Three-gap analysis of structural adjustment in Pakistan

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Zafar Iqbal

geboren op 1 mei 1960 te Multan, Pakistan

Promotor: Prof. dr. Jeffrey James
Copromotor: Prof. dr. Graham Pyatt

To:
my wife, Zubeda
my daughters, Shamshad, Shehlla, Shaista, Robina, and Fatima

Acknowledgments

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Chapter 1

Introduction

As in most other developing countries, structural adjustment has been the subject of intense debate in Pakistan over the past two decades. Proponents and opponents of adjustment have each produced evidence to support their own particular point of view. We believe, however, that this evidence is flawed and that a different methodology must be used to evaluate how structural adjustment measures have influenced Pakistan's economy. This thesis proposes a methodology that combines two streams of literature. One is the recent literature on three-gap models and the other is the literature on social accounting matrices. Based on this literature, the thesis develops a macro-equilibrium model that is capable of assessing the extent to which key adjustment policy variables and external shocks have influenced the macroeconomic performance of Pakistan's economy over the period 1970-93. The study aims to contribute to not only the general debate as to how the effects of structural adjustment policies might be evaluated but also to the specific debate on the effects of these policies in Pakistan.

1.1 Structural adjustment as a policy issue

(a) In general

Events in the 1970s made readily apparent the economic difficulties of the developing world. Internal problems of developing countries typically manifested themselves in burgeoning fiscal deficits, mounting external current account deficits, and misalignments in relative prices. External factors included substantial fluctuations in the world market prices of primary commodities produced by non-oil developing countries, sharp increases in the real prices of energy products, and a sustained period of stagflation and slow growth in the industrial countries. The two Bretton Woods institutions, the World Bank and the

International Monetary Fund (IMF), argued that the domestic economic problems were caused mainly by economic mismanagement in the developing countries (World Development Report, 1983). As a result, both international financial institutions launched stabilization and structural adjustment programs to overcome macroeconomic distortions as well as deep-rooted structural problems in these countries. The distinction between stabilization policies suggested by the IMF and structural adjustment programs advocated by the World Bank is somewhat complex. In this regard, Streeten (1988) argues that the distinction between the two programs has become blurred since 1974, with the IMF giving longer-term loans and concerning itself with aspects of structural adjustment, and the World Bank including stabilization among its balance-of-payments lending objectives. For this reason, in what follows, we shall refer to Bank-Fund adjustment policies without making any distinction between stabilization and structural adjustment programs. Adjustment lending by the World Bank and the IMF has supported the attempts of governments to implement a set of policy reforms, which generally include a drastic devaluation of the domestic currency, a reduction in public current consumption, lifting of price controls, denationalization of industries, deregulation and liberalization of foreign trade and the domestic financial market, and an assortment of other policies to make the economy more outward-oriented. The ratio of World Bank adjustment assistance to the Bank's total lending has risen from zero in 1978 to around 30 percent in 1990 [World Bank 1990]. Other bilateral and multilateral agencies, including the IMF, through its Extended Fund Facilities, have also increased their involvement in adjustment lending activities. Since 1980, many developing countries, and especially the most heavily indebted countries in Asia, Africa and Latin America, have adopted Bank-Fund adjustment programs. These programs have brought about dramatic changes in economic policies in these regions. These policies are mainly geared to restoring the internal and external balances in the countries concerned. As Summers and Pritchett put it:

> *The design of structural adjustment programs directed at the four "...ations" -- stabilization, liberalization, deregulation, privatization -- has become a cottage industry (Summers and Pritchett, 1993:383).*

(b) The case of Pakistan

The crucial events that took place in Pakistan during the 1970s were of both an economic and a political nature. Nationalization of industries, the oil price shocks, and the increasingly unfavorable terms of trade, as well as the rising debt that resulted all hurt not only economic

growth but also the internal and external balances of Pakistan's economy. To solve these problems, Pakistan chose to adopt sectoral and structural adjustment programs under the auspices of the World Bank and the IMF beginning in 1980. The Bank-Fund adjustment programs, which are still in force, have marked a radical departure from earlier economic policies (e.g. the delinking of the Pakistan rupee from the US dollar, price deregulation for a large number of products, privatization, denationalization of state-owned industries, liberalization of foreign trade and financial markets, lifting of foreign exchange controls, substantial reductions in subsidies, and drastic devaluation of the domestic currency). More recent adjustment programs also emphasize investment in expanding and improving the social services (e.g. education and training, sanitation, rural water supply, and health care) and physical infrastructure for transport and communication, irrigation, and energy. These measures attracted a great deal of domestic and international attention, especially in World Bank and IMF circles. Between 1980 and 1994, no less than ten sectoral and structural adjustment programs amounting to $3.2 billion were proposed and supported by both the World Bank and the IMF. The highest adjustment loan was provided by the IMF in 1988 (i.e. $515 million) and since then the government of Pakistan has started serious structural adjustment reforms. One of the most interesting aspects of the adjustment programs has been their persistence under a variety of political regimes during the latter half of the 1980s and continuing to the present.[1]

1.2   Objectives

After a decade of significant and substantive adjustment programs, an intense debate has arisen about how the past and future effects of adjustment policies impart macroeconomic performance in Pakistan. To add another voice to this controversy is the aim of this study. In particular, the study will try to assess whether or not adjustment policies (such as exchange rate devaluation, reduction in public current spending, privatization and denationalization, real interest rate changes, and additional adjustment lending) have had a positive impact on a number of key macroeconomic variables such as exports of goods and services, imports of goods and services, public sector revenues and investment, private savings and investment, and the level of real output in Pakistan. The study will evaluate

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[1] Pakistan has had seven governments -- four caretaker and three elected -- in just over 5 years from August 1988.

adjustment policies according to the direct and indirect effects they may have had on these selected variables. Such an assessment is considered necessary because there are few independent studies on the question. There are some qualitative studies based on 'with-without' and 'before-after' approaches. Bilquees (1987), for example, after evaluating the three-year IMF stabilization program under the Extended Fund Facility arrangement for the period 1980-83, concluded that the programs are generally not suitable for the economic structures prevailing in most LDCs. She argued that the stabilization programs had accentuated rather than alleviated the structural problems of the Pakistan economy. Nicholas (1988) and Balassa (1989a) compared trends of some macroeconomic performance indicators of Pakistan's economy for the periods with and without adjustment programs and concluded that the increasing or decreasing trends in macroeconomic indicators are due to adjustment reforms (ignoring the effects of all other factors). McCleary (1991) found that the adjustment reforms undertaken during the 1980s improved economic performance and the capacity to respond to economic changes of Pakistan's economy. The findings of McCleary were also supported by M.S. Khan (1991). In another study, Kemal (1994) argued that structural adjustment contributed towards increasing efficiency but that this had been accompanied by rising income inequalities and poverty in Pakistan. More recently, a qualitative study by Noman (1995) concludes that the aggregate performance of the Pakistan economy has been worse during the six years of structural adjustment programs than it was in the previous six years. In addition, he suggests that income distribution has sharply deteriorated during the adjustment period.

Contrary to earlier qualitative studies, Naqvi and Sarmad (1993), Vos (1993), and Jansen (1993) provided some quantitative insight in this respect.[2] Naqvi and Sarmad (1993) explained the nature of the external shocks, the importance of the compensatory external flows, and the relevance of the domestic response variables in the adjustment process in Pakistan. Vos (1993) discussed the simulation results based on the computable general equilibrium (CGE) model for Pakistan. The model simulations suggested that additional foreign assistance would generate 'Dutch disease' effects and would thus be unsupportive of a structural adjustment meant to strengthen the export base and traded-goods production. Regarding adjustment policy variables, Vos found that an additional exchange-rate depreciation would produce mainly (cost-push) inflationary tendencies, erosion of real

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[2] All these studies (except Vos) are unpublished; the preliminary results were discussed in a conference organized by the Institute of Social Studies, the Hague, the Netherlands, December 2-3, 1993.

incomes and aggregate demand outfall in the medium-run. A cut in public expenditure would seem less harmful and stimulate a shift towards the traded-goods sectors and, in addition, would allow for lower inflation and 'crowding in' of private investment in Pakistan. In his comparative analysis study, Jansen (1993), in his study of five countries (Mexico, Pakistan, Thailand, Tanzania, and the Philippines), finds that different types of foreign finance have been associated with policy problems and with quite different outcomes in these countries.

The World Bank and the IMF have also periodically undertaken reviews of the effectiveness of the structural adjustment programs that have been proposed for Pakistan.[3] Their reviews, however, are generally based on qualitative assessments. These reviews suggest that structural adjustment programs, on average, improved the internal and external imbalances of Pakistan economy. In short, there is first a lack of an adequate quantitative methodology for assessing the impact of the structural adjustment reforms; moreover, what studies do exist come to conflicting conclusions. It is therefore difficult for policymakers in Pakistan to decide whether to continue with the existing reforms and whether to change them in particular directions. By designing a study that is methodologically more suitable than those found in the existing literature, we hope that this thesis will enable policymakers to make more informed decisions on these crucial issues. In particular, we shall examine, theoretically and empirically, two questions that are critical for understanding the effects of adjustment measures on the economic performance of Pakistan's economy. *The first main question here is whether or not adjustment policies have had positive effects on certain selected target variables.* The policies to be considered are the following:

(i) A crucial component of most adjustment programs is a real depreciation of the domestic currency designed to restore the external balance and make it possible for economic growth to resume. The impact of a real currency depreciation on the external balance and other selected macroeconomic variables is thus a major component of any study on the impact of structural adjustment in developing countries, in general, and Pakistan, in particular.

(ii) Another important policy measure is to reduce public current expenditure through a substantial reduction in subsidies. How will any observed cut in public current spending affect public investment, in particular, and macroeconomic variables, more generally?

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[3] For these reviews see, World Bank (1985a, 1988a, 1989a, 1993)

(iii) Privatization remains a main policy issue in all the adjustment programs. Here, the following question arises: How do local and foreign private investors in Pakistan respond to this policy?

(iv) The Government of Pakistan tends to argue that adjustment lending has been insufficient to meet the financing requirements of adjustment reforms. In this regard, what is the effect of additional adjustment lending on investment and output? In addition, if additional adjustment lending is not available, will domestic adjustment reforms still be possible in Pakistan?

(v) The adjustment packages also include (as a policy measure) the domestic interest rate. It has been suggested that the nominal domestic interest rate should be kept above the inflation rate -- i.e. a positive domestic real interest rate -- in order to raise private savings. To what extent is the interest rate policy effective in mobilizing domestic resources?

In addition, account must be taken of the external shocks to which Pakistan's adjustment reforms were subject during the 1970s and 1980s. Therefore, *the second main question posed here is whether and to what extent external factors such as oil shocks, terms-of-trade deterioration, foreign interest rate shock, and a slowdown in economic activities in the Middle East have aggravated the adjustment process in Pakistan.* From a policy perspective, it is obviously desirable to isolate the effects of external shocks from adjustment policies, which indeed is one of the main limitations of the earlier qualitative studies undertaken in the case of Pakistan.

1.3   Methodology

The 1980s and early 1990s have witnessed considerable interest in analyzing the impact of Bank-Fund adjustment policies in developing countries. Indeed, the effects of these programs have been the subject of fierce debate among economists. According to Balassa (1989a), Schadler et al. (1993),[4] and World Bank (1988b, 1989b, 1990, 1994[5]), macroeconomic

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[4] The IMF recently published the first substantial publicly available evaluation of experiences with its Structural Adjustment and Enhanced Structural Adjustment Facilities, covering 19 program countries.

[5] This is the recent World Bank evaluation report for sub-Saharan Africa.

performance in the areas of foreign trade and GDP growth rates in the program countries has, on average, improved. These effects, however, are based on simple qualitative approaches such as 'before-after' and 'with-without'. In this regard, Goldstein and Montiel (1986), M.S. Khan (1990), Killick et al. (1992), Summers and Pritchett (1993), and Killick (1995) have pointed out the main difficulty in comparing the values of macroeconomic indicators before and after programs or with and without them: such an approach implicitly treats all changes as effects of the adjustment programs themselves. This ignores, however, all the exogenous shocks and other non-program influences on the selected indicators in an economy. Using more sophisticated quantitative techniques, the seminal work by M.S. Khan and Knight (1982, 1985), M.S. Khan (1990), Taylor (1990a, 1990b, 1990c, 1993, 1994), Killick and Malik (1992), Doroodian (1985a, 1993), Mosley et al. (1991a, 1991b), and Mosley and Weeks (1993), gave some mixed results in a range of cross-sectional, regional, and individual country studies. In general, they all agree that Bank-Fund programs have led to an improvement in the current account balance of the balance of payments, a lower rate of inflation, and a decline in growth in developing countries. Even these studies, however, have certain limitations. For example, cross section and regional studies hide the performance of an individual country. In fact, since different countries start from different positions and since they face different conditionalities and program sequences, there is an urgent need for country-specific studies of developing countries. In brief, on the basis of existing studies, one certainly cannot say with any certainty whether the adoption of adjustment programs supported by the World Bank and the IMF has led to an overall improvement in the economic performance of developing economies. In the words of M.S. Khan, a senior research staff member at the IMF:

> *one would be hard-pressed to extract from existing studies inferences about the effects of Fund-supported adjustment programs on the principal macroeconomic targets (M.S. Khan, 1990:222).*

1.4 Three-gap models and social accounting matrices

The World Bank- and IMF-guided structural adjustment programs focus mainly on the internal and external imbalances, which, when negative, are often considered to hamper economic growth in developing countries. During the 1970s and 1980s, experts believed that the rising internal and external imbalances were caused mainly by many domestic and foreign

factors such as debt accumulation, debt-servicing burdens, fiscal imbalances, the crowding out of private investment, huge private capital flight, terms-of-trade shock, oil shocks, foreign interest rate shock, and a slowdown of activities in the industrialized countries. It has therefore become necessary to develop a methodology that takes into account all these factors for the analysis of the internal and external balances in an economy. In recent years, the two-gap models of the sixties [e.g. Chenery and Bruno (1962), Chenery and Strout (1966), Mackinon (1964), and Weisskopf (1972a)] have gained some new relevance in a somewhat different context. Bacha (1990), Solimano (1990), and Taylor (1990b, 1990c, 1993, 1994) initiated the development of three-gap models, which are basically an extension of earlier two-gap models, and they deal with the interactions between the savings gap, the foreign exchange gap, and the fiscal gap in the determination of the growth of a developing country. The addition of the fiscal gap to the other two gaps is crucial because it may pose the binding constraint on the growth prospects, since the public sector budget restrictions limit the expansion of productive capacity through the 'Crowding Out' of private investment in highly indebted developing countries. In addition, these models account for important aspects of structural adjustment reforms, along with other factors that affect the internal and external balances, and they have been applied in a number of country studies. The three-gap framework has an advantage for our purposes over the competing macroeconomic methodologies (i.e. computable or applied general equilibrium models and macroeconometric models)[6] in that it explicitly analyzes the saving gap, the fiscal gap, and the foreign exchange gap and their interrelationships through financial transactions between the various sectors in an open economy. Moreover, the three-gap framework explicitly deals with capital formation and economic growth. As such it focuses directly on the financial structure of an economy and policies that affect it.

While the model used in this thesis is clearly in the tradition of the growing literature that facilitates the incorporation of three-gaps, the flow-of-funds, and important aspects of structural adjustment programs in the case of Pakistan, our approach in an important respect, goes beyond the existing models. For, whereas the previous models are cast in terms of national income accounting identities, we set our approach within the somewhat more general social accounting (SAM) framework. Interest in the SAM framework has grown during the

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[6] For a detailed discussion and comparison of various macroeconomic methodologies, see Naqvi et al. (1982, 1983, 1986, 1991, 1993), Robinson (1988), Taylor (1990), Mosley et al. (1991), Jemio and Vos (1993), Gunning (1993), and Vos (1994).

last three decades and it has been extensively used as a policy analysis tool, by for example, Pyatt and Round (1977, 1979, 1985), King (1985), Thorbecke (1985), Pyatt (1985, 1988, 1991a, 1991b), and James and Khan (1993), who all provide excellent introduction to SAMs and their uses. The main advantage of the SAM framework for this study is that it explicitly incorporates all the macroeconomic balances and their interrelationships of an open economy. The SAM framework developed here consists of two main parts. The first provides a precise description of the three-gaps (e.g. the private sector resource gap, the public sector resource gap, and the external resource gap) and the second part of the matrix contains the flow-of-funds, which shows how the surplus of one sector is transferred to other sectors that are in deficit. Moreover, the key adjustment policies referred to above and the external shocks can also be incorporated in the SAM-based three-gap model. As we previously noted, in order to identify the effects of Bank-Fund adjustment programs, it is essential to quantify the effects on macroeconomic target variables of three influences: the policies that have been implemented, external factors, and the availability of structural adjustment lending. The SAM-based three-gap framework developed here incorporates all three of these components, and attempts (in the light of these) to systematically evaluate Bank-Fund adjustment policies in Pakistan.

1.5   Limitations

It is worthwhile at the outset of the study to mention certain caveats (that is, the things that we shall not cover). First, this study does not purport to provide a complete analysis of all the policies suggested in various adjustment programs for Pakistan. Our objective, rather, is to examine only a selection of the adjustment policies that have been implemented in Pakistan. In addition, the adjustment programs suggested for Pakistan also contain qualitative policy changes; the three-gap methodology developed here, however, ignores these aspects of adjustment programs. Second, this study does not deal with the social impact of structural adjustment programs, in particular on employment, poverty, and income distribution, although poverty alleviation is now one of the main objectives of Bank-Fund supported reform programs for Pakistan. Third, this study does not focus on the political factors associated with structural adjustment programs. Finally, we do not develop a complete macroeconomic model for the economy as a whole, a topic lying beyond the scope of this thesis. The three-gap analysis we develop here must be seen, therefore, as a start on the way to broaden the agenda of policy concerns.

1.6   Organization

The rest of the thesis is structured as follows. Chapter 2 presents an analytical framework of the two-gaps (i.e. the saving-investment gap and the foreign exchange gap) and three-gaps (an additional fiscal gap along with saving-investment and foreign exchange gaps) in an open economy. These gaps are presented in a social accounting framework, which gives a clear picture of how these are filled by financial transactions among various sectors in an open economy. Chapter 3 reviews the theoretical and empirical literature on the two-and three-gap methodology, examining the fiscal constraint, the savings constraint, and the foreign exchange constraint on investment and output growth in developing economies. Chapter 4 presents a framework for constructing a consistent set of time-series data, which are required for analyzing the period 1970-93 in Pakistan. Chapter 5 describes how the three-gaps, the flow-of-funds, adjustment policy variables, and external shock variables have evolved over time. For purposes of comparison, we divide the period 1970-93 into two halves: the years 1970-80 define the pre-adjustment period, and the years 1981-93 define the period of adjustment. The movement of the three-gaps during the 1970s indicates the extent of the growing crises of internal and external imbalances in Pakistan's economy. The description of the same variables in the later period indicates whether the internal and external imbalances actually improved during adjustment. At the same time, the description of changes in the policy variables indicates the extent of government responsiveness towards the Bank-Fund adjustment programs. The final part of this chapter describes the chronology of external factors, which indicates the severity of the external environment surrounding the adjustment process in Pakistan. Chapter 6 develops in stages an analytical framework of a three-gap model for Pakistan. This model incorporates all the adjustment policy variables and external shock variables of interest. Using empirical estimates of Chapter 6, Chapter 7 simulates the contribution of different adjustment policy variables and external shocks to selected macroeconomic indicators of Pakistan's economy. The results obtained then constitute the answers we shall offer here to the questions posed in this study. Chapter 8 presents a summary of the main findings.

Chapter 2

Two- and Three-Gaps in a SAM Context: An Analytical Framework

This chapter attempts to explain how the two-gaps (the saving gap and the foreign exchange gap) and the three-gaps (the savings gap, the fiscal gap, and the foreign exchange gap) of an economy can be derived in a social accounting framework. In general, the saving gap refers to the balance between gross investment and national savings, and the foreign exchange gap refers to the current account balance of the balance of payments of an economy. The fiscal gap is intended to reflect the balance between public revenues and public expenditures. This chapter uses the social accounting framework to derive a precise picture of the two-gaps and three-gaps and their balances through financial transactions in an economy. The financial transfers between various sectors can be traced through the flow-of- funds account in a SAM. The flow-of-funds account shows how the savings of a sector are allocated to investment in that sector and the surplus is transferred to the other sectors which are in deficit. The main advantage of the flow-of-funds account is that it shows the complete picture of capital transactions among various sectors. A number of studies have used the flow-of-funds framework to analyze the financial problems of developing countries [for example, Bhatt (1972) for India, Roe (1985) for developing countries, Jansen (1989) for Thailand, and Sarmad and Mahmood (1994) for Pakistan].

The classification and disaggregation of accounts in a social accounting matrix (SAM) can take various forms, depending on how the constituent accounts are defined and depending on one's analytical interests and specific policy concerns. As noted earlier, interest in the SAM framework has mainly occurred in the last three decades, when it was extensively used

as a tool of policy analysis. For example, Pyatt and Round (1977, 1979, 1985), Pyatt (1985, 1988, 1991a, 1991b), King (1985), Thorbecke (1985), and James and Khan (1993) all provide excellent introduction to SAMs and their uses. The SAM framework is also commonly used in computable general equilibrium (CGE) models for analyzing structural adjustment reforms in developing countries (for example, Robinson (1988) and Taylor (1990a) provide a comprehensive survey on SAM based CGE modelling). This chapter uses the SAM as a reference table to derive the two- and three-gaps, and the flow-of-funds account of an economy. These gaps and the flow-of-funds account can be derived by integrating the national accounts, the balance of payments statistics, and the public finance statistics of an economy in a SAM framework. The analytical framework developed in this chapter will later serve three main purposes. First, it will be used to derive consistent time-series data on the flow-of-funds and the three-gaps in Pakistan's economy. Second, it will help to describe the historical evolution of the three-gaps and their balances through financial transactions among various sectors. Finally, the consistent time-series data based on the SAM framework will assist in operationalizing the three-gap model developed for Pakistan in later chapters.

2.1   A basic SAM

Table 2.1 presents the basic structure of a SAM for an open economy. The matrix is compiled using simple accounting principles; each flow implies an income for the row account and an outlay for the corresponding column account. Table 2.1 provides a complete picture of the circular flow in an economy. It recognizes five types of accounts: (i) current account of institutions; (ii) capital account of institutions; (iii) factors account; (iv) account for production activities; and (v) commodities account. Together, these accounts capture the full range of macroeconomic transactions and fundamental identities of national income accounting in an economy. A brief description of these accounts follows.

The first column and row of Table 2.1 define the current account of institutions. Row 1 records the current income of institutions that contain current transfers among themselves, factor incomes, and taxes on production activities and commodities. The corresponding column 1 views institutions as spenders that contain current consumption and current transfers among themselves; the remaining part of income is the savings of institutions. The capital account of institutions is given in row 2 and column 2. Row 2 refers to total investible funds of institutions, which include their own savings and capital transfers among institutions

Table 2.1 Basic Structure of a Social Accounting Matrix (SAM)

	Institutions		All Others Accounts			Σ
	Current Accounts (1)	Capital Accounts (2)	Factors (3)	Production Activities (4)	Commodities (5)	
Institutions						
Current Accounts (1)	Current Transfers	0	Factors Incomes	Taxes on Activities	Taxes on Products	Current Income
Capital Accounts (2)	Savings	Flow of Funds	0	0	0	Capital Receipts
All Other Accounts						
Factors (3)	0	0	0	Payments for Factor Services (value added)	0	Factor Incomes
Production Activities (4)	0	0	0	0	Output (producer prices)	Total Revenues
Commodities (5)	Consumption	Investment	0	Expenditure on Raw Materials	0	Total Demand
Σ	Allocation of Current Income	Allocation of Capital Receipts	Factors Income	Total Cost	Total Supply	

-- flow-of-funds. The capital account in column 2 shows the allocation of capital receipts of institutions, which includes gross investment by commodities and capital transfers among institutions. Row 3 and column 3 of Table 2.1 refer to the factors account. Factor income (domestic plus foreign) generated by production activities is reported along the row, and expenditures, which are paid to institutions (domestic and foreign) that own the factors, are shown in the column. The account of production activities reported in row 4 and column 4 indicates total revenues and total costs of an economy, respectively. Row 4 records the total value of output at producer prices. Producing this output requires inputs of raw materials, payments for factor services, and taxes on production activities by institutions, which are reported in column 4. Column 5 records total supply, whereas total demand is measured along the corresponding row 5. On the supply side are sales of gross output at producer prices and taxes on commodities (domestic plus imports). The total demand (which matches total supply) comprises current consumption, gross investment, and expenditures on raw materials.

As the main purpose of this chapter is to derive two- and three-gaps of an economy in a social accounting framework, Table 2.1 consolidates all the accounts into two blocks, namely capital account of institutions and all other accounts. These accounts are reported in

Table 2.2 Consolidated Accounts and Flow-of-Funds in a SAM

	Institutions		
	Capital Accounts (1)	All Other Accounts (2)	Σ
Institutions Capital Accounts (1)	Flow of Funds	Savings	Total Funds Available
All Other Accounts (2)	Investment	*	Total Investment
Σ	Uses of Total Funds	Total Savings	*

Table 2.2. The basic SAM (5x5) reported in Table 2.1 is, therefore, reduced to a SAM of 2x2. The first row of Table 2.2 gives total funds available in an economy, which consist of flow-of-funds among institutions and savings. The first column records the uses of total funds in an economy. These funds are used for investment and the remaining balance is transferred among institutions, which is referred to as flow-of-funds. Row 2 and column 2 of Table 2.2 report total investment and total savings, respectively.

2.2 Two-gaps in a SAM framework

In order to derive the saving gap and foreign exchange gap in an open economy, the consolidated accounts of Table 2.2 are divided into two major institutions -- namely the domestic economy and the rest of the world (ROW). These disaggregated accounts are reported in Table 2.3, which shows the interactions between the domestic economy and the rest of the world. Following accounting principles, the total of each row in Table 2.3 must be equal to its corresponding column. The first row refers to the total funds available to the domestic economy, which includes its own savings (S) and net capital inflows from the rest

Table 2.3   Accounting Identities of Two-Gaps

	Capital Account		All Other Accounts (3)	Σ
	Domestic Economy (1)	ROW (2)		
Capital Account				
Domestic Economy (1)	*	F	S	F+S = I
ROW (2)	0*	*	M	M = F+X
All Other Accounts (3)	I	X	*	I+X = S+M
Σ	I = F+S	F+X = M	S+M = I+X	*

* It can be assumed that there is no capital flight to the ROW since F is defined as the net capital inflow.

of the world (F). The corresponding column indicates that these funds are used to finance investment (I). The total available funds to the ROW and their uses are reported in row 2 and column 2, respectively. The total funds of the ROW come from its exports of goods and services, which are imports of goods and services (M) of the domestic economy. These funds are used for imports of goods and services [which are exports of goods and services (X) of the domestic economy] and net capital transfers (F) to the domestic economy. (Note that the * in row 1 and column 1 indicates transactions within the domestic economy and the * in row 2 and column 2 represents transactions within the rest of the world).

Rearranging Table 2.3, we come up with the savings-investment gap and the foreign-exchange gap in an open economy. These gaps are shown in Table 2.4.

Table 2.4   Two-Gaps in a SAM Framework

| | Capital Account | | All Other Accounts (3) | Σ |
	Domestic Economy (1)	ROW (2)		
Capital Account Domestic Economy (1)	*	F	S - I	F+S-I = 0
ROW (2)	0ª	*	M - X	M-X = F
All Other Accounts (3)	0	0	*	0 = S-I+M-X
Σ	0 = F+S-I	F = M-X	S-I+M-X = 0	*

ª It is assumed that there is no capital flight to the ROW.

Table 2.4 depicts the mechanisms of two-gaps, which are originally based on national income accounting identities. Rewrite the mathematical expressions of 'All Other Accounts' to apt the saving-investment gap and foreign-exchange gap in an open economy as follows:

$$I - S = M - X \qquad (2.1)$$
$$\textit{(the savings gap)} \qquad \textit{(the foreign-exchange gap)}$$

2.3 Three-gaps in a SAM framework

The aggregate accounts of the domestic economy can be disaggregated into any set of institutions, depending on one's analytical interests. For example, Pyatt and Round (1977, 1979, 1985), King (1985), Drud et al. (1983), Pyatt (1991a, 1991b), and James and Khan (1993), all define a different set of domestic institutions according to their specific concerns. This chapter, with its main goal to derive three-gaps for an open economy, disaggregates the combined account of domestic economy given in Table 2.3 into two main domestic institutions: the private sector and the public sector. The third institution -- the rest of the world -- is treated as a single aggregate foreign institution. These accounts are reported in Table 2.5, which provides a complete picture of financial interdependence and the interactions among the private sector, the public sector, and the rest of the world. It shows

Table 2.5 Accounting Identities of Three-Gaps

	Capital Accounts of Institutions			All Other Accounts (4)	Σ
	Private (1)	Public (2)	ROW (3)		
Capital Accounts Private (1)	*	R_p	F_p	S_p	$R_p + F_p + S_p = SS_p + KF + I_p$
Public (2)	SS_p	*	F_g	T	$SS_p + F_g + T = R_p + \Delta R + G$
ROW (3)	KF	ΔR	*	M	$KF + \Delta R + M = F_p + F_g + X$
All Other Accounts (4)	I_p	G	X	*	$\begin{array}{c} I_p + G + X \\ = \\ S_p + T + M \end{array}$
Σ	$\begin{array}{c} SS_p + KF + I_p \\ = \\ R_p + F_p + S_p \end{array}$	$\begin{array}{c} R_p + \Delta R + G \\ = \\ SS_p + F_g + T \end{array}$	$\begin{array}{c} F_p + F_g + X \\ = \\ KF + \Delta R + M \end{array}$	$\begin{array}{c} S_p + T + M \\ = \\ I_p + G + X \end{array}$	*

how savings are allocated to investment within a sector and how the surplus capital is transferred to the other sectors.

In accordance with accounting principles, the total of each row in Table 2.5 must be equal to the total of its corresponding column. In the flow-of-funds block -- capital accounts of the institutions -- each column represents lending by the concerned sector, while each row represents the borrowing by the concerned sector from the other sectors. The first row of Table 2.5 refers to total funds of the private sector -- which includes its own savings (S_p), net capital transfers from the rest of the world (F_p), and repayment of loans by the public sector (R_p). The corresponding column indicates that these funds are used for the private sector's own investment (I_p), the capital transferred to the public sector (SS_p) through purchasing public bonds, currency issued by the government, other direct and indirect loans to the public sector, and capital flight (KF) to the rest of the world. The capital flight defined in this study is the sum of net short-term private capital transfers to the rest of the world and errors and omissions in the balance of payments -- assuming as we are that these errors are attributed to the private sector, since the public sector keeps a formal record of all transactions made with the rest of the world.

Table 2.6 Notation and Definition

Notation	Definition
F	Aggregate net foreign capital inflows to domestic economy
F_p	Net foreign capital inflows to the private sector
F_s	Net foreign capital inflows to the public sector
G	Public sector development and non-development expenditures
I	Gross domestic investment
I_p	Private investment
KF	Private capital flight (defined as net short-term private capital transfers to the rest of the world plus errors and omissions in the balance of payments)
M	Imports of goods and services
ΔR	Annual changes in official foreign exchange reserves
R_p	Repayment of public sector loans to the private sector
S	National savings
S_p	Private savings
SS_p	Capital surplus of the private sector
T	Total public revenues (tax and non-tax revenues)
X	Exports of goods and services

Row 2 in Table 2.5 represents total funds available to the public sector, which includes its own revenues (T), net capital transferred from the rest of the world (F_g), and capital transferred from the private sector (SS_p). Total uses of these funds are reported in the corresponding column 2, which indicates that the public sector utilizes its funds for development and non-development expenditures (G) and repayments of domestic loans to the private sector (R_p); the balancing item is net changes in official foreign exchange reserves (ΔR) recorded in the balance of payments of the domestic economy. Finally, the total available funds and their uses by the rest of the world are reported in row 3 and column 3, respectively. The total available funds to the rest of the world are their own exports, which are imports of the domestic economy (M), net changes in the foreign exchange reserves, and private capital flight. The total uses of these funds account for capital transferred to the private sector (F_p), capital transferred to the public sector (F_g), and exports of the domestic economy (X). The income and outlays of the private sector, the public sector, and the rest of the world reported in Table 2.5 are depicted by the following Figure 2.1.

Figure 2.1 Income and Outlays of Institutions in an Economy
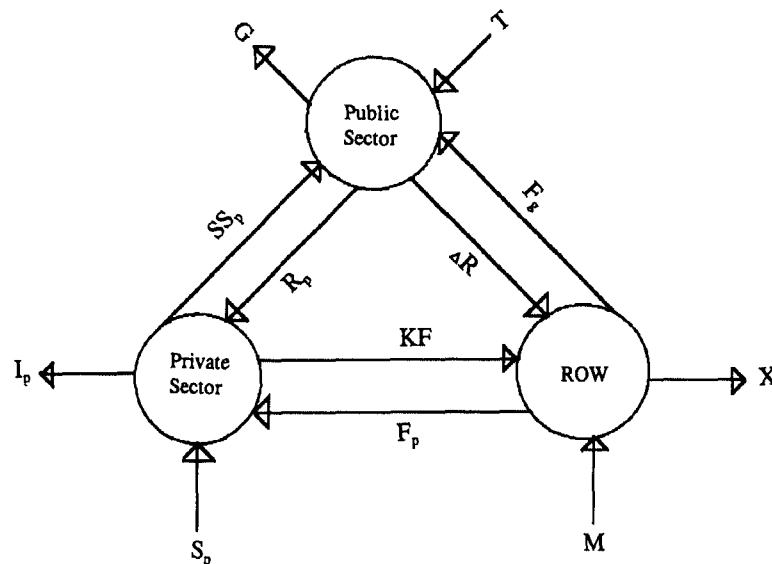
	Income		Outlays
Private sector:	$R_p + F_p + S_p$	=	$SS_p + KF + I_p$
Public sector:	$SS_p + F_g + T$	=	$R_p + \Delta R + G$
ROW:	$KF + \Delta R + M$	=	$F_p + F_g + X$

Table 2.7 reproduces Table 2.5, but with I_p, G, and X transferred from the row of 'All Other Accounts' to their respective columns. It indicates the saving gap, the fiscal gap, and the foreign exchange gap in an open economy.

Table 2.7 Three-Gaps in a SAM Framework

	Capital Accounts of Institutions			All Other Accounts (4)	Σ
	Private (1)	Public (2)	ROW (3)		
Capital Accounts Private (1)	*	R_p	F_p	$S_p - I_p$	$R_p + F_p + S_p - I_p = SS_p + KF$
Public (2)	SS_p	*	F_g	$T - G$	$SS_p + F_g + T - G = R_p + \Delta R$
ROW (3)	KF	ΔR	*	$M - X$	$KF + \Delta R + M - X = F_p + F_g$
All Other Accounts (4)	0	0	0	*	$S_p - I_p + T - G + M - X = 0$
Σ	$SS_p + KF$ = $R_p + F_p + S_p - I_p$	$R_p + \Delta R$ = $SS_p + F_g + T - G$	$F_p + F_g$ = $KF + \Delta R + M - X$	$S_p - I_p + T - G + M - X$ = 0	*

Rearrange the mathematical expressions under 'All Other Accounts' (by presenting this consolidated account on a net basis) to obtain the three-gaps, namely the savings gap, the fiscal gap, and the foreign exchange gap for an open economy as follows:

$$(I_p - S_p) \quad + \quad (G - T) \quad = \quad (M - X) \qquad (2.2)$$

(the savings gap)   *(the fiscal gap)*   *(the foreign-exchange gap)*

In most developing countries, the public sector faces a deficit and the private sector and the rest of the world remain in surplus. The following eq. (2.3), which is derived from eq. (2.2), shows how the deficit of the public sector is financed through the domestic private sector capital surplus and capital transferred from the rest of the world.

$$(S_p - I_p) + (M - X) = (G - T) \qquad (2.3)$$

In the following Table 2.8, column 2 represents the public sector fiscal deficit $(R_p + _\Delta R + G > T)$. The corresponding row 2 reveals that the budget deficit is partially financed by domestic capital transferred from the private sector (SS_p) and the remaining deficit through the capital transferred from the rest of the world (F_g).

Table 2.8 Financing the Public Sector Deficit in a SAM Framework

	Capital Accounts of Institutions			All Other Accounts (4)	Σ
	Private (1)	Public (2)	ROW (3)		
Capital Accounts Private (1)	*	R_p	F_p	$S_p - I_p$	$R_p + F_p + S_p - I_p = SS_p + KF$
Public (2)	SS_p	*	F_g	0	$SS_p + F_g = R_p + _\Delta R + G - T$
ROW (3)	KF	$_\Delta R$	*	M - X	$KF + _\Delta R + M - X = F_p + F_g$
All Other Accounts (4)	0	G - T	0	*	$(S_p - I_p) + (M - X) = (G - T)$
Σ	$\dfrac{SS_p + KF}{=}$ $R_p + F_p + S_p - I_p$	$\dfrac{R_p + _\Delta R + G - T}{=}$ $SS_p + F_g$	$\dfrac{F_p + F_g}{=}$ $KF + _\Delta R + M - X$	$\dfrac{(S_p - I_p) + (M - X)}{=}$ $(G - T)$	*

The following figure depicts how the public sector's deficit is financed through capital transferred from the private sector and rest of the world.

Figure 2.2 Financing of the Public Sector's Deficit

Public sector's deficit

$G-T$
$=$
$SS_p + F_g - R_p - \Delta R$

SS_p

F_g

$R_p + F_p + S_p - I_p - KF$
$=$
SS_p

$KF + \Delta R + M - X - F_p$
$=$
F_g

Private sector's surplus   ROW's surplus
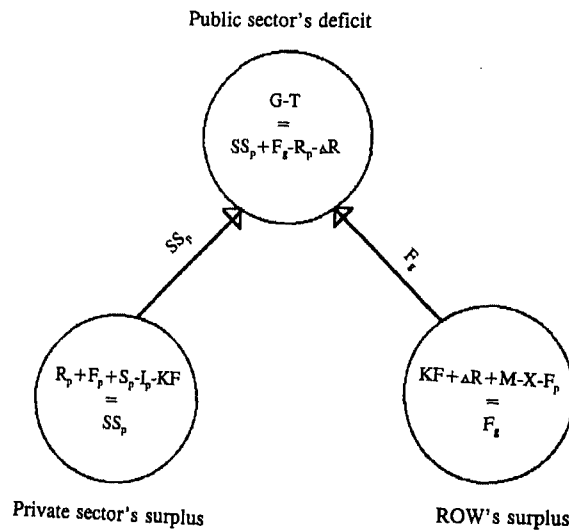
Surplus of the private sector: $R_p + F_p + S_p - I_p - KF = SS_p$

        $+$

Surplus of the ROW: $KF + \Delta R + M - X - F_p = F_g$

        $=$

Deficit of the public sector: $G - T = SS_p + F_g - R_p - \Delta R$

The following Figure 2.3 indicates six possible combinations of three-gaps in an open economy. It reveals that an economy, either developed or developing, must find itself in one out of the six positions depicted in the figure. The possible combinations are as follows:

Figure 2.3 Possible Combinations of Three-Gaps in an Economy
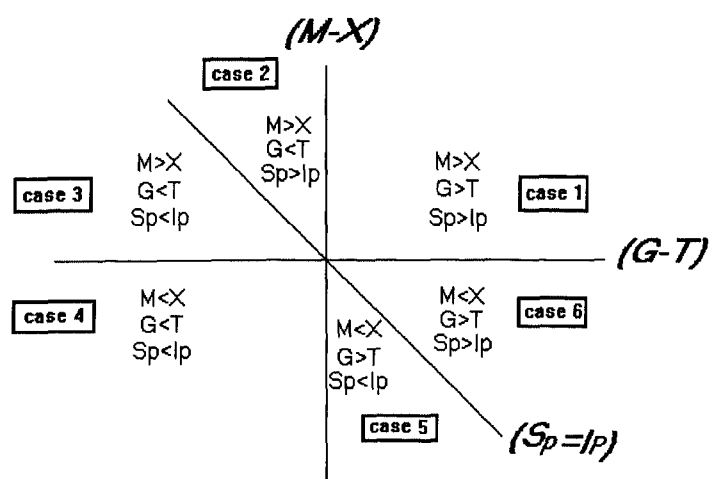
Case 1	M > X	(current account deficit)
	G > T	(public sector deficit)
	$S_p > I_p$	(private sector surplus)

Case 2	M > X	(current account deficit)
	G < T	(public sector surplus)
	$S_p > I_p$	(private sector surplus)

Case 3	M > X	(current account deficit)
	G < T	(public sector surplus)
	$S_p < I_p$	(private sector deficit)

Case 4	M < X	(current account surplus)
	G < T	(public sector surplus)
	$S_p < I_p$	(private sector deficit)

Case 5 $M < X$ (current account surplus)
             $G > T$ (public sector deficit)
             $S_p < I_p$ (private sector deficit)

Case 6 $M < X$ (current account surplus)
             $G > T$ (public sector deficit)
             $S_p > I_p$ (private sector surplus)

Case 1 is the situation (i.e. current account deficit, public sector deficit, and private sector surplus) described in Figure 2.3, which, as we shall show later, corresponds to the actual situation in Pakistan throughout much of the period covered by this enquiry.

2.4   Summary

This chapter has presented the two- and three-gaps of an open economy in a social accounting (SAM) framework. This framework provides a concise picture of the two- and three-gaps and their balances through financial transactions. In the first instance, the classification of various accounts in a SAM is divided into two main parts, namely, 'All Other Accounts' and 'Flow-of-Funds Account.' The 'All Other Accounts' in a SAM capture the private sector saving-investment gap, the public sector fiscal gap, and the current account balance of the balance of payments of an economy. The financial transfers between various sectors are then traced through the flow-of-funds part of the matrix. The flow-of-funds account shows how the savings of a surplus sector are allocated to investment in that sector and the surplus is then transferred to other sectors, which are in deficit. Furthermore, the six possible combinations of three-gaps in an open economy have also been indicated. The analytical framework developed in this chapter will serve three main purposes in the thesis. First, it will be used to derive consistent time-series data on the flow-of-funds and the three-gaps in Pakistan's economy. Second, it will help to describe the historical evolution of the three-gaps and their balances through financial transactions among various sectors. Finally, the consistent time-series data based on the SAM framework will assist in operationalizing the three-gap model developed for Pakistan in later chapters.

Chapter 3

Review of the Two- and Three-Gap Literature

Economists began about 40 years ago to map the linkages between macroeconomic constraints and the rate of growth for developing countries. Gradually, their analysis has become more sophisticated. The development of the two-gap model was thus an important contribution to the literature of economic development. The two-gap model has been widely used by planners in developing countries and donor agencies. It deals with the interaction between the savings constraint and the foreign-exchange constraint in the determination of economic growth in an economy. The savings constraint refers to the situation when the growth of an economy is limited by the availability of domestic savings for investment. A savings gap appears when the domestic saving rate is below the level necessary to permit the investment required to achieve the target rate of growth (while imports are adequate). In this situation, aid covers the savings gap and permits the economy to achieve some exogenous target growth rate. Alternatively, the foreign-exchange constraint refers to the growth of an economy being limited by the availability of foreign-exchange for importing (capital) goods. In this case, aid breaks the import bottleneck and permits the economy to reach the target growth rate. The key assumption here is that the country is unable to transform its domestic savings into imports from abroad. The central idea of the two-gap analysis is that foreign aid can serve as a means of breaking the bottlenecks, thereby permitting fuller utilization of all resources and a continuation of development in an economy. Thus, the distinctive feature of the two-gap model is that foreign capital inflows play a dual role in adding to both investment and foreign exchange resources. In addition, the multiple requirements for external capital to provide additional savings and also to finance required intermediate and

investment imports were highlighted in the two-gap models proposed by various economists. This chapter reviews the mechanisms of the two-gap models proposed by different authors.

The two-gap models that were prominent during the 1960s and the 1970s disappeared from the empirical literature for some time. More recently, however, the two-gap models have been extended into three-gap models -- adding a fiscal constraint to the traditional foreign-exchange constraint and savings constraint as a third gap limiting the growth prospects of highly indebted developing economies. A third gap takes into account the fiscal limitations on policy choice that have become crucial in many developing economies. In such cases, the fiscal constraint is intended to reflect potential limitations on the availability of resources to finance the public investment that may be required to support a given level of output. Hence, some authors consider the government budget constraint to be the most pressing medium-term growth limitation, particularly when a developing country suffers from an external financial shock. Tinbergen (1956), Theil (1958), and Chenery and Bruno (1962) represent a tradition that policy models should contain variables reflecting the economic goals of a society (e.g. maximum income, output growth, and full employment) and the main instruments of government policy (e.g. tax policy, foreign trade policy, investment allocation, exchange control, and foreign borrowing). They also emphasized that a model should be seen as a specification of the important relations connecting these goals and instruments. A three-gap model meets these criteria because it explicitly incorporates output growth and connects the goals and instruments in a meaningful quantitative framework. Accordingly, since we are developing and estimating a three-gap model for Pakistan's economy, we shall present here the salient features of three-gap models developed by Bacha (1990), Taylor (1990b, 1990c, 1993, 1994), and Solimano (1990) in a more detail through a social accounting framework described in Chapter 2. Meanwhile, to provide relevant background, here follow some brief comments on the earlier two-gap literature.

3.1   The Two-gap literature

A formal debate on the two-gap model started with Chenery and Bruno (1962), who extended the Harrod (1939) model, which recognized two binding constraints on growth (namely the supply of labor and the supply of capital) by introducing a third, foreign exchange, constraint on economic growth. Harrod was not unaware of this potential third constraint, but in his writing on the subject he does not take the matter seriously. The policy model developed by Chenery and Bruno (using data for the planning period 1960-65 in the case of Israel) yielded

the following reduced form restrictions for each constraint:

Full-employment equilibrium

$$V_n = 4990(1 - u)/(1 - l_p)^s \qquad (3.1)$$

Savings-investment equilibrium

$$V_n = (2760 + F_n - 4010s)/(0.608 - s) \qquad (3.2)$$

Balance of payments equilibrium

$$V_n = 3.73F_n - 0.38G_n + 5440 \qquad (3.3)$$

where V_n, F_n, and G_n are the gross national product, foreign capital inflows, and government current expenditure for the final planning year 1964-65, respectively, u is the unemployment rate, l_p is an annual increase in labor productivity, and s is the marginal propensity to save. Based on the reduced-form model, they found that the balance of payments -- foreign exchange -- proved to be the binding constraint on economic growth of Israel within the framework of a planning formulation that sought to maximize growth subject to eqs. (3.1 to 3.3) above. In addition, they also found that the productivity of foreign aid in Israel ranged from 0.4 to over 1.0 when foreign exchange was the binding constraint, while it ranged from 0.2 to 0.6 when domestic savings were the limit to growth. Generalizing these results, they argued that the developing countries for which foreign exchange is the binding limit to growth normally show the highest productivity of external aid.

Chenery and Strout (1966) applied a similar programming model to that developed for Israel, using data for the period 1957-62 in the case of fifty developing countries (LDCs). They found their solution of the model suggested two phases. In the first phase, corresponding to a lower development level, these countries faced a savings constraint, which subsequently became a foreign exchange constraint as development progressed. They also calculated aid requirements for fifty LDCs for a given target rate of growth over the period 1962-75. Note that the same study also found that the productivity of foreign aid was much higher when foreign exchange was the limiting factor on Pakistan's economic growth.

Adelman and Chenery (1966) undertook an econometric investigation of the effects of foreign aid on Greece's economic growth using time-series data for the period 1950-61. Using Theil's two-stage least squares method, they found the final estimated equations of their model:

Savings-limited growth

$$V^s_t = 1.078V_{t-1} + 0.3622F_t + 0.0067K_{t-1} - 4390 \qquad (3.4)$$

Import-limited growth

$$V^m_t = 2.61F_t + 344.9P^m_t + 1782T + 9780 \qquad (3.5)$$

where V^s and V^m represent savings-limited and import-limited gross national product, respectively. F is net foreign capital inflows, K is capital stock, P^m is index of the relative price of imports, T is the time trend, and the subscript t indicates the time period. Based on the functions estimated above, Adelman and Chenery found that, for the period up to 1957, savings were the binding constraint on growth, while the import-export gap became increasingly dominant thereafter. The import-limited growth function reported in eq. (3.5) above shows that when savings and investment are not a limitation on growth, the productivity of an additional unit of external assistance is 2.61 -- while it is only 0.36 in eq. (3.4) when the savings constraint is binding.

A study of Pakistan by Chenery and MacEwan (1966) used linear programming to project the optimal patterns of growth and aid for the period 1963-85. For the investigation of binding constraints, they divided the whole period (1963-85) into three regimes, namely, 1963-75 (regime I), 1977-81 (regime II), and 1982-85 (regime III). They found a capacity constraint on total investment to be binding on growth in regime I and a foreign exchange constraint in regime II. A third regime (regime III) finally mentioned in the years when foreign aid was required to end.

Mckinnon (1964) provided a general conceptual framework showing how both trade possibilities and foreign capital transfers affect the growth process in developing economies. His study clarified the basic economic principles underlying the foreign exchange and savings constraints on target growth rates. Mathematically, the two-gap model described by Mckinnon is as follows:

Foreign exchange constraint

$$\omega = \beta(\epsilon + f) \quad if \quad \beta(\epsilon + f) < \sigma(s + f) \qquad (3.6)$$

Savings constraint

$$\omega = \sigma(s + f) \quad if \quad \beta(\epsilon + f) > \sigma(s + f) \qquad (3.7)$$

where ω is the maximum feasible growth rate, σ is the output-capital ratio, s is the average

propensity to save, f is foreign transfers as a fraction of national income, β is the share of imported capital for producing one additional unit of output, and ϵ is average propensity to export with respect to output. Following Chenery and Bruno (1962), Mackinnon argued that when the foreign exchange constraint holds, foreign aid transfers will always have a proportionately greater effect on the feasible growth rate than if the savings constraint holds.

Landau (1971) adopted a different method for identifying the binding constraint for eighteen Latin American countries over the period 1950-66. He abandoned the programming framework of previous authors and relied instead on ex-post saving functions and import functions as follows:

$$S = \alpha_0 + \alpha_1 Y + \alpha_2 F \qquad (3.8)$$

$$M = \beta_0 + \beta_1 Y + \beta_2 F \qquad (3.9)$$

where S is gross national savings, Y is gross national product, F is net foreign capital inflows, M is imports of goods and services, and X is exports of goods and services. Using the format set out in Table 2.4 (Chapter 2), Landau's two-gap model can be presented in a social accounting matrix as set out in Table 3.1. The mathematical expressions for the row and column totals of Table 3.1 can be written as follows:

$$F + (\alpha_0 + \alpha_1 Y + \alpha_2 F) - I = 0 \qquad (3.10)$$

$$(\beta_0 + \beta_1 Y + \beta_2 F) - X = F \qquad (3.11)$$

$$(\alpha_0 + \alpha_1 Y + \alpha_2 F) - I + (\beta_0 + \beta_1 Y + \beta_2 F) - X = 0 \qquad (3.12)$$

Since one of these three equations is implied by the other two, one equation can be dropped from this system. Landau chose to drop eq. (3.12) and to focus his analysis on eqs. (3.10) and (3.11). At the next stage in his analysis, Landau assumed that each economy would operate in one of the two modes with:

$$\alpha_2 = 0 \; if \; I - (\alpha_0 + \alpha_1 Y + \alpha_2 F) > (\beta_0 + \beta_1 Y + \beta_2 F) - X \qquad (3.13)$$
$$and$$
$$\beta_2 = 0 \; if \; I - (\alpha_0 + \alpha_1 Y + \alpha_2 F) < (\beta_0 + \beta_1 Y + \beta_2 F) - X \qquad (3.14)$$

Hence it would be possible to infer from empirical estimates of α_2 and β_2 for individual countries in different time periods which of the two modes was operative. On this basis, Landau identified eight countries (Bolivia, Chile, Colombia, Dominican Republic, Guatemala, Nicaragua, Panama, and Uruguay) that were facing a binding foreign-exchange

Table 3.1   Landau's Two-Gap Model in a SAM

	Capital Accounts		All Other Accounts	Σ
	Domestic Economy	ROW		
Cap. Accounts Domestic Economy	*	F	$(\alpha_0+\alpha_1 Y+\alpha_2 F)$-I	F$+(\alpha_0+\alpha_1 Y+\alpha_2 F)$-I$=0$
ROW	0[1]	*	$(\beta_0+\beta_1 Y+\beta_2 F)$-X	$(\beta_0+\beta_1 Y+\beta_2 F)$-X$=$F
All Other Accounts	0	0	*	$(\alpha_0+\alpha_1 Y+\alpha_2 F)$-I $+(\beta_0+\beta_1 Y+\beta_2 F)$-X $=$ 0
Σ	0$=$F$+(\alpha_0+\alpha_1 Y+\alpha_2 F)$-I F$=(\beta_0+\beta_1 Y+\beta_2 F)$-X		$(\alpha_0+\alpha_1 Y+\alpha_2 F)$-I $+(\beta_0+\beta_1 Y+\beta_2 F)$-X $=$ 0	*

[1] It is assumed that there is no capital flight to the ROW.

constraint, while a savings constraint appeared in the case of four countries (Brazil, Paraguay, Peru, and Venezuela) over the period 1950-66. The remaining six countries (Costa Rica, Honduras, Argentina, Ecuador, El Salvador, and Mexico) appeared to have alternated between the two situations for the same period.

Weisskopf (1972a) examined binding constraints on growth for thirty seven developing countries using time-series data over the period 1953-68. The behavioral functions of his model are as follows:

$$S = \alpha_0 + \alpha_1 Y + \alpha_2 F + \alpha_3 X \qquad (3.15)$$
$$M = \beta_0 + \beta_1 Y + \beta_2 I \qquad (3.16)$$

where S is gross national savings, Y is gross national product, F is the net foreign capital inflow, M is imports of goods and services, X is exports of goods and services, and I is gross domestic investment. Like Landau's model, Weisskopf's two-gap model can also be summarized in a SAM framework. Incorporating behavioral functions (3.15) for S and (3.16) for M in Table 2.4 (Chapter 2) yields the following Table 3.2.

Table 3.2 Weisskopf's Two-Gap Model in a SAM

	Capital Accounts		All Other Accounts	Σ
	Domestic Economy	ROW		
Cap. Accounts Domestic Economy	*	F	$(\alpha_0+\alpha_1Y+\alpha_2F+\alpha_3X)\text{-}I$	$F+(\alpha_0+\alpha_1Y+\alpha_2F+\alpha_3X)\text{-}I=0$
ROW	0^1	*	$(\beta_0+\beta_1Y+\beta_2I)\text{-}X$	$(\beta_0+\beta_1Y+\beta_2I)\text{-}X=F$
All Other Accounts	0	0	*	$(\alpha_0+\alpha_1Y+\alpha_2F+\alpha_3X)$ $\text{-}I+(\beta_0+\beta_1Y+\beta_2I)\text{-}X$ $=$ 0
Σ	$0=F+(\alpha_0+\alpha_1Y+\alpha_2F+\alpha_3X)\text{-}I$	$F=(\beta_0+\beta_1Y+\beta_2F)\text{-}X$	$(\alpha_0+\alpha_1Y+\alpha_2F+\alpha_3X)$ $\text{-}I+(\beta_0+\beta_1Y+\beta_2I)\text{-}X$ $=$ 0	*

[1] It is assumed that there is no capital flight to the ROW.

The mathematical expressions for the row and column totals of Table 3.2 can be written as follows:

$$F + (\alpha_0 + \alpha_1Y + \alpha_2F + \alpha_3X) - I = 0 \qquad (3.17)$$

$$(\beta_0 + \beta_1Y + \beta_2I) - X = F \qquad (3.18)$$

$$(\alpha_0 + \alpha_1Y + \alpha_2F + \alpha_3X) - I + (\beta_0 + \beta_1Y + \beta_2I) - X = 0 \qquad (3.19)$$

Weisskopf treated eq. (3.19) as being redundant and then developed the following hypotheses based on eqs. (3.17) and (3.18) to discover the binding constraints on growth in thirty-seven developing countries. A rearrangement of eqs. (3.17) and (3.18) yields, respectively, eqs. (3.20) for the savings constraint and (3.21) for the foreign-exchange constraint.

Savings constraint

$$I = \alpha_0 + \alpha_1Y + (1+\alpha_2)F + \alpha_3X \qquad (3.20)$$

with $\alpha_1 \geq 0$, $(1+\alpha_2) \leq 1$, and $\alpha_3 \geq 0$ (savings constraint)

Foreign-exchange constraint

$$I = - (\beta_0/\beta_2) - (\beta_1/\beta_2)Y + (1/\beta_2)X + (1/\beta_2)F \qquad\qquad (3.21)$$
$$\text{with } - (\beta_1/\beta_2) < 0 \text{ and } (1/\beta_2) > 1 \qquad \text{(foreign-exchange constraint)}$$

Based on ordinary least squares estimates of eqs. (3.20) and (3.21), Weisskopf found that twenty-three developing countries had been subject to a savings constraint on growth. Eight countries were dominated by a foreign exchange constraint and the remaining six countries were characterized by a hybrid savings and foreign-exchange constraint.

Similarly, Levy (1984) investigated the dominant binding constraint in the case of the Egyptian economy, using the same test suggested by Weisskopf (1972a). He found that saving was the binding constraint for Egyptian economic growth during the period 1960-79.

Blomqvist (1976) criticized Weisskopf's econometric test and argued that it provides no clear-cut criterion for finding binding constraints in developing countries. He suggested an alternative method of computing F-ratios from the estimated functions as specified by Weisskopf (1972a). In order to make the results comparable with those obtained by Weisskopf, Blomqvist used the same data set covering the same thirty-three developing countries. He found that twenty-four countries could be classified as savings constrained economies, while two countries were facing a dominant foreign-exchange constraint and seven countries remained unclassified. Thus, the results obtained by Blomqvist generally supported Weisskopf's main conclusion that most developing countries were facing a savings constraint during the period under consideration.

Waelbroeck (1984) recognized the potential importance of those criticisms of the two-gap model [developed by Chenery and Bruno (1962)], which stressed the fixed-price nature of their model. He therefore set out to compare the theoretical properties of their model with those of the labor-income-floor (LIF) model hinted at many years ago by Lewis. The LIF hypothesis stresses the resistance of labor unions to cuts in their per capita incomes. Waelbroeck concluded that if production is highly sensitive to prices and the trade balance is fairly sensitive, then the properties of the LIF model turn out to be rather similar to those of the two-gap model. He argued that the properties of the two-gap model can, therefore, be interpreted in terms of a fixed-price general equilibrium framework.

Bacha (1984) developed a more policy-oriented two-gap model for pedagogic purposes, from which he derived the following equations for the savings constrained growth rate (g^s) and the foreign-exchange constrained growth rate (g^f).

Savings constraint

$$g^s = [a/(1 - m_k)](m_j + s) - [a/(1 - m_k)]e \qquad (3.22)$$

Foreign-exchange constraint

$$g^f = [as/(m_k s + m_j)]e + [a(m_j + s)/(m_k s + m_j)]f \qquad (3.23)$$

In these expressions, a is the output-capital ratio, m_k is the capital goods import coefficient, m_j is the intermediate goods import coefficient, s is the marginal propensity to save, e is the ratio of net exports to potential output, and f is the foreign capital transfers to potential output ratio. Bacha then argued that for given values of all right-hand variables in both the equations, growth should be considered to be savings constrained if $g^s < g^f$, and foreign-exchange constrained if $g^f < g^s$.

Finally, note that van Wijnbergen (1986) developed a simple open economy macro model and compared its implications with those of the two-gap model. He suggested that a binding-trade gap should be seen as an excess supply of non-traded goods and an excess demand for traded goods. Similarly, a binding-savings gap should be interpreted as an excess demand for non-traded goods and an excess supply of traded goods.

3.1.1 Critiques of the two-gap literature

Two-gap models have been subject to a number of general criticisms and some directed more specifically at their application to analyzing the impact of foreign aid on economic growth in developing countries. This section summarizes the main critiques by various authors on the two-gap literature.

Bruton (1969) criticized the two-gap model developed by Chenery and his followers by claiming that aid is gap-producing instead of gap covering. He argued that aid can impede rather than facilitate development in recipient countries. Bruton suggested a number of reasons for this, some of which can be summarized here. He argued, for example, that the savings rate is flexible and that savings can be converted into foreign-exchange and there need be no trade gap distinct from the savings gap. Similarly, if a developing country has its own capital goods sector, then it may transform a part of its domestic savings into capital without going through international trade. Hence, the rate of capital formation required to reach the targeted rate of growth of output can be achieved without increasing the availability of foreign-exchange. Hence a scarcity of foreign-exchange reflected a failure in the past to build up capacity in the production of capital goods. He also criticized the fact that two-gap

models do not incorporate investment in human capital i.e., the use of resources to improve education, health, and technical research, which are also a form of capital formation. Accordingly, he urged that two-gap models should include all activities which have the effect of increasing the productive capacity of an economy. A third objection he raised was that some versions of the models ignored imports of raw materials, spare parts, and consumer goods.

Following a somewhat different line of attack, Griffin and Enos (1970) argued that the empirical foundations of Chenery-Strout type two-gap models were quite weak. Unlike Chenery and his followers, they found a negative relationship between the GNP growth rate and foreign aid in developing countries. They also found an inverse relationship between foreign savings and domestic savings in aid-recipient countries. Though they estimated many functions, only the two main findings of their study are reported here.

Growth function

$$Y_g = 42.97 - 6.78(A/Y)$$ (3.24)

Savings function

$$Sd/Y = 11.2 - 0.73(Sf/Y)$$ (3.25)

The above growth function reported in eq. (3.24) was estimated for twelve Latin American countries for the period 1957-64. It shows a strong negative relationship between GNP growth rate (Y_g) and a ratio of foreign aid to GNP (A/Y). Similarly, the estimated saving function reported in eq. (3.25) shows that domestic savings as a percentage of GNP (Sd/Y) are inversely related to foreign savings as a ratio to GNP (Sf/Y) for thirty-two developing countries during the period 1962-64. Similar results were also reported in Griffin (1970). On the basis of these results, Griffin and Enos argued that foreign savings and domestic savings are substitutable resources; thus there is no additional input from foreign savings. They concluded that foreign aid may not only lead to lower domestic savings but it may also retard long-run economic growth by altering the composition of investment. They found that a large proportion of foreign assistance sponsored by the public sector was channeled into non-productive activities in developing countries. They argued that the growth rates of recipient countries may be further hampered when aid is tied to expensive purchases in the lending countries. They also emphasized that foreign capital inflows to the public sector may enhance public current consumption (e.g. higher salaries of civil servants and

great social security benefits) and stimulate consumption of importables and exportables.

But the findings of Griffin and Enos did not gain general acceptance. Critics [for example, Eshag (1971)] argued that Griffin's empirical analysis suffered from severe econometric specification errors and had a weak theoretical foundation. Moreover, White (1992) provided a comprehensive critical review of the dual-gap models and argued that the basis for denying a relationship between aid and growth in the context of the dual-gap model is weak.

Joshi (1970) argued that the distinction between a savings constraint and foreign-exchange constraint is of limited use from the perspective of pure trade theory. He contended that the distinction must be based on extreme assumptions if it is to have any empirical content, which would reduce its value as a classification of reality. He argued that it might have some limited uses in a rough short-run calculation of aid requirements (though the institutional assumptions need to be examined carefully) but, over the longer run, aid is positively harmful. This analysis has largely been superseded by that of van Wijnbergen, which has previously been noted.

Weisskopf (1972b) estimated separate saving functions for seventeen developing countries using time-series data over the period 1953-64. The specified savings function is as follows:

<u>*Savings function*</u>

$$S = \alpha_0 + \alpha_1 Y + \alpha_2 F + \alpha_3 X \qquad (3.26)$$

where S is ex-ante gross domestic savings, Y is gross domestic product, F is net foreign capital inflows, and X is total exports of goods and services. The numerical results of the above savings function reported in eq. (3.26) supported the hypothesis put forwarded by Griffin and Enos (1970) -- that the impact of foreign capital inflow on ex-ante domestic savings was significantly negative. Foreign savings, therefore, appeared to be substituted for domestic savings in the sample countries. Weisskopf also pointed out that the negative impact of foreign capital inflow on domestic savings applied only to ex-ante domestic savings but not necessarily to ex-post savings. He argued that when a trade constraint is binding, the impact of foreign capital inflow on ex-post savings is more likely to be positive, since external resources help to relieve the independent limitation on investment imposed by a shortage of specific required imports.

Findlay (1973) criticized the two-gap literature for its neglect of relative prices. Using

a graphical presentation, he (as had Joshi before him) examined the foreign-exchange constraint doctrine from the standpoint of the pure theory of international trade. He argued that spare domestic capacity will occur in countries in which the foreign-exchange constraint is binding. This implies that imports for investment purposes can increase by the full amount of foreign aid. Findlay also pointed out that the growth-promoting effect of foreign aid will thus be higher in the case of a savings constraint.

Voivodas (1973) examined two important underlying assumptions that appeared in some versions of the two-gap model: (a) the entire amount of foreign capital inflows is devoted to domestic capital formation and (b) the incremental capital-output ratio does not change when the inflows of foreign capital take place. Both these assumptions of the two-gap model had previously come under attack by various authors. Voivodas estimated the following specified functions over the period 1956-67 to test the assumptions stated above. Pooled time-series cross-section data were used for twenty-two developing countries. The estimated functions are as follows:

<u>Growth function</u>
$$Y_g = \beta_0 - 0.013 \ (F_t/Y) \qquad\qquad\qquad (3.27)$$
$$(0.201)$$

<u>Capital-output ratio function</u>
$$g = \alpha_0 + 5.552 \ (F_t/Y) \qquad\qquad\qquad (3.28)$$
$$(5.219)$$

where Y and Y_g are real gross domestic product (GDP) and its growth, respectively. F is real foreign capital inflows and g is the incremental capital-output ratio. The numbers in parentheses denote t-values. Voivodas found from the estimated results of eq. (3.28) that foreign capital inflow was associated with a higher overall incremental capital-output ratio, which also confirmed the proposition put forward by Griffin and Enos (1970). Furthermore, the empirical results of eq. (3.27) did not indicate a significant positive relationship between foreign capital inflows and the output growth rate, as is predicted in the two-gap model. Voivodas drew the implication from these results that the ordinarily beneficial effect of foreign capital inflow on domestic growth tends to be neutralized either by a substantial spillover of foreign capital inflows to consumption or a pronounced increase in the incremental capital-output ratio or both.

An empirical study undertaken by Mosley (1980) supported the Griffin-Enos hypothesis that external aid does not contribute to economic growth of developing countries.

He estimated various growth and foreign aid functions, taking cross-section data for the period 1970-77 for eighty-three LDCs. The estimated results are as follows:

Growth function

$$Y_g = 5.00 - 1.08(A/Y)_{l.5} - 0.34(OF/Y)_{l.5} + 0.10(S/Y)$$
$$\quad\;\; (3.43) \;\; (1.74) \qquad\quad (0.93) \qquad\quad (2.43)$$

$$(3.29)$$

Foreign aid function

$$A/Y = 3.63 - 0.11(S/Y)$$
$$\quad\;\;\; (9.46) \;\; (5.08)$$

$$(3.30)$$

where Y_g is the average annual growth rate of real gross domestic product (Y) and S is gross domestic savings. A is net disbursements of concessional assistance and OF is total net disbursements of financial flows (other than aid). The numbers in parentheses denote t-values. The growth function reported in eq. (3.29) shows a negative correlation between aid and growth, while a strong negative correlation between aid and savings is also evident from eq. (3.30). These results are suggestive but hardly pervasive.

Gunning (1983) provided an analysis in depth of the fixed price assumption implicit in the two-gap model. His formal analysis concluded that the two-gap model cannot be reproduced as a fixed price equilibrium system and that it gives an incomplete description of how agents behave in an economy. This result, therefore, conflicts with that of Waelbroeck (1984), who argued that the properties of the two-gap model can be interpreted in terms of fixed price general equilibrium theory.

3.2   The three-gap literature

Since we will be developing and estimating a three-gap model for Pakistan's economy, we will describe here in more detail the salient features of three-gap models developed by various authors [namely Bacha (1990), Taylor (1990b, 1990c, 1993), and Solimano (1990)].

(i)   Bacha's three-gap model (1990)

Bacha (1990) developed a simplified theoretical framework of a three-gap model for an open economy. This model paid particular attention to the impact of foreign transfers on potential output growth and on the rate of inflation of a debtor country. A theoretical discussion is also provided on the possible role of external conditionalities designed to maximize the stabilization and other desirable impacts of debt reduction measures. This model can

appropriately be summarized in a social accounting framework and this form of presentation is also relevant to later chapters. Basic identities of the model, which underlie the three-gap model, are framed in the following social accounting matrix (SAM). For the sake of comparison, the same notations are used in all the three-gap models that will be discussed; some of the notations used here will thus differ from the notations used in the models by Bacha, Taylor, and Solimano.

Table 3.3   Accounting Identities in Bacha's Model

| | Capital Accounts | | | | |
	Private	Public	ROW	All Other Accounts	Σ
Capital Account Private	*	0	0^2	S_p	S_p
Public	SS_p	*	$F_g{}^1$	S_g	I_g
ROW	0^3	0^4	*	$M + J - X$	F
All Other Accounts	I_p	I_g	0	*	I
Σ	S_p	I_g	F	I	*

[1] It is assumed that whole amount of foreign capital inflows is owed by the public sector.
[2] It is zero because of note 1.
[3] It is assumed that there is no private capital flight.
[4] Change in official foreign exchange reserves is netted out of the capital account of the balance of payments to obtain the net value of capital inflows.

Mathematical expressions for the row and column totals of Table 3.3 can be written as follows:

row equations

$$S_p = S_p \qquad\qquad (3.31)$$
$$I_g = SS_p + F_g + S_g \qquad\qquad (3.32)$$
$$F = M + J - X \qquad\qquad (3.33)$$
$$I = I_p + I_g \qquad\qquad (3.34)$$

column equations

$$S_p = SS_p + I_p \tag{3.35}$$

$$I_g = I_g \tag{3.36}$$

$$F = F_g \tag{3.37}$$

$$I = S_p + S_g + M + J - X \tag{3.38}$$

Equalizing row and column sums now yields the following expressions:

$S_p = SS_p + I_p$	*(redundant: implicit in eqs. 3.40 - 3.42)*	*(3.39)*
$I_g = SS_p + F_g + S_g$	*(the fiscal constraint)*	*(3.40)*
$M + J = F + X$	*(the foreign-exchange constraint)*	*(3.41)*
$I_p + I_g = S_p + S_g + F$	*(the savings constraint)*	*(3.42)*

Equation (3.39) implies that private savings (S_p) are used to finance investment (I_p) and that the remaining private capital surplus (SS_p) is transferred to the public sector to partially fulfill its budgetary requirement. Equation (3.40) shows that public investment (I_g) is financed through its own savings (S_g), capital transfers from the private sector (SS_p), and capital transfers from the rest of the world (F_g). Equation (3.41) reveals that imports of goods (M) plus factor and non-factor service payments to the rest of the world (J) are financed through export earnings (X) and foreign savings (F). The conventional saving-investment balance is reported in eq. (3.42); thus private plus public investment ($I_p + I_g$) is equal to the sum of private savings, public savings, and foreign savings. Equations (3.40 - 3.42) represent three constraints: the fiscal constraint, the foreign-exchange constraint, and the savings constraint, respectively. Equation (3.39) is treated as redundant because it can be obtained from eqs. (3.40 - 3.42). In sum, there are three linearly independent equations (3.40 - 3.42) in nine variables (S_p, I_p, SS_p, I_g, F, S_g, M, X, J). Bacha specified the following simple behavioral equations of the model.

$$M = M_c + M_k \tag{3.43}$$

$$M_k = \theta_l I \qquad 0 < \theta_l < 1 \tag{3.44}$$

$$I = I_p + I_g \tag{3.45}$$

$$I_p = \gamma_2 I_g \qquad \gamma_2 > 0 \tag{3.46}$$

$$\therefore I = (1 + \gamma_2) I_g$$

$$SS_p = f(p,h) \tag{3.47}$$

A brief description of the mathematical expressions in eqs. (3.43 - 3.47) is as follows.

Equation (3.43) shows that total imports of goods (M) are divided into two types: capital goods imports (M_k) and other imports (M_c). The coefficient θ_1 in eq. (3.44) is the import content of total investment (I). Equation (3.45) shows that total investment (I) is equal to private investment (I_p) and public investment (I_g). In eq. (3.46), Bacha assumes that private investment (I_p) depends positively on public investment (I_g); the coefficient $\gamma_2 > 0$ reflects, therefore, the crowding-in hypothesis. In eq. (3.47), the private sector's capital surplus (SS_p) is assumed to be a function of the rate of inflation (p) and the propensity to hoard (h). It is expected that the private capital surplus first increases with inflation but eventually decreases with it. The propensity to hoard is assumed to be negatively related to private surplus savings. Bacha also assumes that no market exists for government bonds, which leaves money expansion as the only alternative for domestic financing of the public sector deficit.

The mathematical expressions in eqs. (3.43 - 3.47) yield five new equations in six variables (I, θ_1, γ_2, f, M_c, M_k). In sum, there are eight linearly independent eqs. (3.40 - 3.47) in fifteen variables (S_p, I_p, SS_p, I_g, S_f, S_g, M, X, I, θ_1, γ_2, f, M_c, M_k, J), which gives seven degrees of freedom (the difference between number of variables and number of equations). The above specified behavioral functions reported in eqs. (3.43 - 3.47) are incorporated in the following Table 3.4.

Table 3.4   Accounting Identities and Behavioral Equations in Bacha's Model

	Capital Accounts			All Other Accounts	Σ
	Private	Public	ROW		
Capital Account Private	*	0	0	S_p	S_p
Public	f(p,h)	*	F_g	S_g	I_g
ROW	0	0	*	$M_c + \theta_1(1+\gamma_2)I_g + J - X$	F
All Other Accounts	$\gamma_2 I_g$	I_g	0	*	$(1+\gamma_2)I_g$
Σ	S_p	I_g	F	$(1+\gamma_2)I_g$	*

Table 3.4 reproduces Table 3.3, but with M, M_k, I, I_p, and SS_p replaced by their specifications given in eqs. (3.43 - 3.47). Table 3.4, therefore, yields the following row and column equations.

row equations

$$S_p = S_p \tag{3.48}$$

$$I_g = f(p,h) + F_g + S_g \tag{3.49}$$

$$F = M_c + \theta_1(1+\gamma_2)I_g + J - X \tag{3.50}$$

$$(1+\gamma_2)I_g = (1+\gamma_2)I_g \tag{3.51}$$

column equations

$$S_p = f(p,h) + \gamma_2 I_g \tag{3.52}$$

$$I_g = I_g \tag{3.53}$$

$$F = F_g \tag{3.54}$$

$$(1+\gamma_2)I_g = S_p + S_g + M_c + \theta_1(1+\gamma_2)I_g + J - X \tag{3.55}$$

Equating of the row and column sums now gives the following mathematical expressions.

$$S_p = f(p,h) + \gamma_2 I_g \qquad \text{(redundant: implicit in eqs. 3.57 - 3.59)} \tag{3.56}$$

$$I_g = f(p,h) + F_g + S_g \qquad \text{(the fiscal constraint)} \tag{3.57}$$

$$F + X = M_c + \theta_1(1+\gamma_2)I_g + J \qquad \text{(the foreign-exchange constraint)} \tag{3.58}$$

$$(1+\gamma_2)I_g = S_p + S_g + F \qquad \text{(the savings constraint)} \tag{3.59}$$

Equations (3.57 - 3.59) represent three linearly independent equations in ten variables (S_p, f, I_g, F, S_g, M_c, J, X, θ_1, γ_2), leaving seven degrees of freedom (as before). Equations (3.57 - 3.59) represent the three constraints again as before, respectively, the fiscal constraint, the foreign-exchange constraint, and the savings constraint. Equation (3.56) is treated as redundant because it can be obtained from eqs. (3.57 - 3.59). Each of the three independent eqs. (3.57 - 3.59) can now be expressed as an equation determining the level of public investment (I_g) as follows:

$$I_g = f(p,h) + F + S_g = I_g^F \qquad \text{(the fiscal constraint)} \tag{3.60}$$

$$I_g = [1/\theta_1(1+\gamma_2)]\{X + F - M_c - J\} = I_g^E \qquad \text{(the foreign-exchange constraint)} \tag{3.61}$$

$$I_g = [1/(1+\gamma_2)]\{S_p + F + S_g\} = I_g^S \qquad \text{(the savings constraint)} \tag{3.62}$$

Table 3.5   Notation and Definition in Bacha's Model

Notation	Definition
F	Net aggregate foreign capital inflows
F_g	Foreign capital inflows to the public sector ($F_g = F$)
h	Propensity to hoard money
I	Total gross investment
I_p	Private investment
I_g	Public investment
J	Net foreign factor and non-factor services payments
M	Imports of goods
M_k	Imports of capital goods
M_c	Other imports (defined as $M - M_k$)
p	Rate of inflation
S_p	Private savings
SS_p	Surplus savings of the private sector
X	Exports of goods
θ_1	Import content of investment
γ_2	Coefficient of crowding-in hypothesis

Thus I_g^F, I_g^E, and I_g^S as defined in eqs. (3.60 - 3.62) are all alternative expressions for I_g that correspond to the three independent constraints (3.57 - 3.59). Since total investment (I) is specified as $I = (1+\gamma_2)I_g$, in eq. (3.46) it follows that eqs. (3.60 - 3.62) can also be expressed as three equations determining I as follows:

$$I = (1+\gamma_2) [f(p,h) + F + S_g] = I^F \qquad \text{(the fiscal constraint)} \qquad (3.63)$$

$$I = (1/\theta_1)[X + F - M_c - J] = I^E \qquad \text{(the foreign-exchange constraint)} \qquad (3.64)$$

$$I = [S_p + F + S_g] = I^S \qquad \text{(the savings constraint)} \qquad (3.65)$$

Bacha defines net exports as $E = X - M_c$ and assumes that E cannot exceed a critical level of net exports denoted by E^*, given by the world demand. He also defines the potential level of private savings (S^*_p) at the potential level of private income (Y^*_p). Finally, Bacha puts a limit on $\gamma_2 \leq \gamma^*_2$. These new variables and inequalities are incorporated in eqs. (3.63 - 3.65) as follows:

$$I \leq (1+\gamma^*_2) [f(p,h) + F + S_g] = I^F \qquad \text{(the fiscal constraint)} \qquad (3.66)$$

$$I \leq (1/\theta_1)[E^* + F - J] = I^E \qquad \text{(the foreign-exchange constraint)} \qquad (3.67)$$

$$I \le [S^*_p + F + S_g] = I^s \qquad \text{(the savings constraint)} \qquad (3.68)$$

Thus the three-gap model developed by Bacha provides a conceptual framework of interactions among the three-gaps in an open economy, which emphasizes the scope for maximization of investment (as a proxy for the output growth rate) in a fixed-price one-period growth model subject to a number of equality and inequality constraints. Within the model's context, Bacha claims that the fiscal constraint tends to be the relevant medium-term growth limitation, when the developing economy suffers an external financial shock.

(ii) Taylor's three-gap model (1990b, 1990c, 1993)

Taylor (1990b, 1990c, 1993) developed a three-gap model to analyze the effectiveness of various economic policies on output growth in seventeen developing economies.[7] Adopting a model similar to that of Bacha, Taylor developed a three-gap model that can also be presented in a social accounting framework. The basic accounting identities of the model are framed in the following social accounting matrix (SAM).

As compared to Bacha's model, Taylor's formulation provides more details, particularly with the flow-of-funds part of the above matrix. Table 3.6 shows that aggregate foreign capital inflows are divided into two components: foreign capital inflows to the private sector (F_p) and foreign capital inflows to the public sector (F_g). Taylor also incorporates private capital flight (KF) in his model, while Bacha assumes that there is no private capital flight to the rest of world. Mathematical expressions for the row and column totals of Table 3.6 can be written as follows:

row equations

$$S_p + F_p = S_p + F_p \qquad (3.69)$$

$$I_g = SS_p + F_g + S_g \qquad (3.70)$$

$$F = KF + M + J - X \qquad (3.71)$$

$$I = I_p + I_g \qquad (3.72)$$

column equations

$$S_p + F_p = SS_p + KF + I_p \qquad (3.73)$$

$$I_g = I_g \qquad (3.74)$$

$$F = F_p + F_g \qquad (3.75)$$

$$I = S_p + S_g + M + J - X \qquad (3.76)$$

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[7] Pakistan is not included in this study.

Table 3.6   Accounting Identities in Taylor's Model

| | Capital Accounts | | | All Other Accounts | Σ |
	Private	Public	ROW		
Capital Accounts Private	*	0	F_p	S_p	$S_p + F_p$
Public	SS_p	*	F_g	S_g	I_g
ROW	KF	0^1	*	M + J - X	F
All Other Accounts	I_p	I_g	0	*	I
Σ	$S_p + F_p$	I_g	F	I	*

¹ Change in foreign exchange reserves is included in M.

Equalize row and column sums to get the following expressions:

$$S_p + F_p = SS_p + KF + I_p \qquad \text{(redundant: implicit in eqs. 3.78 - 3.80)} \quad (3.77)$$
$$I_g = SS_p + F_g + S_g \qquad \text{(the fiscal constraint)} \quad (3.78)$$
$$M + J + KF = F_g + F_p + X \qquad \text{(the foreign-exchange constraint)} \quad (3.79)$$
$$I_p + I_g = S_p + S_g + F_g + F_p \qquad \text{(the savings constraint)} \quad (3.80)$$

Equation (3.77) reveals that total available funds to the private sector are its own savings (S_p) plus foreign capital inflows (F_p). These funds are used for that sector's own investment (I_p) and the remaining surplus capital is transferred to the public sector (SS_p) to partially meet its budgetary requirement, and as capital flight to the rest of the world (KF). Eq. (3.78) shows that public investment (I_g) is financed through its own savings (S_g), capital transfers from the private sector (SS_p), and capital transfers from the rest of the world (F_g). Eq. (3.79) reveals that imports of goods (M) plus private capital flight plus net foreign payments for factor and non-factor services (J) are financed through export earnings (X) and

foreign savings received by the private and public sectors. The conventional saving-investment balance is reported in eq. (3.80); that is, private plus public investment $(I_p + I_g)$ is equal to the sum of private savings, public savings, and foreign savings received by the private and public sectors. Eqs. (3.78 - 3.80) represent three constraints: respectively, the fiscal constraint, the foreign-exchange constraint, and the savings constraint. Eq. (3.77) is treated as redundant because it can be obtained from eqs. (3.78 - 3.80). In sum, there are three linearly independent equations (3.78 - 3.80) in eleven variables $(S_p, S_g, F_p, F_g, I_p, I_g, SS_p, KF, M, J, X)$. Taylor specifies the following behavioral equations in his model.

$$S_p = \sigma_0 Y^* + \sigma_1 Y - \sigma_2 F_p \qquad \sigma_0 > 0,\ \sigma_1 > 0,\ \sigma_2 < 0 \qquad (3.81)$$

$$S_g = \alpha_0 Y^* + \alpha_1 Y \qquad \alpha_0 > 0,\ \alpha_1 > 0 \qquad (3.82)$$

$$M = M_c + M_k + M_l \qquad (3.83)$$

$$M_l = \beta_0 Y^* + \beta_1 Y \qquad \beta_0 > 0,\ \beta_1 > 0 \qquad (3.84)$$

$$M_k = \theta_1 I \qquad \theta_1 < 1 \qquad (3.85)$$

$$X = \varepsilon_0 Y^* + \varepsilon_1 Y \qquad \varepsilon_0 > 0,\ \varepsilon_1 > 0 \qquad (3.86)$$

$$I = I_p + I_g \qquad (3.87)$$

$$I_p = \gamma_0 Y^* + \gamma_1 Y + \gamma_2 I_g \qquad \gamma_0 \gtrless 0,\ \gamma_1 > 0,\ \gamma_2 > 0 \qquad (3.88)$$

$$\therefore I = \gamma_0 Y^* + \gamma_1 Y + (1 + \gamma_2) I_g$$

In the private saving function reported in eq. (3.81), the coefficient σ_1 is the marginal saving rate with respect to actual output (Y) and is assumed to be positive. An expected negative value of σ_2 implies that capital inflows to the private sector partially substitute for domestic savings along the lines of Griffin (1970) and Weisskopf (1972b), described earlier in the section on two-gap models. The coefficient α_1 in the public saving function specified by eq. (3.82) is expected to be positive if tax revenues and public enterprise profits rise with the level of economic activity represented by gross domestic product. Aggregate imports of goods (M) are divided into three kinds namely consumption goods (M_c), capital goods (M_k), and intermediate inputs (M_l) reported in eq. (3.83). Import functions of intermediate goods and capital goods are specified by eqs. (3.84) and (3.85), respectively. The coefficient $\beta_1 > 0$ in eq. (3.84) represents the import elasticity of intermediate goods with respect to output. The parameter θ_1 in eq. (3.85) is the share of imported capital goods in total investment (I). In the exports function specified by eq. (3.86), it is expected that there is complementarity between exports and the level of actual output. In the private investment function reported in eq. (3.88), the coefficient γ_2 captures the public investment crowding-in effect and γ_1 is the simplest version of an accelerator. The expressions in eqs. (3.81 - 3.88) yield eight new

Table 3.7 Notation and Definition in Taylor's Model

Notation	Definition
F	Aggregate net foreign capital inflows
F_p	Net foreign capital inflows to the private sector
F_g	Net foreign capital inflows to the public sector
I	Total investment
I_p	Private investment
I_g	Public investment
KF	Private capital flight
M	Aggregate imports of goods
M_c	Imports of consumption goods
M_i	Imports of intermediate goods
M_k	Imports of capital goods
J	Net foreign factor and non-factor payments
S_p	Private savings
S_g	Public savings
SS_p	Surplus capital of the private sector
X	Total exports of goods
Y	Actual gross domestic product
Y^*	Potential gross domestic product
θ	The share of imported capital goods in total investment

equations and six new variables (Y^*, Y, M_c, M_k, M_i, I). In sum, there are eleven equations (3.78 - 3.88) and seventeen variables (S_p, S_g, F_p, F_g, I_p, I_g, SS_p, KF, M, J, X, Y^*, Y, M_c, M_k, M_i, I), which leave six degrees of freedom.

Table 3.8 reproduces Table 3.6 -- but with S_p, S_g, I_p, M, I, and X replaced by their specifications given in eqs. (3.81 - 3.88). Table 3.8, therefore, yields the following row and column equations.

row equations

$$\sigma_0 Y^* + \sigma_1 Y + (1-\sigma_2)F_p = \sigma_0 Y^* + \sigma_1 Y + (1-\sigma_2)F_p \tag{3.89}$$

$$I_g = SS_p + F_g + \alpha_0 Y^* + \alpha_1 Y \tag{3.90}$$

$$F = KF + M_c + \beta_0 Y^* + \beta_1 Y + \theta_1[\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2)I_g] + J - \varepsilon_0 Y^* - \varepsilon_1 Y \tag{3.91}$$

$$\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2)I_g = \gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2)I_g \tag{3.92}$$

column equations

$$\sigma_0 Y^* + \sigma_1 Y + (1-\sigma_2)F_p = SS_p + KF + \gamma_0 Y^* + \gamma_1 Y + \gamma_2 I_g \tag{3.93}$$

$$I_g = I_g \tag{3.94}$$

$$F = F_p + F_g \tag{3.95}$$

$$\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2)I_g = \sigma_0 Y^* + \sigma_1 Y - \sigma_2 F_p + \alpha_0 Y^* + \alpha_1 Y + M_c$$
$$+ \beta_0 Y^* + \beta_1 Y + \theta_1[\gamma_0 Y^* + \gamma_1 Y] + (1+\gamma_2)I_g + J - \varepsilon_0 Y^* - \varepsilon_1 Y \tag{3.96}$$

Table 3.8 Accounting Identities and Behavioral Equations in Taylor's Model

| | Capital Accounts | | | | |
	Private	Public	ROW	All Other Accounts	Σ
Cap. Account Private	*	0	F_p	$\sigma_0 Y^* + \sigma_1 Y - \sigma_2 F_p$	$\sigma_0 Y^* + \sigma_1 Y + (1-\sigma_2)F_p$
Public	SS_p	*	F_g	$\alpha_0 Y^* + \alpha_1 Y$	I_g
ROW	KF	0	*	$M_c + (\beta_0 Y^* + \beta_1 Y)$ $+ \theta_1(\gamma_0 Y^* + \gamma_1 Y)$ $+(1+\gamma_2)I_g + R$ $- (\varepsilon_0 Y^* + \varepsilon_1 Y)$	F
All Other Accounts	$\gamma_0 Y^* + \gamma_1 Y + \gamma_2 I_g$	I_g	0	*	$\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2)I_g$
Σ	$\sigma_0 Y^* + \sigma_1 Y + (1-\sigma_2)F_p$	I_g	F	$\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2)I_g$	*

Equalize row and column sums to get the following equations:

$$\sigma_0 Y^* + \sigma_1 Y + (1-\sigma_2)F_p = SS_p + KF + \gamma_0 Y^* + \gamma_1 Y + \gamma_2 I_g \tag{3.97}$$

(redundant: implicit in eqs. (3.98 - 3.100)

$$I_g = SS_p + F_g + \alpha_0 Y^* + \alpha_1 Y \tag{3.98}$$

(the fiscal constraint)

$$F_p + F_g = KF + M_c + \beta_0 Y^* + \beta_1 Y + \theta_1 [\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g] + J - \varepsilon_0 Y^* - \varepsilon_1 Y \qquad (3.99)$$

(the foreign-exchange constraint)

$$\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g = \sigma_0 Y^* + \sigma_1 Y - \sigma_2 F_p + \alpha_0 Y^* + \alpha_1 Y + F_g + F_p \qquad (3.100)$$

(the savings constraint)

Eqs. (3.98 - 3.100) show three linearly independent equations in nine variables (SS_p, F_p, F_g, KF, I_g, M_c, J, Y^*, Y), which yield six degrees of freedom (as before). These equations, respectively, represent the fiscal constraint, the foreign-exchange constraint, and the savings constraint. Eq. (3.97) is treated as redundant because it can be obtained from eqs. (3.98 - 3.100). As in Bacha's model, the three independent eqs. (3.98 - 3.100) can also be expressed as equations determining the level of public investment (I_g) as follows:

$$I_g = SS_p + F_g + \alpha_0 Y^* + \alpha_1 Y = I_g^F \qquad (3.101)$$

(the fiscal constraint)

$$I_g = [1/\theta_1(1+\gamma_2)]\{(\varepsilon_0 - \beta_0 - \theta_1\gamma_0)Y^* + (\varepsilon_1 - \beta_1 - \theta_1\gamma_1)Y + F_g + F_p - J - M_c - KF\} = I_g^E \qquad (3.102)$$

(the foreign-exchange constraint)

$$I_g = [1/(1+\gamma_2)]\{(\sigma_0 + \alpha_0 - \gamma_0)Y^* + (\sigma_1 + \alpha_1 - \gamma_1)Y + (1-\sigma_2)F_p + F_g\} = I_g^S \qquad (3.103)$$

(the savings constraint)

Thus I_g^F, I_g^E, and I_g^S as defined in eqs. (3.101 - 3.103) can all be expressed as alternative expressions for I_g corresponding to the three independent constraints (3.98 - 3.100). Since total investment (I) is specified as $I = \gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g$ in eq. (3.88) it follows that eqs. (3.101 - 3.103) can also be expressed as equations determining total investment as follows:

$$I = (1+\gamma 2)\{[\gamma_0/(1+\gamma_2)+\alpha_0]Y^*+[\gamma_1/(1+\gamma_2)+\alpha_1]Y+SS_p+F_g]\} = I^F \qquad (3.104)$$

(the fiscal constraint)

$$I = (1/\theta_1)\{(\varepsilon_0 - \beta_0)Y^* + (\varepsilon_1 - \beta_1)Y + F_g + F_p - J - M_c - KF\} = I^E \qquad (3.105)$$

(the foreign-exchange constraint)

$$I = (\sigma_0 + \alpha_0)Y^* + (\sigma_1 + \alpha_1)Y + (1-\sigma_2)F_p + F_g = I^S \qquad (3.106)$$

(the savings constraint)

Taylor specified the following function for the growth rate of potential output.

$$g^* = \mu_0 + \mu_1 \ (I/Y^*) \tag{3.107}$$

Eq. (3.107) shows that potential output growth (g^*) is a function of total investment (I) normalized by the level of potential output (Y^*). The coefficient μ_1 is the incremental potential output-capital ratio and μ_0 is some constant to allow for employment effects, technical progress, etc. As eqs. (3.104 - 3.106) provide three alternative expressions for I, each of them can be used to derive alternative expressions for g^* under each constraint. The three possibilities are as follows:

$$g^* = \mu_1[(1+\gamma_2)\alpha_1 + \gamma_1]cu + \mu_1(1+\gamma_2)[f_g + ss_p] + \mu_0 + \mu_1\gamma_0 + \mu_1(1+\gamma_2)\alpha_0 \ = g^{*F} \tag{3.108}$$

(the fiscal constraint)

$$g^* = (\mu_1/\theta_1)[\varepsilon_1 - \beta_1]cu + (\mu_1/\theta_1)[f_g + f_p - j - m_c - kf] + \mu_0 + (\mu_1/\theta_1)(\varepsilon_0 - \beta_0) \ = g^{*E} \tag{3.109}$$

(the foreign-exchange constraint)

$$g^* = \mu_1(\sigma_1 + \alpha_1)cu + \mu_1[(f_g + (1-\sigma_2)f_p] + \mu_0 + \mu_1(\sigma_0 + \alpha_0) \ = g^{*S} \tag{3.110}$$

(the savings constraint)

These same eqs. (3.108 - 3.110) can be rewritten in a simplified notation as follows:

$$g^* = \pi_1 + \pi_2 cu + \pi_3[f_g + ss_p] = g^{*F} \tag{3.111}$$

(the fiscal constraint)

$$g^* = \pi_4 + \pi_5 cu + \pi_6[f_g + f_p - j - m_c - kf] = g^{*E} \tag{3.112}$$

(the foreign-exchange constraint)

$$g^* = \pi_7 + \pi_8 cu + \pi_9[f_g + (1-\sigma_2)f_p] = g^{*S} \tag{3.113}$$

(the savings constraint)

where

$$\pi_1 = \mu_0 + \mu_1\gamma_0 + \mu_1(1+\gamma_2)\alpha_0$$
$$\pi_2 = \mu_1[(1+\gamma_2)\alpha_1 + \gamma_1]$$
$$\pi_3 = \mu_1(1+\gamma_2)$$
$$\pi_4 = \mu_0 + (\mu_1/\theta_1)(\varepsilon_0 - \beta_0)$$
$$\pi_5 = (\mu_1/\theta_1)[\varepsilon_1 - \beta_1]$$
$$\pi_6 = (\mu_1/\theta_1)$$
$$\pi_7 = \mu_0 + \mu_1(\sigma_0 + \alpha_0)$$

$$\pi_8 = \mu_I(\sigma_I + \alpha_I)$$

$$\pi_9 = \mu_I$$

Note that all explanatory variables on the right-hand side of the expressions (3.108 - 3.113) are normalized with respect to the level of potential output (Y*). Thus, the definitions of the variables that appear in the system (3.101 - 3.113) are as given in Table 3.9.

A summary of the findings of Taylor's study is as follows. Initially, key country parameters of behavioral functions are estimated for seventeen developing countries. Based on these estimates, simulations are performed for all countries in the analysis. In general, this study shows how the capacity utilization rate, public investment, foreign transfers to the government, and public sector borrowing requirement would have to adjust to meet a one percent extra rate of output growth in seventeen countries. Simulation experiments show that this one percent additional output growth needs aggregate foreign transfers of $15 billion, which is 1.2 percent of the total potential output of the seventeen economies. Simulation experiments for individual countries show that there is a fairly wide range of net transfers required to support the one percent increment in potential output growth. Relatively, large and diversified economies such as Argentina, Brazil, India, and the Philippines need foreign capital inflows to the public sector of less than one percent of their respective potential output

Table 3.9 Further Notation and Definition in Taylor's Model

Notation	Definition
cu	Capacity utilization rate (defined as Y/Y*)
f_p	Net foreign capital inflows to the private sector normalized by Y*
f_g	Net foreign capital inflows to the public sector normalized by Y*
g^*	Growth rate of potential output
g^{*F}	Fiscal constrained potential output growth
g^{*E}	Foreign-exchange constrained potential output growth
g^{*S}	Savings constrained potential output growth
I_g^F	Fiscal constrained public investment
I_g^E	Foreign-exchange constrained public investment
I_g^S	Savings constrained public investment
I^F	Fiscal constrained total investment
I^E	Foreign-exchange constrained total investment
I^S	Savings constrained total investment
j	Net foreign factor and non factor payments normalized by Y*
kf	Private capital flight normalized by Y*
m_c	Imports of consumption goods normalized by Y*
ss_p	Surplus capital of the private sector normalized by Y*

in order to achieve the one percent additional output growth. At the other end of the spectrum, small and import-dependent economies such as Nicaragua, Sri Lanka, Tanzania, Uganda, and Zimbabwe require foreign transfers of around three percent of potential output to achieve the target of one percent faster growth. The simulations also reveal that an increase in foreign capital inflows to the public sector reduces the public sector domestic borrowing for fourteen of the seventeen countries. The second set of simulations shows that enhanced fiscal effort, export promotion and import substitution policies, and repatriation of private capital flight reduce external borrowing requirements. In addition, they show that public sector domestic borrowing goes up in twelve of the seventeen economies when the private sector instead of the government benefits from higher foreign capital inflows.

(iii) Solimano's three-gap model (1990)

Solimano (1990) developed a simple three-gap model framed in a disequilibrium setting. This model is calibrated with parameters for the Chilean economy. Solimano examined the effects of various macroeconomic policies (e.g. an increase in public spending, a reduction of interest payments on external debt, and a reduction in the mark up through a cut in indirect taxes) on the rate of GDP growth, the rate of capacity utilization, the real exchange rate, real wages, and the rate of inflation. Like the other three-gap models (mentioned above), this model can also be presented through a social accounting framework. The basic identities of the model are framed in Table 3.10.

Mathematical expressions for the row and column sums of Table 3.10 can be written as follows:

row equations

$$F_p + S_p = F_p + S_p \qquad (3.114)$$

$$I_g = SS_p + F_g + S_g \qquad (3.115)$$

$$F = \Delta R + M + J - X \qquad (3.116)$$

$$I = I_p + I_g \qquad (3.117)$$

column equations

$$S_p + F_p = SS_p + I_p \qquad (3.118)$$

$$I_g = I_g + \Delta R \qquad (3.119)$$

$$F = F_p + F_g \qquad (3.120)$$

$$I = S_p + S_g + M + J - X \qquad (3.121)$$

Equalize row and column sums to get the following expressions:

$$S_p + F_p = SS_p + I_p \qquad \text{(redundant: implicit in eqs. 3.123 - 3.125)} \qquad (3.122)$$

$$I_g = SS_p + F_g + S_g - \Delta R \qquad \text{(the fiscal constraint)} \qquad (3.123)$$

$$\Delta R + M + J = F_g + F_p + X \qquad \text{(the foreign-exchange constraint)} \qquad (3.124)$$

$$I_p + I_g = S_p + S_g + M + J - X \qquad \text{(the savings constraint)} \qquad (3.125)$$

Table 3.10 Accounting Identities in Solimano's Model

	Capital Accounts			All Other Accounts	Σ
	Private	Public	ROW		
Capital Accounts Private	*	0	F_p	S_p	$F_p + S_p$
Public	SS_p	*	F_g	S_g	I_g
ROW	0^1	ΔR	*	$M + J - X$	F
All Other Accounts	I_p	I_g	0	*	I
Σ	$S_p + F_p$	I_g	F	I	*

^{1} It is assumed that there is no private capital flight.

Equation (3.122) reveals that total funds available to the private sector are its own savings (S_p) plus foreign capital inflows (F_p). These funds are used for that sector's own investment (I_p) and the remaining surplus capital is transferred to the public sector (SS_p) to partially meet its budgetary requirement. Eq. (3.123) shows that public investment (I_g) is financed through its own savings (S_g), capital transfers from the private sector, capital transfers from the rest of the world (F_g), and the net change in official foreign-exchange reserves (ΔR). Eq. (3.124) shows that the change in official foreign-exchange reserves, plus imports of goods (M), plus net payments of factor and non-factor services (J) are financed through export earnings (X) and foreign savings received by the private and public sectors. The conventional saving-investment balance is reported in eq. (3.125); that is, private plus

public investment (I_p + I_g) are equal to the sum of private savings, public savings, and foreign savings received by the private and public sectors. Eqs. (3.123 - 3.125) represent, respectively, the fiscal constraint, the foreign-exchange constraint, and the savings constraint. Eq. (3.122) is treated as redundant because it can be obtained from eqs. (3.123 - 3.125). In sum, there are three linearly independent equations (3.123 - 3.125) in eleven variables (S_p, S_g, F_p, F_g, I_p, I_g, SS_p, ΔR, M, J, X), which yield eight degrees of freedom. In his three-gap model, Solimano (1990) specified the following behavioral functions. Expected signs of the coefficients are also given for each equation.

$$S_p = \sigma_0 Y + \sigma_1 Y \qquad\qquad \sigma_0 > 0,\ \sigma_1 > 0 \qquad\qquad (3.126)$$

$$S_g = \alpha_0 Y + \alpha_1 Y \qquad\qquad \alpha_0 > 0,\ \alpha_1 > 0 \qquad\qquad (3.127)$$

$$M = M_c + M_k + M_i \qquad\qquad\qquad\qquad\qquad (3.128)$$

$$M_i = \beta_0 Y + \beta_1 Y + \beta_2 er \qquad \beta_0 > 0,\ \beta_1 > 0,\ \beta_2 < 0 \qquad (3.129)$$

$$M_k = \theta_0 Y + \theta_1 I + \theta_2 er \qquad \theta_0 > 0,\ \theta_1 < 1,\ \theta_2 < 0 \qquad (3.130)$$

$$M_c = \delta_0 Y + \delta_1 Y + \delta_2 er \qquad \delta_0 > 0,\ \delta_1 > 0\ \delta_2 < 0 \qquad (3.131)$$

$$X = \varepsilon_0 Y + \varepsilon_1 w^d + \varepsilon_2 er \qquad \varepsilon_0 > 0,\ \varepsilon_1 > 0\ \varepsilon_2 > 0 \qquad (3.132)$$

$$I = I_p + I_g \qquad\qquad\qquad\qquad\qquad (3.133)$$

$$I_p = \gamma_0 Y + \gamma_1 Y + \gamma_2 I_g \qquad \gamma_0 > 0,\ \gamma_1 > 0,\ \gamma_2 > 0 \qquad (3.134)$$

$$\therefore\ I = \gamma_0 Y + \gamma_1 Y + (1+\gamma_2) I_g$$

Here follows a brief theoretical justification of the behavioral functions reported in eqs. (3.126 - 3.134). The coefficient σ_1 in the private savings function reported in eq. (3.127) shows the marginal saving rate with respect to actual output and is expected to be positive. The coefficient α_1 in the public saving function (3.127) is expected to be positive if tax revenues and public enterprise profits rise with the level of output. Aggregate imports of goods (M) are divided into three kinds, namely, consumption goods (M_c), capital goods (M_k), and intermediate inputs (M_i) and are reported in eq. (3.128). Import functions of intermediate goods, capital goods, and intermediate goods are specified by eqs. (3.129), (3.130), and (3.131), respectively. The coefficients β_1 and δ_1 are, respectively, import elasticities of intermediate goods and consumption goods with respect to output, while θ_1 represents the import elasticity of capital goods with respect to investment. The coefficient of the real exchange rate (er) in all three import functions is assumed to be negative. In eq. (3.132), aggregate exports of goods (X) are assumed to be a positive function of the real exchange

rate and the world demand (w^d). In the private investment function (3.134), the coefficient γ_1 is the simplest version of the accelerator and γ_2 captures the public investment crowding-in effect. The expressions in eqs. (3.126 - 3.134) yield nine new equations and eight new variables (Y^*, Y, M_c, M_k, M_i, I, w^d, er). In sum, there are twelve equations and nineteen variables (S_p, S_g, F_p, F_g, I_p, I_g, SS_p, ΔR, M, J, X, Y^*, Y, M_c, M_k, M_i, I, w^d, er), which leave seven degrees of freedom. The following Table 3.12 reproduces Table 3.10 but with S_p, S_g, I_p, I, M, and X replaced by their specifications in eqs. (3.126 - 3.134).

Table 3.11 Notation and Definition in Solimano's Model

Notation	Definition
er	Real exchange rate
F	Aggregate net foreign capital inflows
F_g	Net foreign capital inflows to the public sector
F_p	Net foreign capital inflows to the private sector
I	Total investment
I_g	Public investment
I_p	Private investment
J	Net foreign factor and non-factor services payments
M	Aggregate imports of goods
M_c	Imports of consumption goods
M_i	Imports of intermediate goods
M_k	Imports of capital goods
S_g	Public savings
S_p	Private savings
w_d	World demand (defined as growth in world GDP)
X	Aggregate exports of goods
Y	Actual GDP
Y^*	Potential GDP

Table 3.12, therefore, yields the following row and column equations.

row equations

$$F_p + \sigma_0 Y^* + \sigma_1 Y = F_p + \sigma_0 Y^* + \sigma_1 Y \qquad (3.135)$$

$$\Delta R + I_g = SS_p + F_g + \alpha_0 Y^* + \alpha_1 Y \qquad (3.136)$$

$$F_p + F_g = \beta_0 Y^* + \beta_1 Y + \beta_2 er + \theta_0 Y^* + \theta_1 [\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g] +$$
$$\theta_2 er + \delta_0 Y^* + \delta_1 Y + \delta_2 er - \varepsilon_0 Y^* - \varepsilon_1 w^d - \varepsilon_2 er + J \qquad (3.137)$$

$$\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g = \gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g \qquad (3.138)$$

Table 3.12 Accounting Identities and Behavioral Equations in Solimano's Model

	Capital Accounts			All Other Accounts	Σ
	Private	Public	ROW		
Capital Account Private	*	0	F_p	$\sigma_0 Y^* + \sigma_1 Y$	$F_p + \sigma_0 Y^* + \sigma_1 Y$
Public	SS_p	*	F_g	$\alpha_0 Y^* + \alpha_1 Y$	$\Delta R + I_g$
ROW	0	ΔR	*	$(\beta_0 Y^* + \beta_1 Y + \beta_2 er)$ $+(\theta_0 Y^* + \theta_1 I + \theta_2 er)$ $+(\delta_0 Y^* + \delta_1 Y + \delta_2 er)$ $-(\varepsilon_0 Y^* + \varepsilon_1 w^d + \varepsilon_2 er)$ $+J$	$F_p + F_g$
All Other Accounts	$\gamma_0 Y^* + \gamma_1 Y + \gamma_2 I_g$ I_g		0	*	$\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g$
Σ	$F_p + \sigma_0 Y^* + \sigma_1 Y$ $\Delta R + I_g$ $F_p + F_g$			$\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g$	*

column equations

$$F_p + \sigma_0 Y^* + \sigma_1 Y = SS_p + \gamma_0 Y^* + \gamma_1 Y + \gamma_2 I_g \qquad (3.139)$$

$$\Delta R + I_g = \Delta R + I_g \qquad (3.140)$$

$$F_p + F_g = F_p + F_g \qquad (3.141)$$

$$\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g = \sigma_0 Y^* + \sigma_1 Y + \alpha_0 Y^* + \alpha_1 Y + \beta_0 Y^* + \beta_1 Y + \beta_2 er +$$
$$\theta_0 Y^* + \theta_1 [\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g] + \theta_2 er + \delta_0 Y^* +$$
$$\delta_1 Y + \delta_2 er - \varepsilon_0 Y^* - \varepsilon_1 w^d - \varepsilon_2 er + J \qquad (3.142)$$

Equalize row and column sums as before to get the following equations:

$$F_p + \sigma_0 Y^* + \sigma_1 Y = SS_p + \gamma_0 Y^* + \gamma_1 Y + \gamma_2 I_g \qquad (3.143)$$
(redundant: implicit in eqs. 3.144 - 3.146)

$$\Delta R + I_g = SS_p + F_g + \alpha_0 Y^* + \alpha_1 Y \qquad\qquad (3.144)$$
$$\textit{(the fiscal constraint)}$$

$$F_p + F_g = \beta_0 Y^* + \beta_1 Y + \beta_2 er + \theta_0 Y^* + \theta_1 [\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g] +$$
$$\theta_2 er + \delta_0 Y^* + \delta_1 Y + \delta_2 er - \varepsilon_0 Y^* - \varepsilon_1 w^d - \varepsilon_2 er + J \qquad (3.145)$$
$$\textit{(the foreign-exchange constraint)}$$

$$\gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g = \sigma_0 Y^* + \sigma_1 Y + \alpha_0 Y^* + \alpha_1 Y + F_p + F_g - \Delta R \qquad (3.146)$$
$$\textit{(the savings constraint)}$$

Eqs. (3.144 - 3.146) imply that there are three linearly independent equations in ten variables (Y, Y^*, F_p, F_g, SS_p, I_g, er, w^d, ΔR, J), which yield seven degrees of freedom (as before). Eqs. (3.144 - 3.146) represent the three constraints; respectively, the fiscal, the foreign exchange, and the savings. Eq. (3.143) is treated as redundant because it can be obtained from eqs. (3.144 - 3.146). And, again as before, these independent equations can all be expressed as equations determining the level of public investment (I_g) as follows:

$$I_g = SS_p + F_g + \alpha_0 Y^* + \alpha_1 Y - \Delta R = I_g^F \qquad\qquad (3.147)$$
$$\textit{(the fiscal constraint)}$$

$$I_g = [1/\theta_1(1+\gamma_2)]\{(\varepsilon_0 - \beta_0 - \theta_0 - \theta_1 \gamma_0 - \delta_0) Y^* - (\beta_1 + \theta_1 \gamma_1 + \delta_1) Y +$$
$$(\varepsilon_2 - \beta_2 - \theta_2 - \delta_2) er + \varepsilon_1 w^d + F_p + F_g - J\} = I_g^E \qquad (3.148)$$
$$\textit{(the foreign-exchange constraint)}$$

$$I_g = [1/(1+\gamma_2)]\{(\sigma_0 + \alpha_0 - \gamma_0) Y^* + (\sigma_1 + \alpha_1 - \gamma_1) Y + F_p + F_g - \Delta R\} = I_g^S \qquad (3.149)$$
$$\textit{(the savings constraint)}$$

Thus I_g^F, I_g^E, and I_g^S as defined in eqs. (3.147 - 3.149) are all alternative expressions for public investment corresponding to the three independent constraints reported in eqs. (3.144 - 3.146). Since total investment (I) is specified as $I = \gamma_0 Y^* + \gamma_1 Y + (1+\gamma_2) I_g$ in eq. (3.134) it follows that eqs. (3.147 - 3.149) can also be expressed as equations determining I as follows:

$$I = (1+\gamma_2)\{[\gamma_0/(1+\gamma_2) + \alpha_0] Y^* + [\gamma_1/(1+\gamma_2) + \alpha_1] Y + SS_p + F_g - \Delta R\} = I^F \qquad (3.150)$$
$$\textit{(the fiscal constraint)}$$

$$I = (1/\theta_1)\{(\varepsilon_0 - \beta_0 - \theta_0 - \delta_0)Y^* - (\beta_1 + \delta_1)Y + (\varepsilon_2 - \beta_2 - \theta_2 - \delta_2)er +$$
$$\varepsilon_1 w^d + F_p + F_g - J\} = I^E \tag{3.151}$$
(the foreign-exchange constraint)

$$I = (\sigma_0 + \alpha_0)Y^* + (\sigma_1 + \alpha_1)Y + F_p + F_g - \Delta R = I^S \tag{3.152}$$
(the savings constraint)

Solimano specified the function for the growth rate of potential output in the same way as Taylor, namely, that

$$g^* = \mu_0 + \mu_1 (I/Y^*) \tag{3.153}$$

Follow the same procedure as in Taylor's model and the three alternative expressions for total investment (I) reported in eqs. (3.150 - 3.152) can be used to derive three corresponding expressions for g^*. The three possibilities are:

$$g^* = \mu_0 + \mu_1(1+\gamma_2)\{[\gamma_0/(1+\gamma_2) + \alpha_0] + [\gamma_1/(1+\gamma_2) + \alpha_1]cu + ss_p + f_g - \Delta r]\} = g^{*F} \tag{3.154}$$
(the fiscal constraint)

$$g^* = \mu_0 + (\mu_1/\theta_1)(1/\theta_1)\{(\varepsilon_0 - \beta_0 - \theta_0 - \delta_0) - (\beta_1 + \delta_1)cu + (\varepsilon_2 - \beta_2 - \theta_2 - \delta_2)er +$$
$$\varepsilon_1 w^d + f_p + f_g - j\} = g^{*E} \tag{3.155}$$
(the foreign-exchange constraint)

$$g^* = \mu_0 + \mu_1[(\sigma_0 + \alpha_0) + (\sigma_1 + \alpha_1)cu + f_p + f_g - \Delta r] = g^{*S} \tag{3.156}$$
(the savings constraint)

Note that all the relevant explanatory variables on the right-hand side of the three mathematical expressions reported in eqs. (3.154 - 3.156) are normalized by the level of potential output (Y^*). Thus, the definitions of the variables that appear in the system (3.154 - 3.156) are as given in Table 3.13. The final estimated reduced-form growth equations of the model are rewritten as follows:

$$g^* = \pi_1 + \pi_2 cu + \pi_3[ss_p + f_g - \Delta r] = g^{*F} \tag{3.157}$$

$$g^* = \pi_4 - \pi_5 cu + \pi_6 er + \pi_7 w^d + \pi_8[f_p + f_g - j] = g^{*E} \tag{3.158}$$

$$g^* = \pi_9 + \pi_{10}cu + \pi_{11}[f_p + f_g - \Delta r] = g^{*S} \qquad (3.159)$$

where

$$\pi_1 = \mu_0 + \mu_1(1+\gamma_2)\{[\gamma_0/(1+\gamma_2) + \alpha_0]$$

$$\pi_2 = \mu_1(1+\gamma_2)[\gamma_1/(1+\gamma_2) + \alpha_1]$$

$$\pi_3 = \mu_1(1+\gamma_2)$$

$$\pi_4 = \mu_0 + (\mu_1/\theta_1)(1/\theta_1)\{(\varepsilon_0 - \beta_0 - \theta_0 - \delta_0)$$

$$\pi_5 = (\mu_1/\theta_1)[\beta_1 + \delta_1]$$

$$\pi_6 = (\mu_1/\theta_1)(\varepsilon_2 - \beta_2 - \theta_2 - \delta_2)$$

$$\pi_7 = (\mu_1/\theta_1)\varepsilon_1$$

$$\pi_8 = (\mu_1/\theta_1)$$

$$\pi_9 = \mu_0 + \mu_1[(\sigma_0 + \alpha_0)$$

$$\pi_{10} = \mu_1(\sigma_1 + \alpha_1)$$

$$\pi_{11} = \mu_1$$

Table 3.13 Further Notation and Definition in Solimano's Model

Notation	Definition
cu	Capacity utilization (defined as Y/Y^*)
f_g	Net foreign capital inflows to the public sector normalized by Y^*
f_p	Net foreign capital inflows to the private sector normalized by Y^*
g^*	Rate of growth of potential output
g^{*E}	Foreign-exchange constrained potential output growth
g^{*F}	Fiscal constrained potential output growth
g^{*S}	Savings constrained potential output growth
I_g^E	Foreign-exchange constrained public investment
I_g^F	Fiscal constrained public investment
I_g^S	Savings constrained public investment
I^E	Foreign-exchange constrained total investment
I^F	Fiscal constrained total investment
I^S	Savings constrained total investment
j	Net foreign factor and non factor payments normalized by Y^*

Solimano estimated the above equations for the growth rate of potential output under three constraints and calibrated the above model for the Chilean economy. The model is used to examine the effects of various macroeconomic policies. The main results of the model are as follows. (i) An increase in government spending would slow down the rate of growth in GDP, appreciate the real exchange rate, and raise real wages in a capacity

constrained-growth regime. (ii) A reduction in interest payments abroad in a capacity constrained situation would accelerate the rate of GDP growth, reduce the real exchange rate, and increase real wages. (iii) Finally, a cut in the mark-up rate increases external competitiveness and real wages simultaneously, allowing an increase in the rate of capacity utilization and an acceleration in the growth of potential GDP.

3.2.1 Critiques of the three-gap literature

(i) Assumptions of the models

The three-gap model developed by Bacha (1990) is somewhat oversimplified and is based on a number of weak assumptions such as no inflows of foreign capital to the private sector, no market for government bonds, no private capital flight, and no change in official foreign-exchange reserves. Regarding the current situation of most developing countries, all these assumptions seem to be unrealistic. Regarding foreign capital inflows, the share of foreign capital to the private sector (particularly private direct foreign investment) has tremendously increased during the 1980s and 1990s in developing countries. [See for example, Tsai (1991), Shabir and Mahmood (1992), Lucas (1993), and Ahmed (1994) -- all of whom did pioneering work in this regard]. Another important factor that may also affect the economic growth of LDCs is private capital flight. Since the early 1980s, capital flight has become a major issue for highly indebted developing countries. For example, M.S. Khan and Haque (1985, 1987), Gulati (1988), Pastor (1990), Boyce (1992), Vos (1992), Sarmad (1993), and Iqbal (1994) have extensively analyzed private capital flight from developing economies. It is well recognized that outflows of private capital have serious consequences not only for the source country but also for the world economy as a whole. This important factor, therefore, cannot be ignored in the analysis of economic growth. Another assumption of the Bacha model is that there is no market for government bonds, which leaves money expansion as the only alternative for domestic financing of the government budget deficit. This assumption also seems unrealistic because government bonds are becoming a major domestic source for financing government fiscal deficit in developing economies. Conversely, the Taylor and Solimano models are based on comparatively few assumptions. Taylor's model explicitly ignores an important factor, the change in official foreign exchange reserves, in its analysis of economic growth. On the other hand, Solimano ignored the role of private capital flight in his analysis.

(ii) The estimates of potential output

Taylor and Solimano normalized all the variables (e.g. investment, imports, exports, foreign savings, foreign interest payments) by the level of real potential output. Since the level of potential output and its growth are key variables in these models, it is important (but difficult) to get accurate quantification of these variables in the case of developing countries. The estimates of potential output used in these studies are also based on weak methods. Because of substantial methodological differences, data limitations, and complexity of the measurement of potential output, it may be more useful to choose appropriate macroeconomic indicators for analysis, which should reflect the real situation of an economy, such as, for example, actual real gross domestic product (instead of potential GDP), private investment, public investment, and private consumption.

(iii) Normalization

In both their studies, Taylor and Solimano normalized all the variables by a common variable, namely, the level of potential output, which implies that a common price deflator (i.e. GDP deflator) is used for all the variables. As a general procedure, this approach does not necessarily commend itself, and alternative normalizations are clearly possible. For example, imports of goods can be normalized by the level of GDP, imports of services by the level of imports of goods, non-trade revenues by the level of GDP, trade revenues by the level of imports of goods, private savings by the level of private income, exports of goods and services by the level of GDP, foreign capital inflows to the private sector by the level of private investment, and foreign capital inflows to the public sector by the level of public investment. Following such an approach, the most relevant price deflators can be brought into the analysis.

(iv) Missing elements

Turning to the balance of payments components, one can say that Taylor and Bacha ignored the effects of the exchange rate on growth, while Solimano did analyze the exchange rate effect in his model. Moreover, one of the main intentions of developing the three-gap model was to incorporate fiscal as well as monetary aspects of an economy. Fiscal aspects were to some extent taken into account in the above mentioned three-gap models, but the monetary aspects, such as the role of the money supply and government bonds and consequently the domestic interest rates in the analysis of three-gaps have been completely ignored in all the models. In addition, all the models ignore the modelling of the flow-of-funds part (e.g.

foreign capital inflows to the private and public sectors, private capital surplus). Finally, these models are not explicitly used for the analysis of structural adjustment reforms in developing economies.

Thus, although the above studies provide valuable insights into the determination of the three-gaps, they also leave behind a considerable agenda for further work. The remaining chapters of this thesis will develop some contributions in response to this agenda.

3.3 Summary

During the 1960s and 1970s, two-gap models were extensively used in various attempts to identify the binding constraint(s) on economic growth and to estimate the aid requirements of developing countries. A summary of the results obtained in various studies of the former question is given in Table 3.14. This overview suggests that most developing economies were subject to a savings constraint on growth during the period under consideration. Two-gap models have been subject to a number of criticisms, the main points of which can be summarized as follows. (i) The two-gap model is too simplistic, both in economic conception and in its exclusion of factors (such as human capital), which may also affect growth. (ii) It is unrealistic to assume that aid provides a one-to-one increment to the capital stock, as there are a range of mechanisms through which aid may displace domestic capital formation. (iii) From a general equilibrium perspective, the two-gap model is 'sticky,' which is not surprising, given that it ignores relative price effects, thereby turning attention away from the real exchange rate (in particular). It is hard to believe in fixed relative prices as a long-term phenomenon. (iv) The two-gap model allows no scope for substitution in production either between factors to relieve capital shortage or to reallocate factors between sectors. (v) The two-gap models have been used to analyze only the aggregate effects of foreign aid in recipient countries, but they do not incorporate the conditionalities associated with these loans, which are also important. (vi) It is also unrealistic to assume a fixed capital-output ratio in the two-gap model, particularly from a long-run perspective. Finally, (vii) some versions of the two-gap model ignore imports of raw materials, spare parts, and consumer goods, which is not realistic.

Turning to the three-gap literature, note that all the criticisms of the two-gap model carry over to the three-gap generalization. Table 3.15 overviews the three-gap models developed by Bacha, Taylor, and Solimano. The comparison is divided into two broad aspects: a flow-of-funds part and specified behavioral functions in each of the three models.

Table 3.14 A Summary of Constraints to Economic Growth of Developing Countries

Author	Period	Studies	Binding Constraint
Chenery and Bruno (1962)	1960-65 (planning)	Israel	Foreign exchange
Chenery and Strout (1966)	1957-62 1962-75 (projection)	50 (LDCs) 50 (LDCs)	Savings Foreign exchange
Adelman and Chenery (1966)	1950-57 1958-61	Greece	Savings Foreign exchange
Chenery and MacEwan (1966)	1963-75 (projection) 1977-81 (projection)	Pakistan	Domestic capacity Foreign exchange
Landau (1971)	1950-66	8 (Latin American) 4 " 6 "	Savings Foreign exchange Unclassified
Weisskopf (1972a)	1953-68	23 (LDCs) 8 " 6 "	Savings Foreign exchange Unclassified
Blomqvist (1976)	1953-68	24 (LDCs) 2 " 7 "	Savings Foreign exchange Unclassified
Levy (1984)	1960-79	Egypt	Savings

Table shows that Bacha provided a simplified version of the three-gap model as compared to Taylor and Solimano. Regarding the flow-of-funds block, it is obvious that there are comparatively fewer zero entries in the Taylor and Solimano models than in Bacha's model. Bacha specified only a few simple behavioral functions in his model. For this part, Solimano included more explanatory behavioral variables than Taylor did. Both Taylor and Solimano specified the same function of the growth rate of potential output and derived three alternative expressions for potential output growth rates under the fiscal, foreign-exchange, and savings constraints, while Bacha did not specify any growth function for potential output. In addition, Bacha specified the function for private surplus capital, while Taylor and Solimano did not specify any function for it. Since Bacha specified fewer and simpler behavioral functions, his final reduced-form expressions of total investment under the three constraints are simpler than are those of the Taylor and Solimano models. The three-gap model developed by Bacha provided a conceptual framework of interactions among the three-

Table 3.15 Comparison of Three-Gap Models Developed by Bacha, Taylor, and Solimano.

		Bacha	Taylor	Solimano
Flow-of-Funds Block				
		SS_p	SS_p	SS_p
		-	KF	-
		-	F_p	F_p
		F_x	F_x	F_x
		-	-	ΔR
Behavioral Functions				
M	=	$M_{c+i} + M_k$	$M_c + M_k + M_i$	$M_c + M_k + M_i$
M_t	=	$\theta_1 I$	$\theta_1 I$	$\theta_0 Y^* + \theta_1 I + \theta_2 er$
M_c	=	-	-	$\delta_0 Y^* + \delta_1 Y + \delta_2 er$
M_i	=	-	-	$\beta_0 Y^* + \beta_1 Y + \beta_2 er$
X	=	-	$\beta_0 Y^* + \beta_1 Y$	$\varepsilon_0 Y^* + \varepsilon_1 w^d + \varepsilon_2 er$
I_p	=	$\gamma_1 I$	$\varepsilon_0 Y^* + \varepsilon_1 Y$	$\gamma_0 Y^* + \gamma_1 Y + \gamma_3 I_t$
S_p	=	-	$\gamma_0 Y^* + \gamma_1 Y + \gamma_2 I_t$	$\sigma_0 Y^* + \sigma_1 Y$
S_g	=	$f(p,h)$	$\alpha_0 Y^* + \alpha_1 Y - \sigma_2 F_p$	$\alpha_0 Y^* + \alpha_1 Y$
SS_p	=	-	$\alpha_0 Y^* + \alpha_1 Y$	-
g	=	$\mu_0 + \mu_1(I/Y^*)$	$\mu_0 + \mu_1(I/Y^*)$	$\mu_0 + \mu_1(I/Y^*)$

Reduced-Form Equations of Total Investment Under Three Constraints

		Bacha	Taylor	Solimano
I^F	=	$(1+\gamma_2)\,[f(p,h)+F+S_g]$	$(1+\gamma_2)\{[\gamma_0/(1+\gamma_2)+\alpha_0]Y^*+[\gamma_1/(1+\gamma_2)+\alpha_1]Y+SS_p+F_g]\}$	$(1+\gamma_2)\{[\gamma_0/(1+\gamma_2)+\alpha_0]Y^*+[\gamma_1/(1+\gamma_2)+\alpha_1]Y+SS_p+F_g-\Delta R]\}$
I^E	=	$(1/\theta_1)[X+F-M_c-J]$	$(1/\theta_1)\{(\varepsilon_0-\beta_0)Y^*+(\varepsilon_1-\beta_1)Y+F_x+F_p-J-M_c-KF\}$	$(1/\theta_1)\{(\varepsilon_0-\beta_0-\theta_0-\delta_0)Y^*-(\beta_1+\delta_1)Y+(\varepsilon_2-\beta_2-\theta_2-\delta_2)er+\varepsilon_1 w^d+F_p+F_x-J]\}$
I^S	=	$[S_p+F+S_g]$	$(\sigma_0+\alpha_0)Y^*+(\sigma_1+\alpha_1)Y+(1-\sigma_1)F_p+F_g$	$(\sigma_0+\alpha_0)Y^*+(\sigma_1+\alpha_1)Y+F_p+F_g-\Delta R$

Note: - indicates zero entry.

gaps in an open economy. Taylor, using his three-gap model, analyzed the effectiveness of various economic policies on potential output growth of seventeen developing economies. This study shows how the capacity utilization rate, public investment, foreign transfers to the public sector, and public sector domestic borrowing would have to adjust to meet a one percent additional rate of economic growth. On the other hand, Solimano examined the effects of various macroeconomic policies (i.e. an increase in public spending, a reduction of interest payments on external debt, and a reduction in the mark up) on the rate of output growth, the rate of capacity utilization, the real exchange rate, real wages, and the rate of inflation in the case of the Chilean economy.

The three-gap models developed by Bacha, Taylor and Solimano have certain specific weaknesses such as (i) the exclusion of potentially important detail: Bacha assumed no foreign capital inflows to the private sector, no market for government bonds, no private capital flight, and no change in official foreign-exchange reserves (in Taylor's model, zero change in official foreign exchange reserves was assumed, and Solimano ignored the role of private capital flight). (ii) Taylor and Solimano used a common GDP deflator for the normalization of all the macroeconomic variables, which is not necessarily the best approach. Finally, (iii) a number of important economic elements such as the role of exchange rate policy (except Solimano), the role of monetary policy, interest rate policy, and modelling of flow-of-funds are completely ignored in all these models.

Chapter 4

Data Requirements

This chapter describes how to construct consistent time-series data for the relevant parts of Pakistan's economy. Consistent data are required to explain the development over time of three-gaps (e.g. the savings gap, the fiscal gap, and the foreign-exchange gap) and to operationalize the three-gap model that will be developed in Chapter 6 to analyze the effectiveness of adjustment policy reforms in Pakistan. It is sometimes difficult to compile consistent time-series data because of certain inconsistencies, and definitional and methodological differences in official statistical documents in Pakistan. This chapter, however, makes an attempt to construct consistent time-series data with some adjustments for the period 1970-93. The following sections describe the procedure for constructing the data for Pakistan's economy.

4.1   A complete data matrix

Table 4.1 presents notations of a complete data matrix including all the variables required for the analysis in this study. The matrix format is used because of its advantage as a means of compiling the consistent data set. The accounts reported in Table 4.1 are separated into two main blocks: (a) the block of all other accounts and (b) the flow-of-funds block. First follows an explanation of the accounts in both the blocks.

4.1.1   All other accounts of institutions

The rows and columns of the block of all other accounts reported in Table 4.1 show,

Table 4.1 A Complete Data Matrix for Pakistan

	Capital Accounts of Institutions			All other Accounts	Total Sources
	Private	Public	R.O.W		
		Flow of Funds			
Capital Accounts					
Private	*	R_p	$DFI+FL=F_p$	S_p	$R_p+F_p+S_p = SS_p+KF+I_p$
Public	$\Delta MS+\Delta GB+OL=SS_p$	*	F_g	$T_d+T_i+T_t+T_s = T$	$SS_p+F_g+T= R_p+\Delta R+R_t+G$
R.O.W.	KF	$\Delta R+R_t$	*	$M_k+M_c+M_i+M_{nf}+M_f = M$	$KF+\Delta R+R_t+M = F_p+F_g+X$
All Other Accounts	I_p	$\begin{array}{l}G_{nf}+G_{id}+G_{tr}\\+G_{sb}+G_{pa}+G_{ac}\\+G_{nc}+G_{de}=G\\=C_g+I_g\end{array}$	$\begin{array}{l}X_p+X_{in}+X_t\\+X_{wr}+X_{as}=X\end{array}$	*	$\begin{array}{c}I_p+G+X\\=\\S_p+T+M\end{array}$
Total Uses	$\begin{array}{c}SE_p+KF+I_p\\=\\R_p+F_p+S_p\end{array}$	$\begin{array}{c}R_p+\Delta R+R_t+G\\=\\SE_p+F_g+T\end{array}$	$\begin{array}{c}F_p+F_g+X\\=\\KF+\Delta R+R_t+M\end{array}$	$\begin{array}{c}S_p+T+M\\=\\I_p+G+X\end{array}$	*

For definition of variables, see Table 4.2

Table 4.2 Notation, Definition, and Source of Data

Notation	Definition	Source
Public finance	**Public finance**	**Public finance**
G	Total government expenditures	Period 1969-70 to 1970-71: *25 Years of Pakistan in Statistics 1947-1972*, Karachi, pp. 170-191.
G_{dc}	Government development expenditures	
G_{df}	Government expenditures on defense	Period 1971-72 to 1974-75: *10 Years of Pakistan in Statistics 1972-1982*, Karachi, pp. 243-278.
G_{ga}	Government expenditures on general administration	
G_{id}	Government interest payments on domestic debt	
G_{if}	Government interest payments on foreign debt	Period 1975-76 to 1980-81: *Pakistan Economic Survey, 1984-85*, Islamabad, pp. 123-127.
G_{c}	Government others current expenditures	
G_{sb}	Government subsidies	Period 1981-82 to 1984-85: *Pakistan Economic Survey, 1989-90*, Islamabad, pp. 129-133.
G_{sc}	Government expenditures on social services	
T	Total government revenues	Period 1985-86 to 1992-93: *Pakistan Economic Survey, 1993-94*, Islamabad, pp. 116-121.
T_{d}	Direct tax revenues	
T_{i}	Indirect tax revenues	
T_{n}	Non-tax revenues (including surplus of autonomous bodies)	
T_{t}	Trade tax revenues	
Balance of payments	**Balance of payments**	**Balance of payments**
DFI	Net private direct foreign investment	Period 1969-70 to 1973-74: *Pakistan Economic Survey, 1980-81*, Islamabad, pp. 124-129.
FL	Net long-term foreign capital transfers to the private sector	
F_{g}	Total gross foreign capital transfers to the public sector $(F_s + R_p)$	Period 1974-75 to 1977-78: *Pakistan Economic Survey, 1984-85*, Islamabad, pp. 226-227.
F_{p}	Total net long-term foreign capital transfers to the private sector	
KF	Private capital flight	Period 1978-79 to 1992-93: *Pakistan Economic Survey, 1993-94*, Islamabad, pp. 135-136.
M	Aggregate imports of goods and services	
M_{c}	Imports of consumers goods	Period 1969-70 to 1992-93: *Pakistan Economic Survey, 1993-94*, Islamabad, pp. 140-141 (components of imports and exports).
M_{f}	Net payments of factor services to the rest of the world	
M_{i}	Imports of intermediate goods	
M_{k}	Imports of capital goods	
M_{nf}	Net payments of non-factor services to the rest of the world	
ΔR	Changes in official foreign exchange reserves	
R_{p}	Repayments of foreign loans by the public sector	

Table 4.2 Notation, Definition, and Source of Data (continued)

Notation	Definition	Source
X X_m X_{sm} X_p X_s X_{wr}	Aggregate exports of goods and services Exports of manufactured goods Other transfers from abroad Exports of primary goods Exports of semi-manufactured goods Workers' remittances	Period 1969-70 to 1992-93: *Pakistan Economic Survey, 1993-94*, Islamabad, pp. 164-165.
Money supply ΔMS	**Money supply** Net change in money supply (M_o)	**Money supply** Period 1969-70 to 1973-74: Kemal A. R. et al. (1980), "*Estimates of Money Supply in Pakistan: (1959-60 to 1978-79)*". Period 1974-75 to 1979-80: *Annual Report 1979-80*, State Bank of Pakistan, Karachi, p.22. Period 1980-81 to 1981-82: *Annual Report 1989-90*, State Bank of Pakistan, Karachi, p.22. Period 1982-83 to 1992-93: *Annual Report 1993-94*, State Bank of Pakistan, Karachi, p.22.
Government bonds ΔGB	**Government bonds** Net purchase of public bonds	**Government bonds** Period 1969-70 to 1970-71: *25 Years of Pakistan in Statistics, 1947-1972*, Karachi, pp. 174, 188. Period 1971-72 to 1980-81: *10 Years of Pakistan in Statistics, 1972-1982*, Karachi, pp. 248-249, 272. Period 1981-82 to 1988-89: *Pakistan Statistical Year Book, 1991*, Karachi, pp. 282-283, 296. Period 1989-90 to 1992-93: *Annual Report 1993-94*, State Bank of Pakistan, Karachi, p.131.

Table 4.2 Notation, Definition, and Source of Data (continued)

Notation	Definition	Source
Other variables	**Other variables**	**Other variables**
I_p	Private sector investment	Period 1969-70 to 1981-82: *Pakistan Economic Survey, 1991-92*, Islamabad, pp.44-53. Period 1982-83 to 1992-93: *Pakistan Economic Survey, 1993-94*, Islamabad, p. 29.
S_p	Private savings (defined as $S_p = S - S_g$)	
I_g	Public investment	Period 1969-70 to 1981-82: *Pakistan Economic Survey, 1991-92*, Islamabad, pp.44-53. Period 1982-83 to 1992-93: *Pakistan Economic Survey, 1993-94*, Islamabad, p. 29.
C_g	Public current consumption (defined as $C_g = G - I_g$)	
S_g	Public savings (defined as $S_g = T - C_g$)	
F	Net foreign savings (defined as $F = M - X$)	
I	Total investment	Period 1969-70 to 1981-82: *Pakistan Economic Survey, 1991-92*, Islamabad, pp.44-53. Period 1982-83 to 1992-93: *Pakistan Economic Survey, 1993-94*, Islamabad, p. 29.
S	National savings (defined as $S = I - F$)	
R_p	Repayments of domestic public loans (taken as error and omission in the private account)	
SS_p	Private sector capital surplus (defined as $SS_p = G + \Delta R + R_r - T - F_p$)	
OL	Other private loans to the public sector (taken as error and omission in the private account)	

respectively, expenditures and revenues of the private sector, the public sector, and the rest of the world. To maintain consistency in the accounts of all three institutions, this study defines the relevant variables of the private sector, the public sector, and the rest of the world in the following way.

## (i)	The public sector account

This study defines public sector revenues, expenditures, investment, current consumption, and savings in the following way.

Public revenues

The consolidated public revenues of the federal and provincial governments (T) are disaggregated into four components: direct taxes (T_d), which include income tax, corporation tax, and taxes on property; indirect taxes (T_i), which include excise duty, sales tax, surcharges on gas and petroleum, and other indirect taxes; taxes on international trade (T_t), which comprise import duties and export duties; and finally, non-tax revenues (T_n), which include interest and dividends, trading profits, receipts from the post office, telephone and telegraph departments, receipts from civil administration, surplus of autonomous bodies, and some other minor non-tax revenues. Algebraically, the expression is:

$$T = T_d + T_i + T_t + T_n \qquad (4.1)$$

Public expenditures

This study adopts two definitions for public sector expenditures. First, the consolidated federal and provincial governments expenditures (G) are divided into non-development and development expenditures. Non-development expenditures are further divided into seven components: expenditure on defense (G_{df}); interest payments on domestic debt (G_{id}); interest payments on foreign debt (G_{if}); current and development subsidies (G_{sb}); expenditures on general administration (G_{ga}); expenditures on social services (G_{se}); and other current expenditure (G_{oc}). The development expenditures (G_{de}) are kept as a single aggregate component. The algebraic expression is

$$G = G_{df} + G_{id} + G_{if} + G_{sb} + G_{ga} + G_{se} + G_{oc} + G_{de} \qquad (4.2)$$

Under the second definition, aggregate public expenditures (G) are divided into public current consumption (C_g) and public investment (I_g). The mathematical expression of this definition is as follows:

$$G = C_g + I_g \qquad (4.3)$$

Public savings

The public sector savings (S_g) are defined as follows:

$$S_g = T - C_g \qquad (4.4)$$

(ii) The private sector account

Private sector savings and investment are defined in the following way.

Private savings

The private sector savings (S_p) are taken as the residual of national savings (S) and the public savings. Thus,

$$S_p = S - S_g \qquad (4.5)$$

Private investment

The investments of the private sector (I_p) are the sum of private sector gross fixed capital formation (I_{kf}) and changes in the stocks of investment (I_{cs}), assuming that the change in stocks belongs to the private sector. Private investment can therefore be written as:

$$I_p = I_{kf} + I_{cs} \qquad (4.6)$$

(iii) The rest of the world account

The composition of exports and imports of goods and services is described in the following way.

Exports of goods and services

Aggregate exports of goods and services (X) are divided into merchandise exports and net factor and non-factor services. The merchandise exports include primary goods (X_p),

manufactured goods (X_m), and semi-manufactured goods (X_s). The exports of services include workers' remittances (X_{wr}) and foreign transfers for other services (X_{os}). The mathematical expression can be written as:

$$X = X_p + X_m + X_s + X_{wr} + X_{os} \qquad (4.7)$$

Imports of goods and services

Merchandise imports include imports of capital goods (M_k), imports of consumer goods (M_c), and imports of intermediate goods (M_i). The imports of services comprise foreign payments for non-factor services (M_{nf}) and factor services (M_f). The expression is:

$$M = M_k + M_c + M_i + M_{nf} + M_f \qquad (4.8)$$

Current account balance

Pakistan's economy has faced a deficit in the current account of its balance of payments during the period under analysis (see Data Appendix I). The current account deficit is defined as the difference between imports of goods and services (M) and the exports of goods and services (X), which is equal to total net foreign capital inflows (F). The mathematical expression is:

$$F = M - X \qquad (4.9)$$

National savings

This study defines national savings (S) as the residual between total investment (I) and foreign savings (F). That is,

$$S = I - F \qquad (4.10)$$

4.1.2 Flow-of-funds of institutions

The flow-of-funds among institutions (that is, the private sector, the public sector, and the rest of the world) are reported in the flow-of-funds block in Table 4.1. In this block, each column represents lending of the corresponding sector, while each row represents borrowing by the corresponding sector from the other sectors. Since the private sector has a capital surplus (except the years 1971, 1975, and 1982) and the public sector has been facing a

deficit in Pakistan throughout the years under analysis (see Data Appendix I), the circular flow-of-funds between the private sector and the public sector reported in Table 4.1 shows that the private sector provides its surplus (SS$_p$) to the public sector through purchasing net government bonds (ΔGB), holding money (ΔMS) issued by the government, and other direct and indirect loans (OL). The public sector also repays its domestic loans (R$_p$) to the private sector. The algebraic expression for the components of private sector lending to the public sector is:

$$SS_p = \Delta MS + \Delta GB + OL \qquad (4.11)$$

Table 4.1 also reports the circular flow of funds between the private sector and the rest of the world. It shows that the rest of the world provides net long-term loans (F$_p$) to the private sector in Pakistan in the form of net private direct foreign investment (DFI) and net other long-term loans (FL). The mathematical expression is:

$$F_p = DFI + FL \qquad (4.12)$$

In turn, the rest of the world receives capital from the private sector in the form of private capital flight (KF). Regarding the estimates of private capital flight, as yet no consensus exists among professionals about its definition. In general, four kinds of estimates of capital flight are used in the current literature: (i) the World Bank's 'inclusive' broad measure [1985b]; (ii) Morgan Guaranty's 'exclusive' broad measure [1986]; (iii) Cuddington's 'hot money' narrow measure [1986]; and (iv) the 'derived' measure by Dooley [1986] and M.S. Khan and UI Haque [1987]. The inclusive measure of capital flight based on the World Bank [1985b] methodology is defined as the sum of net short-term banking and non-banking foreign asset acquisition by the private sector (FA$_p$) and errors and omissions (EO) recorded in the balance of payments.[8] Morgan Guaranty [1986] excludes the net acquisition of foreign assets by banks from World Bank estimates, and considers it as an exclusive broad measure of capital flight.[9] Cuddington [1986] adds net errors and omissions and private net non-bank short-term acquisition of foreign assets reported in the balance of

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[8] The inclusive broad measure of capital flight is widely used by Diaz-Alejandro (1985), Dornbusch (1985), Dooley et al. (1986), Erbe (1985), and Boyce (1992).

[9] The exclusive broad measure is adopted by Dooley et al. (1986), Lessard and Williamson (1987), and Pastor (1990).

payments.[10] The derived measure of capital flight is defined as external assets held by the private sector that do not generate income recorded in the balance of payments of the country. Although none of the estimates of capital flight based on these methodologies provide actual figures about capital flight, the comparatively broad measure is considered to be more reliable because it is more consistent with the standard concepts of the balance of payments. M.S. Khan [1989] suggests that the broad measure would be more appropriate for Pakistan as well as other LDCs with exchange controls and restrictions on capital transfers.[11] This study, therefore, uses the widest estimates of capital flight defined by the World Bank (1985b). The mathematical expression is:

$$KF = FA_p + EO \qquad\qquad (4.13)$$

The circular flow-of-funds between the public sector and the rest of the world reported in Table 4.1 shows that the rest of the world provides gross long-term and short-term loans (F_g) to the public sector in Pakistan to partially fulfill its budgetary requirement. On the other hand, the public sector repays its foreign loans (R_f) to the rest of the world. The balancing item, the change in official foreign exchange reserves (ΔR), is also taken into account to keep consistent the accounts of the public sector and the rest of the world.

4.2   Data adjustment

Most of the data in the national accounts of Pakistan are compiled by the Federal Bureau of Statistics (FBS). During 1988-89, the FBS made revisions to some series of the national accounts (e.g. public consumption, private consumption, private investment, and GDP), which are referred to as the data based on new methodology. The data since 1980 have been revised according to the new methodology, while the earlier data-series are still based on the old methodology. Therefore, the data-series based on the old and new methodologies are not comparable and cannot be used (as they are for analysis). The following regression technique has accordingly been adopted to make comparable data-series based on one methodology (specifically, the new methodology). We chose to use this methodology after confirming a linear relationship between both data-series based on old methodology and new methodology

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[10] The narrow measure is used by Conesa (1987), Cuddington (1987), and Boyce (1992).

[11] For further detail on the issue of capital flight from Pakistan, see Sarmad (1993) and Iqbal (1994).

Figure 4.1

Private Investment in Pakistan, 1981-88

Figure 4.2

GDP in Pakistan, 1981-88
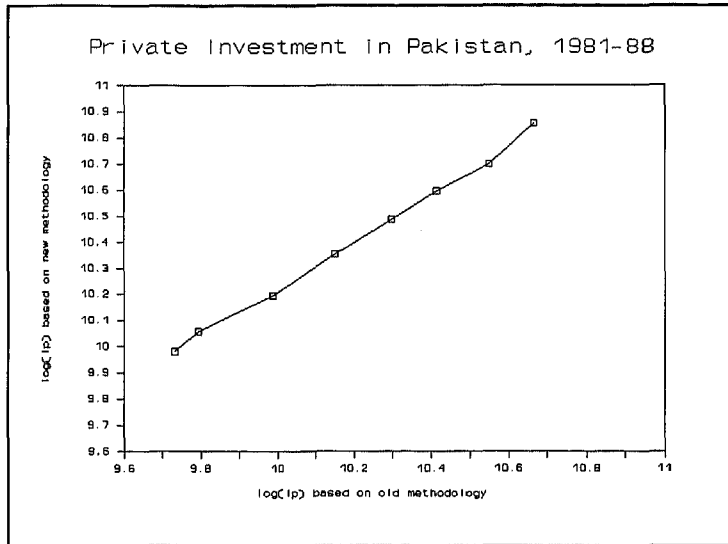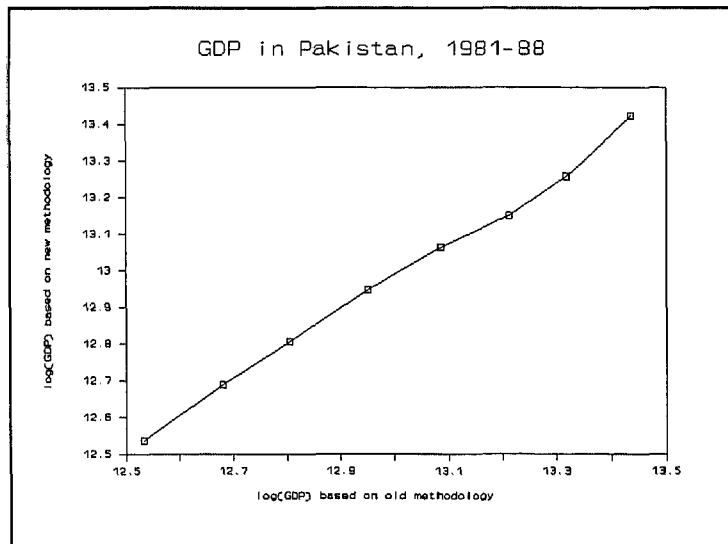
for the overlapping years 1981-88. Figures 4.1 and 4.2 depict these linear relationships for private investment and gross domestic product, respectively. The estimated equation is as follows:

$$log(DS_n) = \alpha + \beta \, log(DS_o)^{12} \qquad\qquad (4.14)$$

DS_n and DS_o are the data-series based on the new and old methodology, respectively.This study has adjusted two variables, private investment and GDP, while it has left unchanged the other data-series reported in the national accounts (i.e. public investment and change in stocks in investment). In the first step, the above regression equation is estimated taking time-series data for overlapping years 1981-88 for both variables, based on the new methodology as a dependent variable and the data for the same variable based on the old methodology as an independent variable.[13] In the second step, the estimated equation is used to predict the values for dependent variables for the period 1970-80 -- given the old values of independent variables for the same period. This procedure seems to generate comparable series of private investment and GDP based on the new methodology for the period 1970-1980. In this way, both the series of private investment and GDP are constructed on the basis of the new methodology for the entire period 1970-93, which makes them consistent with the other data series used in this study.

4.3 Summary

This chapter has attempted to construct a consistent set of time-series data in a social

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[12] The regression results of private investment and gross domestic product functions are as follows:

Private investment

$$log(I_{pn}) = 1.160 + 0.906log(I_{po}) \qquad R^2 = 0.997 \qquad D.W. = 2.35$$
$$\quad\;\; (5.47) \quad (43.64)$$

Gross domestic product

$$log(GDP_n) = 0.800 + 0.937log(GDP_o) \qquad R^2 = 0.996 \qquad D.W. = 1.61$$
$$\qquad\;\;\; (2.48) \quad (37.73)$$

[13] The specified functions for private investment and GDP in absolute values (without log) were also tried, but the estimates given by logarithmic form are closer to the actual trends of both the variables.

accounting (SAM) framework for the period 1970-93 for Pakistan. The SAM framework has been used because of its advantages as a means of compiling the consistent data-set. The time-series data are needed for two purposes. First, the data describe the evolution of the three-gaps, flow-of-funds, and target variables during the pre-adjustment and adjustment periods. Second, the related consistent time-series data make it possible to operationalize the three-gap model for the analysis of the effectiveness of adjustment policy reforms and external shocks on macroeconomic performance in Pakistan.

Chapter 5

History of Three-Gaps, Flow-of-Funds, Adjustment Policy Variables, and External Shock Variables in Pakistan's Economy

This chapter describes the historical development of the three-gaps (i.e. the saving gap, the fiscal gap, and the foreign-exchange gap), flow-of-funds, structural adjustment policy variables, and external shocks in Pakistan's economy over the period 1970-93. The structural adjustment reforms in Pakistan began in 1980. The entire period under analysis (1970-93) is therefore divided into two sub-periods: 1970-80 and 1981-93. These two sub-periods allow a comparison of the development of three-gaps of Pakistan's economy for one decade without structural adjustment reforms and for the other decade characterized by the gradual adoption of policy reforms. The events that took place in Pakistan during the period 1970-93 were both economic and political in nature. During the 1970s, the nationalization measures, oil price shocks, unfavorable terms of trade, and the rising debt crises, not only slowed down economic growth but also worsened the internal and external balances of Pakistan's economy. These events led the government to adopt the structural adjustment reforms suggested by the World Bank and the IMF since 1980. The next sections will describe to what extent and in which direction the internal economic and political events and external factors of pre-1980 and post-1980 affected the resource balance of the private sector, the resource balance of the public sector, and the current account balance of the balance of payments in Pakistan.

5.1   The evolution of the three-gaps

Table 5.1 summarizes the resource balance of the private sector, the resource balance of the

Table 5.1 Development of Three-Gaps in Pakistan (% of GDP at current market prices)

Year	Private Sector Resource Balance			Public Sector Resource Balance			Current Account Balance		
	S_p	I_p	$(S_p - I_p)$	T	G	(T - G)	M	X	(X-M)
1970	12.4	10.9	1.5	15.9	21.5	-5.6	10.8	6.7	-4.1
1971	8.7	10.7	-2.0	14.6	18.1	-3.5	11.7	6.2	-5.5
1972	11.5	10.0	1.5	12.8	20.5	-7.8	16.4	10.1	-6.3
1973	16.9	8.7	8.2	13.3	23.3	-10.0	14.0	12.2	-1.8
1974	9.6	7.0	2.6	15.0	23.3	-8.3	17.8	12.1	-5.7
1975	7.2	7.9	-0.7	14.9	23.9	-9.0	19.7	10.0	-9.7
1976	10.4	7.7	2.7	13.9	23.3	-9.4	17.6	10.9	-6.7
1977	10.4	8.6	1.8	13.9	22.4	-8.4	17.4	10.8	-6.6
1978	12.7	8.1	4.6	14.4	22.3	-7.9	16.8	13.5	-3.3
1979	11.9	8.3	3.6	15.2	24.3	-9.1	20.9	15.4	-5.5
1980	10.3	8.9	1.4	16.7	22.8	-6.1	22.2	17.5	-4.7
Avg.	11.1	8.8	2.3	14.6	22.4	-7.7	16.9	11.4	-5.4
1981	11.0	9.4	1.6	17.6	22.9	-5.3	21.6	17.9	-3.7
1982	9.3	9.6	-0.3	16.6	21.9	-5.3	22.9	17.3	-5.6
1983	14.4	9.2	5.2	16.9	23.9	-7.0	22.4	20.6	-1.8
1984	11.9	9.3	2.6	17.8	23.8	-6.0	22.5	19.1	-3.4
1985	11.5	9.4	2.1	17.0	24.7	-7.7	23.0	17.4	-5.6
1986	13.6	9.5	4.1	18.0	26.1	-8.1	22.7	18.7	-4.0
1987	15.4	9.4	6.0	18.4	26.6	-8.2	20.6	18.4	-2.2
1988	13.2	9.2	4.0	18.2	26.7	-8.5	22.1	17.6	-4.5
1989	12.2	10.0	2.2	18.8	26.1	-7.3	23.1	18.0	-5.1
1990	12.3	10.6	1.7	19.4	25.9	-6.6	22.9	18.1	-4.8
1991	14.2	10.5	3.7	16.8	25.5	-8.8	23.7	18.7	-5.0
1992	16.0	11.4	4.6	19.1	26.5	-7.4	23.2	20.4	-2.8
1993	11.9	11.6	0.3	18.2	26.2	-8.0	26.8	19.1	-7.7
Avg.	12.8	9.9	2.9	17.9	25.2	-7.3	22.9	18.6	-4.3

For definition of notations, see Table 4.2

Figure 5.1 Three-Gaps of Pakistan's Economy
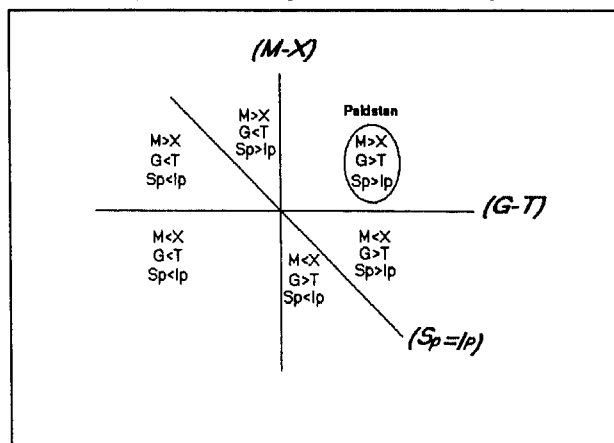
public sector, and the current account balance of the balance of payments of Pakistan for the period 1970-93. The complete set of consistent data is given in Appendix I. The overtime data reported in Table 5.1 show that Pakistan has had a persistent private sector savings surplus (except for three years -- 1971, 1975, and 1982), a public sector deficit, and a current account deficit of the balance of payments throughout the period 1970-93. The analytical framework developed in Chapter 2 provided six possible combinations of three-gaps in an open economy. As a visual representation of the historical data reported in Table 5.1, the Figure 5.1 indicates in the circled area the relevant position of the three-gaps of Pakistan's economy. That is, the private sector in Pakistan had a surplus ($S_p > I_p$), the public sector had a fiscal deficit ($G > T$) and the current account balance of the balance of the payments had a deficit over the period under analysis. Possible explanations of these balances are given in the sub sections that follow.

5.2   Private sector's resource gap

(a)   Pre-1980

Table 5.1 and the following Figure 5.2 present data on private savings, private investment, and the private sector resource balance during the period 1970-93. The vertical line in Figure 5.2 divides the whole period into two sub-periods: the pre-adjustment period 1970-80 and the period with adjustment 1981-93. It shows that the resource balance (saving-investment gap) of the private sector in Pakistan remained in surplus (except in 1971 and 1975) throughout the pre-adjustment period -- private savings were higher than private sector investment. The trend also reveals that the saving-investment gap of the private sector reached a maximum level of 8% of GDP in 1973 and later declined to 5% of GDP in 1978 and 1% of GDP in 1980. These surpluses were transferred to the public sector to meet its budgetary requirements. Figure 5.2 shows that during the 1970s private sector savings ranged between 7% and 17% of GDP and remained higher than private investment, which amounted to between 7% and 11% of GDP, leaving the private sector in capital surplus. Figure 5.2 also shows a continuous fall in private sector investment until 1974, reaching a minimum level of 7% of GDP (but later these trends were reversed). The reversal in trend, however, was not accompanied by a sharp increase in private sector investment. In the early 1970s, the domestic private sector was the major investor, but soon after nationalization and the beginning of the social welfare program, the public sector became the major investor in the economy. Therefore, nationalization measures and political unrest in the country during the

1970s discouraged not only local private sector economic activities but also the inflows of direct foreign private investment to Pakistan. In addition, political and economic instability resulted in massive private capital flight from Pakistan during this decade. Private capital flight, in turn, resulted in a reduction of available resources to finance domestic investment, eventually leading to a decline in the rate of capital formation. Private capital flight hurt not only private savings but also public savings in Pakistan. Government revenue collections had declined as a result of capital flight, and so, consequently, had public savings.[14] This phenomenon has adversely affected the country's current and future economic growth and savings rates. In a nutshell, the period 1970-80 in Pakistan's economic history was a 'decade of crisis' for private sector activities.

Figure 5.2

Resource Balance of the Private Sector
(1970-93)
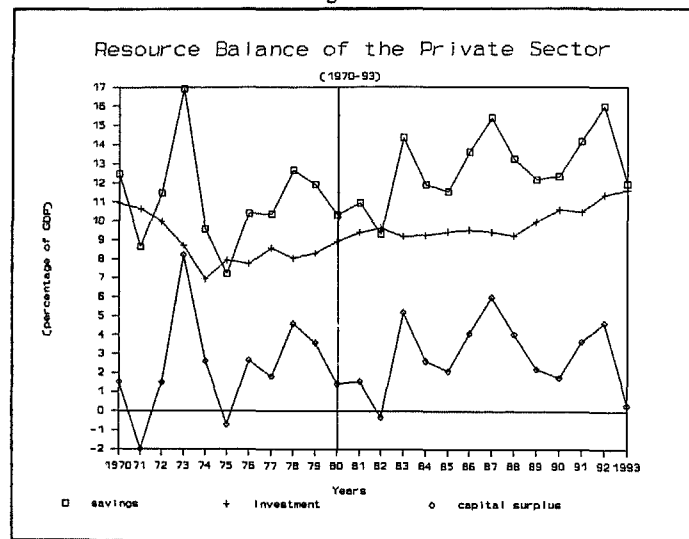
(b) post-1980

The development of private savings, private investment, and the private resource balance during the post-1980 period shows some increase (compared to the 1970s) in private savings

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[14] For further detail on this issue, see Iqbal (1993, 1994a).

during the 1980s and early 1990s. Private savings increased to a maximum level of 16% of GDP in 1992, and thereafter declined to 12% of GDP in 1993. The outstanding feature of private sector savings during the 1980s was a phenomenal increase in workers' remittances. The remittances flow amounted to an annual average of 46% of the total export earnings during 1978-86 (see Table 5.4 below in the section on composition of exports of goods and services). The availability of substantial workers' remittances also reduced the demand by Pakistan's economy for foreign capital inflows.[15] Figure 5.2 shows a continuous increase in private investment since 1980, reaching a maximum level of 12% of GDP in 1993. The savings rate of the private sector averaged around 12% of GDP and the investment rate averaged around 9% of GDP, figures that are low in relation to other developing countries (being only half as high, for example, as in India).

Private sector investment has surpassed public sector investment since 1990, when the government followed the relatively liberal economic policies (e.g. deregulation, privatization, and liberalization of trade) imposed by the World Bank and the IMF under various structural adjustment programs during the post-1980 period. In addition, the present government is also creating a liberal domestic investment environment to attract foreign investors. It has been offering a comprehensive set of incentives to foreign private investors and Pakistanis overseas to motivate them to invest in industrial undertakings in Pakistan, particularly in capital-intensive industries requiring sophisticated technology. Since 1980, many steps have been taken to liberate private enterprises from the shackles of overbearing public controls. The response has been encouraging -- an upsurge in private sector investment activities (local and foreign) in Pakistan. Although liberal economic policies pursued by the present government have resulted in a perceptible movement towards a freer economy, the slow rate of growth of private investment reveals that the favorable economic climate has not been able to fully revive private sector activities in Pakistan -- after 23 years of nationalization.

5.3 Public sector's resource gap

(a) Pre-1980

Table 5.1 and Figure 5.3 present the development of the consolidated (federal plus provincial governments) budgetary position during 1970-93. Total public revenues ranged between 13% to 19% of GDP, while public expenditures floated between 18% to 27% of GDP during the

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[15] For more detail on this issue, see Iqbal (1993) and Naqvi and Sarmad (1994).

period under consideration. Figure 5.3 shows that public revenues remained almost constant until 1977, while later they showed a marginally upward trend. The public revenues increased from 14% of GDP in 1977 to 17% of GDP in 1980. Figure 5.3 shows an almost continuously increasing trend in public expenditures until 1980 e.g. 18% of GDP in 1971 to 23% of GDP in 1980, leaving the budget deficit (on average) 8% of GDP during the 1970s, which is referred to as the growing crisis of Pakistan's economy. The trend toward increasing public expenditures was mainly due to increases in defense expenditure, current subsidies, and debt servicing (see Table 5.3 below in the section on development in fiscal management of the public sector).

Figure 5.3

Resource Balance of the Public Sector
(1970-93)
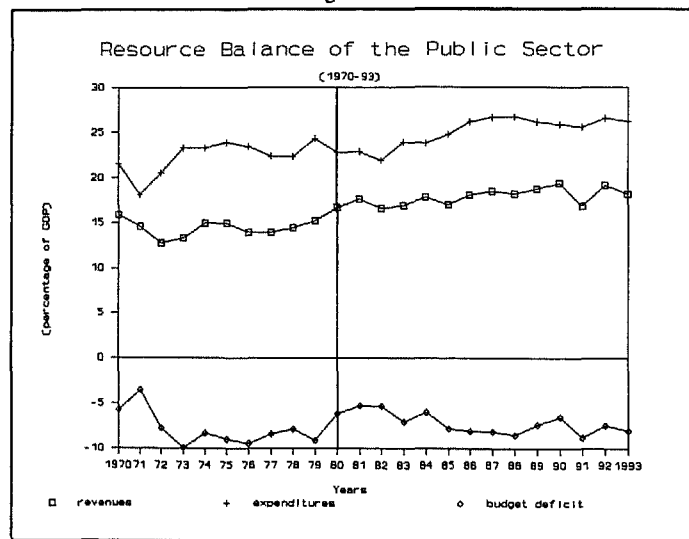
(b) Post-1980

Figure 5.3 also depicts the development of public revenues, public expenditures, and the public sector deficit during the post-1980 period. Unlike the pre-1980 period, public revenues and public expenditures increased simultaneously, but the latter increase was more rapid than the former. Figure 5.3 shows that public revenues increased from 17% of GDP in 1980 to

19% of GDP in 1992, while public expenditures rose from 23% of GDP to 27% of GDP during the same period, leaving the budget deficit, on average, 7% of GDP during the adjustment period (which remains slightly lower than in the pre-adjustment period). The main reason for the recent increase in public revenues was the government's efforts to diminish tax evasion. In the past, the government had made no effort to introduce proper tax reforms for an improvement of tax revenues. In all the adjustment programs, the World Bank and the IMF urged the Government of Pakistan to raise its tax revenues and reduce non-development expenditures. With a view to increase tax revenues and to reduce current expenditures, the present government set up a Tax Reforms Committee in December 1990. A number of improvements in tax policies were proposed by the Committee. These measures include the following: (i) expand the General Sales Tax and employ measures to increase the elasticity of excise duties; (ii) direct public enterprises to reduce dependence on budget financing; (iii) impose strict controls on non-development expenditure, including a ban on new recruitment in the civil service and on the purchase of new vehicles. The government budget deficit is mainly financed through domestic bank, domestic non-bank, and external borrowing, which has led to a rapid accumulation of internal and external public debt (see Table 5.7 below).

In addition, the data reported in Appendix I show that public savings in Pakistan have been quite low. They have never exceeded 5% of GDP and have been negative for the years from 1972 to 1974 and 1991. On average, the public savings rates in Pakistan during the pre-1980 and post-1980 periods have been around 1% of GDP and 2% of GDP, respectively. The data regarding public investment reported in Appendix I reveal that the government has actively engaged in investment activities, especially during the period 1974-90, when private investment activity was replaced by public investment. As a result, the government has had to rely on external resources to maintain investment and growth at reasonable levels. A definite shift in favor of private investment was initiated by the government during the late 1980s through denationalization, deregulation and other liberal economic policies pursued under structural adjustment programs.

5.3.1 Development in fiscal management of the public sector

This section describes the major components of fiscal management in Pakistan. Fiscal management deals with expenditure policy, which determines the level of development and non-development expenditures, and fiscal policy, which is concerned with the financing of these expenditures through tax and non-tax revenues and internal and external loans. The

following section explores the evolution of sources of consolidated public revenues and expenditures (federal plus provincial governments) in Pakistan over the period 1970-93.

(a) Sources of public revenues

The major domestic sources of public revenues in Pakistan can be divided into tax and non-tax sources of revenues. These sources are shown in Table 5.2 and Figure 5.4. They show that taxes remained the major source of public revenues in Pakistan. Tax revenues come from the direct tax, the indirect tax, and the trade tax.[16] Direct taxes consist mainly of income and corporation taxes and property tax. Table 5.2 shows that the direct tax contributed an annual average of 11% and 13% of total public revenues during the pre-1980 and post-1980 periods, respectively. It appears that the share of direct taxes in total public revenues in Pakistan is low compared to international standards. The main reasons seem to be the narrow tax base, an inelastic tax system, tax exemptions, and tax evasion. In addition, agricultural income, which accounts for one-third of GDP, is exempted from income tax.

Indirect taxes consist of excise duties, sales taxes, surcharges on public utilities and other minor indirect taxes. Indirect taxes accounted for annually around 37% of total public revenues during the 1970s, but this share declined to 34% during the post-1980 period. Although more than half of the imports are exempted from import duties, taxes on international trade -- custom duties -- are the main single source of indirect taxes in Pakistan over the period under consideration. Trade tax accounted for an annual average of 27% of total public revenues during the pre-1980 period. Thereafter, this share increased annually to 30% of total revenues during 1981-93. This pattern can also be seen in Figure 5.4. Thus public revenues in Pakistan are highly dependent on indirect taxes, particularly customs duties, excise duties, and sales tax.

Turning to non-tax revenues, the major sources of non-tax revenues in Pakistan are profits of commercial departments of the government (such as the post office, telephone and telegraph, railways, road transport), interest on loans advanced by the government, and fees. Table 5.2 shows that non-tax revenues accounted for about one-fourth of total public revenues. The annual average share of non-tax revenues in total public revenues was 25% during the 1970s, which decreased on average to 24% during 1981-93. This trend is also depicted in Figure 5.4.

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[16] In the public finance of Pakistan, the trade tax is a part of indirect tax, but in this study, it is separated to further our own research interest.

Table 5.2 Sources of Public Revenues in Pakistan (% of total revenues)

Years	Direct Tax	Indirect Tax	Trade Tax	Non-Tax
1970	8.5	40.9	19.9	30.7
1971	8.1	41.3	20.4	30.2
1972	15.6	39.0	17.2	28.2
1973	11.5	35.4	26.3	26.8
1974	8.2	30.9	29.0	31.9
1975	7.7	32.1	27.7	32.5
1976	13.1	40.8	26.8	19.3
1977	13.1	39.9	28.0	19.0
1978	11.6	38.2	31.7	18.5
1979	12.0	36.7	33.0	18.3
1980	13.8	31.4	36.1	18.7
Average	11.2	37.0	26.9	24.9
1981	15.3	34.8	29.1	20.8
1982	16.5	35.4	28.0	20.1
1983	15.1	34.6	30.1	20.2
1984	12.3	36.9	28.8	22.0
1985	12.2	35.1	29.2	23.5
1986	11.1	35.3	31.6	22.0
1987	10.5	36.4	31.6	21.5
1988	10.1	35.0	31.0	23.9
1989	10.1	37.0	29.4	23.5
1990	9.5	32.0	30.6	27.9
1991	12.1	34.0	29.4	24.5
1992	12.9	26.7	31.4	29.0
1993	15.5	32.3	25.9	26.3
Average	12.5	34.3	29.7	23.5

Figure 5.4

Sources of Public Finance in Pakistan (1970-93)
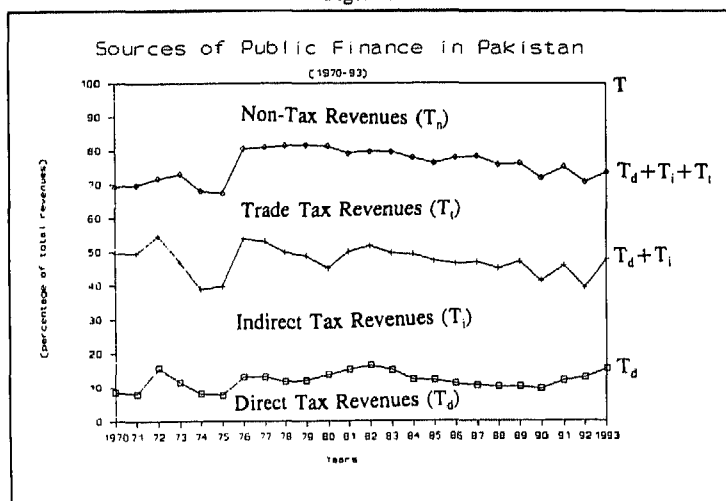
(b) Public resource allocation

This study divides public expenditures into seven components of current expenditures and single aggregate development expenditures. All of these categories of expenditures are reported in Table 5.3, and are also depicted in Figure 5.5. They show an interesting picture of various components of current expenditures and development expenditures over the period 1970-93. It appears that since 1972, aggregate current expenditures continuously declined, and development expenditures increased until 1977. Thereafter, however, these trends appeared to move in opposite directions. Figure 5.5 also suggests that since 1978 the gap between aggregate current expenditures and development expenditures has been continuously widening. Regarding development expenditures, Table 5.3 shows that development expenditures during the 1970s were on average 32% of total expenditures, a figure that declined to 27% during 1981-93. Conversely, aggregate current expenditures continuously increased during the post-1980 period, reaching a peak level of 76% of total expenditures in 1993. Many reasons can be put forward to explain the increasing level of current expenditures; some of them, in fact, can be discerned from the explanation of the composition of current expenditures presented in Table 5.3.

The main components of current expenditures in Pakistan are defense, interest payments on domestic and foreign debt, subsidies, general administration, social services, and other items. The development of these components is reported in Table 5.3 and is also shown in Figure 5.5. Annually, a share of around 25% of total expenditures was devoted to defense during 1970-93. Although defense expenditures may seem high, the strategic position of the country and the ongoing conflicts with India do not seem to allow the government to reduce these expenditures in the near future. Another major component of public current expenditures is debt servicing. The growing budgetary deficits during 1970-93 led to a rapid accumulation of public debt in Pakistan because the public sector deficit was partially financed through both internal and external borrowings; consequently, interest payments on accumulated debt put a heavy burden on public resources. Interest payments on accumulated debt reported in Table 5.3 accounted for an annual average of 10% of total expenditures during 1970-80, which increased to 16% during 1981-93. Government subsidies on some food items, industrial and agricultural inputs, and some exports have also claimed a large share of public expenditures in Pakistan. The average annual share of subsidies in total expenditures accounted for 7% during the 1970s, but these expenditures have been continuously declining during the 1980s and early 1990s, reaching a minimum level of 2% in 1993. This pattern can also be seen from Table 5.3. With limited resources, budgetary

Table 5.3 Components of Public Expenditures in Pakistan (% of total expenditures)

Years	Defense	Domestic Interest Payments	Foreign Interest Payments	Subsidies	General Adminis- tration	Social Services	Other Current	Develop- ment
1970	23.7	9.3	2.9	2.0	3.6	6.6	22.3	29.7
1971	30.9	9.8	3.7	1.9	4.6	7.8	17.3	24.0
1972	29.7	9.9	3.5	1.8	3.2	6.5	29.6	15.9
1973	25.6	4.5	4.0	3.0	3.4	5.1	29.3	24.3
1974	22.2	6.7	3.5	10.1	3.4	5.5	21.0	27.7
1975	24.3	6.1	3.6	9.9	3.4	6.0	8.9	37.8
1976	25.1	4.3	3.3	9.2	3.6	6.5	9.8	38.3
1977	23.1	4.1	3.8	6.9	4.1	6.8	8.5	42.8
1978	23.7	4.3	3.9	8.0	3.4	7.6	11.6	37.5
1979	21.0	4.0	4.1	12.3	3.5	6.8	10.5	37.8
1980	23.2	4.9	4.4	12.9	5.5	7.3	7.0	34.9
Avg.	24.7	6.2	3.8	7.1	3.8	6.6	16.0	31.9
1981	24.0	5.7	3.6	8.5	4.4	7.7	9.5	36.6
1982	26.2	6.9	3.9	6.1	4.8	7.6	9.8	34.7
1983	26.7	7.2	5.0	5.5	4.8	8.5	10.9	31.5
1984	26.8	8.4	5.7	6.1	6.0	9.8	10.6	26.6
1985	27.3	8.7	5.4	5.9	5.6	9.0	11.1	27.0
1986	26.5	9.4	5.3	6.1	5.5	9.2	10.3	27.8
1987	27.1	10.4	5.5	4.6	6.8	10.1	12.5	23.0
1988	26.1	12.5	5.4	5.6	4.7	9.6	11.4	24.7
1989	25.4	14.0	5.5	7.8	5.1	9.6	10.0	22.7
1990	26.5	16.2	5.7	4.6	5.4	9.1	7.8	24.8
1991	24.8	13.7	5.5	4.4	5.2	10.8	11.2	24.5
1992	23.6	15.7	5.3	3.3	5.6	14.1	4.4	28.0
1993	24.9	17.9	5.8	2.3	5.8	15.7	3.2	24.4
Avg.	25.8	11.3	5.2	5.4	5.4	10.1	9.4	27.4

Figure 5.5

Components of Public Expenditures (1970-93)

Development Expenditures (G_{de})

Other Current Expenditures (G_o)

Interest Payments (G_i)

Defence Expenditures (G_{df})

G

$G_{df}+G_i+G_o$

$G_{df}+G_i$

G_{df}
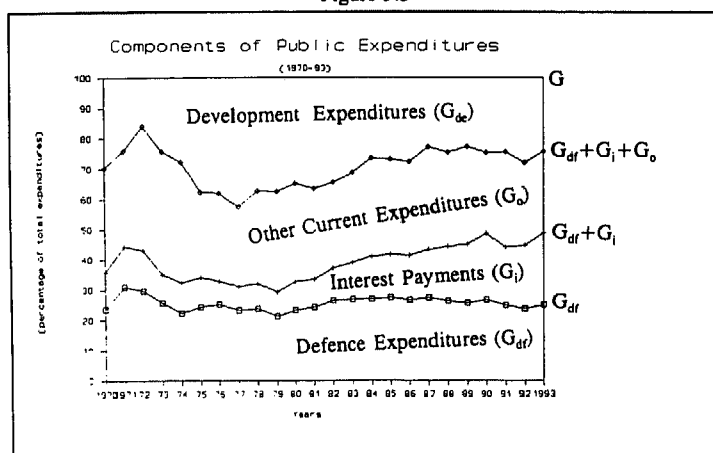
allocations for social services, mainly education and health, have always been low in relation to needs. Table 5.3 shows that expenditures on social services increased considerably from 7% of total expenditures in 1970 to 16% in 1993. Another major component of public current expenditures is general administration. The share of expenditure on general administration in total expenditures was 4% in 1970 which increased marginally to 6% in 1993. This trend is also reported in Table 5.3.

As already explained in the previous chapter, aggregate public expenditures can also be divided into public current consumption and public investment because no development expenditures can be considered as investment expenditures and non-development expenditures as public current consumption. On this basis, the following Figure 5.6 depicts public current consumption and public investment. The trends of public current consumption and public investment remained almost the same as in the case of aggregate non-development and development expenditures depicted in Figure 5.5.

<div align="center">Figure 5.6</div>
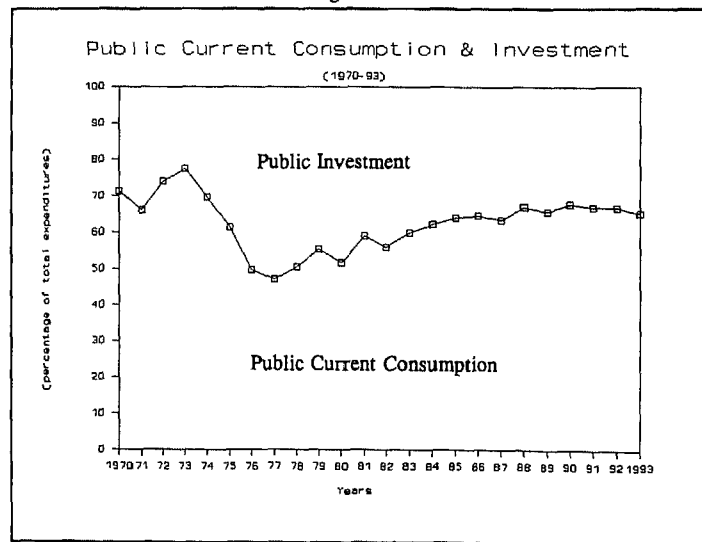
It is generally argued that current expenditures are mainly responsible for the overall budgetary deficit in Pakistan, while development expenditures help in the accumulation of assets and also improve the fiscal balance of the public sector, because development projects

may generate profits. It is obvious from Tables 5.2 that a large part of development and non-development outlays is financed through domestic public revenues (government revenues plus surpluses of autonomous bodies). In spite of financing expenditures through public revenues, a budgetary deficit still appears, which is financed through both internal and external borrowings. The modes of financing the fiscal deficit are described below in the section on flow-of-funds.

5.4 External resource balance

(a) Pre-1980

Table 5.1 and Figure 5.7 present data on exports of goods and services, imports of goods and services, and the current account balance of the balance of payments of Pakistan's economy for the period 1970-93. Figure 5.7 is divided by a vertical line into two parts, showing the development of the current account balance for pre-1980 and post-1980 periods separately. Both exports and imports of goods and services show a rising trend throughout the period under consideration. The tables show that total export earnings increased substantially from 7% of GDP in 1970 to 18% of GDP in 1980 while total import payments

Figure 5.7
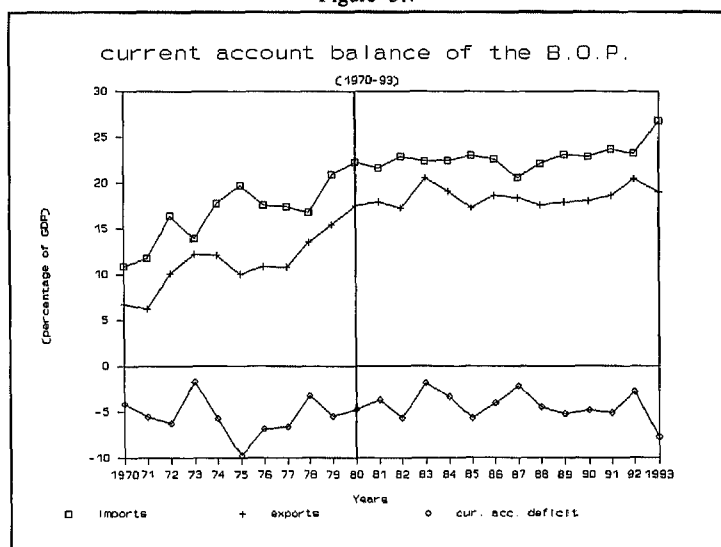
also rose from 11% of GDP to 22% of GDP during the same years. Moreover, Figure 5.7 reveals that the current account of the balance of payments remained in deficit throughout the period -- total imports of goods and services were higher than total exports of goods and services. On average, the current account deficit remained 5% of GDP during the pre-1980 period. Numerous factors such as two oil shocks, deterioration in the terms of trade, and a destructive war with India, seem to have contributed to the current account deficit of Pakistan's economy during the pre-adjustment period.

(b) Post-1980

Since 1970, Pakistan has continuously had a deficit in the current account of the balance of payments. Figure 5.7 shows that the deficit on the current account slowed down during the 1980s. The obvious reason seems to be the availability of workers' remittances (an average of 47% of total export earnings during 1980-86). Subsequently, however, the deficit on this account increased during the late 1980s and the early 1990s. Slow growth in merchandise exports and a considerable decline in home remittances (because of a shift in labor demand in Middle East oil-rich countries) contributed to this changed situation. Note from Figure 5.7 that the current account deficit improved on average after 1980 (the adjustment period) and remained annually 4% of GDP, whereas it was 5% of GDP during the pre-adjustment period. However, during the late 1980s and the early 1990s, with respect to the structural changes in the economy, there has been a significant increase in imported capital goods and industrial raw material. As a result, the current account deteriorated. The changes in the composition of imports and exports of goods and services are described in the following sub-sections, which may provide a clearer picture of the current account balance of the balance of payments of Pakistan's economy during the periods under consideration.

5.4.1 Composition of exports of goods and services

(a) Commodity composition of exports

Total exports of merchandise goods are divided into exports of primary goods, manufactured goods, and semi-manufactured goods. Pakistan's exports have become more diversified over time. There has been an appreciable increase in the share of manufactured goods and an almost equivalent decline in the share of primary and semi-manufactured goods in total exports during the post-1980 period (as compared to the pre-1980 period). Since 1980, the government has taken many steps to boost exports of manufactured goods. These steps

include the introduction of an Export Finance Scheme, provision of export subsidies, concessions in income tax for exporters of manufactured goods, lifting of foreign-exchange control, and establishment of tax-free Export Processing Zones. The results of these policies are encouraging, as can be seen from the following Table 5.4, which presents the development of exports of primary goods, semi-manufactured goods, and manufactured goods during the period 1970-93. The trends of these components of exports are also depicted in Figure 5.8. The share of exports of manufactured goods in total export earnings has been rising continuously, which is indicative of the fact that the country is industrializing. Table 5.4 shows that the share of manufactured goods in total exports was an annual average of 26% during the 1970s, but it increased tremendously to 45% of total exports in 1993. In contrast to manufactured exports, the share of primary and semi-manufactured goods in total exports has continuously declined. Table 5.4 shows that the share of primary goods in total export earnings was at a maximum level of 41% in 1975, but declined thereafter and reached a minimum level of 10% of exports earnings in 1993. A similar trend can be seen in the case of exports of semi-manufactured goods. Its share in total export earnings in 1970 was 53%, which declined to a minimum level of 4% in 1981 but increased to 20% in 1993. The reason for this reversal in the trend seems to be that since the mid 1980s, Pakistan's manufactured exports have been facing more severe tariff and non-tariff restrictions than have exports of semi-manufactured goods, particularly from the US and European countries. As a result, trade has been diverted towards semi-manufactured goods from Pakistan.

Despite the changed pattern of exports, Pakistan's exports are still concentrated on a few products such as raw cotton, cotton manufactures, rice, and leather and leather manufactures, which together accounted for 69% of total exports of merchandise goods in 1993. The other major exportable items are fish and fish preparations, fruits, vegetables, surgical instruments, carpets, raw wool, sporting goods, and petroleum products. This narrow base and lack of diversification of exports may make the country more vulnerable to external shocks in the future.

(b) Workers' remittances[17]

Among invisible foreign receipts (i.e. receipts from activities other than exports of merchandise goods), workers' remittances appeared as one of the major sources of foreign

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[17] For more detail on the importance and effects of workers' remittances on Pakistan's economy, see Burney (1989) and Kazi (1989, 1993).

Table 5.4 Classification of Exports from Pakistan (% of total exports of goods and services)

Years	Primary Goods	Manufactured Goods	Semi-Manufact- ured Goods	Workers' Remittances	Other Transfers
1970	14.7	19.4	52.7	12.5	0.8
1971	18.3	24.6	48.6	8.0	0.5
1972	24.4	15.3	47.2	12.3	0.8
1973	37.0	28.6	18.6	14.9	1.0
1974	34.6	33.3	19.2	11.9	1.0
1975	41.3	33.9	5.9	17.5	1.5
1976	32.7	28.6	15.5	22.4	0.9
1977	27.1	28.1	10.6	33.6	0.7
1978	18.7	25.9	6.6	46.1	2.8
1979	17.6	25.6	9.1	44.5	3.1
1980	23.5	24.0	7.8	41.2	3.6
Average	26.3	26.1	22.0	24.1	1.5
1981	25.7	26.3	3.5	42.0	2.5
1982	16.3	24.4	8.4	47.0	4.0
1983	13.8	26.0	6.2	50.6	3.4
1984	13.4	26.6	6.6	47.9	5.4
1985	13.4	24.8	9.6	47.6	4.7
1986	17.9	25.6	7.6	45.0	3.9
1987	15.9	31.7	10.2	37.6	4.6
1988	18.6	34.4	12.9	30.4	3.7
1989	21.4	31.6	15.9	28.2	3.0
1990	14.0	38.5	16.6	27.2	3.8
1991	13.6	41.3	18.9	23.1	3.2
1992	13.2	41.3	14.0	14.9	16.7
1993	10.2	44.7	19.6	17.2	8.4
Average	15.9	32.1	11.5	35.3	5.2

Figure 5.8

Components of Aggregate Exports (1970-93)
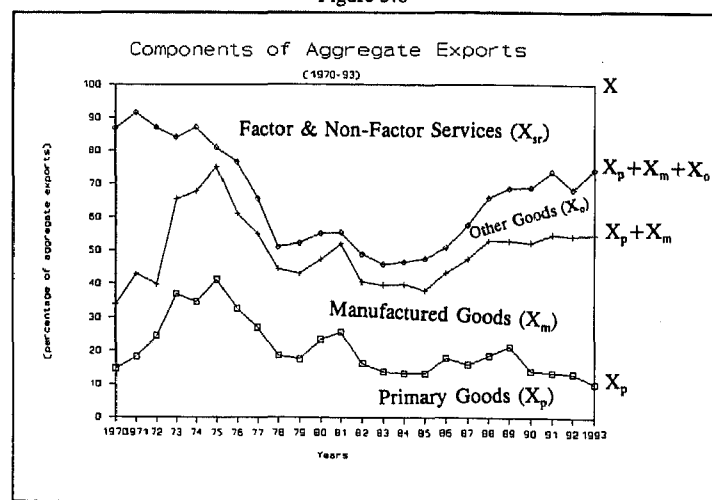
exchange earnings in Pakistan, particularly during 1978-86. The flow of workers' remittances is of great importance, since it releases the foreign-exchange constraint for Pakistan's economy. The Oil Boom of the 1970s caused the emigration of around two million Pakistani workers to the Middle Eastern countries. Table 5.4 presents the figures for the flow of workers' remittances in Pakistan during the period 1970-93. It shows that the share of workers' remittances in total export earnings was 12% in 1972; within one decade it surpassed the total export earnings of merchandise goods, reaching a peak level of 51% in 1983. Since then, a declining trend has been evident and recently (in 1993) the share of workers' remittances went down to 17% of total exports earnings. This reversal of the trend is also visible from Figure 5.8. The main causes for this decline seem to be the slump in the Middle East countries because of the collapse in oil prices, the Gulf crisis of 1991, the recession in the developed countries, the depreciation of the domestic currency, and the emergence of the 'Hundi' system.[18]

5.4.2 Composition of imports of goods and services

(a) Commodity composition of imports

The major imports into Pakistan are machinery, petroleum & petroleum products, chemicals, edible oil, road motor vehicles, wheat, iron & steel, tea, paper & paper board, silk yarn, synthetic fiber, milk and milk products, rubber, sugar, and legumes. In this study, all these imported goods are divided into three broad categories, namely, imports of capital goods, consumer goods, and raw materials for industrial and consumer goods. The current government import policy intends to increase the imports of capital goods and raw materials for industrial goods, and at the same time discourage imported consumer goods and raw materials. Table 5.5 and Figure 5.9 show how imports of capital goods, consumer goods, and intermediate goods (raw materials for industrial and consumer goods) have changed over time. Over the period 1970-93, the share of imported capital goods has increased marginally, while the shares of consumer goods and raw materials have decreased considerably. Table 5.5 shows that expenditures on imported consumer goods had considerably declined from a maximum level of 24% of total imports in 1973 to 10% in 1993. A similar trend can be seen

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[18] Under the hundi system, the Pakistani business community living abroad offers higher exchange rates than the official rates in Pakistan and the money is paid in rupees against foreign currency through their agents in Pakistan. Therefore, money remittances are transferred through non-official sources and are not recorded in the balance of payments of Pakistan.

Table 5.5 Composition of Imports in Pakistan (% of total imports)

Years	Capital Goods	Consumer Goods	Intermediate Goods	Factor & Non-Factor Services
1970	28.3	5.6	51.5	14.6
1971	28.1	5.7	50.3	15.9
1972	14.8	7.9	59.2	18.1
1973	24.0	23.9	37.7	14.5
1974	23.4	18.9	44.6	13.1
1975	26.2	20.1	42.8	11.0
1976	29.4	17.8	39.7	13.2
1977	31.9	13.3	42.0	12.8
1978	30.2	18.0	40.1	11.6
1979	26.1	18.6	45.0	10.3
1980	31.3	14.1	44.9	9.7
Average	**26.7**	**14.9**	**45.3**	**13.2**
1981	24.7	12.9	53.9	8.5
1982	23.6	11.3	57.2	7.9
1983	25.9	11.8	52.6	9.8
1984	25.9	11.4	52.0	10.7
1985	26.7	13.2	48.2	11.9
1986	28.5	14.1	42.9	14.5
1987	28.7	13.8	43.0	14.5
1988	27.0	10.7	45.6	16.6
1989	27.8	13.1	42.2	16.9
1990	24.7	14.5	42.9	17.9
1991	23.3	11.1	48.1	17.6
1992	34.3	10.5	35.4	19.8
1993	30.3	10.0	38.2	21.5
Average	**27.0**	**12.2**	**46.3**	**14.5**

Figure 5.9

Components of Aggregate Imports
(1970-93)
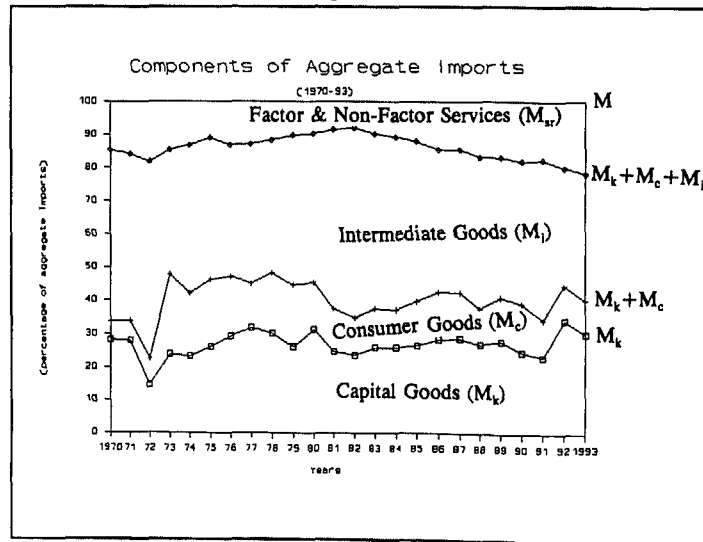
in the case of intermediate goods. Its share in total imports was 52% in 1970 but thereafter declined to 38% in 1993. This positive change indicates that Pakistan is becoming self-sufficient in consumer goods and intermediate goods. Imported intermediate goods have been dominant, with an average annual share of 45% of total imports during 1970-93, while the share of capital goods in total imports has risen marginally from 28% in 1970 to 30% in 1993. The rising share of imported capital goods shows the country's increasing dependence upon imports of machinery and other capital goods, it also reflects a positive trend towards industrialization.

(b) Service payments

Service payments to the rest of the world include shipment, interest payments on foreign capital, and other services hired from foreign companies. Table 5.5 shows that service payments initially declined from 15% of total imports in 1970 to a minimum level of 8% in 1982, but these payments increased considerably to 22% of total imports by 1993. Figure 5.9 also reflects this trend, which seems to be due to an increase in international interest rates on foreign debts from developed countries during the 1980s. Moreover, the increasing volume of Pakistan's international trade implies higher payments for shipping, which is usually hired from foreign companies.

5.5   Development in the flow-of-funds

The following Table 5.6 presents the composition of the flow-of-funds, which helps to delineate the circular flow-of-funds between the private sector, the public sector, and the rest of the world. Also worth noting are certain trends in the flow-of-funds components, for example, government bonds and money supply (in Figure 5.10), gross foreign capital inflows to the public sector and repayments of public debt (in Figure 5.11), and net direct foreign private investment in Pakistan and other long-term foreign loans to the private sector (in Figure 5.12). The possible explanation of these flow-of-fund variables is provided in the following sections.

(a) Money supply and government bonds

This study defines the monetary assets held by the private sector as currency in circulation (M_0) (assuming that all the currency is held by the private sector), net government bonds held by the private sector and other direct and indirect loans from the private sector to the public

Table 5.6   Flow-of-Funds in Pakistan   (% of GDP at current market prices)

Years	Govt. Bonds	Money Supply	Public For.Cap Inflows	Rep. of Foreign Loans	Change in Official Reserves	Net Direct Foreign Investment	Private For. Cap. Inflows	Private Capital Flight
1970	0.6	1.0	4.3	0.9	0.02	0.20	0.5	-0.05
1971	5.8	0.3	5.1	0.8	-0.51	0.01	0.8	0.04
1972	0.5	2.5	6.0	1.0	0.28	0.25	0.8	-0.56
1973	-0.2	0.9	4.4	0.8	2.14	0.00	0.2	-0.11
1974	0.3	2.1	4.3	0.7	-1.53	-0.06	0.7	0.05
1975	0.7	0.8	8.2	0.6	-1.16	0.12	0.7	-0.13
1976	0.2	1.7	6.1	0.8	-0.14	0.16	0.8	-0.34
1977	0.6	1.8	4.5	0.8	-1.59	0.03	0.7	-0.69
1978	0.3	1.5	4.8	0.5	1.70	0.18	0.4	0.00
1979	0.5	2.8	4.7	0.9	-0.91	0.16	0.4	-0.12
1980	0.2	1.7	7.0	1.2	1.87	0.28	0.3	-0.21
Avg.	0.9	1.5	5.4	0.8	0.02	0.12	0.6	-0.19
1981	0.3	2.6	4.0	1.0	0.16	0.25	0.5	-0.09
1982	0.7	0.9	3.2	1.0	-2.12	0.45	0.8	-0.08
1983	1.4	2.2	3.3	1.4	2.51	0.09	1.3	-1.07
1984	1.3	1.5	3.9	1.7	-0.29	0.14	0.4	-0.32
1985	0.2	0.9	3.5	1.5	-3.43	0.34	0.7	0.77
1986	4.0	1.3	4.7	1.7	1.40	0.54	0.5	-1.31
1987	1.9	2.0	4.2	2.2	0.80	0.39	0.3	-0.32
1988	2.3	1.9	5.2	1.9	-0.37	0.41	0.4	0.05
1989	1.9	1.3	6.3	1.9	0.03	0.47	0.5	0.20
1990	2.4	2.1	6.6	1.9	0.96	0.51	0.5	-0.12
1991	3.4	2.2	5.9	1.8	0.01	0.59	0.4	0.00
1992	1.7	1.2	3.6	1.6	0.27	1.16	0.9	0.98
1993	1.5	1.1	6.4	2.4	-1.23	0.94	1.7	0.10
Avg.	1.8	1.6	4.7	1.7	-0.10	0.48	0.7	-0.09

Figure 5.10

Government Bonds and Money Supply
(1970-93)
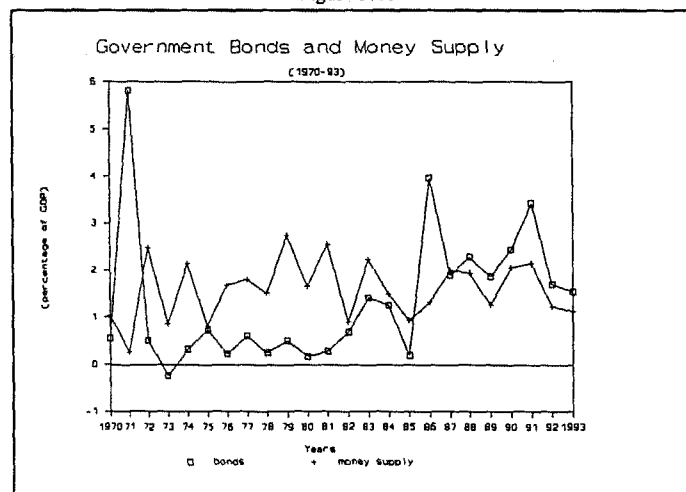
sector. The money supply has remained as one of the major sources of financing the fiscal deficit of the public sector in Pakistan. Table 5.6 and Figure 5.10 show that the annual average share of currency in circulation in GDP has remained almost the same, with only marginal variations around 2% during the pre-1980 and post-1980 periods.

Another major internal source of financing public sector budgetary deficit is bonds. Table 5.6 and Figure 5.10 present the development of net public sector bonds during the period 1970-93. These public bonds include prize bonds, special national fund bonds, bearer national fund bonds, foreign-exchange bearer certificates, income tax bonds, and government bonds for State Life Insurance Corporation. The table shows that government bonds were a minor domestic source of deficit finance during the 1970s and early 1980s. Government bonds remained less than 1% of GDP during 1970-82, except for the year 1971. That year was an exception because of the war with India and the secession of East Pakistan, which put a profound burden on public sector resources; as a consequence, the bonds issued by the government were at a maximum level of around 6% of GDP. Since 1983, there has been a marked increase in the growth of government bonds and the bulk of the budgetary deficit has been financed by these bonds. Table 5.6 shows that government bonds as a share of GDP remained, on average, around 2% of GDP during the period 1983-93. This rising trend reflects the fact that the government has resorted heavily to financing its deficit by turning to bank sources rather than to non-bank borrowing via bonds. It is also apparent that the private sector has shifted its preferences from bank deposits to other financial assets, which bear higher interest earnings in Pakistan. Due to heavy internal borrowing, particularly from high cost government bonds, the level of internal public debt as well as interest payments have been rising. In addition, higher internal borrowing by the public sector seems to crowd out productive private investment in Pakistan.[19]

(b) Foreign borrowing and repayments

Since the early 1950s, Pakistan has been relying on external borrowing. Its main role was to meet the shortage of domestic savings and investment and to quicken the pace of economic development. However, the persistent inadequacy of domestic resource mobilization has perpetuated a dependence on foreign borrowing. As a result, the outstanding foreign debt of the public sector reached about 19 billion US dollars in 1992-93 (37% of GDP and 280% of

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[19] More detail on the issue of crowding out(in) of private investment in Pakistan, see A.H. Khan and Iqbal (1991) and Iqbal (1995).

export earnings in 1992-93). A marked change has also been witnessed in the composition of aid. The proportion of grants has fallen considerably and been replaced by loans on harder terms and conditions. The grant and assistance component in total commitments was 80% during the First Plan period (1955-60), and dropped to 16% during the Seventh Plan period (1988-93).

In addition to internal resources, a large proportion of public sector deficit is financed by external resources transferred from the rest of the world. Table 5.6 and Figure 5.11 show that gross foreign capital inflows to the public sector declined substantially from a peak level of 8% of GDP in 1975 to 4% of GDP in 1987. Thereafter, however, this share increased to 6% of GDP in 1993. The changes presented in Table 5.6 also show that the bulk of the foreign loans and grants were received by the public sector, which implies that Pakistan is an official borrower because most of foreign loans come through official sources to the Government of Pakistan (through government to government arrangements and through international financial institutions to government).[20] The increased level of outstanding debt has caused the debt servicing liability to rise, and net resource inflows over the years have been squeezed as an increasing higher percentage of gross foreign capital inflows has to be returned to the lending countries/agencies in the form of repayments of principal and interest on foreign debt. Table 5.6 shows that since 1984, the repayment of principal on the public sector loans remained annually around 2% of GDP, while it was less than one percent of GDP during the 1970s. This trend can also be seen from Figure 5.11.

The major sources of Pakistan's foreign economic assistance are USAID, the Aid-to-Pakistan consortium countries, non-consortium countries, Islamic countries, and international financial institutions. The largest share of foreign capital came under the auspices of USAID, which slowed down and then completely stopped following the resolution of the Afghan problem and the decline in the strategic importance of Pakistan due to the fall of communism in Russia and the objection by the United States to Pakistan's nuclear fusion capability. As a result, Pakistan has begun since 1988 an extensive series of policy measures to generate additional domestic resources and has also embarked on structural adjustment programs. The second main source of borrowing is the international financial institutions, preeminently the

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[20] The classification of the official, private, and diversified borrowers has been made by Fitzgerald, Jansen and Vos (1989). Official borrowers are those countries with an external debt structure composed for two-thirds or more outstanding debt to official creditors. Private borrowers have more than two-thirds of debt outstanding with private creditors. The remaining capital-importing countries are diversified borrowers.

Figure 5.11
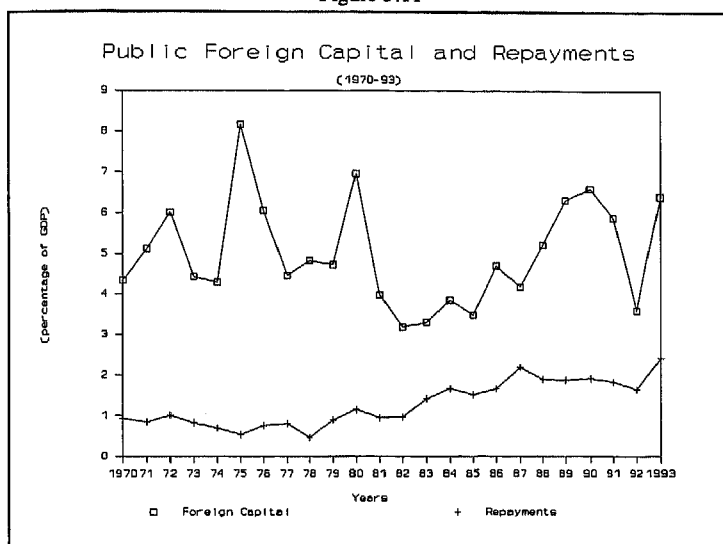
IMF and the World Bank. Credits through these institutions are, in most cases, conditional on adopting certain policies. Both institutions, therefore, have significant control over Pakistan's domestic economic policies. Among other policy measures, the Bank-Fund require Pakistan to reduce its dependence on foreign borrowing and generate its own domestic sources of funds.

(c) Direct private foreign investment and private long-term loans

Foreign capital inflows to the private sector are divided into direct private foreign investment (DFI) and other long-term foreign loans. Direct foreign investment is considered to be an important source of capital in many developing countries. Since the late 1970s, the government of Pakistan has taken numerous steps to encourage local and foreign private investors: (i) DFI in Pakistan is protected by the Foreign Private Investment Act, 1976; (ii) no official permission is required to establish any industrial unit in Pakistan (except for arms and ammunition, security printing, high explosives and radioactive substances); (iii) restriction on the extent of foreign equity in any project has been abolished; (iv) the permission for getting foreign loans and raising investment credits has been eliminated; (v) there is no restriction on repatriation of capital and dividends; (vi) exchange control on

payment of royalty and technical fees has been eliminated; and finally (vii) foreign exchange control has been lifted. Table 5.6 shows that Pakistan has enjoyed a rapid increase in DFI during the 1980s and early 1990s as compared to the 1970s. It shows that the annual average share of DFI in GDP was around 0.1% during the 1970s, but thereafter it has been continuously rising, reaching a peak level of 1.2% of GDP in 1992. This trend is also depicted in Figure 5.12. However, compared to other Asian developing countries such as Thailand, the Philippines, China, Indonesia, and Malaysia, Pakistan has received a relatively small share of total DFI flows in Asia. In 1992, Pakistan's share in total DFI in Asia was only 2 percent, while Indonesia, Thailand, Malaysia, and China gained the lion's share of 6%, 8%, 15%, and 40%, respectively.[21] As with direct private foreign investment, long-term loans to the private sector were also substantially increased during the 1980s and 1990s. The average annual long-term loans to the private sector were 0.6% of GDP during the 1970s, which considerably increased to a peak level of 1.7% of GDP in 1993. This trend is also presented in Figure 5.12.

Figure 5.12

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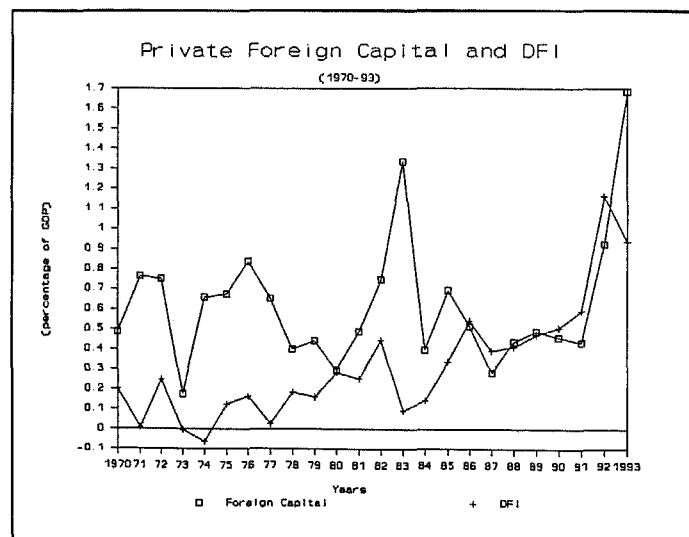
[21] For a comprehensive comparative analysis on DFI flows in Asian countries, see Ahmed (1994).

5.6 Selection of key structural adjustment policy and external shock variables

All the structural and sectoral adjustment programs in Pakistan contain a set of qualitative as well as quantitative policy measures suggested by the officials of the World Bank and the IMF. A summary of important policy measures suggested in various adjustment programs is presented in Appendix II for the period 1980-87 and Appendix III for the period 1988-93. According to Mosley's index of compliance (1991a), Pakistan is among only a few countries e.g. Ghana, Korea, and Turkey, which are highly compliant with Bank-Fund policy conditions. As one would expect, it is not possible to analyze empirically the effects of complex packages of policies suggested by the Bank-Fund officials, particularly qualitative policy measures. Moreover, the overall criterion for evaluating adjustment reforms is not straightforward. There is as yet no single model available that covers the whole range of policy measures contained in the Bank-Fund programs. Existing models (e.g computable general equilibrium models, applied general equilibrium models, macreoeconometric models) are clearly unable to analyze all the questions relating to adjustment programs. In particular, they do not capture the complex ways in which policy variables are related to the ultimate objectives. This is probably one of the reasons why there has not been extensive empirical work on the quantitative effects of adjustment policy reforms in Pakistan. In this study, key quantifiable policy measures, which cover both demand- and supply-side effects, will be selected on the basis of their performance during the pre-1980 (pre-adjustment) period and post-1980 (adjustment) period. In addition, to capture the effects of external circumstances surrounding most of the adjustment reforms in Pakistan, external shock variables will also be incorporated in the analysis. In particular, the following adjustment policy and external shock variables have been selected for analysis.

Policy variables
(a) Exchange rate
(b) Domestic interest rate
(c) Public current expenditures
(d) Domestic credits
(e) Adjustment lending
(f) Private foreign capital inflows
External shock variables
(a) Economic activity in the Gulf region

(b) Oil prices

(c) Terms of trade

(d) Foreign real interest rate

Although these policy variables are by no means the only policy measures in the Bank-Fund programs, they are nonetheless among the more important ones. These quantifiable policy variables, in general, have been given more emphasis in the Bank-Fund adjustment programs in Pakistan. Moreover, these variables are also used by the staff of the World Bank and the IMF and others to evaluate the effectiveness of adjustment policies on performance indicators in developing countries. M.S. Khan and Knight (1981, 1985), for example, evaluated the macroeconomic effects of domestic credit restraint and exchange rate devaluation as policy variables along with some other external and internal factors on target variables such as output, prices, and balance of payments. In his recent work, M.S. Khan (1990) analyzes the effects of domestic credits, the real exchange rate, and fiscal balance on the balance of payments, the current account balance, the inflation rate, and economic growth in a group of 69 developing countries for the period 1973-88. Agenor (1990) examined the impact of selected policy instruments such as an increase in bank credits to the private sector, an increase in government spending, and devaluation on variables such as output and inflation, in a cross-country analysis for the period 1974-86. In his latest pioneering work, Doroodian (1993) examines the relationship between macroeconomic target variables such as real output, domestic inflation, and the current account balance, and Bank-Fund policy measures such as real devaluation, reduction in fiscal deficit, reduction in the growth of domestic credits, and an increase in real domestic interest rate, using cross-country data of 43 countries for the period 1977-83. The changes of policy variables and external shocks with possible explanation are given in the following sub-sections.

5.6.1 Key policy variables

This study selected the aforementioned policy variables on the basis of their performance during the adjustment period in Pakistan. Table 5.7 overviews the policy variables for the period 1970-93, which of course may also reflect the responsiveness of Pakistan's economy towards the implementation of adjustment programs. The following sections provide an overview of policy variables, together with possible reasons for their improvement (or deterioration).

Table 5.7 Selected Policy Variables in Pakistan's Economy

Years	Nominal Exchange Rate (Pak. Rs/$)	Real Exchange Rate for Exports (Pak. Rs/$)	Real Exchange Rate for Imports (Pak. Rs/$)	Nominal Domestic Interest Rates (%)	Real Domestic Interest Rates (%)
1970	4.8	2.2	1.5	5.5	-
1971	4.8	2.3	1.8	5.8	1.0
1972	8.7	4.7	3.9	5.8	-0.4
1973	10.0	10.0	7.1	5.8	-10.1
1974	9.9	12.8	8.2	5.8	-18.2
1975	9.9	9.8	10.1	5.8	-16.5
1976	9.9	8.8	8.5	9.0	-3.1
1977	9.9	9.2	8.3	9.3	-1.4
1978	9.9	9.0	8.3	9.5	0.5
1979	9.9	10.6	8.2	9.8	4.2
1980	9.9	10.4	9.0	11.2	0.7
Avg.	8.9	8.2	6.8	7.6	-4.3
1981	9.9	9.9	9.9	9.4	-1.4
1982	11.9	10.7	12.0	9.4	0.0
1983	13.1	12.1	13.6	9.3	4.0
1984	14.1	13.2	13.9	9.3	-0.4
1985	15.9	15.0	16.1	9.2	4.7
1986	16.7	14.5	16.1	8.8	5.5
1987	17.4	16.1	16.7	8.3	3.7
1988	18.0	18.9	19.6	8.3	-1.3
1989	20.5	20.3	22.7	8.2	-0.4
1990	21.7	23.2	25.9	8.1	1.6
1991	23.8	23.0	29.5	7.9	-5.2
1992	25.1	23.4	28.3	13.2	3.1
1993	28.1	24.7	30.7	13.3	4.6
Avg.	18.2	17.3	19.6	9.4	1.4

(a) Exchange rate

From 1972 to January 1982, the exchange rate of the Pakistani rupee remained linked with the US dollar. By the end of the 1970s there was a widespread realization that the rupee was over-valued and that the fixed exchange rate was hurting Pakistan's exports by eroding export competitiveness in the international market. International recession and restrictive policies in the developed countries towards developing countries further compounded this problem. This was mainly due to an extraordinary appreciation of the US dollar and a consequent depreciation of non-dollar area currencies (the main buyers of Pakistan's major exports). At that time, the Government of Pakistan had two options available to improve its external trade

balance. First, the rupee could remain linked to the US dollar at a lower exchange rate, as was done in the past. Second, the rupee could be delinked from the dollar and put it on a managed floating exchange rate, that is, the value of the rupee would be fixed periodically to a weighted average of all the currencies of Pakistan's major trading partners. The government opted for delinking, and authorized the State Bank of Pakistan to peg the value of the rupee to an exchange rate on the basis of a basket of currencies. Table 5.7 shows how the nominal and real exchange rates of the Pakistani rupee have evolved over time. This study defines real exchange rates for exports and imports are defined separately as follows:

$$RER_x = ER \times (XPI/GDP_d) \qquad (5.1)$$

$$RER_m = ER \times (MPI/GDP_d) \qquad (5.2)$$

where ER is the nominal exchange rate; XPI is the exports price index; MPI is the imports price index; GDP_d is the GDP deflator; RER_x is the real exchange rate for exports; and RER_m is the real exchange rate for imports. Table 5.7 and Figure 5.13 show that since 1982 the nominal exchange rate has been continuously depreciating from 9.9 rupees per US dollar

Figure 5.13
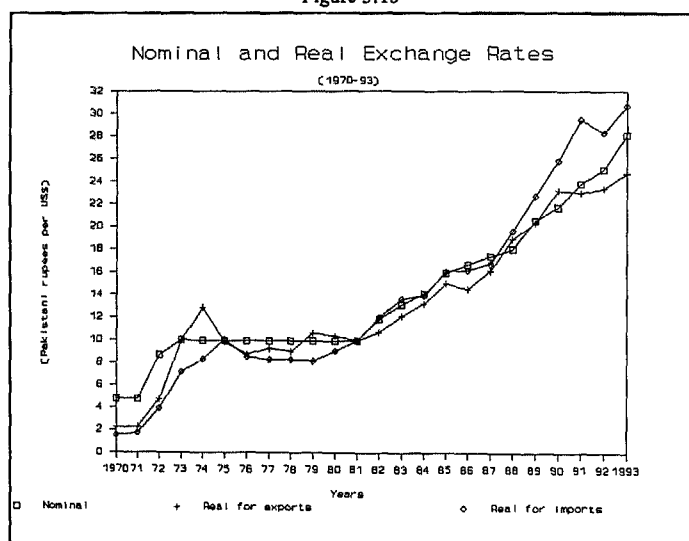
in 1982 to 28.1 rupees per US dollar in 1993. Both real exchange rates also reveal upward trends since the delinking year 1982, but the real exchange rate for imports remained higher than the real exchange rate for exports during the post 1980s period.

As has been the case with structural adjustment programs in other developing countries, the World Bank (1985a, 1988a, 1989a) often urged the government of Pakistan to adopt proper exchange rate management in order to improve the competitiveness of its exports and thus support its balance of payment objectives. The use of devaluation as a tool of adjustment has been a controversial issue in the literature. Real devaluation affects both supply and demand factors. On the demand side, it lowers real domestic absorption through a reduction in real wealth and imports. From this point of view, real devaluation may generate contractionary effects on aggregate demand, imports and output. For example, Diaz-Alejaandro (1981), Edwards (1986), Killick (1984), and van Wijnbergen (1986b) all argue that a real devaluation generates contractionary effects on aggregate demand and output in developing countries. On the supply side, real devaluation increases the prices of traded goods relative to non-traded goods, and thus the domestic production of traded goods will become more profitable. This in turn will lead to an expansion of export earnings, domestic savings and investment. For example, M.S. Khan and Knight (1982, 1985), Donovan (1981), and Doroodian (1993), all argue that real devaluation, on balance, produces expansionary rather than contractionary effects on output and contributes significantly to an improvement in the balance of payments through reduction in imports and expansion in exports. Whether or not the exchange rate improves the internal and external balances of Pakistan's economy is thus an empirical question, which will be dealt with in the next chapter.

(b) Domestic interest rate

The Bank-Fund policy packages require liberalization of the domestic financial market, which has long been regulated by the State Bank of Pakistan, and call for a rise in the real interest rate in order to stimulate domestic savings and economic growth. Since the early 1990s, the Government of Pakistan has been making some policy changes regarding the liberalization of the financial system (e.g denationalization of two large banks and permission to establish private banks), but the interest rate is still controlled and fixed by the monetary authority. Table 5.7 and Figure 5.14 indicate both the nominal and real interest rates over the period 1970-93. In this study, the real interest rate is defined as follows:

$$IRR_d = IR_d - P_d \qquad (5.3)$$

where IR_d is the domestic nominal interest rate on government bonds; P_d is the domestic inflation rate calculated from the GDP deflator of Pakistan's economy; and IRR_d is the domestic real interest rate on government bonds. Figure 5.14 shows that during the pre-adjustment period, the nominal interest rate showed an upward trend, but the real interest rate remained negative for most of the 1970s. Unlike the pre-adjustment period, the nominal interest rate has remained almost constant, but the real interest rate was positive for most of the 1980s and early 1990s. Like the exchange rate, the impact of the interest rate on economic activities in an economy has also been controversial among economists. But some of the empirical evidence, [for example, Fry(1982), Mathieson (1982), and Doroodian (1993)] found a positive relationship between the degree of development of the financial sector (including freer interest rates) and economic performance in developing economies. The effects of the real interest rate on economic activities in the case of Pakistan will be investigated in the later chapters.

Figure 5.14

Nominal and Real Interest Rates
(1971-93)
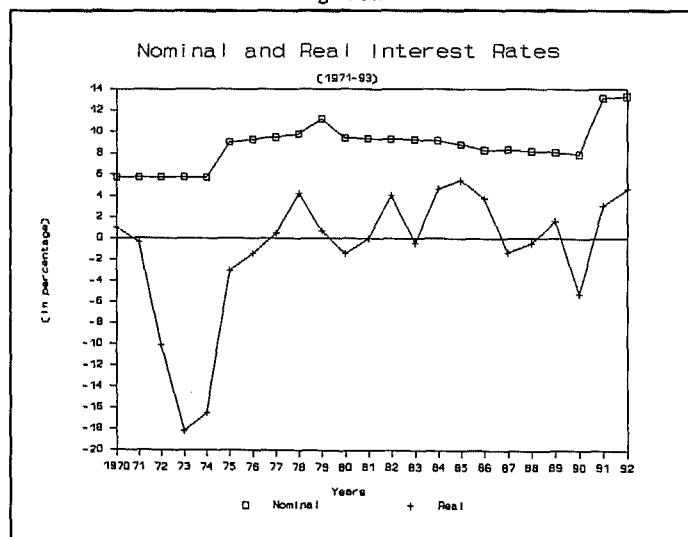
(c) Public current expenditures

In all the structural and sectoral adjustment programs, the World Bank and the IMF urged the Government of Pakistan to reduce its current expenditures, particularly by withdrawal of

subsidies in order to correct the persistent fiscal imbalances. Subsidies were one of the main items of government current expenditure, particularly during the pre-adjustment period 1970-80. Wheat, edible oils, fertilizer, and exports are the recipients of subsidies in Pakistan. Wheat is being subsidized to help the poor, and the subsidy on edible oils is thought not only to ensure the supply of edible oils to ghee mills but also to consumers at reasonable prices. The fertilizer subsidy is provided to farmers, who use imported fertilizers which are blended to improve the efficiency of fertilizer use in the agricultural sector. Finally, export rebates are provided to exporters in order to encourage exports of cotton and woolen yarn, and grey cotton thread. Figure 5.15 shows the pattern of aggregate subsidies in Pakistan. It reveals that since 1980, the expenditure on subsidies has considerably declined from 3.2% of GDP in 1979 to 0.7% of GDP in 1993. This persistent reduction in subsidies is taken as one of the indicators of the implementation of adjustment reforms in Pakistan. The extent to which a reduction in public current consumption affects overall economic activity in Pakistan is an empirical question and will be analyzed in the next chapters.

Figure 5.15
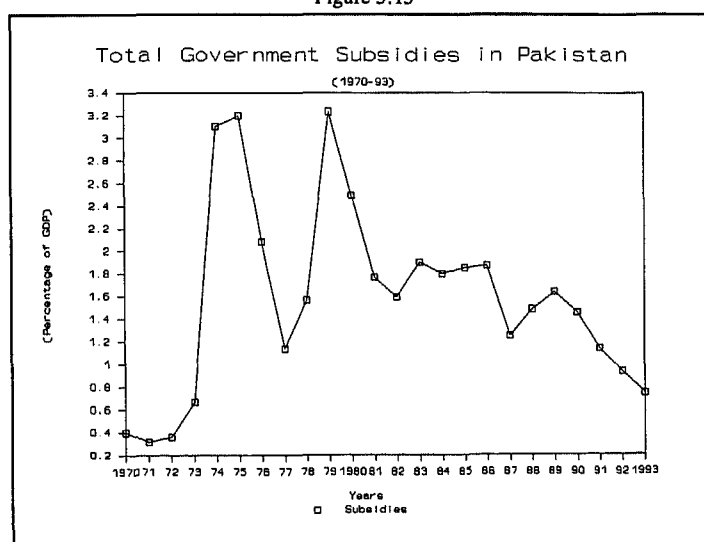
(d) Domestic credits

One of the important policy issues raised in adjustment programs was to limit domestic credit expansion to the public sector. This issue arose because of three major economic worries. First, over-expansion of credit may create an illusion of high resource availability to the public sector because the bulk of the government budgetary deficit is financed by domestic credits. Second, monetary expansion may create inflationary pressure in the economy. Finally, all the Bank-Fund adjustment programs emphasize the need to reduce the role of the public sector in commercial and industrial activities. In Pakistan, there was massive nationalization during the period 1972-77. In the first stage, the government nationalized thirty-one large manufacturing enterprises and five large private commercial banks. In the second stage, some smaller manufacturing units such as flour mills, cotton ginning, rice husking, and vegetable ghee mills were nationalized. Such massive nationalization and a generally hostile attitude on the part of the government towards the private sector discouraged private investment and resulted in a huge private capital flight from Pakistan. Since both the Bretton Woods institutions believe that the private sector is more efficient and better suited for the production of most goods and services than the public sector, all the structural adjustment programs for Pakistan suggest that the government should withdraw from commercial and industrial activities and concentrate on improving the availability of public goods and services and the quality of the infrastructure, which has deteriorated in the past. Therefore, during the 1980s and the early 1990s, a number of steps were taken to reverse the previous policies. For example, (i) agro-based industries were privatized in 1977; (ii) the Protection of Rights in Industrial Property Order 1979 was promulgated to ensure that no industrial units will be nationalized in the future; (iii) the Disinvestment Committee was set up in 1985 to oversee the sales of Rs. 2 billion worth of shares of profitable public sector enterprises; (iv) the private Commission was formed in 1991 to oversee the privatization of 115 industrial units; (v) two large commercial banks (Muslim Commercial Bank and Allied Bank) were denationalized in 1991; and (vi) permission for the establishment of ten commercial banks in the private sector was also given in 1991. Other areas which have been opened to the private sector include shipping, airlines, highway, construction and maintenance, and power generation. The purpose of all these measures was to restore the confidence of the private sector, which had been badly shaken under the previous regime, to free to play its due role in economic development of the country and ultimately to transform the economy into an open and market-oriented one.

The following Figure 5.16 shows that the share of private investment in total

investment was reduced from 64% to 40% during the nationalization period but thereafter it started rising gradually. Although the liberal economic policies pursued by the present government have made for a perceptible movement towards more liberal economy, even after twenty years of nationalization, the favorable economic climate has not been able to fully revive the private sector.

Figure 5.16
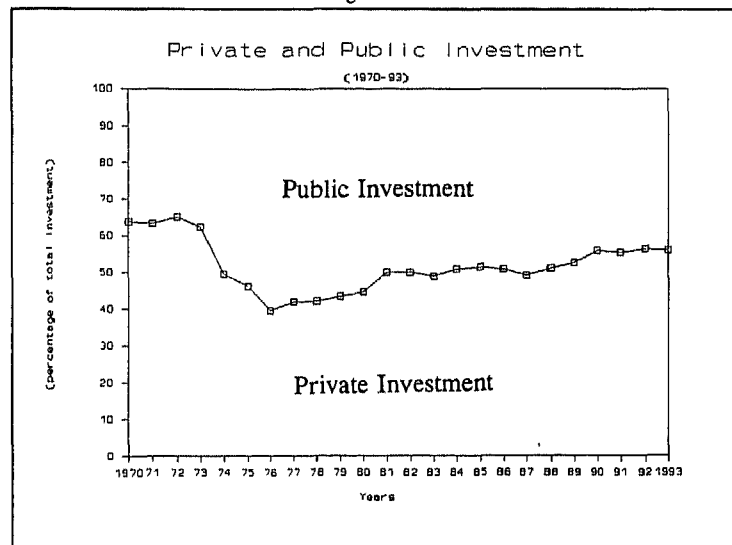
It is notoriously difficult to quantify privatization and denationalization measures. We, therefore, use private capital surplus as defined earlier [private savings minus private investment (SS_p)] as a proxy variable for the above-mentioned three economic worries. Since the bulk of the government budgetary deficit is financed by domestic resources (SS_p), a decrease in SS_p implies that fewer domestic resources are available to the public sector and to that extent a reduced involvement of the government in economic activities. In other words, a low level of private capital surplus indicates that the role of the private sector in economic activities is rising and that the public sector's involvement is falling. The development of SS_p has already been given in Table 5.1 and is also depicted in Figure 5.2.

(e) Adjustment lending and private foreign capital inflows

The impact of foreign capital inflows on economic activities (e.g investment, saving, and economic growth) has been and remains a matter of considerable controversy. Well-known discussions on this issue include Chenery and Strout (1966), Papanek (1973), Voivodas (1974), Stoneman (1975), Mosley (1980), and Park (1987), all of whom argue that foreign capital inflows stimulate economic activities in recipient countries. Alternatively, Griffin and Enos (1970), Weisskopf (1972b), Fry (1980), and Vos (1988), all claim that the availability of foreign capital inflows has a depressing effect on economic activities in developing countries. The main interest of this study is to analyze the impact of structural adjustment lending associated with structural adjustment programs and foreign capital inflows to the private sector, particularly private direct foreign investment in the context of a three-gap analysis in Pakistan. Table 5.8 provides a view of the sectoral and structural adjustment lending in Pakistan, which is relevant to this question.

Table 5.8 Sectoral and Structural Adjustment Lending in Pakistan (US $ million)

Date of Approval	Sectors	IBRD	IDA	IMF	Total
09-16-1980	Fertilizer (SECAL)	-	50	-	50
06-01-1982	Structural Adjustment (SAL)	60	80	-	140
05-23-1985	Energy (SECAL)	178	-	-	178
05-27-1986	Export Development (SECAL)	70	-	-	70
08-02-1988	Agriculture (SECAL)	200	-	-	200
12-28-1988	Structural Adjustment (SAL)	-	-	515	515
03-28-1989	Financial (SECAL)	150	-	-	150
06-29-1989	Energy (SAL)	250	-	-	250
02-01-1994	Structural Adjustment (ESAF)	-	-	1370	1370
02-01-1994	Public Sector (SECAL)	250	-	-	250

5.6.2 External shock variables

As is the case with most other developed and developing economies, Pakistan's economy was also affected by the external shocks of the 1970s and 1980s. In this study, four external shocks, namely, economic activities in the Gulf region, foreign interest rates, oil prices, and terms of trade are taken to represent the extent to which external circumstances during the 1970s and 1980s affected the adjustment reforms in Pakistan. The variables that represent the four external shocks are defined as follows. Investment as a percentage of GDP in the

Middle East (I_{me}/Y_{me}) represents economic activities in the Gulf region; the foreign petroleum price index (PPI) represents the oil price shock, the US interest rate (IR_{us}) is taken as a foreign interest rate shock, and the terms of trade (TOT) shock is defined as the export price index over the import price index. The extent of these external shocks is shown in Table 5.9.

Table 5.9 Development of External Shock Variables

Years	Investment in Gulf Region (% of GDP)	Petroleum Price Index (1981 = 100)	Terms of Trade (1981 = 100)	Foreign Real Interest Rates (%)
1970	20.8	6.2	146	-
1971	18.7	7.5	130	0.7
1972	21.4	8.2	121	3.6
1973	20.6	9.2	140	0.5
1974	19.2	32.9	156	-1.5
1975	25.1	31.1	97	-2.2
1976	25.3	34.7	103	0.8
1977	27.5	37.6	112	0.5
1978	25.6	38.0	109	0.6
1979	25.9	85.6	130	0.9
1980	27.1	104.0	115	2.0
1981	33.3	100.0	100	4.5
1982	31.3	92.0	89	6.7
1983	26.3	83.2	89	6.8
1984	25.7	82.8	95	8.1
1985	22.7	79.1	93	6.6
1986	22.9	40.5	90	4.9
1987	21.9	52.1	96	4.9
1988	22.0	41.5	96	4.7
1989	22.8	50.4	90	4.2
1990	23.6	64.6	90	4.2
1991	25.5	53.6	78	3.4
1992	25.3	53.4	83	3.3
1993	25.1	47.3	81	2.3

(a) Economic activities in the Gulf region

Economic activities in the Gulf countries have a strong impact through their influence on workers' remittances in Pakistan. The overseas workers' remittances, particularly from the Gulf region, have been a significant component of Pakistan's balance of payments and they have largely covered the shortage of foreign exchange. During the late 1970s and mid 1980s, there was a pronounced increase in workers' remittances from the Gulf countries, which surpassed the overall export earnings and reached a maximum level of 10.4 percent of GDP in 1982-83, (as shown in Figure 5.17). This figure also shows that investment as a

percentage of GDP in the Gulf countries was at a maximum level of 33.3% in the same year. However after this boom, the flow of remittances started to decline and reached only 3.3 percent of GDP in 1992-93, because the reduction in oil revenues and the Gulf crisis of the early 1990s slowed down investment activities in that region (i.e. 25% of GDP) and hence reduced the demand for labor from Pakistan. Note in this regard that Pakistan is one of the major exporters of labor to the Gulf region.

Figure 5.17
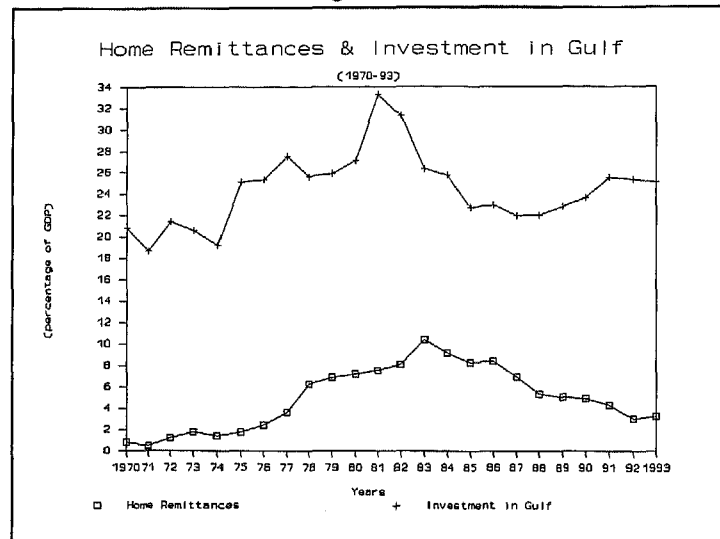
(b) The oil price shock

The petroleum price shock can be named as a second external factor that affected the economic situation in Pakistan during the period under review. Although two oil shocks (1974 and 1979) adversely affected both developed and developing economies, the economic consequences of rising oil prices were especially severe for the developing world. Pakistan, for example, relies heavily on imported petrol and petroleum products to fuel its industrial and agricultural sectors. The massive and unprecedented fourfold jump in the oil price announced by members of the Organization of Petroleum Exporting Countries (OPEC) in

1974 and the continued upward spiral in petroleum prices in 1979 aggravated the balance of payments and inflationary problems in Pakistan. The extent to which oil price explosion affected the adjustment process and economic activities in Pakistan will be analyzed in the following chapters. Figure 5.18 shows the petroleum price index over the period 1970-93. It shows that after the two oil shocks in 1974 and 1979, oil prices declined tremendously during the 1980s.

Figure 5.18

Foreign Petroleum Price Index(1981=100)
(1970-93)
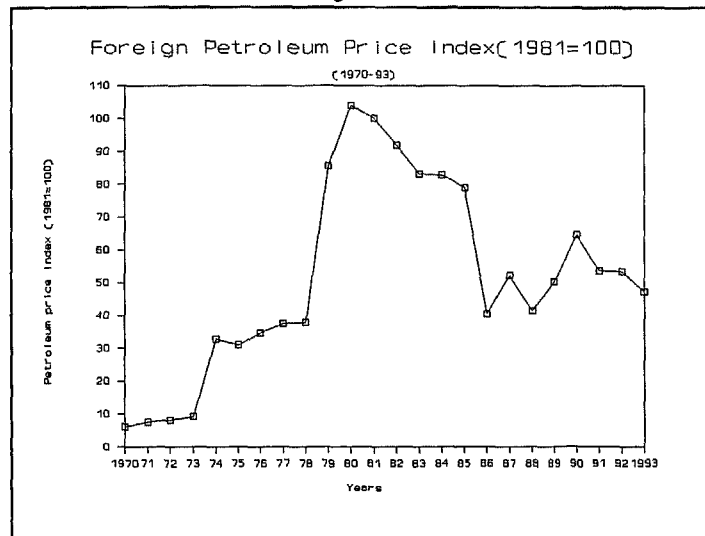
(c) **The terms of trade**

The question of changing relative price levels of exports and imports brings another important quantitative dimension to the trade problems historically faced by Pakistan. The total value of export earnings depends not only on the volume of exports sold abroad but also on the price paid for them. If export prices decline, a greater volume of exports will have to be sold merely to keep total export earnings constant. Similarly, on the import side, the total foreign-exchange expended depends on both the quantity and prices of imports. Therefore, the real cost of a unit of imports will rise for a country when its export prices decline relative to its import prices. Economists give a special name for this relationship, the terms of trade, which is defined as the export price index as a ratio of the import price index

(XPI/MPI). The terms of trade are taken here as a third major external factor for analysis. Table 5.9 and Figure 5.19 show the almost continuous deterioration of the terms of trade facing Pakistan during 1970-93. This trend is not surprising, because most of the exports from Pakistan are primary commodities, which historically have declined relative to manufactured goods. As a result, the terms of trade have on average tended to worsen not only for Pakistan, but also for most of the non-oil exporting developing countries over the last two decades.

Figure 5.19
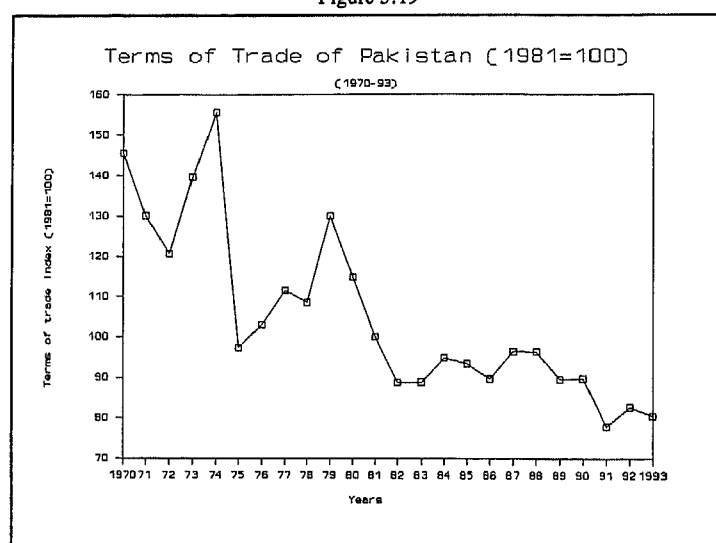
(d) Foreign real interest rates

The fourth major external factor affecting the current account balance of the balance of payments of Pakistan's economy was the sharp increase in real interest rates in industrialized countries. During the 1970s, debt service had not been a very serious problem in Pakistan because international credit markets were generally favorable and a large proportion of outstanding debt had been available from international financial institutions at concessionary rates. During this decade, the foreign real interest rate (defined as US nominal interest rates minus US inflation rates) were low and indeed even negative during the 1970s (as shown in Table 5.9 and Figure 5.20). During the 1980s, this situation changed drastically and real

interest rates on external debt increased sharply. The high real interest rates obviously exerted a powerful impact on service payments on Pakistan's external debt. Note that in order to keep both series comparable, US real interest rates (adjusted for US inflation) on government bonds are taken as foreign real interest rates (IRR_f) and real interest rates (adjusted for inflation rate in Pakistan) on government bonds are taken as domestic real interest rates (IRR_d). These magnitudes will be used in the estimation of a three-gap model for Pakistan in the next chapters. The foreign real interest rate is defined as follows:

$$IRR_f = IR_{us} - P_{us} \qquad (5.4)$$

Figure 5.20

Foreign Real Interest Rates
(1971-93)
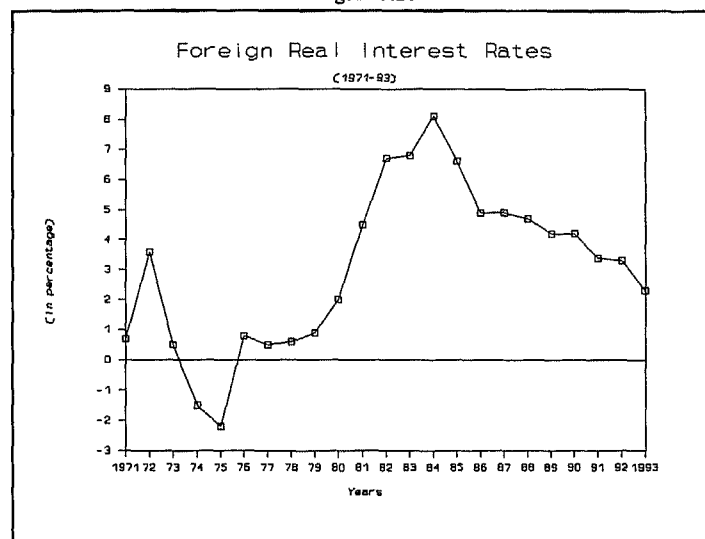
5.7 Summary

This chapter described the evolution of the three-gaps, flow-of-funds, structural adjustment policy variables, and external shocks in Pakistan's economy over the two sub-periods: 1970-80 and 1981-93. This two sub-period approach makes it easier to compare the relevant

magnitudes for the one decade without structural adjustment reforms and for the other decade with the adoption of policy reforms. The performance of the relevant variables during the adjustment period exhibits a marked contrast to the previous decade. It shows that the public sector budget deficit and current account deficit of the balance of payments improved more during the adjustment period than it did in the pre-adjustment period. Moreover, private savings, investment, and capital surplus showed a substantial increase during 1981-93 as compared to the period 1970-80. The composition of the flow-of-funds shows that the average share of currency circulation in GDP remained same, the growth of government bonds increased, net foreign capital inflows to the public sector decreased, external debt service payments rose, and net foreign capital inflows to the private sector and private net direct foreign investment substantially increased during the adjustment period as compared to the pre-adjustment period. Regarding selected adjustment policy variables, the data revealed a drastic devaluation of the domestic currency, a rising trend in domestic real interest rates, a substantial reduction in government subsidies, an increase in adjustment lending, and an upward trend in public sector domestic borrowing during the adjustment period. These changes in policy variables, of course, reflect the responsiveness of Pakistan's economy towards the implementation of the Bank-Fund adjustment programs. The chronology of four external shocks shows that much of the adjustment period was characterized by a slowdown of economic activities in the Gulf region, high foreign real interest rates, low oil prices, and the almost continuous deterioration of the terms of trade. The questions that now need to be addressed concern the relationships between all these changes. As a first step in this direction, the next chapter will address the development of a three-gap model for Pakistan.

Table 5.10 Notation, Definition, and Source of Data

Notation	Definition	Source
ER	Nominal exchange rate of domestic currency (Pak. rupees per US$)	*International Financial Statistics Year Book*, IMF (1992:554-555, 1994:420-421).
GDP_d	Pakistan's GDP deflator (1981=100)	*Pakistan Economic Survey* (1991-92:167-168, 1993-94:123-124).
GDP_{us}	US GDP deflator (1981=100)	*International Financial Statistics Year Book*, IMF (1992:720-721, 1994:568-569).
I_{mc}/Y_{mc}	Investment as a percentage of GDP in Gulf countries	*International Financial Statistics Year Book*, IMF (1994:160-161).
IR_d	Domestic nominal interest rates on government bonds	*International Financial Statistics Year Book*, IMF (1992:554-555, 1994:420-421).
IRR_d	Domestic real interest rates on government bonds (defined as IR_d-P_d)	By definition.
IR_{us}	US nominal interest rates on government bonds	*International Financial Statistics Year Book*, IMF (1992:718-719, 1994:556-557).
IRR_f	US real interest rates on government bonds (defined as IR_{us}-P_{us})	By definition.
MPI	Imports price index (1981=100)	*Pakistan Economic Survey* (1984-85:196, 1991-92:187, 1993-94:139).
P_d	Domestic inflation rates (calculated from GDP_d)	By definition.
P_{us}	US inflation rates (calculated from US GDP deflator)	By definition.
PPI	Foreign petroleum price index (1981=100)	*International Financial Statistics Year Book*, IMF (1994:172-173).
RER_x	Real exchange rates for exports (defined as ER × (XPI/GDP_d)	By definition.
RER_m	Real exchange rates for imports (defined as ER × (MPI/GDP_d)	By definition.
TOT	Terms of trade (defined as XPI/MPI)	By definition.
XPI	Exports price index (1981=100)	*Pakistan Economic Survey* (1984-85:196, 1991-92:187, 1993-94:139).

Table 5.10   Notation, Definition, and Source of Data   (continued)

Notation	Definition	Source
Adjustment Loans	**Adjustment loans**	**Adjustment loans**
Fertilizer (SECAL, 1980)	Sectoral adjustment loan for fertilizer	Nicholas (1988).
Structural Adjustment (SAL, 1982)	Structural adjustment loan	"
Energy (SECAL, 1985)	Sectoral adjustment loan for energy sector	"
Export Development (SECAL, 1986)	Sectoral adjustment loan for export sector	"
Structural Adjustment (SAF, 1988)	Sectoral adjustment facility loan	Landell-Mills (1991).
Agriculture (SECAL, 1988)	Sectoral adjustment loan for agriculture sector	Jaspersen and Sharif (1990).
Energy (SECAL, 1985)	Sectoral adjustment loan for energy sector	"
Financial (SECAL, 1989)	Sectoral adjustment loan for financial sector	"
Structural Adjustment (ESAF, 1994)	Enhanced structural adjustment facility	M.H. Khan (1994)
Public Sector (SAL, 1994)	Public sector adjustment loan	"

Chapter 6

Analytical Framework and Empirical Results of a Three-Gap Model For Pakistan

This chapter develops and estimates a three-gap model for Pakistan in four steps. First, a naïve three-gap model is developed and estimated using time-series data for the period 1970-93. The naïve model specifies the quantitative relationships between the level of real output, public investment, private investment, and private consumption and macroeconomic constraints, particularly in the area of monetary and fiscal policies. Thereafter, section 6.2 develops a more general three-gap model (as the second step) by replacing fixed parameters in the naïve model by behavioral functions. The specified functions are estimated using the time-series data that was discussed in Chapters 4 and 5. Then, in the third step, exports of goods and services, which were previously treated as an exogenous policy variable, are endogenized. And, finally, variables regarding the 'Flow-of- Funds' part of the model, namely, foreign capital inflows to the public and private sectors, which were treated as exogenous policy variables in the previous estimation, are also now endogenized.

6.1   A naïve three-gap model

Table 6.1 reports the basic accounting identities that are required for the development of a naïve, and later for a more general three-gap framework for Pakistan. Note that Table 6.1 is a modified version of Table 4.1 in that some of the accounts are disaggregated here for analytical purposes. A brief description of the accounting formulations is as follows. Total public revenues are divided into two main components, namely, non-trade revenues (T_{nt}) and

trade revenues (T_t). Aggregate imports are divided into imports of goods (M_g) and imports of factor and non-factor services (M_{sr}). In the naïve three-gap model, public current consumption (C_g); net private capital surplus transferred to the public sector [redefined as private capital surplus minus repayments of private sector loans by the public sector (NSS_p)];

Table 6.1   Accounting Identities of a Naïve Three-Gap Model for Pakistan

	Capital Accounts			All Other Accounts	Σ
	Private	Public	ROW		
Capital Accounts					
Private	*	0	NF_p^1	S_p	S_p+NF_p
Public	NSS_p^3	*	NF_g^2	$T_{nt} + T_t - C_g$	I_g
ROW	0	0	*	$M_g + M_{sr} - X$	NF
All Other Accounts	I_p	I_g	0	*	I
Σ	S_p+NF_p	I_g	NF	I	*

[1] NF_p is defined as $F_p - KF$.
[2] NF_g is defined as $F_g - \Delta R$.
[3] NSS_p is defined as $SS_p - R_p$.

aggregate exports (X); net foreign capital inflows to the private sector [redefined as the difference between foreign capital inflows to the private sector and private capital flight (NF_p)]; and net foreign capital inflows to the public sector [redefined as the difference between foreign capital inflows to public sector and change in official foreign-exchange reserves (NF_g)] are assumed to be exogenously determined and are treated as policy variables. Mathematical expressions for the row and column totals of Table 6.1 are written as follows:

row equations

$$S_p + NF_p = S_p + NF_p \tag{6.1}$$

$$I_g = NSS_p + NF_g + T_{nt} + T_t - C_g \tag{6.2}$$

$$NF = M_g + M_{sr} - X \tag{6.3}$$

$$I = I_p + I_g \tag{6.4}$$

column equations

$$S_p + NF_p = NSS_p + I_p \tag{6.5}$$

$$I_g = I_g \tag{6.6}$$

$$NF = NF_p + NF_g \tag{6.7}$$

$$I = S_p + T_{nt} + T_t + M_g + M_{sr} - X - C_g \tag{6.8}$$

Equalize row and column sums to get the following expressions:

$$S_p + NF_p = NSS_p + I_p \tag{6.9}$$

$$I_g = T_{nt} + T_t + NSS_p + NF_g - C_g \tag{6.10}$$

$$NF_p + NF_g = M_g + M_{sr} - X \tag{6.11}$$

$$I_p + I_g = S_p + T_{nt} + T_t + M_g + M_{sr} - X - C_g \tag{6.12}$$

The above eqs. (6.9 to 6.12) are the fundamental equations in both the naïve and more general three-gap models. These equations are used to derive the relationship between the target variables: gross domestic product (Y), private investment (I_p), public investment (I_g), total investment (I), private consumption (C_p), and total consumption (C) and the policy variables and external shocks. The following simple behavioral functions (6.13 - 6.17) can be specified for a naïve three-gap model for Pakistan. The model is described as naïve because it is based on simple average shares of dependent variables in their most relevant explanatory variables. The criterion for choosing the most relevant variables for normalization is based on common sense supported by the regression results (which are reported in Appendix IV). On this basis, imports of goods (M_g) are made to depend on the level of gross domestic product (Y); imports of services (M_{sr}) depend on imports of goods (M_g); public non-trade revenues (T_{nt}) depend on gross domestic product, public foreign trade tax revenues (T_t) depend on imports of goods; and finally private savings (S_p) depend on private income (Y-T). The mathematical expressions of the simple behavioral functions are as follows:

6.1.1 Simple behavioral functions of a naïve three-gap model

Imports of goods

$$M_g/Y \quad = \beta \tag{6.13}$$

Imports of services

$$M_{sr}/M_g \quad = \zeta \tag{6.14}$$

Public non-trade revenues

$$T_{nt}/Y \quad = \alpha \tag{6.15}$$

Public foreign trade tax revenues

$$T_t/M_g \quad = \xi \tag{6.16}$$

Private savings

$$S_p/(Y\text{-}T) \quad = \sigma \tag{6.17}$$

where β is an average share of imports of goods in gross domestic product, ζ is an average ratio of imports of services in imports of goods, α is an average share of public sector non-trade revenues in gross domestic product, ξ is an average share of public foreign trade tax revenues in imports of goods, and σ is an average share of private savings in private income. The above mathematical expressions reported in eqs. (6.13 - 6.17) can now be further simplified as follows:

$$M_g + M_{sr} \quad = \beta Y + \zeta \beta Y = \beta(1 + \zeta)Y \quad = \mu Y \tag{6.18}$$

$$T_{nt} + T_t \quad = \alpha Y + \xi \beta Y = (\alpha + \xi \beta)Y \quad = \theta Y \tag{6.19}$$

$$S_p \quad = \sigma(1 - \theta)Y \tag{6.20}$$

Incorporating eq. (6.20) for S_p in eq. (6.9), eq. (6.19) for $(T_{nt} + T_t)$ in eq. (6.10), eq. (6.18) for $(M_g + M_{sr})$ in eq. (6.11), and eq. (6.18) for $(M_g + M_{sr})$, eq. (6.19) for $(T_{nt} + T_t)$, and eq. (6.20) for S_p in eq. (6.12), yields the following expressions:

$$I_p = \sigma(1 - \theta)Y + (NF_p - NSS_p) \tag{6.21}$$

$$I_g = \theta Y + NSS_p + NF_g - C_g \tag{6.22}$$

$$\mu Y = X + NF_p + NF_g \tag{6.23}$$

$$I_p + I_g = [\sigma(1 - \theta) + \theta + \mu]Y - C_g - X \tag{6.24}$$

which can be used to obtain expressions for the three-gaps (which are sometimes referred to as the model closures) are derived as follows. In the first step, four alternative (but not independent) mathematical expressions for Y can be obtained from eqs. (6.21 - 6.24):

$$Y = [1/\sigma(1-\theta)]\{I_p + NSS_p - NF_p\} \tag{6.25}$$

$$Y = (1/\theta)\{I_g + C_g - NSS_p - NF_g\} \tag{6.26}$$

$$Y = (1/\mu)\{X + NF_p + NF_g\} \tag{6.27}$$

$$Y = \{1/[\sigma(1-\theta)+\theta+\mu]\}\{I_p + I_g + C_g + X\} \tag{6.28}$$

In the second step, using these alternative expressions for Y, four alternative mathematical expressions can be obtained for each of the savings-gap, the fiscal-gap, and the foreign exchange-gap. These expressions are reported in Table 6.2 together with the unused expressions for Y.

Table 6.2 Equality of the Saving-Gap, the Fiscal-Gap, and the Foreign Exchange-Gap (the model closures)

Alternative expressions for the three-gaps	Alternative expressions for Y
First expression of three-gaps	**Unused equations for first expression**
$(S_p\text{-}I_p) = NSS_p\text{-}NF_p$	$Y = (1/\theta)\{I_g + C_g - NSS_p - NF_g\}$
$(T\text{-}G) = \{\theta/[\sigma(1-\theta)]\}\{I_p+NSS_p\text{-}NF_p\}\text{-}C_g\text{-}I_g$	$Y = (1/\mu)\{X + NF_p + NF_g\}$
$(M\text{-}X) = [\mu/\sigma(1-\theta)]\{I_p+NSS_p\text{-}NF_p\}\text{-}X$	$Y = 1/[\sigma(1-\theta)+\theta+\mu]\{I_p + I_g + C_g + X\}$
Second expression of three-gaps	**Unused equations for second expression**
$(S_p\text{-}I_p) = [\sigma(1-\theta)/\theta]\{I_g+C_g\text{-}NSS_p\text{-}NF_g\}\text{-}I_p$	$Y = [1/\sigma(1-\theta)]\{I_p + NSS_p - NF_p\}$
$(T\text{-}G) = - NSS_p\text{-}NF_g$	$Y = (1/\mu)\{X + NF_p + NF_g\}$
$(M\text{-}X) = (\mu/\theta)\{I_g+C_g\text{-}NSS_p\text{-}NF_g\}\text{-}X$	$Y = 1/[\sigma(1-\theta)+\theta+\mu]\{I_p + I_g + C_g + X\}$
Third expression of three-gaps	**Unused equations for third expression**
$(S_p\text{-}I_p) = [\sigma(1-\theta)/\mu]\{X+NF_p+NF_g\}\text{-}I_p$	$Y = [1/\sigma(1-\theta)]\{I_p + NSS_p - NF_p\}$
$(T\text{-}G) = (\theta/\mu)\{X+NF_p+NF_g\}\text{-}C_g\text{-}I_g$	$Y = (1/\theta)\{I_g + C_g - NSS_p - NF_g\}$
$(M\text{-}X) = NF_p+NF_g$	$Y = \{1/[\sigma(1-\theta)+\theta+\mu]\}\{I_p + I_g + C_g + X\}$
Fourth expression of three-gaps	**Unused equations for fourth expression**
$(S_p\text{-}I_p) = [\sigma(1-\theta)/[\sigma(1-\theta)+\theta+\mu]\{I_p+I_g+C_g+X\}\text{-}I_p$	$Y = [1/\sigma(1-\theta)]\{I_p + NSS_p - NF_p\}$
$(T\text{-}G) = \{\theta/[\sigma(1-\theta)+\theta+\mu]\}\{I_p+I_g+C_g+X\}\text{-}C_g\text{-}I_g$	$Y = (1/\theta)\{I_g + C_g - NSS_p - NF_g\}$
$(M\text{-}X) = \{\mu/[\sigma(1-\theta)+\theta+\mu]\}\{I_p+I_g+C_g+X\}\text{-}X$	$Y = (1/\mu)\{X + NF_p + NF_g\}$

Note that it is implicit in the alternative expressions for Y that the sum of the three gaps must always be zero. Hence, incorporating eq. (6.27) for Y in eqs. (6.21), (6.22), and (6.24) gives the following expressions for private investment (I_p), public investment (I_g), total investment (I), private consumption (C_p), and total consumption (C), respectively.[22]

$$Y = (1/\mu)\{X + NF_p + NF_g\} \qquad (6.29)$$

$$I_p = [\sigma(1 - \theta)/\mu]\{X + NF_p + NF_g\} + (NF_p - NSS_p) \qquad (6.30)$$

$$I_g = (\theta/\mu)\{X + NF_p + NF_g\} + [NSS_p + NF_g - C_g] \qquad (6.31)$$

$$I = \{[\sigma(1 - \theta) + \theta]/\mu\}\{X + NF_p + NF_g\} + (NF_p + NF_g - C_g) \qquad (6.32)$$

$$C_p = (1 - \sigma)(1 - \theta)Y = [(1 - \sigma)(1 - \theta)/\mu]\{X + NF_p + NF_g\} \qquad (6.33)$$

$$C = [(1 - \sigma)(1 - \theta)/\mu]\{X + NF_p + NF_g\} + C_g \qquad (6.34)$$

Table 6.3 Notation and Definition in a Naïve Three-Gap Model for Pakistan

Notation	Definition
C	Total current consumption
C_g	Public current consumption
C_p	Private current consumption
F_g	Foreign capital inflows to the public sector
F_p	Foreign capital inflows to the private sector
G	Aggregate public expenditures defined as ($C_g + I_g$)
I	Total investment
I_p	Private investment
I_g	Public investment
KF	Private capital flight
M	Aggregate imports of goods and services
M_g	Imports of goods
M_{sr}	Imports of services
NF	Net aggregate foreign capital inflows defined as ($NF_p + NF_g$)
NF_g	Net foreign capital inflows to the public sector defined as (F_g-ΔR)
NF_p	Net foreign capital inflows to the private sector defined as (F_p-KF)
ΔR	Change in official foreign exchange reserves
R_p	Repayment of private loans by the public sector
S_p	Private savings
SS_p	Private capital surplus transferred to the public sector
NSS_p	Net private capital surplus transferred to the public sector defined as (SS_p-R_p)
T	Total public revenues
T_{nt}	Public non-trade revenues
T_t	Public trade revenues
X	Aggregate exports of goods and services
Y	Gross domestic product

[22] Note that the mathematical expression for gross domestic product (Y) can be used from any one of the above eqs. (6.25 - 6.28), but eq. (6.27) is selected for Y for mathematical convenience. Note that the results in Table 6.4 would not be affected by some other choice.

The variables on the left-hand side of eqs. (6.29 - 6.34) are treated here as target variables, and those on the right-hand side of the same equations are taken as policy variables. Eqs. (6.29 - 6.34) can now be used to derive the implied direction of influence between the target variables and the policy variables. These are set out in the following Table 6.4 using the definitions and notations of the naïve model, as summarized in Table 6.3.

Table 6.4 Expected Implied Impact of Policy Variables on Target Variables

	Policy Variables				
	$X+NF_p+NF_g$	NF_p	NF_g	NSS_p	C_g
Target Variables					
Y	+	0	0	0	0
I_p	+	1	0	-1	0
I_g	+	0	1	1	-1
I	+	1	1	0	-1
C_p	+	0	0	0	0
C	+	0	0	0	1

Note: + indicates positive impact; - indicates negative impact, and 0 indicates no impact.

Eqs. (6.32) and (6.34) can also be used to develop a direct relationship between total investment (I) and total consumption (C) via elimination of the variable C_g. Rewrite these equations to get the following mathematical expressions, respectively.

$$I = \Phi\{X + NF_p + NF_g\} + NF_p + NF_g - C_g \qquad (6.35)$$
where
$$\Phi = \{[\sigma(1 - \theta) + \theta]/\mu\}$$

$$C_g = C - \phi\{X + NF_p + NF_g\} \qquad (6.36)$$
where
$$\phi = [(1 - \sigma)(1 - \theta)/\mu]$$

Incorporation of eq. (6.36) for C_g into eq. (6.35) now gives the following inverse relationship between aggregate investment (I) and aggregate consumption (C).

$$I = (\Phi + \phi)\{X + NF_p + NF_g\} + [NF_p + NF_g] - C \qquad (6.37)$$

The graphical presentation of eq. (6.37) is depicted in the following Figure 6.1.

Figure 6.1
I-C Schedule and the Policy Variables (X, NF_p, NF_g, C_g)
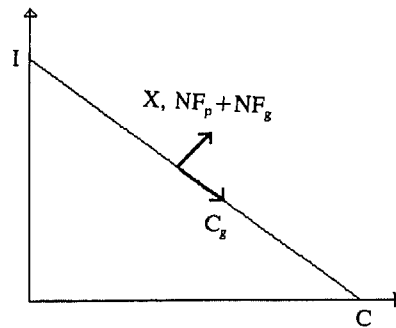
Figure 6.1 shows an inverse relationship between I and C. The downward arrow on the I-C schedule indicates that an increase in public consumption (C_g) crowds out total investment, leaving the I-C schedule unchanged. Conversely, an increase in export earnings (X) and foreign capital inflows to the private and public sectors ($NF_p + NF_g$) both shift the I-C schedule upward as indicated by the upward arrow. It implies that higher exports and foreign capital inflows to the private and public sectors have a simultaneously positive effect on aggregate investment and aggregate consumption -- other things equal.

Eq. (6.32) can be used to derive a direct relationship between private investment (I_p) and public investment (I_g). Rewrite this equation to get the following mathematical expression for I_g.

$$I_g = \Psi[X + NF_p + NF_g] + [NF_p + NF_g - C_g] - I_p \qquad (6.38)$$
where
$$\Psi = \{[\sigma(1 - \theta) + \theta]/\mu\}$$

Eq. (6.38) shows an inverse relationship between public investment and private investment, representing a crowding-out effect between I_g and I_p. The graphical presentation of eq. (6.38) is given in the following Figure 6.2.

Figure 6.2

I_p-I_g Schedule and the Policy Variables (X, NF_p, NF_g, NSS_p, C_g)
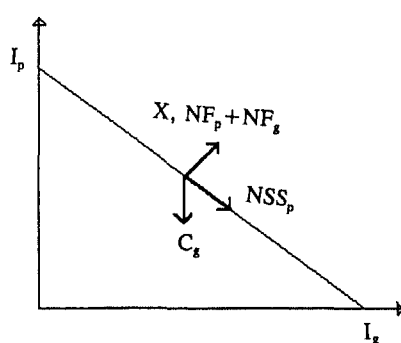
Figure 6.2 represents an inverse association between public and private investment. A downward arrow on the I_p-I_g schedule shows that an increase in public sector domestic borrowing from the private sector (NSS_p) raises the level of public investment but reduces the level of private investment, therefore, the I_p-I_g schedule remains unchanged. Conversely, increases in public consumption (C_g) reduces public investment, leaving the I_p-I_g curve more steep because private investment remains unchanged (which is also indicated by a downward arrow). On the other hand, increases in export earnings (X) and foreign capital inflows to the private and public sectors (NF_p+NF_g) move the I_p-I_g schedule upward, implying that rising exports and foreign capital inflows benefit both private and public investment.

6.1.2 Results of a naïve three-gap model

The estimates of the simple behavioral functions specified earlier in eqs. (6.13 - 6.17) are reported below. All the estimates are for the period 1970-93.

Imports of goods

$$M_g/Y \quad = \quad 0.173 \qquad\qquad\qquad\qquad (6.39)$$

Imports of services

$$M_{sr}/M_g = 0.163 \qquad (6.40)$$

Public non-trade revenues

$$T_{nt}/Y = 0.117 \qquad (6.41)$$

Public foreign trade tax revenues

$$T_f/M_g = 0.273 \qquad (6.42)$$

Private savings

$$S_p/(Y-T) = 0.144 \qquad (6.43)$$

The result reported in eq. (6.39) shows that (on average) the share of imports of goods in gross domestic product (M_g/Y) remained around 17% during the period 1970-93. Eq. (6.40) shows that the ratio of imports of services to imports of goods (M_{sr}/M_g) averaged around 16% during the estimation period. Eqs. (6.41 and 6.42) indicate that the annual average share of public non-trade revenues in gross domestic product (T_{nt}/Y) was around 12%, while the share of public foreign trade tax revenues in imports of goods (T_f/M_g) on average remained approximately 27%, respectively. The average propensity to save out of private income (S_p/Y-T) remained around 14% during the period 1970-93. The overtime trends of these variables for the period 1970-93 are given in Appendix V. Use estimates of simple behavioral functions reported in eqs. (6.39 - 6.43) to obtain the implied results of eqs. (6.29 - 6.34) as follows:

$$Y = 4.975\{X + NF_p + NF_g\} \qquad (6.44)$$

$$I_p = 0.599\{X + NF_p + NF_g\} + (NF_p - NSS_p) \qquad (6.45)$$

$$I_g = 0.816\{X + NF_p + NF_g\} + [NSS_p + NF_g - C_g] \qquad (6.46)$$

$$I = 1.415\{X + NF_p + NF_g\} + (NF_p + NF_g - C_g) \qquad (6.47)$$

$$C_p = 3.560\{X + NF_p + NF_g\} \qquad (6.48)$$

$$C = 3.560\{X + NF_p + NF_g\} + C_g \qquad (6.49)$$

The above equations show the implied relationship between the policy variables on the right-hand side of the equations and target variables, as implied by the naïve three-gap framework. The results are consistent with *a priori* expectations. It is found that export earnings and foreign capital inflows have a positive impact on all the target variables, namely, gross domestic product (Y), private investment (I_p), public investment (I_g), total investment (I), private consumption (C_p), and total consumption (C). Conversely, rising public current consumption negatively affects public investment as well as total investment. Higher public sector domestic borrowing discourages private investment and raises the level of public investment. The following Table 6.5 reproduces Table 6.4, but with positive signs replaced by their implied quantitative estimates as reported in eqs. (6.44 - 6.49).

Table 6.5   Observed Implied Impact of Policy Variables on Target Variables

	Policy Variables				
	$X+NF_p+NF_g$	NF_p	NSS_p	NF_g	C_g
Target Variables					
Y	4.975	0	0	0	0
I_p	0.599	1	-1	0	0
I_g	0.816	0	1	1	-1
I	1.415	1	0	1	-1
C_p	3.560	0	0	0	0
C	3.560	0	0	0	1

Note: + indicates positive impact; - indicates negative impact; and 0 indicates no impact.

6.1.3 Validation of a naïve three-gap model

One of this study's main objectives is to perform policy simulation, and it is therefore crucial to test the validity of the model. The more reliable the model is, the more suitable it is for policy simulation. An informal check is to draw a graph of observed values against predicted values for each relevant variable over time. Generally, the closer the predicted values are to

the observed values, the better the model is for performing reliable policy simulations. The following Figures 6.3 to 6.8 present this information. Figure 6.3 shows observed versus predicted values of gross domestic product, Figure 6.4 observed versus predicted private investment, Figure 6.5 observed versus predicted public investment, Figure 6.6 observed versus predicted total investment, Figure 6.7 observed versus predicted private consumption, and Figure 6.8 observed versus predicted total consumption for the period 1972-93.[23] Based on an informal judgment, all the figures indicate that the simple model developed in this section performs reasonably well, that is, most of the predicted values are generally close to the observed values. Using standard statistical measures, Table 6.6 presents the results on predicted errors of all the target variables. Both mean errors (ME) and root mean squared

Table 6.6 Error Statistics of a Naïve Three-Gap Model
(percentage of actual values, 1972-93)

Variable	Mean error	Root mean squared error
Gross domestic product (GDP)	4.13	1.54
Private investment (I_p)	1.35	3.00
Public investment (I_g)	8.10	1.91
Total investment (I)	4.06	2.35
Private consumption (C_p)	5.05	1.85
Total consumption (C)	3.90	1.51

errors (RMSE) are reported as a percentage of the actual value of the target variables, which indicate the overall performance of the model over the period 1972-93.[24] Generally

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[23] The first two observations for the years 1970 and 1971 are dropped to make figures of a naïve model comparable with the figures of more general three-gap model -- developed in the next section -- in which the first two observations are reduced because of using lagged variables in the estimation procedure.

[24] In order to measure the performance of the model, the following two common measures namely mean error (ME) and root mean squared error (RMSE) for error statistics are provided:

ME $= [1/n\Sigma^n_{t=1}(X^i_t - X^a_t)/X^a_t] \times 100$

RMSE $= [1/n\Sigma^n_{t=1}(X^i_t - X^a_t)^2/(X^a_t)^2]^{0.5} \times 100$

where X^i_t and X^a_t are the implied and actual values of each target variable at time t, respectively. For a discussion of these measures, see Pindyck and Rubinfeld (1981) and Drachman and Zilberfarb (1987).

Informal Validation of the Naïve Three-Gap Model for Pakistan

Figure 6.3

Observed vs Predicted GDP

Figure 6.4

Observed vs Predicted Priv. Investment

Figure 6.5

Observed vs Predicted Pub. Investment

Figure 6.6

Observed vs Predicted Total Investment

Figure 6.7

Observed vs Predicted Priv. Consumption

Figure 6.8

Observed vs Predicted Total Consumption
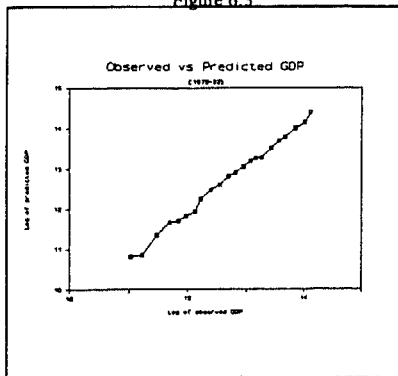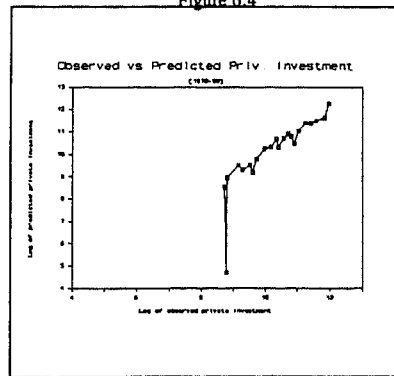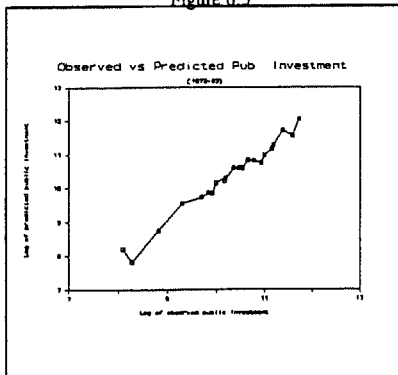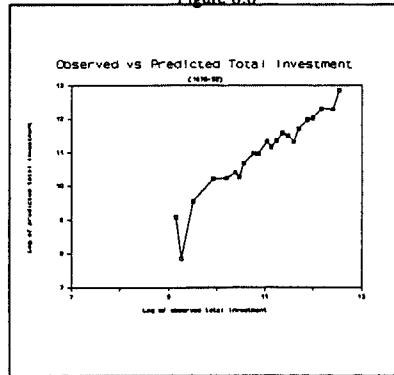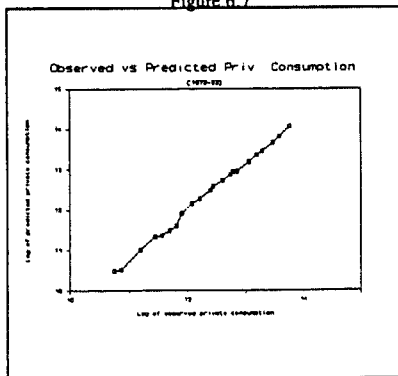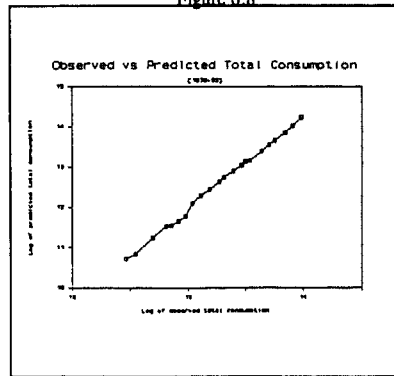
speaking, it is apparent from the statistical results that the predicted errors of all the selected macroeconomic variables are reasonably small. According to the RMSE measure (which represents relatively more standard errors), total consumption (1.5%) and gross domestic product (1.5%) have the best forecasting performance, followed by private consumption (1.8%), public investment (1.9%), total investment (2.4%), and private investment (3%).

However, since this simple model does not include policy variables or allow for external shocks (which are of concern to us), the next step is to improve the results by incorporating possible policy variables and external shocks in the behavioral functions, assuming that these factors also further explain variations in the selected target variables. The following section, therefore, has two main objectives in developing a more general three-gap for Pakistan. The first purpose to incorporate more policy and external shock variables in the analysis. The second objective is to improve the results of the naïve model for the purposes of reliable policy simulations.

6.2   A more general three-gap model

Our more general three-gap framework for Pakistan is to be developed here in three steps. The first step specifies behavioral functions for the endogenous variables that have been reported in eqs. (6.13 - 6.17) in the case of the naïve three-gap model. Possible policy variables and external shocks are incorporated in the specification of these functions. This step uses the following explanatory variables: exports of goods (X_g), exports of services (X_{sr}), net foreign capital inflows to the private sector (NF_p), net foreign capital inflows to the public sector (NF_g), private capital surplus transferred to the public sector (NSS_p), and public sector current consumption (C_g). In the second step, exports of goods and exports of services are endogenized, while other variables $(NF_p, NF_g, NSS_p,$ and $C_g)$ remain as exogenous policy variables. The estimated results of exports of goods and exports of services are then combined with the earlier results of the more general three-gap model obtained in the first step. The reasons for endogenizing exports of goods and services are twofold. First, the impact of various policy variables and external shocks on exports of goods and services needs to be analyzed. Second, the sensitivity of the results must be tested of a more general thee-gap model with endogenous exports of goods and services. In the final step, the 'Flow-of-Funds' variables, namely, foreign capital inflows to the private sector (NF_p) and foreign

capital inflows to the public sector (NF_g) are endogenized, while NSS_p and C_g are treated as policy variables. The possible factors that determine NF_p and NF_g are incorporated in the specification of their functions. There are two main reasons for endogenizing NF_g and NF_p: first, since the major part of public investment in Pakistan is financed through foreign capital inflows, it is important to know the statistical association between public investment and foreign capital inflows along with other explanatory factors. The same is the case with foreign capital inflows to the private sector. Private direct foreign investment has been a major share in foreign capital inflows to the private sector and it is, therefore, also important to know the factors that determine the inflows of foreign capital to the private sector. Second, the World Bank and the IMF provide adjustment lending to support each structural adjustment package in Pakistan. However, if both institutions would refuse to provide adjustment lending, one must know how the selected target variables will respond towards domestic adjustment without Bank-Fund financial support.

Before proceeding to estimation, it is appropriate to test the stationarity of all the variables used in the more general three-gap model. A stationary series is a time-series in which the variable has a constant mean and variance over time. Here we apply an Augmented Dicky-Fuller (ADF) test in examining the stationarity of all the time series. The ADF test consists, first, of running a regression of the first difference of the Y series [i.e. Y-Y(-1)] against the series lagged once i.e. Y(-1), a constant (α), and a time trend (T). The mathematical expression is as follows:

$$Y\text{-}Y(\text{-}1) = \alpha + \gamma T + \beta Y(\text{-}1) \tag{6.50}$$

Then, as a second step, the t-statistic (t) associated with the coefficient (β) of the lagged variable Y(-1) is compared with the Mackinnon's critical t-values (t_c). If $t \geq t_c$, this suggests that the series is stationary. The results reported in Table 6.7 suggest that all of the series except for $Log(M_{sr}/M_g)$ and $log(X_g/M_g$ in the three-gap model for Pakistan are stationary. This limitation should be noted in evaluating the regression results involving these variables which are to be reported shortly.

Table 6.7 Results of Dicky-Fuller Test for a Three-Gap
Model for Pakistan

Time-Series Variables	Augmented Dicky-Fuller t-statistic	Time-Series Variables	Augmented Dicky-Fuller t-statistic
$Log(M_g/Y)^*$	-3.4!! (-3.0)	$Log(RER_m)$	-6.3! (-4.4)
$Log(M_{sr}/M_g)$	-1.1 (-3.2)	$Log(RER_x)$	-5.3! (-4.4)
$Log(T_{nt}/Y)$	-3.8!! (-3.6)	$Log(C/Y)$	-3.3!!! (-3.2)
$Log(T_t/M_g)$	-5.8! (-4.4)	$Log(I/Y)$	-3.2!!! (-3.2)
$Log(S_p/Y_p)$	-4.2!! (-3.6)	$Log(X_g/M_g)^*$	-1.7 (-2.6)
$Log(X_g/Y)$	-3.5!!! (-3.2)	IRD^*	-2.9!!! (-2.6)
$Log(X_{sr}/Y)^*$	-4.2! (-3.8)	$Log(I_p/C_p)$	-3.3!!! (-3.2)
$(NF_g/I_g)^*$	-3.8! (-3.8)	$Log(X_{sr}/M_g)^*$	-3.0!! (-3.0)
$(NF_p/I_p)^*$	-4.9! (-3.8)	IRR_d	-3.4!!! (-3.3)
$Log(I^{me}/Y^{me})^*$	-2.4 (-2.6)	$Log(PPI)^*$	-2.6!!! (-2.6)
(FER/I_g)	-3.7!! (-3.6)	$Log(W^d)$	-3.2!!! (-3.2)
Y_g	-4.5! (-4.5)	(FER/I_p)	-4.1!! (-3.6)

Notes: (1)   Mackinnon critical value (t_a) is given in parenthesis.
      (2) !   indicates statistically significant at 1% level.
          !!   indicates statistically significant at 5% level.
          !!! indicates statistically significant at 10% level.
      (3) *   means T is dropped because it was insignificant,
               otherwise it is included.

6.2.1 Theoretical background of a more general three-gap model

For the development of a more general three-gap framework for Pakistan, the behavioral functions for imports of goods, imports of services, public non-trade revenues, public foreign trade tax revenues, and private savings are specified in the first stage as follows:

Imports of goods

$$log(M_g/Y) = \beta_0 - \beta_1 log(RER_m) + \beta_2 log(I/Y) + \beta_3 log(C/Y) + \beta_4 log(X_g/Y) + \beta_5 log(X_{sr}/Y)$$
$$+ \beta_6 log(M_g/Y)_{t-1} \tag{6.51}$$

Imports of services

$$log(M_{sr}/M_g) = \zeta_0 - \zeta_1 log(RER_m) + \zeta_2 log(X_g/M_g) - \zeta_3 IRD + \zeta_4 log M_{sr}/M_g)_{t-1} \tag{6.52}$$

Public non-trade revenues

$$log(T_{nt}/Y) = \alpha_0 + \alpha_1 log(I_p/C_p) + \alpha_2 log(T_{nt}/Y)_{t-1} \tag{6.53}$$

Public foreign trade tax revenues

$$log(T_t/M_g) = \xi_0 + \xi_1 log(X_g/M_g) + \xi_2 log(X_{sr}/M_g) - \xi_3 log(RER_m) + \xi_4 log(T_t/M_g)_{t-1} \tag{6.54}$$

Private savings

$$log(S_p/Y_p) = \sigma_0 + \sigma_1 IRR_{dt-1} + \sigma_2 log(S_p/Y_p)_{t-1} \tag{6.55}$$

The following section briefly describes the theoretical justification for the inclusion of certain explanatory variables in the specified functions. The expected sign of each explanatory variable is also reported in all the functions. Note that each function is normalized by the explanatory factor with which it is most closely associated, as described earlier. One of the main advantages of normalization of the functions is to eliminate certain econometric problems, particularly multicollinearity among the explanatory variables. Another objective is to assess the effects of other explanatory policy variables in each function.

Imports of goods and services

Aggregate imports are divided into two main categories: imports of goods (M_g) and imports of services (M_{sr}). Imports of goods are the sum of imports of capital goods, consumption goods, and raw materials. Imports of services include insurance, shipping, and interest payments on foreign debt. The import demand of goods is hypothesized to be a function of

the real exchange rate for imports (RER$_m$), domestic activities and demand shift variables proxied by total investment (I), total consumption (C) and exports of goods (X$_g$), exports of services (X$_{sr}$), and the lagged dependent variable. All the relevant variables included in this function are normalized by the level of gross domestic product. The theoretical justification for inclusion of the explanatory variables is as follows. An increase in RER$_m$ -- a devaluation in domestic currency -- is assumed to have a negative impact on the level of imports of goods because it tends to raise the relative price of imported goods, thereby reducing their demand in Pakistan. The other explanatory variables, namely, total investment, total consumption, and exports of goods, which are proxies for increasing economic activities and demand shift variables in Pakistan, are assumed to be positively related to the level of aggregate imports of goods. Pakistan, like other developing countries, is a capital-deficient economy and is heavily dependent on imported capital goods. A higher level of investment therefore requires extra imports of capital goods. The impact of increasing consumption is also expected to have a positive effect on imported goods. Most exportable commodities from Pakistan need imported raw materials; a positive statistical association is therefore expected between imports of goods and exports of goods. Regarding exports of services, as is the case in most labor-exporting countries, the inflow of workers' remittances in Pakistan showed a significant impact on the overall economy -- particularly during the late 1970s and mid 1980s. Since workers' remittances have supplemented foreign-exchange resources available to Pakistan's economy, it is widely believed that increased remittances significantly encourage imports of goods. In addition, since the early 1980s, the Government of Pakistan has been providing incentives to migrants to use remittances for freer imports of non-essential items, which also raises the volume of imports.[25] Nishat and Bilgrami (1991) estimated the multiplier effect of workers' remittances on economic activities in Pakistan at around 2.54. It is therefore expected that the inflow of workers' remittances (which is a major part of exports of services as shown in Table 5.4 in Chapter 5) increases the aggregate imports of goods. Lagged imports of goods are included as an explanatory factor to account for the habit formation process of imported goods on the part of consumers. The import demand function for goods specified in this study is not much different from other models of developing countries. Taylor (1990b), for example, included investment as an explanatory variable in his imports of capital goods function and gross domestic product in his imports of raw-materials function in the case of seventeen developing countries; Solimano (1990) incorporated the level of

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[25] For a detailed analysis about the impact of workers' remittances on Pakistan's economy, see Burney (1989).

investment and the real exchange rate as exogenous variables in his import function for capital goods, and gross domestic product and real exchange rate in import functions of consumption goods and raw-materials, in the case of Chile; Drachman and Zilberfarb (1987) included total investment, total consumption, total exports, and real exchange rate as explanatory determinants in a function for imports of total goods in the case of Israel; and Naqvi et.al (1993) specified separate import functions for four components of imported goods in the case of Pakistan. They incorporated value added in manufacturing as an exogenous variable in the import function of food and beverages; gross domestic product and foreign-exchange reserves in the import function of crude materials, fuel, and mineral oils; and gross domestic product, import price index of manufactured goods, and workers' remittances are taken as exogenous variables in the import function of manufactured goods.

The imports of services consist mainly of activities related to both exports of goods and imports of goods (e.g. insurance and shipping) and interest payments on foreign debt (see Tables 5.3 and 5.5 in Chapter 5). In this model, imports of services are hypothesized to be a function of the real exchange rate (RER_m), the volume of trade as measured by the sum of exports and imports of goods, the real interest rate differentials, and the lagged dependent variable. The relevant variables in the function of imports of services are normalized by the level of imports of goods. Like the import function of goods, an increase in RER_m -- a devaluation in domestic currency -- is assumed to have a negative impact on the imports of services because it tends to raise the relative price of imported services, thereby reducing their demand in Pakistan. Regarding the volume of trade, it is expected that imports of services, particularly shipping and insurance, increase with the rising level of exportable commodities because Pakistan is deficient in shipping and insurance services. Since imports of services include a large proportion of interest payments on foreign accumulated debt stock of the country, it is therefore expected that an increase in the foreign interest rate, relative to the domestic interest rate, would reduce the demand for foreign loans, and as a consequence reduce the interest payments on foreign loans in Pakistan.

Public trade and non-trade revenues

The key macroeconomic variable modelled in the public sector is public revenues, while public expenditure is treated as a policy variable in the more general three-gap model for Pakistan. Total public sector revenues are divided into two main components, namely, non-trade revenues (T_{nt}) and foreign trade tax revenues (T_t). Non-trade public revenues include direct taxes, indirect taxes, and non-tax revenues. Tax revenues from international trade

consist of both custom duties and export duties. The behavioral functions for trade and non-trade revenues are kept simple. The level of non-trade revenues is normalized by the level of gross domestic product and is taken as a dependent variable. It is postulated to be a distributed lag function of private investment, expressed as a ratio of private consumption. The inclusion of private investment as a ratio of private consumption as an explanatory variable is unique to this model and is included here to allow for the different revenue implications of private corporate investment relative to expenditures on consumer goods in Pakistan.[26] Previous models of the Pakistan economy ignored this effect. Since the private corporate tax rate is much higher than the tax on consumer goods (e.g. sales tax and excise duties) in Pakistan, it is expected that the higher is the ratio of private corporate tax to the tax on consumer goods, the more public non-tax revenues will be obtained by the government of Pakistan. The lagged non-trade revenues are included as an explanatory factor to take into account lags in the collection of taxes.

Foreign trade taxation, particularly custom duties, have been a relatively major source of government revenues in Pakistan throughout the period under analysis. In the function describing foreign trade tax revenues, all the relevant variables are normalized by the level of imports of goods. Foreign trade tax revenues are assumed to be a function of exports of goods, exports of services, and the real exchange rate for imports with a distributed lag provision. In Pakistan, tax revenues from exports of goods and exports of services have also been sources of government revenues (although these sources are minor as compared to import tariffs). The inclusion of the real exchange rate as an explanatory variable is designed to test whether exchange rate policy has any impact on foreign trade tax revenues.

Private savings

The key macroeconomic variable modelled in the private sector is its savings (S_p). The function of private saving is kept simple. Private savings as a ratio to private income are made a function of only the real domestic interest rate, which is treated as one of the important policy variables in this study. The impact of the real interest rate on private savings remains a controversial issue among economists because the income effect and substitution effect of rising domestic interest rates go in opposite directions. On the one hand, it is argued that current private consumption may increase because of higher expected income

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[26] The ratio of private sector profits to wages might be a more appropriate explanatory variable, but the necessary data are not readily available.

in the future through the income effect, resulting in less savings. This hypothesis is supported by Giovannini (1983, 1985). On the other hand, it is argued that an increase in the real interest rate tends to encourage private savings through the substitution effect. Most of the empirical findings, for example, Fry (1978, 1980, 1988), Fry and Mason (1982), Gupta (1987), Balassa (1989b), A.H. Khan et al. (1992, 1994), and Iqbal (1993) support the hypothesis of a positive association between the real domestic interest rate and the savings rate, which implies that the substitution effect dominates the income effect in most developing countries. Although the direction of the statistical association between the domestic real interest rate and the private savings rate depends on the strength of the income and substitution effects, it is not expected *a priori* that the rising real domestic interest rate would raise the private saving rate in Pakistan.

Note that the definitions of most of the notations that are used in the more general three-gap model have already been given in Table 6.3. Thus, only the definitions of new notations that appear in the system are given in the following Table 6.8.

Table 6.8   Notation and Definition in a More General Three-Gap Model

Notation	Definition
ER	Domestic nominal exchange rate (defined as Pak. rupees per US $)
GDP_d	Domestic GDP deflator
IR_d	Nominal domestic interest rate on government bonds
IRR_d	Real domestic interest rate on government bonds (defined as $IR_d - P_d$)
IR_{us}	Nominal US interest rate on government bonds, representing foreign interest rate
IRR_f	Real foreign interest rate on government bonds (defined as $IR_{us} - P_{us}$)
IRD	Real interest rate differential (defined as $IRR_f - IRR_d$)
MPI	Domestic import price index
P_d	Domestic inflation rate calculated from domestic GDP deflator
P_{us}	US inflation rate calculated from US GDP deflator
RER_m	Real exchange rate for imports (defined as $ER \times MPI/GDP_d$)
RER_x	Real exchange rate for exports (defined as $ER \times XPI/GDP_d$)
XPI	Domestic export price index
Y_p	Private income (defined as $Y - T$)

6.2.2 Empirical results of a more general three-gap model

Eqs. (6.51 - 6.55) have been estimated by ordinary least squares (OLS) using the time-series data for the period 1970-93 (previously discussed in Chapters 4 and 5). The results are reported in Table 6.9. These are generally satisfactory in the sense that the coefficient signs are mostly as expected. More detailed commentary on the results is offered in the following paragraphs.

Imports of goods and services

The regression results of import demand function of goods conform to theoretical expectations. The results show that all the domestic activity variables (proxied by total investment, total consumption, and exports of goods), real exchange rate, exports of services, and lagged imports of goods are significant determinants of import demand in Pakistan. Comparison of the different levels of import elasticities of the three domestic activity proxies developed reveals that the import elasticity of total consumption is higher (more than one) than the import elasticities of total investment and exports of goods (less than one) during the estimation period. The high import elasticities with respect to consumption may indicate the higher demand for imported consumer goods in Pakistan because many luxurious consumer goods are not produced in Pakistan. Moreover, people may also prefer imported consumer goods over domestically produced consumer goods. The real exchange rate is considered one of the important policy variables in structural adjustment programs in Pakistan. The estimated parameter for the real exchange rate possesses an appropriately negative sign and is statistically significant at the 95% level, suggesting that imports of goods in Pakistan are sensitive to relative import prices. The results for exports of services, mainly workers' remittances, are consistent with a priori expectation. Its coefficient is significant and has the expected positive sign, suggesting that increased remittances significantly encouraged imports of goods in Pakistan during the period under consideration. Lagged imports of goods are significant at the 10% level with a positive sign, indicating the habit formation of imports of goods on the part of local consumers in Pakistan.

The estimated import demand function of services also produces sensible results. The real exchange rate variable turns out to be insignificant even with an unexpected positive sign. The insensitivity of imports of services to the real exchange rate depreciation is not surprising, given the fact that Pakistan's economy is heavily dependent upon imports of services. It seems that depreciation in the real exchange rate may not reduce the demand of

Table 6.9   Regression Results of a More General Three-gap Model for Pakistan (1970-93)

Dependent Variables	Explanatory Variables	$\bar{R}^2$	D.W.[27]
$\log(M_g/Y)$	$2.351 - 0.101\log(RERm) + 0.646\log(I/Y) + 4.569\log(C/Y) +$ (3.84)! (2.13)!! (4.52)! (8.10)!		
	$0.391\log(X_g/Y) + 0.241\log(X_{sr}/Y) + 0.243\log(M_g/Y)_{t-1}$ (4.12)! (7.79)! (2.07)!!	0.95	1.76
$\log(M_{sr}/M_g)$	$-0.328 + 0.044\log(RERm) + 0.357\log(X_g/M_g) - .015IRD +$ (1.21) (1.04) (1.36) (2.46)!!		
	$0.729\log(M_{sr}/M_g)_{t-1}$ (3.87)!	0.83	1.46
$\log(T_{nt}/Y)$	$-0.560 + 0.289\log(I_p/C_p) + 0.465\log(T_{nt}/Y)_{t-1}$ (1.96)!!! (2.11)!! (2.23)!!!	0.66	1.65
$\log(T_f/M_g)$	$-0.541 - 0.108\log(RERm) + 0.451\log(X_g/M_g) + 0.181\log(X_{sr}/M_g)$ (1.60) (1.69)!!! (2.26)!! (2.13)!!	0.11	1.92
$\log(S_p/Y_p)^{28}$	$-1.917 + 0.019IRR_{dt-1}$ (52.47)! (3.33)!	0.32	2.10

t-statistics are given in parentheses. !, !!, and !!! denote statistically significant at 1 percent, 5 percent, and 10 percent levels, respectively.

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[27] Although the "h" test is considered to be an alternative test for autocorrelation when a one-year lagged dependent variable is included as an independent variable, this test is strictly recommended for large samples and its application in small samples is not justified. Durbin's-h test has also another problem, however. The test statistic is undefined in certain circumstances [i.e. when $n.(se^2) \geq 1$, where n is the sample size and se^2 is the square of the estimated standard error of the estimated coefficient of the lagged dependent variable] because the value under the square root sign is negative as happened with our results. For more detail, see Studenmund (1992), pp. 489-490. Therefore, we prefer to report the "D.W." statistic.

[28] We also attempt to assess the potential impact of workers' remittances on private savings. Our estimate of the private savings function with workers' remittances is as follows:

$$\log(S_p/Y_p) = -2.014 + 0.022IRR_{dt-1} - 0.034\log(WR/Y_p)$$
$$(9.96)\quad (2.93)\qquad (0.49)$$

$$\bar{R}^2 = 0.30 \qquad DW = 2.21$$

The results show that the estimated coefficient of workers' remittances as a ratio of private income (WR/Y_p) remains insignificant at any traditional level of confidence.

imports of services, because of insufficient shipping and insurance services in Pakistan. The coefficient of the real interest rate differential is statistically significant with a negative sign. Its estimated parameter suggests that a rising foreign interest rate relative to the domestic interest rate seems to reduce the demand for foreign loans and consequently leads to lower foreign interest payments of the country. Finally, the estimated coefficient of one-year lagged imports of services is found to be significant with a positive sign, which reflects the strong relevance of current import policy with the previous year's import policy regarding the imports of services in Pakistan.

Public non-trade and trade tax revenues

The estimated behavioral functions of non-trade and trade tax revenues appear to be free from econometric problems and also confirm *a priori* to theoretical expectations. Since the agricultural sector in Pakistan is exempted from income tax, the government's taxable targets are non-agricultural sources, mainly personal income, private corporate income, consumer goods, and international trade. The estimated coefficient of private investment as a ratio to private consumption is noteworthy in the non-trade revenues function. Its statistically significant coefficient with a positive sign verifies that a higher tax rate on private investment, as compared to consumer goods, raised the level of government revenues during the estimation period. It is also reasonable to infer from the estimated coefficient that a higher tax rate on profits over wages results in higher government revenues. Another explanatory variable included in the specification is one-period lagged public non-trade revenues. Its positive and statistically significant coefficient indicates that tax revenues in Pakistan are not entirely dependent on current income. Rather there is some evidence here of a lagged relationship whereby revenues depend on the trend in incomes.[29]

The regression results for the foreign trade tax revenues function show that exports of goods, export of services, and the real exchange rate are significant determinants of public revenues from international trade in Pakistan. The estimated elasticities show that taxes on exports of goods contribute more to the public sector than do taxes on exports of services. The estimated coefficient of the real exchange rate shows a negative and significant association between real exchange rate depreciation and foreign trade tax revenues. This seems to reinforce the results obtained in the imports of goods function that depreciation in

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[29] For further discussion on statistical association between current and lagged public revenues, see Aghevil and Sassanpour (1991) and M.S. Khan and Knight (1991).

the real exchange rate results in a reduction in imports of goods and a consequent decline in custom duties. Lagged trade revenues turned out to be insignificant as an explanatory variable and have therefore been omitted from the estimated equation.

Private savings

This model treats the domestic interest rate as one of the important policy variables. Its direct effect on private savings, thus, as well as its indirect effects on target variables are of great interest. The inclusion of the domestic real interest rate in the specification has a direct impact on private savings during the period under consideration. The estimated coefficient of the domestic real interest rate is found to be positive and statistically significant at the 99 percent level of confidence, which seems to confirm the predominance of the substitution effect over the income effect in Pakistan. This finding also follows Fry (1978, 1980, 1988), Fry and Mason (1982), Gupta (1987), Balassa (1989b), A.H. Khan et al. (1992, 1994), and Iqbal (1993), who all favor a positive association between the domestic interest rate and the domestic savings rate. The estimated elasticity of the domestic real interest rate is 0.02, which suggests that a one percent increase in the real domestic interest rate will raise private savings as a ratio of private income by 0.02 percent in Pakistan. The lagged dependent private savings as a ratio of private income remains insignificant and is therefore dropped from the estimated equation.

6.2.3 Validation of a more general three-gap model

The following Figures 6.9 to 6.14 represent, respectively, the observed versus predicted values of gross domestic product (Y), private investment (I_p), public investment (I_g), total investment (I), private consumption (C_p), and total consumption (C). These figures tend to support the more general three-gap model for Pakistan. All the figures show that the results of the naïve model developed in the previous section are improved by incorporating more explanatory factors in the above specified functions. It is also apparent that various policy variables have a significant impact on the target variables, an issue which will be explored in greater detail through the discussion on policy simulation in the next chapter. One way of interpreting the improvement in the results is to recognize that the coefficients β, Υ, α, ξ, and σ are average values which are treated as being fixed in the naïve model. In the more general three-gap model, these coefficients are allowed to change as functions of the explanatory variables whenever changes are in fact observed that can be explained by these

Informal Validation of the More General Three-Gap Model for Pakistan

Figure 6.9

Observed vs Predicted GDP

Figure 6.10

Observed vs Predicted Priv. Investment

Figure 6.11

Observed vs Predicted Pub. Investment

Figure 6.12

Observed vs Predicted Total Investment

Figure 6.13

Observed vs Predicted Priv. Consumption

Figure 6.14

Observed vs Predicted Total Consumption
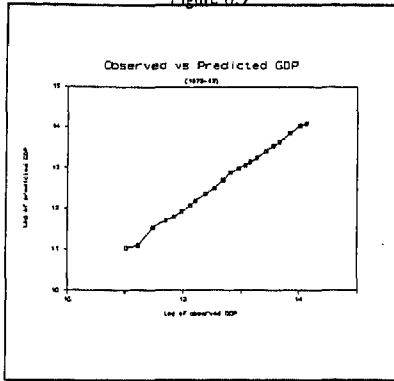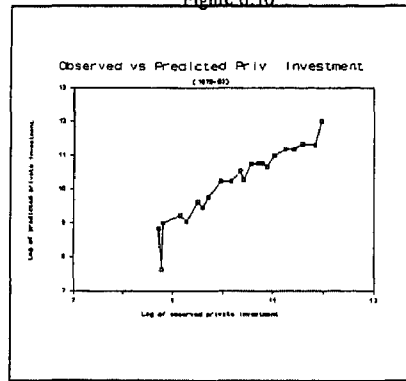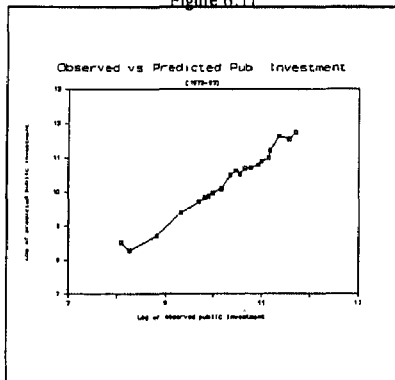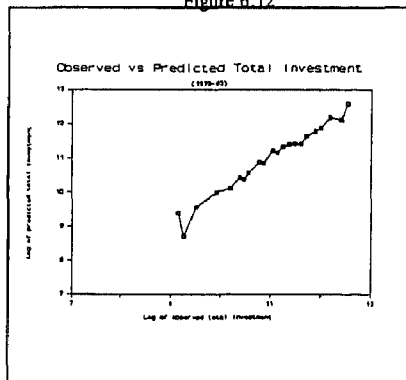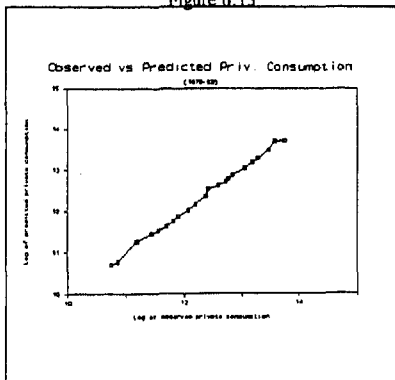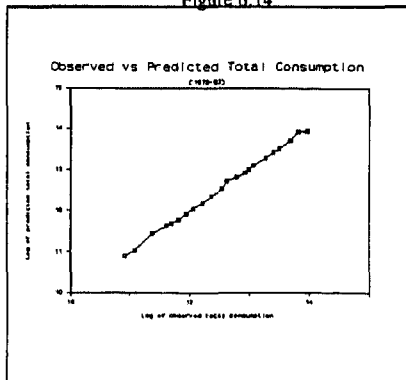
same explanatory variables.

Table 6.10 reports summary statistics of predicted errors of the more general three-gap model over the period 1972-93. It is evident that the implied results of all the selected variables have low root mean-squared errors as a percentage of actual values; for example, gross domestic product (0.4%), total consumption (0.4%), private consumption (0.5%), total investment (1.4%), public investment (1.5%), and private consumption (2.3%). In the case of the ME measure, note that the rank order of predicted errors remained the same as in the case of the RMSE measure for all the target variables. Model performance in these respects is comparable with economy-wide models designed for other developing countries: examples include Drachman and Zilberfarb (1987) for Israel, Lipumba et al. (1988) for Tanzania, Shakellariou and Howland (1993) for Greece, Chiarini (1993) for Italy, and Beenstock (1995) for oil importing developing countries. Again, it can be concluded that the implied values of the selected macroeconomic variables are improved and are more stable as compared to the naïve model.

Table 6.10 Error Statistics of a More General Three-Gap Model
(percentage of actual values, 1972-93)

Variable	Mean error	Root mean-squared error
Gross domestic product (GDP)	-0.15	0.40
Private investment (I_p)	-3.69	2.27
Public investment (I_g)	3.03	1.51
Total investment (I)	-1.26	1.42
Private consumption (C_p)	0.20	0.54
Total consumption (C)	0.10	0.44

6.3 Modelling of exports of goods and services

In the second stage of the development of our more general three-gap model, exports of goods and services, which were treated as policy variables in the first stage of the model, are now endogenized. This section has two main objectives in the modelling of exports of goods and services. The first is to assess the sensitivity of the previous results of a more general three-gap model by endogenizing exports of goods and services. The second objective is to

discover those important policy factors and external shocks that affect exports of goods and services, factors that are required for the simulation experiments to be performed in the next chapter. The theoretical background to the specification of functions of exports of goods and services is given in the following paragraphs.

6.3.1 Theoretical background of export functions

Aggregate exports are divided into two main components: exports of goods (X_g) and exports of services (X_{sr}). The following two separate functions for exports of goods and exports of services are specified on the basis of standard theoretical arguments.

Exports of goods

$$log(X_g/Y) = \omega_0 + \omega_1 log(RER_x) + \omega_2 log(W^d) - \omega_3 log(PPI) + \omega_4 log(X_g/Y)_{t-1} \tag{6.56}$$

Exports of services

$$log(X_{sr}/Y) = \varepsilon_0 + \varepsilon_1 log(RER_x) + \varepsilon_2 log(Ime/Yme) + \varepsilon_3 log(X_{sr}/Y)_{t-1} \tag{6.57}$$

The export function of goods includes the real exchange rate for exports (RER_x), world demand (W^d), the petroleum price index (PPI), and the lagged dependent variable. According to standard trade theory, when the real exchange rate depreciates, exports of goods become more competitive in the world market, and as a result the level of exports goes up. One therefore expects a positive association between exports of goods and real exchange rate depreciation in the case of Pakistan. Another explanatory factor, world demand (defined as index of world gross domestic product) is also expected to have a positive impact on the exports of goods from Pakistan. Conversely, export of goods is hypothesized to be negatively related with the rising price of petroleum, which can be interpreted as a second demand-side effect. Lagged exports of goods are included as an explanatory factor to account for some inertia in international markets.

The exports of services from Pakistan mainly include workers' remittances (see Table 5.4 in Chapter 5). In spite of the potential importance of workers' remittances in labor-exporting developing countries, no comprehensive theory of remittances exists. In Pakistan, no major attempt except Burney (1987, 1989) has been made to determine the macroeconomic factors that may explain the migrants' propensity to remit. This study, therefore, specifies a simple function for exports of services (including workers' remittances).

Like exports of goods, the real exchange rate is used to see whether exchange rate policy has any impact on the exports of services from Pakistan. *A priori* it is expected that a depreciation of the real exchange rate would increase the exports of services from Pakistan. In other words, a positive relationship between RER_x and X_{sr} is likely to exist. Since a large proportion of workers' remittances came from the Middle East to Pakistan, gross investment as a ratio to gross domestic product in the Middle East is included as a proxy for the level of economic activity in this region.[30] It is hypothesized that a higher level of economic activity in the Middle East would increase the demand for labor and as a consequence the size of the flows of workers' remittances into Pakistan.

6.3.2 Empirical results of export functions

Equations (6.56) and (6.57) for exports of goods and services have been estimated by using an ordinary least squares (OLS) estimation procedure, taking time-series data for the period 1970-93 of Pakistan's economy. The results are reported in Table 6.11. The estimated results corresponding to the exports of goods and services functions are, on the whole, quite satisfactory and the signs of the coefficients are mostly as expected. One explanation for the results is given in the following paragraphs.

Estimation of the export supply function for goods indicates that the real exchange rate has a significant and positive impact on exports of goods during the estimation period, suggesting that a real exchange rate depreciation enhances the competitiveness of exports of Pakistani goods in the world market. Regarding the petroleum price index, the results indicate a significant negative relationship between exports of goods and the petroleum price index, supporting the view that the export sector in Pakistan is relatively energy-intensive and higher petroleum prices have a negative impact on the production and supply of exportable commodities in Pakistan. The estimated coefficients of world demand and lagged exports of goods turn out to be insignificant, leaving inconclusive the question of demand and habit formation on the part of foreigners.

The estimated function for exports of services also produces sensible results. The coefficient of the real exchange rate possesses an appropriately positive sign, but it remains statistically insignificant, leaving inconclusive the impact of exchange rate policy on the

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[30] Real GDP or growth rate in real GDP in the Middle East would seem to be a relatively more appropriate variable representing economic activity in this region, but the necessary data are not readily available.

exports of services from Pakistan. The economic activity variable proxied by gross investment as a ratio to gross domestic product in the Middle East, is found to affect positively the export of services from Pakistan. This is primarily because the initial impact of an increase in the price of oil is to increase the oil revenues of oil producing Gulf countries, which leads to an increase in the level of economic activity in that region. It is,

Table 6.11   Regression Results of Exports of Goods and Services from Pakistan (1970-93)

Dependent Variables	Explanatory Variables	R^2	D.W.
$\log(X_g/Y)$	$-3.078 + 0.250\log(RERx) - 0.098\log(PPI) + 0.257\log(W^d) +$ (2.46)!! (1.96)!!! (2.37)!! (0.94) $0.295\log(X_g/Y)_{t-1}$ (1.45)	0.77	1.48
$\log(X_{sr}/Y)$	$-5.178 + 0.112\log(RERx) + 1.273\log(Ime/Yme) + 0.710\log(X_{sr}/Y)_{t-1}$ (2.90)! (0.80) (2.74)! (7.22)!	0.89	1.87

t-statistics are given in parentheses. '!', '!!', and '!!!' denote statistically significant at 1 percent, 5 percent, and 10 percent levels, respectively.

therefore, an increase in investment that further leads to an inflow of the labor force from the labour-exporting countries including Pakistan, which results in an increase in the inflows of remittances from Gulf countries to labor-exporting countries. Note that Pakistan is one of the largest exporters of labor to the Gulf region. This situation brings to mind similar arguments made by Burney (1989), who suggests that increasing economic activity in the Gulf countries (proxied by the level of investment in that region) enhances the flow of remittances into Pakistan. The estimated coefficient of lagged exports of services is found to be highly significant with a positive sign.

6.3.3   Validation of a more general three-gap model with endogenous exports

Figures 6.15 to 6.20 show graphs of the observed versus predicted values of gross domestic product (Y), private investment (I_p), public investment (I_g), total investment (I), private

Validation of the More General Three-Gap Model with Endogenous Exports

Figure 6.15
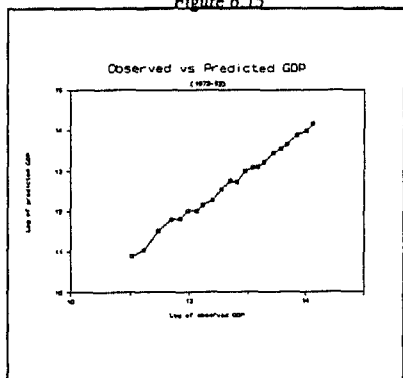
Observed vs Predicted GDP

Figure 6.16

Observed vs Predicted Priv Investment

Figure 6.17

Observed vs Predicted Pub Investment

Figure 6.18

Observed vs Predicted Total Investment

Figure 6.19

Observed vs Predicted Priv Consumption
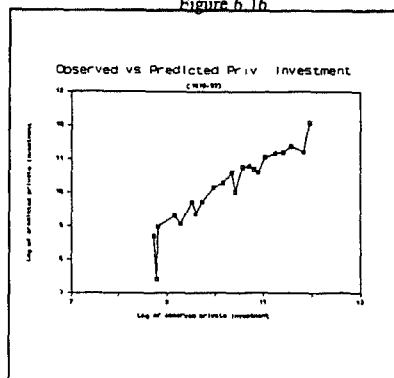
Figure 6.20
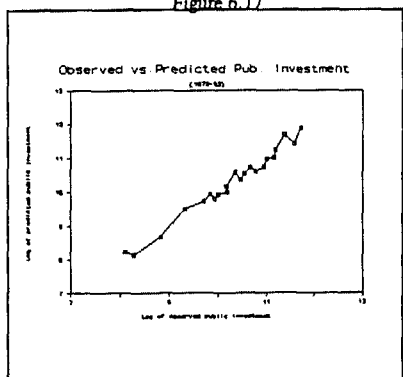
Observed vs Predicted Total Consumption
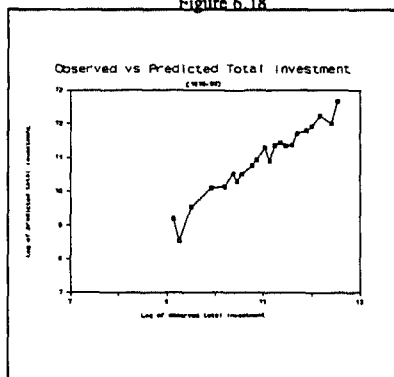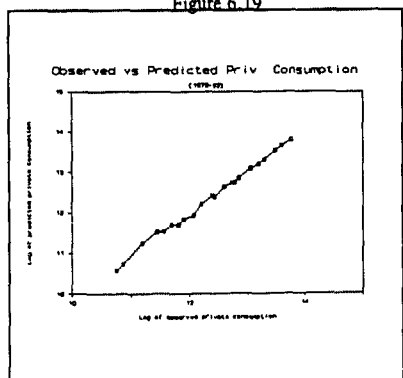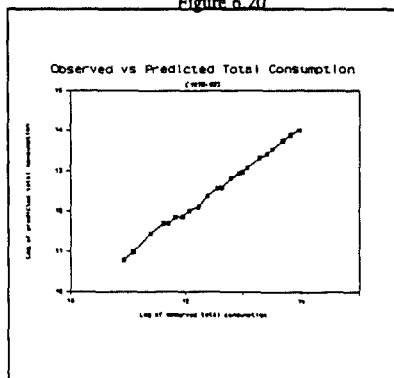
consumption (C_p), and total consumption (C) in our three-gap model with endogenous exports of goods and services. These implied results are obtained by substituting the predicted values of exports of goods and services for actual values in the simulations obtained in the previous stage of the model. If one compares Figures 6.15 to 6.20 (implied results with endogenous exports) with Figures 6.9 to 6.14 (implied results with exogenous exports), it is evident that the implied results of the more general three-gap model remain almost the same because of the higher correlations obtained for the export functions. Table 6.12 presents the summary statistics of predicted errors of all the target variables. It shows that root mean-squared errors are reasonably small in all the cases and they range from 0.6% (total consumption) to 2.6% (private investment).

Table 6.12 Error Statistics of a Three-Gap Model with Endogenous Exports
(percentage of actual values, 1972-93)

Variable	Mean error	Root mean-squared error
Gross domestic product (GDP)	-1.28	0.68
Private investment (I_p)	-5.44	2.56
Public investment (I_g)	0.23	1.51
Total investment (I)	-3.37	1.78
Private consumption (C_p)	-0.97	0.69
Total consumption (C)	-0.85	0.57

6.4 Modelling of flow-of-funds variables

The net acquisition of foreign transfers by the private and public sectors in the flow-of-funds part of a three-gap model are obviously important variables in terms of their behavioral consequences. This study has two main objectives in endogenizing the flow-of-funds variables [namely, foreign capital inflows to the public sector (NF_g) and foreign capital inflows to the private sector (NF_p)]. First, as is the case for most developing countries, public and private investment in Pakistan depend heavily on foreign transfers. It is therefore important to find out the main determinants of foreign transfers, since this might be useful knowledge for policy purposes in Pakistan. Second, in the next chapter, we shall perform simulation experiments and assess the sensitivity of the results with and without the availability of additional foreign capital inflows, particularly adjustment lending. An attempt, therefore, is

made to endogenize foreign capital inflows both to the public sector and to the private sector. The third variable in the flow-of-funds part of the model developed in this study, namely, private sector domestic net capital transfers to the public sector (NSS_p), is treated here as a policy variable. The following section briefly describes the theoretical justification for and empirical evidence of the main determinants of foreign transfers to the public and private sectors in Pakistan during the period 1970-93.

6.4.1 Theoretical background of flow-of-funds variable functions

The formulation of behavioral functions for net foreign capital inflows to the public sector (NF_g) and foreign capital inflows to the private sector (NF_p) is kept simple. The dependent variables NF_g and NF_p are normalized by the level of public investment (I_g) and private investment (I_p), respectively. Note that because net foreign capital inflows can be positive or negative, a logarithmic formulation is not appropriate. Hence both functions are kept linear. The specified functions are as follows:

Net foreign capital inflows to the public sector

$$NF_g/I_g = \delta_0 - \delta_1 RERm - \delta_2 IRD - \delta_3 (FER/I_g) - \delta_4 Y_g + \delta_5 (NF_g/I_g)_{t-1} \qquad (6.58)$$

Net foreign capital inflows to the private sector

$$NF_p/I_p = \Theta_0 - \Theta_1 RERm - \Theta_2 IRD - \Theta_3 (FER/I_p) - \Theta_4 Y_g + \Theta_5 (NF_p/I_p)_{t-1} \qquad (6.59)$$

The functions above include both demand and supply factors that may affect foreign capital inflows to the private and public sectors in Pakistan. The specified behavioral function of foreign capital inflows to the public sector as a ratio to public investment includes the real exchange rate for imports (RER_m), the real interest rate differential (IRD), defined as an annual average percentage real government bond yield in US minus an annual average percentage real government bond yield in Pakistan, total foreign exchange reserves as a ratio to aggregate imports (FER/M), annual growth in real domestic income, defined as the annual growth rate in real gross domestic product (Y_g), and the lagged dependent variable. The theoretical justification for inclusion of these explanatory factors in the above-specified functions is as follows. It is an *a priori* expectation that real devaluation would reduce the demand for foreign capital inflows by the public sector. This expectation follows from the above results for imports and exports functions, which show that the real exchange rate has a positive impact on exports of goods but a negative effect on imports of goods, suggesting

that the country's current account balance improves and there is consequently less demand for foreign capital inflows. Regarding the level of the country's official foreign-exchange reserves, it is hypothesized that higher reserves, as an indicator of a lower likelihood of a balance of payments crisis, lead to less demand for external borrowing by the public sector. Similarly, a larger gap between international and domestic real interest rates is expected to reduce the demand for foreign loans by the government of Pakistan. Finally, increasing domestic income is also expected to lead to lower demand for external loans.

The function for foreign transfers to the private sector (expressed as a ratio of private investment) includes the real exchange rate, the real interest rate differential, total foreign-exchange reserves as a ratio of aggregate imports, real domestic income, and the lagged dependent variable. Unlike foreign capital inflows to the public sector, devaluation in the real exchange rate may increase the inflows of foreign transfers by the private sector. Since net foreign transfers to the private sector comprise mainly private foreign direct investment, real devaluation makes foreign private investors more willing to invest in Pakistan, where the value of their assets may be expected to increase. As in the case of public sector foreign borrowing, similar negative effects can be expected for the real interest rate differential, foreign-exchange reserves, and domestic real income on the demand for foreign loans by the private sector.

6.4.2 Empirical results of flow-of-funds variable functions

Using time-series data for the period 1970-93, ordinary least squares estimates of functions of foreign capital inflows to the public and private sectors seem robust and are reported in Table 6.13. In the former case and consistent with our *a priori* expectation, the coefficient of the real exchange rate possesses a negative sign but the coefficient is not significant at any usual level of confidence. The real interest rate differential variable turns out to be significant with a positive sign, which is contrary to *a priori* expectations. It seems that in this case the supply factor dominates the demand factor, suggesting that the supply of foreign capital rises at the higher foreign interest rates. In addition, governments in developing countries do not take the foreign interest rate changes seriously whenever there is a great need for foreign capital. The estimated negative and highly significant coefficient of foreign-exchange reserves as a ratio of total imports supports the hypothesis that low reserves are associated with an enhanced enthusiasm to disburse foreign loans. Finally, foreign capital inflows to the public sector are negatively related to real GDP growth, suggesting that, at least in this respect,

higher growth in domestic income tends to lessen the need to borrow from abroad. This result follows Mosely (1980), Taylor (1990b), and Boyce (1992), all of whom argue that an increase in domestic income depresses the demand for foreign loans. The one-year lagged public sector foreign borrowing as an explanatory variable is found insignificant and is therefore dropped from the estimated function.

The estimated results of the function of private sector foreign loans also seem to be reasonable. Unlike public sector foreign borrowing, the positive and statistically significant coefficient of the real exchange rate suggests that devaluation encourages the flows of foreign capital -- particularly direct foreign private investment -- into Pakistan. The negative and statistically significant coefficient of the interest rate differential suggests that demand-side

Table 6.13   Regression Results of Flow-of-Funds Variables (1970-93)

Dependent Variables	Explanatory Variables	$\bar{R}^2$	D.W.
NF_g/I_g	$0.952 - 0.005RERm + 0.020IRD - 0.490(FER/I_p) - 0.072Y_g$ (8.10)! (1.14) (2.88)! (2.82)! (4.49)!	0.62	2.32
NF_p/I_p	$0.075 + 0.005RERm - 0.008IRD + 0.310(FER/I_p) - 0.013Y_g -$ (1.94)!!! (3.08)! (3.33)! (4.00)! (2.54)!! $0.322(NF_p/I_p)_{t-1}$ (1.72)!!!	0.44	1.80

Note: t-statistics are given in parentheses. !, !!, and !!! denote statistically significant at 1 percent, 5 percent, and 10 percent levels, respectively.

considerations influenced the level of external borrowing by the private sector. during the period under consideration. On the other hand, foreign private investors also seem reluctant to invest in Pakistan when the gap between international and domestic real interest rate increases. Contrary to *a priori* expectation, the coefficient of foreign-exchange reserves is found to be significantly positive. One reason may be that increasing foreign-exchange reserves provide an indication to private foreign investors about the country's balance of payments stability. In particular, a chronic balance of payments deficit may foster restrictive foreign-exchange measures, which can, in turn, endanger foreign capital and dividend remittances. This finding supports Pio and Vannini (1992) who argue that economic stability

factors such as low and stable inflation and a balance of payments deficit are important for attracting direct foreign private investment in developing countries. Finally, the negative and statistically significant coefficient of domestic real income implies that rising domestic income discourages the demand for foreign borrowing.

6.4.3 Validation of a three-gap model with endogenous exports and flow-of-funds variables

Figures 6.21 to 6.26 show the observed versus predicted values of gross domestic product (Y), private investment (I_p), public investment (I_g), total investment (I), private consumption (C_p), and total consumption (C) for this final version of our three-gap model, in which exports of goods and services and net foreign transfers both to the public and to the private sectors are endogenous. These implied results are obtained by incorporating the predicted values of net foreign capital inflows to the private and private sectors in the results obtained in the second stage of the three-gap model developed in this study. With regard to the sensitivity of the results, Figures 6.21 to 6.26 are compared with the first stage results depicted in Figures 6.9 to 6.14 (implied results with exogenous exports) and the second stage results shown in Figure 6.15 to 6.20 (implied results with endogenous exports). It is evident that the implied results of the final version of the three-gap model remain almost unchanged in the final stage. Table 6.14 reports the predicted errors of all the selected target variables over the period 1972-93. It is again evident that the results have low root mean-squared errors as a percentage of actual values and they range from 0.8% (total consumption) to 2.4% (private investment). These results, therefore, give some confidence that the final model with endogenous exports and foreign transfers can be used for policy simulations, and in particular, the effects of policy variables and external shocks with and without additional Bank-Fund adjustment lending, on the selected target variables.

Table 6.14 Error Statistics of a Three-Gap Model with Endogenous Exports and Foreign Transfers
(percentage of actual values, 1972-93)

Variable	Mean error	Root mean squared error
Gross domestic product (GDP)	-0.68	0.85
Private investment (I_p)	-4.56	2.38
Public investment (I_g)	0.61	2.42
Total investment (I)	-2.22	1.94
Private consumption (C_p)	-0.31	0.91
Total consumption (C)	-0.29	0.76

Validation of the More General Three-Gap Model with Endogenous Exports and Foreign Transfers

Figure 6.21

Observed vs Predicted GDP

Figure 6.22

Observed vs Predicted Priv. Investment

Figure 6.23

Observed vs Predicted Pub. Investment

Figure 6.24

Observed vs Predicted Total Investment

Figure 6.25

Observed vs Predicted Priv. Consumption

Figure 6.26

Observed vs Predicted Total Consumption
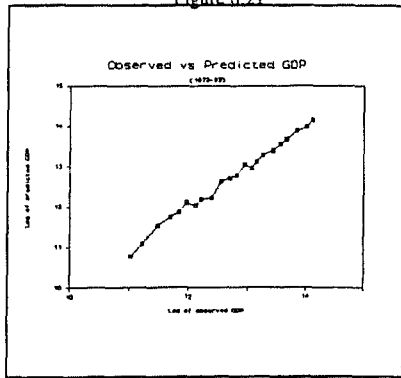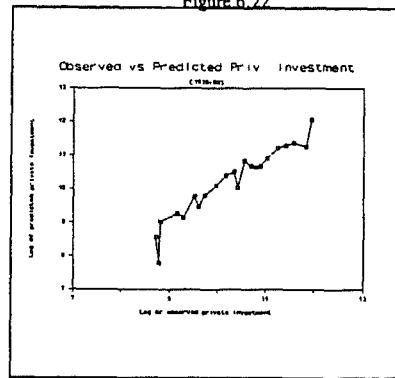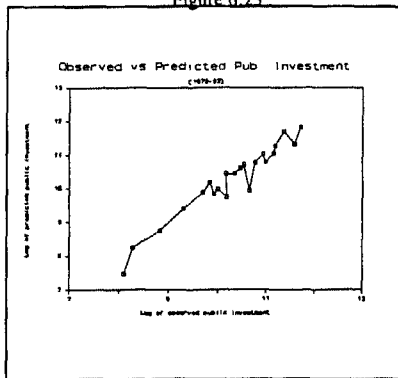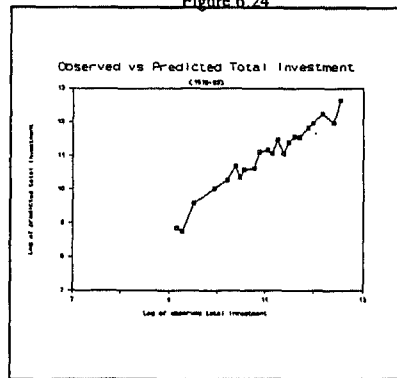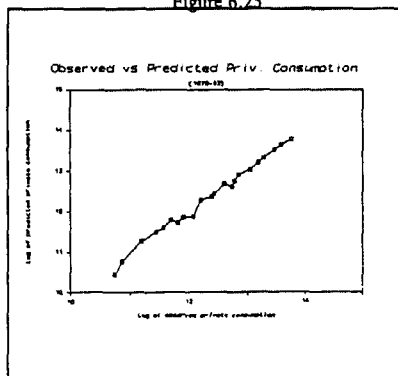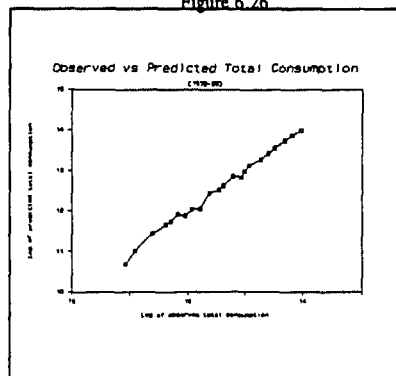
6.5   Summary

This chapter attempted to describe the main elements of the three-gap model for Pakistan. The model has been developed in various stages. First, a naïve three-gap model is developed and estimated using time-series data for the period 1970-93. The naïve model estimates the simple quantitative relationships between the target variables, namely, the level of real output, public investment, private investment, total investment, private consumption, and total consumption and macroeconomic policies (i.e. aggregate exports, foreign capital inflows to the public and private sectors, public current consumption, and public sector domestic borrowing). The implied results show that higher export earnings and foreign capital inflows have a positive impact on all the target variables. Conversely, rising public current consumption hurts public investment as well as total investment. Higher public sector domestic borrowing discourages private investment and raises the level of public investment. In the second stage, a more general model specifies behavioral functions to replace the fixed parameters assumed in the naïve version of the model. The specified functions include all the selected adjustment policy and external shock variables and are estimated by OLS using the time-series data under consideration. Regarding policy variables, regression results show that the real exchange rate hurts imports of goods and public foreign trade revenues, suggesting that imports of goods and consequently custom duties in Pakistan are sensitive to domestic exchange rate policy. The domestic real interest rate as a policy variable has a positive impact on private savings in Pakistan. The real interest rate differential as an external shock harms the import of services, which suggests that rising foreign interest rates reduce the demand for foreign loans and consequently lead to lower foreign interest payments by the country. Furthermore, this step shows that the implied results of the naïve three-gap model are improved by incorporating adjustment policy variables and external shocks along with other explanatory factors in the analysis.

The third stage of the development of a more general three-gap model endogenizes exports of goods and services, which were previously treated as an exogenous policy variable in the first and second stages of the model. With regard to policy variables, the regression results indicate that the real exchange rate depreciation has a significantly positive impact on exports of goods during the estimation period, suggesting that real exchange rate depreciation enhances the competitiveness of exports of Pakistani goods in the international market. Turning to external shocks, a rise in the petroleum price index hurts exports of goods and conversely, the economic activity variable proxied by gross investment as a ratio to gross

domestic product in the Middle East, is found to affect positively the export of services, particularly workers' remittances. The final stage of the model's development endogenizes variables that are located in the 'Flow-of-Funds' part of the model, namely, foreign capital inflows to the public and private sectors, which were treated as exogenous policy variables in the previous estimation. The real exchange rate depreciation shows a significantly positive impact on foreign capital inflows to the private sector, which suggests that devaluation encourages the flow of foreign capital -- particularly private direct foreign investment -- into Pakistan. Furthermore, the negative impact of the interest rate differential suggests that the demand for foreign capital inflows by the private sector diminishes as the real foreign interest rate increases.

Chapter 7

Simulation Experiments

This chapter outlines a range of simulation experiments with all three versions of our model for Pakistan. The analysis presented here brings together the information presented in Chapter 6 on the theoretical structure and parameter estimates of the model. Simulation experiments aim at a better understanding of the reaction of the model to changes in policies regarding structural adjustment programs and external shocks. In so doing, the experiments assess the realism of the effects envisaged in that model. These simulation experiments provide some insights from a policy perspective and also give policymakers some impression of how the model can be used in practice.

As mentioned earlier, it is not easy to analyze empirically the effects of the complex package of policies suggested in various Bank-Fund adjustment programs because it is difficult to choose an overall criterion for evaluating adjustment programs. In addition, no single model is at present available that covers the whole range of policy measures contained in the Bank-Fund programs. In this study, the simulation experiments are conducted for the adjustment policy variables and external shocks that appeared in the three-gap model for Pakistan. These variables represent a range of important economic policies in the areas of foreign trade, foreign borrowing, fiscal policy, and monetary policy. The external shock variables that appeared in the model are the foreign interest rate, economic activity in the Gulf region, the foreign petroleum price, and terms of trade. The path over time of selected policy variables and external shock variables has already been described in detail in Chapter 5. In order to characterize the more general three-gap model, we obtain the simulation results by changing both each single variable and a group of related variables. The simulation

experiments are undertaken in two steps. The first step predicts the response of the endogenous variables to exogenous variables for the base year 1993, using the estimated parameters of the model reported in Chapter 6. These estimates are used to obtain the implied results for the selected target variables, gross domestic product (Y), private investment (I_p), public investment (I_g), total investment (I), private consumption (C_p), and total consumption (C) for the base year 1993. The second step investigates the effects of changes in policy variables and external shock variables on the endogenous variables. These estimates make it possible to obtain the implied effects on selected target variables. The percentage deviations of the second step implied results from the base year implied results are calculated. These results reveal the effects of policy variables and external shocks in Pakistan's economy. Note that only those policy variables and external shock variables are selected for simulation experiments, which appeared as statistically significant in the regression results reported in Chapter 6. The mathematical expression of the estimation procedure is written as follows:

$$[(X^{se} - X^{be})/X^{be}] \times 100 \qquad\qquad (7.1)$$

where X^{be} represents base-year predicted values of a vector of endogenous and target variables and X^{se} is a vector of simulated values for the same variables with changes in policy and external shock variables. Note that in this case the effects of the policy changes on target variables are static -- once and for all effects -- but the model can also be used for dynamic simulations.

Before performing any simulations, it is important to check the stability of the estimated coefficients of the model. Using the Chow (1960) test, we have checked the stability of the estimated coefficients of the three-gap model for Pakistan. Chow defines the following F-statistic to find out whether the two sets of regression coefficients are equivalent.

$$F = \frac{(RSS_t - RSS_1 - RSS_2)/(K+1)}{(RSS_1 + RSS_2)/(N_1 + N_2 - 2K-2)} \qquad\qquad (7.2)$$

where:

RSS_t = sum of squared residuals from the whole sample period 1970-93
RSS_1 = sum of squared residuals from the first sub sample period 1970-80
RSS_2 = sum of squared residuals from the second sub sample period 1981-93
K   = the number of independent variables
N_1 = the number of observations in the first sub sample
N_2 = the number of observations in the second sub sample

Table 7.1   Results of Chow Test for a Three-Gap
Model for Pakistan

Specified Functions	F-statistic (1% level of significance)
$Log(M_g/Y)$	1.31 (5.61)
$Log(M_{sr}/M_g)$	2.13 (4.86)
$Log(T_{nt}/Y)$	10.38 (5.19)
$Log(T_t/M_g)$	1.01 (3.01)
$Log(S_p/Y\text{-}T)$	0.99 (3.55)
$Log(X_g/Y)$	1.33 (3.03)
$Log(X_{sr}/Y)$	2.04 (3.06)
NF_g/I_g	1.50 (3.03)
NF_p/I_p	0.84 (3.09)

Note: Critical F-statistic (F_c) is given in parenthesis.

The results reported in Table 7.1 show that the null hypothesis (H_0: the two sets of the regression coefficients are stable) cannot be rejected [except for the function $log(T_{nt}/Y)$] as $F \leq F_c$ where F_c is the critical F value for K+1 numerator and $N_1+N_2\text{-}2K\text{-}2$ denominator degrees of freedom. Accordingly the behavioural relationships in the model are apparently stable and the estimated coefficients can legitimately be used for simulations.

7.1   Experimental design

This chapter conducts simulation experiments under eight different scenarios to illustrate the

effects of key policy variables and external shocks on selected target variables in Pakistan's economy. The percentage changes in selected adjustment policy variables and the size of the external shocks chosen for computing their effects on target variables are arbitrary -- but this does not matter to a first order of approximation. The simulation experiments are conducted using all three versions of the three-gap model described in Chapter 6 (i.e. a model with exogenous exports and exogenous foreign capital inflows; a model with endogenous exports and exogenous foreign capital inflows; and finally, a model in which both exports and foreign capital inflows are endogenous). The purpose of performing simulations in all the three stages of the model is to show the sensitivity of the results, not least to the availability of adjustment lending, which is usually provided by the World Bank and the IMF with each suggested sectoral and structural adjustment program (see Table 5.8 in Chapter 5). The changes in policy variables and external shocks used in the analysis are given under the following scenarios I to VIII.

Scenario I   (with exogenous exports and exogenous net foreign capital inflows)
Policy variables
(a)   A 5% increase in exports of goods and services (X).

(b)   A 10% increase in foreign capital inflows to the private sector (NF_p).

(c)   A 10% increase in foreign capital inflows to the public sector (NF_g).

(d)   A 10% reduction in domestic capital transfers to the public sector (NSS_p).

(e)   A 5% reduction in public sector current expenditure (C_g).

(f)   A 3% increase in the real domestic interest rate in the previous year (IRR_{dt-1}).

(g)   A 10% devaluation of the real exchange rate for imports (RER_m).

External shock
In this first version of the model (i.e. with exogenous exports and exogenous net foreign capital inflows), the only external shock variable that appears in the system is the real interest rate differential. Therefore, in scenario I, the real interest rate differential is taken into account as an external shock and the percentage change in this variable is as follows:

(a)   A 2% increase in the foreign real interest rate over the domestic real interest rate (IRD).

Scenario II   (with endogenous exports and exogenous foreign capital inflows)
In this scenario, exports of goods and services are endogenized, while foreign capital inflows

to the private and public sectors are kept as exogenous policy variables. The main objective of endogenizing exports of goods and services is to find out the effects of exchange rate policy in general, and external shocks such as the petroleum price index, economic activity in the Gulf region, and terms of trade. In scenario II, the changes in policy and external shock variables are as follows:

Policy variables
(a) A 10% increase in foreign capital inflows to the public sector (NF_g).
(b) A 10% increase in foreign capital inflows to the private sector (NF_p).
(c) A 10% reduction in domestic capital transfers to the public sector (NSS_p).
(d) A 5% reduction in public sector current expenditure (C_g).
(e) A 3% increase in the real domestic interest rate in the previous year (IRR_{a-1}).
(f) A 10% devaluation of the real exchange rate for imports (RER_m).
(g) A 10% devaluation of the real exchange rate for exports (RER_x).

External shocks
(a) A 2% increase in the foreign real interest rate over the domestic real interest rate (IRD).
(b) A 10% increase in the foreign petroleum price index (PPI).
(c) A 2% contraction in total investment as a ratio to GDP in the Gulf countries (I_{we}/Y_{we}).
(d) A 7.7% deterioration in the terms of trade (TOT), calculated as a 5% increase in the import price index and a 5% decrease in the export price index.

Scenario III   (with endogenous exports and endogenous foreign capital inflows)
Policy variables
(a) A 10% reduction in domestic capital transfers to the public sector (NSS_p).
(b) A 5% reduction in public sector current expenditure (C_g).
(c) A 3% increase in the real domestic interest rate in the previous year (IRR_{a-1}).
(d) A 10% devaluation of the real exchange rate for imports (RER_m).
(e) A 10% devaluation of the real exchange rate for exports (RER_x).

External shocks
(a) A 2% increase in the foreign real interest rate over the domestic real interest rate (IRD).
(b) A 10% increase in the foreign petroleum price index (PPI).

(c) A 2% contraction in investment as a ratio to GDP in the Gulf countries (I_{me}/Y_{me}).

(d) A 7.7% deterioration in the terms of trade (TOT), calculated as a 5% increase in the import price index and a 5% decrease in the export price index.

Scenarios IV, V, VI, VII, and VIII:

After the analysis of individual policies, it may be useful to analyze all the policy variables and external shocks collectively in order to gauge their aggregate effects on the endogenous and target variables. Therefore, the policy variables of scenario I, scenario II, and scenario III are taken together and the policy simulations are performed collectively. The results of these policy simulations are reported, respectively, under scenario IV, scenario V, and scenario VI. Similarly, the external shock variables of scenario II and scenario III are taken together and the simulations are conducted collectively. The simulation results of the combined external shocks are reported under scenarios VII and VIII, respectively.

The selected percentage changes along with absolute changes in the base-year (1992-93) observed values of policy and external shock variables under scenarios I to III are summarized in Table 7.2.

Table 7.2 A Summary of Percentage and Absolute Changes in Base-year (1992-93) Observed Values

Variables	Base-year 1992-93 observed values	Changes in base-year observed values (absolute)	Changes in base-year observed values (%)
Policy variables			
X (Rs. billion)	256.1	12.8	5
NF_p (Rs. billion)	33.8	3.4	10
NF_g (Rs. billion)	69.9	7.0	10
NSS_p (Rs. billion)	38.0	-3.8	-10
C_g (Rs. billion)	230.0	-11.5	-5
IRR_{dt-1} (percent)	3.1	3.0	97
RER_x (Rs. per $)	24.7	2.5	10
RER_m (Rs. per $)	30.7	3.1	10
External shocks variables			
IRD (percent)	-2.3	2.0	-87
PPI (1980-81=100)	47.3	5.0	10
I_{me}/Y_{me} (percent)	25.1	-2.0	-8
TOT	80.6	-7.7	-10

7.2 Simulation results of individual policy changes

A summary of the main results of individual policy simulations under scenarios I to III is presented in Tables 7.3a to 7.5a (in absolute values), in Tables 7.3b to 7.5b (in absolute deviations from the base year 1993 values), and in Tables 7.3c to 7.5c (in percentage deviations from the base year 1993 values). The following paragraphs briefly describe the results and possible channels through which the policy variables may have affected selected macroeconomic variables in Pakistan's economy.

An increase in export earnings: The Bank-Fund adjustment programs for Pakistan call for an improvement in the structure of the balance of payments by stimulating exports -- especially of non-traditional exports through trade and industrial liberalization measures. Therefore, treating aggregate exports as a policy variable, the simulation experiment of a 5% increase in exports of goods and services above the base year 1993 is reported in Table 7.3 and no other policy changes are assumed to take place. The simulated results show that a positive export shock and hence additional foreign exchange, which tends to increase domestic output by Rs. 9 billion (0.7%), private investment by Rs. 1 billion (0.3%), public investment by Rs. 6 billion (4.9%), private consumption by Rs. 3 billion (0.3%) and total consumption by Rs. 3 billion (o.2%) in Pakistan. In addition, Table 7.3c also shows that an increase in exports, particularly exports of goods, require more imports of capital goods and raw materials (2.9%). At the same time, higher imports of goods raise foreign trade revenues of the government (3.1%), which is one of the major sources of public revenues in Pakistan.

An increase in public foreign capital inflows: During the early 1980s, most donors, particularly the World Bank and the IMF were unwilling to provide adjustment finance until they were convinced that the recipient government was serious about implementing the adjustment reforms. Only after the government of Pakistan depreciated the exchange rate, raised the real domestic interest rate, reduced public current expenditures (particularly subsidies), opted for denationalization, and reduced domestic credits (among other policies), the donors provided substantial adjustment support. During 1980-94, the government received total adjustment lending equal to $3.2 billion. By almost any measure, this is a huge amount of resources. Here, the main focus is to analyze the effects of adjustment lending associated with sectoral and structural adjustment programs. The simulation experiments with increases in foreign capital inflows through adjustment lending are important from a policy perspective.

In addition, the three-gap model requires stipulation of the extent of the foreign exchange constraint in Pakistan's economy. The simulated results of a 10% increase in foreign capital inflows to the public sector above those in the base year 1993 are reported in Tables 7.3 and 7.4. They show that all the target variables are positively affected by the availability of additional foreign capital flows into Pakistan. The main channel through which foreign transfers influence the outcome is through public sector investment. The results also show that additional foreign capital flows into the public sector tend to produce stronger positive effects on all the target variables (i.e. increases in output by Rs. 26 billion and in aggregate investment by Rs. 16 billion) than do foreign capital flows into the private sector (i.e. increases in output by Rs. 13 billion and in aggregate investment by Rs. 8 billion). A plausible reason seems to be that public investment depends more heavily on foreign capital inflows than does private investment. The simple regression results of foreign capital inflows to the private and public sectors reported in Appendix IV also support the argument, suggesting that a one unit increase in public investment requires 0.41 unit of foreign capital inflows, whereas a one unit increase in private investment requires 0.15 unit of foreign capital inflows. Moreover, one can see that foreign capital inflows to the private and public sectors are also used to finance current consumption. These numbers, however, do not give the full impact of foreign aid flows on total consumption since public current consumption is taken as a policy variable. The expansionary effects of foreign capital inflows confirm the findings of Chenery and Strout (1966), Papanek (1973), Voivodas (1974), Stoneman (1975), Mosley (1980), Park (1987), and Iqbal (1990, 1994), all of whom argue that foreign capital inflows stimulate investment in recipient countries. The advantage of the simulation as shown is that it isolates the individual effects of adjustment lending from other policy variables.

An increase in private foreign capital inflows: In Pakistan, the share of private capital flows in total foreign capital flows was 13% during the pre-adjustment period 1970-80, which considerably increased to 29% of total foreign capital flows during the adjustment period 1981-93. In this experiment, we presume that the combination of the depreciation of the domestic currency and increased real domestic interest rates led to inflows of foreign capital by local as well as foreign investors, and therefore we include private capital inflows among the group of policy reforms. The results of a simulation of 10% increase in private capital inflows are reported in Tables 7.3 and 7.4. They show that overall gross domestic product increases by Rs. 13 billion (around 1% growth from the base year level of GDP), private investment rises by Rs. 5 billion (3% increase from the base year level of private investment)

Table 7.3a Effects of Absolute Changes in Policy Variables and External Shocks on Selected Target Variables (scenario 1)

	Absolute changes in policy variables							Absolute change in external shock
	X (12.8) (Rs b.)	NF$_p$ (3.4) (Rs b.)	NF$_g$ (7.0) (Rs b.)	NSS$_b$ (-3.8) (Rs b.)	C$_a$ (-11.5) (Rs b.)	IRR$_{d+1}$ (3.0) (%)	RER$_m$ (3.1) (Rs/$)	IRD (2.0) (%)
Endogenous variables						Regression results	(Pak. rupee billions)	
M$_g$	294 (286)	-	-	-	271 (286)	-	283 (286)	-
M$_{sr}$	-	-	-	-	-	-	-	75 (77)
T$_m$	-	-	-	-	-	-	-	-
T$_i$	75 (73)	-	-	-	-	-	72 (73)	-
S$_p$	-	-	-	-	-	182 (171)	-	-
						Implied results		
Target variables								
Y	1337 (1328)	1341 (1328)	1354 (1328)	-	1400 (1328)	-	1341 (1328)	1336 (1328)
I$_p$	165 (164)	169 (164)	168 (164)	168 (164)	174 (164)	175 (164)	166 (164)	165 (164)
I$_g$	132 (126)	129 (126)	138 (126)	122 (126)	147 (126)	-	127 (126)	128 (126)
I	297 (290)	298 (290)	306 (290)	-	321 (290)	301 (290)	293 (290)	293 (290)
C$_p$	914 (911)	920 (911)	929 (911)	-	964 (911)	900 (911)	921 (911)	917 (911)
C	1144 (1141)	1150 (1141)	1159 (1141)	-	1183 (1141)	1130 (1141)	1151 (1141)	1147 (1141)

Note: base year predicted values are given in parentheses.

Table 7.3b Effects of Absolute Changes in Policy Variables and External Shock on Selected Target Variables (scenario I)

	Absolute changes in policy variables							Absolute change in external shock
	X (12.8) (Rs b.)	NF$_p$ (3.4) (Rs b.)	NF$_g$ (7.0) (Rs b.)	NSS$_p$ (-3.8) (Rs b.)	C$_g$ (-11.5) (Rs b.)	IRR$_{d-1}$ (3.0) (%)	RER$_m$ (3.1) (Rs/$)	IRD (2.0) (%)
Endogenous variables							(Pak. rupee billions)	
							Regression results	
M$_x$	8	-	-	-	-15	-	-3	-
M$_{sr}$	-	-	-	-	-	-	-	-2
T$_m$	-	-	-	-	-	-	-	-
T$_i$	2	-	-	-	-	-	-1	-
S$_p$	-	-	-	-	-	11	-	-
Target variables							Implied results	
Y	9	13	26	-	72	-	13	8
I$_p$	1	5	4	4	10	11	2	1
I$_g$	6	3	12	-4	21	-	1	2
I	7	8	16	-	31	11	3	3
C$_p$	3	9	18	-	53	-11	10	6
C	3	9	18	-	42	-11	10	6

Note: base year predicted values are given in parentheses.

Table 7.3c Effects of Percentage Changes in Policy Variables and External Shocks on Selected Target Variables (scenario I)

	Percentage changes in policy variables							Percentage change in external shock
	X (+5%)	NF_p (+10%)	NF_z (+10%)	NSS_p (-10%)	C_z (-5%)	IRR_{d-1} (+97%)	RER_m (+10%)	IRD (-87%)
	(percentage deviations from the base-year results)							
Endogenous variables								
					Regression results			
M_z	2.88	-	-	-	-5.15	-	-0.95	-
M_{ur}	-	-	-	-	-	-	-	-2.89
T_m	-	-	-	-	-	-	-	-
T_i	3.14	-	-	-	-	-	-1.02	-
S_p	-	-	-	-	-	6.01	-	-
Target variables								
					Implied results			
Y	0.66	0.94	1.94	-	5.42	-	0.96	0.62
I_p	0.25	3.02	1.99	2.31	5.94	6.16	1.13	0.64
I_z	4.85	1.85	9.36	-3.01	16.63	-	0.75	1.22
I	2.25	2.51	5.19	-	10.59	3.48	0.96	0.89
C_p	0.24	0.94	1.94	-	5.79	-1.11	1.10	0.62
C	0.19	0.75	1.55	-	3.62	-0.89	0.88	0.50

Note: percentage deviations calculated from Table 7.2a may differ marginally because of rounding errors.

and private consumption increases by Rs. 9 billion (1% increase from the base year level) during the period of the experiment.

Recycling of domestic credit from the public sector to the private sector: The Bank-Fund adjustment programs call for a reduction of domestic credit extended to the public sector and an expansion of domestic credit to the private sector as one of their main tenets. The main reason for suggesting this policy is to reduce the role of the public sector and to encourage the participation of the private sector in commercial and industrial activities, which were badly shaken by the nationalization measures under the previous regime in Pakistan. Tables 7.3 to 7.5 present the results of a 10% contraction in domestic credit extended to the public sector. As expected, recycling of domestic credit from the public sector to the private sector causes a decline in public investment and a rise in private investment (equal to 3% and 2.3%, respectively). It is also worth noting that since we did not develop a direct relationship between investment and output in the three-gap model for Pakistan, recycling of domestic credit from the public sector to the private sector reduces public investment and raises private investment, leaving the other target variables (e.g. gross domestic product, total investment, private consumption, total consumption) in the system unaffected. Therefore, reducing over-expansion of the public sector appears to be an effective policy tool for stimulating local private and foreign private investment activities in Pakistan, which can also be visualized in Figures 5.12 and 5.16 in Chapter 5.

A reduction in government current expenditures: All the Bank-Fund adjustment programs have emphasized that Pakistan should reduce public current expenditures, particularly through reducing subsidies. Subsidies were one of the main items of government current spending, particularly during the pre-adjustment period. Subsidies were, on average, 11% of government current expenditures during 1970-80, which considerably declined to 7% of government current expenditures during the adjustment period 1981-93. A summary of the main results of a reduction in government current spending is presented in Tables 7.3 to 7.5. To standardize the simulations, we have reduced the level of government current expenditures by 5% below that of the base year 1993. The effects of a contraction in government current spending appear to be positive in Pakistan's economy. As one can see, there are two main channels through which the effects of a fiscal contraction operate. The first channel provides a direct link between public current consumption and public investment -- the reduction in government recurrent spending is offset by an increase in public

Table 7.4a   Effects of Absolute Changes in Policy Variables and External Shocks on Selected Target Variables (scenario II)

	Absolute changes in policy variables					(Pak. rupee billions) Regression results		Absolute changes in external shocks			
	NF_p (3.4) (Rs b.)	NF_g (7.0) (Rs b.)	NSS_p (-3.8) (Rs b.)	C_g (-11.5) (Rs b.)	IRR_a-1 (3.0) (%)	RER_m (3.1) (Rs/$)	RER_x (2.5) (Rs/$)	IRD (2.0) (%)	PPI (5) (%)	ImelYme (-2.0) (%)	TOT (-7.7) (%)
Endogenous variables											
X_z	-	-	-	-	-	-	191 (186)	-	185 (186)	-	184 (186)
X_{ir}	-	-	-	-	-	-	-	-	-	84 (93)	-
M_z	-	-	-	271 (286)	-	283 (286)	-	-	-	-	284 (286)
M_{ir}	-	-	-	-	-	-	-	75 (77)	-	-	-
T_m	-	-	-	-	-	-	-	-	-	-	-
T_i	-	-	-	-	-	72 (73)	-	-	-	-	72.6 (73.0)
S_p	-	-	-	-	182 (171)	-	-	-	-	-	-
Target variables						Implied results					
Y	1429 (1416)	1442 (1416)		1493 (1416)		1430 (1416)	1433 (1416)	1425 (1416)	1409 (1416)	1381 (1416)	1414 (1416)
I_p	180 (175)	178 (175)	179 (175)	186 (175)	186 (175)	177 (175)	178 (175)	177 (175)	174 (175)	171 (175)	175 (175)
I_g	145 (143)	155 (143)	139 (143)	164 (143)		144 (143)	146 (143)	144 (143)	141 (143)	136 (143)	142 (143)
I	325 (318)	333 (318)		350 (318)	329 (318)	321 (318)	324 (318)	321 (318)	315 (318)	307 (318)	317 (318)
C_p	980 (972)	989 (972)		1028 (972)	961 (972)	982 (972)	983 (972)	978 (972)	967 (972)	948 (972)	971 (972)
C	1210 (1202)	1219 (1202)		1246 (1202)	1191 (1202)	1212 (1202)	1213 (1202)	1208 (1202)	1197 (1202)	1178 (1202)	1201 (1202)

Note: base year predicted values are given in parentheses.

Table 7.4b Effects of Absolute Changes in Policy Variables and External Shocks on Selected Target Variables (scenario II)

	Absolute changes in policy variables							Absolute changes in external shocks			
	NF_p (3.4) (Rs b.)	NF_g (7.0) (Rs b.)	NSS_p (-3.8) (Rs b.)	C_g (-11.5) (Rs b.)	IRR_{d-1} (3.0) (%)	RER_m (3.1) (Rs/\$)	RER_x (2.5) (Rs./\$)	IRD (2.0) (%)	PPI (5) (%)	ImeYme (-2.0) (%)	TOT (-7.7) (%)
Endogenous variables											
	(Absolute deviations from the base-year results in Pak. rupee billions)										
						Regression results					
X_g	-	-	-	-	-	-	5	-	-1	-	-2
X_{sr}	-	-	-	-	-	-	-	-	-	-9	-
M_g	-	-	-	-15	-	-3	-	-	-	-	-2
M_{sr}	-	-	-	-	-	-	-	-2	-	-	-
T_m	-	-	-	-	-	-	-	-	-	-	-
T_i	-	-	-	-	-	-1	-	-	-	-	-0.4
S_p	-	-	-	-	11	-	-	-	-	-	-
Target variables											
						Implied results					
Y	13	26	-	77	-	14	17	9	-7	-35	-2
I_p	5	3	4	11	11	2	3	2	-1	-4	-0.2
I_g	2	12	-4	21	-	1	3	1	-2	-7	-1
I	7	15	-	32	11	3	6	3	-3	-11	-1
C_p	8	17	-	56	-11	10	11	6	-5	-24	-1
C	8	17	-	44	-11	10	11	6	-5	-24	-1

Note: base year predicted values are given in parentheses.

Table 7.4c   Effects of Percentage Changes in Policy Variables and External Shocks on Selected Target Variables (scenario II)

	Percentage changes in policy variables							Percentage changes in external shocks			
	NF$_p$ (+10%)	NF$_i$ (+10%)	NSS$_p$ (-10%)	C$_g$ (-5%)	IRP$_{ob-1}$ (+97%)	RER$_m$ (+10%)	RER$_x$ (+10%)	IRD (-87%)	PPI (+10%)	Ime\Yme (-8%)	TOT (-10%)
Endogenous variables											
				(percentage deviations from the base-year results)						
						Regression results				
X$_s$	-	-	-	-	-	-	2.41	-	-0.98	-	-1.28
X$_{sr}$	-	-	-	-	-	-	-	-	-	-10.03	-
M$_s$	-	-	-	-5.15	-	-0.95	-	-	-	-	-0.49
M$_{sr}$	-	-	-	-	-	-	-	-2.89	-	-	-
T$_m$	-	-	-	-	-	-	-	-	-	-	-
T$_i$	-	-	-	-	-	-1.02	-	-	-	-	-0.52
S$_p$	-	-	-	-	6.01	-	-	-	-	-	-
Target variables											
						Implied results				
Y	0.88	1.82	-	5.42	-	0.96	1.17	0.62	-0.48	-2.44	-0.13
I$_p$	2.83	1.87	2.16	5.93	6.15	1.12	1.20	0.64	-0.49	-2.50	-0.06
I$_s$	1.63	8.28	-2.66	15.16	-	0.70	2.18	1.15	-0.89	-4.53	-0.80
I	2.29	4.74	-	10.07	3.39	0.94	1.64	0.87	-0.67	-3.41	-0.39
C$_p$	0.88	1.82	-	5.79	-1.11	1.10	1.17	0.62	-0.48	-2.44	-0.06
C	0.71	1.47	-	3.73	-0.90	0.89	0.95	0.50	-0.39	-1.97	-0.05

Note: percentage deviations calculated from Table 7.3a may differ marginally because of rounding errors.

investment as government savings increases. The simulated results show that a decrease in government current spending directly contributes to an increase in government investment by Rs. 21 billion (16% increase from the base year public investment level) during the period of the experiment. It is also worth noting that the positive effects of a decline in public current expenditure are greater on public investment than they are on the other target variables reported in Tables 7.3 to 7.5. In effect, in this simulation, government current spending shifts from current consumption to investment -- government was the major investor in Pakistan during the nationalization period (the share of public investment in aggregate investment was 60% in 1976 but thereafter this share declined gradually to 44% in 1993). The second channel demonstrates the impact of a reduction in public current spending on imports of goods. The simulation experiments show that a decline in government current spending discourages the level of imports of goods (i.e. 5% reduction from the base year level of imports of goods) in the economy. The net impact on output is substantial -- output increases by between Rs. 72 billion and Rs. 77 billion (5.4% growth from the base year output level). Moreover, the reduction in government current spending leads to a smaller public sector current account deficit (i.e. public current consumption minus public revenues). The simulation results in this respect are comparable with those of Vos (1994), who found, using a CGE model for Pakistan, that a cut in public current spending would stimulate a shift towards traded goods and would allow for lower inflation and 'crowding in' of private investment.

An increase in the domestic real interest rate: This model treats the domestic interest rate as an important tool of monetary policy. The Bank-Fund policy packages require the government to raise the domestic real interest rate in order to stimulate domestic savings and discourage private capital flight from Pakistan. The main results of simulating an increase in the real domestic interest rate by 3% above those in the base run are reported in Tables 7.3 to 7.5. The summary tables show that a higher real interest rate discourages private consumption by Rs. 11 billion (1.1% less than the base year level of private consumption) and enhances private investment by Rs. 11 billion (6.2% higher than the base year level of private investment). The main route through which monetary policy operates on the endogenous variables is via private savings. The higher real interest rate raises the propensity to save and consequently reduces the propensity to consume of the private sector. The higher private savings result in a higher level of private investment as well as a higher level of total investment in Pakistan. In addition, the positive effect of a higher interest rate on investment

Table 7.5a Effects of Absolute Changes in Policy Variables and External Shocks on Selected Target Variables (scenario III)

	Absolute changes in policy variables					Absolute changes in external shocks			
	NSS_p (-3.8) (Rs b.)	C_f (-11.5) (Rs b.)	IRR_{d-1} (3.0) (%)	RER_m (3.1) (Rs/$)	RER_x (2.5) (Rs/$)	IRD (2.0) (%)	PPI (5) (%)	imelYme (-2.0) (%)	TOT (-7.7) (%)
				(Pak. rupee billions)					
Endogenous variables			Regression results						
NF_p	-	36 (33)	-	-	-	31 (33)	-	-	35 (33)
NF_x	-	-	-	-	-	71 (66)	-	-	-
X_g	-	-	-	-	191 (186)	-	185 (186)	-	184 (186)
X_sr	-	-	-	-	-	-	-	84 (93)	-
M_g	-	271 (286)	-	283 (286)	-	-	-	-	284 (286)
M_sr	-	-	-	-	-	75 (77)	-	-	-
T_m	-	-	-	-	-	-	-	-	-
T_i	-	-	-	72 (73)	-	-	-	-	72.6 (73.0)
S_p	-	-	182 (171)	-	-	-	-	-	-
Target variables			Implied results						
Y	-	1476 (1400)	-	1422 (1400)	1417 (1400)	1419 (1400)	1394 (1400)	1366 (1400)	1403 (1400)
I_p	177 (173)	183 (173)	184 (173)	178 (173)	175 (173)	173 (173)	172 (173)	169 (173)	175 (173)
I_g	132 (136)	158 (136)	-	139 (136)	139 (136)	144 (136)	135 (136)	129 (136)	135.6 (135.9)
I	(136)	341 (309)	320 (309)	317 (309)	314 (309)	317 (309)	307 (309)	298 (309)	310 (309)
C_p	-	1017 (961)	950 (961)	977 (961)	972 (961)	974 (961)	956 (961)	937 (961)	963 (961)
C	-	1235 (1191)	1180 (1191)	1207 (1191)	1202 (1191)	1204 (1191)	1186 (1191)	1167 (1191)	1193 (1191)

Note: base year predicted values are given in parentheses.

Table 7.5b Effects of Absolute Changes in Policy Variables and External Shocks on Selected Target Variables (scenario III)

	Absolute changes in policy variables					Absolute changes in external shocks			
	NSS_p (-3.8) (Rs b.)	C_f (-11.5) (Rs b.)	IRR_{d-1} (3.0) (%)	RER_m (3.1) (Rs/$)	RER_x (2.5) (Rs./$)	IRD (2.0) (%)	PPI (5) (%)	Ime/Yme (-2.0) (%)	TOT (-7.7) (%)
Endogenous variables									
				Regression results					
				(Absolute deviations from the base-year results in Pak. rupee billions)					
NF_p	-	-	-	3	-	-2	-	-	2
NF_s	-	-	-	-	-	5	-	-	-
X_g	-	-	-	-	5	-	-1	-	-2
X_{sr}	-	-	-	-	-	-	-	-9	-
M_g	-	-15	-	-3	-	-	-	-	-2
M_{ir}	-	-	-	-	-	-2	-	-	-
T_m	-	-	-	-	-	-	-	-	-
T_t	-	-	-	-1	-	-	-	-	-0.4
S_p	-	-	11	-	-	-	-	-	-
Target variables									
				Implied results					
Y	-	76	-	22	17	19	-6	-34	3
I_p	4	10	11	5	2	0.1	-1	-4	2
I_z	-4	22	-	3	3	8	-1	-7	-0.3
I	-	32	11	8	5	8	-2	-11	1
C_p	-	56	-11	16	11	13	-5	-24	2
C	-	44	-11	16	11	13	-5	-24	2

Note: base year predicted values are given in parentheses.

Table 7.5c Effects of Percentage Changes in Policy Variables and External Shocks on Selected Target Variables (scenario III)

	Percentage changes in policy variables					Percentage changes in external shocks			
	NSS (-10%)	C (-5%)	IRR_g^{-1} (+97%)	RER_m (+10%)	RER_x (+10%)	IRD (-87%)	PPI (+10%)	Ime\Yme (-8%)	TOT (-10%)
Endogenous variables									
					(percentage deviations from the base-year results)				
					Regression results				
NF_p	-	-	-	6.81	-	-7.01	-	-	3.41
NF_g	-	-	-	-	-	7.54	-	-	-
X_x	-	-	-	-	2.41	-	-0.98	-	-1.28
X_{sr}	-	-	-	-	-	-	-	-10.03	-
M_g	-	-5.15	-	-0.95	-	-	-	-	-0.49
M_{sr}	-	-	-	-	-	-2.89	-	-	-
T_m	-	-	-	-	-	-	-	-	-
T_t	-	-	-	-1.02	-	-	-	-	-0.52
S_p	-	-	6.01	-	-	-	-	-	-
Target variables									
					Implied results				
Y	-	5.42	-	1.57	1.19	1.32	-0.48	-2.47	0.16
I_p	2.19	5.95	6.17	3.06	1.22	0.01	-0.50	-2.53	0.89
I_x	-2.79	15.83	-	1.89	2.29	6.22	-0.93	-4.76	-0.26
I	-	10.30	3.45	2.55	1.69	2.74	-0.69	-3.51	0.39
C_p	-	5.79	-1.11	1.70	1.19	1.32	-0.48	-2.47	0.23
C	-	3.71	-0.90	1.38	0.96	1.07	-0.39	-1.99	0.19

Note: percentage deviations calculated from Table 7.4a may differ marginally because of rounding errors.

may also be the result of reduced private capital flight from Pakistan. It is also worth noting that the higher interest rate does not directly affect the level of public investment and output in the system.

A depreciation of the real exchange rate: In January 1982, the government of Pakistan opted for delinking the rupee from the US dollar and authorized the State Bank of Pakistan to peg the value of the rupee to an exchange rate on the basis of a basket of currencies. Since 1982, the nominal exchange rate has been continuously depreciating from 10 rupees per US dollar in 1982 to 28 rupees per US dollar in 1993. In general, all the Bank-Fund adjustment programs contain suggestions regarding exchange rate policy in order to improve the balance of payments position of Pakistan. Tables 7.3 to 7.5 display the results of a 10% real exchange rate depreciation for imports (RER_m) on the selected target variables, taking exports of goods and services as an exogenous policy variable in the first step. In all the cases, the exchange rate depreciation has a positive impact on all the selected target variables in Pakistan's economy. The main route through which changes in the exchange rate work in the model is via a reduction in the volume of imports of goods (1% less than the base year level of imports of goods). A reduction in the volume of imports of goods also leads to lower public sector revenues from the foreign trade sector. Also note that since the regression results reported in Table 6.9 in Chapter 6 showed that the effect of a change in the real exchange rate on imports of services was statistically insignificant, it is not included in the simulation experiment.

Treating exports of goods and exports of services as endogenous variables in the model, the results of a simulation experiment conducted with a 10% devaluation in the real exchange rate are reported in Tables 7.4 and 7.5. The simulated results show that with endogenous exports, the percentage deviations of all the target variables from their base-year values are positive. In this model, the main route through which exchange rate policy operates is through an increase in the level of Pakistan's exports of goods (2.4% growth rate) in the international market.

Overall, the real devaluation of domestic currency appears to discourage the demand for imports of goods (because the domestic prices of imported goods rise) and stimulate exports of goods (because the international prices of exported goods fall). The results show that, on the whole, production increases by Rs. 31 billion and Rs. 39 billion reported in Tables 7.4b and 7.5b (the corresponding growth rates 2.1% and 2.8% are reported in Tables 7.4c and 7.5c). Aggregate investment rises by Rs. 9 billion and Rs. 13 billion as reported

in Tables 7.4b and 7.5b (with corresponding growth rates 2.6% and 4.2% reported in 7.4c and 7.5c). The current account balance of the balance of payments, as one would expect, improves with the depreciation of domestic currency. These findings are consistent with those of previous studies. M.S. Khan and Knight (1985), for example, indicate that real devaluation, on balance, results in an expansionary effect on output in developing countries. Donovan (1981) shows that exchange rate policy in conjunction with appropriate adjustment policies contributes significantly to an improvement in the balance of payments and a successful adjustment process in the developing economies. More recently, Doroodian (1993) finds that real devaluation has a positive impact on output and also improves the balance of payments in developing economies. These findings do not, however, support Vos (1994), who argued that exchange rate depreciation would be of little help in stimulating exports and growth of traded goods sectors and would tend to have a contractionary effect on Pakistan's economy in the medium run. In a nutshell, real devaluation appears to be an effective policy instrument to deal with a balance of payments deficit in the circumstances here under consideration.

7.3 Simulation results of external shocks

To capture the effects of external circumstances surrounding most of the adjustment package for Pakistan, our model explicitly adds four external shock variables to the analysis. The movement of the external shock variables (namely, the foreign real interest rate, the foreign petroleum price index, economic activities in the Middle East, and terms of trade) over time has already been explained in detail in Chapter 5. It is also worth pointing out that in the simulation experiments only those external shock variables are used which appeared as statistically significant in the regression results reported in Chapter 6. The advantage of the simulation as shown is that it isolates the effects of external shocks from the policy variables. The simulated results of external shock variables are reported in Tables 7.3 to 7.5. The following paragraphs briefly describe the effects of external shocks on the selected target variables.

An increase in the foreign real interest rate: An increase in the foreign real interest rate as an external shock variable is simulated in the model by increasing it 2% above the domestic real interest rate in the base-year level. Tables 7.3 to 7.5 report the results, showing that an increase in the real foreign interest rate has a positive impact on all the

selected macroeconomic variables in Pakistan. In this model, the main channels through which the foreign interest rate affects the target variables is through its effects on imports of services and foreign capital inflows to the private and public sectors. The simulation experiments are consistent with the regression results, which show that the real interest rate differential (defined as foreign real interest rate minus domestic real interest rate) reduces the demand for imports of services and discourages the inflows of foreign capital to the private sector but enhances the availability of foreign capital to the public sector in Pakistan. On average, the simulation experiments that deal with the real interest rate differential tend to produce expansionary effects. Output grows by 1.3% and investment by 2.7% as reported in Table 7.5c.

An increase in the foreign petroleum price index: The fourfold jump in the petroleum price in 1973-74 and the further substantial increase in 1979-80 clearly affect the adjustment process in Pakistan. The petroleum price shock is taken as a second external factor that can affect the selected target variables. The simulated results reported in Tables 7.4 and 7.5 consider an increase of 10% in the foreign petroleum price index above the base-year 1993 level. The simulation experiment shows that an increase in the petroleum price index has a negative effect on all the selected target variables in Pakistan. As one can see, the main route through which an increase in the petroleum price adversely affects all the target variables is through its negative effect on exports of goods.

A contraction in economic activities in the Gulf region: Another external factor, a decrease in economic activities in the Gulf countries, also has a strong negative impact through its influence on workers' remittances to Pakistan. As already described in detail in Chapter 5, the overseas workers' remittances (particularly from the Gulf region) have been a significant component of Pakistan's balance of payments. During the late 1970s and mid 1980s, there was a pronounced increase in workers' remittances from the Gulf countries (i.e. a maximum of 51% of aggregate exports of goods and services in 1983), but thereafter, a reduction in oil revenues and the Gulf crisis of the early 1990s, slowed down the economic activities in that region, thus diminishing the flow of remittances into Pakistan (i.e. to 17% of aggregate exports of goods and services in 1993). The simulated results reported in Tables 7.4 and 7.5 show that a contraction in economic activities, as measured by a 2% reduction in the investment/GDP ratio in the Gulf region, appears to produce strong contractionary effects on all the target variables of Pakistan's economy. Overall, production decreases by

2.5% and investment by 3.5% in the simulation period.

A deterioration in the terms of trade: The fourth external factor, a change in the terms of trade, is simulated in the model by increasing the import price index for non-oil imports by 5% and reducing the export price index by 5%, which together yield a deterioration in Pakistan's terms of trade by 7.7% below the base-year value. The simulation experiments reported in Tables 7.4 and 7.5 provide a quantitative assessment of the relationship between a change in the terms of trade and the selected target variables. The simulated results reported in Table 7.4 show that a deterioration in the terms of trade tends to produce contractionary effects on all the selected variables of the model. The main channel of the model through which a deterioration in the terms of trade works is the current account balance of the balance of payments. As one can see, a deterioration in the terms of trade discourages exports of goods more than imports of goods and does therefore result in a worsening of the current account balance. Such an outcome discourages domestic output, private and public investment, and private and total consumption. This finding is consistent with that of M.S. Khan and Knight (1985), M.S. Khan (1990), and Doroodian (1985a, 1993), all of whom argue that the deterioration in the terms of trade has deflationary effects on economic activities in developing economies. Note that in Table 7.5 the effects of a deterioration in the terms of trade turn out to be slightly positive on the selected target variables (except public investment) when foreign capital inflows are endogenized to the private and public sectors. The main reason seems to be that deterioration in the terms of trade encourages flows of foreign capital into the private sector.

7.4 Simulation results of the whole policy package and aggregate external shocks

Each adjustment program for Pakistan contains a set of policy variables that need to be implemented simultaneously. Therefore, all the policy variables of scenario I, scenario II, and scenario III are now taken together and the policy simulations are performed collectively. The results of the combination of the policy reforms are reported, respectively, under scenario IV, scenario V, and scenario VI in Tables 7.6a (in absolute values), 7.6b (in absolute deviations from the base year values), and 7.6c (in corresponding growth rates). The simulated results under scenario IV (policy variables combined with an increase in exports and additional foreign capital inflows available to the private and public sectors) and scenario V (policy variables combined with endogenous exports but additional foreign capital inflows

Table 7.6a   Combined Effects of Absolute Changes in All Policy Variables and External Shocks on Selected Target Variables

	Absolute changes in all policy variables			Absolute changes in all external shocks	
	(scenario IV)	(scenario V)	(scenario VI)	(scenario VII)	(scenario VIII)
			(Pak. rupee billions)		
Endogenous variables			Regression results		
NF_p	-	-	36 (33)	-	32 (33)
NF_g	-	-	-	-	71 (66)
X_g	-	191 (186)	191 (186)	182 (186)	182 (186)
X_{ur}	-	-	-	84 (93)	84 (93)
M_g	276 (286)	268 (286)	268 (286)	284 (286)	284 (286)
M_{ur}	-	-	-	75 (77)	75 (77)
T_{ur}	-	-	-	-	-
T_t	75 (73)	72 (73)	72 (73)	72.6 (73.0)	72.6 (73.0)
S_p	182 (171)	182 (171)	182 (171)	-	-
Target variables			Implied results		
Y	1463 (1328)	1566 (1416)	1517 (1400)	1381 (1416)	1380 (1400)
I_p	200 (164)	215 (175)	206 (173)	171 (175)	169 (173)
I_g	165 (126)	179 (143)	160 (136)	135 (143)	136.2 (135.9)
I	365 (290)	394 (318)	366 (309)	306 (318)	306 (309)
C_p	993 (911)	1067 (972)	1034 (961)	948 (972)	947 (961)
C	1212 (1141)	1286 (1202)	1253 (1191)	1178 (1202)	1177 (1191)

Note: base year predicted values are given in parentheses.

Table 7.6b Combined Effects of Absolute Changes in All Policy Variables and External Shocks on Selected Target Variables

	Absolute changes in all policy variables			Absolute changes in all external shocks	
	(scenario IV)	(scenario V)	(scenario VI)	(scenario VII)	(scenario VIII)
	(Absolute deviations from the base-year results in Pak. rupee billions)				
Endogenous variables			Regression results		
NF_p	-	-	3	-	-1
NF_g	-	-	-	-	5
X_x	-	5	5	-4	-4
X_{xr}	-	-	-	-9	-9
M_x	-10	-18	-18	-2	-2
M_{sr}	-	-	-	-2	-2
T_m	-	-	-	-	-
T_t	2	-1	-1	-0.4	-0.4
S_p	11	11	11	-	-
Target variables			Implied results		
Y	135	150	117	-35	-20
I_p	36	40	33	-4	-4
I_x	39	36	24	-8	0.3
I	75	76	57	-12	-3
C_p	82	95	73	-24	-14
C	71	84	62	-24	-14

Note: base year predicted values are given in parentheses.

Table 7.6c Combined Effects of Percentage Changes in All Policy Variables and External Shocks on Selected Target Variables

Endogenous variables	Percentage changes in all policy variables			Percentage changes in all external shocks	
	(scenario IV)	(scenario V)	(scenario VI)	(scenario VII)	(scenario VIII)
	(percentage deviations from the base-year results)				
			Regression results		
NF_p	-	-	6.81	-	-3.60
NF_g	-	-	-	-	7.54
X_s	-	2.41	2.41	-2.25	-2.25
X_{sr}	-	-	-	-10.03	-10.03
M_s	-3.34	-6.05	-6.05	-0.49	-0.49
M_{sr}	-	-	-	-2.89	-2.89
T_m	-	-	-	-	-
T_i	2.09	-0.99	-0.99	-0.52	-0.52
S_p	6.01	6.01	6.01	-	-
Target variables			Implied results		
Y	10.12	10.57	8.34	-2.46	-1.49
I_p	21.64	22.28	19.31	-2.45	-2.15
I_g	30.70	25.69	17.45	-5.10	0.24
I	25.57	23.81	18.49	-3.63	-1.10
C_p	8.99	9.86	7.64	-2.39	-1.42
C	6.17	7.01	5.20	-1.93	-1.15

Note: percentage deviations calculated from Table 7.5a may differ marginally because of rounding errors.

available to the private and public sectors) show that the overall effects of all the policy variables on selected target variables are positive and hence tend to produce expansionary effects. They show that the changes in policies together increase total output by Rs. 135 billion and Rs. 150 billion, and investment by Rs. 75 billion and Rs. 76 billion under scenarios IV and V, respectively. Overall, the policy package generates GDP growth of 10.1% and 10.6%, and investment growth of 25.6% and 23.8% under the same scenarios reported in Table 7.6c. In order to form some judgment about the sensitivity of the analysis and the extent of the foreign exchange constraint in Pakistan's economy, the simulation experiment is also performed with no additional foreign capital inflows available to the private and public sectors. Note under scenario VI in Table 7.6c, that without additional adjustment lending, the combined policy variables still have a positive impact on all the selected target variables (i.e. 8.3% growth in GDP and 18.5% growth in investment) -- but these results are weaker than the earlier two scenarios IV and V. Therefore, it seems sensible for the IMF and the World Bank to provide adjustment lending to make the adjustment process more effective. These findings do not, however, follow Vos (1994), who argued that additional foreign assistance would generate strong 'Dutch disease' effects and would thus be unsupportive of structural adjustment meant to strengthen the export base and traded goods production in Pakistan.

Finally, all the external shock variables of scenarios II and III are taken together and the simulations are performed collectively. The results are reported, respectively, under scenarios VII and VIII in Table 7.6. The simulation experiments show that, on average, external shocks have negative effects on all the selected target variables and hence adversely affect economic performance. The four changes in external shocks together decrease total output by 2.5% and 1.5%; investment by 3.6% and 1.1%; and consumption by 1.9% and 1.2% under scenarios VII and VIII reported in Table 7.6c. This finding follows Killick and Malik (1992), who argue that the intrusion of unforeseen external shocks is one of the main reasons for the failure of adjustment programs in developing countries.

7.5 Summary

This chapter attempted to provide answers to some of the questions posed at the beginning of the thesis, through a range of simulation experiments with the three-gap model for Pakistan (which was developed in Chapter 6). The simulation exercises have sought to provide a better understanding of the reaction of the model to changes in structural

adjustment policies (i.e. an increase in export earnings, an increase in foreign capital inflows, recycling of domestic credit from the public sector to the private sector, a reduction in government current expenditures, an increase in the domestic real interest rate, and a depreciation of the real exchange rate) and external shocks (i.e. an increase in the foreign real interest rate, an increase in the foreign petroleum price index, a contraction in economic activities in the Gulf region, and a deterioration in the terms of trade). In order to fully exploit the more general three-gap model, we have obtained the simulation results by changes in both each single variable and a group of related variables. The simulation experiments are conducted under eight different scenarios using all three versions of the three-gap model (i.e. a model with exogenous exports and exogenous foreign capital inflows; a model with endogenous exports and exogenous foreign capital inflows; and a model with endogenous exports and endogenous foreign capital inflows).

The simulation analysis has been undertaken in two steps. The first step predicts the response of the endogenous variables to exogenous variables for the base year 1993, using the estimated parameters of the model. These estimates have been used to obtain for the base-year 1993 the implied results for the selected target variables, namely, gross domestic product, private investment, public investment, total investment, private consumption, and total consumption. The second step investigates the effects of changes in policy and external shock variables on the endogenous variables. These estimates are used to obtain the implied results of selected target variables. The percentage deviations of the second step implied results, from the base year implied results, are calculated, which reveal the effects of policy variables and external shocks on selected target variables in the case of Pakistan's economy. In general, the simulation results support the effectiveness of Bank-Fund adjustment reforms in Pakistan. These results confirm the generally held view that Pakistan has adopted appropriate adjustment policies, which on average have contributed to improved macroeconomic performance during the adjustment period. On the whole, the changes in policies together increase GDP by 8% to 11% and investment by 18% to 26%. Regarding external shocks, the simulation results show that, on average, external shock variables have negative effects on all the selected target variables and hence adversely affect economic performance. The four changes in external shocks together decrease GDP by 2% to 3% and investment by 1% to 4%. Therefore, it can be concluded (as one would expect) that such a combination of external events has made the problem of economic management, in general, and the current account balance adjustment, in particular, more difficult for Pakistan.

Chapter 8

Conclusions

Structural adjustment reforms advocated by the World Bank and the International Monetary Fund (IMF) began in Pakistan in 1980, and since then the economy has become substantially more outward-looking, flexible, and market oriented. The Bank-Fund adjustment programs were intended primarily to overcome a variety of macroeconomic distortions as well as a set of deep-rooted structural problems in the economy. After more than a decade of intensive adjustment reforms, still no consensus can be found about the effects they have had on Pakistan's economy. Though there are a number of studies on this question, they suffer from methodological weaknesses and they arrive at conflicting conclusions. This thesis has attempted to redress some of these deficiencies in the existing literature and thereby contribute to a more adequate assessment of structural adjustment reforms in Pakistan.

8.1 Methodological issues

(a) Limitations of the existing literature

Our initial concern was to survey the work that had already been done on the impact of structural adjustment policies in Pakistan. This review led us to a broad conclusion that the existing literature has been conducted using very simple methodologies such as 'with-without' and 'before-after,' that is, an approach that compares macroeconomic performance indicators during the program period with the period prior to the implementation of the program. The problem with this approach is that it ignores all the other variables that might have affected the observed outcomes. Consequently, studies based on those methodologies do not provide

a satisfactory answer to the question of whether adjustment reforms have or have not improved the economic performance of Pakistan's economy. It is suggested here that what is required instead is a methodology that is based on a macroeconomic model of the economy, which can be used to conduct simulation experiments. The existing macroeconomic models for Pakistan developed by Naqvi et al. (1982, 1983, 1986, 1991, 1993) provide a starting point for such analysis but they have also certain limitations. For example, the real exchange rate, which is one of the important adjustment policy variables of our concern, is not included in the import and export functions. These models do not specify behavioral function for private savings and thereby ignore the impact of the domestic real interest rate as another key adjustment policy tenet. These macroeconomic models completely ignore the modeling of the flow-of-fund variables. Furthermore, these models treat government consumption as an endogenous variable, while this thesis treated it as an exogenous policy variable (in particular the component of government subsidy as one of the Bank-Fund main tenets). In view of these limitations, we decided that rather than use the existing macroeconomic models it would be better to make a fresh start for the quantitative assessment of structural adjustment reforms in Pakistan. The model we chose for this purpose is based on the emerging literature on three-gap analysis, reviewed in Chapter 3. The three-gap framework incorporates all the main macroeconomic balances of an open economy and has already been applied in the assessment of structural adjustment policies in a number of developing countries. The existing three-gap models developed by Bacha (1990), Taylor (1990b), and Solimano (1990) have certain limitations (from our perspective): (i) their analysis is based on a number of restrictive assumptions (for example, Bacha assumed no foreign capital inflows to the private sector, no market for government bonds, no private capital flight, and no change in official foreign exchange reserves; Taylor's model assumed zero change in official foreign exchange reserves; and Solimano ignored the role of private capital flight). (ii) Taylor and Solimano focused on potential output, which is not easily estimated in any satisfactory way. (iii) They all have used a common GDP price deflator for the normalization of all the macroeconomic variables. Finally, (iv) all the models ignore a number of certain important economic elements, such as the role of exchange rate policy (except Solimano), the role of monetary policy, interest rate policy, and the modelling of flow-of-funds. However, in an important respect the model we have employed goes beyond the existing three-gap models. For, whereas these models are cast in terms of traditional national income accounting identities, our approach is based on a social accounting (SAM) framework. The main advantage of the SAM-based three-gap model from our point of view

is that it explicitly incorporates all the main macroeconomic balances of Pakistan's economy. Moreover, the key adjustment policy variables and external shocks of our interest are incorporated in the three-gap model developed for Pakistan. We believe that the SAM-based three-gap framework developed in this study has taken us a long way towards a systematic evaluation of Bank-Fund adjustment programs in Pakistan and that it has yielded more substantial results than have previous studies based on other methodologies.

(b) Derivation of the SAM-based three-gap framework

In order to derive a SAM-based three-gap model for Pakistan's economy, we proceeded in a number of stages. Chapter 2 began with an analytical framework of two- and three-gaps in an open economy. We attempted to present a precise picture of the two- and three-gaps and their balances through the flow-of-funds in a social accounting framework. The classification of various accounts in a SAM is divided into two main parts, namely, 'All Other Accounts' and 'Flow-of-Funds.' The 'All Other Accounts' describes the private sector saving-investment gap, the public sector fiscal gap, and the current account balance of the balance of payments of an economy. The financial transfers between various sectors have been traced through the flow-of-funds part of the matrix. The flow-of-funds account shows how the savings of a sector are allocated to investment in that sector and the surplus is transferred to the other sectors that are in deficit. Chapter 4 used the analytical framework developed in Chapter 2 to construct a consistent set of time-series data for the period 1970-93 in the case of Pakistan. The SAM framework contributes significantly in this respect. Chapter 5 used the time-series data to describe the evolution of the three-gaps and the flow-of-funds in Pakistan over the two-sub periods: 1970-80 and 1981-93. This allowed us to compare the relevant magnitudes for the decade prior to structural adjustment reforms with the subsequent period during which policy reforms were progressively adopted. The data show that the public sector budget deficit and the current account deficit of the balance of payments improved more during the adjustment period than in the pre-adjustment period. Moreover, private savings, investment and capital surplus showed a substantial increase during 1981-93 as compared to the period 1970-80. The composition of the flow-of-funds shows that the average share of currency circulation in GDP remained the same, the growth of government bonds increased, the net foreign capital inflows to the private sector (other than private foreign direct investment) decreased, external debt service payments rose, and the net foreign capital inflows to the public sector and private net direct foreign investment substantially increased during the adjustment period as compared to the pre-adjustment period. This

chapter also indicated the changes in adjustment policy and external shock variables during the period under consideration. Regarding selected adjustment policy variables, the data revealed a drastic devaluation of the domestic currency, a rising trend in domestic real interest rates, a substantial reduction in government subsidies, an increase in adjustment lending, and an upward trend in public sector domestic borrowing during the adjustment period. These changes in policy variables reflect, of course, the responsiveness of Pakistan's economy towards the implementation of the Bank-Fund adjustment programs. The chronology of four external shocks shows that much of the adjustment period was characterized by a slowdown of economic activities in the Gulf region, high foreign real interest rates, high oil prices, and an almost continuous deterioration of the terms of trade.

Chapter 6 attempted to describe the main elements of a three-gap model for Pakistan. The model is developed in various stages. First, a naïve three-gap model is developed and estimated using time-series data for the period 1970-93. The naïve model estimated the simple quantitative relationships between the target variables, namely, the level of real output, public investment, private investment, total investment, private consumption, and total consumption and macroeconomic policies (i.e. aggregate exports, foreign capital inflows to the public and private sectors, public current consumption, and public sector domestic borrowing). The implied results show that higher export earnings and foreign capital inflows have a positive impact on all the target variables. Conversely, rising public current consumption negatively affects public investment as well as total investment. Higher public sector domestic borrowing discourages private investment and raises the level of public investment in Pakistan. The second stage developed a more general three-gap model by specifying behavioral functions for the same variables that were treated as dependent variables in the naïve three-gap model. The specified functions include all the selected adjustment policy and external shock variables and are estimated using the time-series data under consideration. The third stage of the development of a more general three-gap model endogenized exports of goods and services, which were previously treated as an exogenous policy variable in the first and second stages of the model. The final stage of the development of the model then endogenized variables regarding the flow-of-funds part of the model, namely, foreign capital inflows to the public and private sectors, which were treated as exogenous policy variables in the previous estimation. Chapter 7 attempts to provide some reliable answers to the questions posed at the beginning of the thesis through a range of simulation experiments with the more general three-gap model for Pakistan. The simulation exercises have sought to provide a better understanding of the reaction of the model to

changes in structural adjustment policies and external shocks. In order to fully exploit the more general three-gap model, we have obtained the simulation results by changes in both each single variable and a group of related variables. The simulation experiments are conducted under eight different scenarios using all three steps of the more general three-gap model. The percentage changes in selected adjustment policy variables [i.e. a 10% increase in foreign capital inflows to the public sector (NF_g), a 10% increase in foreign capital inflows to the private sector (NF_p), a 10% reduction in domestic capital transfers to the public sector (NSS_p), a 5% reduction in public sector current expenditure (C_g), a 3% increase in the real domestic interest rate in the previous year (IRR_{dt-1}), and a 10% devaluation of the real exchange rate (RER)] and the size of external shocks [i.e. a 2% increase in the foreign real interest rate over the domestic real interest rate (IRD), a 10% increase in the foreign petroleum price index (PPI), a 2% contraction in total investment as a ratio to GDP in the Gulf countries (I_{me}/Y_{me}), and a 7.7% deterioration in the terms of trade (TOT) calculated as a 5% increase in the import price index and a 5% decrease in the export price index] chosen for computing their effects on target variables, while somewhat arbitrary, are based as far as possible on the policy changes that actually occurred. The following section will summarize the major findings of the more general three-gap model.

8.2 Synthesis of findings

This study addresses two specific sets of questions. The first main question that has occupied a number of researchers is whether the Bank-Fund adjustment programs have had any positive effects to date on macroeconomic performance (i.e. on exports, imports, savings, investment, consumption, and gross domestic product, which are the main objectives of Bank-Fund supported programs) in Pakistan. The second main question posed here is whether and to what extent external factors aggravated the adjustment process in Pakistan. The purpose of this study has accordingly been to provide systematic quantitative evidence of these fundamental questions, using 1970 to 1993 as the period of observation. Our major findings are summarized in Table 8.1. As regards the first set of questions, the statistical evidence from the regression and simulation results allow the following conclusions:

(i) A depreciation of the real exchange rate (RER) (one of the main elements in Bank-Fund adjustment programs) has a positive impact on exports of goods and a negative impact on imports of goods, and appears, as one would expect, to improve the overall current account

Table 8.1 A Summary of Results of Effects of Policy Variables and External Shocks on Selected Target Variables

	Policy variables							External shocks			
	NF_p	NF_g	NSS_p	C_g	IRR_{t-1}	RER_m	RER_x	IRD	PPI	Ime\Yme	TOT
Endogenous Variables					Regression results						
Exports of goods	-	-	-	-	-	-	+ve	-	-ve	-	-ve
Exports of services	-	-	-	-	-	-	-	-	-	-ve	-
Imports of goods	-	-	-	-ve	-	-ve	-	-	-	-	-ve
Imports of services	-	-	-	-	-	-	-	-ve	-	-	-
Public non-trade revenues	-	-	-	-	-	-	-	-	-	-	-
Public foreign trade revenues	-	-	-	-	-	-ve	-	-	-	-	-ve
Private savings	-	-	-	-	+ve	-	-	-	-	-	-
Target Variables					Implied results						
Gross domestic product	+ve	+ve	-	+ve	-	+ve	+ve	+ve	-ve	-ve	-ve
Private investment	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve	-ve	-ve	-ve
Public investment	+ve	+ve	-ve	+ve	-	+ve	+ve	+ve	-ve	-ve	-ve
Total investment	+ve	+ve	-	+ve	+ve	+ve	+ve	+ve	-ve	-ve	-ve
Private consumption	+ve	+ve	-	+ve	-ve	+ve	+ve	+ve	-ve	-ve	-ve
Total consumption	+ve	+ve	-	+ve	-ve	+ve	+ve	+ve	-ve	-ve	-ve

Note: +ve and -ve indicate positive effect and negative effect, respectively.

balance of the balance of payments of Pakistan's economy. The simulation experiments also show that a real depreciation of domestic currency has a positive impact on all the selected macroeconomic target variables. This finding supports such empirical evidence as is currently available, which demonstrates that real devaluation would, on balance, have an expansionary rather than a contractionary effect on economic performance.

(ii) An increase in the domestic real interest rate (IRR) emerges as an important instrument of monetary policy that tends to discourage private consumption and enhance private savings and investment in Pakistan. The simulated results show that a higher domestic real interest rate has significant impact on the behavior of all key macroeconomic variables. These results are consistent with the view that in a depressed financial system such as is found in Pakistan, an increase in the domestic real interest rate, through liberalizing the domestic financial market, would increase domestic savings. Thus, the real interest rate targeting appears to be an effective policy tool in achieving Bank-Fund objectives.

(iii) All the Bank-Fund suggested reform programs emphasize the need to reduce public current consumption (C_g), particularly through reducing subsidies. The effects of a contraction in government current spending appear to have a positive effect on all the selected target variables. As one can see from the regression and simulation results, there are two main channels through which the effects of a fiscal contraction appear in the system. The first channel provides a direct link between public current consumption and public investment. The second channel provides a negative impact of a reduction in public current spending on imports of goods.

(iv) The Bank-Fund packages also require a reduction in the role of the public sector in commercial and industrial activities in order to encourage the participation of the private sector in economic activities, which was badly discouraged because of the nationalization measures under the previous regime in Pakistan. Both the regression results and simulation experiments support the World Bank view that recycling of domestic credit (NSS_p) from the public sector to the private sector encourages local and foreign private investment activities in the economy and would enhance economic growth in the long-run.

(v) One of the main concerns of this study was to analyze whether Bank-Fund adjustment lending (NF_g) improves macroeconomic performance and eases the government's efforts to

implement the adjustment reforms. The empirical results indicate that additional adjustment lending is necessary to meet the financing requirements of adjustment reforms. Although the government of Pakistan can itself implement the adjustment reforms without the financial assistance from the World Bank and the IMF, the effects of these policies are much smaller than in the case with adjustment lending.

(vi) Finally, the results obtained from an aggregative analysis of all selected policies in a simulation experiment are supportive of adjustment reforms. These findings confirm the view held particularly by the World Bank and the IMF that Pakistan has adopted appropriate adjustment policies and has, on average, experienced higher macroeconomic performance as a result. This finding also follows McCleary (1991) who argued that Pakistan's macroeconomic performance has improved during the adjustment period. An important reason seems to be that since 1980, the government of Pakistan has remained highly compliant with the Bank-Fund adjustment policies. Mosley (1991a) estimated compliance indices for nineteen countries for the period 1980-86, which are indirectly derived from World Bank (1986). These indices are based on compliance with World Bank structural adjustment policy conditions and many of these conditions are related to medium-term supply-side policy variables (e.g. exchange rate devaluation, increases in agricultural prices, removal of subsidies, removal of import restrictions, and positive real interest rates). The average compliance indices reported in Table 8.2 are defined as follows: 0 shows no compliance, 1 shows low compliance, 2 shows moderate compliance, and 3 shows high compliance with Bank policy conditions. Through the regression analysis, Mosley found (as one might expect) in a cross-section analysis of nineteen countries that high compliance with Bank-guided adjustment reforms has a positive effect on gross domestic product and export performance. Table 8.2 shows that Pakistan is the second most compliant country (i.e. 2.6) among nineteen countries under analysis.

In a nutshell, the quantitative appraisal of adjustment policy reforms thus indicates three main conclusions from an economic policy perspective. First, Bank-Fund adjustment reforms have worked at least in part because of a comparatively high degree of compliance with those reforms. Second, the increased foreign support has eased the adjustment path in Pakistan. Third, foreign-assisted reforms have contributed to reducing the internal and external imbalances of Pakistan's economy.

Turning to the second set of questions raised, that is, whether external factors (i.e. the terms of trade deterioration, the higher foreign real interest rate, an increase in oil prices,

Table 8.2 Indices of Compliance with World Bank Policy Conditions
(average of 1980-86)

Country	Average compliance indices
Pakistan	**2.6**
Bolivia	0.7
Chile	0.9
Costa Rica	1.1
C.D'Ivoire	1.6
Ghana	1.7
Guyana	0.3
Jamaica	1.4
Kenya	1.3
Korea	2.6
Malawi	2.0
Niger	0.3
Panama	0.9
Philippines	1.7
Senegal	0.7
Thailand	1.0
Togo	1.6
Turkey	3.0
Yugoslavia	0.9

and slowdown activities in the Gulf region) aggravated the adjustment process in Pakistan, the following conclusions can be drawn.

(i) The empirical results show that a deterioration in the terms of trade (TOT) tends to produce contractionary effects on all the selected target variables. The main channel through which a deterioration in the terms of trade works in the model is through worsening the current account balance of the balance of payments of Pakistan's economy.

(ii) An increase in the foreign real interest rate (IRD) as an external shock variable shows, contrary to a general view, a positive impact on all the selected target variables. The main channel through which the foreign real interest rate affects the target variables is through its negative effect on imports of services and foreign capital inflows to the private sector and positive impact on the flows of foreign capital into the public sector in Pakistan.

(iii) The petroleum price index (PPI), taken as another external shock factor, shows a

uniformly contractionary effect on all the selected macroeconomic variables in the system. As one can see, the main route through which an increase in the petroleum price affects adversely all the target variables is through its negative effect on exports of goods from Pakistan.

(iv) The final key external shock variable analyzed in the three-gap model is declining economic activities in the Gulf region (Ime/Yme). This external shock shows a strong negative impact on the target variables through its adverse influence on workers' remittances from the Gulf region, which have been a significant component of Pakistan's balance of payments during the late 1970s and mid 1980s.

(v) Finally, the combined effect of all the four external factors undertaken in the simulation analysis indicates that, on average, external shocks have a negative impact on all the target variables and have hence affected adversely the internal and external balances and consequently lowered economic growth. This finding follows Killick and Malik (1992), who argue that the intrusion of unforeseen external shocks is one of the main reasons for the failure of adjustment programs in developing countries.

The central finding of the monograph, therefore, is that in broad terms, Bank-Fund adjustment programs resulted in a substantial improvement in the macroeconomic performance of Pakistan's economy. In particular, using a set of simulated policy changes, we found that the combined impact of the changes led to an increase in income of between 8 and 11 percent and in investment of between 18 and 26 percent. Furthermore, the adverse effects associated with external shocks appeared to have been severe during the adjustment process in Pakistan. In this case, our simulations suggested that the combined effects of the shocks led to a reduction of 2 to 3 percent in the level of income and 1 to 4 percent in the level of investment.

8.3   Extension of work

Although our analysis has captured some of the main policy variables involved in structural adjustment reforms, it has by no means captured all of them. There is thus a need to explore the potential influence of other variables in future research on this topic. In particular, we have not estimated the level of potential output in Pakistan and this analysis has proceeded

on the assumption that there has been no binding capacity constraint since 1970. This assumption can, of course, be relaxed in further research and should be. Similarly, it would be a useful development to analyse separately the various components of foreign capital flows into the public sector (i.e. tied and untied capital inflows, grants and loans, food and non-food aid, project and non-project aid) and into the private sector (i.e. direct foreign investment, capital flight, long-term loans), since this would be an important contribution to the formulation of more precise policies towards foreign capital inflows. Another area that deserves attention is the link between private and public investment. This potential relationship [the crowding out(in) effect] was neglected in our analysis where both forms of investment have been taken as target variables.

Another important area of further research is to analyze the social impact of adjustment reforms -- particularly on employment, poverty, and income distribution -- using an appropriate quantitative framework. It is crucial to assess whether the positive impact on output and investment which the study has established conflicts with possibly negative effects on employment, poverty, and income distribution in Pakistan. Finally, we also suggest, as Summer and Pritchett (1993) indicate, that the relationship between the environment and adjustment is a new area of research. They describe that the issue of environment in the structure of economic policies will be an important point on the agenda for the World Bank in the 1990s. Meanwhile, for the present, this thesis is submitted as a basis upon which such potential developments might build.

Appendix I: Data Matrix for Pakistan

A data matrix for Pakistan, 1969-70   (Rs. million)

	Capital Account of Institutions Private	Capital Account of Institutions Public	ROW	All Other Accounts	Σ
Capital Accounts Private	*	0	109+263=372	6720	7092
Public	557+298+373=1228	*	2343	735+3497+1700 +2623=8555	12126
ROW	-28	10+500=510	*	1655+329+3015 +344+513=5856	6338
All Other Accounts	5892	2749+1081+ 338 + 232+413+ 765 +2593+3445=11616 =8274+3342	532+702+1909 + 451+ 29=3623	*	21131
Σ	7092	12126	6338	21131	*

A data matrix for Pakistan, 1969-70   (% of GDP)

	Capital Account of Institutions Private	Capital Account of Institutions Public	ROW	All Other Accounts	Σ
Capital Accounts Private	*	0	0.20+0.49=0.69	12.46	13.15
Public	1.03+0.55+0.69=2.28	*	4.34	1.36+ 6.48+3.15 +4.86=15.86	22.49
ROW	-0.05	0.02+0.93=0.95	*	3.07+0.61+ 5.59 +0.64+0.95=10.86	11.75
All Other Accounts	10.93	5.10+2.00+ 0.63 +0.43+0.77+ 1.42 +4.81+6.39=21.54 =15.34+6.20	0.99+1.30+ 3.54 +0.84+0.05= 6.72	*	39.18
Σ	13.15	22.49	11.75	39.18	*

A data matrix for Pakistan, 1970-71   (Rs. million)

	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Capital Accounts Private	*	4188	5+437=442	4947	9577
Public	150+3319+0=3469	*	2927	677+3449+1700 +2518=8344	14740
ROW	24	-293+481=188	*	1885+385+3380 +436+628=6714	6926
All Other Accounts	6084	3200+1018+ 386 + 193+ 477+ 808 +1797+2485=10364 =6850+3514	650+876+1727 +285+ 19=3557	*	20005
Σ	9577	14740	6926	20005	*

A data matrix for Pakistan, 1970-71   (% of GDP)

	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Capital Accounts Private	*	7.33	0.01+0.76=0.77	8.66	16.76
Public	0.26+5.81+0.00=6.07	*	5.12	1.18+ 6.04+2.98 +4.41=14.60	25.80
ROW	0.04	-0.51+0.84=0.33	*	3.30+0.67+ 5.92 +0.76+1.10=11.75	12.12
All Other Accounts	10.65	5.60+1.78+ 0.68 +0.34+0.83+ 1.41 +3.14+4.35=18.14 =11.99+6.15	1.14+1.53+ 3.02 +0.50+0.03= 6.23	*	35.01
Σ	16.76	25.80	12.12	35.01	*

A data matrix for Pakistan, 1971-72   (Rs. million)

	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Capital Accounts					
Private	*	0	151+460=611	7018	7629
Public	1517+313+37=1867	*	3679	1219+3046+1343 +2203=7811	13357
ROW	−345	174+616=790	*	1482+ 795+ 5937 + 537+1278=10029	10474
All Other Accounts	6107	3726+ 1248+ 443 + 228+ 397+ 814 +3718+1993=12567 =9300+3267	1510+947+2920 + 759+ 48=6184	*	24858
Σ	7629	13357	10474	24858	*

A data matrix for Pakistan, 1971-72   (% of GDP)

	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Capital Accounts					
Private	*	0.00	0.25+0.75=1.00	11.46	12.46
Public	2.48+0.51+0.06=3.05	*	6.01	1.99+ 4.98+2.19 +3.60=12.76	21.82
ROW	−0.56	0.28+1.01=1.29	*	2.42+1.30+ 9.70 +0.88+2.09=16.38	17.11
All Other Accounts	9.98	6.09+2.04+ 0.72 +0.37+0.65+ 1.33 +6.07+3.26=20.53 =15.19+5.34	2.47+1.55+ 4.77 +1.24+0.08=10.10	*	40.60
Σ	12.46	21.82	17.11	40.60	*

A data matrix for Pakistan, 1972-73   (Rs. million)

	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Capital Accounts					
Private	*	0	-3+131=128	12624	12752
Public	641-177+5869=6333	*	3304	1143+3517+2612 +2668=9940	19577
ROW	-79	1593+616=2209	*	2499+2485+ 3919 + 841+ 666=10410	12540
All Other Accounts	6498	4440+ 781+ 859 + 522+ 583+ 880 +5091+4212=17368 =13448+3920	3366+2602+1691 +1359+ 90=9108	*	32974
Σ	12752	19577	12540	32974	*

A data matrix for Pakistan, 1972-73   (% of GDP)

	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Capital Accounts					
Private	*	0.00	-0.01+0.18=0.17	16.93	17.10
Public	0.86-0.24+7.87=8.49	*	4.43	1.53+ 4.72+3.50 +3.58=13.33	26.25
ROW	-0.11	2.14+0.83=2.96	*	3.35+3.33+ 5.25 +1.13+0.89=13.96	16.81
All Other Accounts	8.71	5.95+1.05+ 1.15 +0.70+0.78+ 1.18 +6.83+5.65=23.29 =18.03+5.26	4.51+3.49+ 2.27 +1.82+0.12=12.21	*	44.21
Σ	17.10	26.25	16.81	44.21	*

A data matrix for Pakistan, 1973-74

(Rs. million)

Capital Accounts	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Private	*	0	-62+631=569	9163	9732
Public	2046+304+684=3034	*	4115	1174+ 4442+4169 +4589=14374	21523
ROW	48	-1462+665=-797	*	3975+3214+ 7596 + 713+1518=17016	16267
All Other Accounts	6650	4949+1488+ 782 +2243+ 760+ 1230 +4678+6190=22320 =15546+6774	4007+3860+ 2228 +1376+ 112=11583	*	40553
Σ	9732	21523	16267	40553	*

A data matrix for Pakistan, 1973-74

(% of GDP)

Capital Accounts	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Private	*	0.00	-0.06+0.66=0.59	9.57	10.17
Public	2.14+0.32+0.71=3.17	*	4.30	1.23+ 4.64+4.35 +4.79=15.01	22.48
ROW	0.05	-1.53+0.69=-0.83	*	4.15+3.36+ 7.93 +0.74+1.59=17.77	16.99
All Other Accounts	6.95	5.17+1.55+ 0.82 +2.34+0.79+ 1.28 +4.89+6.47=23.31 =16.24+7.07	4.19+4.03+ 2.33 +1.44+0.12=12.10	*	42.36
Σ	10.17	22.48	16.99	42.36	*

A data matrix for Pakistan, 1974-75   (Rs. million)

Capital Accounts	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Private	*	1564	148+802=950	8609	11123
Public	966+867+0=1833	*	9732	1372+ 5708+4918 +5763=17761	29326
ROW	-158	-1376+653=-723	*	6152+4714+10062 +1614+ 970=23512	22631
All Other Accounts	9448	6914+ 1729+ 1030 +2819+ 962+ 1709 +2545+10777= 28485 =17475+11010	4932+4047+ 703 +2089+ 178=11949	*	49882
Σ	11123	29326	22631	49882	*

A data matrix for Pakistan, 1974-75   (% of GDP)

Capital Accounts	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Private	*	1.31	0.12+0.67=0.80	7.23	9.34
Public	0.81+0.73+0.00=1.54	*	8.17	1.15+ 4.79+4.13 +4.84=14.92	24.63
ROW	-0.13	-1.16+0.55=-0.61	*	5.17+3.96+ 8.45 +1.36+0.81=19.75	19.01
All Other Accounts	7.94	5.81+1.45+ 0.87 +2.37+0.81+ 1.44 +2.14+9.05=23.92 =14.68+9.24	4.14+3.40+ 0.59 +1.75+0.15=10.04	*	41.90
Σ	9.34	24.63	19.01	41.90	*

A data matrix for Pakistan, 1975-76 (Rs. million)

	Capital Account of Institutions				
	Private	Public	ROW	All Other Accounts	Σ
Capital Accounts					
Private	*	0	228+1158=1386	14383	15769
Public	2330+319+2882=5531	*	8376	2520+7860+5164 +3720=19264	33171
ROW	-466	-198+1040=842	*	7158+4337+ 9681 +1772+1436=24384	24760
All Other Accounts	10704	8103+ 1386+ 1069 +2981+ 1165+ 2096 +3163+12366=32329 =16042+16287	4902+4283+ 2319 +3356+ 138=14998	*	58031
Σ	15769	33171	24760	58031	*

A data matrix for Pakistan, 1975-76 (% of GDP)

	Capital Account of Institutions				
	Private	Public	ROW	All Other Accounts	Σ
Capital Accounts					
Private	*	0.00	0.16+0.84=1.00	10.41	11.41
Public	1.69+0.23+2.09=4.00	*	6.06	1.82+ 5.69+3.74 +2.69=13.94	24.00
ROW	-0.34	-0.14+0.75=0.61	*	5.18+3.14+ 7.00 +1.28+1.04=17.64	17.91
All Other Accounts	7.74	5.86+1.00+ 0.77 +2.16+0.84+ 1.52 +2.29+8.95=23.39 =11.61+11.78	3.55+3.10+ 1.68 +2.43+0.10=10.85	*	41.99
Σ	11.41	24.00	17.91	41.99	*

A data matrix for Pakistan, 1976-77 (Rs. million)

	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Capital Accounts					
Private	*	0	40+1029=1069	16338	17407
Public	2831+953+1220=5004	*	7029	2870+8750+6139+4151=21910	33943
ROW	-1089	-2495+1267=-1228	*	8750+3651+11538+1851+1673=27463	25146
All Other Accounts	13492	8120+1445+1346+2428+1438+2375+2981+15038=35171=16529+18642	4622+4783+1802+5722+119=17048	*	65711
Σ	17407	33943	25146	65711	*

A data matrix for Pakistan, 1976-77 (% of GDP)

	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Capital Accounts					
Private	*	0.00	0.03+0.65=0.68	10.38	11.06
Public	1.80+0.61+0.78=3.18	*	4.47	1.82+5.56+3.90+2.64=13.92	21.57
ROW	-0.69	-1.59+0.81=-0.78	*	5.56+2.32+7.33+1.18+1.06=17.45	15.98
All Other Accounts	8.57	5.16+0.92+0.86+1.54+0.91+1.51+1.89+9.55=22.35=10.50+11.85	2.94+3.04+1.14+3.64+0.08=10.83	*	41.75
Σ	11.06	21.57	15.98	41.75	*

A data matrix for Pakistan, 1977-78 (Rs. million)

	Private	Capital Account of Institutions Public	ROW	All Other Accounts	Σ
Capital Accounts Private	*	0	337+732=1069	23198	24267
Public	2787+468+6250=9505	*	8880	3082+10113+8390 +4897=26482	44867
ROW	0	3118+851=3969	*	9316+5555+12364 +1792+1792=30819	34788
All Other Accounts	14762	9674+ 1752+ 1604 +3290+ 1378+ 3087 +4760+15353=40898 =20647+20251	4634+6435+ 1633 +11444+ 693=24839	*	80499
Σ	24267	44867	34788	80499	*

A data matrix for Pakistan, 1977-78 (% of GDP)

	Private	Capital Account of Institutions Public	ROW	All Other Accounts	Σ
Capital Accounts Private	*	0.00	0.18+0.40=0.58	12.65	13.23
Public	1.52+0.26+3.41=5.18	*	4.84	1.68+ 5.51+4.57 +2.67=14.44	24.46
ROW	0.00	1.70+0.46=2.16	*	5.08+3.03+ 6.74 +0.98+0.98=16.80	18.97
All Other Accounts	8.05	5.27+0.96+ 0.87 +1.79+0.75+ 1.68 +2.60+8.37=22.30 =11.26+11.04	2.53+3.51+ 0.89 +6.24+0.38=13.54	*	43.89
Σ	13.23	24.46	18.97	43.89	*

A data matrix for Pakistan, 1978-79　　　　　　　　(Rs. million)

| | Capital Account of Institutions | | ROW | All Other Accounts | Σ |
	Private	Public			
Capital Accounts					
Private	*	0	327+891=1218	24004	25222
Public	5532+1029+2165=8726	*	9524	3699+11271+10123 +5611=30704	48954
ROW	-247	-1832+1792=-40	*	10970+7842+18966 + 2030+2307=42115	41828
All Other Accounts	16743	10302+ 1966+ 2010 + 6030+ 1729+ 3317 + 5146+18494= 48994 =27138+21856	5475+7963+ 2838 +13840+ 970=31086	*	96823
Σ	25222	48954	41823	96828	*

A data matrix for Pakistan, 1978-79　　　　　　　　(% of GDP)

| | Capital Account of Institutions | | ROW | All Other Accounts | Σ |
	Private	Public			
Capital Accounts					
Private	*	0.00	0.16+0.44=0.60	11.91	12.52
Public	2.75+0.51+1.07=4.33	*	4.73	1.84+ 5.59+5.02 +2.78=15.24	24.30
ROW	-0.12	-0.91+0.89=-0.02	*	5.44+3.89+ 9.41 +1.01+1.15=20.90	20.76
All Other Accounts	8.31	5.11+0.98+ 1.00 +2.99+0.86+ 1.65 +2.55+9.18=24.32 =13.47+10.85	2.72+3.95+ 1.41 +6.87+0.48=15.43	*	48.05
Σ	12.52	24.30	20.76	48.05	*

A data matrix for Pakistan, 1979-80   (Rs. million)

Capital Accounts	Private	Capital Account of Institutions Public	ROW	All Other Accounts	Σ
Private	*	0	673+703=1376	24716	26092
Public	3982+415+852=5249	*	16661	5504+12572+14431 +7459=39966	61876
ROW	-496	4485+2762=7247	*	16679+7500+23905 + 2356+2783=53223	59974
All Other Accounts	21339	12655+ 2695+ 2375 + 7024+ 3011+ 3979 + 3808+19082=54629 =28209+26420	9838+10053+ 3285 +17266+ 1495=41937	*	117905
Σ	26092	61876	59974	117905	*

A data matrix for Pakistan, 1979-80   (% of GDP)

Capital Accounts	Private	Capital Account of Institutions Public	ROW	All Other Accounts	Σ
Private	*	0.00	0.28+0.29=0.58	10.33	10.90
Public	1.66+0.17+0.36=2.19	*	6.96	2.30+ 5.25+6.03 +3.12=16.70	25.86
ROW	-0.21	1.87+1.15=3.03	*	6.97+3.13+ 9.99 +0.98+1.16=22.24	25.06
All Other Accounts	8.92	5.29+1.13+ 0.99 +2.94+1.26+ 1.66 +1.59+7.97=22.83 =11.79+11.04	4.11+4.20+ 1.37 +7.22+0.62=17.53	*	49.27
Σ	10.90	25.86	25.06	49.27	*

A data matrix for Pakistan, 1980-81   (Rs. million)

	Private	Capital Account of Institutions Public	ROW	All Other Accounts	Σ
Capital Accounts **Private**	*	1227	703+1356=2059	30459	33745
Public	7101+794+0=7895	*	11069	7503+17067+14276 +10175= 49021	67985
ROW	-258	446+2673=3119	*	14882+7775+32417 +2515+2583=60172	63033
All Other Accounts	26108	15300+ 3629+ 2280 +5378+ 2783+ 4904 +6044+23321= 63639 =37541+26098	12824+13136+ 1750 +20948+ 1247=49905	*	139652
Σ	33745	67985	63033	139652	*

A data matrix for Pakistan, 1980-81   (% of GDP)

	Private	Capital Account of Institutions Public	ROW	All Other Accounts	Σ
Capital Accounts **Private**	*	0.44	0.25+0.49=0.74	10.95	12.13
Public	2.55+0.29+0.00=2.84	*	3.98	2.70+ 6.13+5.13 +3.66=17.62	24.44
ROW	-0.09	0.16+0.96=1.12	*	5.35+2.79+11.65 +0.90+0.93=21.63	22.66
All Other Accounts	9.38	5.50+1.30+ 0.82 +1.93+1.00+ 1.76 +2.17+8.38=22.88 =13.50+9.38	4.61+4.72+ 0.63 +7.53+0.45 =17.94	*	50.20
Σ	12.13	24.44	22.66	50.20	*

A data matrix for Pakistan, 1981-82 (Rs. million)

	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Capital Accounts Private	*	1993	1446+2429=3875	30185	36053
Public	2900+2225+0=5125	*	10321	8882+ 19047+15074 +10836= 53839	69285
ROW	-261	-6873+3152=-3721	*	17504+8407+42452 + 2086+3792=74241	70259
All Other Accounts	31189	18631+ 4891+ 2770 + 4333+ 3438+ 5360 + 6947+24643=71013 =39755+31258	9112+13651+ 4717 +26366+ 2217=56063	*	158265
Σ	36053	69285	70259	158265	*

A data matrix for Pakistan, 1981-82 (% of GDP)

	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Capital Accounts Private	*	0.61	0.45+0.75=1.20	9.31	11.12
Public	0.89+0.69+0.00=1.58	*	3.18	2.74+ 5.88+4.65 +3.34=16.61	21.37
ROW	-0.08	-2.12+0.97=-1.15	*	5.40+2.59+13.10 +0.64+1.17=22.90	21.67
All Other Accounts	9.62	5.75+1.51+ 0.85 +1.34+1.06+ 1.65 +2.14+7.60=21.91 =12.26+9.65	2.81+4.21+ 1.46 +8.13+0.68=17.29	*	48.82
Σ	11.12	21.37	21.67	48.82	*

A data matrix for Pakistan, 1982-83   (Rs. million)

	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Capital Accounts					
Private	*	0	341+4868=5209	52329	57538
Public	8117+5171+14674=27962	*	12044	9261+ 21258+18510 +12438= 61467	101473
ROW	-3883	9158+5194=14352	*	21135+9593+42954 + 2480+5510=81672	92141
All Other Accounts	33459	23224+ 6276+ 4374 + 4779+ 4162+ 7377 + 9526+27403=87121 =52118+35003	10326+19498+ 4642 +37864+ 2558=74888	*	195468
Σ	57538	101473	92141	195468	*

A data matrix for Pakistan, 1982-83   (% of GDP)

	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Capital Accounts					
Private	*	0.00	0.09+1.34=1.43	14.36	15.79
Public	2.23+1.42+4.03=7.67	*	3.31	2.54+ 5.83+5.08 +3.41=16.87	27.85
ROW	-1.07	2.51+1.43=3.94	*	5.80+2.63+11.79 +0.68+1.51=22.41	25.29
All Other Accounts	9.18	6.37+1.72+ 1.20 +1.31+1.14+ 2.02 +2.61+7.52=23.91 =14.30+9.61	2.83+5.35+ 1.27 +10.39+0.70=20.55	*	53.64
Σ	15.79	27.85	25.29	53.64	*

A data matrix for Pakistan, 1983-84

(Rs. million)

	Capital Account of Institutions				
	Private	Public	ROW	All Other Accounts	Σ
Capital Accounts Private	*	0	604+1672=2276	50048	52324
Public	6272+5263+3244=14779	*	16171	9197+ 27632+21532 +16494= 74855	105805
ROW	-1363	-1208+7011=5803	*	24419+10746+49037 + 3864+ 6208=94274	98714
All Other Accounts	38908	26798+ 8443+ 5685 + 6134+ 5955+ 9815 +10581+26591=100002 =62208+37794	10789+21378+ 5332 +38455+ 4313=80267	*	219177
Σ	52324	105805	98714	219177	*

A data matrix for Pakistan, 1983-84

(% of GDP)

	Capital Account of Institutions				
	Private	Public	ROW	All Other Accounts	Σ
Capital Accounts Private	*	0.00	0.14+0.40=0.54	11.92	12.46
Public	1.49+1.25+0.77=3.52	*	3.85	2.19+ 6.58+5.13 +3.93=17.83	25.20
ROW	-0.32	-0.29+1.67=1.38	*	5.82+2.56+11.68 +0.92+1.48=22.46	23.51
All Other Accounts	9.27	6.38+2.01+ 1.35 +1.46+1.42+ 2.34 +2.52+6.33=23.82 =14.82+9.00	2.57+5.09+ 1.27 +9.16+1.03=19.12	*	52.21
Σ	12.46	25.20	23.51	52.21	*

A data matrix for Pakistan, 1984-85   (Rs. million)

	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Capital Accounts					
Private	*	0	1593+3281=4874	54455	59329
Public	4408+901+5932=11241	*	16488	9730+ 28117+23371 +18824=80042	107771
ROW	3648	-16201+7153=-9048	*	28968+14372+ 52383 + 4922+ 8061=108706	103306
All Other Accounts	44440	31886+10182+ 6356 + 6861+ 6560+ 10485 +12940+31549=116819 =74734+42085	10981+20334+ 7825 +38965+ 3839=81944	*	243203
Σ	59329	107771	103306	243203	*

A data matrix for Pakistan, 1984-85   (% of GDP)

	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Capital Accounts					
Private	*	0.00	0.34+0.69=1.03	11.53	12.57
Public	0.93+0.19+1.26=2.38	*	3.49	2.06+ 5.96+4.95 +3.99=16.95	22.83
ROW	0.77	-3.43+1.51=-1.92	*	6.14+3.04+11.09 +1.04+1.71=23.02	21.88
All Other Accounts	9.41	6.75+2.16+ 1.35 +1.45+1.39+ 2.22 +2.74+6.68=24.74 =15.83+8.91	2.33+4.31+ 1.66 +8.25+0.81=17.36	*	51.51
Σ	12.57	22.83	21.88	51.51	*

A data matrix for Pakistan, 1985-86 (Rs. million)

	Capital Account of Institutions				
	Private	Public	ROW	All Other Accounts	Σ
Capital Accounts					
Private	*	0	2797+2647=5444	70024	75468
Public	6829+20372+6035=33236 *		24209	10267+32813+29343 +20396=92819	150264
ROW	-6727	7226+8575=15801	*	33195+16432+50007 +6260+10656=116550	125624
All Other Accounts	48959	35606+12642+ 7092 + 8130+ 7379+ 12375 +13886+37353=134463 =86877+47586	17139+24561+ 7284 +43207+ 3780=95971	*	279393
Σ	75468	150264	125624	279393	*

A data matrix for Pakistan, 1985-86 (% of GDP)

	Capital Account of Institutions				
	Private	Public	ROW	All Other Accounts	Σ
Capital Accounts					
Private	*	0.00	0.54+0.51=1.06	13.61	14.67
Public	1.33+3.96+1.17=6.46	*	4.71	2.00+ 6.38+5.70 +3.96=18.04	29.20
ROW	-1.31	1.40+1.67=3.07	*	6.45+3.19+ 9.72 +1.22+2.07=22.65	24.42
All Other Accounts	9.52	6.92+2.46+ 1.38 +1.58+1.43+ 2.41 +2.70+7.26=26.13 =16.88+9.25	3.33+4.77+ 1.42 +8.40+0.73=18.65	*	54.30
Σ	14.67	29.20	24.42	54.30	*

A data matrix for Pakistan, 1986-87   (Rs. million)

Capital Accounts	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Private	*	0	2245+1618=3863	88048	91911
Public	11427+10844+17618=39889	*	23978	11105+ 38458+33364 +22765=105692	169559
ROW	-1827	4594+12563=17157	*	33841+16213+ 50727 + 4994+12093=117868	133198
All Other Accounts	53849	41335+15817+ 8346 + 6933+10399+ 15452 +19084+35036=152402 =96711+55691	16796+33345+ 10724 +39655+ 4837=105357	*	311608
Σ	91911	169559	133198	311608	*

A data matrix for Pakistan, 1986-87   (% of GDP)

Capital Accounts	Capital Account of Institutions		ROW	All Other Accounts	Σ
	Private	Public			
Private	*	0.00	0.39+0.28=0.67	15.38	16.05
Public	2.00+1.89+3.08=6.97	*	4.19	1.94+ 6.72+5.83 +3.98=18.46	29.62
ROW	-0.32	0.80+2.19=3.00	*	5.91+2.83+ 8.86 +0.87+2.11=20.59	23.27
All Other Accounts	9.41	7.22+2.76+ 1.46 +1.21+1.82+ 2.70 +3.33+6.12=26.62 =16.89+9.73	2.93+5.82+ 1.87 +6.93+0.84=18.40	*	54.43
Σ	16.05	29.62	23.27	54.43	*

A data matrix for Pakistan, 1987-88 (Rs. million)

| | Capital Account of Institutions | | ROW | All Other Accounts | Σ |
	Private	Public			
Capital Accounts					
Private	*	0	2790+2952=5742	89456	95198
Public	13082+15363+4242=32687	*	35208	12441+43014+38001+29354=122810	190705
ROW	342	-2520+12852=10332	*	40350+16027+68165+ 9954+14904=149400	160074
All Other Accounts	62169	47015+22549+ 9766 +10130+ 8542+ 17325 +20498+44548=180373 =120876+59497	22163+41012+ 15341 +36234+ 4374=119124	*	361666
Σ	95198	190705	160074	361666	*

A data matrix for Pakistan, 1987-88 (% of GDP)

| | Capital Account of Institutions | | ROW | All Other Accounts | Σ |
	Private	Public			
Capital Accounts					
Private	*	0.00	0.41+0.44=0.85	13.25	14.10
Public	1.94+2.27+0.63=4.84	*	5.21	1.84+ 6.37+5.63 +4.35=18.18	28.24
ROW	0.05	-0.37+1.90=1.53	*	5.97+2.37+10.09 +1.47+2.21=22.12	23.70
All Other Accounts	9.20	6.96+3.34+ 1.45 +1.50+1.26+ 2.57 +3.03+6.60=26.71 =17.90+8.81	3.28+6.07+ 2.27 +5.36+0.65=17.64	*	53.55
Σ	14.10	28.24	23.70	53.55	*

A data matrix for Pakistan, 1988-89   (Rs. million)

| | Capital Account of Institutions | | ROW | All Other Accounts | Σ |
	Private	Public			
Capital Accounts					
Private	*	1033	3636+3779=7415	93716	102164
Public	9723+14339+0=24062	*	48577	14586+ 53390+42362 +33959=144297	216936
ROW	1540	226+14501=14727	*	49498+23359+75175 +12036+17973=178041	194308
All Other Accounts	76562	51053+28093+ 11039 +15700+10192+ 19304 +20108+45687=201176 =132168+69008	29563+43679+ 21940 +38964+ 4170=138316	*	416054
Σ	102164	216936	194308	416054	*

A data matrix for Pakistan, 1988-89   (% of GDP)

| | Capital Account of Institutions | | ROW | All Other Accounts | Σ |
	Private	Public			
Capital Accounts					
Private	*	0.13	0.47+0.49=0.96	12.17	13.27
Public	1.26+1.86+0.00=3.13	*	6.31	1.89+ 6.94+5.50 +4.41=18.75	28.18
ROW	0.20	0.03+1.88=1.91	*	6.43+3.03+ 9.77 +1.56+2.33=23.13	25.24
All Other Accounts	9.95	6.63+3.65+ 1.43 +2.04+1.32+ 2.51 +2.61+5.94=26.14 =17.17+8.97	3.84+5.67+ 2.85 +5.06+0.54=17.97	*	54.05
Σ	13.27	28.18	25.24	54.05	*

A data matrix for Pakistan, 1989-90 (Rs. million)

Capital Accounts	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Private	*	14108	4342+3930=8272	105569	127949
Public	17559+20847+0=38406	*	56381	15741+ 53029+50665 +46150=165585	260372
ROW	-1020	8185+16434=24619	*	48420+28432+ 84041 +14112+20971=195976	219575
All Other Accounts	90563	58708+35947+ 12558 +10214+11927+ 20243 +17168+54880=221645 =150132+71513	21641+59661+ 25641 +42161+ 5818=154922	*	467130
Σ	127949	260372	219575	467130	*

A data matrix for Pakistan, 1989-90 (% of GDP)

Capital Accounts	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Private	*	1.65	0.51+0.46=0.97	12.33	14.95
Public	2.05+2.44+0.00=4.49	*	6.59	1.84+ 6.20+5.92 +5.39=19.35	30.42
ROW	-0.12	0.96+1.92=2.88	*	5.66+3.32+ 9.82 +1.65+2.45=22.90	25.65
All Other Accounts	10.58	6.86+4.20+ 1.47 +1.19+1.39+ 2.36 +2.01+6.41=25.89 =17.54+8.35	2.53+6.97+ 3.00 +4.93+0.68=18.10	*	54.57
Σ	14.95	30.42	25.65	54.57	*

A data matrix for Pakistan, 1990-91   (Rs. million)

	Private	Capital Account of Institutions		All Other Accounts	Σ
		Public	ROW		
Capital Accounts					
Private	*	8855	6045+4451=10496	144550	163901
Public	21900+34951+0=56851	*	60023	20762+ 58350+50528 +42137=171777	288651
ROW	24	143+18683=18826	*	56303+26900+116360 +14994+27608=242165	261015
All Other Accounts	107026	64623+35710+14307 +11525+13494+28129 +29275+63907=260970 =174550+86420	25820+78663+ 35985 +43982+ 6046=190496	*	558492
Σ	163901	288651	261015	558492	*

A data matrix for Pakistan, 1990-91   (% of GDP)

	Private	Capital Account of Institutions		All Other Accounts	Σ
		Public	ROW		
Capital Accounts					
Private	*	0.87	0.59+0.44=1.03	14.16	16.06
Public	2.15+3.42+0.00=5.57	*	5.88	2.03+ 5.72+4.95 +4.13=16.83	28.28
ROW	0.00	0.01+1.83=1.84	*	5.52+2.64+11.40 +1.47+2.71=23.73	25.57
All Other Accounts	10.49	6.33+3.50+ 1.40 +1.13+1.32+ 2.76 +2.87+6.26=25.57 =17.10+8.47	2.53+7.71+ 3.53 +4.31+0.59=18.67	*	54.72
Σ	16.06	28.28	25.57	54.72	*

A data matrix for Pakistan, 1991-92 (Rs. million)

| | Capital Account of Institutions | | ROW | All Other Accounts | Σ |
	Private	Public			
Capital Accounts					
Private	*	0	14095+11186=25281	193780	219061
Public	14852+20626+34117=69595	*	43539	29807+ 61821+72680 +67205=231513	344647
ROW	11888	3260+19913=23173	*	96453+29478+ 99740 +24027+31751=281449	316510
All Other Accounts	137578	75751+50307+ 17168 +10653+17930+ 45440 +14095+90130=321474 =214992+106482	32645+102352+ 34594 +36817+ 41282=247690	*	706742
Σ	219061	344647	316510	706742	*

A data matrix for Pakistan, 1991-92 (% of GDP)

| | Capital Account of Institutions | | ROW | All Other Accounts | Σ |
	Private	Public			
Capital Accounts					
Private	*	0.00	1.16+0.92=2.09	16.00	18.08
Public	1.23+1.70+2.82=5.75	*	3.59	2.46+ 5.10+6.00 +5.55=19.11	28.45
ROW	0.98	0.27+1.64=1.19	*	7.96+2.43+8.23 +1.98+2.62=23.23	26.13
All Other Accounts	11.36	6.25+4.15+ 1.42 +0.88+1.48+ 3.75 +1.16+7.44=26.54 =17.75+8.79	2.69+8.45+ 2.86 +3.04+3.41=20.45	*	58.34
Σ	18.08	28.45	26.13	58.34	*

A data matrix for Pakistan, 1992-93   (Rs. million)

Capital Accounts	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Private	*	0	12565+22600=35165	160087	195252
Public	15045+20733+2200=37978	*	85848	37839+78837+63225 +64061=243962	367788
ROW	1406	-16557+32495=15938	*	108993+36056+137428 +35137+42109=359723	377067
All Other Accounts	155868	87753+63081+ 20369 + 8215+20507+ 55085 +11177+85663=351850 =229974+121876	26133+114388+ 50121 +43908+ 21504=256054	*	763772
Σ	195252	367788	377067	763772	*

A data matrix for Pakistan, 1992-93   (% of GDP)

Capital Accounts	Capital Account of Institutions			All Other Accounts	Σ
	Private	Public	ROW		
Private	*	0.00	0.94+1.68=2.62	11.93	14.55
Public	1.12+1.54+0.16=2.83	*	6.40	2.82+ 5.87+4.71 +4.77=18.18	27.41
ROW	0.10	-1.23+2.42=1.19	*	8.12+2.69+10.24 +2.62+3.14=26.81	28.10
All Other Accounts	11.61	6.54+4.70+1.52 +0.61+1.53+ 4.10 +0.83+6.38=26.22 =17.14+9.08	1.95+8.52+ 3.73 +3.27+1.60=19.08	*	56.91
Σ	14.55	27.41	28.10	56.91	*

Appendix II: Summary of Structural Adjustment Policies Suggested for Pakistan during 1980 - 1987

Key Objectives	Policy Actions
Domestic resource mobilization	Reform taxation system through (i) the introduction of a broad-based sales tax; (ii) greater reliance on user charges; (iii) **curtail open and implicit subsidies**; (iv) increase self-financing of investment by public enterprises; and (v) improve the preparation and execution of public investment programs.
Increased public investment	(i) **Increase public investment** in physical infrastructure (e.g. power, irrigation, highways) and social sectors (e.g. education, health); and (ii) appropriate maintenance of existing assets.
Trade reforms	**Expand and diversify manufactured export base** and encourage efficient import substitution. The suggested measures are the following: (i) improve access of export manufacturers to imported inputs at international prices; (ii) provide adequate compensation to exporters for the use of relatively more expensive domestic inputs; (iii) improve the system of export financing; (iv) improve export insurance arrangements; and (v) **adopt proper exchange rate management** in order to improve the competitiveness of Pakistan's exports.
Reforms in agricultural sector	(i) Strengthen institutional arrangements and support services; (ii) keep agricultural pricing policies of major crops close to international parity levels; (iii) **reduce subsidies on agricultural inputs**; and (iv) introduce "core public investment program" to reduce the possibility of distortions in investment priorities.
Reforms in manufacturing sector	Rationalize industrial incentives through measures such as (i) reduce the level and dispersion of effective protection rates; (ii) eliminate sanctioning requirements for most private investment; and (iii) replace cost-plus pricing arrangements by more market-oriented approach.
Reforms in energy sector	(i) Modify the producer pricing formula for new natural gas in order to provide adequate incentives to attract private sector exploration and development; (ii) sustain increases in gas consumer prices; and (iii) rationalize the structure and level of electricity tariffs.

Source: World Bank (1985)

Appendix III: Summary of Structural Adjustment Policies Suggested for Pakistan During 1988 - 1993

Key Objectives	Policy Actions
I. Fiscal Policy	I. Fiscal Policy
Reduction of deficit	Reduce public sector deficit to about 5% of GDP by 1991 and sustain or further reduce it thereafter.
Rationalization of expenditure	**Curtail growth in current expenditures** through measures such as (i) reduce workforce; (ii) keep nominal wage increases below the inflation rate; and (iii) continue to reduce subsidies (e.g. on wheat, fertilizer).
Improvement in efficiency of public enterprises	**Accelerate disinvestment in public enterprises** and improve efficiency of entities remaining in public sphere through (i) increased autonomy, accountability, and better cost control/management practices; and (ii) restructuring of unprofitable public enterprises.
Improvement in annual development plan (ADP)	Keep ADP/GDP ratio at current levels by (i) prioritizing investment especially in major sectors; (ii) improving maintenance and rehabilitation; (iii) coordinating pace of investment with provision of recurrent expenditures to use the investments effectively; and (iv) encouraging private sector participation, where desirable and feasible.
Revenue sharing	Implement new Federal/Provincial revenue-sharing formula.
Resource mobilization	Tax reform measures: (i) institute expanded sales or value added tax; (ii) improve tax administration; (iii) broaden personal and company income tax base; (iv) institute agricultural land tax or other provincial-based taxes to improve provincial revenue base; (v) coordinate the rationalization of trade tariff structure; (vi) continue regular increases in public sector tariffs; and (vii) extend cost recovery to other services provided by the public sector.
Deficit financing	**Reduce growth in government borrowing** with reduced recourse to domestic bank and non-bank financing and external borrowing consistent with medium-term balance of payment viability.
II. Trade Policy Export promotion	II. Trade Policy Maintain fiscal and financial export promotion incentives and support freer access to imports.
Elimination of non-tariff barriers (NTBs)	Undertake initial import policy reforms aimed at eliminating NTBs and simplifying tariff structure: (i) replace existing bans with tariff protection; (ii) remove value limits on cash imports of machinery and millwork; (iii) replace all import restrictions by tariffs; (iv) reduce duty exemptions and concessions; (v) lower prohibitively high redundant tariffs with substitution of special excise taxes on luxury goods (maximum tariff would be in the range of 120%; (vi) raise minimum duty to at least 10%; and (vii) abolish import surcharge.
Rationalization of tariffs	Further trade liberalization measures: (i) lower all tariff rates gradually from maximum ceiling of 120% to 50-60% in three-year period; (ii) continue subsequently to narrow the tariff band; and (iii) complete phase out of duty exemptions/concessions.

Summary of Structural Adjustment Policies Suggested for Pakistan During 1988 - 1993 (continued)

Key Objectives	Policy Actions
III. Domestic Deregulation	III. Domestic Deregulation
Removal of restrictions on investment	(i) Remove import license limits on imported machinery on cash basis and abolish investment sanctioning requirement where imported raw material inputs exceed both 60% of total inputs and 20% of total assets; (ii) abolish remaining sanctioning requirements based on project size (now investment sanctioning is Rs. 500 million); (iii) limit further industries on the "Specified List" to those associated with national security, religious, special health, and safety concerns; and (iv) simplify bankruptcy, foreclosure, restructuring, and merger laws to deal with sick industries after appropriate study.
Continuation of price and market deregulation	Reduce formal and informal price controls on manufactured products (e.g. motor vehicles, drugs, pharmaceutical) and continue deregulation to major crops (e.g. cotton, rice, wheat), eventually limiting government intervention to preventing extreme price fluctuations and other market safeguards.
Location clearances	Move towards charging prices that reflect economic costs of providing infrastructure services (water, sewerage, gas, electricity) and provide resources for additional required investment.
IV. Financial Sector Reforms	IV. Financial Sector Reforms
Efficient and competitive banking system	(i) Improve efficiency, profitability and viability of nationalized commercial banks (NCBs); (ii) provide sufficient autonomy to bank management; (iii) improve portfolio flexibility in short-run by limiting expansion of mandatory credit programs and raising the interest rates on subsidized credit; (iv) establish effective legal and administrative framework for debt recovery and sanctions against willful defaults; and (v) increase competition through privatization/partial disinvestment of NCBs.
Market-oriented debt	(i) Rationalize the interest rate and maturity structure of saving schemes; (ii) initiate regular auction program for government securities; and (iii) gradually change mix of government borrowing using saving schemes for longer-term funds and marketable securities for meeting short-term requirements.
Market-oriented monetary and credit management	(i) Hold the ratio of mandatory to total allocation for private sector at the 1988 level; (ii) increase interest rates on subsidized credit programs to at least cover inflation; and (iii) develop efficient capital markets.
V. Complementary macroeconomic policies	V. Complementary macroeconomic policies (i) Continue conservative monetary policy to insure sufficient credit to the private sector; (ii) build-up in foreign exchange reserves without inflationary pressures; and (iii) continue active exchange rate policy to support balance of payment objectives.

Source: World Bank (1988, 1989)

Appendix IV: Ordinary Least Squares Estimates of Simple Behavioral Functions

Estimated Functions	R^2
Imports of goods $\qquad M_g = -4469.920 + 0.201Y$ $\qquad\qquad (2.27)!! \qquad (57.35)!$	0.99
Imports of services $\qquad M_{sr} = -4985.609 + 0.253M_g$ $\qquad\qquad (3.63)! \qquad (20.24)!$	0.95
Public non-trade revenues $\qquad T_{nt} = -3779.111 + 0.133Y$ $\qquad\qquad (3.59)! \qquad (71.28)!$	0.99
Public foreign trade tax revenues $\qquad T_t = 532.367 + 0.268M_g$ $\qquad\qquad (0.39) \qquad (21.34)!$	0.95
Private savings $\qquad S_p = -5092.104 + 0.171(Y-T)$ $\qquad\qquad (1.64)!!! \qquad (25.35)!$	0.97
Exports of goods $\qquad X_g = -11634.127 + 0.142Y$ $\qquad\qquad (4.77)! \qquad (32.83)!$	0.98
Exports of services $\qquad X_{sr} = 3133.830 + 0.057Y$ $\qquad\qquad (1.12) \qquad (11.46)!$	0.85
Net foreign capital inflows to the public sector $\qquad NF_g = -1063.911 + 0.413I_g$ $\qquad\qquad (0.37) \qquad (7.23)!$	0.69
Net foreign capital inflows to the private sector $\qquad NF_p = -864.794 + 0.146I_p$ $\qquad\qquad (0.78) \qquad (7.85)!$	0.73

Note: t-statistics are given in parentheses. !, !!, and !!! denote statistically significant at 1 percent, 5 percent, and 10 percent levels, respectively.

Appendix V: Overtime Trends of Simple Behavioral Functions

Figure 6.27

Imports of goods (1970-93)

Figure 6.28

Imports of services (1970-93)

Figure 6.29

Public non-trade revenues (1970-93)
(as a ratio to GDP)

Figure 6.30

Public foreign trade revenues (1970-93)
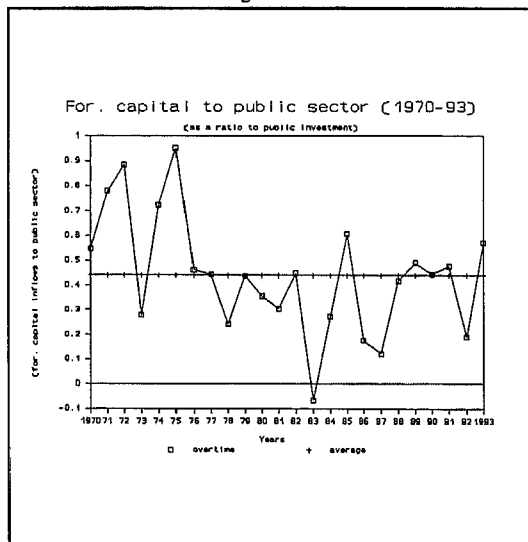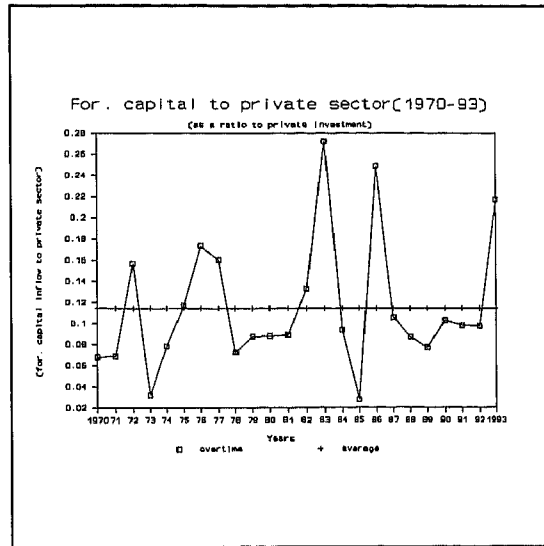(as a ratio imports of goods)
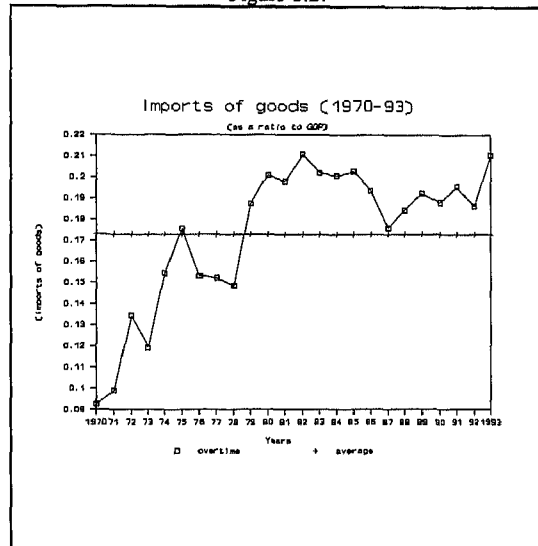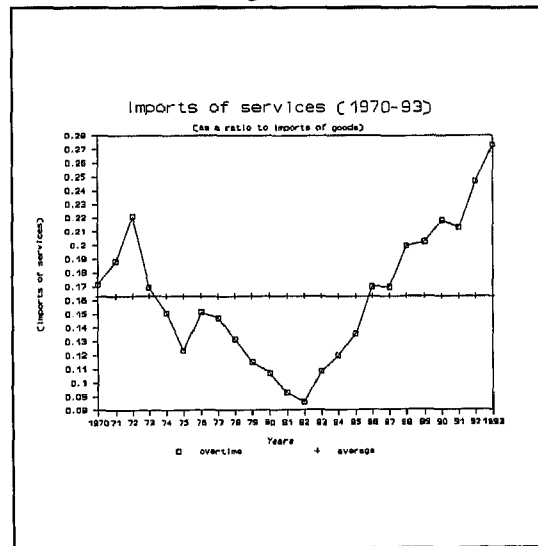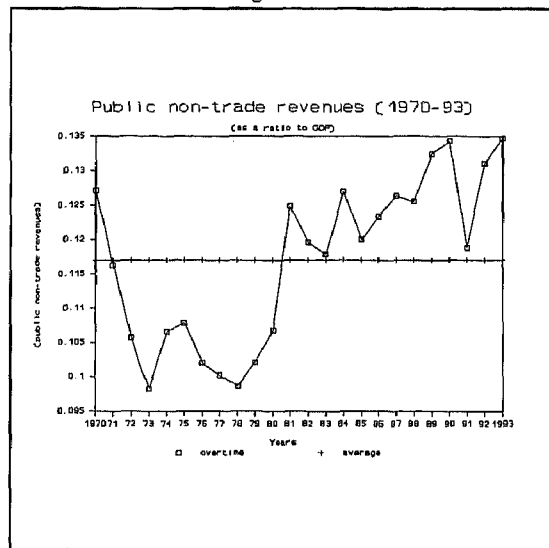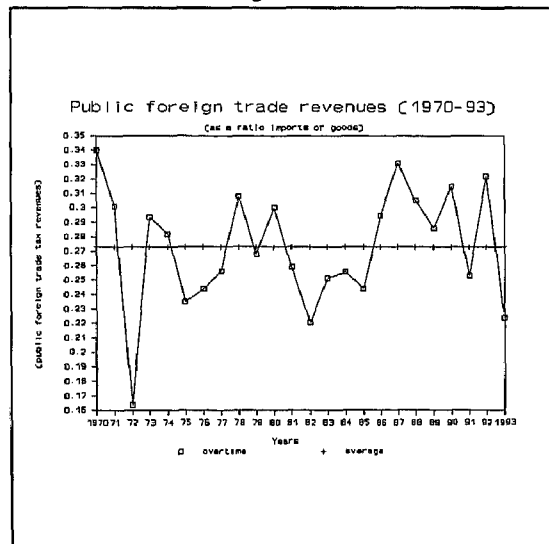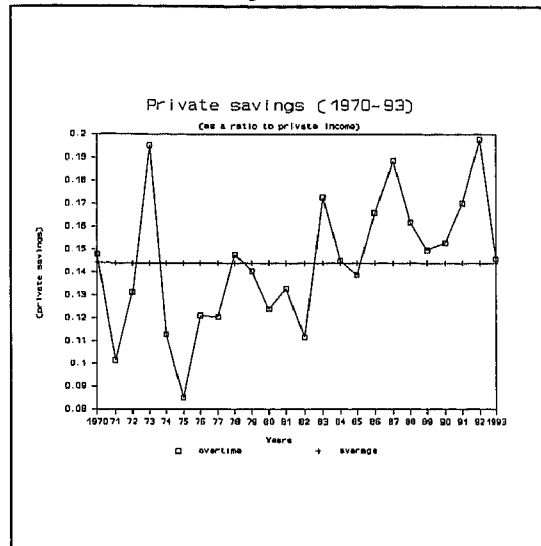
Figure 6.31
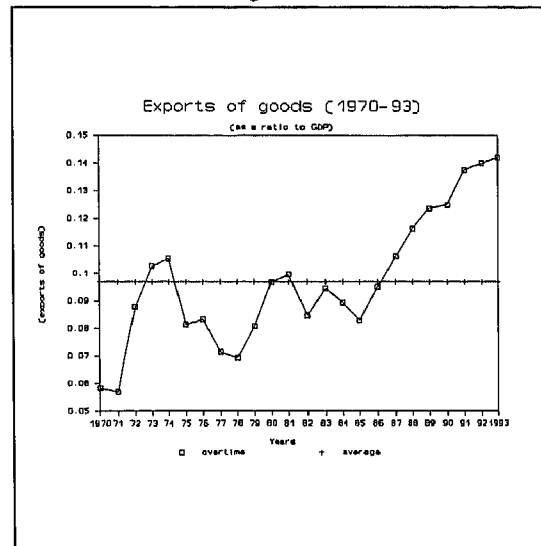
Figure 6.32

Figure 6.33
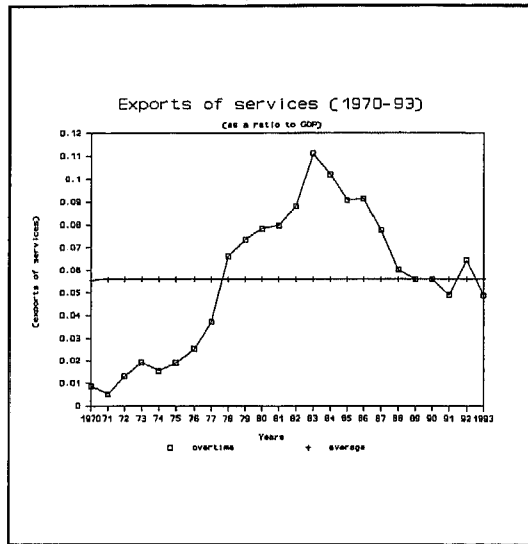
Figure 6.34

Figure 6.35

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Samenvatting (Summary in Dutch)

Hervormingen van structurele aanpassing, zoals voorgestaan door de Wereldbank en het Internationaal Monetair Fonds (IMF) zijn in Pakistan begonnen in 1980 en sindsdien is de economie beduidend meer naar buiten gericht, flexibel en meer markt-georiënteerd geworden. De aanpassingsprogramma's van de Wereldbank en het IMF hadden vóór alles de bedoeling om zowel een verscheidenheid aan macro-economische verstoringen, alsook een aantal diepgewortelde structurele problemen in de economie te boven te komen. Na meer dan een tiental jaren van intensieve hervormingen en aanpassingen kan er nog steeds geen overeenstemming gevonden worden over de effecten die deze hervormingen hebben gehad op de Pakistaanse economie. Hoewel er een aantal studies over deze kwestie zijn verschenen, lijden ze aan methodologische zwakheden en komen ze tot tegenstrijdige conclusies. In dit proefschrift is een poging gedaan om enkele van deze tekortkomingen in de bestaande literatuur recht te zetten om daarmee bij te dragen aan een meer adequate beoordeling van de hervormingen van structurele aanpassing in Pakistan.

Methodologische kwesties

(a) Beperkingen van de bestaande literatuur

Onze eerste zorg was om een overzicht te geven van het werk dat al was gedaan over het effect van structureel aanpassingsbeleid in Pakistan. Dit overzicht leidde ons tot een algemene conclusie, dat het bestaande onderzoek is uitgevoerd met gebruikmaking van zeer eenvoudige methoden zoals vergelijkingen "met-en-zonder" en "voor-en-na", dat wil zeggen een benadering die indicatoren van macro-economische prestatie tijdens de periode van programma vergelijkt met indicatoren uit de periode voorafgaand aan het programma. Het probleem met deze benadering is, dat die geen oog heeft voor alle andere variabelen

die de waargenomen uitkomsten zouden hebben kunnen beïnvloeden. Dientengevolge geven studies die gebaseerd zijn op deze methoden van onderzoek geen bevredigend antwoord op de vraag of aanpassingshervormingen de economische prestaties van de Pakistaanse economie wel of niet verbeterd hebben. Hier wordt voorgesteld, dat in plaats daarvan een methode vereist is die is gebaseerd op een macro-economisch model van de economie, dat gebruikt kan worden om simulatie-experimenten mee uit te voeren. De bestaande macro-economische modellen voor Pakistan, die zijn ontwikkeld door Naqvi e.a. (1982,1983,1986,1991,1993) bieden weliswaar een startpunt voor een dergelijke analyse, maar zij hebben ook bepaalde beperkingen. De reële wisselkoers bijvoorbeeld, die een van de meest belangrijke variabelen in geval van structurele aanpassing is, is niet opgenomen in de import- en export vergelijkingen. Deze macro-economische modellen negeren bovendien individueel spaargedrag waardoor de invloed van de binnenlandse reële interestvoet als beleidsvariabele teniet wordt gedaan. Deze macro-economische modellen schenken helemaal geen aandacht aan de modellering van de financiële stroomvariabelen. In deze modellen wordt bovendien overheidsconsumptie als endogene variabele gezien, terwijl overheidsconsumptie in dit proefschrift gezien wordt als exogene beleidsvariabele (in het bijzonder de component van overheidssubsidie als een van de speerpunten in structurele aanpassingsprogramma's). Vanwege al deze beperkingen, wordt in dit proefschrift een andere aanpak gehanteerd, gebaseerd op de recentelijk sterk in opmars zijnde drievoudige-kloof-analyse (three-gap analysis), waarvan in hoofdstuk 3 een overzicht wordt gegeven. Drievoudige-kloof-analyses houden rekening met de belangrijkste macro-economische sluitposten van een open economie en zijn reeds toegepast op een aantal ontwikkelingslanden. De bestaande drievoudige-kloof-modellen ontwikkeld door Bacha (1990), Taylor (1990b) en Solimano (1990) hebben niettemin ook enkele beperkingen. Op de eerste plaats worden in deze modellen een aantal sterke aannames gemaakt. Bacha neemt aan dat er geen buitenlands kapitaal naar de private sector vloeit, dat er geen markt is voor staats-obligaties, er geen vlucht is van particulier kapitaal, en dat de officiële reserves aan buitenlandse valuta constant blijven. Deze laatste aanname wordt ook door Taylor gemaakt, terwijl Solimano de vlucht van privaat kapitaal uitsluit. Op de tweede plaats wordt door Taylor en Solimano gekeken naar potentiële output, wat moeilijkheden geeft ten aanzien van het doen van schattingen. Op de derde plaats worden alle macro-economische variabelen gecorrigeerd voor een gezamenlijke inflatievoet. Op de vierde en laatste plaats, worden een aantal belangrijke economische elementen niet in de analyse meegenomen. De rol van het monetair beleid, interestvoet beleid, de model-

lering van de financiële stromen en wisselkoersbeleid (behalve in Solimano) zijn voorbeelden hiervan. Het model dat in dit proefschrift is beschreven gaat verder dan de bestaande drievoudige-kloof-modellen. In tegenstelling tot de bestaande modellen, waar uitgegaan wordt van de traditionele boekhoudkundige identiteiten, binnen de nationale rekeningen, is de aanpak in dit proefschrift gebaseerd op het raamwerk van een sociale rekeningen matrix (SRM). Het belangrijkste voordeel van een op SRM gebaseerde drievoudige-kloof-analyse is dat zo expliciet rekening gehouden wordt met alle belangrijke macro-economische sluitposten van de Pakistaanse economie. Bovendien, kunnen zo gemakkelijk beleidsvariabelen en externe schokken in de drievoudige-kloof-analyse worden opgenomen. De op een SRM gebaseerde drievoudige-kloof-analyse zoals die in dit proefschrift is uitgevoerd, geeft meer substantiële resultaten dan eerdere studies en draagt met name bij aan een meer systematische evaluatie van de invloed van structurele aanpassingsprogramma's op de Pakistaanse economie.

(b) Afleiding van het raamwerk voor de drievoudige-kloof-analyse gebaseerd op de SRM

Teneinde een drievoudige-kloof-model voor de Pakistaanse economie af te leiden, dat gebaseerd is op de SRM, gaan we tewerk in een aantal fasen. Hoofdstuk 2 begint met een analytisch raamwerk van twee- en drievoudige kloven in een open economie. We hebben getracht om een precies beeld te presenteren van de twee- en drievoudige kloven en hun dichting door de financiële stromen in een raamwerk van maatschappelijke rekeningen. De classificatie van verschillende rekeningen in een SRM is verdeeld in twee hoofdbestanddelen, namelijk "Alle Overige Rekeningen" en "Geldstromen". Het deel "Alle Overige Rekeningen" geeft een beschrijving van de kloof tussen de besparingen in de particuliere sector en de investeringen; de belastingkloof van de overheidssector en het tekort of overschot op de lopende rekening van de betalingsbalans van een economie. De financiële overdrachten tussen verschillende sectoren zijn we op het spoor gekomen door middel van het financiële-stromen-deel van de matrix. De rekening van financiële stromen toont aan hoe de besparingen van een sector worden verdeeld over investeringen in dezelfde sector en hoe het overschot wordt overgebracht naar de andere sectoren die een tekort hebben. In hoofdstuk 4 wordt het model van hoofdstuk 2 gebruikt om een consistente tijdreeks dataset voor de periode 1970-1993 voor Pakistan te krijgen, daarbij sterk gebruikmakend van de sociale rekeningen matrix. In hoofdstuk 5 wordt met behulp van de

tijdreeksgegevens een beschrijving gegeven van de ontwikkeling van de drie kloven (spaarkloof, belastingkloof en handelskloof) en de geldstromen in Pakistan over twee sub-perioden: 1970-1980 en 1981-1993. Door deze opdeling over de tijd is het mogelijk een vergelijking te maken tussen een periode zonder, respectievelijk een periode met structurele aanpassingsprogramma's. We zien dat het overheidstekort en het tekort op de lopende rekening van de betalingsbalans sterker zijn gedaald in de periode van structurele aanpassingen na 1980 dan in de periode ervoor. Bovendien vertonen de private besparingen, investeringen en het kapitaaloverschot een substantiële stijging in de periode 1981-1993 in vergelijking tot de periode 1970-1980. Wat betreft de samenstelling van de geldstromen zien we dat de verhouding tussen de gemiddelde hoeveelheid geld in omloop en het bruto nationaal produkt constant bleef, dat de groei van staats-obligaties toenam, dat de netto kapitaal toevoer naar de private sector (anders dan directe buitenlandse private investeringen) afnam, en dat de netto kapitaal toevoer naar de publieke sector en directe buitenlandse private investeringen aanmerkelijk toenamen tijdens structurele aanpassingen in vergelijking met de periode ervoor. In dit hoofdstuk wordt tevens gekeken naar de veranderingen in de aanpassingsprogramma's over de tijd en de externe schokken in de betreffende periode. Ten aanzien van de geselecteerde beleidsvariabelen kan opgemerkt worden dat er een drastische devaluatie van de Pakistaanse munt heeft plaatsgevonden. Verder is er sprake van een toenemende trend in de reële interestvoet in Pakistan, een substantiële reductie in overheidssubsidies, een toenemende IMF aanpassingslening, en een overheid die in toenemende mate op de binnenlandse markt leent in de periode van structurele aanpassingen. Deze veranderigen in beleidsvariabelen geven aan hoe de Pakistaanse economie heeft gereageerd op de aanpassingsprogramma's zoals die door de Wereldbank en het IMF zijn opgesteld. Hierbij moet opgemerkt worden dat de periode van structurele aanpassingen gekenmerkt wordt door vier externe schokken: ten eerste een dalende economische activiteit in de Golf-regio, ten tweede hoge buitenlandse reële interestvoeten, ten derde hoge olieprijzen en tenslotte een bijna voortdurende verslechtering van de ruilvoet.

In hoofdstuk 6 worden de belangrijkste elementen van een drievoudige-kloof-model voor Pakistan beschreven. Allereerst wordt een naïef model beschreven en geschat met behulp van tijdreeksgegevens voor de periode 1970-1993. Met behulp van dit model worden de simpele kwantitatieve verbanden geschetst tussen enerzijds de verschillende doelvariabelen, zoals het niveau van de reële output, overheids-, private en totale investeringen, private en totale consumptie, en anderzijds macro-economisch beleid (dat

wil zeggen totale export, buitenlandse kapitaaltoevoer naar de publieke sector en private sectoren, overheidsconsumptie en leningen van de overheid op de binnenlandse markt). De resultaten laten zien dat hogere exportopbrengsten en buitenlandse kapitaalinvoer een positieve invloed hebben op alle doelvariabelen. Aan de andere kant zien we dat een stijging van de overheidsconsumptie een negatieve invloed heeft op overheidsinvesteringen en bijgevolg ook op de totale investeringen. Vervolgens wordt een meer algemeen model beschreven en geschat. In dit model worden variabelen die in het naïef model als afhankelijk werden behandeld middels gedragsfuncties gespecificeerd. Met behulp van deze gedragsfuncties is het mogelijk beleidsdoelstellingen en externe schokken op te nemen. Vervolgens is het model veralgemeniseerd door de exporten van goederen en diensten niet langer als exogeen maar als endogeen te zien. In het meest algemene model dat hier wordt beschreven zijn bovendien ook de buitenlandse kapitaaltoevoer naar de publieke en de private sector als endogene variabelen verondersteld. In hoofdstuk 7 wordt getracht betrouwbare antwoorden te geven op de eerder gestelde vragen middels een aantal simulatie-experimenten gebaseerd op het in dit proefschrift ontwikkelde drievoudige-kloof-model. Met behulp van deze experimenten is een beter inzicht te verkrijgen in de gevoeligheid van de resultaten ten aanzien van structurele aanpassingsprogramma's of onderdelen daaruit en ten aanzien van externe schokken. De simulatie experimenten zijn uitgevoerd onder acht verschillende scenario's. De procentuele veranderingen in de geselecteerde beleidsvariabelen en de grootte van de externe schokken waarmee de experimenten zijn uitgevoerd zijn gebaseerd op de beleidsaanpassingen die daadwerkelijk zijn opgetreden, maar blijven natuurlijk enigszins arbitrair. De resultaten van de experimenten worden in de volgende paragraaf uiteengezet.

Samenvatting van de resultaten

Deze studie behandelt twee specifieke groepen van vragen. De eerste hoofdvraag die een aantal onderzoekers heeft bezig gehouden is of de aanpassingsprogramma's van de Wereldbank en het IMF tot op heden enig positief effect hebben gehad op de macro-economische prestaties van Pakistan (d.w.z. enig positief effect op exporten, importen, besparingen, investeringen, consumptie en bruto binnenlands produkt, waarvan de groei de voornaamste doelstellingen zijn van de programma's die door de Bank en het Fonds worden ondersteund). De tweede hoofdvraag die hier gesteld wordt is of en in hoeverre externe factoren het aanpassingsproces in Pakistan hebben verzwaard. Het doel van deze

studie is dienovereenkomstig geweest om op een systematische manier kwantitatieve bewijzen te geven van deze fundamentele kwesties waarbij de periode 1970 tot 1993 als tijdvak van waarneming wordt genomen. Met betrekking tot de eerste groep van vragen laten de statistische resultaten van de regressieanalyse en de simulatie toe de volgende conclusies te trekken:

(i) Depreciatie van de reële wisselkoers (een van de belangrijkste elementen in structurele aanpassingsprogramma's) heeft een positief effect op de export van goederen en een negatief effect op de import van goederen. Hieruit blijkt, volgens verwachting, dat er sprake is van een verbetering van het saldo van de lopende rekening. Uit de simulatie experimenten blijkt verder dat een reële depreciatie van de Pakistaanse munt een positief effect heeft op alle geselecteerde macro-economische doelvariabelen. Deze constatering ondersteunt recent empirisch bewijs, dat een reële devaluatie per saldo een expansief in plaats van een beperkend effect op de economie kan hebben.

(ii) Een verhoging van de binnenlandse reële intrestvoet blijkt een belangrijk monetair beleidsinstrument te zijn dat private consumptie ontmoedigt, en private besparingen en investeringen in Pakistan aanmoedigt. De simulaties laten zien dat een hogere binnen-landse reële interestvoet significante invloed heeft op het gedrag van alle belangrijke macro-economische variabelen. Deze resultaten zijn consistent met het beeld dat bij een onderdrukt financieel systeem zoals in Pakistan, binnenlandse besparingen toenemen bij een toename van de binnenlandse reële interestvoet door liberalisatie van de binnenlandse financiële markt. Een beleid welk zich richt op de reële interestvoet lijkt daarmee inderdaad effectief voor het bereiken van de onderliggende doelen van de structurele aanpassingsprogramma's.

(iii) Alle structurele aanpassingsprogramma's benadrukken het belang van een reductie in de overheidsconsumptie, vooral door het terugdringen van subsidies. Beperking van de overheidsuitgaven blijkt alle geselecteerde doelvariabelen positief te beinvloeden. Uit de regressie- en simulatieresultaten blijkt dat er twee kanalen zijn waarlangs een daling van de overheidsuitgaven het economisch systeem beinvloedt. Het eerste kanaal geeft een direct verband tussen de overheidsconsumptie en de overheidsinvesteringen. Het tweede kanaal zorgt voor een negatief verband tussen lagere overheidsconsumptie en de import van goederen.

(iv) De structurele aanpassingsprogramma's van de Wereldbank en IMF vereisen ook een minder actieve rol van de overheid in commerciële en industriële activiteiten, om zo de private sector aan te moedigen deel te nemen aan deze economische activiteiten. Tijdens het vorige regime in Pakistan, toen men een beleid van nationalisatie voorstond, is de private sector sterk ontmoedigd geraakt. Zowel de regressie- als de simulatieresultaten ondersteunen de gedachte van de Wereldbank dat een toename van kredieten aan de private sector als deel van de totale binnenlandse kredietvoorziening, welke dus ten koste gaat van de kredietvoorziening van de publieke sector, binnenlandse en buitenlandse private investeringen verhoogt, en bijgevolg economische groei op de langere termijn stimuleert.

(v) Een van de belangrijke vragen in deze studie is of specifieke leningen ten behoeve van de structurele aanpassingen de macro-economische prestaties verbeteren en of de overheid zo wellicht gemakkelijker in staat is het aanpassingsprogramma door te voeren. De empirische resultaten laten zien dat additionele leningen nodig zijn om de hervormingen te kunnen financieren. Alhoewel de Pakistaanse overheid zelf de aanpassingsprogramma's zonder de steun van de Wereldbank en IMF zou kunnen doorvoeren, zijn de effecten van de hervormingen in dat geval minder groot dan bij additionele leningen.

(vi) Tot slot, worden de structurele aanpassingshervormingen ondersteund door een geaggregeerde analyse van alle gekozen beleidsopties in een simulatie-experiment. Dit is in overeenstemming met het beeld van de Wereldbank en IMF dat Pakistan enkele juiste aanpassingen heeft doorgevoerd en daardoor hogere economische prestaties heeft bereikt. Ook McCleary (1991) heeft beargumenteerd dat de economische prestaties van Pakistan beter zijn geworden gedurende de aanpassingsperiode. Een belangrijke reden lijkt te zijn dat de Pakistaanse overheid zich sinds 1980 strikt gehouden heeft aan de voorgestelde hervormingen van de Wereldbank en IMF. Pakistan blijkt volgens Mosley (1991a) na Turkije in dat opzicht het meest meegaand te zijn uit een aantal van negentien landen.

Kort gezegd, geeft de kwantitatieve waardering van structurele aanpassingshervormingen aanleiding tot een drietal conclusies vanuit beleidseconomisch perspectief. Op de eerste plaats hebben de hervormingen, zeker ten dele, goed gewerkt vanwege de strikte naleving van het beleid. Op de tweede plaats, is het aanpassingsproces verzacht door de toenemende buitenlandse steun. Op de derde plaats, hebben de hervormingen de interne en externe onevenwichtigheden in de Pakistaanse economie gereduceerd.

Ten aanzien van de tweede vraag of, en zo ja in welke mate, externe factoren (zoals een verslechtering van de ruilvoet, een hoge buitenlandse reële interestvoet, stijgende olieprijzen, crisis in de Golf-regio) het structurele aanpassingsproces in Pakistan hebben bemoeilijkt, kunnen een vijftal conclusies worden getrokken.

(i) De empirische resultaten geven aan dat een verslechtering van de ruilvoet alle geselecteerde doelvariabelen negatief beinvloedt, vooral omdat hierdoor het saldo van de lopende rekening van de betalingsbalans van Pakistan wordt verslechterd.

(ii) Een stijging van de buitenlandse reële interestvoet, gezien als externe schok variabele, heeft een positieve invloed op alle geselecteerde doelvariabelen, dit in tegenstelling tot de algemene opvatting hierover. De buitenlandse reële rentevoet heeft met name een negatief effect op import van diensten en op kapitaalinvoer uit het buitenland naar de private sector en heeft een positieve invloed op de buitenlandse kapitaalinvoer naar de publieke sector.

(iii) De prijsindex van petroleum, ook gezien als een externe schok variabele, beinvloedt alle geselecteerde macro-economische variabelen negatief. De reden hiervoor is dat een stijging in de prijs van petroleum een daling van de export van Pakistaanse goederen tot gevolg heeft.

(iv) De laatste belangrijke externe schok factor die geanalyseerd is, is een daling van de economische activiteiten in de Golf-regio. We zien een sterk negatief effect op de doelvariabelen, omdat er dan minder geld door Pakistaanse werknemers in de Golf-regio overgemaakt kan worden naar hun families in Pakistan. Vooral aan het eind van de jaren zeventig en halverwege de jaren tachtig, vormde dit een belangrijk deel van Pakistan's betalingsbalans.

(v) Tenslotte geeft het gecombineerde effect van de vier genoemde externe factoren aan dat externe schokken, gemiddeld, een negatieve invloed hebben op alle doelvariabelen en derhalve economische groei hebben gereduceerd. Dit is in overeenstemming met Killick en Malik (1992), die aangeven dat in onverwachte externe schokken een van de belangrijkste oorzaken ligt voor het mislukken van aanpassingsprogramma's in ontwikkelingslanden.

De conclusie in dit proefschrift is, in brede zin, dan ook dat de structurele aanpassingsprogramma's van de Wereldbank en IMF de macro-economische prestaties van Pakistan substantieel hebben verbeterd. In het bijzonder blijkt aan de hand van simulaties, dat het inkomen met acht tot elf procent is toegenomen, terwijl ook de investeringen met achttien tot zesentwintig procent zijn toegenomen. Verder komt naar voren dat de negatieve gevolgen die geassocieerd worden met externe schokken, relatief klein zijn geweest tijdens het aanpassingsproces in Pakistan. Uit onze simulatie blijkt dat het gecombineerde effect van de schokken een daling van het inkomen tot gevolg heeft gehad van zo'n twee tot drie procent, en een daling van de investeringen met zo'n één tot vier procent.

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ZAFAR IQBAL received his MA degree in Economics from the Islamia University Bahawalpur (Pakistan) in 1983 and Master's degree in Economic Policy and Planning from the Institute of Social Studies, the Hague (the Netherlands) in 1990. He carried out his PhD research in economics at CentER, Tilburg University (the Netherlands) during 1992-1996. He is currently working at the Pakistan Institute of Development Economics, Islamabad.

This study addresses two specific sets of questions. The first main question that has occupied a number of researchers is whether the adjustment programs (advocated by the World Bank and the International Monetary Fund) have had any positive effects to date on macroeconomic performance (i.e. on exports, imports, savings, investment, consumption, and gross domestic product) in Pakistan. The second main question posed here is whether and to what extent external factors aggravated the adjustment process. The purpose of this study has accordingly been to provide systematic quantitative evidence on these fundamental questions, using 1970 to 1993 as the period of observation. We use a three-gap framework to explore the contributions to macroeconomic performance of the adjustment policy reforms and external shocks. The individual and collective effects of adjustment policies and external shocks are measured through a number of simulation experiments. The central finding of the study is that in broad terms, the adjustment programs resulted in a substantial improvement in macroeconomic performance of Pakistan's economy. Furthermore, the adverse effects associated with external shocks appeared to have been severe during the adjustment process.

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