Crowding-in Effect of Budget Deficit: Evidence from Pakistan (1960-2005)

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ABSTRACT

The paper critically analyzes the effect of budget deficit on private and public investment. Annual data for the period 1960-2005, taken from Economic Survey of Pakistan and International Financial Statistic is used for analysis. Simultaneous equation model is used for estimation. The study revealed that bank credit to private sector, government domestic bank borrowing, and foreign reserves have positive significant effect on money supply. Demand for money is positively related to out put and negatively to interest rate. Out put is positively related to consumption expenditure, private investment, public investment, balance of trade and negatively related to real interest rate. Private investment is positively related to out put, bank credit to private sector and negatively related to interest rate. The relationship between private investment and interest rate is statistically significant only at 10%, signifying that interest rate is not affecting private investment because of the greater return to private investors. Public investment is positively related to out put and foreign reserve and negatively to real interest rate. Both domestic bank borrowing and foreign borrowing to finance budget deficit crowded-in private and public investment with same elasticity, but foreign borrowing encourage foreign reserve outflow. Based on findings of the study it is recommended that domestic sources of financing including domestic non-bank borrowing and bank borrowing should encourage for budget deficit financing.

Key Words: Budget Deficit, Crowded-in, Private Investment, Public Investment.

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INTRODUCTION

Budget deficit has sturdy impact on macroeconomic variables in both developed and developing countries. But developing countries are more prone to budget deficits owing to limited financing choices, irreconcilable corrective policies, saggy political situation, and tied down of donor's conditionality. Most of the developing countries meet in excess expenditure than their revenue, and trap in a budget deficit. Pakistan is one of the developing countries facing the same state of affairs. In budget deficit experience, developing countries are tug to involve in debt financing, which is anticipated to be high inflationary and also negatively affect other macroeconomic variables.

The issue of budget deficit has attracted a great deal of attention over the last two decades, as reflected in considerable debate in academic literature and in policy-making community. The budget deficit, and it's financing, has become a main problem facing the Pakistan economy.

Under the influence of the "Keynesian revolution" most economists thought that high employment and stability could be accomplished through appropriate manipulation of budget (Martino, 1998). In recent times, however, a reversion in the profession's conventional lore has been proved. Deficits are now being held responsible for a lot of different economic evils.

The actual problem with any fiscal deficit expansion lies with how it could be financed. Domestic banks, domestic non-banks, and external sources are the three broad options accessible for deficit financing. The first option effect is likely to be highly inflationary, as budget deficit is financed through money creation. The latter two options would accumulate further debt, which would extract a greater debt-servicing requirement in the future. Developing countries such as Pakistan are characterized by under-developed institution, rampant corruption, immature financial markets, and profitable financing options are likely to be severely limited (Haq, 2003).

In Pakistan during 1960-1971, overall fiscal deficit and real GDP growth at factor cost averaged over 2% and 6% of GDP respectively. Total investment growth averaged over 16% of GDP. During 1972-1977, total investment, total revenue, and total expenditure averaged over 17%, 16%, and 21% of GDP respectively. Overall fiscal deficit and real GDP growth averaged over 5% and 4% of GDP respectively. In 1977-1988, overall fiscal deficit and real GDP growth at factor cost in Pakistan averaged over 7% and 5% of GDP respectively. Total investment, total revenue, and total expenditure growth rate averaged over 18%, 17%, and 24% of GDP respectively (Economic survey of Pakistan, 1980).

The period of 1989-1999, has been marked by a great deal of sluggish economic growth, recurring foreign exchange crisis and political instability. Frequent removal of government leading to successive elections did not give strong and clear mandate or stability. During this period the overall GDP growth rate averaged over 4%, fiscal deficit averaged over 6%, while total investment and total revenue averaged over 18% and 17% of GDP respectively. During 1999-2005, the overall budget deficit to GDP ratio decreased to 3% in 2005 from 6.1% in 1999, GDP real growth increased from 4.2% in 1999 to 8.4% in 2005. Government total revenues decreased from 15.9% of GDP in 1999 to 13% of GDP in 2005. Total expenditure goes down to 16% of GDP in 2005, from 22.0% of GDP in 1999(Economic Surveys of Pakistan, 2005-06).

The empirical evidence regarding the effect of budget deficit on investment is not conclusive. Bailey (1971), Buiter (1977), and David and Scadding (1974) argued that public expenditures crowding-out private investment, and this crowding-out effect of public expenditure trim down the capability of the government to manipulate economic activity through fiscal actions. Yellen (1989) argued that if a given government expenditure program is finance by issuing bonds rather than through current taxation, investment and/or net exports ought to be absolutely "crowded-out". Premchand (1984) asserted that funding the budget deficits by borrowing from the public contributes to the financial crowding-out of the private sector. Barro (1990, 1991) found that government consumption lowered saving and growth through the distorting effects from taxation or government expenditure programs, but had no direct effect on private productivity. Heng (1997) argued that public capital crowds-in private capital through two channels, first its impact on the marginal productivity of labor and savings, and second gross complementarity's/substitutability between public and private capital.

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. Chaudhary and Shabbir (2005) observed that increase in government budget deficit, partially due to an income inelastic revenue structure, create excessive supply of money over demand and lead to foreign reserves outflow. The basic model used by Chaudhary and Shabbir (2005) does not capture the affects on private and public investment. To improve upon the shortcomings in literature and obtain reliable result for private and public investment, the model is extended beyond 1990, and incorporating the private and public investment function in order to obtain empirical results for crowding-in effects of budget deficit.

Objective

The main objective of the research is to study and analyzed the impact of continuous budgetary deficit on private and public investment.

MATERIALS AND METHODS

Time series data for the sample period 1960-2005, which are taken from Economic survey of Pakistan various issues, and International Financial Statistics is used. To determine the stationarity of data, an Augmented Dickey-Fuller (ADF) test is used. The Akaike information criterion is used to select the optimum ADF lag. 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. The simultaneous equation model is used to analyze the impact of budget deficit on the private and public investment. Keys equations are separately estimated using two stage least square method. The simultaneous equation is more effective due to the interdependent of macroeconomic variables. A statistical package Eview is used for deriving the results. More specifically, the following simultaneous equation models are used for estimation:

The money supply function is given as follows.

$$M^s = f\ (BCP, GBD, RES) \qquad (1)$$

Where M^s is the money supply, RES is the international reserves, GBD is the government borrowing from the banking system (to finance the budget deficit) and BCP is the commercial banks credit provided to the private sector.

Demand for real money balances is the function of real income and interest rate.

$$(M^d/P) = f\ (y, i) \qquad (2)$$

M^d is the demand for nominal cash balances, P is the domestic price level, y is real income and i is interest rate.

The real output is the function of real government expenditures (consumption expenditure), private investment, public investment, balance of trade and real rate of interest.

$$y = f\ (GC, PINV, PUINV, BT, r) \qquad (3)$$

Where GC is the total consumption expenditure, PINV is the private investment, PUINV is the public investment, BT is balance of trade, and r is the real rate of interest.

The private investment depends on real income, rate of interest, and availability of bank credit to private sectors.

$$PINV = f\ (y, BCP, i) \qquad (4)$$

Where y is the real income, i is the rate of interest, and BCP is the bank credit to private sector.

The public investment depends on real income, real rate of interest rate, net foreign exchange reserves.

$$PUINV = f\ (y, RES, r) \qquad (5)$$

Where RES is the foreign exchange reserve (balance of payment).

The balance of trade and foreign exchange reserve (balance of payments) equation are defined as:

$$BT = x - m \qquad (6)$$
$$RES = RES_{(-1)} + BT + fB \qquad (7)$$

Where BT is the trade balance and fB is the net foreign borrowing.

The complete model in log form can be written as:

$$\ln(M^s) = a_0 + a_1 \ln (BCP) + a_2 \ln (GBD) + a_3 \ln (RES) + \mu_1 \qquad (8)$$
$$\ln(M^d/p) = b_0 + b_1 \ln (y) + b_2 \ln(i) + \mu_2 \qquad (9)$$
$$\ln(y) = c_0 + c_1 \ln(GC) + c_2 \ln(PINV) + c_3 \ln(PUINV) + c_4 \ln(BT) + c_5 \ln(r) + \mu_3 \qquad (10)$$
$$\ln (PINV) = d_0 + d_1 \ln(y) + d_2 \ln(BCP) + d_3 \ln (i) + \mu_4 \qquad (11)$$
$$\ln (PUINV) = e_0 + e_1 \ln(y) + e_2 \ln(RES) + e_3 \ln(r) + \mu_5 \qquad (12)$$

Endogenous variables are: M^s, M^d, y, RES, PINV and PUINV
Exogenous variables are: GBD, BCP, GC, fB, r, BT, and i.

The models work as follows: The increase in money supply (M^s) takes place due to, say, an increase in government borrowing from the banking system (GBD) to finance budget deficit. When the government use this borrowing (increase both in consumption and investment expenditure), means increase in out put (Equation 10) that in turn raises the public's demand for real money balances (Equation 9), private investment (Equation 11). The change in domestic price level depends on change in aggregate income or expenditure. If increase in aggregate spending due to increase in money supply (ΔM^s) is more than the volume of production then prices increases, if increase in volume of production of output is more than the increase in aggregate spending then prices will decreases, and if aggregate spending and volume of production of output is same then prices remain the same. The change in prices affects the supply of export and demand for import through relative prices of exports and imports.

Changes in exports (x) and imports (m) affects the balance of trade (BT) (Equation 6), which in turn affects the reserve (Balance of payment equation 7).This will bring a corresponding change in M^s (Equation 8) and at the same time in public investment (Equation 12), which again affect output y (Equation 10). Thus the system is interdependent.

RESULTS AND DISCUSSION

Table I present the results of the unit root test. All the sixteen variables are non-stationary when intercept is included only, after inclusion of trend money demand becomes stationary.

Table I. ***ADF Test for Stationarity***

Variables	Include intercept only		Include intercept and trend		Result
	Test statistics[1]	Critical Value	Test statistics[1]	Critical Value	
M^s	.0079[0]	-3.5814	-1.8765[1]	-4.1728	I(1)*
	(-5.2760)[2][0]	-3.5850	(-5.1948) [0]	-4.1781	I(1)**
M^d	-0.6369[0]	-3.5814	-5.4659[0]	-4.1728	I(1)*
	(-9.8811) [0]	-3.5850			I(0)**
GBD	-1.4207[1]	-3.5814	-4.0627[0]	-4.1728	I(1)*
	(-9.5202) [2]	-3.5850	(-9.4101) [2]	-4.1781	I(1)**
y	0.0812[0]	-3.5814	-2.7585[0]	-4.1728	I(1)*
	(-6.8740) [1]	-3.5850	(-6.8051) [1]	-4.1781	I(1)**
i	-1.4018[0]	-3.5814	-0.0915[0]	-4.1728	I(1)*
	(-5.7430) [0]	-3.5850	(-6.9744) [0]	-4.1781	I(1)**
r	-3.3145[0]	-3.5814	-3.2602[0]	-4.1728	I(1)*
	(-6.8789) [0]	-3.5850	(-5.8423) [0]	-4.1781	I(1)**
P	.4780[1]	-3.5814	-2.1224[1]	-4.1728	I(2)*
	(-3.0890)[0]	-3.5850	(-3.0430)[0]	-4.1781	I(2)*
	{-6.7071}[3][1]	-3.5889	{-6.6556}[1]	-4.1837	
BCP	-2.4968[0]	-3.5814	-4.0394[0]	-4.1728	I(1)*
	(6.4620) [0]	-3.5850	(-6.5287) [0]	-4.1781	I(1)**
GC	0.2963[2]	-3.5814	-3.3077[0]	-4.1728	I(1)*
	(-7.9223) [2]	-3.5850	(-7.8686) [2]	-4.1781	I(1)**
PINV	-0.5524[0]	-3.5814	-1.7584[1]	-4.1728	I(1)*
	(-6.1102) [0]	-3.5850	(-6.0441) [0]	-4.1781	I(1)**
PUINV	-2.6289[0]	-3.5814	-2.3017[0]	-4.1728	I(1)*
	(-5.5205) [0]	-3.5850	(5.6561) [2]	-4.1781	I(1)**
RES	-0.5073[0]	-3.5814	-3.0511[0]	-4.1728	I(1)*
	(-8.0077) [0]	-3.5850	(-8.0868) [0]	-4.1781	I(1)**
BT	-1.2668[0]	-3.5814	-2.4228[0]	-4.1728	I(1)*
	(-4.8138) [0]	-3.5850	(-4.8021) [0]	-4.1781	I(1)**
x	-0.0031[2]	-3.5814	-2.9976[1]	-4.1728	I(1)*
	(-5.3915) [1]	-3.5850	(-5.3240) [1]	-4.1781	I(1)**
m	-0.4620[0]	-3.5814	-2.6071[0]	-4.1728	I(1)*
	(-6.4383) [0]	-3.5850	(-6.3491) [2]	-4.1781	I(1)**
fB	-3.3751[1]	-3.5814	-3.3980[1]	-4.1728	I(1)*
	-9.6155[0]	-3.5850	-9.8946[0]	-4.1781	I(1)**

[1]Figures in square brackets besides each statistics represent optimum lags selected using the minimum AIC value.
[2]Figures in Parentheses are first difference of variables, [3]Figures in {} are second difference of variables, * shows result when intercept is included only, ** show results when intercept and trend is included.

Johansen Likelihood Ratio (LR) test is used to find out the cointegration in the regressions used for analysis. The result of Likelihood Ratio (LR) test is not depicted here due to space restriction. Briefly, the Likelihood Ratio (LR) test results point out that the assumption of no cointegration has been rejected for all equations by Likelihood Ratio (LR) statistics. The calculated values of Likelihood Ratio (LR) statistics are greater than the critical values at 5 percent as well as 1 percent. The test results show that the variables are cointegrating and they have long-term relationships.

The results of the simultaneous models are reported in Table II. In general the results are logical because the explanatory power, R^2 for each equation is fairly high and there is no serious autocorrelation problem for each equation as shown by Durbin Watson and H statistics[1].The linkages for each equation are discussed separately.

The estimates of money supply signify that money supply is positively related to bank credit to private sectors (BCP), borrowing from banking sector (GBD) i.e. domestic source of financing the budget deficit and foreign reserve (RES). The result indicate that about 1% increase in bank credit to private sector, government borrowing to finance budget deficit and foreign reserve lead to increase money supply by an amount of .95%, .12% and .17% respectively. All the coefficients are statistically significance at 1% level of significance indicating no multicollinearity in the variables. The Durbin-Watson statistic value 2.11 lying close to 2 shows that there is no autocorrelation in the model and R^2 value indicate that about 95% variation in money supply is explained by bank credit to private sector, government borrowing from domestic banking system to finance budget deficit and foreign reserve.

The demand for money regression indicates that demand for money is positively related to output and negatively to interest rate. The result indicates that increase in output lead to increase in money demand and increase in interest rate lead to decrease in money demand. The empirical values of the regression show that 1% increase in output lead to increase in money demand by 1.09%, and 1% increase in interest rate reduce money demand by .06%. The coefficient of output is significant at 1% level of significance and coefficient of interest rate is significant at 10% level of significance. Durbin-Watson statistic value is close to 2 showing that autocorrelation is not present in the model. The R^2 value shows that about 97% variation in money demand is explained by output and interest rate.

The result showed that interest rates have negative relationship with money demand but significant at 10% level of significance only, indicating that in Pakistan other financial assets carry great momentum of profit margin, and public demand for money increases and this money are invested in financial assets as for as profit margin for these assets are greater than interest rate.

The result of output supply equation indicate that all coefficient except coefficient of real interest rate are significant at 1% level of significance, h value -.43 indicate no autocorrelation and R^2 value indicate that explanatory variable are responsible for about 99.9% variation in output. The result indicate that output is positively related to government consumption (GC), private investment (PINV), public investment (PUINV), trade balance (BT), lagged value of output and negatively related to real interest rate. 1% change in government consumption, private investment and public investment bring .63%, .09% and .07% change in output respectively. The result also indicate that 1 unit change in trade balance bring .89% change in output. The interest rate is negatively related to output but is insignificant. The result of the output equation indicates that private investment, public investment and government consumption play important role in determining the level of output in Pakistan's economy.

The result of the private investment equation indicates that private investment is positively related to output, bank credit to private sector, lagged value of private investment and negatively related to interest rate. The result shows that 1% increase in output and bank credit to private sector brings increase in private investment by 1.5% and 0.11% respectively. The private investment relationship with interest rate indicate that 1% increase in interest rate reduce private investment by .07%. All the coefficients of explanatory variables are significant at 1% level of significance. The coefficient of interest rate is significant at 10% level of significance only, indicating that interest rate is not significantly affect private investment because of the greater return than interest rate from investment to private investors. The value of R^2 indicates that almost 98% variation in private investment is explained by output, bank credit to private investment, interest rate and lagged value of private investment. The h statistics value is .32 indicating that there is no serious autocorrelation problem.

The estimated result of public investment equation indicate that public investment is positively related to output, foreign reserve, lagged public investment and negatively to real interest rate. The result shows that 1% increase in output and foreign reserve increase public investment by .94% and .11%, respectively. The public

[1] When lagged value of dependent variable is used as an independent variable in regression equation then estimated DW statistic has no significance about the presence of autocorrelation. Thus, H test is used to check the existence of autocorrelation. If H statistic is significant, then we reject the hypothesis that there is no serial auto correlation other wise accept it. For further detail see J. Durbin (1970)

investment relationship with real interest rate indicate that 1% increase in real interest rate reduce public investment by .003% but insignificant. The coefficient of output and foreign reserve are significant at 5% and 1% respectively. The R^2 value shows that about 97% of variation in public investment is explained by output, foreign reserve, real interest rate, and lagged value of public investment. The h value -.43 of the equation shows that there is no serious autocorrelation.

The increase in bank credit to private sector and foreign reserve lead to rise in private and public investment level, which enhances the productive capacity of the economy, employment opportunities and reduce poverty level.

Table II. ***Results of Simultaneous Model***

Money Supply Equation

M^s= -.294 + 0.952 BCP + 0.118 GBD + 0.170 RES

s.e 0.1321 0.0745 0.0443 0.0491

t (-2.22)** (12.78)* (2.68)* (3.47)*

R-sq = 94.7% R-sq (adj) = 94.3%

S.E of regression = .1271 Durbin-Watson statistic = 2.11

Money Demand Equation

M^d = - 1.76 + 1.09 Y - 0.0645 I

s.e 0.3258 0.0306 0.0346

t-stat (-5.41)* (35.57)* (-1.87) ***

R-sq = 97.1% R-sq (adj) = 96.9%

S.E of regression = .1401 Durbin-Watson statistic = 1.81

Output Supply Equation

y = 0.484 + 0.634GC + 0.092PINV + 0.07PUINV + 0.0088BT - 0.001r + .21Ly

s.e 0.087 0.0613 0.0142 0.0159 0.0014 0.0006 0.0707

t.stat (5.54)* (10.35)* (6.50)* (4.42)* (6.16)* (-1.66) (2.96)*

R-sq = 99.9% R-sq (adj) = 99.9%

S.E of regression = .01835 h- statistic = -.43

Private Investment Equation

PINV = 0.139 + 1.52 y + 0.106 BCP - 0.0689 I + 0.897 LPINV

s.e 0.1679 0.4604 0.0419 0.0375 0.1405

t.stat (0.83) (3.29)* (2.52)* (-1.84)*** (6.38)*

R-sq = 98.5% R-sq (adj) = 98.3%

S.E of regression = .1123 h- statistic = .32

Public Investment Equation

PUINV = 0.998 + 0.943 y + 0.113 RES - 0.00274 r + 0.772 LPUINV

s.e 0.2626 0.4475 0.0469 0.0045 0.0666

t.stat (3.80)* (2.11)** (2.41)* (-0.61) (11.6)*

R-sq = 97.5% R-sq (adj) = 97.2%

S.E of regression = .1090 h- statistic = - .43

2SLS is used for estimation of coefficients

CONCLUSION AND RECOMMENDATIONS

The study revealed that the elasticity of bank credit to private sector and foreign reserve to crowded-in private and public investment respectively, almost the same in magnitude. The policies to raise bank credit to private sector, government bank borrowing and international reserves have favorable positive impact on money supply. Rises in out put have positive impact and rise in interest rate have negative impact on money demand. Any rise in out put reflected more in money demand than out put as the coefficient of out put is 1.09. A rise in consumption expenditure, private investment, public investment, balance of trade have favorable positive impact on out put, while rise in real interest rate have insignificant negative impact on out put. Rises in productivity, extension of bank credit and foreign reserve have positive impact on private and public investment respectively, while rise in interest rate

have negative impact on private investment. Out put enhancement quickly reflected more in private investment than public investment as the coefficient of out put for private and public investment are 1.52 and .934 respectively.

Based on these evidences it is obvious that fiscal and monetary variables are important to determine the private and public investment in Pakistan. If the government gives priority to finance budget deficit through domestic sources and extended credit to private sector, it can enhances the productive capacity of the economy, employment opportunities and reduce poverty level. Parallel and effective running of monetary and fiscal policies are needed to deter foreign reserve outflow.

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