Impact of Monetary and Fiscal Policies on Pakistan's Economy using Vector Autoregressive Model

Pervaiz A. Memon[1], Niaz Hussain Ghumro[2]

_____

Abstract

This paper makes an attempt to develop a model on effects of monetary and fiscal stimulus in Pakistan economy. The well-trodden technique Vector autoregressive (VAR) has been applied on the annual time series data for the period from 1972-2007, including both fiscal and monetary sides using data on output gap, inflation, short term interest rate, and government fiscal deficit over the period. This paper makes the contribution in the literature by considering the impact of both monetary and fiscal policies together. We have found positive effect of fiscal stimulus on inflation; but that on output gap the effect is negative. Effect of interest rate on output gap and inflation has been found to be negative. For policy reaction, we have found countercyclical response of monetary policy; but that of fiscal policy is pro-cyclical. The response of interest rate to deficit financing is negative while fiscal deficit positively responds to changes in interest rate.
Keywords: *VAR, Impulse Response Functions, Variance Decomposition, Monetary Policy, Fiscal Policy*

_____

1.   Introduction

Market economies never run on stable path. They face fluctuations. The objective of policy makers is to stabilize economy and minimize cyclical impact. Supply side shocks are exogenous and in most of cases cannot be controlled by governments. Then governments are left with only

[1] Assistant Professor Sukkur Institute of Business Administration, Pakistan and corresponding author, can be reached at pervaiz@iba-suk.edu.pk. Phone No: 0092-715630272

[2] Assistant Professor Sukkur Institute of Business Administration, Pakistan

one option which is affecting economy by managing aggregate demand. So demand management policies are important for stabilization of the economies.

There are two branches of the governments; the fiscal branch and the monetary branch. Policy actions by either of the branches affect aggregate demand. More specifically government expenditures have direct impact on aggregate demand. Changes in taxes affect aggregate demand through their impact on consumption. On the monetary side changes in interest rate affects investment decisions, thereby affecting aggregate demand. Notwithstanding the importance of these two policies, their effect on economy has been controversial in economic literature. In Walrasian system wages and prices are flexible. Therefore changes in output are possible only through changing aggregate supply. So according to monetarist doctrine demand side policies affect only prices and not the output. On the other hand Keynesians assume nominal rigidities so demand side policies have real effect. Due to this controversy most of the research in the area of macroeconomics has been devoted to empirically investigate the effect of changes in demand side policies on micro economic variables like output and inflation.

In case of Pakistan a good number of research studies is available that investigate effect of monetary and fiscal policy changes on the economy. For instance, Agha *et al*. (2005) takes interest rate as monetary policy instrument and estimates monetary policy transmission mechanism. Malik (2006) takes monetary base as monetary policy instrument and estimates the effect of changes in monetary base on output gap and inflation. Alam and Waheed (2006) estimate transmission mechanism of monetary policy in different sectors of the economy. Khalid, Malik, and Sattar (2007) estimate fiscal transmission mechanism. In all of these studies the interaction of monetary and fiscal policies is missing.

Therefore the objective of this study is to estimate the effects of changes in monetary and fiscal policy instruments on output gap and inflation. We also estimate the response of policy makers to changes in output gap and inflation, which is the second objective of the study. Changes in one of the policies' instruments have undesirable consequences for the other. Therefore, third objective of the study is to estimate the response of one policy instrument to changes in the other.

For these objectives we have estimated four variables VAR and then after imposing appropriate restrictions we have estimated impulse response functions and variance decomposition. Since 1980, when Sims introduced Vector Autoregression (VAR) methodology, most of the studies in the area of fiscal and monetary policy are based on this technique. VAR technique is preferred to

instrumental variables techniques as finding instruments is not an easy job. Similarly VAR treats all variables as endogenous, thereby abstracting from the problem of identifying exogenous variables. Impulse response functions are estimated to investigate the effects of fiscal and/or monetary stimulus on output gap and inflation. For instance, Bernanke (1992) and Bernanke and Mihov (1998) find hump shaped response of output and inflation to monetary policy changes.

We have found positive effect of fiscal stimulus on inflation but that on output gap is negative. This contradictory result can be attributed to supply side shocks which remain prominent in the history of Pakistan's economy. Effect of interest rate on output gap and inflation has been found to be negative, which is in conformity with the conventional wisdom that increase in interest rate has contractionary effects on the economy. For policy reaction, we have found countercyclical response of monetary policy but that of fiscal policy is pro-cyclical. This is again a result which is generally believed as monetary authority misses the targets because of fiscal pressure. The response of interest rate to deficit financing is negative. This might be due to the significant reliance of government on money creation as source of deficit financing. On the other hand fiscal deficit positively responds to changes in interest rate, which is standard result.

In section 2 theoretical framework is explained. Section 3 deals with econometric methodology. In section 4 empirical results are explained while section 5 concludes the paper.

2.   Theoretical Framework

In contrast to the controlled economies, market economies have business cycles. The three phases of business cycle are peak, recession, trough, and expansion (McConnell, Brue, & Flynn, 2012). During expansion economies grow along with the growth in employment, output, and income. Continuous growth can overheat the economy that can result in high prices and increasing interest rates. In recession unemployment increases, and income, prices, interest rates and output decrease.

Keynes argued that the changes in business cycle are because of the change in total demand of goods and services. Colander (2013) defines aggregate demand as curve depicting the change in total expenditure on all goods and services in an economy due to change in price levels. Aggregate demand of an economy can be measured as:

AD = Consumption + Investment+ Government Expenditure + Net exports

When aggregate demand increases prices increase along with output increases. Decrease in aggregate demand brings decrease in prices and output.
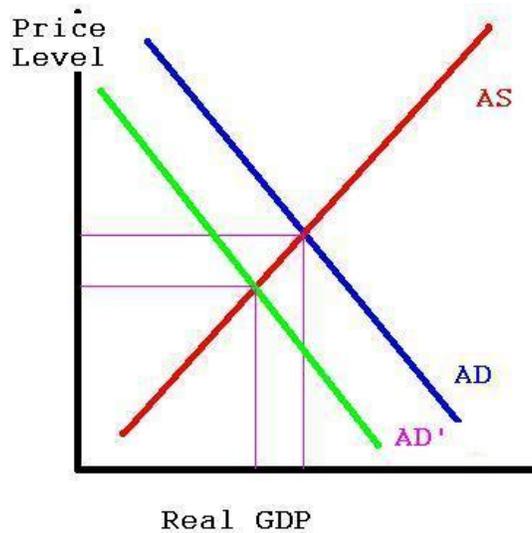

Figure 1: Aggregate Demand – Aggregate Supply Diagram

In market economies states have two types of policies to regulate or control the aggregate demand. They are the fiscal policy and the monetary policy. Monetary policy is typically framed and implemented by the central banks of the states while fiscal policy decisions are taken by the governments. Monetary policy is the change in interest rates and money supply to expand or contract the aggregate demand in the economy. Whenever governments want to contract the overheating economy they increase the interest rates. Increase in interest rates decreases both investment and consumption which reduces the aggregate demand and prices also reduce. Malik and Zakir (2013) report the ineffectiveness of monetary policy actions during the high growth period and strong impact of these actions during recessions.

Fiscal policy is the change in taxes and government expenditures to affect the aggregate demand. In an overheated economy government either reduces the expenditure or increases the tax rate. This will decrease the aggregate demand and ultimately prices will reduce. Gupta *et al.* (2002) investigate for 39 low income countries the impact of fiscal adjustment and expenditure composition on growth and report that one percent decrease in the deficit to GDP ratio yields per

capita real growth of 0.25 to 0.5 percent in the short run. Shaheen and Turner (2010) report the positive impact of government spending on inflation and output. Jalil, Tariq, and Bibi (2014) report the fiscal deficit as the major determinant of inflation in Pakistan.

Shaheen and Turner (2010) describe that monetary policy is intended to achieve two objectives of output growth and inflation control in Pakistan. But the presence of large budget deficits limits the ability of monetary policy to achieve these goals. Zakir and Malik (2013) find that in low growth economic phase in Pakistan, the output responds strongly to tight monetary policy. Fazlani *et al.* (2013) report that the interest rate, a monetary policy instrument, has greater impact on inflation in Pakistan.

3.   Data and Econometric Methodology

This study takes the data on output gap, inflation, short term interest rate, and government fiscal deficit over the period 1972-2007. We have used Money Market Rate as monetary policy instrument which is the only interest rate on which data are available for our sample period. And this is also consistent with the literature on monetary policy. Data on this variable are taken from International Financial Statistics (IFS). We have divided nominal GDP by constant price GDP to get GDP deflator – an aggregate measure of prices. Then inflation rate is calculated as growth rate of GDP deflator. Data on both nominal and constant price GDP are taken from IFS. However the data is available with different base year prices in IFS. So before further calculation, we convert GDP on 2000 prices. Real GDP is converted into output gap. For this we regressed real GDP on time and square of time. Fitted values of this regression are measure of potential GDP. Percentage deviation of real GDP from this potential level is a measure of output gap. Positive and negative values of output gap indicate boom and recession respectively. Fiscal deficit is taken as overall deficit (primary deficit plus debt servicing) as % of GDP. For this variable we have used data source, Economic Survey of Pakistan published by Ministry of Finance.

In this study VAR methodology has been used with four variables; output gap, inflation rate, interest rate, and fiscal deficit. When a model has both endogenous and exogenous variables, appropriate estimation techniques require some instrumental variables. Sometimes it becomes difficult to find the instruments while Vector Autoregression (VAR) method assumes all variables as endogenous variables.

Consider the following four variables structural VAR, with only one lag[3]

$$Y_t = \gamma_{10} + b_{11}P_t + b_{12}i_t + b_{13}f_t + \gamma_{11}Y_{t-1} + \gamma_{12}P_{t-1} + \gamma_{13}i_{t-1} + \gamma_{14}f_{t-1} + e_{yt} \ \ldots\ldots..(1)$$

$$P_t = \gamma_{20} + b_{21}Y_t + b_{22}i_t + b_{23}f_t + \gamma_{21}Y_{t-1} + \gamma_{22}P_{t-1} + \gamma_{23}i_{t-1} + \gamma_{24}f_{t-1} + e_{pt} \ \ldots\ldots.(2)$$

$$i_t = \gamma_{30} + b_{31}Y_t + b_{32}P_t + b_{33}f_t + \gamma_{31}Y_{t-1} + \gamma_{32}P_{t-1} + \gamma_{33}i_{t-1} + \gamma_{34}f_{t-1} + e_{it} \ \ldots\ldots..(3)$$

$$f_t = \gamma_{40} + b_{41}Y_t + b_{42}P_t + b_{43}i_t + \gamma_{41}Y_{t-1} + \gamma_{42}P_{t-1} + \gamma_{43}i_{t-1} + \gamma_{44}f_{t-1} + e_{ft} \ \ldots\ldots.(4)$$

In this system of equations Y_t, P_t, i_t, f_t are respectively, output gap, inflation rate, interest rate, and fiscal deficit as percentage of GDP, which are endogenous variables and Y_{t-1}, P_{t-1}, i_{t-1}, f_{t-1} are lagged values of these variables.

This system of equations can be rearranged so that only lagged values appear on right hand side. So we can rewrite

$$Y_t + b_{11}P_t + b_{12}i_t + b_{13}f_t = \gamma_{10} + \gamma_{11}Y_{t-1} + \gamma_{12}P_{t-1} + \gamma_{13}i_{t-1} + \gamma_{14}f_{t-1} + e_{yt} \ \ldots\ldots.(5)$$

$$P_t + b_{21}Y_t + b_{22}i_t + b_{23}f_t = \gamma_{20} + \gamma_{21}Y_{t-1} + \gamma_{22}P_{t-1} + \gamma_{23}i_{t-1} + \gamma_{24}f_{t-1} + e_{pt} \ \ldots\ldots.(6)$$

$$i_t + b_{31}Y_t + b_{32}P_t + b_{33}f_t = \gamma_{30} + \gamma_{31}Y_{t-1} + \gamma_{32}P_{t-1} + \gamma_{33}i_{t-1} + \gamma_{34}f_{t-1} + e_{it} \ \ldots\ldots.(7)$$

$$f_t + b_{41}Y_t + b_{42}P_t + b_{43}i_t = \gamma_{40} + \gamma_{41}Y_{t-1} + \gamma_{42}P_{t-1} + \gamma_{43}i_{t-1} + \gamma_{44}f_{t-1} + e_{ft} \ \ldots\ldots.(8)$$

$$
\begin{bmatrix}
1 & b_{11} & b_{12} & b_{13} \\
b_{21} & 1 & b_{22} & b_{23} \\
b_{31} & b_{32} & 1 & b_{33} \\
b_{41} & b_{42} & b_{43} & 1
\end{bmatrix}
\begin{bmatrix}
Y_t \\ P_t \\ i_t \\ f_t
\end{bmatrix}
=
\begin{bmatrix}
\gamma_{10} \\ \gamma_{20} \\ \gamma_{30} \\ \gamma_{40}
\end{bmatrix}
+
\begin{bmatrix}
\gamma_{11} & \gamma_{12} & \gamma_{13} & \gamma_{14} \\
\gamma_{21} & \gamma_{22} & \gamma_{23} & \gamma_{24} \\
\gamma_{31} & \gamma_{32} & \gamma_{33} & \gamma_{34} \\
\gamma_{41} & \gamma_{42} & \gamma_{43} & \gamma_{44}
\end{bmatrix}
\begin{bmatrix}
Y_{t-1} \\ P_{t-1} \\ i_{t-1} \\ f_{t-1}
\end{bmatrix}
+
\begin{bmatrix}
e_{yt} \\ e_{pt} \\ e_{it} \\ e_{ft}
\end{bmatrix}
\ \ldots\ldots.(9)
$$

Or in compact form as:

---

[3] For Simplicity we have taken one lag. However for the selection of appropriate lag we have used the criterion like Likely hood Ratio (LR), Akaike Information (AIC), and Schwartz Criteria.

$BZ_t = B_o + \gamma \; z_{t-1} + \mu$

Taking B on right hand side

$Z_t = B^{-1}B_o + B^{-1}\gamma \; z_{t-1} + B^{-1}\mu$

$Z_t = A_o + A_1 z_{t-1} + et$ ………………………………………………..(10)

Where $Z_t = \begin{bmatrix} Y_t \\ P_t \\ i_t \\ f_t \end{bmatrix}$, $A_0 = \begin{bmatrix} a_{10} \\ a_{20} \\ a_{30} \\ a_{40} \end{bmatrix}$, $A_{1=} \begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix}$, and $e_t = \begin{bmatrix} e_{yt} \\ e_{pt} \\ e_{it} \\ e_{ft} \end{bmatrix}$

This final version of the model is reduced form VAR as only lagged values which are exogenous and appear on the right hand side. This form of VAR can be written as:

$Y_t = a_{10} + a_{11}Y_{t-1} + a_{12}P_{t-1} + a_{13}i_{t-1} + a_{14}f_{t-1} + e_{yt}$ ……………………(12)

$P_t = a_{20} + a_{21}Y_{t-1} + a_{22}P_{t-1} + a_{23}i_{t-1} + a_{24}f_{t-1} + e_{pt}$ ……………...............(13)

$i_t = a_{30} + a_{31}Y_{t-1} + a_{32}P_{t-1} + a_{33}i_{t-1} + a_{34}f_{t-1} + e_{it}$ ……………………(14)

$f_t = a_{40} + a_{41}Y_{t-1} + a_{42}P_{t-1} + a_{43}i_{t-1} + a_{44}f_{t-1} + e_{ft}$ ……………………(15)

This system of equations can be estimated by OLS as long as right hand side variables are equal in number in all of the equations and all the four variables are stationary at different levels.

4. Empirical Results

We have estimated above model for Pakistan Economy over the period 1972 to 2007. The first step in VAR is selection of appropriate lag length. We have used three criteria, namely the Likelihood Ratio test, Akaike Information Criterion, and Schwartz information criterion for the selection of lag length. It is shown in table 1 that only one lag is appropriate for our case and this is confirmed by all the three criteria. The detailed results obtained, when we include one lag, are given in table 2.

Table: 1 Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-360.847	NA	7463.833	20.26928	20.44522	20.33069
1	-297.1883	109.6343*	532.3456*	17.62157*	18.50131*	17.92862*
2	-285.7506	17.15663	711.1086	17.87503	19.45855	18.42772
3	-278.9582	8.679159	1301.760	18.38657	20.67387	19.18490
4	-260.4882	19.49611	1371.237	18.24934	21.24043	19.29331

* indicates lag order selected by the criterion, FPE: Final prediction error, AIC: Akaike information SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

Table 2 Vector Autoregression Estimates

	P_t	Y_t	F_t	i_t
P_t (-1)	0.324756	-0.039989	0.054585	0.133521
	(0.18495)	(0.06547)	(0.04836)	(0.05402)
	[1.75589]	[-0.61077]	[1.12878]	[2.47181]
Y_t (-1)	-0.101136	0.938714	0.038557	0.111649
	(0.20958)	(0.07419)	(0.05480)	(0.06121)
	[-0.48256]	[12.6527]	[0.70364]	[1.82401]
F_t (-1)	0.146530	-0.085217	0.608487	-0.026318
	(0.52630)	(0.18631)	(0.13760)	(0.15371)
	[0.27842]	[-0.45740]	[4.42202]	[-0.17122]
i_t (-1)	-0.094373	-0.287482	0.111751	0.573680
	(0.45375)	(0.16062)	(0.11864)	(0.13252)
	[-0.20799]	[-1.78978]	[0.94197]	[4.32895]
C	6.354782	3.491808	1.091935	2.583038
	(3.95132)	(1.39875)	(1.03310)	(1.15403)
	[1.60827]	[2.49638]	[1.05695]	[2.23828]
R-squared	0.117138	0.846454	0.523646	0.602492
Adj. R-squared	0.003220	0.826641	0.462180	0.551201
Akaike AIC	6.264593	4.187653	3.581626	3.803011
Schwarz SC	6.484526	4.407586	3.801559	4.022945

In table 2, Y_t . P_t , i_t, f_t are respectively, output gap, inflation rate, interest rate, and fiscal deficit as percentage of GDP, which are endogenous variables and Y_{t-1}, P_{t-1} , i_{t-1}, f_{t-1} are lagged values of these variables.

After estimating VAR we have imposed appropriate number of restrictions which according to Choleski Decomposition are six. Estimated contemporaneous response coefficients through this procedure are helpful in estimation Impulse Response Functions (IRF). We have estimated IRF for three different issues; to estimate effect of changes in policy instruments on output and inflation, to estimate effect of changes in one policy instrument on the other, and relationship between output gap and inflation. Below we discuss results in detail.

4.1 Response of Output gap and Inflation rate to Changes in Monetary and Fiscal Policies

Results in figure 2 suggest that whenever government goes for deficit financing inflation increases along with decrease in output gap. The effect of fiscal deficit on inflation takes almost two years to reach the peak and lasts for three to four years. Whereas the effect on output gap is negative and remains so for ten years. As for as the response of inflation is concerned, it is in conformity with the economics theory; but the response of output gap is hard to be justified. A possible interpretation of this result could be that in Pakistan most of the fluctuations in output and inflation are supply driven. So fiscal policy has little role in output determination.

Effect of interest rate changes on output gap and inflation has been found to be according to theory. Results in upper panel of figure 3 show that increase in interest rate reduces output gap. The effect starts after one period, reaches the peak in fifth year and then gradually converges to zero. Monetary policy tightening increase upward pressure on lending rate thereby increasing discouraging investment and hence decrease in aggregate demand results. This reduction in aggregate demand slows down economic activity and helps in curbing inflation, which is evident from lower panel of figure 3. The effect of changes in interest rate on inflation has been found to be negative. It is worth noting here that response of output gap to changes in interest rate is estimated with reasonable standard error while that of inflation is estimated with large standard errors. So on statistical grounds effect on output gap is more significant. This again may be due to the supply factors that neutralize the effect of demand side factors on inflation.

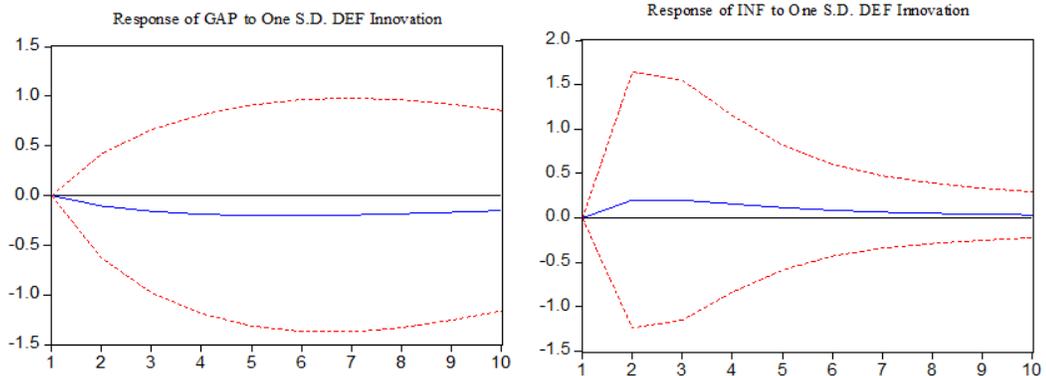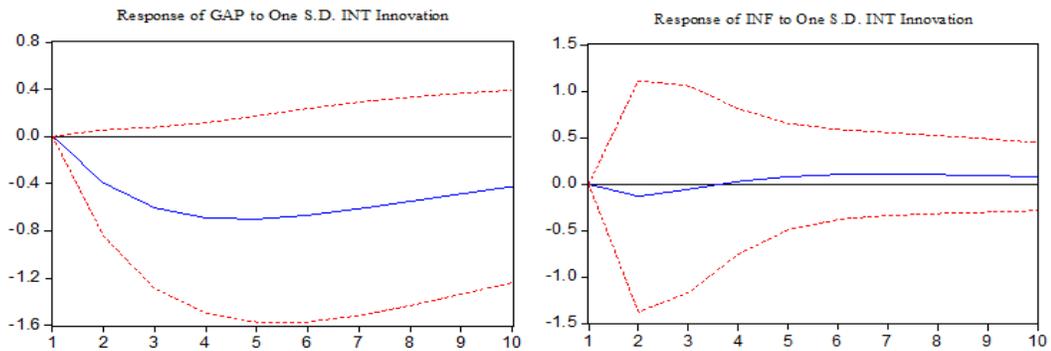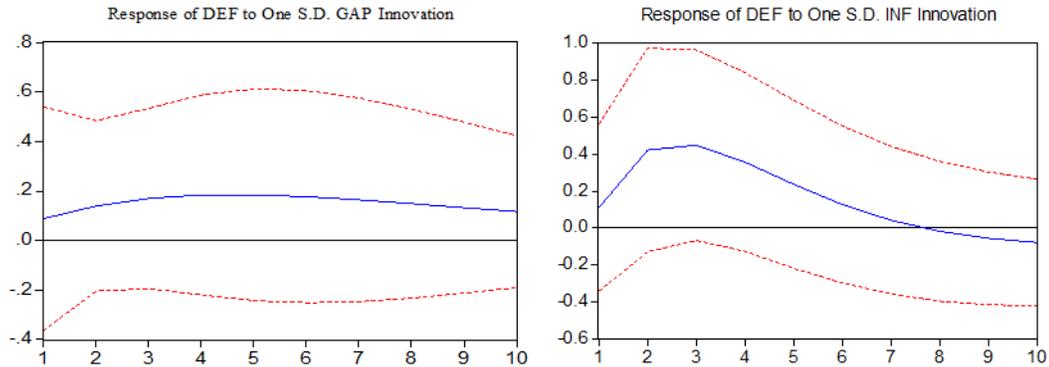**Figure2: Response of Output Gap and Inflation Rate to Fiscal Policy Changes**

Response of GAP to One S.D. DEF Innovation

Response of INF to One S.D. DEF Innovation

Figure 3: Response of Output Gap and Inflation Rate to Monetary Policy Changes

Response of GAP to One S.D. INT Innovation

Response of INF to One S.D. INT Innovation

### 4.2 Monetary and Fiscal Policy Response to Changes in Output Gap and Inflation Rate

We have found pro-cyclical response of fiscal policy to the state of economy. It is shown in figure 4 that whenever there is increase in output gap, which is an indicator of boom, government increases fiscal deficit. Same is the case with inflation; increase in inflation leads to positive change in fiscal deficit. This pro-cyclical response is hard to justify on normative grounds. However this response is because of constraint on borrowing of the government. In case of boom government has more opportunity to borrow so government creates fiscal deficit. This opportunity is limited when economy is already on down turn. This behavior shows poor fiscal discipline.

44

Figure 4: Response of Output Gap and Inflation Rate to Fiscal Policy Changes

On the other hand we found counter cyclical response of monetary policy to changes in output gap and inflation. Results in figure 5 show that interest rate positively respond to output gap and inflation. So whenever economy moves towards boom, positive output gap and increasing inflation, monetary authority takes contractionary actions. This behavior is desirable for economy to move on stable steady state path. This behavior of monetary authority in Pakistan can be attributed to financial sector reforms initiated in 1989. As a result of these reforms State Bank of Pakistan got autonomy which is helpful in counter cyclical response.

Figure 5: Response of Output Gap and Inflation Rate to Monetary Policy Changes

45
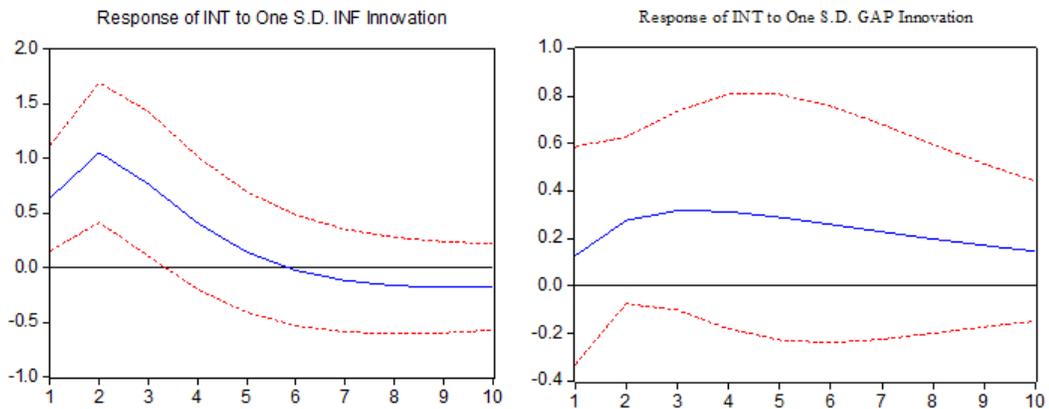
4.3 Relationship between Policies' Instruments

We have also estimated effect of one policy instrument on that of other one. As shown in Figure 6, fiscal deficit increases in response to monetary policy tightening. Increase in interest rate by monetary authority has undesirable consequences for fiscal branch of the government. Increase in interest rate increases cost of borrowing for the government which raises fiscal deficit. This result again shows poor discipline of fiscal branch; rather than economizing on debt in response to changes in interest rate, fiscal branch let the fiscal deficit increase.

**Figure: 6 Relationship between policies' instruments**
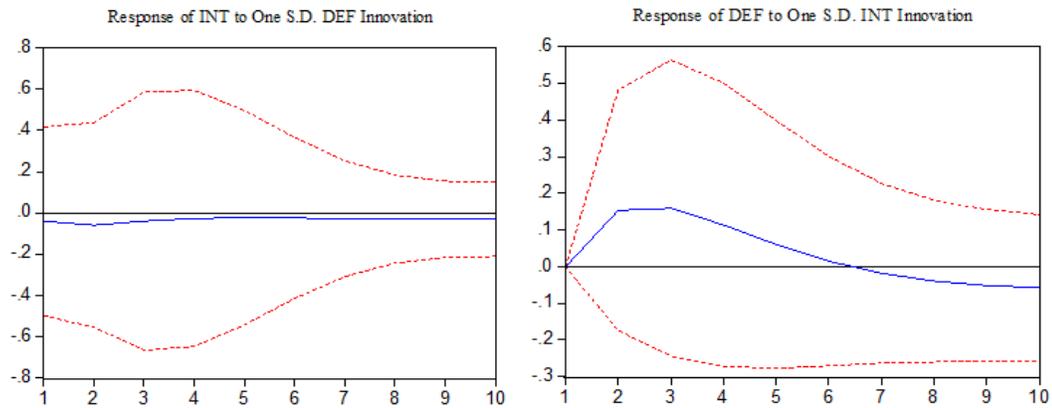
On the other hand if fiscal branch of the government increases fiscal deficit, then interest rate responds negatively.   This result is against the conventional wisdom that increase in deficit increases pressure in the credit market thereby increasing interest rate. However the result may be opposite if deficit is financed through money creation. This increase in money supply neutralizes the effect of contractionary measures taken by the monetary authority. In Pakistan government relies heavily on central bank borrowing to finance deficit. That why we have found inverse relationship between fiscal deficit and interest rate.

4.4 Relationship between Output Gap and Inflation Rate

Finally we have estimated the relationship between two economic indicators output gap and inflation rate. Results in figure 7 suggest that inflation has negative effect on output gap. This

46

happens when high and volatile inflation rates distort agents' choices regarding certain economic decisions like investments, savings, money demand, and asset holding etc. This inconvenience in decision making negatively affects economic activity. So response of output gap to inflation rate is negative. Another reason for finding such inverse relationship is that in case of negative supply side shocks inflation increases along with decrease in economic activity – a phenomenon known as stagflation. Same can be seen in lower panel of figure 6. Inflation responds negatively to changes in output gap. This justified only in case of supply side shock. Negative supply shocks not only increase inflation and decrease economic activity, it also decreases potential output. Output gap decreases if decrease in actual output is more than that in potential output. So output gap decreases that coexists with increase in inflation.

Figure 7: Relationship between inflation and output gap
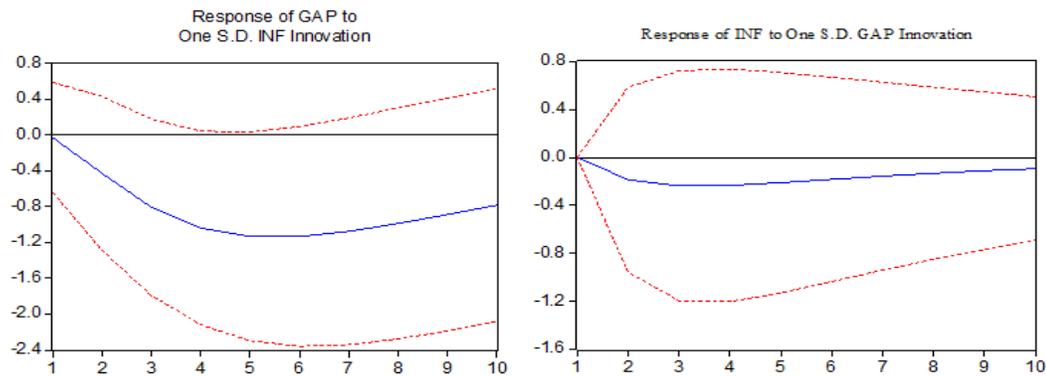
4.5 Variance Decomposition

Results in table 3 show that most of the variation in inflation is explained by its own lags. So inflation has considerable inertia. But as the time pass effect of lagged values of inflation reduces and more variation in inflation rate is explained by output gap. It is important to note that interest rate alone does not contribute much in explaining variation in inflation. This is because changes in interest rate transmit into output gap which then affects inflation. Output gap too has significant amount of inertia. Most of the variation in output gap is again explained by itself. Other factors explaining variation in output gap can be ranked as inflation, interest rate and deficit. This shows that monetary policy, rather than fiscal policy, contributes more towards inflation.

Table: 3 Variance Decomposition

Variance Decomposition of P_t

Period	S.E.	P_t	Y_t	F_t	i_t
1	5.202997	100.0000	0.000000	0.000000	0.000000
2	5.466292	99.69234	0.114892	0.136648	0.056122
3	5.502007	99.36807	0.297740	0.269166	0.065021
4	5.514993	99.10678	0.475161	0.350296	0.067764
5	5.524501	98.89664	0.619069	0.394275	0.090021
6	5.532877	98.72863	0.726900	0.418076	0.126390
7	5.540214	98.59815	0.804684	0.431572	0.165591
8	5.546312	98.49991	0.859769	0.439707	0.200611
9	5.551129	98.42772	0.898436	0.444900	0.228942
10	5.554788	98.37557	0.925465	0.448363	0.250606

Variance Decomposition of Y_t

Period	S.E.	P_t	Y_t	F_t	i_t
1	1.841840	0.021113	99.97889	0.000000	0.000000
2	2.564822	2.774607	94.69661	0.163259	2.365521
3	3.140050	8.432566	85.92042	0.362764	5.284248
4	3.627528	14.48226	77.40236	0.539235	7.576145
5	4.031201	19.60354	70.56623	0.684328	9.145897
6	4.354466	23.55316	65.46206	0.801661	10.18312
7	4.606303	26.48755	61.74745	0.895868	10.86913
8	4.798470	28.63616	59.06435	0.970853	11.32864
9	4.942835	30.20069	57.12856	1.029888	11.64086
10	5.049985	31.33721	55.73134	1.075811	11.85564

Cholesky Ordering: P_t Y_t F_t i_t

5. Conclusion

The prime objective of the study is to estimate the effect of changes in monetary and fiscal policy on output gap and inflation. Besides we also estimated response of policy makers to changes in output gap and inflation, response of one policy instrument to changes in other and the

relationship between economic factors, output gap and inflation rate. The results show that fiscal stimulus positively affects inflation but its effect on output gap is negative. This contradictory result can be attributed to supply side shocks which remain prominent in the history of Pakistan's economy. Changes in interest rate – monetary policy instrument, discourages aggregate demand thereby reducing aggregate demand which helps curbing inflation. This result is in conformity with the conventional wisdom that increase in interest rate has contractionary effects on the economy. For policy reaction, we have found countercyclical response of monetary policy but that of fiscal policy is pro-cyclical. This is again a result which is generally believed as monetary authority misses the targets because of fiscal pressure. Fiscal deficit has negative impact on interest rate which may be justified if most of the deficit is financed through printing money. On the other hand fiscal deficit positively responds to changes in interest rate, which is standard result.

References

Agha, A. I., Ahmed, N., Mubarik, Y. A., & Shah, H. (2005). Transmission mechanism of monetary policy in Pakistan. *SBP-Research Bulletin*, *1*(1), 1-23.

Alam, T., & Waheed, M. (2006). The monetary transmission mechanism in Pakistan: a sectoral analysis.

Bernanke, B. S., & Mihov, I. (1998). Measuring monetary policy. *The Quarterly Journal of Economics*, *113*(3), 869-902.

Christiano, L. J., Eichenbaum, M., & Evans, C. L. (2005). Nominal rigidities and the dynamic effects of a shock to monetary policy. *Journal of political Economy*, *113*(1), 1-45.

Colander, D. (2013). *Economics.* New York: McGraw Hill/Irwin.

Fazlani, T. A., Hashmi, P., Nasar, A., Mustafa, M., & Hirani, G. (2012). The Determinants of Inflation and Its Impact on Economic Growth: A Case Study of Pakistan (2002-2010). *Academic Research International*, *3*(1), 213-222.

Friedman, B. M. (2000). *Monetary policy* (No. w8057). National Bureau of Economic Research.

Gupta, S., Clements, B., Baldacci, E., & Mulas-Granados, C. (2002). Expenditure Composition, Fiscal Adjustment, and Growth in Low-Income Countries. *IMF Working Paper No. 02/77*.

Jalil, A., Tariq, R., & Bibi, N. (2014). Fiscal deficit and inflation: New evidences from Pakistan using a bounds testing approach. *Economic Modelling*, *37*, 120-126.

Khalid, M., Malik, W. S., & Sattar, A. (2007). The Fiscal Reaction Function and the Transmission Mechanism for Pakistan. *The Pakistan Development Review*, 435-447.

Malik, W. S. (2007). *Monetary policy objectives in Pakistan: An empirical investigation* (No. 22212). East Asian Bureau of Economic Research.

McConnell, C., R., Brue, S., L., & Flynn, S., L. (2012) *Economics: Principles, Problems, and Policies.* New York: McGraw Hill/Irwin.

Shaheen, R., & Turner, D. P. (2010). Measuring the dynamic Effects of Fiscal Policy shocks in Pakistan. *25Th Agm Pide Pakistan*.

Sidrauski, M. (1967). Rational choice and patterns of growth in a monetary economy. *The American Economic Review*, *57*(2), 534-544.

Sims, C. A. (1986). Are forecasting models usable for policy analysis?. *Federal Reserve Bank of Minneapolis Quarterly Review*, *10*(1), 2-16.

Sullivan, Arthur; Steven M. Sheffrin (2003). *Economics: Principles in action*. Upper Saddle River, New Jersey 07458: Pearson Prentice Hall. pp. 387. ISBN 0-13-063085-3

Taylor, J. B. (1996). How should monetary policy respond to shocks while maintaining long-run price stability?–Conceptual issues. In *Proceedings of a Conference on Achieving Price Stability* (pp. 29-31).

Zakir, N., & Malik, W. S. (2013). Are the effects of monetary policy on output asymmetric in Pakistan?. *Economic Modelling*, *32*, 1-9.