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ABSTRACT

The paper critically appraises causality, susceptibility to innovation of budget deficit, domestic borrowing from banking system and foreign borrowing. Secondary data is used, which was taken from annual Economic Survey of Pakistan (various issues), and International Financial Statistics (2005). For analysis, Vector Autoregressive (VAR) model with Impulse Response Function (IRF), Error Variance Decomposition and Granger Causality test is used. The study revealed that any innovation of one standard deviation took seven years for budget deficit and more than ten years for domestic bank borrowing and foreign borrowing to be effective. The variation in budget deficit is mostly explained by itself. Most of the variation in domestic bank borrowing is explained by budget deficit, while variation in foreign borrowing is mostly explained by budget deficit and domestic bank borrowing. Two unilateral causality are found and no bilateral causality, and in mostly independent relationships have been detected. Based on the finding the study suggests parallel and harmonized fiscal and monetary policy to reduce foreign reserves outflow. Fiscal policy is more vulnerable to shocks or innovations and monetary policy took longer time to become effective, so the gap between monetary policy formation and its implementation must be reduced.
Key Words*: Budget Deficit, Causality, Domestic Bank Borrowing, Foreign Borrowing, Inter-Dependencies,*

INTRODUCTION

The budget deficit and its financing has become a major problem for Pakistan's economy for over the last three decades. Over the period of time, increased budgetary deficit was witnessed during the period of political volatility[1]. The political volatility period witnessed large falls in GDP growth, considerable increases in the budget deficit, causing massive increase in money supply, high inflation and stern depreciation of Pakistani currency (Shah, 2002).

In Pakistan, domestic banks borrowing, domestic non-banks borrowing, and external borrowing are the three broad options obtainable for deficit financing. Domestic bank borrowing is highly inflationary, as budget deficit is financed through money creation. The latter two choices would mount up further debt, which would extort a greater debt-servicing requirement in the future. Private sector debts involve higher interest rate than multilateral or official bilateral debt, and where apparent risk is high, these rates are likely to be further inflated. Policy makers in Pakistan besides being constrained by IMF conditionalities are reluctant to involve in expansionary policy measure owing to a lack of financing option – additional increase of debt at high rates of interest would have led to unsustainable debt repayments, and domestic bank financing would create menacing inflationary consequences (Haq, 2003).

Overall fiscal deficit at factor cost was averaged over 2% in Pakistan during 1960-1971. In 1977-1988, overall fiscal deficit at factor cost increased to average over 7%. The period of 1989-1999, has been marked by a great deal of political volatility, recurring foreign exchange crisis and slow economic growth. Overall fiscal deficit averaged over 6%, during this period. In the period of 1999-2005, the overall budget deficit to GDP ratio decreased to 3% in 2005 from 6.1% in 1999(Economic Survey of Pakistan, 2005).

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[1] Democratic governments dismissed four times in short period (1990, 1993, 1996, and 1999)

Pakistan depends on both domestic and external sources of financing to maintain its economic development. External debt and liabilities of Pakistan remained high almost for the last three decades, but at the end of the 1990s decade it reached deplorable level, posing a severe peril to the economic future of the country. The large fiscal deficit continued for an extended period of one decade considered liable for the rapid increase in the external debt.

Public debt of Pakistan continuously showed increasing trend from 1960 to 1972. Total debt of Pakistan increased to 89.15% of GDP in 1972 from 30.5% of GDP in 1960. In total public debt the dominant component up to 1970 was domestic debt, but in 1972 the huge rise in total public debt, came in the form of external debt. After 1972 total public debt got declining trend up to 1975, decrease to 52.74% of GDP in 1975 from 89.15% of GDP in 1972. In 1984 total public debt was 54.26% of GDP, which consist external debt 28.88% of GDP and domestic debt 25.38% of GDP. From 1985 till 1993 public debt include most of the domestic debt. Total public debt was 79.43% of GDP in 1993, in which domestic debt was around 45.97% of GDP and external debt was 33.47% of GDP (Economic Survey of Pakistan, 2000).

The empirical studies relating to the link between budget deficit and its funding sources are not conclusive. Ahking and Miller (1985) observed that government budget deficit appears to be inflationary. Bachman (1992) observed that there is unidirectional causality from the federal deficit to the current account. Barro (1974) examined that government deficits finance by higher saving do not affect the exchange rate. Barro (1978) observed that deficits are outcome of inflation, rather than inflation being a consequence of deficits. Bisignano and Hoover (1982) observed that rises in the deficit may appreciate or depreciate the exchange rate depending on the relative significance of wealth effects and relative asset substitution effects. They concluded that the currency will appreciate, due to the deficit combined with tight monetary policy. Bundt and Solocha (1988) found that fiscal policy with expansionary debt financing is absolutely crowded-out under a flexible exchange rate and perfect capital mobility in a small open economy model. Burney and Akhtar (1992) observed that budget deficits have significant positive impact on the real exchange rate directly as well as indirectly through the price level. In the present study two different choices available to finance budget deficit are included to find out the causality among budget deficits and its funding sources, and to observe the vulnerability to shocks or innovations in respect of budget deficit, domestic bank borrowing and foreign borrowing.

Objectives
The main objectives of the study are: (i) to appreciate the inter-relationships that can be detected in this way among budget deficit and its financing sources (ii) to detect causality links among these variables (iii) to see which one amongst these variables are more susceptible to innovations or shocks (iv) to see how the Autoregressive Vector Methodology (VAR) and the causality theory act in this kind of approaches.

MATERIALS AND METHODS
Annual data for the sample period 1960-2005, taken from Economic Survey of Pakistan (various issues), and International Financial Statistics (2005) is used for analysis. The stationarity of data is determined by using Augmented Dickey-Fuller (ADF) Test. To select the optimum ADF lag, Akaike Information Criterion (AIC) is used. Stationarity of the variables are checked once with an intercept is included only, and again when both an intercept and a linear deterministic trend is included. Johansen Co-integration Test is used to determine the Co-integration in the regressions used for analysis. Vector Autoregression (VAR) model, which treats all the variables in the system as endogenous, is used to analyze the dynamic impact of the random errors on the variable's system. In order to encapsulate the causality among the three main variables of the study (Budget deficit, Domestic bank borrowing, and External borrowing) Granger causality test is used. Eview is used for deriving the results. More specifically, the following multivariate VAR model of order P is used for estimation:

$$y_t = C + \sum_{i=1}^{n} \alpha_i y_{t-1} + \sum_{i=1}^{n} \beta_i x_t + \varepsilon_t \qquad (1)$$

Where,

y_t and x_t is a $(n \times 1)$ vector of endogenous variables being considered (budget deficit, domestic bank borrowing and external borrowing), α_i and β_i is $(n \times n)$ matrix of coefficient, C is the vector of constant, P is the number of lags and ε_t is a $(n \times 1)$ vector of uncorrelated white noise disturbances.

RESULTS AND DISCUSSION

The results in Table I and II of the unit root test indicate that all the three variables, budget deficit, government domestic bank borrowing and external borrowing to finance budget deficit are non-stationary at level whether trend is included or not.

Table I. *ADF test for stationarity (includes intercept but not a trend)*

Variables	I(0)		I(1)		I(2)		Result
	Test statistics[1]	Critical value	Test statistics	Critical value	Test statistics	Critical value	
Budget Deficit(BD)	-1.5428[0]	-3.5814	-7.4811[1]	-3.5850			I(1)
Real Domestic govt. ban borrowing(GBD)	-1.4207[1]	-3.5814	-9.5202[2]	-3.5850			I(1)
Foreign borrowing (fB)	-3.3751[1]	-3.5814	-9.6155[0]	-3.5850			I(1)

[1] Figures in square brackets besides each statistics represent optimum lags, selected using the minimum AIC value.

Table II. *ADF test for stationarity (include intercept and a trend)*

Variables	I(0)		I(1)		I(2)		Result
	Test statistics[1]	Critical value	Test statistics	Critical value	Test statistics	Critical value	
Budget Deficit(BD)	-3.3144[0]	-4.1728	-7.3596[1]	-4.1781			I(1)
Real Domestic govt. bank borrowing(GBD)	-4.0627[0]	-4.1728	-9.4101[2]	-4.1781			I(1)
Foreign borrowing (fB)	-3.3980[1]	-4.1728	-9.8946[0]	-4.1781			I(1)

[1] Figures in square brackets besides each statistics represent optimum lags, selected using the minimum AIC value

The results of Likelihood Ratio (LR) test is presented in Table III. There is possibility of spurious regression, due to non-stationary time series variables. But when performed Johansen's cointegration test, long run relationships were found. The Likelihood Ratio (LR) test results reject the assumption of no cointegration, and indicate the existence of one cointegrating equation as the calculated value of Likelihood Ratio (LR) is greater than the critical values at 1 percent.

Table III. *Johansen cointegration test result with intercept (no trend) in CE and no intercept in VAR. (Variables included in the cointegrating vector: BD, GBD and fB).Test assumption: No deterministic trend in the data. Lag interval is 1 to 1*

Eigen value	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.4488	42.09	34.91	41.07	None **
0.2314	15.88	19.96	24.60	At most 1
0.0932	4.30	9.24	12.97	At most 2

*(**) denotes rejection of the hypothesis at 5 %(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

The graphical illustration gives the evaluation of the three variables in IRF terms to variations, unitary innovation or shocks (of one standard deviation). Figure 1 translates the rapidity of absorption of the innovation by the three variables. It is found that the absorption takes 7 years for budget deficit, and more than 10 years for domestic bank borrowing and foreign borrowing. Figure 2 indicates the response or the absorption rhythm of each one of the three variables to innovation or impulses of size 1 s.d. +/- 2 s.e. The first, second and third graph in row 1 of Figure 2 give the response of the budget deficit to innovations or impulses introduced by their own, by domestic bank borrowing and by foreign borrowing respectively. The first, second and third graph in row 2 of Figure 2 give the response of the domestic bank borrowing to innovations or impulses introduced by budget deficit, by their own and by foreign borrowing respectively. In similar fashion the first, second and third graph in row 3 of Figure 2 give

the response of the foreign borrowing to innovations or impulses introduced by budget deficit, by domestic bank borrowing and by their own. The numerical values in Table IV support the graphics referring the 3 variables responses to innovations introduced in the VAR model structure. In Fig. 3 and Table V the values of variance decomposition of the three variables are given. This table values show how the variance of each one of the series is decomposed during a period of ten years.
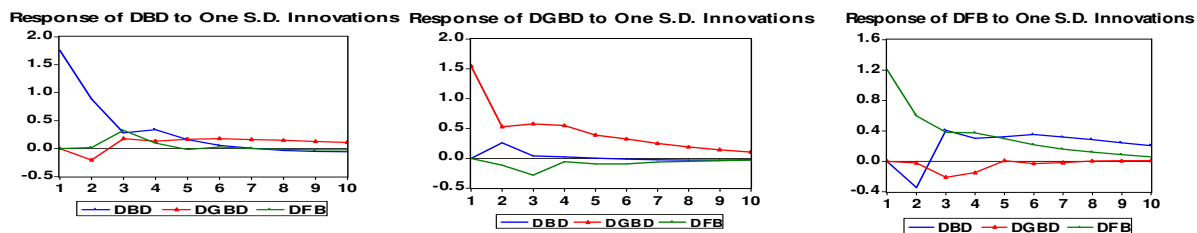
Fig. 1 *Economical response to impulses of 1 standard deviation (D.V) innovations*
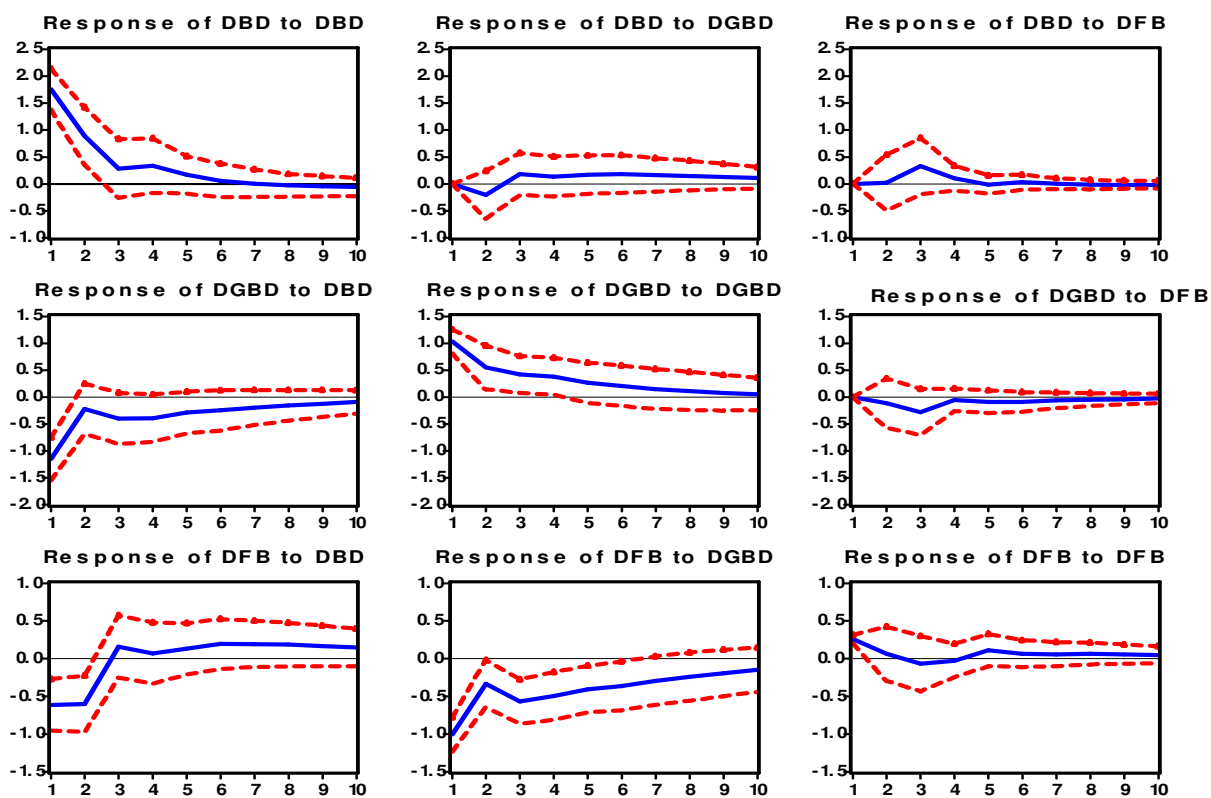
Fig. 2 *Economical responses to impulses of 1 standard deviation (D.V) +/- 2 standard errors*

Variance Decomposition
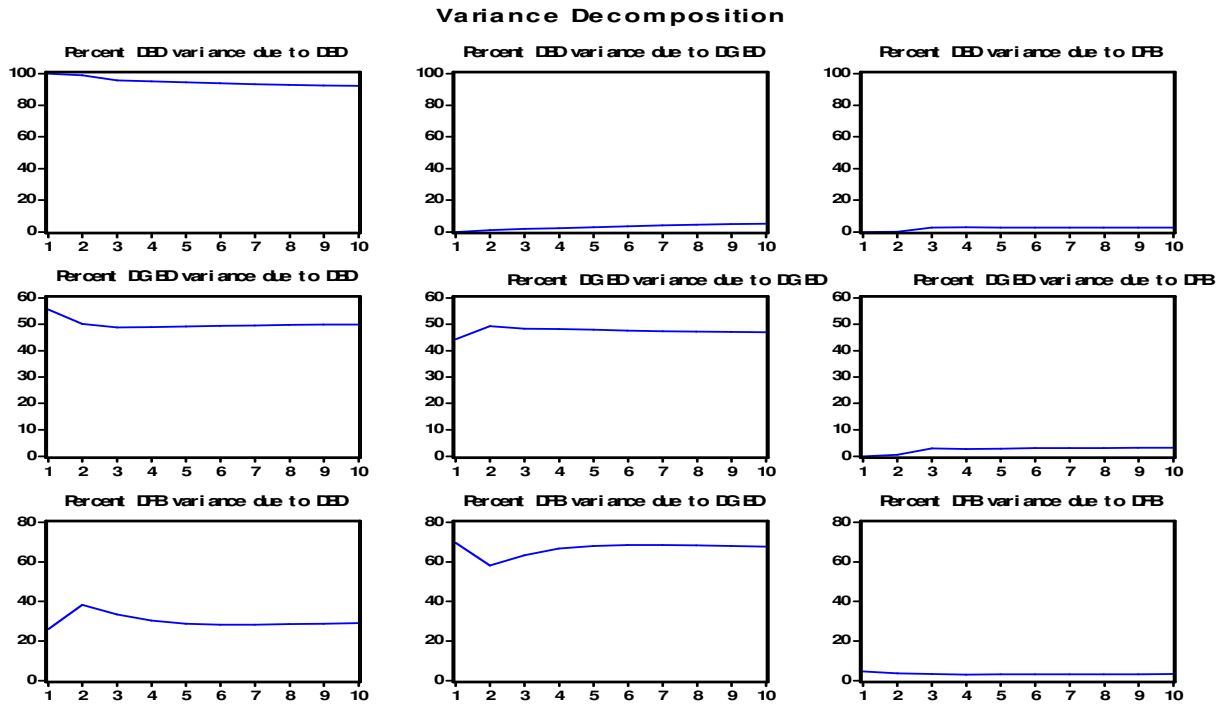
Fig. 3 *Variance decomposition*

Table IV. *Values of the impulse response function (IRF)*

	Response of DBD:		
Period	DBD	DGBD	DFB
1	1.755714	0.000000	0.000000
3	0.281189	0.177684	0.325744
6	0.058402	0.178113	0.027798
9	-0.049322	0.128815	-0.019488
10	-0.059114	0.108`978	-0.020875
	Response of DGBD:		
Period	DBD	DGBD	DFB
1	-1.155018	1.030042	0.000000
3	-0.402285	0.416520	-0.281905
6	-0.252025	0.204665	-0.094429
9	-0.124757	0.075147	-0.039512
10	-0.094651	0.050446	-0.030087
	Response of DFB:		
Period	DBD	DGBD	DFB
1	-0.614957	-1.006369	0.258157
3	0.156704	-0.571960	-0.069486
6	0.193230	-0.364730	0.063521
9	0.167303	-0.192725	0.056735
10	0.147174	-0.150250	0.048528
	Ordering: DBD DGBD DFB		

Table V. *Values of the variance decomposition*

Period	S.E.	DBD	DGBD	DFB
Variance Decomposition of DBD:				
1	1.755714	100.0000	0.000000	0.000000
3	2.031688	95.63970	1.783183	2.577119
6	2.087680	93.84454	3.462984	2.692472
9	2.104178	92.45638	4.878007	2.665611
10	2.107931	92.20613	5.127934	2.665935
Variance Decomposition of DGBD:				
1	1.547596	55.70090	44.29910	0.000000
3	1.780618	48.74522	48.32033	2.934451
6	1.936625	49.33426	47.63461	3.031132
9	1.969468	49.79754	47.06702	3.135444
10	1.972616	49.86897	46.98232	3.148709
Variance Decomposition of DFB:				
1	1.207309	25.94490	69.48283	4.572267
3	1.514287	33.37586	63.32890	3.295240
6	1.707356	28.27065	68.54006	3.189286
9	1.791058	28.77661	67.98527	3.238124
10	1.804017	29.03020	67.70567	3.264129
Ordering: DBD DGBD DFB				

The first group of columns in Table V is referred to budget deficit. Those values of standard errors that budget deficit explains by itself lies between 92% to 100%, with values descending slowly. Domestic bank borrowing is the second variable to explain most the variation in budget deficit with values ranging from 1.78% to 5.13%. Foreign borrowing explains 2.58% to 2.67% variation in budget deficit. The second group of columns refers to the domestic bank borrowing variance decomposition. Domestic bank borrowing by itself explains variation between 44.3% to 47%. Budget deficit and foreign borrowing explain 55.7% to 50% and 2.9% to 3.1% of variation in domestic bank borrowing. The third group of columns shows the foreign borrowing variance decomposition. Foreign borrowing by itself explains variation between 3.3% to 4.6%. Budget deficit and domestic bank borrowing explain 25.9% to 29% and 67.7% to 69.5% of variation in foreign borrowing.

Granger (1969) and Sims (1972) causality test is used to investigate the direction of causality among the three variables i.e. budget deficit, domestic bank borrowing and foreign borrowing.

Table VI. *Appreciation of the causality direction in the four variables*

Pair-wise Granger Causality Tests

Sample: 1960 2005

Lags: 2

Null Hypothesis:	Obs.	F-Statistic	Probability
GBD does not Granger Cause BD	44	1.92331	0.15973
BD does not Granger Cause GBD		1.07243	0.35205
FB does not Granger Cause BD	44	1.13856	0.33069
BD does not Granger Cause FB		7.19014	0.00220
FB does not Granger Cause GBD	44	0.80536	0.45422
GBD does not Granger Cause FB		8.22202	0.00105

The results of the regression in Table VI indicate that the there are two unilateral causality. One directed from budget deficit to foreign borrowing and another directed from domestic bank borrowing to foreign borrowing.

The coefficients of lagged values of budget deficit and domestic bank borrowing as a group is statistically different from zero at 1% level of significance in both cases. The result further indicates that mostly independent type relationships are detected and no bilateral causality is found as in none of the regression set both of the coefficient found to be statistically significant.

CONCLUSION AND RECOMMENDATIONS

The study reveals that any innovation of one standard deviation taken place toward budget deficit took 7 years, while for domestic bank borrowing and foreign borrowing took more than 10 years to become effective. The results further indicate that the variation in budget deficit is mostly explained in their own.(like above this need be revised). The variation in domestic bank borrowing is mostly explained by budget deficit. Most of the variation in foreign borrowing is explained by budget deficit and domestic bank borrowing. The results of the causality indicate two unilateral causalities, one directed from budget deficit to foreign borrowing and another from domestic bank borrowing to foreign borrowing. Mostly independent type relationships have been detected and no bilateral causality is found. The results indicate that foreign borrowings are the outcome of budget deficit and domestic bank borrowing, rather than budget deficit and domestic bank borrowing being a consequence of foreign borrowing. The outcome of the study suggests that Pakistan's fiscal policies are more susceptible to innovations or shocks than monetary policy. On the other side, monetary policy takes longer time to become effective. But still both policies are interdependent. As is the case of other economies, the country economic manager's harmonized the use of fiscal policies and monetary policy for sustainable budget deficit. This will help reduce country reliance on foreign borrowing.

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