169-210.

Kakar Z, K. (2011) "Impact of Fiscal Variables on Economic Development of Pakistan" Romanian Journal of Fiscal Policy. Volume 2, Issue 2, July - December 2011, Pages 1-10

Khan, S. and Qayyum, A (2007), "Measure of Monetary Policy Stance: The Case of Pakistan" PIDE working papers 2007; 39.

Mahmood, T and Sial, M, H. (2011) "The Relative Effectiveness of Monetary and Fiscal Policies in Economic Growth: A Case Study of Pakistan" Asian Economic and Financial Review, 2011, vol. 1, issue 4, pages 236-244.

Muhammad, S.D Wasti, S.K. A,Lal, I and hussain, A,(2009) an Empirical investigation between money supply, government expenditure, output and price: the pakistan eveidence. European juneral of economics, finance and adminirastive sciecnes, issue 17, 60-68

Noman, S., and Khudri, M. (2015), "the effects of monetary and fiscal policy on economic growth in Bangladesh", ELK Asia Pacific Journal of Finance and Risk Management, 4325/EAPJER (2015).

Pakistan Economic Survey (2009- 2010), „*Government of Pakistan, Finance Division*, Islamabad.

Rakic, B & Radenovic, T(2013). The effectiveness of Monetary and Fiscal Policy in Serbia: *Industrija,* Vol.41 No.2, 103-122.

Tesfay G. B. (2010) Economic Analysis of Smallholder Vegetable Production in Tigary, Ethiopia. A Case of IPMS's AlamataWereda Pilot learning Project, Thesis. Mekelle:MU.

Zaidi S. A, "Issues in Pakistan's Economy", A Political Economy Perspective: Third Edition, ISBN. 978-0-19-940183-3. Oxford University Press www.oup.com/pk.

Appendix

Date: 09/11/16 Time: 00:33
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: LGDP LGE LTAX LER LMS1 LKF
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.678894	133.4002	95.75366	0.0000
At most 1 *	0.535882	86.82485	69.81889	0.0012
At most 2 *	0.440491	55.35260	47.85613	0.0084
At most 3 *	0.399653	31.54411	29.79707	0.0311
At most 4	0.223954	10.62393	15.49471	0.2357
At most 5	0.005562	0.228670	3.841466	0.6325

Trace test indicates 4 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.678894	46.57540	40.07757	0.0081
At most 1	0.535882	31.47225	33.87687	0.0943
At most 2	0.440491	23.80849	27.58434	0.1415
At most 3	0.399653	20.92018	21.13162	0.0535
At most 4	0.223954	10.39526	14.26460	0.1872
At most 5	0.005562	0.228670	3.841466	0.6325

Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LGDP	LGE	LTAX	LER	LMS1	LKF
1.602029	1.073734	2.621159	-1.803658	-15.92024	-9.696232
-9.201356	-2.029489	5.544414	-0.281646	13.15692	-12.09171
-0.106017	2.704243	-2.600264	1.308467	-1.104747	-10.31244
1.367097	-0.934233	2.567028	-5.056764	14.20777	-9.172362
0.868338	-7.451295	1.402539	-1.220604	-5.505786	-3.683656
-1.204553	3.362454	1.538690	0.039998	8.071889	-6.510728

Unrestricted Adjustment Coefficients (alpha):

D(LGDP)	-0.028444	0.006372	0.003981	0.006399	-0.004301	0.002225
D(LGE)	-0.000923	-0.008489	-0.012325	0.033703	0.023682	0.000349
D(LTAX)	-0.015782	-0.066601	0.042740	0.031916	-0.018721	0.003100

D(LER)	0.014756	0.003549	-0.017157	0.003146	-0.008912	-0.001356
D(LMS1)	0.020988	-0.009389	-0.015802	-0.008568	0.013138	0.001017
D(LKF)	0.025368	0.022293	0.011630	0.007264	-0.000911	0.001110

1 Cointegrating Equation(s): Log likelihood 382.4637

Normalized cointegrating coefficients (standard error in parentheses)

LGDP	LGE	LTAX	LER	LMS1	LKF
1.000000	0.670233	1.636149	-1.125858	-9.937544	-6.052469
	(0.73677)	(0.48467)	(0.46239)	(1.85798)	(1.65249)

Adjustment coefficients (standard error in parentheses)

D(LGDP)	-0.045568
	(0.01222)
D(LGE)	-0.001479
	(0.02358)
D(LTAX)	-0.025284
	(0.04180)
D(LER)	0.023639
	(0.01196)
D(LMS1)	0.033624
	(0.01406)
D(LKF)	0.040640
	(0.01342)

2 Cointegrating Equation(s): Log likelihood 398.1998

Normalized cointegrating coefficients (standard error in parentheses)

LGDP	LGE	LTAX	LER	LMS1	LKF
1.000000	0.000000	-1.700660	0.597860	2.743138	4.927457
		(0.27204)	(0.26246)	(1.11467)	(0.99592)
0.000000	1.000000	4.978578	-2.571817	-18.91980	-16.38224
		(1.03031)	(0.99406)	(4.22169)	(3.77197)

Adjustment coefficients (standard error in parentheses)

D(LGDP)	-0.104198	-0.043473
	(0.07029)	(0.01728)
D(LGE)	0.076635	0.016238
	(0.13661)	(0.03358)
D(LTAX)	0.587537	0.118220
	(0.21228)	(0.05219)
D(LER)	-0.009020	0.008640
	(0.06943)	(0.01707)
D(LMS1)	0.120020	0.041592
	(0.08022)	(0.01972)
D(LKF)	-0.164486	-0.018005
	(0.06723)	(0.01653)

3 Cointegrating Equation(s): Log likelihood 410.1041

Normalized cointegrating coefficients (standard error in parentheses)

LGDP	LGE	LTAX	LER	LMS1	LKF
1.000000	0.000000	0.000000	-0.273906	-2.528268	1.314251
			(0.08577)	(0.67781)	(0.49421)

0.000000	1.000000	0.000000	-0.019776	-3.488083	-5.804804
			(0.20626)	(1.62999)	(1.18848)
0.000000	0.000000	1.000000	-0.512605	-3.099623	-2.124590
			(0.09689)	(0.76570)	(0.55830)

Adjustment coefficients (standard error in parentheses)

D(LGDP)	-0.104620	-0.032709	-0.049579
	(0.06993)	(0.02656)	(0.04987)
D(LGE)	0.077942	-0.017091	-0.017442
	(0.13481)	(0.05120)	(0.09614)
D(LTAX)	0.583006	0.233801	-0.521769
	(0.19790)	(0.07516)	(0.14114)
D(LER)	-0.007201	-0.037757	0.102970
	(0.06221)	(0.02363)	(0.04437)
D(LMS1)	0.121695	-0.001141	0.044044
	(0.07503)	(0.02850)	(0.05351)
D(LKF)	-0.165719	0.013444	0.159856
	(0.06390)	(0.02427)	(0.04557)

4 Cointegrating Equation(s): Log likelihood 420.5642

Normalized cointegrating coefficients (standard error in parentheses)

LGDP	LGE	LTAX	LER	LMS1	LKF
1.000000	0.000000	0.000000	0.000000	-4.337820	2.199371
				(0.63760)	(0.68867)
0.000000	1.000000	0.000000	0.000000	-3.618731	-5.740899
				(1.02398)	(1.10600)
0.000000	0.000000	1.000000	0.000000	-6.486125	-0.468125
				(0.89690)	(0.96874)
0.000000	0.000000	0.000000	1.000000	-6.606461	3.231467
				(1.14980)	(1.24190)

Adjustment coefficients (standard error in parentheses)

D(LGDP)	-0.095872	-0.038687	-0.033153	0.022360
	(0.06971)	(0.02709)	(0.05272)	(0.04086)
D(LGE)	0.124017	-0.048578	0.069074	-0.182497
	(0.12171)	(0.04730)	(0.09204)	(0.07134)
D(LTAX)	0.626638	0.203984	-0.439840	-0.058242
	(0.19142)	(0.07439)	(0.14476)	(0.11220)
D(LER)	-0.002900	-0.040696	0.111046	-0.065972
	(0.06261)	(0.02433)	(0.04735)	(0.03670)
D(LMS1)	0.109981	0.006864	0.022049	-0.012559
	(0.07421)	(0.02884)	(0.05612)	(0.04350)
D(LKF)	-0.155789	0.006658	0.178502	-0.073549
	(0.06322)	(0.02457)	(0.04781)	(0.03706)

5 Cointegrating Equation(s): Log likelihood 425.7618

Normalized cointegrating coefficients (standard error in parentheses)

LGDP	LGE	LTAX	LER	LMS1	LKF
1.000000	0.000000	0.000000	0.000000	0.000000	9.061096
					(1.71599)
0.000000	1.000000	0.000000	0.000000	0.000000	-0.016655
					(0.62187)
0.000000	0.000000	1.000000	0.000000	0.000000	9.791869

					(2.33100)
0.000000	0.000000	0.000000	1.000000	0.000000	13.68181
					(2.55453)
0.000000	0.000000	0.000000	0.000000	1.000000	1.581837
					(0.31120)

Adjustment coefficients (standard error in parentheses)

D(LGDP)	-0.099606	-0.006639	-0.039185	0.027609	0.646867
	(0.06956)	(0.06095)	(0.05339)	(0.04158)	(0.18851)
D(LGE)	0.144581	-0.225039	0.102289	-0.211403	0.265076
	(0.11433)	(0.10017)	(0.08774)	(0.06834)	(0.30983)
D(LTAX)	0.610382	0.343477	-0.466097	-0.035392	-0.115701
	(0.18917)	(0.16574)	(0.14518)	(0.11307)	(0.51265)
D(LER)	-0.010639	0.025707	0.098547	-0.055094	-0.075503
	(0.06074)	(0.05321)	(0.04661)	(0.03630)	(0.16460)
D(LMS1)	0.121389	-0.091032	0.040476	-0.028596	-0.634290
	(0.07057)	(0.06183)	(0.05416)	(0.04218)	(0.19123)
D(LKF)	-0.156580	0.013450	0.177224	-0.072436	-0.015185
	(0.06346)	(0.05560)	(0.04871)	(0.03793)	(0.17198)