

## Government Budget Deficits and Interest Rates: An Empirical Analysis for Pakistan

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### I. INTRODUCTION

In recent years many developed and developing countries have experienced large budget deficits, generally believed to be the result of the over-expansionary fiscal actions of the policy-makers. The prevailing orthodoxy argues that larger budget deficits cause interest rates to rise and thus leads to crowding-out of private investment expenditure. The empirical evidence on this point, however, has been inconclusive. Studies by Cebula (1988); Deleuw and Holloway (1985); Hoelscher (1986) and Khan (1988) have found evidence linking deficits to higher interest rates. On the other hand, Dewald (1983); Dwyer (1982); Evans (1985, 1987); Hoelscher (1983); Makin (1983); Mascaro and Meltzer (1983); McMillin (1986); Motley (1983) and Plosser (1982) have concluded that deficits do not have significant impact upon interest rates.

In Pakistan, the overall government budget deficit as a percentage of GDP has increased steadily over time. During the Eighties, however, it increased at a much faster rate compared to the earlier periods and reached an unprecedented level of 8.4 percent in 1987-88. Since then it has declined to a little over 7 percent, but is still considered by many experts to be too high. These large deficits have led to excessive borrowing, which has resulted in a more than five-fold increase in domestic debt since 1980-81. Unfortunately, little is known about the possible effects of budgetary deficits on the performance of the economy. In this study, an attempt is made to investigate the nature of the empirical relationship that may exist between the government budget deficit and nominal interest rates in Pakistan. The findings are expected to shed light on whether budgetary deficits in Pakistan, by causing interest rates to rise, have resulted in the "crowding-out" of private consumption and investment.

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The rest of the paper is organized as follow: Section II describes the model and the data used. The empirical results and the analysis are presented in Section III. Finally, concluding remarks are reported in Section IV.

## II. THE THEORETICAL MODEL AND THE DATA

Theoretically, deficits can affect interest rates in two possible ways. First, within the parameters of the Keynesian IS-LM framework an increase in the budget deficit affects the goods market equilibrium, shifting the IS-curve rightward and causing interest rates to rise. If the deficit is financed through borrowing from the public this increase in the interest rate is reinforced by a leftward shift in the LM curve. In case the deficit is financed through printing money, i.e., increasing the money supply, the initial increase in the interest rate is somewhat offset by the rightward shift in the LM curve. Secondly, according to the loanable funds approach, a deficit increases the supply of securities and, *ceteris paribus*, reduces their price, hence, market interest rates rise.

In this paper, a loanable funds approach is adopted to describe the determination of the nominal interest rate. The advantage of this method is that it allows government borrowing to be included as a direct determinant of the interest rate. Under this approach the interest rate is determined by an equilibrium of the following form:

$$D - S = B - M \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

where

- $D$  = Real demand for bonds by the private sector;
- $S$  = Real supply of bonds by the private sector;
- $B$  = Real borrowing by the authorities; and
- $M$  = Real purchase of securities by the Banking System.

Equation (1) implies that if total supply of bonds/securities exceed total demand in the economy interest rate will rise to clear the market and *vice versa*. In accordance with the standard loanable funds model, it is assumed that real demand for bonds depends on the nominal interest rate ( $i$ ) and the expected inflation rate ( $p^e$ ):

$$D = D(i, p^e) \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

It is further assumed that the real demand for bonds is an increasing function of the nominal interest rate, i.e.,  $D_i > 0$ , and a decreasing function of the expected

where  $\alpha$  = intercept,  $u_t$  = stochastic error term, and subscript "t" refers to year "t". Since the expected inflation rate ( $p^e$ ) is unobservable, we overcome the problem by using three alternative assumptions regarding people's expectations about future inflation rates. The assumptions are as follows:

- (i) People's expectations about the future inflation rate are static, i.e.,  $p_t^e = p_{t-1}$ . In other words, the expected inflation rate in year  $t$  is equal to the actual inflation rate in year  $t-1$ ;
- (ii) People have perfect foresight and as such can predict future inflation rate accurately, i.e.,  $p_t^e = p_t$ . In other words, the expected inflation rate in year  $t$  is equal to the actual inflation rate in year  $t$ ; and
- (iii) People's expectations about future inflation rate are adaptive, i.e.,  $p_t^e - p_{t-1} = \theta(p_t - p_{t-1}^e)$ , where  $0 < \theta < 1$  is the adjustment coefficient. In other words, people gradually adjust their expectations about the future inflation rate over time by taking into account their most recent previous experience.

The empirical analysis in this paper is based on annual data covering the period from 1970-71 to 1988-89. Three different measures of government budget deficit: (i) overall government budget deficit ( $BD$ ), (ii) deficit financed through domestic borrowing ( $DF$ ), and (iii) deficit financed through borrowing from the domestic banking system ( $BF$ ), are used to examine the effect of the deficit on interest rates. Furthermore, because the money market in Pakistan is still not well-established, and the interest rates are controlled by the monetary authorities, the call money rate, which to a large extent is determined by the interaction of market forces, is chosen to examine the impact of the budget deficit on interest rates. The actual inflation rate is estimated using the GNP deflator. The data on  $y_t$ ,  $p_t$ , and  $B_t$  are obtained from Government of Pakistan (1989) and those on  $i_t$  and  $M_t$ , from Government of Pakistan (Various Issues). The data is deflated by the GNP deflator to get the series in real terms. Finally, Equation (5) is estimated using the Ordinary Least Square (OLS) method.

### III. EMPIRICAL RESULTS AND ANALYSIS

The OLS estimates of Equation (5) are reported in Table 1. The explanatory variables included in the regression explain upto 80 percent of the variation in the nominal interest rate. The Durbin-Watson statistics further indicate that the estimates

<sup>2</sup>This is also taken as extreme form of the "Rational Expectations".

Table 1  
 Ordinary Least-square Estimates of Equation 5

	Constant	$P_t$	$P_{t-1}$	$y_t$	$BD_t$	$DF_t$	$BF_t$	$M_t$	$i_{t-1}$	$R^2$	$\bar{R}^2$	F	D.W.
1.	7.284 (4.78)*	0.055 (0.79)	-	0.045 (1.92)**	0.001 (2.14)**	-	-	-0.001 (-3.04)*	-	0.578	0.448	4.45	1.53
2.	7.865 (4.64)*	0.074 (0.87)	-	0.051 (1.91)**	-	0.0004 (0.90)	-	-0.0004 (-1.85)**	-	0.463	0.298	2.80	1.32
3.	6.001 (3.35)*	0.122 (1.55)	-	0.052 (2.23)**	-	-	0.001 (2.15)*	-0.0002 (-1.88)**	-	0.579	0.449	4.47	1.44
4.	6.067 (3.52)*	-	0.166 (2.02)**	0.055 (2.15)*	0.0002 (0.56)	-	-	-0.0002 (-1.02)	-	0.650	0.534	5.58	1.69
5.	6.014 (3.43)*	-	0.184 (2.45)*	0.057 (2.21)*	-	0.0001 (0.20)	-	-0.0002 (-0.72)	-	0.643	0.523	5.39	1.65
6.	4.905 (3.15)*	-	0.203 (3.17)*	0.057 (2.66)*	-	-	0.001 (2.14)*	-0.0001 (-1.20)	-	0.740	0.654	8.56	1.93
7.	0.287 (0.11)	0.158 (2.38)*	-	0.023 (1.12)	0.0001 (0.50)	-	-	-0.0001 (-0.35)	0.692 (2.88)*	0.750	0.646	7.21	2.66
8.	-0.195 (-0.08)	0.172 (2.58)*	-	0.022 (1.05)	-	0.0001 (0.29)	-	-0.00003 (0.17)	10.747 (3.67)*	0.747	0.641	7.08	2.69
9.	-0.541 (-0.24)	0.198 (3.25)*	-	0.024 (1.29)	-	-	0.001 (1.71)	-0.000004 (-0.03)	0.663 (3.56)*	0.795	0.710	9.32	1.59

Notes: Figures in the Parentheses are t-ratios.

\*Significant at the 5 percent level.

\*\*Significant at the 10 percent level.

do not suffer from a very high degree of serial auto-correlation.<sup>3</sup> It is evident from the table that all the coefficients have anticipated signs, but they are not necessarily statistically significant.

A close examination of the results indicates that the expected inflation rate, under the assumption that the expectations about future inflation rate are "static" or "adaptive", has significant positive impact on the nominal interest rate in Pakistan. In the case of expectations being adaptive, the coefficient of adjustment ranges from 0.25 to 0.34, depending upon which measure of the deficit is considered. This implies that, on average, it takes 3 years for people to adjust their expectations about the future inflation rate.

The estimates reported in the table reveal that, in general, the overall government budget deficit in Pakistan does not have any significant impact on the nominal interest rates. This finding, although in conformity with those of Dewald (1983); Dwyer (1982); Evans (1985, 1987); Hoelscher (1983); Makin (1983); Mascaro and Meltzer (1983); McMillin (1986), Motley (1983) and Plosser (1982), differs in the sense that while the above-mentioned studies seek to establish the relationship between the budget deficit and the real interest rate, the focus of this study is on the impact of the budget deficit on the nominal interest rate. However, when assumed that people can predict the future inflation rate accurately, the overall deficit is found to have a significant impact on the nominal interest rate. Burney (1988) has shown that in Pakistan there exists an inverse relationship between investment and nominal interest rates. Thus suggesting that an increase in the overall deficit is likely to crowd-out private investment expenditure in Pakistan.

It is of interest to note that deficits financed through borrowing from the banking system are found to have a significant positive impact on the nominal interest rates in Pakistan. Perhaps, this can be attributed to the fact that we have used the call money rate as the dependent variable, which is the rate charged by the banks on inter-bank transactions. Given the amount of funds available with the banks for lending to the general public, increased government borrowing from the banking system by leaving smaller amount to meet the public's demand for credit exerts an upward pressure on the interest rate.

<sup>3</sup> As lagged dependent variable appears among the set of explanatory variables in Equations (7) and (9), Durbin  $h$  rather than Durbin  $d$  is the appropriate statistic to test for auto-correlation. The  $h$  statistic can be calculated from the D. W. statistic using the following formula:

$$h = (1 - (D W/2)) * \sqrt{(T / (1 - T * \text{Var}(\hat{\beta})))}$$

where  $T$  is the number of observations and  $\text{Var}(\hat{\beta})$  is the variance of the coefficient of the lagged dependent variable. Because of the large variance of the coefficient of the lagged dependent variable in Equations (7) and (8), however, the above formula cannot be applied directly. Therefore, the D. W. statistic corresponding to Equation (9) reported in Table 1, refers to the  $h$ -statistic.

The estimates reported in the table further highlight that, in general, the coefficient of the change in per capita GNP is positive and significant, thus confirming the existence of the "accelerator effect". This finding, while in conformity with the perspectives of Hoelscher (1986) and Khan (1988), is in contrast with that of Cebula (1988). Finally, the estimates indicate that the purchase of securities by the banking system in Pakistan does not exercise a significant negative influence upon the nominal interest rates.

#### IV. CONCLUSION

In this paper an attempt has been made to investigate the nature of the empirical relationship that exists between the government budget deficit and the nominal interest rates in Pakistan. In general, the evidence presented in the paper points to the non-existence of any relationship between the overall government budget deficit and the nominal interest rates. It is only under extreme circumstances, i.e., people having perfect foresight about the future inflation rate, that the government budget deficit is found to have a significant positive impact on the nominal interest rate. The analysis, however, indicates that the government deficit financed through borrowing from the banking system is associated with higher nominal interest rates. This suggests that budget deficits, if financed through borrowing from the banking system, are likely to result in higher nominal interest rates and hence, may end up in crowding-out private investment and consumption expenditures. Thus, government's efforts to boost investment in the economy by increasing the share of the public sector, particularly by borrowing, is likely to fall short of its objectives. This may also lead to a slowing down of the economy.

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## Comments on “Government Budget Deficits and Interest Rates: An Empirical Analysis for Pakistan”

The main hypothesis here is that budget deficits increase interest rates and hence crowd out private investment. The analysis is, however, restricted to exploring the effect of budget deficits on the interest rates. The results of Table 1 show an almost insignificant relation between interest rates and budget deficits. Since this conclusion is not in line with common held perceptions, authors need to review their work, particularly the specification of the model and the variables. I hope the authors will find the following observations on these issues useful.

The first observation is fundamental. The authors have completely ignored the main transmission channel. The process of deficit financing gives rise simultaneously to fiscal and monetary expansionary effects. These effects in turn give rise to inflationary effects. It would be a rare coincidence that these effects cancel each other. Alternatively, one has to adopt the extreme assumption of the economy having been caught in a liquidity trap. Barring these possibilities, one cannot ignore this transmission channel. The modelling of this channel, however, may not be easy but one cannot ignore it.

Even within the existing framework, the authors need to be careful. In the underlying specification of Equations No. 1–3, the relation of the interest rate to other variables is non-linear. But for empirical estimation, a linear approximation has been used, see Equation No. 5. Such an approximation may not be appropriate when the magnitude of variation is large and unidirectional as is the case here. Therefore, I would suggest for trying on a non-linear relation. Similarly, it does not seem appropriate to tie the interest rate with per capita income in a linear relationship. The authors should also check to see if the lag in one of the explanatory variables,  $p$ , i.e. the assumption of adoptative expectations, can lead to the lagged Equations as used in No. 7-8 of Table 1.

The next observation relates to the choice of variable on the budget deficit. Budget deficits ( $BD$ ) are financed from three main sources, i.e., foreign aid, bank borrowing ( $M$  or  $BF$ ) and non-bank borrowing. The last two sources, of course, sum to the total domestic borrowing ( $DF$ ). To a large extent foreign aid is autonomous although it could sometimes relieve the pressures for domestic borrowing i.e., an inverse relation between aid (and budget deficit) and interest rates. Since

saving in Pakistan is done exclusively by the private sector, it is really the non-bank borrowing which could drive interest rates up and crowd out private investment. This means that the logical explanatory variable is non-bank borrowing, i.e.,  $DF-M$  or  $BF$  and not both. The model, envisioned in Equations No. 1–3, also implies equal coefficients for the variables  $B$  and  $M$  but opposite in sign. According to this argument, Equations No. 2 and 5 in Table 1 are the only sound specifications which is to some extent confirmed by appropriate coefficients also.

My next observation relates to the proxy used for the interest rate. Is the interbank money rate a reasonable proxy for the interest rate relevant for private investment? Interest rates vary over a large spectrum. The relevant rate is the weighted average of the rates relevant for private investment. The nearest proxy available is the average rate of interest on the bank advances for private investment. These interbank rates are not only much lower but also are only weakly correlated to the interest rates on bank advances. Therefore, I am tempted to suggest the use of the average interest rate instead of an interbank rate.

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