

Government Budget Deficits and Exchange Rate Determination: Evidence from Pakistan

NADEEM A. BURNEY and NAEEM AKHTAR

I. INTRODUCTION

It is now generally accepted that the real exchange rate is a key relative price in an economy.¹ Changes in the real exchange rate influence foreign trade flows, balance of payments, the structure and level of production, allocation of resources, etc. While the real exchange rate is an endogenous variable that responds to both exogenous as well as policy-induced shocks, the nominal exchange rate is usually taken as a policy instrument. The two rates, however, are found to be related to each other.² For effective policy-making, it is imperative to have some idea about different factors that influence the real exchange rate. Equally important is the knowledge of the manner in which the real exchange rate responds to changes in the exogenous variables. While there is a general consensus that the impact of various exogenous shocks on the exchange rate is transmitted through four broad channels, namely, (i) absolute prices, (ii) relative prices, (iii) income, and (iv) interest rates, the relative importance of each of these channels is found to vary across countries. In general, it depends on the degree of openness of the economy and the relative effectiveness of the fiscal and the monetary sectors within a country.

In recent years, a major concern among the macroeconomists has been the unprecedented growth in government budget deficits of most of the countries, particularly the developing countries. Large budget deficits are found to be associated with, among other things, high interest rates, excessive growth in money supply, high prices, etc.³ Thus, budget deficits are believed to have an indirect

Nadeem A. Burney and Naeem Akhtar are, respectively, Chief of Research and Staff Economist at the Pakistan Institute of Development Economics, Islamabad.

Authors' Note: We are grateful to Drs Ashfaq H. Khan and Tayyeb Shabbir for their helpful comments. We alone, however, are responsible for any remaining errors.

¹Real exchange rate is defined as nominal exchange rate adjusted for difference in the price level of the two countries.

²See Khan and Lizondo (1987).

³For instance, Burney and Yasmeen (1989); Cebula (1988); Deleuw and Holloway (1985); Hoelscher (1983, 1986) and Khan (1988) report positive association between deficits and interest rates.

impact on the real exchange rate. In this paper it is argued that the budget deficits can have both direct as well as indirect effects on the real exchange rate. The latter effect depends on whether or not the particular channels through which it influences the real exchange rate are important for the concerned country. As an empirical support to the argument, the paper presents some estimates for Pakistan.

Between 1981-82 and 1989-90, Pakistan's nominal (real) exchange rate increased by 103(71) percent. During this period, the budget deficit, as a percentage of GDP, increased from 5.8 percent to 6.8 percent. Despite its importance as a key, relative price, few studies have attempted to analyse the role of the various factors in influencing Pakistan's exchange rate. The purpose of this paper is two-fold. First, in the case of Pakistan, it examines the relative importance of different channels through which exogenous variables affect exchange rates. Second, it analyses the effects of budget deficits on the exchange rate. The rest of the paper is organised as follows: Section II examines the trends in Pakistan's nominal and real exchange rates since 1959-60. Section III presents the theoretical framework to analyse the issues at hand. Section IV discusses results from the estimated model. Finally, Section V summarises the major findings of the paper.

II. TRENDS IN NOMINAL AND REAL EXCHANGE RATES

The primary objective of Pakistan's commercial policy has been import-substituting industrialisation. As such, since the early 1950s it has maintained an over-valued exchange rate. The degree of over-valuation, however, has decreased over time. Table 1 gives various measures of the exchange rate for Pakistan. Between the early 1950s and January 1982, Pakistan pursued a fixed exchange rate policy. During this period the value of the rupee in terms of the U. S. Dollar changed only once. This was because in May 1972 the rupee was devalued from Rs 4.76 to Rs 11.00 to the dollar but was subsequently re-adjusted to Rs 9.90. As a result of this policy, in the 1960s the degree of over-valuation of the rupee, relative to Purchasing Power Parity (PPP) exchange rates, was as high as 50 percent. During the 1970s, because of a relatively more realistic exchange rate policy, the over-valuation of the rupee declined to around 30 percent.

A major change in Pakistan's exchange rate regime occurred in 1982. On January 8, 1982 Pakistan shifted from the fixed exchange rate policy to a managed float policy and the authorities undertook to manage the nominal exchange rate. Under this policy, while the U.S. dollar remains the intervention currency, the rupee is pegged to a basket of currencies. The rupee-dollar exchange rate is altered continuously, in view of appreciation or depreciation of the trading partners'

Table 1
*Nominal, Purchasing Power Parity, and Equilibrium Exchange
 Rates for Pakistan*

	Nominal	Purchasing Power Parity*	Equilibrium*
1960-61	4.762	8.746 (54.45)	7.45 (63.92)
1964-65	4.762	9.414 (50.58)	7.82 (60.89)
1969-70	4.762	10.161 (46.86)	7.87 (60.51)
1974-75	9.900	13.214 (74.92)	13.53 (73.17)
1979-80	9.900	13.940 (71.02)	13.17 (75.17)
1984-85	15.16	17.092 (88.70)	19.20 (78.96)
1986-87	17.70	18.965 (93.33)	20.91 (84.65)
1989-90	21.45	25.03 (85.70)	—

*Source: [Hamid *et al.* (1990).]

Note: Figures within the parenthesis are nominal exchange rates expressed as a percentage of the purchasing power parity and equilibrium rates respectively.

currencies. The goal is to achieve a targeted path of the nominal effective exchange rate and hence sustain a desired level of external competitiveness.⁴ As a result of this policy, while Pakistan's nominal exchange rate, i.e. rupee-dollar rate, increased by 117 percent between 1980-81 and 1989-90, the extent of the over-valuation of the rupee declined and during the 1980s varied between 10 to 20 percent.⁵ Between 1971-72 and 1989-90, while Pakistan's PPP exchange rate increased by more than 138 percent, its budget deficit as a percentage of GDP increased from 3.3 to 6.8 percent.

⁴See Haque and Montiel (1991) for a detailed evaluation of Pakistan's exchange rate policy since 1980.

⁵Although the extent of the over-valuation of the rupee relative to the equilibrium exchange rate is less compared to the PPP exchange rate, the trend in over-valuation nevertheless is the same as that with respect to PPP rate.

III. THEORETICAL FRAMEWORK

Over the years, various models for exchange rate determination have been emphasised in the literature. While the models in the 1950s and 1960s focussed largely on the current transactions (current account) in the commodity markets, in the 1970s the emphasis shifted to capital transactions (capital account) in the asset markets.⁶ Although the incorporation of the role of asset markets has been a major development in the analysis of exchange-rate determination, the asset market models do not fully explain changes in the exchange rates. This is primarily because, assets are a stock and a flow is necessary to acquire or dispose of them. As such, total neglect of trade in goods and services leaves out an important element. The recent models, therefore, have focussed on the relationship between current and asset transactions for the determination of the exchange rate.⁷ While the asset markets are believed to determine the exchange rate in the short run, the value of the exchange rate determined in the asset markets influences the commodity market where prices adjust slowly. This influence affects the balance of trade, the level of national income, and rates of price changes. In general, the exchange rate is thus influenced through four different channels: (i) difference between domestic and foreign inflation rates; (ii) changes in relative prices, i.e. the terms of trade; (iii) changes in income; and (iv) difference between domestic and foreign interest rates. The real exchange rate can thus be expressed as a function of the above variables, i.e.⁸

$$e = f(\pi_d - \pi_f, TOT, Y, i_d - i_f) \quad f_1 > 0, f_2 > 0, f_3 > 0, f_4 < 0, \quad \dots \quad (1)$$

where e is the real exchange rate; π_d and π_f are, respectively, domestic and foreign inflation rates; TOT is the international terms of trade, i.e. export prices relative to import prices; Y is level of economic activity (national income); and i_d and i_f are, respectively, domestic and foreign interest rates.

⁶A fundamental property of the current account models is that the excess demand for goods can exist only if there is an access supply of something else, presumably money. The capital account models, on the other hand, assume perfect substitution between domestic and foreign assets. In the literature, the current and the asset transaction models have also been referred to as the 'flow' and 'stock' models, respectively.

⁷For a comprehensive review of the three broad categories of models, as well as various approaches adopted within each category, [see Krueger (1983), Chapters 3, 4 and 5].

⁸While the model outlined below maintain that fluctuations in the explanatory variables causes exchange rate to change, the direction of causation between the exchange rate and the explanatory variables is an important issue. In reality the exchange rate and the independent variables are endogenous determined jointly. Testing the direction of causation makes little sense because while it is observed that exchange rate reacts quickly and even tend to over shoot, the explanatory variables are sluggish.

The above model postulates that excess of domestic inflation rate over the foreign inflation rate depreciates the domestic currency.⁹ If domestic prices rise at a rate faster than the foreign prices, the demand for foreign goods will increase resulting in an excess supply of domestic currency and hence a decline in its value. Since, in general, the depreciation of the domestic currency is not exactly equal to the difference between domestic and foreign inflation rates, therefore, the terms of trade change. An improvement in the terms of trade by making domestic goods relatively more expensive in foreign markets causes the domestic currency to depreciate. If depreciation of the currency improves the trade balance, then depending on the marginal propensity to save it leads to higher employment and hence higher income. Further, depending on the marginal propensity to import, increased incomes imply higher imports which results in a further depreciation of the currency. Finally, if the domestic interest rate exceeds the foreign interest rate, then depending on whether the domestic currency is expected to appreciate or depreciate, the demand for domestic bonds in the international market will increase or decrease resulting in capital inflow (outflow) and hence appreciation (depreciation) of the currency.¹⁰ The extent of adjustment through asset transactions depends on the degree of international capital mobility. If citizens of a country are unable to own bonds of other countries, the interest rate channel will be totally absent.

There is a considerable debate in the literature on the influence of budget deficits on the interest rate, price level, and growth rate of money supply. Large budget deficits, it is generally argued, are likely to result in higher interest rates, excessive growth of money supply, and higher prices. Thus, budget deficits are likely to have an indirect affect on the exchange rate. This has been shown to be true for the U.S.A. by Abell (1990).

From the government budget constraint identity we know that a government can finance its budget deficit by either one of the following five methods: (i) by increasing money supply; (ii) by borrowing from the public; (iii) by borrowing from external sources; (iv) by drawing on external reserves; and (v) by a combination of the above four options. For the system to yield a solution, one of the implications of the government budget constraint is that from the various available policy options, at any one point in time, the government can fix arbitrary targets

⁹This follows from the proposition that depreciation of a nation's currency is equal to the difference between domestic and foreign inflation rates, generally known as the law of Purchasing Power Parity (PPP).

¹⁰This relationship between exchange rate and interest rates is known as Interest Parity (IP). The more nearly perfect are international capital markets, the stronger is the tendency towards IP.

values for only $n-1$ of the policy instrument. The value of the n th instrument has to be left for the system to determine. Both external borrowings as well as external reserves are influenced by the prevailing exchange rate. The authorities in most developing countries, because of the limited resources at their disposal, rarely intervene in the buying or selling of currencies to influence the value of their currency. In other words, given the value of their currency they have to make adjustments by changing other policy instruments. In this context, the budget deficits could then possibly have a direct effect on the exchange rate. Equation (1) can then be extended to include budget deficits, i.e.

$$e = f(\pi_d - \pi_f, TOT, Y, i_d - i_f, BD) f_5 > 0 \dots \dots \dots (2)$$

where BD is budget deficit. Higher budget deficits can thus result in depreciation of the currency both directly as well as indirectly through the price level, interest rate, and growth of money supply.¹¹

IV. EMPIRICAL RESULTS AND ANALYSIS

The empirical analysis in this paper is based on Pakistan's experience during the period from 1971-72 to 1989-90. The real exchange rate, i.e. nominal rupee-U. S. dollar rate deflated by the ratio of U. S. wholesale price index (WPI) and Pakistan's consumer price index (CPI), is taken as the dependent variable. Thus $(\pi_d - \pi_f)$ and $(i_d - i_f)$ are, respectively, differences between Pakistan's and U. S. A. inflation rates and interest rates. The inflation rate series for both the countries is constructed using consumer price indices. Since the mid 1970s, workers' remittances have been a major source of foreign exchange earnings for Pakistan. Although in recent years their absolute magnitude has declined, they continue to be an important source of foreign exchange for Pakistan. In order to capture the impact of capital transactions on the real exchange rate, both interest rate and remittances are used alternatively in the regression. To take account of the 1982 shift in the exchange rate regime, a dummy is used in the regression.

The data on nominal exchange rate, WPI (USA), CPI (USA), CPI (Pak), and interest rates are taken from the International Financial Statistics (IFS). The data on other variables are taken from various issues of the Pakistan Economic Survey and State Bank Bulletin of Pakistan. For estimating the equation, the relevant variables are deflated by the GDP deflator. Finally, Equation (2) is

¹¹ Khan and Lizondo (1987) while analysing the effects of reduction in fiscal deficit on the real exchange rate has shown that the effect of fiscal deficit on the real exchange rate depends on how the deficit is reduced.

estimated in linear form using the Ordinary Least Squares (OLS) method.

The estimated results are reported in Table 2. The explanatory variables included in the regressions explain more than 93 percent of the variation in the

Table 2

*Ordinary Least Square Estimates of Real Exchange Rate Function for
Pakistan Period 1971-72 - 1989-90*

Explanatory Variables	1	2	3	4	5
Constant	-47.928 (-2.243)*	-58.381 (-3.576)*	-28.734 (-2.990)*	-48.960 (-5.090)*	-14.561 (-2.212)*
$\pi_d - \pi_f$	0.127 (3.174)*	0.130 (3.307)*	0.091 (2.792)*	0.059 (2.206)*	0.038 (1.649)*
$i_d - i_f$	0.625 (0.777)	-	-	-	-
BD (as % of GDP)	0.705 (0.728)	1.294 (2.180)*	1.064 (2.252)*	0.684 (1.881)**	0.633 (2.100)**
Y (per Capita GNP)	0.077 (4.353)*	0.078 (4.515)*	-	0.097 (9.085)*	-
GNP	-	-	0.0005 (6.357)*	-	0.0005 (11.229)*
Remittances (as % of GNP)	-	-	-	-1.634 (-4.995)*	-1.200 (-4.644)*
TOT	0.061 (0.580)	0.108 (1.261)	0.102 (1.528)	0.016 (0.305)	0.030 (0.686)
D	3.364 (0.701)	4.235 (0.923)	3.146 (0.972)	1.924 (0.715)	2.874 (1.344)
R^2	0.936	0.932	0.958	0.979	0.986
R^2 (Adjusted)	0.901	0.904	0.941	0.968	0.978
D.W.	1.519	1.499	1.531	2.167	2.242
F-Statistic	26.715	33.026	54.920	86.617	127.799

* Implies significant at 5 percent level.

** Implies significant at 10 percent level.

Figures within the parenthesis are 't' ratios.

real exchange rate. Furthermore, the estimates do not suffer from any serious serial correlation. In general, all the coefficients have anticipated signs, but they are not necessarily statistically significant. Not surprisingly, the interest rates are found not to exert any influence on the real exchange rate in Pakistan. This is primarily because; (i) money market in Pakistan is controlled by the authorities and interest rates do not reflect market conditions, and (ii) until recently people were not allowed to own bonds of other countries. Remittances in flows, however, are found to have a significant negative impact on the real exchange rate.¹² In other words, in the case of Pakistan, direct capital inflows rather than return on assets have helped in limiting the depreciation of the rupee during the 1970s and 1980s. The terms of trade (*TOT*) are also found to have no influence on the real exchange rate.¹³

The estimates reported in the table further reveal that in Pakistan the government budget deficit has a significant direct impact on the real exchange rate. Burney and Yasmeen (1989) have shown that while the overall government deficit has no relationship with the nominal interest rate in Pakistan, the government deficit financed through borrowing from the banking system is associated with higher nominal interest rates. Similarly, Shabbir and Ahmad (1991) have shown that the government budget deficit has significant direct and perhaps an indirect effect as well on the price level in Pakistan. While budget deficits do have an impact on the interest rates, the real exchange rate in Pakistan is not influenced, in any significant manner, by variations in the interest rates. Thus, government budget deficits have influenced real exchange rates in Pakistan both directly as well as indirectly through the price level. The results show that the law of purchasing power parity does not hold in its strict sense.

V. CONCLUDING REMARKS

It is generally accepted that exogenous and policy-induced shocks influence real exchange rates, a key relative price in an economy, through four channels; namely absolute prices, relative prices, income, and interest rates. The relative importance of each of the channels for a particular country depends on a number of country-specific factors. In this context, the government budget deficits, through their linkages with the price level, interest rates, and growth of money supply, are believed to have an indirect effect on the real exchange rate.

¹²See also Burney (1987); Dorosh and Valdes (1990) and Haque and Montiel (1991).

¹³This finding is consistent with that of Dorosh and Valdes (1990) and Haque and Montiel (1991).

In this paper it has been argued that government budget deficits can have both direct as well as indirect effects on the real exchange rate. As an empirical support to the argument, estimates for Pakistan have been presented. The estimated coefficient indicate that in the case of Pakistan, government budget deficits have influenced the real exchange rate directly as well as indirectly through the price level.

REFERENCES

- Abell, John D. (1990) The Role of the Budget Deficits During the Rise in the Dollar Exchange Rate From 1979–85. *Southern Economic Journal* 57:1 66–74.
- Burney, Nadeem A. (1987) Worker's Remittances from Middle-East and their Effect on Pakistan's Economy. *The Pakistan Development Review* 26:4.
- Burney, Nadeem A., and Attiya Yasmeen (1989) Government Budget Deficits and Interest Rates: An Empirical Analysis for Pakistan. *The Pakistan Development Review* 28:4
- Cebula, J. R. (1988) Federal Government Budget Deficit and Interest Rates: An Empirical Analysis for the United States. *Public Finance* 43: 337–47.
- Deleuw, F., and T. Holloway (1985) The Measurement and Significance of Cyclically Adjusted Federal Budget and Deficits. *Journal of Money, Credit and Banking* 17:2 232–42.
- Dorosh, Paul, and Alberto Valdes (1990) *Effects of Exchange Rate and Trade Policies on Agricultural Incentives, Output, Trade and Farm Income in Pakistan*. Chap. 5, Washington, D. C: IFPRI.
- Hamid, N., I. Nabi and A. Nasim (1990) *Trade, Exchange Rate, and Agricultural Pricing Policies in Pakistan*. Washington, D. C: The World Bank.
- Haque, Nadeem U., and P. J. Montiel (1991) Exchange Rate Policy in Pakistan: Recent Experience and Prospects. (Unpublished Mimeo.)
- Hoelscher, G. (1983) Federal Borrowing and Short-Term Interest Rates. *Southern Economic Journal* 50:2 319–33.
- Hoelscher, G. (1986) New Evidence on Deficits and Interest Rates. *Journal of Money, Credit and Banking* 18:1 1–17.
- Khan, Z. H. (1988) Government Budget Deficits and Interest Rates: The Evidence Since 1971, Using Alternatives Deficit Measures. *Southern Economic Journal* 54:3 725–31.
- Khan, Mohsin S., and J. Saul Lizondo (1987) Devaluation, Fiscal Deficits and the Real Exchange Rate. *The World Bank Economic Review* 1:2 357–74.

Krueger, A. O. (1983) *Exchange Rate Determination*. New York: Cambridge University Press.

Shabbir, Tayyeb, and Ayaz Ahmad (1991) Do Budget Deficits Affect the Price Level? Some Evidence from a Developing Country. (Unpublished Mimeo.)

Comments on
"Government Budget Deficits and Exchange Rate
Determination: Evidence from Pakistan"

The main theme of the Burney and Akhtars' paper is that in addition to having an indirect effect, the budgetary deficit also has a direct effect on the real exchange rate in the case of Pakistan. To substantiate their hypothesis, they have regressed Pakistan's budgetary deficits on the differentials of the inflation rates of Pakistan and the U.S. and of interest rates prevailing in the two countries, and Pakistan's terms of trade (all indirect channels transmitting the effects of budgetary deficits to the exchange rate), and budgetary deficit itself (to capture the direct effect). GNP and GNP per capita, too, have been admitted alternately into the equation as explanatory variables. Out of five different equations, estimated by the authors, the coefficient of the budgetary deficit has an expected sign and is statistically significant at 5 percent in two equations, at 10 percent in the other two equations and is not significant in the remaining one equation, when the variable is used along with other independent variables. These results have been presented to reject the null hypothesis that there is no direct relationship between the budgetary deficits and the real exchange rate.

The major problem with the paper is that the explanation of the direct effect of the budgetary deficit on the real exchange rate, is not elaborate enough to convince the reader. The statement about the four distinct options for financing budgetary deficits, two of these, namely external borrowings and the use of foreign exchange reserves, being influenced by the prevailing exchange rate, the inability of Pakistan to influence the exchange rate through intervention in the foreign exchange market, and hence the need to use "the other policy instrument" does not seem to lead automatically to the conclusion that "the budget deficits could then possibly have a direct effect on the exchange rate". Hence, the theoretical underpinnings of the main hypothesis of the paper is not very clear.

Though not mentioned anywhere in the paper as to which particular interest rate has been used as one of the explanatory variables in the equation, one of the authors has told me that it is the weighted average of interest rates on deposits for Pakistan, as reported in the State Bank Bulletin, and Government Bond Yield (medium/long-term?) for the U.S., as reported in the IMF's International Finance Statistics. As is clear from the footnote given under the statistical table for the weighted average interest rate on deposits in the Bulletin, this rate is only for non-PLS deposits, which means only foreign currency accounts since July (?)

1985, deposits in which were extremely limited upto February 1991. Before the liberalisation of rules governing these accounts in February 1991, these deposits were quite irrelevant for those considering the transfer of funds abroad to take advantage of interest rate differentials.

There are also some factual errors in the paper. First, in Table 1 the numbers given in the parentheses in the columns for 'purchasing power parity' and 'equilibrium' show the nominal exchange rate as a percentage of the other two measures of the exchange rate, and not differences between the nominal and other measures, as stated in the footnote of the table. Second, the magnitude of overvaluation of the Pak rupee relative to the purchasing power parity during the Sixties was not 50 percent, but almost 100 percent, as is clear from the numbers given in Table 1 for 1964-65. Third, Pakistan's nominal exchange rate, i.e. rupee/dollar rate increased by 117 percent between 1980-81 and 1989-90, and not by 167 percent.

Ghulam Qadir

World Bank,
Islamabad.