

## **AN ANALYSIS OF SHORT-TERM EFFECTS OF BUDGET DEFICITS ON MACROECONOMICS VARIABLES: EVIDENCE FROM PAKISTAN (1960-2005)**

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### **ABSTRACT**

This paper critically analyzes short-term effects of budget deficit on money supply, private and public investment, output, balance of payment, international reserves and unemployment. Annual data for the period 1960-2005, taken from Economic Survey of Pakistan (various issues) and International Financial Statistic (2003) is used for analysis. Error Correction Mechanism (ECM) is used for estimation. The study revealed that short run changes in money supply is positively related to short run changes in foreign reserves. The short run change in money demand is positively related to short run changes in income. The short run changes in output is positively related to short run changes in consumption expenditures, private investment, public investment, and balance of trade. It is negatively related to short run changes in real rate of interest. Short run changes in private and public investment is positively related to short run changes in output. Short run changes in export is positively related to short run changes in output, relative prices of export, and exchange rate. Short run change in import is negatively related to short run changes in exchange rate. Short run change in unemployment is negatively related to short run changes in output growth (GDP). Based on findings of the study it is recommended that long-term private/public investment policies, can gain better result in economic growth. Export sector needs more attention in term of quality standard, price control, and internationally adopted marketing strategies. Skill development may also accelerate employment generating capacity of output growth.

**Key words:** Short-term disequilibrium and rapidity of adjustment in macroeconomic variables disequilibrium

### **INTRODUCTION**

Pakistan could not find true path for sustaining high economic growth for the last three decades. A continues interruption in government formation, social and political problems, ever increasing population, and outmoded bureaucratic procedure are almost responsible for the embezzlement of macroeconomic balances.

During the 1960s, the governments adopted a deliberate policy of concentrating national income in the hands of the upper income groups on the basis of economic assumption that the rich save a larger proportion of their income and hence a higher national savings rate could be achieved with an unequal distribution of income. In practice the assumption that it would elevate domestic savings over time failed to become visible, while the policy of dispensing incomes in favour of the economic elite succeeded. A sharp increase in foreign aid requirement resulted, from the failure of the economic elite to save out of their increased income during the 1960s. In 1950-55 gross foreign aid inflows was US\$373 million, and increased to US\$2,701 million in 1965-70. The compositions of foreign aid also change from grants to higher interest loans, besides the rapid increase in inflows. Eventually, the debt-servicing burden rose dramatically (Economic Survey of Pakistan, 1994).

Pakistan sustained a large budget deficit during the 1990s owing to the stagnation of fiscal efforts over the last fifteen years. Realizing the imperfection of

Pakistan's tax structure a concentrated reform effort was initiated in the early 2000. Total revenue increase from 13.3 percent of GDP in 2000-01 to 14.2 percent of GDP in 2001-02. These rise in revenue become possible because of the prudent tax policy of the government. Total expenditure continuously decreasing from financial year 2000-01. Rise in revenue and reduction in expenditure reduce the gap between revenue and expenditure and fiscal deficit reduced to 3.0 percent of GDP in 2004-2005 from 5.2 percent of GDP in 1999-00 (Economic Survey of Pakistan, 2004-05).

The empirical evidence regarding the short-term effect of budget deficit on macroeconomic variables is not conclusive. Ghali (1998) observed that public investment has negative short-run impact on private investment and a negative long-run impact on both private investment and economic growth. Al-Khedair (1996) observed that budget deficits led to higher short-term interest rate in seven countries. Hutchison and Pyle (1984) observed that short-term real interest rates are systematically and positively associated with central government budget deficits across countries and across times.

Likewise the effect of budget deficit on macroeconomic variables in long-term is a fairly well studied topic in Pakistan, but the magnitude and speed of adjustment of disequilibrium in short-term is far from certain. 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 present study has been extended beyond 2000s, include the post reform period. Moreover this paper employs different set of macroeconomic variables to assess the short-term effects of budget deficit on macroeconomic variables.

### **Objective of the Present Study**

The main objective of this study is to analyze short-term effects of budget deficit on macroeconomic variables.

### **MATERIALS AND METHODS**

For the analysis, time series data ranging from 1960-2005 has been used, taken from Economic survey of Pakistan, and International Financial Statistics. 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. Variables which are non-stationary at level make stationary after taking first difference. Johansen cointegration test is used to ascertain the cointegration in the regressions used for analysis. To assess the short-term effect of budget deficit on macroeconomic variables, the following Error Correction Mechanism (ECM) is used.

$$\Delta y_t = \beta_0 + \beta_1 \Delta x_t + u_{t-1} \quad (1)$$

Where  $\Delta$  is difference operator and  $u_{t-1}$  is the lag value of error term i.e. equilibrium error term.

In each Error Correction Mechanism (ECM) equation, first difference of dependent variable depends on the equilibrium error term ( $u_{t-1}$ ) besides first difference of other independent variables. The parameter of equilibrium error term is expected to be negative. The positive/negative value of  $u_{t-1}$  acting with their respective parameter brings equilibrium in short-term. If all other independent variables have positive short-term aggregate impact on dependent variables, then  $u_{t-1}$  must be positive, so that the negative parameter makes it negative and restored the equilibrium. In similar fashion if all other independent variables have negative short-term aggregate impact on dependent variables, then  $u_{t-1}$  must be negative, so that the negative parameter makes it positive and restored the equilibrium. The absolute value of parameter indicates how quickly the equilibrium will restore. Statistical package Eview is used for deriving the results.

### **RESULTS AND DISCUSSION**

Table I present the results of the unit root test. Among the nineteen variables, eighteen are non-stationary when intercept is included only, after inclusion of trend money demand becomes stationary. GDP remain stationary whether trend is included or not.

Johansen Likelihood Ratio (LR) test is used to ascertain the cointegration in the regressions used for analysis. We do not go into the model of long-run, but our ultimate goal is to estimate short-run disequilibrium and rapidity of adjustment towards long-run equilibrium. The complete results of Likelihood Ratio (LR) test is not presented here due to space limitation. Briefly, the Likelihood Ratio (LR) test results indicate 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 indicate that the variables are cointegrating and they have long-term relationships.

The result of Error Correction Mechanism (ECM) is presented in table II. The regression results of Error Correction Mechanism (ECM) of money supply equation shows that short-run changes in bank credit to private sectors, and government domestic bank borrowing to finance budget deficit have positive but insignificant impact on short-term changes in money supply. The foreign exchange reserves have statistically significant positive impact on short run changes in money supply. The coefficient of error term is statistically insignificant, implies that statistically, the equilibrium error term is zero, suggesting that money supply adjusts to changes in the same time period.

Money demand equation of Error Correction Mechanism (ECM) regression result shows that short-run changes in real output have statistically significant positive impact on the short-run changes in money demand while short-term change in nominal interest rate have statistically insignificant negative impact on the short-run changes in money demand. The result further indicate that short run changes in money demand is more sensitive to short run changes in output as the coefficient of output is 1.39. About .96 of discrepancy in previous year is eliminated this year.

Real output supply regression result shows that short-run changes in government consumption, private investment, public investment and balance of trade have positive impact on the short-run changes in

output, while short-term change in real rate of interest have negative impact on the short-run changes in output. All the short changes are statistically significant. The coefficient of equilibrium error term is 1, indicating that about all the discrepancy in the previous year is eliminated this year.

Private investment regression result indicates that short-run changes in real output have statistically significant positive impact on short run changes in private investment. Bank credits to private sector have positive but statistically insignificant impact on the short-run changes in private investment. The interest rates have statistically insignificant negative impact on the short-run changes in private investment. The result also indicates that about .186 of discrepancy in previous year is corrected this year.

The results of ECM equation regression of public investment shows that short-run changes in output have statistically significant (at 10% level of significance) positive impact of short run changes in public investment. Real interest rates have positive but statistically insignificant impact on the short-run changes in public investment. Short-run changes in foreign exchange reserve have statistically insignificant negative impact on short-run changes in public investment. Besides, the short run changes in output quickly reflected in public investment as the coefficient of output is .87. About .15 of discrepancy in previous year is eliminated this year.

Real export supply equation result indicate that short run changes in real out, relative prices of export and exchange rate have positive impact on the short-run changes in export. All the estimated coefficients are statistically significant. About .29 of discrepancy in previous year is corrected this year.

Import demand equation of Error Correction Mechanism (ECM) regression result indicate that short-run changes in real out and relative prices of import have positive but statistically insignificant impact on the short-run changes in import. Short-run changes in reserves have statistically insignificant negative impact on short run changes in import. Exchange rates have statistically significant (significance at 10%) negative impact on the short-run changes in import. The result also shows that about .313 of discrepancy in previous year is corrected this year.

In the Error Correction Mechanism (ECM) unemployment relationship with GDP regression result shows that short-run changes in GDP have statistically significance negative impact on short-run changes in unemployment. The coefficient of equilibrium error term is 1.1, indicating that about all the discrepancy in the previous year is eliminated this year.

## CONCLUSION AND RECOMMENDATIONS

The study revealed that the rapidity of adjustment towards long run steady state is found below one, for money demand, private investment, public investment, export and import, indicating that the adjustment process is slow and short-term disequilibrium of pervious period never adjusts completely in the current period. The speed of adjustment towards long-term equilibrium for out put and unemployment is found equivalent to or above one, indicating that short-term discrepancy of pervious period adjust entirely in the current period. Short run disequilibrium adjustment pace of money supply is statistically insignificance, indicating that short run discrepancies adjust completely in the same period.

The short-term policies to raise international reserves have favorable impact on money supply. The short-term policies have favorable impacts in term of output development. It results in gain of better internal performance, in term of consumption expenditure, capital expenditures and balance of trade. Short-term policies have favorable impacts in term of private and public investments. The short-term policies for foreign sector facing the dilemma. The depreciation of domestic currency effects in short-term raise export significantly, but the import fall insignificantly. Unemployment response to output growth (GDP) in short-term is significant, but not encouraging in magnitude.

Based on these evidences it is apparent that fiscal and monetary variables are important to determine the macroeconomic stability in Pakistan. If the government gives priority to long-term private/public investment policies, it can gain better results in economic growth, poverty alleviation and unemployment retardation. Parallel and effective running of monetary, fiscal and exchange rate policies are needed to reduce balance of payment deficit. Long-term skill development and merit based recruitment policies may also accelerate employment generating capacity of output growth.

**Table I ADF Test for Stationarity**

Variables	Include intercept only		Include intercept and trend		Result
	Test statistics <sup>1</sup>	Critical Value	Test statistics <sup>1</sup>	Critical Value	
M <sup>s</sup>	.0079[0] (-5.2760) <sup>2</sup> [0]	-3.5814	-1.8765[1] (-5.1948) [0]	-4.1728	I(1)* I(1)**
M <sup>d</sup>	-0.6369[0] (-9.8811) [0]	-3.5814	-5.4659[0]	-4.1728	I(1)* I(0)**
GBD	-1.4207[1] (-9.5202) [2]	-3.5814	-4.0627[0] (-9.4101) [2]	-4.1728	I(1)* I(1)**
y	0.0812[0] (-6.8740) [1]	-3.5814	-2.7585[0] (-6.8051) [1]	-4.1728	I(1)* I(1)**
i	-1.4018[0] (-5.7430) [0]	-3.5814	-0.0915[0] (-6.9744) [0]	-4.1728	I(1)* I(1)**
r	-3.3145[0] (-6.8789) [0]	-3.5814	-3.2602[0] (-5.8423) [0]	-4.1728	I(1)* I(1)**
BCP	-2.4968[0] (6.4620) [0]	-3.5814	-4.0394[0] (-6.5287) [0]	-4.1728	I(1)* I(1)**
GC	0.2963[2] (-7.9223) [2]	-3.5814	-3.3077[0] (-7.8686) [2]	-4.1728	I(1)* I(1)**
PINV	-0.5524[0] (-6.1102) [0]	-3.5814	-1.7584[1] (-6.0441) [0]	-4.1728	I(1)* I(1)**
PUINV	-2.6289[0] (-5.5205) [0]	-3.5814	-2.3017[0] (5.6561) [2]	-4.1728	I(1)* I(1)**
RES	-0.5073[0] (-8.0077) [0]	-3.5814	-3.0511[0] (-8.0868) [0]	-4.1728	I(1)* I(1)**
UE	-0.8091[0] (-6.3643) [1]	-3.5814	-3.5134[1] (-6.3048) [1]	-4.1728	I(1)* I(1)**
BT	-1.2668[0] (-4.8138) [0]	-3.5814	-2.4228[0] (-4.8021) [0]	-4.1728	I(1)* I(1)**
x	-0.0031[2] (-5.3915) [1]	-3.5814	-2.9976[1] (-5.3240) [1]	-4.1728	I(1)* I(1)**
m	-0.4620[0] (-6.4383) [0]	-3.5814	-2.6071[0] (-6.3491) [2]	-4.1728	I(1)* I(1)**
RPx	-1.7586[0] (-5.5176) [0]	-3.5814	-0.8526[0] (5.7488) [0]	-4.1728	I(1)* I(1)**
RPm	-1.9913[0] (-5.6023) [0]	-3.5814	-0.8980[0] (-5.9277) [0]	-4.1728	I(1)* I(1)**
ER	-2.2978[0] (-5.7804) [0]	-3.5814	-2.2978[1] (5.7048) [0]	-4.1728	I(1)* I(1)**
GDP	-6.3822[2]	-3.5814	-6.5463[0]	-4.1728	I(0)* I(0)**

<sup>1</sup>Figures in square brackets besides each statistics represent optimum lags selected using the minimum AIC value.

<sup>2</sup>Figures in Parentheses are first difference of variables, \* shows result when intercept is included only, \*\* show results when intercept and trend is included.

**Table II Regression Results of ECM equations**

Money Supply equation $\Delta M_t^s = 0.0445 + 0.132\Delta BCP_t + 0.0123\Delta GBD_t + 0.0691\Delta RES_t - 0.09365u_{t-1}$ $t = (3.34) \quad (1.47) \quad (0.49) \quad (2.29) \quad (-1.26)$ $R^2 = .131 \quad d = 1.64$
Money demand equation $\Delta M_t^d = -0.0176 + 1.39\Delta y_t - 0.0358\Delta i_t - 0.959u_{t-1}$ $t = (-0.46) \quad (2.50) \quad (-0.38) \quad (-6.09)$ $R^2 = .519 \quad d = 1.99$
Output supply equation $\Delta y_t = 0.01 + 0.62\Delta GC_t + 0.10\Delta PINV_t + 0.09\Delta PUIINV_t + 0.009\Delta BT_t - 0.001\Delta r_t - 1.00\Delta u_{t-1}$ $t = (2.24) \quad (9.33) \quad (4.90) \quad (4.06) \quad (6.19) \quad (-2.28) \quad (-6.04)$ $R^2 = .81 \quad d = 1.94$
Private investment equation $\Delta PINV_t = -0.0334 + 1.67\Delta y_t + 0.167\Delta BCP_t - 0.0147\Delta i_t - 0.186u_{t-1}$ $t = (-1.07) \quad (3.64) \quad (1.34) \quad (-1.19) \quad (-2.17)$ $R^2 = .32 \quad d = 1.62$
Public investment function $\Delta PUIINV_t = 0.00862 + .879\Delta y_t - 0.0641\Delta RES_t + 0.00035\Delta r_t - 0.150u_{t-1}$ $t = (.24) \quad (1.68) \quad (-1.19) \quad (0.09) \quad (-1.91)$ $R^2 = .149 \quad d = 1.53$
Export supply equation $\Delta x_t = 0.0432 + 0.620\Delta y_t + 0.0967\Delta RP_x_t + 0.346\Delta ER_t - 0.294 u_{t-1}$ $t = (1.75) \quad (1.82) \quad (2.05) \quad (3.94) \quad (-2.67)$ $R^2 = .577 \quad d = 1.51$
Import demand equation $\Delta m_t = 0.0579 + 0.314\Delta y_t + 0.0704\Delta RP_m_t - 0.220 \Delta ER_t - 0.0718\Delta RES_t - 0.313 u_{t-1}$ $t = (1.75) \quad (0.68) \quad (1.28) \quad (-1.71) \quad (-1.52) \quad (-2.51)$ $R^2 = .289 \quad d = 1.71$
Unemployment relationship with GDP equation $\Delta UE_t = -0.012 - 0.211 \Delta GDP_t - 1.10 u_{t-1}$ $t = (-.04) \quad (-4.04) \quad (-7.04)$ $R^2 = .654 \quad d = 2.09$

$\Delta$  is the difference operator,  $u_{t-1}$  is the lag value of residual, 2SLS is used for estimation  $M^s$  is Money supply, BCP is bank credit to private sectors, GBD domestic bank borrowing to finance budget deficit, RES is International Reserve,  $M^d$  is Demand for Money,  $y$  is output,  $i$  is nominal interest rate, GC is government Consumption Expenditure, PINV is private Investment, PUIINV is Public Investment, BT is trade Balance,  $r$  is real rate of interest,  $x$  is export,  $RP_x$  is relative prices of export, ER is exchange rate,  $m$  is import,  $RP_m$  is relative prices of Import, UE is unemployment rate and GDP gross domestic product.

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